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The Silent Sentinel

August 2011

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.

Submarine USS San Francisco Holds Change of Command

From: Submarine Squadron 11 Public Affairs, July 22, 2011

NAVAL BASE POINT LOMA, Calif. – Commander Eric L. Severseike relieved Commander Nathan H. Martin as Commanding Officer of Los Angeles-class, fast-attack submarine USS San Francisco (SSN 711) during a change of command ceremony at the Roncador Submarine Memorial on Naval Base Point Loma July 22.

San Francisco recently returned from a Western Pacific deployment, steaming more than 37,500 miles in support of the Maritime Strategy and completing three operations in support of theater and national tasking. Also, while under Cmdr. Martin's command, the ship completed an extended dry dock maintenance period at Puget Sound Naval Shipyard in Washington, a major combat systems modernization, and several fleet and tactical development exercises.

Rear Admiral Michael J. Connor, director of Naval Warfare Integration Group, was the guest speaker. Rear Adm Connor and Cmdr. Martin previously served together onboard USS Seawolf (SSN 21).

Cmdr. Martin, a native of Clifford, North Dakota, will remain in San Diego and next serve as Deputy Commander, Submarine Squadron Eleven.

Cmdr. Severseike, a native of Radcliffe, Iowa, began his Navy career in 1994 after graduating from the U.S. Naval Academy with a bachelor's in mechanical engineering. He has previously served aboard USS Pasadena (SSN 752), USS Michigan (SSBN 727) (Gold), and USS Rhode Island (SSBN 740) (Gold). Additionally, he holds a master's in military studies from the U.S. Marine Corps Command and Staff College.

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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.

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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*

August Meeting

Our monthly meetings are held on the second Tuesday of the month at VFW Post 3787, 4370 Twain Ave., San Diego. Our next meeting will be on 9 August, 2011. 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 July

Submitted by C J Glassford

G – 2 (SS 27) Duty Section on Board: Sank, on 30 July 1919, At Moorings, in New London, Connecticut : " 3 MEN LOST "

GRUNION (SS 216) 70 Men on Board: Sunk, on 13 July 1942, by Gunfire from Torpedoed Japanese Transport (Kashima Maru), Ten Miles North of Segula, near Kiska Island, Aleutians : " ALL HANDS LOST "

S – 28 (SS 133) 50 Men on Board: Sunk, on 4 July 1944, During ASW Exercises, Off the Hawaiian Islands : " ALL HANDS LOST "

ROBALO (SS 273) 78 Men on Board: Sunk, on 26 July 1944, by a Mine, Off Western Palawan, Philippine Islands. " 74 MEN " went down with the Boat. Four Men managed to swim away, but were picked up by a Japanese Destroyer. " ONE MAN DIED, " of injuries on board the Destroyer. " THREE MEN DIED, " in POW Camp : " THERE WERE NO SURVIVORS "

Commanders Corner

AUG 2011

Hello all! I hope you all had a chance to make it to the Joint SubVets Picnic this year. We had lots of folks there (about 125 or so). We had folks from the Las Vegas Base/Motorcycle club (Base 51) come join us. I would like to thank all the Bases and our WWII Chapter for participating in this year's picnic and all the support. A big thanks to David Ball for running with the program this year due to me almost not being here due to work. Thanks to Ron for running the games and folks to the afternoon tours. And thanks to Rick for mustering the folks together for both tour groups. I hope we can get more folks out for next year's picnic. Yes, we made our own Horseshoe pit and hopefully the base will put them back in to the newly remodeled park. A Big thanks to Fred for repainting the float for the 4th of July parade in Julian. We had a great turn-out for the parade with 20 or 24 people there. We have a few more parades coming up later this year and I hope we can support them as well as we did in Julian.

I am working on getting another tour together for the end of Sept. I had a big demand on the sign-up sheet, but had a handful of no-shows in the morning group. Please let me or whoever is taking the names know if you can't make the tour, so others who are on the stand-by list can get the opportunity to make the tour. Plus it looks bad on use when we request 2 tours of 25 people and don't fill the slots. I will not get confirmation of the tour until late Aug., and I will get the word out.

The National Convention is right around the corner and I hope to see some of you all there! If you are thinking about going and are not sure about going, please talk to me. Hopefully I will be able to bring back some goodies to raffle off. If nothing else, I will have a butt ton of pictures of the convention and hopefully of the boat reunions.

The next time we see Jim Rogers from the LA/Pasadena Base (also a SD base member), please Thank him for all the great items he has donated to the base for raffles and auctions. He had some great items that we all liked to have. On that note, to all my Shipmates and their families, please be safe and have a great summer!!

