Forget the RAF LUTON satire at the top- 13 seconds to just AGAIN look at what would be so easy to hurl out the back of Spartan, Herc, C-17 aft ends and be monitored by pretty much anything you like: local USV/UUV mother/reponse ships, specfit commercial aircraft from local area airfields; Whale Song clones, Kimbla replacements, MV SYCAMORE - anything you like really -with all of them pretty much immune to torpedo counterattack and able, with a party pack, capable of nailing a boat that came up onto the roof to have a go. Aircraft-wise anything from a KINGAIR up size would be thsooooper - 10 years ago there was a Canadian or West Coast US mob that had sono rx and battery packs you just slung over standard pax seats like backpacks and connected to stuck on antennae - it's all pretty brainless after you ponder the how to's for 15 minutes. EEZ/Littoral IUSS for the masses!
https://twitter.com/i/status/1494584894063849496

ROK Navy Finds Major Defects on Three of its Type 214 Submarines

The Republic of Korea Navy (ROK Navy) announced that defects were found in 3 of the 9 Son Won-il-class submarines, the South Korean variants of the Type 214, currently in active service.

Juho Lee 19 Feb 2022

ROK Navy submarine force will face a major setback in the coming months as the submarines go through major overhaul and parts are sent to Germany for repairs.

The ROK Navy found defects in the cables of the inverter module, one of the central components in the propulsion system, aboard ROKS *Son Won-il*, ROKS *Yoon Bong-gil*, and ROKS *Yoo Gwan-soon*. These are the first, fifth, and sixth boats of the class. Each submarine will have to go through a complex overhaul to receive repairs. This will immobilize each vessel at least four months.

To make matters worse, the inverter modules, produced by Siemens, cannot be fixed in Korean shipyards due to legal barriers concerning technology transfers and intellectual property. Therefore, the parts will need to be shipped to Germany for repairs, with the round way trip expected to last 2 months, leading to each submarine being out of action for at least 6 months.

This is expected to have a major negative impact on force readiness. The Son Won-il-class submarines are considered to be one of the ROK Navy's most valuable assets, providing a strong deterrent against North Korean aggression. Displacing 1,860 tons when submerged, the submarines use air-independent propulsion, allowing them to stay underwater for up to two weeks. Moreover, they are capable of launching the Hyunmoo III cruise missile which can hit targets up to 1,000 km away.

These features make the ships especially effective at neutralizing North Korea's mobile ballistic missile launchers based inland. Some fear that the reduction in force readiness will invite

provocations from North Korea. The country may see the major overhaul as an opportunity to act more aggressively.

Siemens has already been awarded a ₩7 billion (~$6 million) contract to make repairs to the three subs. Work on the ROKS *Son Won-il* began in January. Repairs for the ROKS *Yoon Bong-gil* and ROKS *Yoo Gwan-soon* will begin in August this year and February next year, respectively.

"We are cooperating with the manufacturer," a ROK Navy source told local media. *"The overhaul periods have been spaced out to minimize the negative impact on force readiness."*

This Is Our First Look At The Navy's Snakehead Unmanned Submarine

https://www.thedrive.com/the-war-zone/44339/this-is-our-first-look-at-the-navys-snakehead-unmanned-submarine
Most Graphics removed - can be seen via the above link

Snakehead can be launched from a nuclear submarine and will accommodate many future tasks including intel collection.

By Brett Tingley February 17, 2022

The U.S. Navy has offered a glimpse at its new Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) by publishing pictures taken during the christening of one of the vehicles. The service wants these drones, which its Dry Deck Shelter-equipped nuclear-powered submarines will be able to launch and recover underwater, to initially be able to scout ahead or monitor certain areas, as well as perform other intelligence-gathering missions.

The images of the Snakehead's christening were published this week by the Naval Undersea Warfare Center (NUWC) Division Newport and the Program Executive Office Unmanned and Small Combatants (PEO USC). The vehicle was christened at the Narragansett Bay Test Facility on February 2.

During the christening, Capt. Pete Small, the program manager for Unmanned Maritime Systems, said he has been "blown away by the team of subject matter experts and the complexity and technical rigor of the project" since joining in 2018.

Christopher DelMastro, head of NUWC Division Newport's Undersea Warfare Platforms and Payload Integration Department, added that the christening marks a significant milestone for the Navy's UUV plans, one that was nearly twenty years in the making. "During the winter of 2004, a UUV team from NUWC was at this very pier demonstrating the utility of large vehicles to inform the Navy's future unmanned vision," DelMastro said. "Today we have a new team - the Snakehead team - comprised of talented individuals representing the warfare centers, university laboratories, and industry. It was

very challenging at times and it was a long and difficult path to get here, but today you succeeded in delivering many firsts for the Navy."

From what we can tell from these images, the Snakehead seen in the christening ceremony appears to be very much inline with renderings previously shared by the Navy.

Details about Snakehead and the contractors developing it remain scarce. What is known is that the drone is a long-endurance, multi-mission UUV that can be deployed from the Dry Deck Shelter of some of the Navy's submarines and has been previously described by the service as “the largest UUV intended for hosting and deployment from submarines.” According to a contract awarded in 2019, Snakehead is powered by Lithium-ion Fault Tolerant (LiFT) batteries.

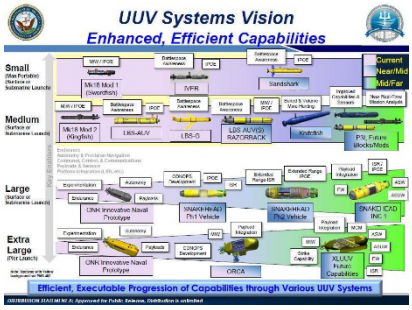
The drone subs have some degree of autonomy thanks to the Navy’s Unmanned Maritime Autonomy Architecture (UMAA) and Common Control System (CCS). These software systems offer operators a common tool for mission planning and execution, as well as monitoring UUVs in the field.

