American Submariners Inc.
4370 Twain Ave.
San Diego, CA 92120-3404

The Silent Sentinel
June 2016

Our Creed and Purpose

To perpetuate the memory of our shipmates who gave their lives in the pursuit of their duties while serving their country. That their dedication, deeds, and supreme sacrifice be a constant source of motivation toward greater accomplishments. Pledge loyalty and patriotism to the United States of America and its Constitution.

In addition to perpetuating the memory of departed shipmates, we shall provide a way for all Submariners to gather for the mutual benefit and enjoyment. Our common heritage as Submariners shall be Strengthened by camaraderie. We support a strong U.S. Submarine Force.

The organization will engage in various projects and deeds that will bring about the perpetual remembrance of those shipmates who have given the supreme sacrifice. The organization will also endeavor to educate all third parties it comes in contact with about the services our submarine brothers performed and how their sacrifices made possible the freedom and lifestyle we enjoy today.

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Chaplain
Position is Open

The Silent Sentinel via Email

To all of my Shipmates and families who currently receive our Great newsletter via the mail who would like it sent via email or continue to receive it via mail, please fill out the form and mail it to the base or myself. We are trying to cut the cost of the newsletter down from $3700 to about $1900 a year. By receiving the Silent Sentinel via email will cut down the printing and mailing cost. The other plus to receiving it via email is you can save it on your computer and not have the paper lying around the house.

A subscription to the Silent Sentinel newsletter will be available to surviving family members via internet email, at no charge, upon notification of the Membership Chairman. If a printed hard-copy is preferred, via US Post Office delivery, an annual donation of $5.00 will be requested to cover costs.

NAME: _____

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EMAIL: _____

TELEPHONE: _____

Would like the SILENT SENTINEL emailed: YES_____ NO_____

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*DUE TO LOGISTICS CONSTRAINTS, ALL INPUTS FOR THE SILENT SENTINEL MUST BE IN MY HAND NO LATER THAN **ONE WEEK** AFTER THE MONTHLY MEETING. IF I DO NOT RECEIVE IT BY THIS TIME, THE ITEM WILL NOT GET IN. NO EXCEPTIONS! MIKE*

June 2016 MEETING

Our monthly meeting is held on the second Tuesday of the month at VFW Post 3787, 4370 Twain Ave., San Diego. Our next meeting will be on *June 14th.* The post is located one-half block West of Mission Gorge Road, just north of I-8. The meeting begins at 7 p.m. The E-Board meets one hour earlier at 6 p.m.

Check us out on the World Wide Web
www.ussvisandiego.org

Binnacle List

None reported

Submarine Losses in June

Originally Compiled by C J Glassford

USS Herring (SS-233)
Lost on June 1, 1944 with the loss of 83 men near Matsuwa Island. Herring was on her 8th war patrol and was conducting a surface attack when a shore battery spotted her and made 2 direct hits on her conning tower and causing her loss. Before being sunk, she had sank a freighter and a passenger-cargoman. Herring was the only US submarine sunk by a land battery.

USS R-12 (SS-89)
Lost on June 12, 1943 with the loss of 42 men near Key West, FL during a practice torpedo approach. The cause was probably due to flooding through a torpedo tube. The CO and 2 other men on the bridge survived, as did 18 crew members on liberty at the time of the accident.

USS Golet (SS-361)
Lost on June 14, 1944 with the loss of 82 men. On her 2nd war patrol, Golet was apparently lost in battle with antisubmarine forces north of Honshu.

USS Bonefish (SS-223)
Lost on June 18, 1945 with the loss of 85 men when sunk near Suzu Misaki. Winner of 3 Navy Unit Citations, Bonefish was on her 8th war patrol. After sinking a passenger-cargoman, Bonefish was subjected to a savage depth charge attack.

USS S-27 (SS-132)
Lost on June 19, 1942 when it grounded off Amchitka Island. She was on the surface in poor visibility, charging batteries and drifted into the shoals. When she could not be freed and started listing, the captain got the entire crew to shore (400 yards away) in relays using a 3-man rubber raft. The entire crew was subsequently rescued.

USS O-9 (SS-70)
Lost on Jun 20, 1941 with the loss of 33 men when it foundered off Isle of Shoals, 15 miles from Portsmouth, NH.

USS Runner (SS-275)
Lost between June 26 & July 4th 1943 with the loss of 78 men. Runner was on her 3rd war patrol probably due to a mine. Prior to her loss, she reported sinking a freighter and a passenger-cargoman off the Kuriles. This boat's last known ship sunk happened on June 26th, so she probably hit that mine on or after that date but before July 4th, when she was scheduled back at Midway.

San Diego Base, United States Submarine Veterans Inc.

Minutes of Meeting - 10 May 2016

1900 - Base Commander Bob Bissonnette called the meeting to order

Conducted Opening Exercises - Pledge of Allegiance lead by Secretary Jack Kane.

Treasurer David Ball lead the prayer

Base Treasurer David Ball conducted Tolling of the Boats for boats lost in the month of February.

Base Commander Bob Bissonnette recognized Past Commanders, dignitaries and guests.

Secretary Jack Kane announced 23 members present.

Treasurer David Ball gave his report. Checking Balance is $6314.17, Savings Balance is $22,578.73. Charlie Marin Scholarship Fund is $2,398.00. A copy of the Treasurer's Report will be filed with these minutes.

The minutes of the 12 April 2016 meeting were approved as published in the Sentinel.

Base Commander Called For Committee Reports

Acting Chaplain David Ball reported the following on the Binnacle List: Ray Febrache, Mike Hyman and Jack Ferguson.