Sincerely,
Bob Bissonnette
Base Commander

Submarine Veterans Inc., San Diego Base Minutes of July 12, 2011

Bob Bissonnette opened the meeting @ 1900.
Bob Bissonnette read our CREED.
Jim Bilka lead us in the Pledge of Allegiance.
Bill Earl lead us in prayer.
A bell was tolled for the following boats lost in the month of July:

USS G-2	30 JUL 1919	3 MEN LOST
USS GRUNION (SS-266)	31 JUL 1942	ALL HANDS LOST
USS S-28 (SS-133)	04 JUL 1944	ALL HANDS LOST
USS ROBALO (SS-273)	26 JUL 1944	ALL HANDS LOST

A moment of silence was observed.
All E-Board member were present with the exception of the secretary.
The Jr. Vice Commander introduced past officers, new members and guests.
40 members were present.
The base treasurer gave his report.
Committee chairmen gave their reports: Chaplain's Binnacle List, Parade, Scholarship, Storekeeper and Breakfast.
Parades:
9/11 & Salute to Veterans Parade 9/10/11
Parade in Borrego Springs
Veterans Day Parade 11/11/10
Parade in Ramona May 2012

Held 50/50 drawing and raffle
Auctioned a pair of dolphin candlesticks to Juanita Williams for $50
SUBVET'S Picnic on 7/17/2011

Holland Club Inductee:
Bob Oberting

SAILING LIST

Fred Fomby	Bill Earl	Joe Acay
Charlie Marin	Phill Richeson	Frank McCoy
Bob Bissonnette	David Kauppinen	Mike Cosgrove
Jim Bilka	Nihl DLmut	J J Lynch
David Ball	Bob Oberting	Joel Eikam
Bob Farrell	Jack Addington	Larry Doret
Cliff Britt	Mert Weltzien	Jim Harer
Larry Kendall	Paul Hitchcock	Dennis McCreight
Jack Kane	Sergio Frost	Kurt Greiner
Ed Welch	Russ Filbeck	C J Glassford
Tom Polen	Ed Farley	Dennid Mortensen
Benny Williams	Glenn Gerbrand	Ray Ferbrache
Bob Bissonnette		

adjourned the meeting @2015

Submarine Veterans Inc., San Diego Base Minutes for 10 May 2011.

1902 – Meeting called to order by Base Commander Bob Bissonnette.
Conducted opening Exercises:
Reading of our Creed:
Pledge of Allegiance led by Fred Fomby:
Chaplin led members in prayer:
Conducted Tolling of the Boats for the month of May:

USS SQUALUS (SS192) 23 MAY 1939 26 MEN LOST
USS LAGARTO (SS371) 3 MAY 1945 ALL HAND LOST
USS STICKLEBACK (SS415) 30 MAY 1958 NO LOSS
USS SCORPION (SSN589) 22 MAY 1968 ALL HANDS LOST

A moment of Silent Prayer observed for our shipmates.

E-Board members, VIP's and guests honored.
Secretary reported 43 members and guests have signed the Sailing list.
Treasurer's report will be held until next month since treasurer is out of town.
Chaplin's report: Richard Dick and Don Philpot are on the Binnacle list.
Parade Committee (Jack Kane):
La Mesa Day Parade, June 4 at 10:00. We will meet up between 9-10.
Julian Parade, July 4.
Membership Committee (Ron Gorence): Our membership stands at 330.
Some interesting facts about our membership:
Our oldest members are 92, 93, and 96.
Our youngest members are 44, 47, and 48.
Members Qualified in Submarines before or during WWII – 37.
Members Qualified in Submarines after 1971 – 39.
Largest number of members Qualified in 1956 and 1960.