The drone submarines are aimed primarily at Intelligence Preparation of the Operational Environment roles, or IPOE. These missions typically involve collecting information about specific areas or objectives in advance of operations. For UUVs, this would mean using a variety of sensors including side-scan sonar and other bathymetric instruments to map the seafloor and identify obstacles or objects of interest.

This type of intelligence is critical for submarines to help ensure they can safely enter and leave designated areas without being detected or striking obstacles. UUVs in this role can identify potential obstacles or hostile assets in a given area while their host vessels are safely out of harm’s way, or be used to help locate sunken objects or undersea cables. They can also provide critical mapping and other forms of intelligence for maritime special operations raids and larger-scale amphibious operations.

A December 2020 Navy press release announcing the final request for proposals (RFP) for the UUV’s Phase 2 development stated that while initial Snakeheads were intended mainly for IPOE roles, “Future vehicle missions may include deployment of various payloads.” Because Snakehead is designed with a modular, open architecture, new systems or payloads could be rapidly integrated in the future to further expand their capabilities.

PEO USC briefing materials from 2018 show that some of the future payloads the Navy intends for Snakehead include anti-surface warfare (ASUW) and anti-submarine warfare (ASW) systems in addition to electronic warfare platforms (EW).



USN

A 2018 briefing slide showing the Navy's plans for the various UUVs including the Snakehead.

EW systems would likely require the UUV to operate near the surface or use a buoy or an extendable mast system, but this would still present a much lower risk than a crewed submarine in the same role. Snakeheads equipped with these systems could potentially function as part of the Navy's secretive EW ecosystem known as the Netted Emulation of Multi-Element Signature against Integrated Sensors ecosystem, or NEMESIS. NEMESIS is aimed at developing a 'system of systems' that uses highly-networked manned and unmanned aircraft, ships, and submarines to execute highly coordinated electronic attacks and decoy operations across wide geographical areas and against disparate enemy sensors, even creating 'phantom fleets' to confuse and distract opponents. Read this past *War Zone* feature to learn more about this highly revolutionary program.

It's worth pointing out that it's not yet clear what submarines might deploy the UUV in the future, but the Navy has previously stated that Snakehead will fully integrate with Modernized Dry Deck Shelter (DDS) and Payload Handling System-equipped submarines. Currently, DDS can be equipped by the Navy's four *Ohio*-class guided-missile submarines, or SSGNs, and at least six *Virginia*-class submarines. Additionally, the unique *Seawolf*-class spy submarine USS *Jimmy Carter* features a large "ocean interface" section that can be used to launch UUVs.

The *Ohio*-class SSGNs, in particular, are capable of deploying a wide range of unmanned assets for various missions. It has been proposed that UUVs can be launched and recovered from the SSGNs using the Universal Launch and Retrieval Module, an elevator-like device that extends from modified Trident missile tubes to transport payloads in and out of the submarines. You can read all about the *Ohio*-class SSGNs and their revolutionary capabilities in this past *War Zone* feature.

Snakehead isn't the only LDUUV the Navy has been testing and evaluating on a more experimental basis in recent years. Other projects include the Boeing Orca (technically an XLUUV), and the Large Training Vehicle 38 test platform. The Navy even stood up its first-ever dedicated underwater drone unit in 2017, Unmanned Undersea Vehicle Squadron One, or UUVRON 1, in order to develop and test these new platforms.

The fact that the Navy has now christened one of the drones shows the service is continuing to move forward with its plans to operate a larger number of unmanned vehicles both above and below the waves. Navy leadership has signaled that unmanned systems are critical for its future operations, helping it move towards a more distributed concept of operations in which large numbers of unmanned assets add additional operational capacity, presence, and even unique capabilities with less personnel and logistical demands.

Just this week, Chief of Naval Operations Adm. Mike Gilday said that the service could begin incorporating large unmanned platforms into the fleet within the next five years. "In the long run, the goal is … to put ourselves in a position where we can scale those platforms and into the 2030s have unmanned in larger numbers available to the commanders," Gilday said, according to *Breaking Defense*.

Snakehead and other large UUVs like it have the potential to add significant tactical capabilities to the service's already capable fast attack and guided-missile submarine fleet. Now that a Snakehead has been christened, it's likely we'll see the drone sub make more appearances as the Navy moves it towards some sort of operational capacity. Regardless, when it comes to undersea warfare, it is becoming clearer with each passing day that unmanned platforms will become essential to dominating the battlespace below the waves.