Parade Chair Joel Eikam announced the next two parades are: Ramona on 21 May 2916 and La Mesa on 4 June2016.

Chairman Ray Febrache is on Binnacle. A membership Report will be given at the next meeting.

Scholarship Chairman Paul Hitchcock called for Scholarship Committee volunteers. He has 6 applications in hand. Shipmates Mert Weltzien and Ed Farley volunteered. Any other volunteers see Paul at the break.

Storekeeper Phill Richeson has Dolphins (gold and silver) newly stocked and new dolphin tie clips. He also has 2016 Calendars at a discount.

Base Vice Commander Warren Branges reported the next breakfast will be on 29 May. Volunteers are needed to cook and serve.

Base Vice Commander Warren Branges announced the next ALL FLAGS Day will be Saturday, 21 May 2016 - Armed Forces Day. Meet at 0700 to put up the flags. The 52 Boat Memorial received $184.00 from a Raffle held at the Western Region Roundup in Laughlin.

Shipmate David Kauppinen noted that major connectors were re-torqued just before the Linda Vista Parade. The float is good shape for the upcoming parades.

1926 - Base Commander called for a break.

1935 - Base Commander called the meeting back to order. 50/50 drawing was held. The Base made $52.53.

1949 - Unfinished Business

Base Commander Bob Bissonnette gave a short report about the Western Region Roundup. A longer report will be forthcoming. Next year's Western Region Roundup will be at Sam's Town on the Boulder Highway in Las Vegas 23-28 April 2017.

Base Vice Commander Warren Branges that the Old-Timer's Luncheon and Tolling of the Bells was held on 28 April 2016 at the Roncador.

Base Vice Commander Warren Branges reported that San Diego Base sponsored three WWII Submarine Veterans at the Submarine Birthday Ball. They were Joe Sasser, Charlie Tate and Colley O'Gorman. The Tolling of the Bells was done by Subase San Diego. Five WWII Submarine Sailors were honored at the Birthday Ball. Three of those honored qualified in 1943. The newly qualified submariner who was helped cut the cake will be invited to a future meeting to be presented a complimentary SUBVET Membership. Shipmate David Kauppinen noted that the turnout of SUBASE Subvets could have been better. You missed a good time by not attending.

Base Commander Bob Bissonnette noted the National Convention is in Reno NV this year. Dates are:
August 15-21. Registration Forms and agenda are available in the latest American Submariner or on the USSVI National Convention Website.

Base Commander Bob Bissonnette and Base Vice Commander Warren Branges reported that arrangements for the Memorial Day Ceremony on SUBASE Point Loma are progressing. The Ceremony will be held at 1000, 30 May 2106 at the Roncador. The Deputy Commander, Submarine Squadron Eleven will be the Guest Speaker. Some help is still needed for setup and for Gate Escorts. Let Warren know if you can help.

Base Commander Bob Bissonnette announced the Southern California SUBVETS Picnic will be held on Saturday, 23 July 2016. Submarine Tours will be at 0930 and 1300. Invitations to SUBRON 11 and boats will be sent in June.

Base Commander Bob Bissonnette has booked the VFW Hall for our Christmas Party on 3 December 2016. More information to follow.

2010 - New Business

Voting for National Elections will held on-line. Regional Directors will be also elected On-Line. The position of Western Region Director will be contested this year. Jim Denizen, (Director WD 1) is running against or own Base Commander Bob Bissonnette. Make sure you vote.

Base Commander Bob Bissonnette gave a quick update on National Mid-term Meeting. The Groton Base Situation. Groton Base is still mingling Base Fund (Non-profit) with Canteen Funds (For Profit). National will be looking at remedies. Future National Conventions will be held in Orlando (2017) and a Caribbean Cruise in 2018. National is looking for a Base to Host the 2019 Convention.

2021 – Good of the Order

Submarine History on the back table.

Storekeeper Phil Richeson announced that his grandson Phillip (USSVI Associate Member) graduates from High School in Arizona this month and will be attending parades and meetings starting in June.

Shipmate Ed Farley recounted an encounter with a newly qualified submariner whom he educated about Fleet Oilers.

Scholarship Chairman Paul Hitchcock thanked those who volunteered for the Scholarship Committee. The Committee now has enough volunteers to finish their work for the year.

Chief of the Boat Fred Fomby showed the USSVI Birdhouse that would be raffled at the next breakfast.

Fred Fomby told a groaner.

The Meeting was adjourned at 2042
Jack Kane, Secretary

/s/ Jack E. Kane

Sailing List for 10 May 2016

Fred Fomby	Bob Farrell	Bob Bissonnette	Phill Richeson
David Ball	Bill Earl	Jack Kane	Joe Sasser
Ed Farley	Warren Branges	Dennis Mortensen	Matt Baumann
Paul Hitchcock	David Kauppinnen	Ron Gorence	Chris Stafford
Mert Weltzien	Dennis McCreight	Joel Eikam	Peter Lary
Manny Burciaga	Joe Acay	Bud Rollison	

Current News

**"Plataginet, I will; and like thee, Nero,
Play on the lute, beholding the towns burn" (*Henry VI,* Shakespeare)**

New Evolving Navy Drone Strategy Envisions More Autonomy, Faster Processing
Kris Osborn, Scout Warrior, June 7

Groups of underwater drones will soon simultaneously use sonar and different sensors to identify and destroy enemy submarines and surface ships, search for mines, collect oceanographic data and conduct reconnaissance missions – all while a single human performs command and control functions aboard a Navy ship or submarine, senior service officials explained.