Scholarship Committee (Paul Hitchcock) we have received two new applications
and will extend the application dead line to June 15, 2011. We need two
volunteers to help review the applications and select a candidate for the Scholarship funds. Let me know if you are interested in helping.
Storekeeper (Philip Richerson) we have a new catalog and more hats and other items in the back for sale.
Breakfast Committee (Fred Fomby): Our next breakfast will be 29 May 2011 at 800-1200. It's a great breakfast for only 6.00 dollars. Come on down and bring your friends and family. We do need help to serve and take orders.
1935 – Base Commander called a 10 Minute break….
1935- Base Commander called meeting back to order.
Jim Rogers presented his display of international Dolphins from his personnel collection.
Guest speaker, Len Martini author of the new book ICE-X '86 Freezing the Cold War discussed his new book. The book describes the events of three boats who
were tasked by President Reagan to investigate the possibilities of launching through the polar ice cap. These events, according to the author, were instrumental in bringing the Cold War to its conclusion.
Books can be purchased at Amazon.com for $12.99 or on Kindle for $9.00.
Memorial Day Weekend:
Old Timer Luncheon will be held Friday, May 27th at the Harbor Inn Naval Base Point Loma. The program will start at 1030 with Tolling of the Boats Ceremony,
1100 a no-host social and lunch at 1200. Please RSVP by Wednesday, May 18th.
Additional information is located in the back.
Submarine Birthday Ball, May 28, 2011 starting at 1700, will be at the Hilton San Diego Bayside Hotel. For reservations contact Rick Morris, 619 533 7757 or Chief Elton, 619 5538577.
Sunday, May 29, at 0800 will be the Submarine Veterans breakfast here at the VFW.
Monday, May 30 will be the Memorial Day Services on the Submarine Base. Service will begin at 1000 with Tolling of the Boats and buglers echoing taps.
Jay Crumby has let us use his old Klaxon with the agreement at if it needed to
be replaced it would be for the charge of 450 dollars. If you think you can fix
the old klaxon we have it here.
New Business:
The National Chaplin has provided sympathy cards and get well cards for membership use. It was presented to the membership to purchase some of these cards for our members to use. A motion was made, seconded and motion was passed by the membership.
Base commander received an email for the convention committee for ads in the convention book. However, the price is very high and district has requested that they revise their prices. If they do we will consider putting an ad in the convention ad book. The 2011 convention will be held in Springfield Missouri.
Good of the order:
In the back of the room are some article on Submarine History and charts of the
Arctic all are free.
We are still looking for someone to volunteer for Assistant Chaplin.
Jim has donated a dolphin plaque and will sell the klaxon salvaged from the
USS Dolphin. Price for the klaxon is 400 dollars.
We have still have patches for sale.
Fred Fomby related the story of how 2 shipmates were lost on the USS Barbel on April 30 and May 1st.
2015 Base Commander adjourned meeting.

SAILING LIST

FRED FOMBY	BILL EARL	CHUCK BABCOCK
JIM BILKA	BOB BISSONNETTE	JIM ROGERS
J.J. LYNCH	PAUL HITCHCOCK	RON GORENCE
ED WELCH	TOM POLEN	DENNIS MORTENSEN
BOB FARRELL	BOB OBERTING	BOB SCHIVE
JACK KANE	TOM WARNER	FRANK CAMPBELL
JIM HARER	ROY BANNACH	KEN GORDERT
PHILL RICHESON	RAY FERBRACHE	MANNY BURCIAGA
PHILLIP RICHESON	ED FARLEY	JOSEPH E. JONES
LARRY BISTIN	JACK ADDINGTON	FRANK MCCOY
DAVID KAUPPINEN	JOESPH DUBOIS	TONY DACK
M. RESURRECCION	CARL GIBBENS	HOWARD CHATHAM
BOB COATES	DON MATHIOWETZ	C J GLASSFORD
DONALD WLBAUM	BUD ROLLISON	STEVE LAMPRIDES

San Diego Rescue Unit Targets Submarines
North Island crew a vital resource as U.S. military's sole submergence responders
Sign On San Diego, July 25

Submarines often operate thousands of feet underwater, where rescue is impossible. If a seam fails or a fire damages the hull, sea pressure will crush the submersible long before help can arrive.

In 2000, the international community of undersea sailors was faced with the unthinkable: the Russian submarine Kursk sank after an explosion, with some crew members thought to be trapped alive.

It was the moment that sailors with the U.S. Navy's Deep Submergence Unit based in San Diego have trained for their entire careers. The American military's sole submarine rescue unit readied its gear and prepared to deploy from North Island Naval Air Station.

Russia refused international offers of help. All 118 submariners aboard the Kursk died, and the disaster caused a sea change in the field of submarine rescue. A decade later, international coordination among the few countries that have rescue teams is growing, along with the number of nations deploying submarines.

Both trends mean the Deep Submergence Unit in San Diego is more important than ever, despite the fact that its sailors have never had to rescue an American submarine crew.

"An actual submarine rescue is going to be an international event. It's who's closest and can get there the fastest and what can they bring," said U.S. Navy Cmdr. Dave Lemly, the unit's commander.

With a fleet of 70 submarines, including 30 or so under way on any given day, the United States is committed to having its own rescue team for the rare worst-case scenario. But increased international coordination among submarine rescuers has upped the chances that an American crew in distress on the other side of the world might be saved one day by a foreign team.

