Heads of USAF's six battlelabs make their first-year progress reports.

From the Battlelabs

By Peter Grier

BATTLELAB seems like a natural name for a cutting-edge military research organization, but one year ago, when the Air Force's six battlelabs began official operations, few service officials had a clear vision for what a battlelab should do or how it should be organized.

Not even the newly named battlelab commanders knew where they were headed. "I didn't really know what the battlelab was," said Col. Joe Grasso, head of the Unmanned Aerial Vehicle Battlelab, at a July 1 Defense Colloquium hosted by the Air Force Association's Aerospace Education Foundation in Arlington, Va. "I knew less about UAVs."

Today, all the Air Force battlelabs are up, running, and beginning to produce innovative ideas, said officials at the AFA discussion. Their work has involved everything from new types of munitions trailers to classified research on information war.

Said Col. Ronald Kurjanowicz, head of the Air Force Battlelab Integration Division, "The impression I want you to get straightaway is that the battlelabs are for real. One year later, they're here to stay."

The mission of the Air Force battlelabs is to rapidly measure the worth of innovative operations and logistics concepts and then recommend ways to insert the most promising ideas into service doctrine, operations, or acquisition.

The six battlelabs are the Air Expeditionary Force Battlelab, Mountain Home AFB, Idaho; Unmanned Aerial Vehicle Battlelab, Eglin AFB, Fla.; Force Protection Battlelab, Lackland AFB, Texas; Space Battlelab, Schriever AFB, Colo.; Command and Control Battlelab, Hurlburt Field, Fla.; and Information Warfare Battlelab, Kelly AFB, Texas.

Air Expeditionary Force Battlelab

Since it became operational July 1, 1997, the AEF Battlelab has received 111 ideas for ways to improve expeditionary strike package fighting power. Of these, 43 were industry responses to a broad area announcement the lab put out earlier this year.

Twelve initiatives are in an advanced state of development. At least two were put in the plan for Expeditionary Force Experiment 98, a major annual exercise designed to test futuristic concepts and technologies.

One of the demonstrations entails a new en route Expeditionary Operations Center, which is intended to allow AEF planning personnel to make better use of their time.

"Every wing that deploys has an operations center," said Lt. Col. Jeff Neuber, AEFB deputy commander. "Historically, this group of people, during the 14- to 18-hour flight time to the Area of Responsibility, they really haven't been able to do anything."

The point of the en route EOC is to allow them to do mission planning while still in the air. It involves sticking a phased array antenna on top of an aircraft—a KC-135R from the 366th Operational Support Squadron will be the platform of choice for the EFX demonstration—and connecting it to a discrete pallet of electronic planning equipment in the cargo compartment.

Mission planners will receive the up-to-date information they need before reaching their beddown location. Upon arrival, unit commanders with this capability will theoretically be able to roll out their Air Tasking Order and begin operations right away.

An Integrated Planning and Execution Capability will be the other EFX demo for the lab. In essence, IPEC is

an effort to automate the base support planning process.

The lab will send an advance squad equipped with a powerful laptop into a potential beddown location. The squad will do a site survey, take digitized pictures, even video, and download them into the computer. Using a 3-D capability to "build" a picture of the location graphically, they will then zap the data back to the oncoming deployers.

"You can lay out your parking plan, decide where you're going to put your security checkpoints, your vehicle yard; ... you can build your whole base before you get there," said Neuber.

A third initiative that AEF lab leaders believe has promise is the Next Generation Munitions Trailer.

Right now, the Air Force takes two kinds of trailers when it deploys: the 15-foot MHU-110 and the 10-foot MHU-141. A battlelab master sergeant had the bright idea of building a one-size-fits-all version that expands and contracts as needed, instead.

In addition to generating, receiving, and processing ideas, the battlelab has functioned as something of a meeting place, as it has sponsored several AEF conferences.

UAV Battlelab

In the past, the Air Force commitment to UAVs has waxed and waned, said UAV Battlelab Commander Grasso.

Today, "that interest is rising again, in part due to the technology that now exists and the commitment that industry has made to further that technology and expand concepts."