Perhaps several submarine-launched underwater robots or Large Displacement Unmanned Undersea Vehicles could identify a threatening enemy submarine or surface vessel at distances far beyond the normal detection range.

Groups of integrated drones would then instantly relay pertinent data to underwater or ship-board computing systems and sensors. As a result, humans in a command and control function to access relevant information faster and more efficiently, providing commanders with a larger window with which to make critical decisions, Rear Adm. Robert Girrier, Director, Unmanned Warfare Systems, told Scout Warrior in an interview.

Using satellite integrated telemetry, some underwater drones can transmit information back to boats in near real time; this provides a substantial tactical advantage because smaller drones are less detectable to enemy sonar and therefore able to access areas that are more difficult for larger submarines to penetrate. Such a technology allows for closer-in reconnaissance missions when it comes to operating in enemy territory, close to the shoreline, or overcoming the anti-access/area-denial challenges posed by potential adversaries.

Correspondingly, a group of ship-launched aerial platforms such as Puma unmanned systems accompanied by swarms of mini-drones are might be able to beam back real-time video feeds of threats beyond-the-horizon, finding and possibly attacking otherwise out-of-range enemy targets such as fast-approaching small boats, ships or incoming anti-ship cruise missiles.

It is not inconceivable more timely identification of approaching threats and attacks at farther distances could mean the difference between life or death for crew members on board a ship or submarine.

Such scenarios, envisioned for the not-too-distant future, provide the conceptual foundation of the Navy's emerging drone strategy. The idea is to capitalize upon the fast increasing speed of computer processing and rapid improvements in the development of autonomy-increasing algorithms; this will allow unmanned systems to quickly operate with an improved level of autonomy, function

together as part of an integrated network, and more quickly perform a wider range of functions without needing every individual task controlled by humans.

"We aim to harness these technologies. In the next five years or so we are going to try to move from human operated systems to human assisted systems ones that are less dependent on people. Technology is going to enable increased autonomy," Girrier told Scout Warrior.

The strategy is aimed at enabling submarines, surface ships and some land-based operations to take advantage of fast-emerging computer technologies. While not likely to be realized in immediate or near-term future, this trajectory will ultimately likely lead to the use of what's called "artificial intelligence." This involves the use of more independent, computer-driven unmanned systems to gather, organize and integrate a vast array of different information and sensor data – before providing it to human commanders.

Girrier explained that the emerging strategy is by no means intended to replace humans but rather leverage human perception and cognitive ability to operate multiple drones while functioning in a command and control capacity.

Perhaps multiple small drones could send out an acoustic ping and then analyze the return signal to pinpoint the location of a threatening enemy target – providing a submarine with the necessary data to launch a precision-guided heavyweight torpedo to destroy the threat from a safer distance.

"This is not talking about removing the human in the loop but optimizing humans and machines working together. Think about combining the creativity and agility of the human mind with a computer that does things faster – that is pretty powerful. That is at the center of our unmanned strategy," Girrier added.

The approach is designed as a mission multiplier to increase efficiency and perform a wider range of functions much more quickly. Armed with a small fleet of underwater drones, a submarine or destroyer will be able to perform higher-priority missions while allowing unmanned systems to quickly gather and transmit combat-relevant tactical and strategic information.

Unmanned systems will also increasingly be involved in strike missions to identify and attack enemy targets from the air, land or undersea domain, Girrier added. However, in a manner consistent with the development of other unmanned systems, decisions about the use of lethal force with drones will, according to Pentagon doctrine, be made by human beings in a command and control capacity.

Current Progress

The Navy's Unmanned Systems Directorate, or N99, was formally stood up this past September with the focused mission of quickly accessing emerging technologies and applying them to unmanned platforms.

Girrier explained how the process of increasing computing power is already underway with a handful of current Navy platforms, including the Navy's RQ-4 Alpha Global Hawk or Broad Area Maritime surveillance which has been operating in the Middle East region for quite some time now. The Navy Global Hawk is now being developed into a high-tech maritime-specific platform called the Triton; the Triton is engineered with particular maritime sensors, an ability to traverse through different altitudes and weather conditions and a special ability to operate in icy conditions.

The Navy has added a new software programmable radio technology to the RQ-4 system, giving it a much more efficient ability to transmit information. Software programmable radios can often operate on multiple frequencies with different waveforms to send IP packets of data, voice and even video across the force in real time. Each radio not only sends RF signals but also functions like a node or router in a wireless computer network. These radios allow the Navy to combine multiple radios into a single box, Girrier explained.

"Software reprogrammable radio is an ability to increase the configuration of a specific radio so that way you do not have to change it out. Instead of having four different radios in different spectrum ranges, you have one box," he said. "Technology is allowing us to reconfigure things within the same size, weight and space."

In addition, the Navy is operating a small ship-launched Puma drone to provide over-the-horizon visual range for surface platforms, he added.

"This is helpful in counter-piracy and interdiction ops and has an enhanced recovery. It uses a GPS position to fly the UAS into a net and make it more precise, quicker and more efficient," Girrier said.

The Navy is also working with platforms called Wavegliders designed to collect oceanographic and hydrographic information, Girrier explained. For instance, a current underwater drone called the Seaglider uses buoyancy and wings to achieve forward motion as opposed to an electrically driven propeller. It is able to gather oceanographic data for long periods of time, collecting data and then sending it back.

The service is the early phases of developing an emerging program called the MQ-25 Stingray intended to be a carrier-launched unmanned refueling and ISR platform.

