Aperture

By John A. Tirpak, Executive Editor

Pilotless futures; Modular airplanes; Strategic agility; Invisible jammers .....

SEEING VISIONS

The Air Force will soon roll out a series of roadmaps and "visions," Chief of Staff Gen. Mark A. Welsh III said in March. They will all connect to a guiding single master plan due to be released next month.

The master plan will be called "Strategic Agility" and will govern hardware and operations concepts ranging from remotely piloted aircraft to mobility to fighter recapitalization to intelligence, surveillance, and reconnaissance, and many others. Such a unifying strategy is something USAF hasn't had "for nine years," Welsh said in a speech at the Center for Strategic and International Studies in Washington, D.C.

The new document is urgently needed and has been in the works for a year, Welsh said. During the wars in Iraq and Afghanistan, the Air Force was awash in cash earmarked for capabilities specific to those conflicts. Now, the spigot has been turned off—abruptly and forcibly—and USAF finds itself ill-practiced and ill-prepared for "full-spectrum conflict," Welsh said. USAF must align its capabilities with the expected funds available to achieve them, he added.

The existing plan "for the mid-20s and beyond is a pipe dream; we can't afford it," Welsh told CSIS attendees. The service has to get busy defining its top priorities so that nothing the Air Force knows it will have to be able to do in 2023 falls to budget cuts or inattention, he said. The new plan will be "fiscally informed," and anything new will have to displace something else within a servicewide portfolio.

"If you go above that line, you can't add it," he said. Even so, it will still be "threat-based ... rather than resource-based."

A 30-year "call to the future," Strategic Agility is the next logical step in the continuum of Air Force guiding concepts stretching from strategic bombardment in the 1940s through nuclear deterrence, AirLand, counterinsurgency, parallel warfare, and global vigilance, reach, and power, Welsh explained. The new name means flexibility in decision-making, resourcing, and acquisitions; how USAF will respond to both conflicts and disasters; and "how you deliver weapons on the battlefield."

The plan will include a prominent threat assessment and explain how the Air Force will cope with those challenges. It will also explain how USAF fits in with the other services—specifically, the core functions that it alone masters and provides to the overall strategic picture and that the other services depend on USAF to provide. Other aspects will include "human capital development, training, and education" and a research and development component that will be a roadmap to get USAF to the hardware it must have circa 2030-50. There will be 13 smaller roadmaps in all.

Rather than a document that is put on a shelf and ignored "until the next one comes out," Welsh envisions Strategic Agility as "something that lives and breathes" and is constantly debated and revised. There will be an update every two years and a total rewrite every four, he said.

THE RISE OF BLACKTRON

One of the things that likely won't get a long page count in the publicly releasable version of Strategic Agility, however, is the electronic warfare/electronic attack element. At a Pentagon press roundtable shortly after the Fiscal 2015 budget request was forwarded to Congress, USAF's top planner, Maj. Gen. James J. Jones, brushed away most questions about EW/EA, a contest that Pentagon acquisition, technology, and logistics chief Frank Kendall recently said was virtually a dead heat among the US, China, and other countries.

Jones repeated the Air Force's oft-stated assertion that it will mostly rely on the stealth of its fifth generation aircraft and the Navy's EA-18G Growlers to survive the intense electromagnetic battlespace of the future. The Air Force will also up its inventory of Miniature Air Launched Decoys and their MALD-J jamming variant, he said, and conduct an upgrade of the ALQ-131 self-protection pods and other such gear. He was silent, however, on the subject of USAF's own plans for large-scale, theater jamming and EW/EA.

While he did allow that the F-35 will include "sophisticated" EW/EA features in the initial and subsequent blocks, Jones would not elaborate on them.

Asked about an EW/EA roadmap, Jones admitted, "There are things in the black world"—top secret—that will have a bearing on it.

The Air Force has in recent years held Industry Days to discuss the future of its EW/EA capabilities, but these have been closed to the public. On the agenda for some of these meetings, however, has been a "Penetrating Stand-In Airborne platform.

NO MAN'S PLAN

The "United States Air Force RPA Vector," which spells out the service's vision for remotely piloted aircraft through 2038, boils down to this: Unmanned vehicle technology is moving really fast, and the service needs to hurry up and

Illustration by Erick Simonsen

Global Hawks figure in USAF's future.

develop operational concepts that can take advantage of it. At the same time, though, it's clear that unmanned systems are going to be a huge part of USAF's future, and certain enabling concepts and technologies must be developed right away to ride the crest of this new wave.

The state of RPAs today—their technology and operational concepts—"are like where airpower was in World War I," said Col. Kenneth Callahan, director of USAF's RPA Capabilities Office. At an April press conference to roll out the 100-page document, subtitled "Vision and Enabling Concepts 2013-2038," Callahan said the military "has this new capability … and now we have to figure out what to do with it."

Of course, USAF has been employing the MQ-1 Predator RPA and others like it for nearly 20 years, but today's versions have far more endurance, are armed, and have greater capability in terms of sensors and range. The next generation, though—and it will be needed quickly—will have to operate in contested airspace. Air Force RPAs will have to be stealthy and capable of swift autonomous reaction to pop-up threats using artificial intelligence and without necessarily relying on human operators.

