Unmanned Aerial Vehicle Procurement Guide

SPECIFICATIONS, QUESTIONS, AND OTHER CRITERIA TO CONSIDER

GHSC-PSM, a USAID project, is working to explore utilizing Unmanned Aerial Vehicles (UAV) to move HIV/AIDS supplies and other health commodities through public health supply chains to serve hard-to-reach health facilities. The project is focusing this UAV initiative in rural settings with limited distribution systems and infrastructure that create gaps in servicing patients. GHSC-PSM will assess UAV technology by integrating UAVs into country supply chains to improve health outcomes through increased speed and access.

Purpose of this guide

Many organizations are determining how an UAV could be applied to their work. For those organizations moving to the next step of testing or implementing, the procurement of a UAV or UAV services is uncharted territory.

In an effort to contribute to the UAV community's knowledge base and prevent organizations from reinventing the wheel or starting from zero, GHSC-PSM would like to share our experiences to benefit others undertaking similar efforts.

GHSC-PSM developed this resource guide based on our experience in completing the UAV procurement process for cargo application. This guide provides:

- A list of general considerations for evaluating manufacturers.
- A thorough list of specifications and relevant questions for inclusion in a request for proposals (RFP). This structured approach will help you easily compare and analyze UAV companies and service providers to determine the most qualified and ensure they meet organizational needs.
- A sample short list of recommended criteria to use when visiting manufacturers or attending demonstrations.

We Want to Hear From You

GHSC-PSM is dedicated to sharing information and collaborating with the greater UAV community. All those pursuing the application of an UAV have valuable experiences and lessons to share. This UAV procurement guide is meant to be a living document that we will update periodically with the UAV community's contributions.

To that end, please contact with your feedback:
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The USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project works to ensure uninterrupted supplies of health commodities to save lives and create a healthier future for all.

GHSC-PSM is implemented by a Chemonics International-led consortium. To learn more, visit ***ghsupplychain.org****.*

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General Considerations When Evaluating Manufacturers

Platform	Capabilities and design of the UAV, and required infrastructure
Flight System	Ease of use and robustness of the flight software system
Flexibility	Manufacturer's willingness to make adjustments to meet your needs
Evolving Technology	Manufacturer's vision and ability to innovate and improve on their technology
Staff Availability	Manufacturer's availability to participate in the various phases of the project (regulatory approval, set up, training, flight operations, etc.)
Partnership	With the current level of maturity in the sector, the organization/supplier relationship will be more of a partnership than a one-off procurement. Personalities, vision, and approaches should be considered

Manufacturer Visits Are Critical

Since manufacturers often provide prototypes or newly released technology, visits are critical to ensure their claims can be demonstrated. Visits are also an opportunity to get to know senior management and staff, and to determine if there is potential to form a good working relationship. In addition to confirming specifications provided in a proposal, GHSC-PSM recommends having the manufacturer carry out a demonstration that is aligned with the purpose for which the UAV will be used. It is also recommended that visitors interact with the UAV in: assembling/disassembling, flight planning, carrying, loading/unloading, battery changing, etc.

RECOMMENDED SPECIFICATIONS

This table provides specification recommendations that organizations can use when procuring UAV services.

	SPECIFICATIONS	NOTES
UAV (HARDWARE) STRUCTURE & DESIGN	Type	Indicate if the model or models include motor, fixed-wing, or hybrid (VTOL). Indicate what year model was created. Include pictures and design drawings of the UAV.
	Propulsion system	Indicate manufacturer and model used. Indicate how all essential elements of the propulsion system are reliable and meet commercial standards.
	Ergonomics	Describe how the design minimizes the chances of human error.
	Dimensions	Indicate the physical dimensions of the UAV and the box used to transport the UAV.
	Weight	Provide the weight of the UAV including batteries, the maximum take-off weight, the UAV's weight when empty, and the weight of the box used to transport the UAV.
	Movement, transportation	Indicate the number of people typically required to manually move the assembled UAV from one position or location to another.
	Flight Controls	Describe how flight control design provides continuous control of the UAV by means of a controller unit whose display provides unambiguous operations and clear indications of UAV flight status both in autonomous and manual modes.
	Power Source	Indicate if the platform is powered by battery, fuel, or a hybrid of energy sources. Also indicate what type and number of batteries or fuel are required.
	System power/electrical load	Indicate maximum electrical load factor, system management during power failure, etc.
	UAV control station/remote pilot station and ground support equipment	List and describe any additional ground support equipment to be utilized.
	Navigation system and data link	Describe ability for continuous monitoring, signal strength monitor, protection against signal failure, etc.