Marlin Underwater Drone

As further evidence of the Navy's progress toward computer-driven drones, the Navy and General Dynamics Electric Boat are testing a prototype of a system that would allow the launch and recovery of unmanned underwater vehicles and other payloads from the missile tube of a cruise missile submarine.

Called the Universal Launch and Recovery Module, the system houses, launches and recovers an underwater vehicle, a Lockheed-built 10,000-pound prototype vehicle called Marlin, from the submarine's missile tube.

The system is showing promise in early testing and was slated to go sea aboard a guided missile, nuclear powered submarine (SSGN), Electric Boat officials said.

The vehicle is designed for a range of potential underwater missions to include counter-mine patrol, sonar or other intelligence, surveillance and reconnaissance (ISR) missions.

Electric Boat and Navy officials explained how submarines have the ability to get really close to something.

The prototype vehicle is hooked up to temporary hydraulics and engineered to acquire a buoy at the top of the missile tube using a transponder, officials explained.

Marlin comes out of a tube, rotates, and then deploys. It goes off and does its thing – mine warfare, ISR, etc. – Then it comes back and it mates with that buoy before it is brought back down into the tube, Electric Boat developers said.

Once a tactical version of the technology is built, it will fill up the launch tube out to 60-inches in diameter and stretch as long as 23-feet. The vehicle could weigh up to 30,000-pounds.

The prototype vehicle is controlled by two laptop computers, removing the need to adjust the infrastructure of the submarine in order to accommodate the system, Electric Boat officials explained.

"It is a gigantic elevator that will take up to 30,000 pounds and raise it from inside the ship to outside the ship. We're not modifying the submarine's infrastructure to control this," an Electric Boat developer described.

In addition to being configured to swim from an SSGN, the system is also being configured by Electric Boat and the Navy to work from the Virginia Payload Modules of Virginia-Class attack submarines to begin construction by 2019.

Virginia Payload Modules, or VPM, consist of an effort to increase the missile firing capability of Virginia-Class submarines from 12 to 40 vertically fired missiles.

British Navy Intercepts Russian Submarine On Way To Channel
Staff, The Guardian, June 8

The Royal Navy has intercepted a Russian submarine as it cruised towards the Channel.

The sub was being escorted by the frigate HMS Kent on Tuesday evening and was expected to pass the strait of Dover on Wednesday morning.

It is understood that the Stary Oskol, a Kilo-class submarine capable of carrying cruise missiles and torpedoes, was first detected in the North Sea, where NATO forces are monitoring the waters.

The Ministry of Defense said it would continue to be shadowed by the Type 23 Duke-class frigate, which had been taking part in commemorations for the Battle of Jutland centenary.

The defence secretary, Michael Fallon, said: "This shows that the navy is maintaining a vigilant watch in international and territorial waters to keep Britain safe and protect us from potential threats."

HMS Kent's commanding officer, Cdr Daniel Thomas, said: "Locating this submarine was a combined effort with NATO allies and shadowing such units is routine activity for the Royal Navy.

"We continue to escort the submarine as it conducts its passage, providing a visible presence."

The incident is the latest face-off between the British and Russian militaries following several incursions by aircraft in skies around the UK.

In April 2015 a trawler was dragged violently by its nets while fishing 18 miles off the coast of Northern Ireland, leading to suspicions they had snagged on a Russian submarine.

Admiral Warns: Russian Subs Waging Cold War-Style 'Battle of the Atlantic'
Sam LaGrone, USNI, June 3

Russia has stepped up its submarine operations and is regularly probing U.S. anti-submarine networks in a new "Battle of the Atlantic," the commander of U.S. 6th Fleet said.

In an article for the U.S. Naval Institute's June issue of Proceedings, Vice Adm. James Foggo III outlined a new era in U.S. and Russian submarine warfare he dubs "The Fourth Battle of the Atlantic."

In his piece, Foggo compares the current uptick in Russian submarine posture to the great submarine battles between the Allies and the Germans in World War I and World War II and the Soviets and the U.S. during the Cold War.

"Once again, an effective, skilled, and technologically advanced Russian submarine force is challenging us. Russian submarines are prowling the Atlantic, testing our defenses, confronting our command of the seas, and preparing the complex underwater battlespace to give them an edge in any future conflict," Foggo wrote.

"Not only have Russia's actions and capabilities increased in alarming and confrontational ways, its national-security policy is aimed at challenging the United States and its NATO allies and partners."

Since the Russian seizure of Crimea in 2014, Russian Navy surface ships, aircraft and submarines have been much more active in presence operations – particularly the submarines.

Russian officials have been open about increased submarine operations over the last two years. Russian Navy head Adm. Viktor Chirkov said in March of 2015 that submarines operations have increased by 50 percent.

"This is logical and necessary to guarantee the security of the state," he said at the time in Russian state-controlled press.

While Russian surface ships and aircraft trail behind their U.S. equivalents technologically, Russia has maintained a strong submarine industrial base since the collapse of the Soviet Union.

In late 2014, the U.S. officer in charge of the U.S. submarine construction told a conference he was so impressed with the Russian Navy's new Yassen-class attack submarine he had a model built of the first-in-class attack boat K-329 Severodvinsk.

"We'll be facing tough potential opponents. One only has to look at the Severodvinsk, Russia's version of a [nuclear-guided missile submarine] (SSGN)," then-Program Executive Office submarines Vice Adm. Dave Johnson said at the time.

"I am so impressed with this ship that I had [the Navy] build a model from unclassified data."