The vision encompasses large RPAs, such as Predator, Reaper, and Global Hawk, smaller vehicles that can be launched out of a backpack, and even micro-RPAs for use at the squad level up to the national level. These micro-UAVs will operate "inside buildings, canyons, and caves" and on the battlefield.

The roadmap is the second the Air Force has released on this topic; the first was unveiled in 2009, and future updates are promised every two years or so. This version only obliquely mentions the RQ-170 Sentinel, a stealthy flying wing-type aircraft that has been used in Southwest Asia (and one of which crashed in Iran) acknowledging only that it is, in fact, a remotely piloted aircraft and not an autonomous, i.e., self-directed, platform. Callahan would not discuss the RQ-170, saying that while it is an Air Force system, it is "not in our portfolio" at the RPA Capabilities Office.

Callahan described the roadmap as "our strategic enterprise vision" of what has to happen not only in RPA design but in the support and enabling technologies that need to be developed, such as reducing the number of personnel needed to launch, fly, and recover the aircraft and accelerating the rate the data they gather can be analyzed and applied in a rapidly unfolding mission. Similarly, strides must be made in reducing or compressing the bandwidth RPAs need to communicate across a broad network of unmanned and manned craft and to be more capable of action on their own if data links are lost through jamming or communication equipment failure.

"People focus too much on the platforms," Callahan said, observing that the actual shapes and characteristics of the RPAs themselves will be secondary to the communications and network "architecture … that makes it possible" to employ them. The underlying structure will be the first priority. USAF will build on the existing structure, but it will also go beyond it, because the existing RPA architecture grew up during wartime and in the most expedient manner—not necessarily optimized for institutional use, according to the report.

MIX 'N MATCH

That said, RPA vector clearly spells out that the next generation of RPAs will likely be modular, with interchangeable payloads to take on roles in intelligence, surveillance, and reconnaissance; attack and interdiction; suppression/

destruction of enemy air defenses; electronic warfare/electronic attack; delivery of cargo; and even dogfighting. In short, everything now done by manned platforms.

Callahan wouldn't speculate on the future ratio of manned-to-unmanned platforms in the Air Force of 10, 20, or 30 years from now, but said RPAs will increasingly be an adjunct to all missions. The vector describes a vision of the "loyal wingman," an RPA that flies near or alongside a manned aircraft, providing additional capabilities in the form of jamming or extra weapons. F-22 pilots have said they could be even more dominant in air combat, but they just run out of missiles too quickly. Callahan said there are no plans on the books yet for an aircraft that would actually escort an F-22 and match its aerodynamic capabilities, but a definite possibility could be a stealthy aircraft, flying well ahead of a flight of Raptors, that could launch weapons cued by the F-22s, he said.

A similar escort capability could conceivably be applied to a nonstealthy RPA like the MQ-9 Reaper, he added.

"The technology to do that is here," he said. "We just don't have the conops [concept of operations] yet."

He also said the MQ-9 will probably be "continually updated" and evolve with different configurations of wings, fuel tanks, weapons, and sensors. Emphasizing the need for modularity in the next generation, the report notes that, to meet urgent combat needs, "more than 20 uniquely configured MQ-9 aircraft" were built—a pattern that is "logistically unsupportable" in the future.

Modular interfaces are already being developed that will make sensors, payloads, and weapons alike interchangeable between RPAs and combat aircraft, according to the RPA vector. This, it is hoped, will save on integration costs and speed the development of new machines that must make use of existing payloads. The next generation of RPAs will also have to be able to fly in adverse weather, at least to the degree that manned aircraft can today, and function as well in "day or night conditions, jamming, areas of dense foliage/vegetation, [and] enemy obscuration."

For high-altitude applications, enabling technologies could include "regenerative and energy-harvesting … technologies," such as solar power, that would allow relay craft or ISR platforms to remain on station for "several weeks or even multiple years of endurance." Such motor and energy technologies are a priority, as is developing the ability for "station-keeping in winds."

Near-term objectives, according to the roadmap, will include development of common control stations—to the extent possible—to streamline the training of RPA pilots and sensor operators, regardless of the platforms. Another near-term goal is to develop concepts of operation for "swarming" action, where multiple RPAs would conduct a mission, digitally linked and acting collaboratively. In parallel, work is going on to make it possible for a single operator to control such a swarm without having to watch the speed, altitude, and attitude of each individual aircraft.

The Air Force vector also indicates that, like it or not, RPAs represent a technology that will only escalate, and the enemy will include not just national peers but "state and nonstate actors" with the technology and wits to make them.

"By no means is it certain that the United States and its allies will maintain their overall lead" in technology, according to the report. Enemies of the US "recognize the advantages of UA [unmanned aircraft] and will seek ways to mitigate and defeat such capabilities. Adversaries will continue developing formidable remotely piloted technologies" for use as "weapons of mass destruction, suicide bombers, long-range and precise weapons," and for "advanced cyberattack capabilities," requiring the US in turn to develop counter-RPA measures. ∎