

The buildup is still in full force, but USAF is already pondering what's next for its remotely piloted fleet.

The New Normal for RPAs

Photo illustration by Erik Simonsen

By Marc V. Schanz, Senior Editor

Among the many cultural and operational shifts experienced by the Air Force in the last decade, the transformation of its intelligence-surveillance-reconnaissance enterprise is one of the most significant. The explosion in capability was largely aided by the growth and expansion of remotely piloted aircraft, primarily the MQ-1 Predator, MQ-9 Reaper, and the RQ-4 Global Hawk.

The adaptable and persistent Predator and Reaper aircraft particularly have come to define a range of air operations in Southwest Asia since 2001—from quick-response close air support to persistent surveillance of militant groups or high-value targets. “This is an exciting time to be in the ISR business,” said Brig. Gen. Mark W. Westergren, the director of strategy, plans, doctrine, and force development for the Air Staff’s ISR shop (A2), during a talk at an August defense conference in Washington, D.C.

But as the US shrinks its footprint in Southwest Asia, USAF’s RPA force will have to tackle several tasks as it normalizes operations, while still pushing toward achieving at least 65 combat

Artist conception by Erik Simonsen

Above: A Predator armed with Hellfire missiles prowls the sky. Here: An artist's conception of the future MQ-X advanced remotely piloted aircraft.



air patrols of coverage in the US Central Command region.

In 2009, Lt. Gen. David A. Deptula, then head of the Air Force ISR efforts, released a plan for transitioning to a more integrated, compatible, and modernized unmanned aerial vehicle force—a UAV flight plan—laying out steps the service should take all the way to Fiscal 2047. Emphasis in the document was placed on building a “system” of capabilities; developing payloads, networks, and processing tools for the scads of information flowing into ISR networks; building more modular systems with standard interfaces; and improving automation to reduce the large manpower footprint the mission has developed over the past several years.

A Million Hours

Of course, the document stipulates in its opening section that these goals must be achieved within USAF budgetary constraints—pressures that have grown steeply in the past year.

Older systems must be modernized, many of which were built for the immediate needs of Iraq and Afghanistan, and some of these assets will shift to operations here in the United States at their home stations (something not seen since 2001 due to war demands).

Planners and ISR officials are also concerned about how a force of almost all defenseless, legacy RPAs will operate in an environment less permissive than Afghanistan or Iraq.

Modernization plans are getting a close scrub as well—especially the Air Force’s MQ-X next generation RPA. The Air Force, in light of the current budget picture, has delayed the acquisition of an MQ-9 Reaper replacement aircraft several years until at least 2018.

Modern warfare is now all but inextricably linked with the ISR and strike capabilities RPAs bring to the battlefield, officials say. The entirety of the Air Force’s ISR efforts have evolved from taking “snapshots” of areas, to being able to develop complex “patterns of life” via streaming imagery, signals intelligence, electronic intelligence, and a host of other sources—gathered from airborne platforms such as RPAs, then sent to troops in combat or collated and fed back to distributed ground systems, Westergren noted. Combat ISR hours have grown upward of 3,000 percent in the last decade, he said. In 2011 alone, USAF ISR assets—from the MC-12 Liberty to Predators to JSTARS and

Artist photo and illustration concept by Erik Simonsen



An MQ-9 Reaper is equipped with Gorgon Stare, an Air Force wide-area surveillance sensor system.

the U-2 fleet—had flown about 350,000 hours as of August.

Unmanned systems are central to this trend (Westergren noted RPAs alone have amassed nearly a million combat hours since 2001). Now we need “a whole rack of sensors. ... We have different targets, we have moving targets, we have targets that are mixed in with civilians,” Westergren said. Modern counterinsurgency would be nearly unthinkable without the sensors and awareness RPAs give commanders.

All of this growth does not appear to be slowing and has come with its pains, noted Randall G. Walden, the director for information dominance programs in the Office of the Assistant Secretary of the Air Force for Acquisition. Walden, who oversees acquisition strategy and decision-making for a range of ISR and command and control programs, said the insatiable demands of the Afghan battlefield have created “complexities” with trying to deliver that much ISR—from sensors to communications tools to processing, exploitation, and dissemination (PED) both in theater and across the globe via the Air Force’s Distributed Common Ground System

(DCGS)—at 45 geographically dispersed sites.

“There are challenges with each of those [elements],” he said during the panel on RPA modernization at the August Washington conference sponsored by the Association for Unmanned Vehicle Systems International.

But after several years on the front burner, the Air Force’s RPA force structure is filling out, thanks to large purchases over the last decade. As of August, the Air Force had received its full complement of 268 MQ-1 Predator aircraft, and is proceeding toward its planned transition to an all-MQ-9 Reaper force.

“The procurement of [this fleet] ebbs and flows, but right now the max we’re planning [buying] is 48 a year,” Walden said. As of August, USAF had received 79 of a planned fleet of around 400 airframes—and Reapers are flying an equivalent of 57 CAPs in theater.

The Air Force is also planning to buy 55 RQ-4 Global Hawk high-altitude ISR aircraft in the next several years. Many Block 20 aircraft are currently flying in theater now, supporting communications relay activities, in addition

to six CAPs of the multisensor Block 30 airframes.

Air Force RPA demands will require about \$20.4 billion in unmanned aircraft purchases through Fiscal 2020, according to a June Congressional Budget Office report—breaking down to \$7.3 billion for Global Hawks and \$13.1 billion for Reapers and their follow-on aircraft.