In addition to nuclear submarines, the Russians are improving the technological capability of their diesel-electric submarines, including the ability for Russian Kilos to launch long-range Kalibir NK cruise missiles.

"These are the platforms that are the most challenging for us to deal with because of their inherent stealth," Foggo wrote.

"As demonstrated last December by Kalibr launches into Syria from the Eastern Mediterranean, Russian leaders will use such weapons at will, without the same qualms we have about collateral damage."

All told, Foggo outlines an "arc of steel" of Russian submarine strength from the Arctic to the Black Sea.

"Combined with extensive and frequent submarine patrols throughout the North Atlantic and the Norwegian Sea, and forward-deployed forces in Syria, Russia has the capability to hold nearly all NATO maritime forces at risk," he wrote.

The Submarine Drones That Could Depower Trident
James O'Malley, Alphr, June 1

It has been constant political background noise for years, but soon the politicians are finally going to have to make a decision: should our Trident nuclear deterrent be renewed for another generation?

The Trident system consists of four nuclear submarines – of which at least one is at sea at all times, hiding in the shadows under the water. The idea is that they enable Britain to have an independent "second-strike" capability, so that if the worst happens and London is reduced to a smoldering ash-filled crater, Britain will still be able to unleash the same apocalyptic level of destruction on Moscow, Beijing or whichever villainous power fired first.

The argument as to whether Britain needs nukes or not is contentious enough, but there is one other potential problem that Trident could face in the coming decades: a new generation of submersible drones that could soon render it useless.

Improving drones

Remotely Operated Vehicles (ROVs) have been used to explore under the sea for decades, but these have always remained tethered to the ship, and have been driven by remote control by someone sat at the surface. The challenge for scientists now is to build autonomous underwater vehicles (AUVs) that can operate truly independently.

Such drones would obviously be a threat to Trident, because they could be deployed for long periods of time – and in large numbers – without requiring human operation, making global ocean surveillance a genuine possibility.

AUVs face different challenges to aerial drones. For example, although weight is less of an issue under water, radio waves do not easily travel beneath the surface. This means that any such drones can't easily be guided by GPS and must instead rely on onboard sensors. It also makes transmitting collected information more difficult.

In March, the National Oceanography Centre (NOC) won £2.9 million of government funding to continue work on its Autosub program. Based in Southampton, over the past several years the project has made some impressive leaps towards solving these marine-specific challenges. The public face of the project is all about civilian-focused applications such as in scientific research, but it's easy to imagine how the technologies could be deployed for military purposes.

For example, the Autosub3 has been tested a number of times in 24-hour missions in which it has been sent to collect data from beneath polar ice, and it has returned every time. The way it solves the GPS problem is rather clever: it uses a technique called dead reckoning, which was used by mariners long before we had satellites. The idea is that once you know one fixed position, you can use your knowledge of the speed and direction that you're travelling to calculate your position. The Autosub3 uses sonar waves bounced off the ocean floor to figure out its speed by comparing the Doppler effect. For direction, it uses a fiber-optic gyroscope, which apparently means it makes errors of only about one meter for each kilometer travelled.

There is one problem AUVs have in common with UAVs: battery power. According to NOC, the Autosub3 is powered by the same "D" batteries that you might find in a torch (the big, thick batteries that are about twice the size of a AA battery). It's pretty power-hungry, though: it required 5,000 of them to run.

This means that the AUV has been able to explore undersea ice caves in the Antarctic that would otherwise be inaccessible to humans. And amazingly, this isn't the cutting edge – this was achieved back in 2009.

Mobile technology

More recently, NOC scientists have been taking advantage of the revolution in mobile technology thanks to a booming smartphone industry. The tiny, fast and power-efficient processors that we use on our phones have also made more powerful UAVs possible. The Autosub LR (as in "long range") can – in theory – last up to six months, with a range of 6,000km. With this range, it could also be launched much more cheaply – being launched from the shore and then travelling to its destination, rather than requiring a polar research vessel to take a trip.

In 2014, the Autosub LR was launched for the first time off the coast of Ireland, and it wasn't a 100% success. It lasted three days – surfacing each day to transmit data back – before the scientists lost signal. It was presumed lost, but eventually made contact using its emergency satellite beacon. Scientists were able to retrieve the AUV and are currently in the process of figuring out what went wrong. But what's clear is that even though this test ended badly, this is the sort of AUV that could conceivably be tasked with hunting down nuclear submarines.

Drones that can maneuver themselves would also make it harder for submarines to get away once they've been detected. Currently the best detection system to figure out what is going on beneath the waves is the sonobuoy. These are missile-shaped devices that are usually dropped out of planes, which then deploy a parachute and land gracefully on the water. At this point, a sonar is dropped beneath the surface and scanning can begin. Signals are then sent back to the aircraft flying above, or perhaps a satellite. The problem with them currently is that they're static, so if they pick up an enemy sub, the bad guys can simply float off somewhere else. A UAV system, by contrast, could conceivably lock on to the signal and essentially chase it.

The actual detection technology is getting better, too. Although sonar is still the primary means of detection, techniques are being developed that use other types of sensing – including optical. Processing signals is also improving. Relatively recent research shows that scientists are improving the range at which they can model the contents of the ocean – with man-made objects giving a distinct acoustic pattern to fish and other natural material.

Underwater networks

Another other area in which UAVs are driving new research and technology is in networking. As mentioned above, radio waves don't travel well under water – which makes it hard to feed data back to base. But if this problem can be solved, it could be hugely useful to whoever manages to crack it – and could conceivably undermine Trident's ability to hide.