"When I joined, it was the Cold War. It was a different world. Now it's about open cooperation with as many countries as we can," said Lemly, who has been a submarine officer for 22 years.

The international spirit reached a fitting apogee last month off the coast of Cartagena, Spain, during a triennial submarine rescue exercise hosted by NATO called Bold Monarch. When the U.S. team piloted its rescue module more than 300 feet down to the sea floor, the Navy divers inside finally got their chance to assist the Russians — who contributed a submarine to a NATO exercise for the first time.

Meeting the Russian crew on the other side felt historic, said U.S. Navy Diver 2nd Class Joseph Olin, 28, of Tierrasanta. "It was the first time we had ever mated with a Russian submarine before, so it was a milestone when it came to submarine rescue for the United States."

Olin escorted the rescue module home to San Diego late last month on a chartered Antonov cargo plane, which arrived with its Russian flight crew at Miramar Marine Corps Air Station.

The American and Russian participants were among more than 2,000 from 13 countries aboard 20 ships in the exercise, which culminated in the coordinated rescue of more than 100 people aboard multiple submarines. The U.S. team also "rescued" submariners from Turkey (another first), Spain and Portugal.

The number of countries fielding subsurface ships for military or commercial purposes, especially smaller diesel-powered models, is swelling. Malaysia is one newcomer, and Vietnam and Thailand are shopping for submarines.

More than 40 nations are known to operate submarines, but there are only five rescue systems worldwide that can be flown to the scene in time to save a crew operating in remote waters, according to the International Submarine Escape and Rescue Liaison Office in Norfolk, Va. (In all, 13 nations or organizations have rescue systems, including the simplest ones used only in shallower waters.)

The organization was established in 2004 in the wake of the Kursk disaster to coordinate the international network of rescue resources. Now when a submarine needs help, the liaison office issues a global alert that sends rescuers and equipment within 72 hours — fast enough in most cases to retrieve a crew before onboard life support runs out.

The U.S. Deep Submergence Unit uses Pressurized Rescue Module Falcon for deep water missions. The tethered diving capsule, first deployed in 2008, is flown to the scene and operated off commercially available ships.

The U.S. team can use its rescue module to retrieve submariners at depths of up to 2,000 feet, where carbon dioxide exhaled in the breath will eventually suffocate the crew.

Lemly's group of about 120 active-duty, reservist and civilian personnel practice regularly on a mount 2,000 feet deep and nine miles offshore of La Jolla, with foreign militaries that visit San Diego — such as Chile — and in international exercises.

One reason they are called on so rarely is the safety record of submarines. The sinking of the Thresher off the New England coast in 1963 inspired the development of submarine rescue vehicles and SUBSAFE, a prevention program that includes rigorous protocols for operation, casualty control and maintenance.

The U.S. lost 16 subs between 1915 and 1963 to issues unrelated to combat, but only one since SUBSAFE was instituted in 1963, according to Naval Sea Systems Command.

William Orr, the U.S. Navy submarine escape and rescue officer who heads the international liaison office in Norfolk, said he later came to believe the Kursk crew could not have been rescued safely. Nevertheless, "one of the legacies of those who died in the Kursk is that we've built this global cooperative network, so that when bad things happen, things can be done as fast as possible," he said.

That legacy went into action in 2005, Orr said, when a mini-submarine became entangled off the Siberian coast. Russia sounded a distress call and international rescue teams bolted for Kamchatka.
The crew of seven, whose air supply was nearly depleted, was saved.

Women To Finally Serve On US Navy Subs
Kentucky Post, July 25

The first female Navy officers selected for duty on submarines are on track to join their boats beginning later this year.

The Navy says it is not treating them any differently from men receiving the same training, but officials have been working to prepare the submarine crews for a dramatic cultural change.

The initial class of 24 women will be divided among four submarines, where they will be vastly outnumbered by men.

The female officers, many of them engineering graduates from the Naval Academy, are accustomed to being in the minority and so far they say they hardly feel like outsiders.
Ensign Peggy LeGrand of Amarillo, Texas, says she is thrilled at the opportunity although she feels the women's mistakes and successes will be magnified more than they deserve.

You Can Swim, But You Can't Hide From This Robot Jet Ski
Wired, July 25

The Army has autonomous robots scampering around on land. The Air Force has killer drones dropping bombs from the air. Now the Navy — understandably just a little jealous, and clearly not satisfied with its robotic helicopters — prepares to add two new seafaring 'bots to the mix.

"Blackfish" is a remote controlled, sawed-off jet ski meant to patrol ports for terrorist swimmers up to no good. "Harbor Wing" is a 60-foot, 10-ton, environmentally friendly sailboat with a catamaran's hull, packed full of surveillance equipment meant to aim a stealthy, sailor-free eye on far away horizons. Both vessels would surf around without a human on board.