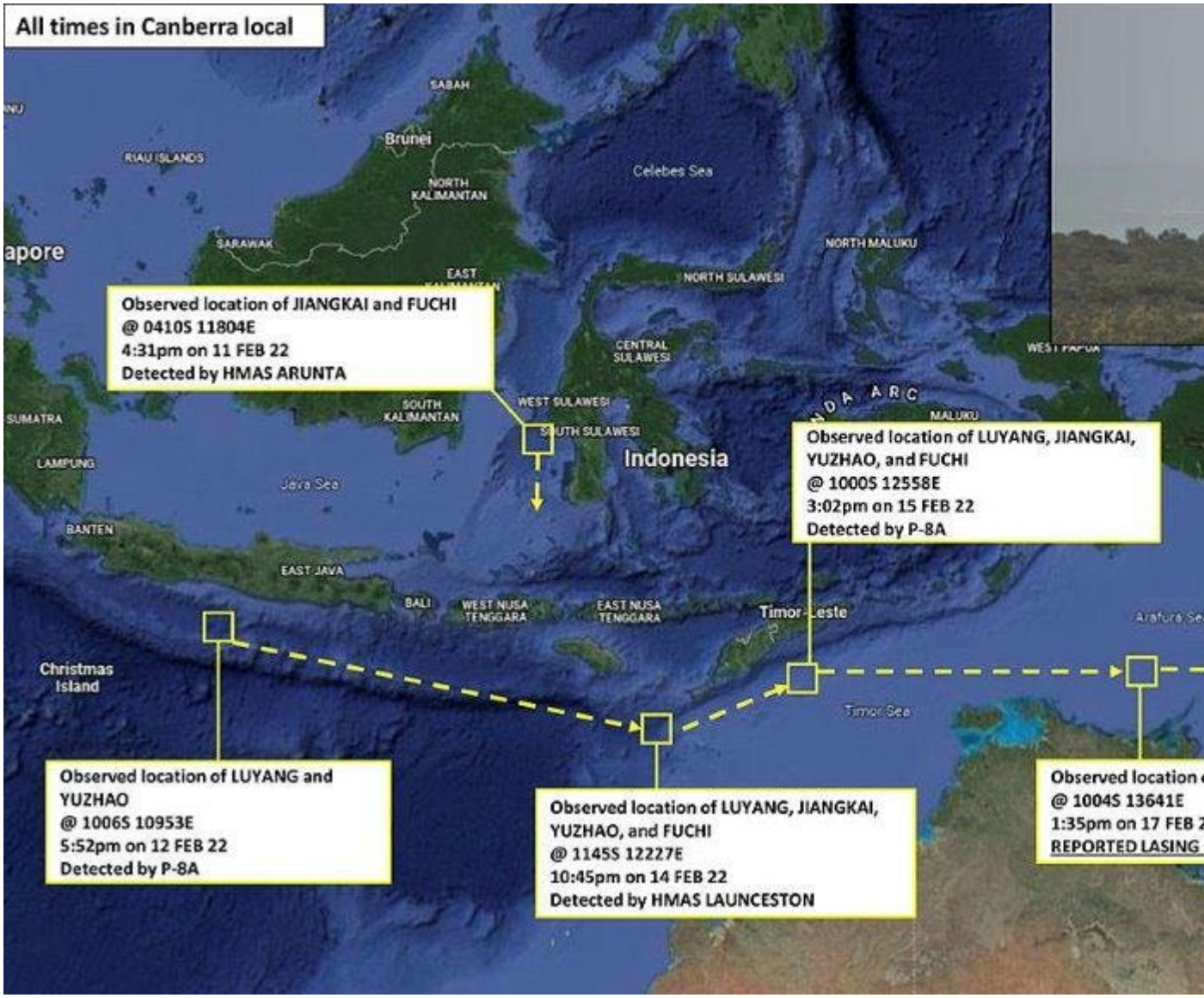
Contact the author: Brett@TheDrive.com

Investment spurs undersea technology gains

By
APDR Staff
17/02/2022

'offers the promise of order-of-magnitude capability gains in areas such as undersea surveillance and sonar systems' If one of these carpetbaggers came in and said this is going to give you 10 times the capability you currently have, any reasonable user would probably ask if the spruiker could reach into its bag of tricks and offer an example or two. However S&T has learnt that the term order-of-magnitude is one of those terms that has been unquestioned by the SLG for at least 2 generations and so may be used at every opportunity to scrounge gold from the treasury. In fact the SLG seem to have adopted the term as a feature in its budgeting.

One of the peacetime dividends when the wall came down was to simply brain dump any knowledge in surveillance because the Wide Area Surveillance Study conducted as the bricks were falling produced results scarier* to Defence than a phone call from 4 Corners. Quickly followed by same caused by an even scarier* ASW Capability Study in the mid 90s. So if one were to grab a brew and wander around the repositories of knowledge on both subjects I can assure you your brew would still be piping hot when you finished. While the Ronnies have a Surveillance and Response Group -this depiction of this week's laser incident indicates it should be Reconnaissance and Response Group - till they get enough assets to do Surveillance. *scary= requiring knowledge based accountable decisions



Anyway this is another of these 'investments' that should be on some cub reporter's dart board to check in on to report on progress. But remember: 10 times almost zero is not that much above zero regardless of the number of photo opportunities. Once again the Users should be driving where the tech thrusts should be and if we aren't using what we currently get out of the sensors very well - my suggestion is that the tech thrust should be over in the 'what is that we aren't using very well from the sensors' domain and sorting the information management applications to rectify that. And I COULD reach into my bag and show you any number of instances where, with almost zero as the current base, I could render hundreds of order-of-magnitudes improvements. Starting with heaps of infinities: Eg source heard since time began but its significance to the mission never known. Knowledge of mission significance now made available to the listener - Mission POD goes from 0 to 1. and if you say BS never happen - blow soft and hard across the top of your longneck bottle and marvel.

Significant capability gains in areas such as sonar systems and undersea surveillance are being pursued under a new program supported by Defence's Next Generation Technologies Fund. Projects have commenced in the Advanced Piezoelectric Materials and Applications (APMA) Program under a five-year collaboration between DMTC Limited and its partners, including Defence scientists, to accelerate the development of next-generation piezoelectric materials for defence applications.

The characteristics of this emerging class of third-generation piezoelectrics in terms of reduced weight and power requirements, and enhanced electro-mechanical interactions, offers the promise of order-of-magnitude capability gains in areas such as undersea surveillance and sonar systems. In an era of increasingly contested seaways and challenging geopolitical conditions, these capabilities will contribute to Australia's submarine and undersea capabilities and to maintaining superiority under, on and beyond the sea.