This is because we shouldn't just think about individual vehicles working independently when we think about UAVs. What is more likely is that we'll eventually reach a point where UAVs operate in packs – patrolling the ocean together.

For example, Georgia Tech Research Institute has a program working on UAVs that can collaborate without human intervention – so that one drone can call over another that perhaps has a different type of sensor on board.

To get around the communication problem, the Institute's current research is using acoustic communication techniques – essentially the same sound energy as found in sonars – to send data between UAVs. The problem is that data transfer is very slow compared to radio frequencies. The Institute has expressed hopes though that it will actually carry out further research on radio signals – although the trade-off will presumably be that any radio communications require more power to boost the signal so it can travel through water.

The danger to Trident is that UAVs hunting in packs will bring the same efficiencies that a pack of wolves has over an individual wolf looking for its prey. If communication technologies improve too – as seems likely – then this will enable even greater efficiencies.

Troubled waters?

Given these advances, and the new technologies that are predicted to be close, there's an awkward question: is renewing Trident pointless? The deterrent needs to last us an entire generation – both for actual defense reasons, and in order to justify the enormous price tag.

We can take some solace in the fact that the technologies talked about here are being developed by the West – and moreover for non-military applications – rather than any likely adversary. But this doesn't mean Trident is safe, nor that other countries aren't already pursuing similar, albeit militarized projects: if the Cold War arms race taught us anything, it's that any technological advantage doesn't remain an advantage for long. (And you only have to glance at consumer technology to see that China is just as capable of producing world-leading technologies as we are.)

For all the leaps and bounds being made in UAV tech, however, it's important not to underestimate the sheer scale of the challenge involved in detecting a submarine, nuclear or otherwise. As Andrew Tate, a former UK Royal Navy officer, writes in Jane's Navy International, "The most difficult challenge in anti-submarine warfare is to find the patrolling SSBN (nuclear-powered ballistic missile-carrying submarine). It will operate at slow speed to minimize its signature, will not make any transmissions, will rarely return to periscope depth, and may operate in a vast area. For example, the North Atlantic Ocean covers more than 15 million square miles… Persistent UAVs, even with comparable or better sensors, would not change the odds significantly."

The good news is that even if Trident faces challenges from advances in underwater drone technology, it could still have some use. Simply put: Trident could still be the best option available. The comparison to make isn't between having Trident submarines and not having Trident submarines at all. The question is whether a submarine delivery system is still the best option compared to aircraft, missile silo or any other way of delivering a warhead to its destination.

Similarly, although Trident will likely become less easy to hide, if it can remain relatively well hidden, it will still remain a better option than a means that cannot be hidden at all.

So should we renew Trident? That's a question for politicians and ethicists – but whatever we decide, we should probably think about technological evolution first.

The Fourth Battle Of The Atlantic
Vice Adm. James Foggo III, U.S. Navy, and Alarik Fritz, Proceedings Magazine, June 1

With 'more activity from Russian submarines than we've seen since the days of the Cold War,' an improved European force posture becomes vital for the U.S. Navy and NATO.

One hundred and one years ago, a great power released a new weapon on the world. They allowed it to sidestep its adversaries' military advantages and deal them a near-crippling blow. Those weapons, the U-boats of the German Empire, used new technologies to blockade the British Isles and sink millions of tons of Allied shipping. Eventually, the Royal Navy prevailed, but the outcome of that battle was never a foregone conclusion. It took the development of an array of new antisubmarine technologies and tactics, as well as a massive mobilization of resources, that enabled the Allies to win this "First Battle of the Atlantic."

Seventy-six years ago, the Second Battle of the Atlantic began. Again, German U-boats threatened the Allies, this time with new tactics and technologies based on experiences in the previous war. The Germans had learned how to overcome the antisubmarine warfare (ASW) advantages of the Allies, and only by again bringing new technologies, tactics, and resources to bear did the Allies prevail.

During the Cold War, our ASW forces engaged in a constant cat-and-mouse game with the Soviet Union's submarines. Nuclear power, ballistic and cruise missiles, and quieter systems empowered Soviet submarines in troubling ways. To respond, the United States and its allies were forced to build greater and more effective ASW forces and continually refine their own ASW technologies and doctrine to counter the Soviets. In the shadow of nuclear deterrence, the stakes of this competition were as high as could be imagined. This was the Third Battle of the Atlantic, and, although it was not a shooting war, it showed once again that a responsive, adaptive, and forward-deployed ASW force is necessary to deter aggression against our nation and its allies.

In the early 1990s, the end of the Cold War, the collapse of the Soviet Union, and commentary such as Francis Fukuyama's landmark essay "The End of History?" led us to believe that our strategic rivalry with Russia and our need to stay one step ahead of Russian capabilities had faded. It has not. Once again, an effective, skilled, and technologically advanced Russian submarine force is

challenging us. Russian submarines are prowling the Atlantic, testing our defenses, confronting our command of the seas, and preparing the complex underwater battlespace to give them an edge in any future conflict. Vice Admiral Clive Johnstone, Royal Navy, the head of NATO's maritime forces, noted recently that his forces report "more activity from Russian submarines than we've seen since the days of the Cold War." Some analysts believe that even our underwater infrastructure–such as oil rigs and telecommunications cables–may be under threat by these new and advanced forces. Russian focus, investment, and activity in the undersea domain are now so unmistakable that even the head of the Russian Navy, Viktor Chirkov, has admitted that Russian submarine patrols have grown 50 percent since 2013.