The first major UAV Battlelab initiative involved the use of unmanned aircraft in the Suppression of Enemy Air Defenses role. In a New Mexico demonstration, the lab showed that a UAV outfitted with a direction-finding package can find, identify, and very precisely geo-locate mobile emitting threats and then forward that data to an F-16 cockpit, via the UAV's command center.

The next step in this initiative will be what Grasso calls an active SEAD concept.

"We're saying, 'OK, now let's take this same UAV with that same capability and let's add the capability to jam or decoy the threat on demand from the fighter.' "

The lab is further working on an initiative to "liberate" UAVs from restricted airspace. Currently, the Federal Aviation Administration is wary of allowing UAVs into general US airspace. To get around this barrier (which Grasso described as "cultural") the lab will use a commercially available traffic alert system on a UAV and demonstrate that this gives the craft the ability to detect and avoid conflicting air traffic.

Another UAV lab concept is called "geo-reference." This involves taking imagery from Predator UAVs and from national reconnaissance assets and combining the two with specially developed computer software.

The result will be near real-time UAV images with precise location coordinates. Predator pictures on their own are not accurate enough to allow use of precision guided munitions, but "you'd be able to target against [a geo-located threat] if you wish," said Grasso.

Finally, the UAV battlelab is also investigating the use of UAVs as surrogate satellites. A Global Hawk long-endurance craft, outfitted with JTIDS Link 16 and UHF radio links, could serve as a quick, cheap substitute for space-based communications.

Force Protection Battlelab

Col. Don Collins, the commander of the Force Protection Battlelab, said the first thing he found out after his organization started working a year ago was that he needed a lot more than cops to solve force protection problems.

He needed experts in blast mitigation, which is a civil engineering discipline. He needed explosives scientists. He even needed talent oriented toward the medical issues inherent in food and water supplies.

Much of the lab's first year has been spent in helping those carrying out current operations to defend against bad guys.

During the Bright Star deployment to the Gulf, the lab pulled together an explosives detection team to help out on-site commanders. Last September, the lab sent experts to Izmir, Turkey, where a US military population lives and works downtown. The team bolstered the base force protection package.

The force protection folks also put together a multidiscipline package designed to protect a multilateral counterdrug center based at what was, at the time, Howard AFB, Panama.

When it comes to general initiatives, "the most important thing that I would tell you we have started working on is explosive detection," said Collins.

A large vehicle laden with explosives remains the No. 1 threat in the US Central Command AOR. Ion-scan technology and other high-tech solutions can at least help guard against such bombs.

"We wanted to take this kid with the mirror under the truck and put more sophisticated things like X-ray technology into the hands of the troops in the field," said Collins.

The lab has also joined forces with its UAV counterpart and has assembled a proof of concept demonstration of the use of a UAV in a force protection role.

Combining a UAV with a wide area surveillance thermal imager and other off-the-shelf tactical sensors could potentially provide an unprecedented peek at the surrounding area for ground commanders.

The lab is also working on detection of chemical and biological agents. While the Army and Marine Corps are developing equipment aimed at sniffing out airborne toxins advancing on troops, the Air Force battlelab's emphasis in this area is more prosaic: food and water.

The easiest way to attack Americans in an AOR might be to slip poison into their food and water, which is often provided by local contractors.

Initiatives for the future include software that combines such capabilities as blast modeling and injury-reduction modeling to give commanders some empirical help in making force protection decisions and microwave weapons that might be useful in clearing out hostile checkpoints in a nonlethal manner.

Space Battlelab

Space surveillance has been one of the primary focuses of the Space Battlelab. One of the lab's initiatives, for instance, involves evaluation of commercial off-the-shelf telescopes that might be able to provide accurate data on deep space objects to increase the capacity of the Space Surveillance Network. Another will test tracking satellites via use of ambient radio frequency energy.

The latter project "is basically taking advantage of physics," said Col. (sel.) Bob Bivins, Space Battlelab chief.

The Earth is studded with TV and radio transmitters that beam energy up into the sky and into space. This ambient energy then reflects off Low Earth Orbit satellites.

An Earth-based receiver might read these reflections and provide an accurate picture of where the satellites are and where their orbit will take them.

"There are obviously advantages here," said Bivins. "We don't pay for the power of this. We're just doing a passive receive. And it gives you a lot of advantages in identifying changes in orbital parameters without being too obvious about it."