Support from Defence's Next Generation Technologies Fund (NGTF) and StaR Shot missions, managed by Defence Science and Technology Group, is geared towards technology advancement in support of realising the integrated undersea surveillance system capability envisioned in the Defence Strategic Update 2020. The APMA Program delivered by DMTC represents a coordinated, collaborative, long-term vision to establish a strategic national capability in advanced piezoelectric materials and their application.

The program extends along the entire pipeline from education and training, to research and development, to providing Australian industry with a world-leading capability to design and fabricate piezoelectrics for sonars. The Program is making strategic investments in industrial and research infrastructure. Single crystal forms of piezoelectrics produce enhanced performance due to their microstructure. The first phase of the APMA Program is focused on fully characterising and understanding the properties that will enable piezoelectric technology to be utilised to efficiently produce single crystals of a size required for advanced transducer devices. This will remove the current reliance on imported single crystal and ensure security of supply for both sovereign Australian and export opportunities.

ANSTO has been a lead researcher in the field of piezoelectrics working with Thales Australia. Universities around Australia have also been brought on board, including UNSW Sydney, the University of Sydney, the University of Wollongong, Monash University, RMIT and the Australian National University. Australian startup business Critus Pty Ltd will work with DMTC to develop piezoelectric characterisation instruments that will provide unique and rapid insights into the structural properties and performance of piezoelectric material samples. In line with DMTC's track record of achieving innovation breakthroughs across traditional Defence domains, the developments in this area are also expected to translate to enhancements in sensors for aerospace platforms.

Mine Warfare Revival

2021 Naval Mine Warfare Essay Contest—Third Prize
Sponsored by the Mine Warfare Association
By Lieutenant Virgil Fermin, U.S. Navy
February 2022
Proceedings
Vol. 148/2/1,428

In the series 'Where Mine WArfare Goes ASW should keep a very close eye'

It is easy to get enamored and distracted by the prospect of technology, automation, autonomy, and artificial intelligence. For some, the possibility of a mine warfare (MIW) revival is defined by autonomous and unmanned vehicles. Instead, MIW practitioners and tacticians should propose executable solutions for approval to reinvigorate the Navy mission area. Executable solutions do not have to be elaborate technical capabilities that require funding. However, specific questions need to be answered before the Navy can deliver the means to meet the 21st-century MIW demands: Where

are we? Where should we go? How do we get there? Are we getting there?[1] The answers to a successful MIW revival depend on honest analysis and the translation of strategy into operations and tactics.

Strategy: Where Are We?

Released in December 2020, the Tri-Service Maritime Strategy, *Advantage at Sea*, did not provide explicit insight on the future of MIW. In total, MIW is only mentioned twice in the new strategy. The only indication of the future of MIW is encompassed in the Naval Services Investments Annex under the Undersea Warfare subsection with the promise of expanding mine warfare capabilities. Nevertheless, *Advantage at Sea* implies that MIW is a mission area inherent to sea control and power projection.

Advantage at Sea provides holistic clarity and direction. The strategy designated the People's Republic of China (PRC) as the most pressing and long-term strategic threat.[2] In turn, MIW practitioners must consider and ask: Where are they? In 2009, the PRC's inventory was estimated to be between 50,000 to 100,000 mines. The PRC's mine inventory also contained "over 30 varieties of contact, magnetic, acoustic, water pressure and mixed reaction sea mines, remote control sea mines, rocket-rising, and mobile mines." A decade later, one can assume the PRC's mine inventory has grown, and delivery methods have advanced. In addition, the People's Liberation Army Navy's (PLAN) preponderance of civilian vessels and asymmetric MIW threats further complicate matters.

Advantage at Sea provides strategic guidance as to where the naval services should prioritize and unify their efforts. Particularly the preponderance of Navy forces in the Indo-Pacific region and the modernization of the Marine Corps. Although not fully actualized, the Marine Corps is pivoting toward an increased role in sea control and sea denial. This inclusion further reinforced the relevance of the expeditionary combat power and combined arms doctrine within *Advantage at Sea*. The naval services are in search of new methods of producing dilemmas for adversaries, and at a crossroads between danger and opportunity with the chance to create a new MIW identity.[3]

Operational: Where Should We Go?

Advantage at Sea implies that the naval service concepts of distributed maritime operations, littoral operations in a contested environment (LOCE), and expeditionary advanced base operations (EABO) will serve as foundational guidance at the operational level. Combined, these concepts provide new opportunities to revive MIW within an integrated all-domain naval force. However, ideas are not the all-inclusive solution to full-spectrum MIW revival. At the operational level, the future of MIW requires personalization, appropriately defined as an ongoing conversation between creator and consumer.[4]

Combatant commanders (CoComs) are the consumer of military force capabilities and are authorized to employ forces as necessary to carry out missions assigned to the command. In addition, they also are empowered to submit recommendations through the Chairman of the Joint Chiefs of Staff to the Secretary of Defense concerning the content of guidance affecting the strategy and/or fielding of joint forces.[5] Multiple avenues to personalize MIW are available to CoComs to meet mission demands. Force planners are the brokers between the CoComs and the capability creators or force providers. Further, force planners are the gatekeepers between the status quo and MIW innovation.

Thus, naval force planners must adopt the Army's force-tailoring methodology to accelerate the MIW revival. Force planners will have to creatively aggregate existing military capabilities and

balance resource constraints by translating CoComs' requirements into deployable and employable force packages. Creating a better demand signal for MIW resources is a significant step toward changing the conversation. In the near term, force tailoring creates a sustainable pathway for emerging MIW technology to be deployed and integrated.

The 38th Commandant's Planning Guidance (CPG) has changed the realm of possibilities for force planners. Under Commandant General David H. Berger's direction, the Fleet Marine Force (FMF) is rapidly emerging as a dynamic resource creator. With Stand-in Forces, the FMF will equip CoComs with an array of low-signature, technically disruptive options, affordable and risk-worthy platforms, and payloads. If aligned with MIW, these delivery options provide agile and expeditionary solutions in close and confined seas.