Despite the economic crisis in Russia, rubles continue to flow into the development of Russian submarine technology and the growth of that force. The father of the modern Russian submarine force, the brilliant and highly decorated design engineer Igor Spassky, admits Russian submarine forces are expanding and advancing, and that they will be a key part of the country's arsenal for the foreseeable future.

By 2020, the Russian Black Sea Fleet alone will receive the equivalent of $2.4 billion of investment. And these are not the submarines we faced during the Cold War. There may be fewer of them, but they are much stealthier, carry more devastating weaponry, and go on more frequent and longer deployments than before. The submarines of the Russian Federation are one of the most difficult threats the United States has faced. This threat is significant, and it is only growing in complexity and capacity.

Russia's New Approach

Not only have Russia's actions and capabilities increased in alarming and confrontational ways, its national-security policy is aimed at challenging the United States and its NATO allies and partners. For example, the new Russian national security-strategy depicts the United States and NATO as threats to Russian security and accuses us of applying "political, economic, military, and information-related pressure" on Russia. Thus, not only is Russia pursuing advanced military capabilities (especially in the underwater domain) that enable it to be a credible threat to us, it is now boldly saying that it intends to act as one.

An enduring objective of Russian foreign policy today is to challenge NATO and elevate Russia on the European stage once again. Building on the national strategy, the new Russian maritime doctrine reorients its naval forces in a calculated and determined way. By confronting NATO at will, Russia confirms its status as a great power in the 21st century. The new maritime doctrine tells us that Russia will counter our existing ASW technologies; challenge U.S. and NATO's maritime presence in the Atlantic as well as the Baltic, Black, and Mediterranean seas; and expand Russian permanent presence in the Arctic and Mediterranean.

Furthermore, Russia is rapidly closing the technological gap with the United States. It has created an advanced military designed to overcome our advantages and exploit our weaknesses–this is the epitome of asymmetric warfare. Nowhere is this more evident than in the maritime (and especially underwater) domain. Russia rapidly is building and deploying more advanced and significantly quieter attack submarines and frigates armed with the long-range Kalibr cruise missile (including six new Kilo-class nuclear-powered attack submarines destined for the Black Sea). Not coincidentally, these are the platforms that are the most challenging for us to deal with because of their inherent stealth. As demonstrated last December by Kalibr launches into Syria from the Eastern Mediterranean, Russian leaders will use such weapons at will, without the same qualms we have about collateral damage. The clear advantage that we enjoyed in antisubmarine warfare during the Cold War is waning. Russian submarines are more capable than before, and so we are again in a technological arms race with Russia.

Russia is claiming maritime battlespace across Europe and deploying forces outside Russian borders. An interlocking system of Russian coastal missiles, interceptor aircraft, air-defense systems, surface ships, and submarines now threatens all maritime forces in the Baltic, as well as our NATO allies in Lithuania, Estonia, and Latvia–who no longer control even their own coastlines unless Russian leaders allow them to do so. A similar anti-access/area-denial (A2/AD) "fortress" was constructed in the Black Sea after Russian forces invaded Ukraine and seized Crimea. Russian forces deployed to Syria are growing steadily, and Russia has constructed military bases in the Arctic, militarizing and claiming large swaths of it, in contravention of customary international law. In this way, Russia has blunted our power-projection capabilities through A2/AD and extended its influence far beyond its borders.

Russia now employs an "arc of steel" from the Arctic through the Baltic and down to the Black Sea. Combined with extensive and frequent submarine patrols throughout the North Atlantic and Norwegian Sea, and forward-deployed forces in Syria, Russia has the capability to hold nearly all NATO maritime forces at risk. No longer is the maritime space uncontested. For the first time in almost 30 years, Russia is a significant and aggressive maritime power.

In his extensive academic research on naval innovation, Owen R. Cote, Jr., of the Massachusetts Institute of Technology's Strategic Studies Program has long warned of a potential "fourth battle" for control of the undersea domain. It is now clear that a fourth battle is not looming, but is being waged now, across and underneath the oceans and seas that border Europe. This is not a kinetic fight. It is a struggle between Russian forces that probe for weakness, and U.S. and NATO ASW forces that protect and deter. Just like in the Cold War, the stakes are high.

Winning the Fourth Battle Today

With our allies and partners in NATO and across the globe, we present a broad and united front against any potential Russian threats. Our maritime partnerships yield a global network of navies that together form the greatest maritime force for peace ever known. NATO exercises demonstrate our unity superbly. For example, on 7 June 2015, 17 nations, with 49 ships, more than 60 aircraft, and a vast array of ground forces, demonstrated their abilities to operate together to defend the Baltic region in BALTOPS. This exercise, in its 43rd year, made it clear that the United States, NATO, and partner nations have an unwavering commitment to protect themselves by acting in concert. Similarly, Sea Breeze 2015 sent a clear signal to Russia that the United States and its allies will not back down in the Black Sea region. Eighteen ships from 11 nations (Bulgaria, Germany, Greece, Italy, Moldova, Romania, Sweden, Turkey, Ukraine, the United Kingdom, and the United States) demonstrated the will and ability to operate together to achieve maritime security and conduct air defense and antisubmarine warfare in the Black Sea.

A variety of policy and resource shifts have been enacted that signal our resolve to Russia. For example, the U.S. Navy's revised Cooperative Strategy for 21st Century Seapower notes the critical importance of all-domain access and deterrence. The Chief of Naval

Operations' recent Design for Maintaining Maritime Superiority puts the Navy on a clear path to adapt to the new global security environment. But we must act now to implement such guidance before Russia provokes again. To do so, we must engage and conduct operations forward more deliberately, more strategically, and with more forethought–and in ways that encourage responsible behavior by Russia while still deterring Russian belligerence.