This isn't the Navy's first venture into robotic catamarans. A few years back they released a whole master plan on how unmanned vessels could help spy on enemies, transport soldiers across the water, torpedo hostile boats or outsmart pirates. And defense electronics companies have been quick to jump on the robo-ship bandwagon. This is just the latest iteration.

A smaller prototype of Harbor Wing, the X-1, has been petering around Hawaii for some time now. The new model is scheduled to set sail this fall. Guided by GPS, the X-2 will venture into the open ocean, going solo on a preprogrammed course from San Diego to Hawaii and back again. That course is pretty precise — Harbor Wing supposedly never veers more than five meters off its designated path. It's got a collision avoidance system to avoid rogue objects that turn up in the Pacific, self-defense capabilities to fend off attackers, and can survive some pretty nasty weather conditions. 18-foot waves? No problem.

The Navy hopes to use Harbor Wing for long-range surveillance and observation missions. But hey, it might even help them keep track of marine mammals — apparently it's costly for their helicopters and airplanes to do the job.

Drone jet ski Blackfish, on the other hand, will be concerned with a different sort of mammal: the human kind. The sensor-packed nautical Knight Rider, developed by British contractor QinetiQ, will patrol foreign and national harbors to ferret out terrorists lurking where larger Navy ships can't find them.

"There's great concern about swimmers approaching the boats underwater," QinetiQ's Mark Hewitt tells Discovery News. "The Navy has been working on the problem for some time."

But never fear, a robotic jet ski outfitted with sonar, radar and video cameras will do the trick. Who knew the 10-foot-long craft would prove so useful in the fight against terrorism? It's capable of zipping along at 40 miles an hour, but will probably stay at about a crawl. Even very determined terrorist swimmers don't go much faster than 2 mph — and the robot has to ease up enough to detect them.

Both of these nautical automatons can be controlled from afar — Harbor Wing from hundreds of miles, Blackfish up to a kilometer away — but the idea is to get them to sail solo. Which is oh, just a little worrisome, since both may be armored with weapons. So hey, if you weren't already concerned about accidentally getting hit by an automated watercraft while swimming, now you can fret about getting blown out of the water.

Israel Gets A Guilt Discount On Sixth Dolphin

Strategy Page, July 26

July 26, 2011: Germany has agreed to pay 20 percent of the cost of a sixth Dolphin class submarine for Israel, which was ordered earlier this year. Two more are under construction, and will arrive in the next two years. The sixth one should arrive in 2015. The first three arrived in 1998-2000. The new Dolphins cost about $650 million each, with Germany picking up a third of the cost on two of them. The first two Dolphins were paid for by Germany, as was most of the cost of the third one. This is more of German reparations for World War II atrocities against Jews.

The three older boats have since been upgraded to include larger fuel capacity, converting more torpedo tubes to the larger 650mm size, and installing new electronics. The fuel and torpedo tube mods appear to have something to do with stationing the subs off the coast of Iran. Larger torpedo tubes allow the subs to carry longer range missiles.

The larger fuel capacity makes it easier to move Dolphins from the Mediterranean to the Indian ocean. Although Israel has a naval base on the Red Sea, Egypt had, until recently, had not allowed Israeli subs to use the Suez canal. So the Dolphins were modified to go around Africa, if they had to. But now the Egyptians, who are also feuding with Iran, regularly allow Israeli subs to use the canal. Larger fuel capacity also allows the subs to spend more time on station off the Iranian coast. Currently the Dolphins can stay at sea for about 40 days (moving at about 14 kilometers an hour, on the surface, for up to 8,000 kilometers). Larger fuel capacity extends range to over 10,000 kilometers, and endurance to about 50 days.

The three Dolphins under construction have a fuel cell based (AIP, or Air Independent Propulsion) system which enable them to stay under waters for over a week at a time. The Dolphins are also very quiet, and very difficult to hunt down and destroy. The first three Dolphins didn't have the AIP system.

Israel equipped it's new Dolphin class submarines with nuclear cruise missiles in 2002. Israel also fitted their 135 kilometer range Harpoon missiles with nuclear warheads. These missiles are fired from the sub's torpedo tubes. The 1,625 ton Dolphins can carry 16 torpedoes or missiles and have ten forward torpedo tubes (four of them the larger 650mm -26 inch- size). The Dolphins are considered the most modern non-nuclear subs in the world. The first three cost $320 million each. All have a crew of 35 and can dive to a depth of more than 200 meters (660 feet). The Dolphin design is based on the German 209 class subs, but has been so heavily modified that it is considered a different class.

