

Navy Innovators Reveal Revolutionary Research to Counter Emerging Threats

DAHLGREN, Va. – Navy inventors are confident that their latest research in quantum physics, artificial intelligence, and cyber security – to name a few – will ultimately impact U.S. military and homeland security efforts. The innovations and their potential military applications were introduced and explained by the researchers at a recent event, Naval Surface Warfare Center Dahlgren Division (NSWCDD) announced Oct. 12.

In all, principal investigators presented 20 research projects with the titles of their discoveries ranging from “Cyber Security for the Internet of Things” and “Electrochemical Destruction of Bulk Chemical Warfare Agents” to the “Dynamical Non-Locality Induced Effect in Quantum Interference.”

Navy technical managers, engineers and scientists networked with representatives from academia, industry, transition partners, and other key stakeholders to see and hear more about these new innovations at the In-house Laboratory Independent Research (ILIR) and Independent Applied Research (IAR) End of Year Review at the University of Mary Washington Dahlgren Campus, Sept. 25.

Funded by the Office of Naval Research (ONR), the ILIR and IAR program fosters fundamental and applied research at the Navy Warfare Centers to counter emerging threats by connecting technological needs with current and emerging capabilities.

The NSWCDD principal investigators identified challenges, objectives, accomplishments and future benefits while answering questions and briefing the ILIR and IAR projects they’ve been working on over the past year.

“The program helps to ensure a next generation of technically competent scientists by supporting masters and doctoral dissertation research, and research in the areas that are essential to our future mission,” said Dr. Jeff Solka, NSWCCD ILIR/IAR program director. “Our ILIR and IAR process is a means to develop the next generation of Navy scientists and engineers capable of addressing key warfighter challenges to ensure the Navy maintains a leading edge in science for national defense.”

Many of the projects presented at the ILIR and IAR event have the potential to result in Cooperative Research and Development Agreements. This legal agreement provides a means for NSWCCD and a private sector partner to cooperatively conduct research and development in a given technical area and share in the technical results.

“We have three strategic thrusts for ILIR and IAR programs,” Solka said, in reference to the programs at NSWCCD. “We provide funding for science, engineering, mathematics and statistics students to complete their graduate studies. New researchers can develop their own science and technology projects and portfolios. In addition, world-class researchers have the ability to develop revolutionary ideas.”

For example, world-class principal investigators Scott Spence and associate investigator Dr. Dan Parks developed a revolutionary idea for their quantum physics project, titled, “Dynamical Non-Locality Induced Effect in Quantum Interference.” The potential military applications of their research include anti-tamper cybersecurity, invisible security fences and highly sensitive vibrometer technologies.

“Dynamic non-locality is more robust than kinematic non-locality,” said Spence, pointing out that dynamical non-locality will provide an enabling technology for future quantum devices.

Principal investigator Dr. Joseph Hunt's work – "Synthesis and Characterization of Carbon Nanotube-Metal Organic Framework Composites" – could be used to develop new electromagnetic materials with enhanced, tunable properties with applications in electromagnetic offense and defense, and electric weapons in addition to chemical, biological and radiological protection.

"The Metal Organic Framework nanotube composites could be transitioned to a variety of operational areas in which thin layers of material with high electromagnetic lossiness is desired," said Hunt. "The other permittivity and potential electronic properties could be used in electric weapons or directed energy projects."

Hunt's project – performed to produce composites with enhanced properties by combining carbon nanotube and reticular chemistry – advance the state of the art by exploring how the material properties of Metal Organic Framework are affected by the incorporation of increasing amounts of carbon nanotubes.

"This work enables future weapon systems by providing control over the electromagnetic properties of the material as well as providing the improved conductivity necessary for sensors and other electronic systems utilized by the Navy and Department of Defense."

Principal investigator Kimberly Zeitz – an NSWCDD scientist and Ph.D. student at Virginia Tech – presented a new security technique in her project, "Cyber Security for the Internet of Things," that has the potential to protect data from sensor devices utilized for wartime communications.