From a diplomatic perspective, we can find areas of common interest. One of the most obvious examples is maintaining safety at sea. Despite the recent aggressive "buzzing" of the USS Donald Cook (DDG-75) in the Baltic by a Russian Su-24, the incidents-at-sea (INCSEA) agreements with Russia remain a heartening example of how we can still cooperate with Russia despite its leadership's adventurism. We also share a desire to defeat violent extremist organizations such as ISIS. We must be prepared to work with Russian leaders if they want to collaborate responsibly on these or other issues of mutual interest. To do so, we can and should meet with our Russian counterparts when possible and prudent. Track-two diplomatic efforts, international symposiums, and other forums that provide such opportunities should also be encouraged.

Of course, diplomacy alone is unlikely to be sufficient. To encourage responsible behavior by Russia we must engage from a position of strength, not weakness. Improving our current force posture in Europe will demonstrate our strength and thereby deter Russia from further adventurism. The first step in improving our force posture is to leverage allied navies to enhance our maritime security. We must work directly with our NATO partners to help them develop the capabilities and capacity to operate seamlessly together and with the United States, respond to contingencies, and protect key maritime infrastructure. Through combined exercises and maritime presence, a network of navies in Europe and across the globe can face Russia from a position of strength and ensure continued peace. Our part in supporting these efforts has been clearly outlined by CNO Admiral John Richardson: We must "prioritize key international partnerships through information sharing, interoperability initiatives, and combined operations [and] explore new opportunities for combined forward operations." The old saying "a house divided cannot stand" is more true now than it has been in many years. To preserve peace, we must unite to deter Russian aggression.

We also should reassess our own global force deployments and exercises. Additional submarines, ASW forces, carrier strike groups, and other assets should be rotated through Europe and used to show Russia that we can bring overwhelming force to bear if need be. We should increase our ASW exercises with our NATO allies, in both the Atlantic, Mediterranean, and elsewhere, to demonstrate that NATO can track Russian submarines at will, no matter where they are.

Finally, we must not lose our technological edge. More than perhaps any other warfare area, ASW requires us to stay one step ahead of Russian technologies. In the world wars, the Allies prevailed over German U-boats not by force alone, but by innovation. In the Cold War, the rise of nuclear-powered Soviet submarines required us to develop new acoustic and other technologies. Today, we are once again in a technological arms race with Russia. We must maintain an innovative edge and rapidly field new technologies if we are to prevail.

At this time in history we would do well to remind ourselves it is better to prevent wars than to fight them. The U.S. Navy, through forward presence, power projection, and technological advantage, is the epitome of demonstrating resolve and capability in the service of war prevention. In today's world, wars can only be truly prevented in partnership and cooperation with other nations. The stronger and more resolute we and our allies and partners are together, the less likely that war will occur. And therein lies the true strength of the U.S. Navy–it is not simply by maintaining our technological edge and our readiness to impose unacceptable costs on Russia should the need arise. What makes ours the world's greatest and most effective navy is the fact that we act in concert with our NATO allies and partners. It is only in this way that we, and all like-minded allies and partners, maintain peace–by unmistakably and constantly deterring Russian aggression.

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The U.S. Navy's New Lethal Torpedo Is Almost Ready for War
Dave Majumdar, The National Interest, May 31

The U.S. Navy and Lockheed Martin are restarting production of the latest version of the Mk-48 heavyweight torpedo. The new Mod 7 version-which is being upgraded under the Common Broadband Advanced Sonar System (CBASS) program-will help the Navy's attack boats take on the threat from advanced Russian and Chinese-built ships and submarines.

"The latest guidance and control technologies for Mk-48 torpedo are thanks in part to Lockheed Martin's $10 million investment in manufacturing efficiencies, facilities, and laboratories to ensure navies can pace the threats in littoral and deep sea environments," said Tom Jarbeau, Lockheed Martin Mk-48 program director. "We are building on our five decades of experience in undersea systems and our strong record of providing complex electronic systems to our customers on schedule and on budget."

Lockheed Martin developed the new version of the Mk-48 under a five-year $425 million contract that was awarded in 2011. While the Mod 7 upgrade will be applied to new torpedoes, it can also be used to upgrade older weapons to the new standard. Under the terms of the contract, Lockheed Martin will deliver 20 Mod 7 CBASS kits to the Navy per month. The company expects that it could sell as many as 250 torpedoes to the Navy over the next five years.

Compared to older versions of the venerable Mk-48, the new modular Mod 7 variant increases sonar bandwidth. It can transmit and receive pings over a wider frequency band and it takes advantage of broadband signal processing techniques to greatly improve the weapon's search, acquisition and attack effectiveness. The new weapon is also much more resistant to advanced enemy counter-measures. Perhaps most significantly, the Mod 7 uses modern open-architecture computers, which means it will be easier to integrate new hardware and software upgrades.

The new upgrades will keep the venerable 21-inch diameter, 3500lbs weapon—which incorporates a 650lbs warhead—relevant well into the future. The original version of the weapon was designed during the 1960s and entered service in 1971 with the U.S. Navy. Over the years the Mk-48 has been upgraded many times and remains the principal anti-ship and anti-submarine weapon onboard American submarines—and indeed many allied navies. Versions of the Mk-48 are in service with the Canadian, Australian, Dutch and Brazilian fleets.

The Mk-48 will remain the U.S. submarine fleet's primary weapon for the foreseeable future.