The Israelis have developed a cruise missile, which is has a range of 1,500 kilometers and carries a 200 kiloton nuclear warhead. The objective of deploying nukes on subs is to further enhance deterrence to any nation launching a nuclear strike against Israel. If one of the Dolphins are always at sea, even a first strike against Israel would not prevent a nuclear strike by submarine launched nukes.

Race To The Bottom: Chinese Sub Dives 5000 Metres

The Sydney Morning Herald, July 26

A Chinese submersible has conducted the country's deepest manned dive ever as it seeks to exploit the vast resources of the ocean floor.

The Jiaolong undersea craft - named after a mythical sea dragon - reached 5038 metres below sea level in a test dive in "an international area" of the Pacific ocean, the official Xinhua news said, citing the State Oceanic Administration (SOA).

Chinese technical capabilities have gathered pace in recent decades, exemplified by a fast-growing space program that in 2003 made China just the third nation to conduct manned space flight.

Maximum depth of 7000 metres

The craft is designed to reach a maximum depth of 7000 metres and it had carried three people to 4027 metres below sea level in a test on Thursday.

Its success signified that the submersible was capable of reaching more than 70 per cent of the planet's seabed, the SOA said, according to Xinhua.

The agency quoted the submersible's chief designer Xu Qinan as saying its "state-of-art" digital underwater communication systems and undersea mobility systems allowed it to "move back and forth easily under the sea".

Although much of the craft's components were produced in China, some had to be imported from abroad such as the underwater high-definition video-shooting and transmission equipment, Xu told Xinhua.

The deepest dive ever conducted was by the US Navy, which reached the bottom of the Mariana Trench - the deepest point in the world's oceans at 11,000 metres - in 1960 in a manned undersea craft.

In April, British entrepreneur Richard Branson announced his plans to take a one-man winged submarine down to the deepest parts of the oceans, including the Mariana Trench and the Puerto Rico Trench in the Atlantic - about 8.4 kilometres deep, later this year.

Search for resources

China has pushed hard in recent years to obtain oil, minerals and other natural resources needed to fuel its growth.

It has said its development of submersible technology is aimed at scientific research and the peaceful exploration and use of natural resources.

But China's appetite for resources, rapid expansion of its military capabilities and increasingly strident territorial claims in the ocean have caused concern.

"There's nothing wrong with this technology. It's obviously an accomplishment. The questions arise about the way the technology might be used," said senior security analyst Rory Medcalf of the Lowy Institute, who has released a report on maritime security in the Indo-Pacific Asia.

"The suggestion is that China might be exploring for resources in areas that were once thought to be inaccessible and this has a direct relationship with the contested maritime claims, for example in the South China Sea or the East China Sea."

During the vessel's dive to the bottom of the disputed South China Sea last year, it planted a Chinese flag in the seafloor in what was seen by some as a provocative act.

The South China Sea, which is believed to be rich in oil and gas, is claimed in whole or in part by China, Taiwan, the Philippines, Vietnam, Brunei and Malaysia.

Tensions in the region have spiked in recent months after several incidents at sea involving China and its neighbours.

Scientists say the ocean's floors contain rich deposits of a range of potentially valuable minerals.

However, some concerns have also been raised that deep-sea vessels could be used to tap into or sever communications cables.

Mr Medcalf said apart from attempts to assert sovereignty, the submersible could be used by China to collect oceanographic data for its military submarines.

"One of the big questions about future security in the region will relate to the submarine competition between the United States and China.

"If a craft like this improves China's ability to collect oceanographic data, that's going to improve its submarine capability and I suspect that will be seen as troubling by the United States in particular," Mr Medcalf said, adding that China could use the data to better hide submarines that can launch nuclear weapons.

"These are some of the potential uses and it's pretty clear there's no firewall between civilian and military maritime agencies in China."

The SOA said the submersible would attempt a 7000-metre dive in 2012, Xinhua reported.

Bulava Ushers In A New Era In Russia's Strategic Naval Nuclear Forces

Russia Beyond The Headlines, July 26

Russia has successfully tested a next generation missile: the Bulava intercontinental ballistic missile has been launched from its projected carrier, the Yury Dolgoruky strategic ballistic missile submarine – a Project 955 Borei class sub. According to the Ministry of Defense, the serial production of the Bulava will begin soon.

During earlier trials, Bulava missiles were launched from another specifically modified nuclear submarine, the Dmitry Donskoi, the world's largest strategic ballistic missile submarine (a Project 941U Typhoon class). But out of 14 trials, only a few were successful. Half failed completely and five more were partially successful.

