With Focus on Future Capabilities, U.S. 4th Fleet Is ‘Fleet for Innovation’

A VBAT vertical take-off and landing (VTOL) unmanned aerial system (UAS) prepares to land on the flight deck of the Military Sealift Command expeditionary fast transport vessel USNS Spearhead. The C4F “innovation cell” directed the test of the VTOL. U.S. Navy/Mass Communication Specialist 2nd Class Anderson W. Branch

When it comes to evaluating new naval technologies and concepts in an operational environment, the U.S. 4th Fleet could be called “the fleet for innovation.”

Christopher Heagney is the science adviser to Commander, U.S. Naval Forces Southern Command/U.S. 4th Fleet, detailed from the Office of Naval Research (ONR). In this capacity, Heagney is helping to ensure the Chief of Naval Research-managed $2.1 billion annual science and technology (S&T) budget meets the fleet’s needs.

Check out the digital edition of the February/March Seapower magazine here.

He also leads a team he calls the “innovation cell,” helping the Navy get new capabilities into the hands of warfighters. Other members of the cell include Robert Trost, an econometrician from the Center for Naval Analyses (CNA), and Ted Venable, a retired Navy captain and F/A-18 pilot and the unmanned aircraft system (UAS) and counter illicit trafficking program manager on the staff.

“We’re essentially technology scouts,” Heagney said. “We’re out looking for the latest and greatest technologies being developed by DoD labs, industry and academia that we can pull forward and bring to the fleet to solve operational needs.”

Exercises like Unitas bring navies and coast guards together, but for the U.S. it is also an opportunity for experimentation when a variety of assets are combined such as Coast Guard cutters, Military Sealift Command expeditionary fast transports (EPFs) and UAS like ScanEagle, Puma and V-BAT.

A Knifefish unmanned undersea vehicle (UUV) training model undergoes crane operations aboard the Spearhead. The “innovation cell” also oversaw testing of the Knifefish. U.S. Navy/Mass Communication Specialist 2nd Class Anderson W. Branch

A top priority for the fleet commander is persistent maritime domain awareness. “When I talk to my counterparts at the other fleets, that’s really the big thing,” Heagney said. “If it’s not No. 1, it’s No. 2 or 3 on their list of priorities. ‘What is out there in the maritime domain that I don’t know about?’ That’s been a naval objective since the beginning of time, and it’s something we still struggle today with. We have overhead satellites, unmanned surface and subsurface and aerial vehicles, and we still can’t get enough. So, how can we help scratch that itch of the commander? That’s really what we’re trying to get at.”

Because intelligence, surveillance and reconnaissance is a capability gap for the theater, Venable said, the team needs to get creative.

"We are resource-limited in aircraft and ships, so we have worked together with industry to provide unmanned maritime aircraft – both land-based and sea-based.

Some are programs-of-record [POR] and then there are non-POR aircraft. We had a large UAS operate from El Salvador International Airport and Panama's International Airport in 2009 and 2010 to help the partner nations in the counter-narcotics detection and the monitoring role," Venable said.

> *"We're essentially technology scouts. "We're out looking for the latest and greatest technologies being developed by DoD labs, industry and academia that we can pull forward and bring to the fleet to solve operational needs."*
>
> *Christopher Heagney, science adviser to Commander, U.S. Naval Forces Southern Command/U.S. 4th Fleet*

The Stark Aerospace's Heron deployment to Panama was successful, helping the Panamanians seize more than 12 metric tons of cocaine, Venable said. The team also experimented with the ship-based AeroVironment Puma AE (all-environment) unmanned aerial vehicle (UAV). Puma AE is a handheld UAV and contractor-owned/contractor-operated (COCO). "Most of the operations we do are COCO, because we can contract for services instead of owning the airplane and having to worry about the training and maintenance. We contract for a

flight-hour requirement, and the company is responsible for satisfying that.

“One of the technologies we’ve been looking at is very simple, but will help in the landing of our UAVs,” Venable said. “It’s an optical landing system by Planck Aerosystems that uses something like a QR code that is about 3 feet square, and the aircraft scan it, locks on and lands on it.”

4th Fleet Covers Theater Friendly to Innovation

Venable said there are three key factors that make the 4th Fleet area of operations a good place to do the testing. “One, it’s a benign environment; two, it’s right in our backyard and three, we have assets and air space available to industry to come down and demonstrate their technology either as a proof of concept or in an actual operational deployment. It’s mutually beneficial to the company and the Navy.”

Heagney said the innovation cell also focuses on theater security and cooperation and humanitarian assistance and disaster relief (HA/DR). Whether it’s a hurricane, earthquake, flood or a country that becomes unstable, C4F has had to respond. “As a naval force, we respond rapidly when we’re called forward. So, we’re interested in what kind of technologies can we find that will help with that mission, whether its medical, or moving supplies, or conducting search and rescue. We want to find where people

are in the most need when a disaster hits and make sure our response can get what they need to them. We focus on medical and HA/DR because we don't have a major kinetic priority," he said. "We have a little more flexibility to focus on things other than warheads on foreheads."