Zeitz focused on limiting the time attackers may conduct reconnaissance on low-powered embedded system devices while considering the challenges such as resource and performance constraints. Low-powered, low-resource devices cannot use traditional security methods.

“This Micro Moving Target IPv6 Defense obscures communications of these devices through address rotation,” said Zeitz, regarding her research at NSWCDD, which is closely linked to ongoing research conducted within the Virginia Tech Information Technology Security Lab.

“Past and ongoing research includes a Moving Target IPv6 Defense and its applications in enhancing network security,” said Zeitz. “This security technique can be catered for use with different applications on different embedded devices. The ability to select the hashing algorithm used allows it to be adapted for a best fit and also to stay current as new has algorithms are developed.”

Dr. Elizabeth Haro’s research on data visualization support resulted in a tool that will be transitioned to the Aegis Readiness and Training Center for use in in training Sailors. Her research project – “Data Visualization Support for Creation of a Numerical Table: Effects on Training and Performance” – can result in novel visualization techniques, including 3D visualizations to optimize delivery and utilization for the human users.

An incorrectly developed ship doctrine can lead to catastrophic events. Currently, the system includes a tabular display of completed doctrine statements on the Aegis Display System and the doctrine comparison capability in 2D. There is no graphical representation to aid the warfighter in the development of doctrine.

“This technology is a visual-based doctrine system that could enable the ability for centralized Fleet level doctrine creation and tactics in real time,” said Haro, the team lead for the NSWCDD Human Systems Integration Science and Technology Team. “It can reduce Sailor workload by minimizing the required sectors that a warfighter must monitor for each ship based on the global coverage area of the fleet doctrine.”

Navy Strategic Systems Official: Hypersonics 'Coming to a Theater Near You'

WASHINGTON – The Navy's Strategic Systems Program (SSP) office is planning two more test flights to demonstrate conventional prompt strike (CPS) capability, a program official said, to capitalize on the first test conducted a year ago.

"Hypersonics is coming to a theater near you," Capt. Doug Williams, the SSP's technical director, said at the third annual Triad conference.

"As part of a program of record within the Office of the Secretary of Defense, we [SSP] have been working a hypersonic glide technology demonstration," Williams said. "We called it Flight Experiment No. 1. FE-1 flew about a year ago, Oct. 31. We took an old A3 [Polaris] rocket motor built in the late '80s, made it a stack, and launched it off of Hawaii, flew it a couple thousand miles. It landed at Kwaj [Kwajalein Atoll].

"It was brilliant. The whole time we had telemetry pumping down. We saw everything in a virtual model, real time, and it was one of those things that makes your hair on the back of your neck stand up. And you stand up as you see the body do what the body did and the body land exactly where it was supposed to land. It was awesome," he said.

Williams said that hypersonics is the No. 1 priority of Michael D. Griffin, undersecretary of defense for research and engineering.

"We're leaning forward," Williams said. "We have two more

experiments to fly. We are working with the Office of the Secretary of Defense and with ASNRD&A [assistant secretary of the Navy for research, development and acquisition] staff to understand conventional prompt strike. For the Navy it is going to be indeed a program.”

Williams noted that even with the potential of conventional prompt strike, the primary mission of SSP is to provide a nuclear deterrence capability with the Strategic Weapon System. He cautioned that “if we don’t do that right, no one is going to care about CPS. We are on a path to ensure that we firewall this conventional capability. That, no doubt, will be a heavy lift. We cannot have CPS drain Trident [the Navy’s submarine-launched ballistic missile program].”

Navy Elevates TACAMO Weapons Tactics Detachment to Full Command

ARLINGTON, Va.— The Navy has upgraded the TACAMO strategic communications community’s weapons tactics detachment to a full command.