The most anticipated launch – from the Yury Dolgoruky – should have been carried out more than six months ago, but it wasn't. Allegedly, the test launch was postponed because the canal through which submarines get from the dock to the open sea was ice-bound. However, the excuse seemed insincere to experts because the Yury Dolgoruky is designed to operate in the highest latitudes under Arctic ice and even surface if necessary through found water openings or to make such openings with its hull or torpedoes.

The excuse was also suspicious because in the winter the submarine was put into dry dock for commissioning operations, which suggests that either the submarine or the Bulava were not ready for the tests.

But now the launch has been made, and its success is important for a number of reasons. First off, it has shown skeptics that the missile has been successfully developed and can be put into service of the Russian Navy. Secondly, the successful launch of the Bulava is evidence that, despite all its problems, the Russian military-industrial complex can build new strategic submarines and design new strategic missiles – the basis for the nation's nuclear deterrent forces.

According to Navy plans, the Project 955 submarines as well as their upgraded counterparts Project 955A / 955U will be the foundation for Russia's naval strategic nuclear forces after 2018, when the current strategic ballistic missile submarines, the Delta-III and Delta-IV (Kalmar and Murena) class, are retired. Altogether, eight Borei class submarines are to be built at a cost of 23 billion rubles each ($830 million). Unlike the Dolgoruky, which can carry 12 Bulava missiles, the new vessels with number two and number three hulls are to carry 16 and 20 missiles, respectively.

Viktor Litovkin is the editor-in-chief of the Russian journal "Independent Military Review."

Additional information

The Bulava-30 (SS-NX-30, a.k.a. R-30/3M30 or RSM-56) is a three-stage solid-fuel naval strategic missile developed by the Moscow Institute of Thermal Technology (MITT). Yury Solomonov is the Chief designer of the project. The missile is designed for prospective Borei Class submarines. Each Bulava missile can carry up to 10 hypersonic, individually guided, maneuverable warheads that can change the trajectory height and course and strike enemy targets at ranges up to 8,000 km.

A Submarine That Doesn't Make Waves

by Kate McAlpine, Science Mag.org, 22 July 2011

Wading through water can be such a drag. Even streamlined submarines have to fight the pull of the ocean slowing them down. But with the right outerwear, they may be able to zip through the sea as unburdened as a rocket in outer space—and without leaving so much as a ripple of wake.

Researchers have already developed other types of cloaking devices. An invisibility cloak reported a couple of years ago, for example, makes an object disappear by redirecting light around it. Researchers have also developed materials that can cloak objects against sound waves, ocean waves, and even the elastic waves in Earth's crust caused by earthquakes. Now, Yaroslav Urzhumov and David Smith, both metamaterials researchers at Duke University in Durham, North Carolina, have developed the concept of a wake cloak, which would look like a blade-covered hedgehog and could let an object glide through the water without making waves.

Urzhumov explains that anything moving through water is dragging water with it, making it feel heavier and creating turbulence. But if you just run your little finger through the water, the drag is much smaller. The cloak designed by Urzhumov and Smith makes the cloaked object seem like nothing at all, so the water doesn't pull against it.

The proposed cloak would be a mesh of wires or blades, mounted on the surface of the object moving through water. For their model, the researchers chose a sphere, one of the simplest shapes to simulate. The simulated mesh was layered in 10 concentric shells around the sphere, guiding 10 streams of water. The water nearest the sphere needs the most deflection, so these wires or blades would be thickest. The thinner blades on the outside, however, would hardly change the path of the water, giving it a gentle entrance and exit. Micropumps would control the speed of the water in each layer, ensuring that each stream moved near the same speed as its neighbors. This gradual change from the near stillness of the outer layer to the speed of the sphere in the inner layer would prevent the water from dragging on the sphere or itself.

Urzhumov estimates that the cloak on a 10-centimeter-wide sphere could be anywhere from 1 centimeter to 10 centimeters thick. "Generally, thicker cloaks are easier to fabricate, but they also weigh more, so it's a tradeoff that engineers will decide on," he says.

Shuang Zhang, a metamaterials researcher at the University of Birmingham in the United Kingdom, calls the idea "a valuable extension of invisibility from optics to fluid dynamics". For example, he says, "it can be used for ships to dramatically reduce the dragging force from water and therefore to enhance the speed and efficiency."