Key to the success of the innovation efforts are the experiment designs, data collection, analysis and reports that capture what they did and why it's important.

Trost was an economics professor for 33 years. He's involved in designing the experiments, collecting the data during the experiments and providing the post-mission analyses.

"I design the data collection analysis plans and pass them on to Ted and Chris for comments," Trost said. "After the experiments are complete, I write up the results and again get their comments."

In updating data or improving computer models and simulations, the right data must be collected and it must be in the appropriate format.

"We might look at 10 things and only two or three of them turn out successful," Heagney said. "It's important for the warfighters to know what works and what doesn't. We can help find that out. And we have the data to back that up."

Some of the experiments require little or no supervision or intervention. "We've been working with a SBIR [Small Business Innovation

Research] and RIF [Rapid Innovation Fund] project for a new coating for aircraft. We've taking aluminum panels called coupons that have the new coating, as well as some with no coating, and we've taken them to sea aboard a leased commercial vessel for at-sea data collection," Heagney said. "We're getting real, no-kidding at-sea data on how do these perform in the environment that our aircraft operate in. Instead of having an F-18 corrode because we picked the wrong one, we let these corrode and we pick the perfect one."

The U.S. 4th Fleet is responsible for 14 million square miles of water from the Caribbean Sea, Atlantic and Pacific oceans. While it has a lot of ocean, it doesn't have a lot of ships. But the 4th Fleet does have platforms, such as the Military Sealift Command expeditionary fast transport USNS Spearhead (T-EPF 1), which supports a number of logistics and theater security cooperation missions, and leased offshore support vessels, which can be used as platforms for testing.

With the Navy procuring 24 mine countermeasure (MCM) mission packages for littoral combat ships (LCS), Heagney and his team are looking at how they can employ components of those mission packages even if an LCS is not available.

"If we think of LCS as the truck, and the mission package as the payload, why can't we use another vessel of opportunity to accomplish

that mission with an MCM adaptive force package? We're stepping up and saying, 'Well, we've got an EPF if you want to try it on other ships – what other ships do we have that could potentially do this? The EPF is a good one.' "

Heagney points to a test with Naval Warfare Development Command using a British Royal Fleet Auxiliary ship, the RFA Mounts Bay, to use elements of the LCS MCM mission package from a vessel of opportunity, as a good example. The test used elements of the mission package such as the Common Unmanned Surface Vessel (CUSV), the Knifefish UUV, Airborne Laser Mine Detection System (ALMDS), Airborne Mine Neutralization System (AMNS), the Mark 18 Mod 1 Swordfish, and the Mark 18 Mod 2 Kingfish UUVs and involved LCS Squadron (LCSRON) 2 Helicopter Sea Combat Squadron (HSC) 2 and HSC-28 and Explosive Ordnance Disposal Mobile Unit (EODMU) 2.

"It's not necessarily the capability of that one particular system, because we assume the vehicle does what it's supposed to do," Heagney said. "We want to develop a concept for doing it. It's proving that we can get it on the ship, that there is battery storage and the ability to recharge them, that there are procedures down so we can actually get it to the crane and be able to safely deploy the vehicle in the water and then be able to recover it. That's what we want to demonstrate, because I If you put in the

water and tell it to ‘go find mines’ it will find mines, right? But it’s all the ability to launch and recover and do that from multiple ships. I think that’s what really adds to the punch that the Navy can deliver. We’re not just tied to these couple ships to do this mission.”

“We don’t really have mine equities, but our sister fleets – 2nd, 5th, 6th and 7th– definitely do. And we can test it here for their benefit. We can be the theater innovation,” Heagney added. “It’s really a benefit for the Navy as a whole.”

‘Unparalleled Opportunities’ to Test, Refine New Capabilities

“Fourth fleet offers unparalleled opportunities to test and refine new capabilities and tactics in a risk-controlled environment, versus a well-resourced, determined, creative adversary that also has a high capture benefit,” said Rear Adm. Don Gabrielson, commander of the 4th Fleet. “This team values every opportunity to contribute to national security and is dedicated to partnering with the U.S. Coast Guard and all our partner nations in bringing every resource to bear. These innovative systems operate in an unparalleled learning environment with real national security benefits. We are grateful for their contributions.”

Heagney said, “When we’re going and doing these innovation events, we bring scientists out with us. We want them to get out of

the lab and see what it’s like to interface with the fleet.”

A lot of the demonstrations and testing sound simple and straightforward, but the devil is in the details.

“It is amazing the simple things that you think, ‘Oh yeah, that should be no problem,’ ” Heagney said. “But when you get out on the water, on a new or different ship, things just go south really quick. The maritime environment is crazy difficult. When we take a brand-new technology, and it’s the first time an operator has seen it, and you put in the water, you will be shocked by the results you have. And that’s why we do what we do. We learn.”

Edward Lundquist spoke with the U.S. 4th Fleet innovation cell at Mayport, Florida.