	SPECIFICATIONS	NOTES
UAV (HARDWARE) STRUCTURE & DESIGN	Infrastructure and Equipment	Identify other equipment that is necessary for flight operations in addition to the UAV and tablet/ computer/controller.
	Imaging/Mapping Camera	Indicate whether it is possible to attach a camera to the UAV. If so, is it easily attachable/detachable?
	POV Camera	Is a point of view (POV) camera already a part of the UAV hardware, or is this an optional addition to the structure? Is it possible to connect with 3G or 4G networks to provide a live video feed?
	Replacement parts	Indicate whether replacement parts are commercially available. If so, which parts are and are not? What are the costs of replacement parts?
	UAV Communication	On which frequency is the UAV communicating? How is communication managed beyond visual line of sight? Is it possible to communicate with the UAV using 3G or 4G as well as manage navigation?
SOFTWARE DESIGN	Flight logs	Describe the software capabilities to log flights and store flight data. How is the data transmitted from the flight system?
	Flight planning	Indicate the software used for planning and programming flight paths, whether custom-built or commercially available.
	Automated return feature	Describe how the UAV is prepared for return after it lands at the target site and whether the UAV has an automated return feature.
CONSIDERATIONS SPECIFIC TO CARGO-CARRYING UAV	Payload capacity	Describe maximum payload capabilities (weight) for the distances the UAV is able to travel. Provide a table illustrating the trade-off between distance and payload capacity.
	Cargo hold	Describe the physical dimensions and volume of the cargo holding space. Is the hold internal or external? Can the cargo hold be customized? What is the maximum weight the cargo area holds? Include pictures of the cargo hold.
	Configuration options	Indicate whether the UAV can hold a large camera or monitoring device (such as LiDAR or a sensor).
	Cargo placement	Indicate any requirements for balancing the cargo. Does the UAV require counter weights, or specific cargo placement in the hold?
	Cold chain capabilities	Indicate whether there is an option to insulate the cargo hold and/or monitor temperatures internally.
	Cargo hold capabilities	How is payload delivered? Is it directly accessed by the recipient? Can UAV land and leave cargo behind? Can UAV release cargo while flying? How does payload attach/detach? Is it dropped and left behind, or opened manually and potentially repacked?
PERFORMANCE CHARACTERISTICS	Maximum altitude	Indicate maximum altitude from ground and sea level, as well as the cruising altitude.
	Maximum range	Indicate the maximum flight range. Note some general parameters for how the range is affected by altitude, payload, and battery life as applicable. At a minimum provide maximum ranges at these altitudes for each 1, 2 and 5 kg: 1. Sea Level; 2. 1000 m ASL (above sea Level); 3. 2000 m ASL.
	Performance envelope	Indicate the performance envelope through a written description or graphic.
	Airspeed	Describe the airspeed necessary for take-off, cruise, landing, and stall maximum airspeed.
	Maximum rate of climb	Indicate the maximum rate of climb.
	Maximum rate of descent	Indicate the maximum rate of descent.
	Maximum bank angle	Indicate the maximum bank angle.