According to an internal Navy directive, the Detachment Weapons Tactics Unit of commander, Strategic Communications Wing One, at Tinker Air Force Base, Oklahoma, was disestablished on Oct. 1. In its place, on the same day, TACAMO Weapons School was established with a commanding officer instead of an officer in charge.

TACAMO, an acronym for “Take Charge and Move Out,” is a system of survivable communications designed to maintain

communications between the national command authority with the elements of the U.S. strategic deterrent triad: Air Force bombers and intercontinental ballistic missile bases and Navy ballistic-missile submarines.

The Navy's two operational TACAMO squadrons, Fleet Air Reconnaissance Squadrons Three and Four, also based at Tinker, fly 15 Boeing E-6B Mercury aircraft in support of U.S. Strategic Command.

Navy Secretary Names Two Littoral Combat Ships

WASHINGTON – Navy Secretary Richard V. Spencer has announced the names of two future littoral combat ships (LCSs), the secretary's public affairs office announced in two Oct. 9 releases. The Freedom-variant LCS 29 will be named USS Beloit and the Independence variant LCS 32 will be named USS Santa Barbara.

The future USS Beloit (LCS 29) is named in honor of Beloit, Wisconsin, and is the first ship to bear the name.

"The city and citizens of Beloit have been a steadfast supporter of the Navy and Marine Corps," Spencer said. "From building engines for Freedom-variant LCSs to manufacturing components for the Ford-class aircraft carriers, the contributions of Beloit citizens make our Navy stronger, more capable and more lethal. I am proud to name the next ship in honor of the city and citizens of Beloit."

USS Beloit will be constructed by Lockheed Martin with Marinette Marine in Marinette, Wisconsin. This ship will be

387 feet long, have a beam length of 57.4 feet and travel at speeds in excess of 40 knots.

The future USS Santa Barbara (LCS 32) is named in honor of Santa Barbara, California, and is the third ship to bear the name.

“I am pleased to name the next Independence variant LCS after the city of Santa Barbara,” Spencer said. “This city’s innovative workforce and longstanding support of our Navy and Marine Corps team, whether active duty, reserve force, civilian or Veterans, the support from this community strengthens our Navy and nation.”

The future USS Santa Barbara will be built by Austal USA in Mobile, Alabama. This ship will be 421 feet long with a beam length of 103.7 feet and be capable of operating at speeds in excess of 40 knots.

The Navy has accepted delivery of 16 LCSs. Including the recent contract modifications, a total of 32 LCSs have been procured with 10 ships under construction (LCS 15, 17, 19-26).

Navy Awards General Dynamics Contract Increase to Modernize Personnel and Pay System

FAIRFAX, Va. – The U.S. Navy has awarded General Dynamics Information Technology (GDIT) a contract ceiling increase from \$177 million to \$270.2 million for the Personnel Modernization

(PERSMOD) contract, which supports the Navy Standard Integrated Personnel System (NSIPS), the company said in an Oct. 8 release.

NSIPS is the primary human resource system for the Navy, performing personnel management, pay and entitlement transactions and leave for over \$34 billion worth of the Navy's annual personnel budget. The Navy will leverage GDIT's solutions and alliance partnerships to help drive down sustainment costs through the accelerated consolidation, migration and de-customization of legacy systems.

"GDIT's ongoing support of NSIPS allows us to rapidly advance new solutions and help the Navy maintain momentum on this important initiative," said Senior Vice President Leigh Palmer, head of GDIT's Defense Division. "Through the PERSMOD contract, we have already completed modernization updates and collapsed one legacy HR system, with a second system's retirement in progress. We are excited to leverage these milestones for the Navy and continue to upgrade this program."

Through this increase, GDIT will accelerate the support and transformation of the Navy's integration of Oracle's PeopleSoft Global Payroll product as well as the implementation of the Treasury Direct Disbursing (TDD) process. These updates will improve financial reporting and eliminate errors at the source for the Navy.