Out-year spending remains in flux, however. USAF had initially planned on starting to replace MQ-9s in 2014, but money concerns and shifting requirements have pushed the time frame to the right. As of July, the Air Force had not definitively clarified the new schedule for initiating the MQ-X program, but long-term acquisition plans anticipate a new unmanned aircraft would enter production in 2017.

Asked about what direction the program could take in a future analysis of alternatives, Walden did not specify but suggested the Air Force is thinking long term. The MQ-X is a set of requirements looking at a more developed threat. “Where we are today is meeting current warfighter needs; there is a great emphasis on the CAP delivery,” he said, as USAF pushes to the 65 CAP number. Today, the program is closer to the start of an analysis of alternatives, he added.

“Clearly, you’d like to have better sensors on some of these platforms that we’re buying,” Walden said, describing some of the requirements being examined for a successor RPA. The Reaper, for example, began as a follow-on for the Predator, but can now carry a diverse range of payloads, such as weapons and the Gorgon Stare—the Air Force’s wide-area surveillance sensor system. Its second increment will incorporate tracking algorithms as part of Argus, tools developed by the Defense Advanced Research Projects Agency.

USAF acquisition and ISR planners are working on how to get more capability, for little additional cost. In the June CBO report, several alternative procurement options were presented for a follow-on system, such as potentially scaling back the near-term MQ-9 Reaper buy by approximately 336 airframes in favor of the more advanced MQ-X project. “Although the option would yield a smaller inventory of multimission unmanned aircraft, the force’s total payload-duration would remain about the same, relative to current plans,” the CBO argued, noting speed and payload advantages would compensate for a smaller inventory.

Modernization with RPAs will be tricky, Westergren and others said, because the Air Force is trying to find the “knee in the curve” of cost versus capability. Technology will help down the road, Westergren said, but right now USAF is trying to build as much of a consistent presence with its current systems as it can.

Any future MQ-X system, as postulated by CBO and others, would be jet-engine powered—allowing greater speed—and have stealthy features to help it operate in defended airspace, though the amount of stealth involved in the project would greatly affect cost, CBO pointed out.

Seeking Normalized Access

“If you are going against a threat that is trying to counter you, you are going to want to leverage the tech you have today, … and over time you want to standardize it,” Walden said of RPA force modernization. The Air Force wants to get to universal interfaces and “plug and play” tools with the unmanned fleet, much as universal interfaces with weapons were introduced to fighters years ago.

Over the last several years, driven by combat commander requirements, sensor capability in electro-optical and infrared (EO/IR) areas as well as hyperspectral imagery use has grown, and with more capability, greater demand is created from the battlefield, Walden said.

With tools such as synthetic aperture radar and ground moving target indicator systems, both analysts and commanders are getting greater fields of view and better resolution of the environment they are operating in. “When you do those things, you need a lot more bandwidth to move that data,” Walden noted. “You also need to move that data off platforms, … but you can’t ship it all. So how do you turn it into something meaningful for the folks on the ground?”

Walden said USAF is putting a lot of effort into finding ways to get more onboard processing capabilities onto Predators, Reapers, and Global Hawks in the next several years, while making new sensor tools lighter and less unwieldy. With greater onboard processing power, the strain on comm networks and bandwidth will be partially alleviated, allowing valuable Internet Protocol data to be transformed into useful information.

Today, the Air Force is developing “expeditionary PED” technology to move away from narrow, stovepipe

solutions, Walden added. Data such as full-motion video must be “tagged,” so it can be leveraged and catalogued by DCGS analysts for building a more developed ISR picture. The aerospace industry, for its part, is helping USAF open up architectures to drive improved data network standards, Westergren said. This way, when USAF tries to bring on newer systems, or evolve current ones, it stays in sync with other capabilities. “We have to have folks around the world get the data, see the data, and tag the data,” Westergren said.

Aside from the hardware, the Air Force and the Department of Defense are also pushing hard to work RPA operations into domestic airspace in the next several years. This would aid and standardize remotely piloted flight operations much like the rest of military aviation. “We want to get to normalized access, … just like general aviation,” said Steven Pennington, the Air Force’s head of logistics, training, and airspace integration efforts, noting he wants to help build a “highway for civil operations” for unmanned systems.

“We certainly don’t do that regularly today,” he said during the August conference, adding that RPAs must get certificates to operate in civil airspace from the Federal Aviation Administration. The problem will be more acute soon, he said, as the US draws down forces in Afghanistan.

“What’s going to happen is, we are buying more [of these systems], but we are bringing a bunch of them home,” Pennington said. “You have to be able to operate and train with them.”

In the near term, DOD and the FAA want to experiment with ground-based sense and avoid technology, such as radars and air traffic controllers, Pennington said, using data links to connect the pilot to controllers. In the long term, automatic sense and avoid broadcast tools will be used to compensate for not having human eyeballs in the cockpit—and such technology could dramatically mitigate risk.

To move forward with the initiatives, though, the FAA must be funded to continue its experimentation along with DOD, Pennington added, as there are currently discussions for up to 10 RPA test sites to test operations in civil airspace. Pennington said the sooner the Air Force can demonstrate that RPA operations do not threaten the other aircraft in domestic airspace, the sooner “we can get to a highway.” ■