General Berger has offered more direction on where naval forces should go and suggested the Marine Corps absorb more expeditionary functions, forces, and capabilities and unify under a single naval expeditionary force. As eloquently stated by Steven Johnson in *Where Good Ideas Come From*, "The trick to having good ideas is not to sit around in glorious isolation and try to think big thoughts. The trick is to get more parts on the table."[6] At the end of the day, it does not matter where the parts come from; what matters is that the mission is being accomplished, understood, and led. Nevertheless, naval warfare and MIW are headed toward reinterpretation in the 21st century.

Tactical: How Do We Get There?

At the tactical level, MIW is conceptually constrained by what the warfare area cannot achieve and the possibility of what the future holds. The naval force requires affordable mining and mine countermeasures (MCM) solutions and replacements for the aging *Avenger*-class MCM ships. Autonomous and unmanned vehicles are part of the affordable solutions, but those systems will require additional time to mature. Capabilities are the means to an end, but the technology will not lead itself.

The naval force must rearrange and reuse existing pieces to achieve desired effects at the tactical level.[7] Command and control (C2) and leadership are among the existing pieces in MIW's future equation. In the words of Army General Omar Bradley, "Leadership is an intangible. No weapon, no impersonal piece of machinery ever designed can take its place."[8] Regardless of capabilities, someone has to cultivate the ecosystem of MIW unity at the tactical level.

The naval force must alter the composite warfare (CW) doctrine and revitalize the MIW commander's (MIWC) role for the 21st century.[9] Decades of naval operations in permissive MIW environments have relegated the MIWC to the functional group commanders. This relegation also signals that tactical level leaders are overlooking MIW risks and have developed a false sense of consensus.[10] The MIWC deserves a larger role within CW and is the optimal method to implement clear C2 overall tactical forces assigned. Captain G. Bruce McEwen, the commander of the MIW effort during the Gulf War, likely would argue the same.[11] C2 will become exponentially crucial with emerging robotics and unmanned system. The next question that arises is who should be the force MIWC?

As an existing pillar, CW provides the officer in tactical command with flexibility to delegate CW roles to support Navy mission areas. History indicates that the delegation of the MIWC can be executed better. During the Gulf War, Captain McEwen was tasked with serving as the MIWC without the requisite technical and operational experience to accomplish the duties. As described in *The General's War*, "McEwen's only experience in mine warfare had been in dropping them from his A-7

during the Vietnam War."[12] The MIWC needs to be adequately resourced and complemented by technical knowledge.

MIW has become expeditionary because of the limitations of the *Avenger* class. Therefore, the resource providers of MIW capabilities today are more inclined to be naval expeditionary forces. Navy and Marine Corps capabilities are designed to be combined and complementary. This concept is already defined in doctrine in *NWP 3-32 Maritime Operations at the Operational Level of War* and can be feasibly translated at the tactical level. Thus, the MIWC should be a practitioner of expeditionary warfare. Marines and Navy ordnance disposal officers are the most logical choices to serve as MIWC and more likely to require MIW direct support. Moreover, General Berger has already made Marine Corps CW integration a prerequisite to the execution of amphibious operations. General Berger's guidance to the Marine Corps is an opportunity to accelerate the MIW revival. In addition, this is an opportunity to inject new leadership and direction into an overlooked warfare area.

MIWC must be experimentally deployed as part of expeditionary forces on vessels of opportunity. The naval services can achieve a deliverable solution by deploying amphibious and littoral combat ships (LCSs) together. Combined, these platforms and EABO create the flexibility to execute expanded MIW missions. This requires planners and decision-makers to expand their consideration of LCSs outside of the limitations of their mission package. The MIWC can conceal MIW assets in the well decks of amphibious ships and maximize force flexibility.

Expeditionary vessels and the prospect of MIW expeditionary advanced bases create new tactical dilemmas for adversaries. Offensive mining expeditionary advanced bases can be utilized as flexible deterrent options for the CoComs in support of sea control and sea denial. These expeditionary options remove the constraints of operating within a carrier strike group (CSG) construct as airpower and strike operations are often prioritized over other mission areas.

End Game: Are We Getting There?

MIW is not "getting there" fast enough. MIW practitioners ought to shape the environment instead of waiting for the environment to change. The naval force needs to aggressively employ expeditionary MIW assets in named areas of interest. Initially, the expanded execution of MIW will not be perfect or overwhelmingly popular. Military leaders are more inclined to be impressed by kinetic operations and visual effects. However, intelligence preparation of the operations environment and deterrence are equally valuable: "Wars can be won through battles never fought, as much as through the 'battles of annihilation' taught in the military textbooks."[13] Going forward, every deployment presents an opportunity to maximize time and space with MIW forces.

Increased MIW operations are the only path to accurately inform the science and technology community of accurate modernization requirements. In addition, the MIWC can validate concepts of operations and provide the out-of-the-box MIW analysis desperately needed in today's Navy. [14] General Berger has made the exploration of the adjacent possible a reality by opening a door with EABO.[15] Now, it is time for force planners to remove the surrounding walls and create a demand signal for MIW resources. Experimentation and trial by error with expeditionary force tailoring will generate operational intelligence. No one should expect this to be the ultimate unilateral solution. MIW's revival is contingent on doing more, letting nature take its course.[16]

Lieutenant Fermin is a surface warfare officer and amphibious warfare tactics instructor serving at the Naval Surface and Mine Warfighting Development Center Sea Combat Division in San Diego,

California. He previously served as the combat systems maintenance officer at Littoral Combat Squadron 1 and ship's gunner on board the USS *Nimitz* (CVN-68).