This contract increase includes an immediate award of \$93.2 million with the potential to award two preapproved six-month increments. If awarded, these increments will extend the ordering period by an additional year and increase the contract ceiling by an additional \$95.7 million to approximately \$366 million. The indefinite-delivery, indefinite-quantity contract was originally awarded to SRA International Inc., a managed affiliate of GDIT, in June 2014. It included a five-year ordering period through June 2019. Up to one year of additional ordering may be permitted through

June 2020.

Over the past four years, GDIT has successfully collapsed one legacy human resources system, Reserve Headquarters System, with the retirement of a second system, known as the Inactive Manpower and Personnel Management Information System, currently in progress. At the same time, GDIT supported the successful rollout of the Blended Retirement System, eliminated significant manual processes with addition of Retirements and Separations functionality, and additional automation to Reservists' drill processing with a major update to the Enhanced Drill Management (EDM) system in NSIPS. The EDM also provided self-service functionality allowing the individual sailor to schedule/reschedule drills, which eliminated the need for paper from the process and significantly reduced human error. The system can now handle the entire gamut of drill scheduling and processing.

SaaLEX Solutions Awarded U.S. Navy OLSS Contract

CAMARILLO, Calif. – SaaLEX Solutions Inc. has been awarded the SeaPort Ordnance Logistics Support Services (OLSS) contract by the U.S. Navy, valued at \$5.7 million over five years, the company said in an Oct. 4 release.

The work will support the Navy Munitions Command Pacific CONUS West Division (NMCPAC CWD). SaaLEX will provide technical and support services at Naval Weapons Station (NWS) Seal Beach and NWS Fallbrook for the NMCPAC CWD mission of Fleet Ordnance Support.

SaaLEX's contract services include administrative and

inventory support, truck driving and heavy equipment operations, key custodianship and magazine access for NMCPAC CWD, USB and DET FB. Support specific to the Surface Launched Missiles Division at USB includes support of the Standard Missile, Evolved SeaSparrow Missile, Tomahawk Missile and Vertical Launch systems material coordination, movement, and tracking. Support specific to the Air Launched Missiles Division includes support of the Navy Sidewinder, Maverick, Hellfire and Air Force Maverick material coordination, movement and tracking.

“Saalex is proud to be awarded this contract and once again support the Navy,” said Travis Mack, president and CEO of Saalex. “We have a longstanding commitment to serving the Navy in its efforts to maintain the security of the United States and are honored to expand that relationship even further with this contract.”

L3 OceanServer Successfully Participates in Advanced Naval Technology Exercise

FALL RIVER, Mass. – L3 OceanServer successfully participated in the Advanced Naval Technology Exercise (ANTX), an annual event held at the Naval Undersea Warfare Center in Newport, Rhode Island, where the future of naval technologies is demonstrated, the company announced in an Oct. 4 release. L3 OceanServer’s presence included 12 Iver unmanned underwater vehicles (UUVs), the largest UUV showing at ANTX.

Iver vehicles successfully completed seven missions at the event, including three customer-operated missions, showcasing

new technology payloads and advanced command and control capabilities. One successful exercise integrated the Marine Magnetics internal magnetometer into an Iver UUV for the collection of magnetometer data over a simulated minefield.

Notably, an Iver4 concept vehicle demonstrated battery power endurance and system efficiency by completing a long ingress/egress mission. The vehicle started its mission with a 15-nautical-mile ingress, was retasked on arrival to survey a simulated minefield and finished with a 3-nautical-mile egress. On mission completion, 57 percent of battery power remained.

“As undersea missions evolve, our dialogue with naval customers has consistently reiterated the need for a portable vehicle that can complete long-duration missions,” said Daryl Slocum, L3 OceanServer’s general manager. “The Iver4 offers a broad range of innovative technologies, including various power options, to execute these demanding missions.”