	SPECIFICATIONS	NOTES
PERFORMANCE CAPABILITIES & LIMITATIONS	Turn rate limits	Indicate the maximum turning rate.
	Environmental endurance	Describe UAV performance limitations due to environmental and meteorological conditions (e.g. wind, ice, humidity, temperature, rain, hail).
	Take-off and landing	Indicate required distances and/or surface areas required for take-off and landing. List any equipment required, such as catapult or net, or the need to be thrown. Also include the measurement between the landing gear and the body of the UAV.
	Autopilot	Describe autopilot type, manufacturer, and working method.
	Navigation systems	Describe all components, together with horizontal, vertical position, and velocity accuracy.
	GPS Technology	Describe the use of real-time kinematic (RTK) or post processed kinematic (PPK) GPS systems for improving performance positioning. Is RTK or PPK GPS system an option?
	Sensors and/or telemetry	Describe the controls on the UAV controller, sensors, computers, and actuation parts necessary to control the UAV. What systems are in place for continued control of the UAV in the event of a propulsion or power generation system failure?
EMERGENCY PROCEDURES FOR SYSTEM FAILURES	Briefly describe procedures for documenting and handling each of the following scenarios, if applicable.	Loss of autopilot
		Loss of flight control due to server failure
		Loss of propulsion power
		Loss of engine power (one engine out)
		Low battery voltage
		Loss of navigation components (heading or altitude)
		Loss of Global Navigation Satellite System
		Loss of data link (radio control link failure)
		Remote pilot station communication failure
		Loss of power at remote pilot station
		Loss of remote pilot/UAV observer communication
		Structural damage to UAV
	Flight control surfaces and actuators	Note: The UAV flight management system shall include the controls on the UAV controller, sensors, computers and actuation parts necessary to control the UAV. Any single failure of the flight control system should not affect the functions to control UAV recovery.
	Failure modes or scenarios other than those listed above that can endanger safe flight shall be identified, described, and managed in a safe manner.	
HAZARD CONSIDERATIONS AND FAILSAFE FEATURES	Identification of UAV functions	Describe how indications and warnings necessary to ensure safe control of the UAV flight path, including collision avoidance, are available in real time with continuous data transmission and with a high level of protection against hacking.
	Identification of degradation and failure conditions	Describe how the UAV system provides immediate notification of a system failure.
	Management and mitigations of the failure conditions	Describe how the UAV would automatically switch to an alternate or degraded mode of operation.
	A list of alarms and methods for troubleshooting	Describe how the UAV system software monitors and identifies safety critical aspects.
	Flight termination	Describe the fail-safe system which provides recovery to a predetermined recovery area with programmable capability for maintaining safe flight control or operation within design parameters.
	Location of all air data sensors, antennas, radios, and navigation equipment with respect to segregation and redundancy	Include a drawing of the UAV with the locations identified.

QUESTIONS FOR OFFERORS

These are additional questions that organizations can consider integrating into RFPs and writing into scopes of work for UAV services.

QUESTIONS	NOTES, FOLLOW-UP QUESTIONS
Personnel	
Does the offeror have pilots on staff?	If so, how many? Describe the experience and licenses of the pilot(s).
If requested, what would be the availability of pilots on staff to assist and oversee flight operations?	If requested, how many staff would the offeror request to have on site overseeing flight operations?
What is the offeror's company structure?	How many staff members are there? How many are full-time versus part-time consultants? Who would be responsible for liaising with the company extending the RFP? What would their availability be during the time of the proposed activities? Describe the staff's maintenance and production experience.
Relevant Experience	
Has the offeror ever participated in a certification or approval process with a country outside of their own?	How long did this process take and where?
Has the offeror ever participated in a UAV activity?	Describe the activity or activities. What was the duration of the activity and what were the outcomes?
Has the offeror ever participated in culturally appropriate community outreach and education programs in developing countries?	
Has anyone outside the offeror's company or organization ever operated the UAV independently?	Where and in what contexts is the UAV currently used?
Operations and Maintenance	
Does the offeror manufacture the UAV?	If so, is UAV manufactured in-house? What is order and production lead time?
Does the offeror produce their own UAV replacement parts or order them from other companies?	Does the offeror maintain a stock of available replacement parts? What is the lead time required to order various replacement parts?
What data is available on the operation and maintenance requirements of the UAV?	
Are there written SOPs for various stages of flight (e.g. pre-flight checklist, in-flight checks)?	
How many flights has the proposed model completed (testing/in-service)?	What was the distance and duration of flights? What modifications were made as a result of the analysis of the flight and of previous flights?
Can the offeror provide the option to lease the UAV or must it be purchased outright?	
What is the process to change the battery?	Can it easily be completed by untrained staff? How long does it take?
Are there different sets of rotors for takeoff/landing and forward flight?	If so, why?
What is the lead time for availability and delivery of a UAV from the time the order is placed?	What is the production capacity per month?
Technical Specifications & Training	
Is the UAV commercially available?	For which applications is it commercially available? When did it become available? How many units have been sold?
Does the offeror have a training curriculum for pilots/flight operations?	Is it theoretical or practical training? Does successful completion of training result in officially recognized certification or license?
What is the flexibility in the design of the cargo area?	Is the offeror willing and able to adopt the design of the cargo hold to meet the needs of the proposed activities?
What is the amount of time required to assemble or disassemble the UAV?	Can this be done by untrained staff? What tools are required?
Can the offeror demonstrate power or fuel consumption over the course of a flight (e.g. during takeoff, during continuous flight, during landing procedures)?	What is the battery or fuel consumption required for each take-off and landing?
What is the offeror able to demonstrate during a manufacturer visit? (keeping airspace regulations in mind)	
If battery-powered, what is the type and size of the battery used?	If for a cargo-carrying UAV, do the batteries take up space in the cargo hold?

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