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N221-056 TITLE: Unmanned, Autonomous Avoidance of Active Acoustics Harassment of Marine Mammals

OUSD (R&E) MODERNIZATION PRIORITY: General Warfighting Requirements (GWR)

TECHNOLOGY AREA(S): Sensors
This just indicates they haven't learnt too much in the last 25 years and are going to do the wrong thing strategically, tactically and environmentally with their DSS, UUVs and USVs -ha
The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Investigate and develop a conceptual design for a model prototype with a low-power, autonomous marine mammal harassment mitigation or avoidance capability for use during active sonar operations of unmanned, autonomous Deployable Surveillance Systems (DSS), whose feasibility is demonstrated using modeling and simulation (M&S).

DESCRIPTION: The U.S. Navy has been and continues to be a leader in environmental stewardship for maintaining a healthy marine ecology of the world's oceans through its heavily funded research and environmental protection practices. Moreover, federal regulations have invoked certain policies for Navy to use mitigation practices in order to avoid harassment or injury to marine mammals when operating active sonar during training and testing operations. At the same time, federal law requires the Navy, under Title 10 of the U.S. code, to uphold its military obligation to defend the security interests of the nation that include use of its active sonar during training and testing operations during peacetime in order to maintain wartime readiness. The Navy continually sustains the required balance to keep in compliance with both federal laws. The scope of this SBIR topic concerns continuing to maintain this balance for DSS. Current mitigation practices enforced by the Navy require a human in-the-loop for visual sightings of nearby surfaced marine mammals during daytime operations of active sonar and/or passive acoustics to detect nearby vocalizing marine mammals during training and testing exercises. A technical problem/challenge for the proposer is to provide an innovative solution for conducting autonomous active sonar DSS operations by developing an unmanned, autonomous mitigation prototype without the requirement of human intervention for performing mitigation or avoidance procedures. DSS are a family of unmanned, autonomous systems which provide acoustic surveillance mission capabilities for maritime theater undersea warfare. Transition of DSS capability is accomplished through systems increments and spiral developments.

DSS is a middle-tier acquisition program with rapid-prototyping and rapid-fielding demands which necessitate modularity and shorter timeframes to transition DSS increments and spiral capabilities while still considering total ownership costs over the life of the capability (e.g., development, test/evaluation, sustainment, manufacturing, modernization, obsolescence, sunset) to transition the capability.

The purpose of an autonomous prototype is to: (a) detect vocalizing marine mammals with passive acoustic sensor(s) in the harassment range of active sonar operations; (b) replace the human lookout/on watch to look for non-vocalizing marine mammals; (c) make autonomous decisions to ascertain the presence of animal(s) in vicinity of operations in which case the sonar cannot go active; and (d) reduce active power emissions or turn off active sonar, as appropriate, if marine mammals are detected within a prescribed harassment area. The desired built-in prototype capability shall have low-power and shall be integrated into the autonomous prototype as a 'go/no go' decision for using active acoustics (vice as a modeling tool for understanding acoustic impact to marine mammals).

DSS systems, which may use active acoustics during operations, will need to avoid harassment of marine mammals, which could result in behavior modification or harm to marine mammals. Current military active acoustic harassment mitigations all include manned (human in-the-loop) operations.

The Navy needs an innovative solution that provides the ability to sense/detect, without any human involvement, marine mammals (whether vocalizing or not) that are within range of active acoustics harassment and prevent such harassment from occurring. If a potential harassment situation occurs, the goal is to provide and integrate decision-making algorithms to the DSS system to prevent, without any human involvement, such harassment with least impact to the DSS maritime surveillance mission that requires employment of its active sonar.

The solution must provide an energy-efficient capability that does not negatively impact power and energy needs in other areas of DSS system operations. Energy consumption is just one of many other examples. In a second example, when no marine mammals are present in the operating area and mitigation steps are not being required to reduce DSS operational source level, the automated marine mammal harassment mitigation prototype should not cause any interference or degradations to DSS normal mission/sonar operational performance capability. In a third example, the DSS prototype may be provided with a communications link to command authority with a mitigation disabling option for wartime combat missions. These are just a few trade-space examples. Offerors are asked to research, develop, and demonstrate new solutions to the stated problem.

Work produced in Phase II may become classified. Note: The prospective contractor(s) must be U.S. Owned and Operated with no Foreign Influence as defined by DOD 5220.22-M, National Industrial Security Program Operating Manual, unless acceptable mitigating procedures can and have been implemented and approved by the Defense Counterintelligence Security Agency (DCSA). The selected contractor must be able to acquire and maintain a secret level facility and Personnel Security Clearances, in order to perform on advanced phases of this contract as set forth by DCSA and NAVSEA in order to gain access to classified information pertaining to the national defense of the United States and its allies; this will be an inherent requirement. The selected company will be required to safeguard classified material IAW DoD 5220.22-M during the advance phases of this contract.

PHASE I: Develop a conceptual design for an energy-efficient low-power, autonomous marine mammal harassment mitigation or avoidance capability, an innovative technology solution that will fill the current technology gap.

Base the solution on a model design identifying key elements that are used to determine the technical feasibility of the approach through computer modeling and simulation, and best available science. (Note: Examples of the available science on marine mammals and sonar technologies are provided as illustration in references 1 through 3.)

Identify anticipated performance milestones.

Demonstrate, via computer modeling and analysis, the operational feasibility for fielding the modeled design for a Phase II prototype build, test, and at-sea demonstration.

Provide: (a) a detailed description of the concept design (hardware and software) architecture; (b) description of the analytical approach, the methods and results of computer modeling and simulation (M&S) performed as a basis for justifying the proposed architecture; and (c) the plan for incorporating the proposed architecture into a prototype build in Phase II (Phase I Option).