In a non-surveillance project, the lab intends to evaluate the effectiveness of commercial wireless communications in a military environment. It will send 50 Motorola handsets to South Korea to see if they help operations.

Another space initiative involves placing a Hyper-Spectral Imagery collector on top of Pikes Peak in Colorado. This receiver will peer down at nearby military bases such as Ft. Carson and see if it can spot anything interesting. The intent is to validate future space-based HSI strategies.

The very environment of space is also of interest to the battlelab. An initiative named SEAM (Space Environmental Anomaly Monitoring) aims to take advantage of sensors mounted on some current satellites that measure fluctuations in space energy.

"What we're trying to do is leverage that information to try and see if we can figure out any trends developing," said Bivins. "If there's a lot of proton activity, is it going to cause a higher number of [satellite] upsets? It might allow us to more effectively manage our satellite assets."

C² Battlelab

The Hurlburt-based C² Battlelab has the distinction of having produced the first Air Force battlelab initiative that has been completed and entered the formal procurement system. That effort involved Air Tasking Order visualization and assessment.

"What it does is produce a cartoon of the Air Tasking Order, so that you can look at it more easily," said Col. John Gorman, lab commander.

The battlelab looked at eight different systems, bringing in "real warfighters" to help them, said Gorman. The finished product is being incorporated into the system.

"We'll see it in March '99," said the lab chief.

Many of the battlelabs have paid particular attention to off-the-shelf information technology, and the command and control lab is no exception. An initiative that focuses on future Joint Forces Air Component Commander command-and-control systems looked at commercial technology that might help out.

"The market is exploding with things, such as chat room capability, that have obvious applications to ... the Air Ops Center," said Gorman.

The organization is also looking at simply reducing the size of C² hardware. "I put that into the category of, 'Duh,' " said Gorman.

Flat screen displays, workstation laptops, and wireless local area networks could reduce the size of an Air Operations Center by the size of a C-17 load, according to C² Battlelab calculations.

Future projects might include C² systems that include speech recognition—something that might come in particularly handy to ops crews encased in bulky chemical protection gear. "You can just address it and say, 'I want to go to target list, strategic, electric grid,' and boom, you're there. You save about eight mouse clicks," said Gorman.

The C² lab also wants to draw more on lessons from industry. In recent months, lab representatives visited private concerns to see how they work global communications and control.

Information Warfare Battlelab

The IW battlelab deals with a subject of particular interest nowadays in the Air Force and in the military as a whole. Within a few weeks of opening its doors, the lab had received 50 to 60 ideas for initiatives from industry. Though the rate has since slowed down, their idea count stood at 113 in late June.

About 75 percent of their ideas come from private industry.

"As you can imagine, many contractors came forth with old marketing pitches that they dusted off, put a new cover sheet on, and fired at us," said lab chief Col. James C. Watkins.

Thirty-six percent of the pitches dealt with information security measures. Twenty-six percent involved information attack, and 20 percent focused on electronic warfare. The other defined pillars of Air Force info war—physical destruction, psychological operations, and military deception—all were in the single digits, when it came to percent of ideas.

Six ideas were funded for Fiscal 1997. Eight were picked for Fiscal 1998. A number of them deal with classified projects.

"We find that we deal with a considerably larger number of classified initiatives than the other battlelabs do," said Watkins.

Among the projects Watkins could talk about was IW Reachback. This initiative involves connecting remote users with Sensitive Compartmented Information through existing low-cost satellite relays, via portable electronic equipment.

Another initiative is an attempt to visualize the information battlespace. This hardware–software combo produces a digitized, 3-D picture of information nodes and the data flow among them. One mouse click, and any node can be eliminated, with subsequent flow interruptions easily visible.

"This would be a powerful tool to do self-analysis to see where you're vulnerable," said Watkins.

To date most of the info war lab's work has involved small solutions to "mission gaps" that have been brought to its attention, said Watkins. In the future, the lab hopes to seize upon initiatives that have a broader operational impact at a higher level.

If nothing else, "I believe it is safe to say that the information systems protection portion of what we do will be with us forever," said Watkins. ▪

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