L3 OceanServer is part of the Maritime Sensor Systems sector within L3’s Communications & Networked Systems business segment. Since its inception in 2003, L3 OceanServer has sold more than 300 autonomous underwater vehicles worldwide, providing highly capable solutions to a broad array of military, commercial and international customers.

**Naval Aviation Leaders:
Readiness Improving, but**

'Still Not Where We Need to Be'

WASHINGTON – The combat readiness of naval aviation is improving, but it is not where it needs to be, the Navy and Marine Corps top aviation leaders said Oct. 5.

Vice Adm. DeWolfe Miller, commander of Naval Air Forces, said his readiness has increased from the one-third availability reported by his predecessor a year ago, "to about 50 percent, on average. We're still not where we need to be."

"I have 260 airplanes [ready] on average. We need 341," Miller told a Center for Strategic and International Studies forum.

Miller noted that when he was director of Air Warfare in the Pentagon last year, the feeling was they could fix readiness quickly and move on to modernizing the force. When he moved to the fleet as air boss, he said, "we found the hole is a little bit deeper than we thought."

But, Miller said, "the entire naval air enterprise is being aligned toward this recovery," and there is "a sense of urgency" throughout that enterprise.

After a lot of analysis by industry and military experts, "It comes down to people and parts," he said.

Marine Lt. Gen. Steven Rudder, the deputy commandant for Aviation, had a similar conclusion on what it will take to fix the Corps' aviation readiness, which had been lingering around 25 percent in some aircraft types.

Rudder did not give a readiness number, saying the Marines used different metrics, but said the Corps made a decision that they needed to "fully fund the accounts for keeping aircraft up, and we did." He said they gave money to the

supply system to buy the parts required, to the Fleet Readiness Centers and aviation depots that repair aircraft, and to the program managers so they could “help a particular community to get out of the hole.”

He said later that they were taking steps to reverse personnel decisions made when the Marines were reducing end strength and created shortages of experienced maintenance noncommissioned officers on the flight lines.

And, he said, “we put money back into the flight-hour program so we can fly. We’re not where we should be, but we are seeing some increases” and “seeing higher percentage of up aircraft.”

Rudder said Marine pilots had averaged 13.5 hours a month in fiscal 2016, 15.4 hours in fiscal 2017 and “we’re closing out ’18 averaging 17.9. Our readiness is creeping up. It will take time, because some of our aircraft are old. ... But we’re moving in the right direction.”

Asked about complaints about the material condition of the new F-35Bs they are receiving, Rudder acknowledged that he was not satisfied with the quality of some of the planes delivered by Lockheed Martin.

But, he said, “if the taxpayers give the Marine Corps new airplanes, we’re going to use them.”

He noted that the Corps has 33 operational F-35Bs, and 22 are forward deployed in Asia, and in the Central Command where the Marine Lightning IIs reportedly conducted their first combat missions.

Miller said the Navy’s first squadron of carrier-capable F-35Cs was in transition and expected to make its first deployment in fiscal 2021. He said the Navy was preparing for that deployment by using tactics developed by the Top Gun air combat training unit and applying lessons from the Marines’ experience with their F-35s on the amphibious ships to the

F-35s.

Both of the aviation leaders said they no longer used old metrics of whether aircraft were “full mission capable” or lower readiness status.

“It’s going to be very simple. We’re going to have an airplane that’s ready to fight, or it’s not,” Miller said, adding that the aircraft being deployed are the best they can be.

And both listed a variety of programs they are using to retain qualified pilots, including a new Navy program that would allow some midgrade aviators to opt out of the normal quest for command positions and remain as “permanent pilots” in training units.

Navy to Christen Guided-Missile Destroyer Frank E. Petersen Jr.

ARLINGTON, Va. – The Navy will christen the newest guided-missile destroyer, the future USS Frank E. Petersen Jr. (DDG 121) Oct. 6 at Huntington Ingalls Industries shipyard in Pascagoula, Mississippi, the Defense Department said in an Oct. 4 release.