The Phase I Option, if exercised, will include notional design specifications and a capabilities description to build a prototype in Phase II. Include how total operating costs of the solution can be addressed while maintaining state-of-the-art advances as future DSS increments and spirals are transitioned, for example, additive manufacturing, advanced materials, modularity of subcomponents.

PHASE II: Implement the proposed architecture developed in Phase I and deliver and test at-sea a prototype to implement an unmanned, autonomous solution for avoidance of active acoustics harassment of marine mammals for effective use of DSS systems using active acoustics. The feasibility of the proposed solution will be demonstrated in a variety of potential ocean environments, system integration architectures, and for mission concepts of operation using modeling tools. Build and demonstrate components or sub-components of the system to validate the accuracy of the model.

Validate that the prototype operates in accordance with the model in a laboratory or at-sea environment. Incorporate lessons learned from simulated computer simulation and modeling, actual at-sea acoustic measurement trials, and analysis of the collected test data into a full system design. A final prototype will be delivered at the end of Phase II.

It is probable that the work under this effort will be classified under Phase II (see Description for details).

PHASE III DUAL USE APPLICATIONS: Provide total operating costs of a transitioned capability (including but not limited to manufacturing, integration, deployment, sustainment, and modernization).

Support the Navy in transitioning the technology to Navy and commercial use. Further refine, fabricate, and implement the developed hardware and/or software to suit the operation of a capability for DSS systems to avoid active acoustics of marine mammals and support testing in laboratory and ocean environments to meet requirements for functionality, environmental extremes, reliability, safety, and other requirements to certify the system for Navy use. (Note: The Navy will support operational testing.) Deliver hardware/software, related documentation, support installation on existing systems, and retrofit technology for use in operational testing.

Provide an execution plan for commercial dual-use application of the advanced technology. One example of a technology application of an autonomous mitigation prototype device for dual-use in the commercial sector is in the commercial fishing and shipping industries for possible mitigation of net entanglements, bi-catch, and ship strikes.

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KEYWORDS: Marine Mammal Harassment; Active Acoustics; Maritime Surveillance; Theater Undersea Warfare; behavioral response; auditory sensitivity

N221-057 TITLE: Alternative Power for Anti-Submarine Warfare Targets

OUSD (R&E) MODERNIZATION PRIORITY: General Warfighting Requirements (GWR)

TECHNOLOGY AREA(S): Electronics

I wonder why they don't want faster ones. I'd have liked an EMATT that could hammer and stress the OPS ROOM out rather than one representing a GUPPY II for an extra 21 hours - yep we could do with both but a faster one would be the priority for mine - given that the Skimmers lose interest after about an hour if no wooshie wooshies are involved. And the birdies need to learn how to mark a trotter and a galloper with a view to a kill.

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Develop an alternate power source greater than 3.6 KWhrs in a 6.75 inch diameter by 30 inch length extended endurance section for the MK39 Expendable Mobile Anti-Submarine-warfare Training Target (EMATT).

DESCRIPTION: Anti-Submarine Warfare (ASW) training is conducted most effectively when air, surface, and subsurface platforms train in the operational environment. Training against live submarines is costly and often not available; therefore, mobile ASW training targets fill this critical training need. The addition of a larger and higher density power source to the MK39 EMATT would give its users more options to improve its emulation of a submarine for ASW proficiency training. The baseline MK39 EMATT is powered by a Li SO2 battery capable of doing 3 to 8 knots, is very high in energy density, is low cost, has a long active life, contains lithium metal, and is pressurized. The existing battery uses L026SXC cells manufactured by SAFT, Inc. The battery pack consists of two (2) parallel strings of fifteen (15) D-size L026SXC cells connected in series (15S2P). This provides a 45 Volt (V) power source with a capacity rating of 16 Ampere-hours (Ah). Each string is protected by redundant diodes and the pack is fused with an 8 amp slow blow fuse. The existing form factor is much smaller than the 6.75 inch diameter by 30 inch length extended endurance section to be investigated under this SBIR effort.

The objective is to develop an alternative power source that accomplishes the requirements and meets the goals set by the MK39 EMATT program and ASW targets.

The Navy is in need of an innovative way of powering the MK39 EMATT and ASW targets. The SBIR topic seeks development of a power source that is expended after one use that is not required to be recharged. This SBIR effort would evaluate concepts based on specific needs such as endurance and sprint speed. Currently there are emerging methods such as fuel cell, battery paper, carbon zinc, etc. both commercially and in Government. Increasing the power capabilities of an ASW training target will make it more realistic to real world threats. Also, with increased power ASW targets will have a wider range of capabilities. This includes increased speed, additional sensors, and increased endurance. With the addition of an extended endurance section to the EMATT that is 6.75 inch diameter by 30 inch length, the cg (Center Of Gravity) becomes an issue to investigate as the EMATT is negatively buoyant. The goal is to have a cg of -1.5 inches or less below the center of buoyance. The goal for buoyancy of the section to be approximately neutrally buoyant.

An innovative way of powering the MK39 EMATT and ASW targets should enable a longer run time per vehicle, looking at approximately an objective time of 24 hours. Desired voltage is to maintain the baseline 45Volts. Estimated amperage required for the speed range of the larger vehicle is approximately 10-15 amps. Driving down the cost per hour below $100 per hour is also desired. The Navy would like to develop and build thirty to forty prototype power sources for testing and evaluation.