The future USS Frank E. Petersen Jr. is the first ship named in honor of Marine Corps Lt. Gen. Frank E. Petersen Jr., the first African-American Marine Corps aviator and the first African-American Marine Corps officer promoted to brigadier general. When he retired in 1988 after 38 years of service, he was, by date of designation, the senior-ranking aviator in the

Marine Corps and the U.S. Navy.

At the ceremony, the principal speaker will be Gen. Alfred Gray, 29th commandant of the Marine Corps. D'Arcy Neller, wife of Gen. Robert Neller, commandant of the Marine Corps, and Dr. Alicia J. Petersen, widow of Frank E. Petersen Jr., will serve as ship's sponsors. In a time-honored Navy tradition, the two sponsors will christen the ship by breaking a bottle of sparkling wine across the bow.

"The future USS Frank E. Petersen Jr. will serve for decades as a reminder of Lt. Gen. Petersen's service to our nation and Navy and Marine Corps team," said Navy Secretary Richard V. Spencer. "This ceremony honors not only Petersen's service but also the service of our nation's industrial partners, who, for centuries, have helped make our Navy the greatest in the world."

The future Frank E. Petersen Jr. will be the 71st Arleigh Burke-class destroyer, and is the fifth of 21 ships currently under contract for the DDG 51 program. The ship will be configured as a Flight IIA destroyer, which enables power projection, forward presence, and escort operations at sea in support of low-intensity conflict/coastal and littoral offshore warfare, as well as open ocean conflict.

Navy Air Warfare Director: C-2 Aircraft Retirement Moved Up to 2024

WASHINGTON – The replacement of the Navy's C-2A Greyhound carrier on-board delivery (COD) aircraft with the CMV-22B

Osprey tiltrotor transport aircraft has been moved up three years because of accelerated procurement of the needed Ospreys, a Navy admiral said.

“The initial plan was to sundown the C-2 in 2027,” Rear Adm. Scott D. Conn, director of Air Warfare in the Office of the Chief of Naval Operations, testified Sept. 28 before the House Armed Services Seapower and Projection Forces subcommittee. “With additional adds [CMV-22Bs] we’ve been able to push that left to FY ’24. The CMV-22 will IOC [reach initial operational capability] in the Navy in 2021. That is mapped to our first F-35 deployment for [F135] engine [transport] considerations. Transition will be complete by FY ’24.”

The Navy operates two squadrons of C-2As (for a total of 34 aircraft) which send out detachments of two aircraft with each carrier deployment.

Conn noted that the C-2A is more than 30 years old and is accordingly more difficult to sustain.

“We have gone from a 32 percent mission-capable rate in 2017 to 40 percent in ’18, so the trend is in the right direction, but it is nowhere near where we want it to be,” he said. “We’re going to continue to make those investments to make sure those aircraft are safe to get airborne until the end of its service life. I have to fully fund that aircraft until I’m completely done with it.”

He said the CMV-22 on a hot tropical day fully loaded with 10,000 pounds of cargo will be able to fly in excess of 1,100 nautical miles, “which meets our requirements for combat operations.”

The first CMV-22B is being built at the Boeing plant in Ridley, Pennsylvania, and will be delivered in 2020.

Conn said the CMV-22 will enjoy a shortened test program because its modifications are slight.

“We have to do a modified operational test,” he said. “The only thing we’re testing are those things that are different on the CMV-22 as compared to the MV-22. That’s going to be a very compressed test.

“We then IOC and get our first three aircraft to deploy in 2021,” he said. “There is no means by which I can accelerate that any further when you look at the [facilities construction], the training that’s required for our Sailors to operate and maintain, and the aircrew that have to fly it and get the hours they need. We’re going as fast as we can go. Any additional aircraft at this point would relieve or provide a shock absorber during the transition as we go from transition to deployment to follow-on detachments until we’re completely divested of our C-2.”