System performance will be demonstrated through bench and safety testing. The awardee will perform bench testing, at the awardee's facility, to determine if the prototype meets size, weight, and power. Bench testing is expected to be conducted halfway through the Phase II effort. Evaluation results will be used to refine the prototype into an initial design that will meet Navy requirements. Conduct safety testing in accordance with Navy lithium safety program responsibilities and procedures of S9310-AQ-SAF-010 [Ref 1] as applicable with Naval Surface Warfare Center Carderock. Conduct safety testing in accordance with High-Energy Storage System Safety Manual, SG270-BV-SAF-010 [Ref 2] with Naval Surface Warfare Center Carderock. Safety testing will be conducted at the end of the Phase II effort. The prototype shall meet operational temperature requirements of -5°F to 135°F. The prototype shall meet operational vibration requirements of exposure to a random vibration of 20 Hz to 1126 Hz for duration of 3 hours. The prototype is not required to meet any operational shock requirements, however the prototype design shall be evaluated to determine shock survivability.

PHASE I: Develop an initial concept design and feasibility of an extended endurance power source. Consider how the candidate alternate power supply can be integrated into the ASW mobile training target. Provide design data and analysis to substantiate the findings. Demonstrate the feasibility of the concept to meet the parameters listed in the Description through modeling, simulation, and analysis. The Phase I Option, if exercised, will include the initial design specifications and capabilities description to build a prototype solution in Phase II.

PHASE II: Based on the results of Phase I and the Phase II Statement of Work (SOW), the small business will develop and deliver a prototype for evaluation as appropriate. Approximately Thirty power sources shall be built for testing and evaluation. The prototype will be evaluated to determine its capability in meeting the performance goals defined in the Phase II SOW. System performance will be demonstrated through prototype evaluation as described in the Description. Evaluation results will be used to refine the prototype into an initial design that will meet Navy requirements. Conduct safety testing in accordance with Navy lithium safety program responsibilities and procedures of S9310-AQ-SAF-010 as applicable. Conduct safety testing in accordance with High-Energy Storage System Safety Manual, SG270-BV-SAF-010. Conduct environmental testing.

PHASE III DUAL USE APPLICATIONS: Support the Navy in transitioning the technology to its intended platform for Navy use. Develop the extended 6.75 inch diameter by 30 inch length extended power source for evaluation to determine its effectiveness in an operationally relevant environment. Support the Navy for test and validation to certify and quantify the system for Navy use. The developed power source will be transitioned for use in the MK39 EMATT and other ASW targets.

Compact High-Energy Storage Systems are in demand for a variety of commercial applications including automobiles, unmanned undersea vehicles, emergency and portable power systems, and residential storage.

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US Navy Tilt-Rotor Aircraft Falls Short in Sea Reliability Tests

February 18, 2022

One of those 'operationally effective for heaps of things - if only it could get off the deck' stories.

A lot like what I see in the Uninhabited platforms world where the gizmo people come in with this straight out of Star Trek wonder that needs an AFL teams worth of support (for the foreigners not a footie fan but I believe an AFL team consists of a playing group, at training group, a management group, a legal group, a merchandise group, an I am so woke they have to keep giving me sleeping pills group (the basis for the need for a legal group etc)) - They start to break alongside if you don't treat them with due deference, they have a good change of breaking when you put them in the water, and will almost certainly break when you pull them out with the minorest of procedural omissions. Yes there are many exceptions to that rule: most sea gliders aren't too bad, OCIUS' Bluebottle seems unique in that genus, The SV-3 wavegliders seem easy to get in and getting easier to get out but the things that have lots of thrusters and fragile looking appendages need a lot of sailor proofing - things like Double Eagle that advertise a certain level of fragility with bumper bars and guards spring to mind. Sailor proofing a noble task, officer proofing- an essential one (the right way or no way - no decisions)

By Tony Capaccio (Bloomberg) The U.S. Navy’s new version of the tilt-rotor Osprey aircraft designed for missions at sea isn’t yet “operationally suitable” because it has only “partially met reliability requirements,” according to the Pentagon’s testing office.

Among the problems: Its ice protection system “accounted for 25% of the operational mission failures, which will result in mission aborts,” the Defense Department’s director of operational test and evaluation said in a non-public assessment marked “Controlled Unclassified Information” and obtained by Bloomberg News.

Otherwise, though, the test office found the CMV-22B Osprey is “operationally effective for carrier onboard delivery, medical evacuation, Naval Special Warfare support and search and rescue.”

The CMV-22B is a modified version of the widely used Marine Corps aircraft that lands and takes off like a helicopter and then flies like an airplane. It’s replacing the C-2A Greyhound, a nausea-inducing, claustrophobic aircraft first produced in 1965, to land cargo and people on aircraft carriers.

Spokespersons for Bell Helicopter Textron and Boeing Co., which jointly produce the Osprey, referred questions to the Naval Air Systems Command.

The new aircraft “will provide the Navy with significant increases in capability and operational flexibility,” according to a fact sheet from the command.

A command spokesperson, Megan Wasel, asked about actions the Navy was taking to address the test assessment, said the aircraft had just completed its first operational deployment this month “and successfully proved” its value “as part of the U.S. Navy’s Air Wing of the Future. In the coming months, we will be reviewing this first deployment in its entirety and will implement key lessons learned, with the goal of improving readiness, reliability, and combat capability.”

The Navy has purchased all of the planned 44 aircraft, Wasel said. (I guess if it fails, there is always the option for RAN to take it off their hands)

Navy operational tests evaluated the aircraft from January 2021 until mid-July 2021, and it has flown in limited fleet operations. It didn’t meet a requirement for 75% operational availability or a metric to fly longer than 12.5 hours before an “operational mission failure,” according to the test office assessment.

The aircraft’s HF radio “which is required for over-the-horizon communications to support” Navy operations far from shore “was inconsistent, demonstrating a 12% success rate for long-range, two-way communications,” according to the report.