At the moment, Urzhumov is setting his sights a bit lower. In the model described in an upcoming issue of Physical Review Letters, the computer simulation studied a fully submerged, bullet-sized vessel that travels at crawling speed, just a few millimeters per second. Yet even this has applications as the United States military explores the possibilities of automaton spies that look like birds, insects, and fish. Urzhumov proposes that a cloaked robo-minnow could stealthily investigate an enemy submarine, moving slowly but requiring little energy. As for when the first cloaks could hit the water, he speculates that it will take at least 5 years of basic research and development to get a working prototype.

However, he and Smith suggest that a different sort of cloak, made specifically to reduce the drag rather than the entire wake, might be easier to make and could be scaled up to fuel-efficient dream boats. "This is a terribly interesting question that someone will answer soon," Urzhumov says.

Lack of U.S. Nuclear Modernization Dangerous
By Michaela Bendikova, The Foundry, July 22, 2011

The Obama Administration traded 25 percent of the U.S. operationally deployed strategic nuclear missiles for a Russian nuclear buildup in New START, a bilateral arms control treaty with the Russian Federation, writes Mark Schneider in his latest op-ed.

This became clear after the U.S. State Department released a factsheet making the disparity in destruction of accountable systems—delivery vehicles, nuclear warheads, deployed and non-deployed launchers of intercontinental-range ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs), and deployed and non-deployed heavy bombers—official.

According to the factsheet, Russia can deploy 179 more ICBMs, SLBMs, and bombers (the U.S. has to remove 182 total) and add 27 accountable nuclear warheads to its operational arsenal (the U.S. has to remove 250 accountable nuclear warheads). In concurrence with New START—President Obama's alleged step to a world free of nuclear weapons—Russian officials announced the largest nuclear buildup since the end of the Cold War. So much for leading by example.

If the Russians follow through on their modernization plan and the United States sticks to the "no new nuclear warheads, no new military missions, no new military capabilities" policy stated in President Obama's 2010 Nuclear Posture Review, the country's forces will be vulnerable to a Russian first strike. Second-class nuclear forces are likely going to make the U.S. deterrent less effective and could eventually contribute to adversaries more aggressively pursuing their national goals, which are likely to be contrary to U.S. interests.

Currently, the average age of U.S. delivery platforms is 41 years for the Minuteman III, 21 years for the Trident II D-5 SLBM, 50 years for the B-52H bomber, 14 years for the B-2 bomber, and 28 years for the Ohio-class submarine. Russia, unlike the United States, is planning on buying 36 strategic ballistic missiles, two strategic missile submarines, and 20 strategic cruise missiles in 2011 alone. Starting in 2018, fifth-generation ICBMs will make up at least 80 percent of the Russian strategic arsenal. The Minuteman III replacement missile will be deployed, if ever, in 2030 at earliest.
Despite President Obama's nuclear modernization promises, increases in funding for the U.S. nuclear weapons enterprise will allow only sustainment rather than real modernization of the U.S. nuclear capabilities. In the view of the Russian modernization and the deterioration of the U.S. nuclear weapons knowledge and skill base, it seems only prudent that Congress establish a link between New START implementation and modernization of U.S. strategic nuclear weapons.

Diving Into The Abyss Aboard Britain's World-Leading Submarine Rescue System
By Andrew Preston, The Daily Mail, July 23, 2011

The British co-pilot of the rescue vehicle speaks slowly and deliberately into his microphone: 'Lima, Lima, Lima.'

The signal is broadcast directly into the Mediterranean Sea via 'underwater telephone' using low frequency sound waves. The message is picked up in the control room of the Alrosa, a Russian submarine from the Black Sea fleet. The code words mean that the Nato rescue vehicle, known as Nemo, has successfully 'mated', or docked, with the Russian sub.

At the same time a diver clambers through a hatch in the floor of Nemo with a spanner. He follows up the message with two loud taps on the hatch of the submarine casing beneath him, then after a short pause taps a third time. This is the signal that it is now safe for the Russian crew to open the outer hatch. The two vessels have established a hydrostatic water-tight seal, and suction is now the only thing holding them together 300ft underwater.

All this is happening on the bottom of the Mediterranean Sea just off the coast of Cartagena in south-east Spain. Shortly afterwards the submarine hatch of the diesel submarine opens and a smiling Russian face appears. History has been made.

When it was built during the Cold War, the Kilo-class Alrosa was designed for anti-submarine and anti-ship warfare. Its mission was to snoop, avoid detection, and try to track and, if required, attack Nato forces. Now, for the first time, a Russian submarine is actually taking part in a Nato exercise.

Inside the rescue vehicle it is cramped and humid. In the forward compartment, with its bulbous clear acrylic nose on the front, the pilot and co-pilot sit surrounded by joysticks and a myriad of dials and switches. Behind them, a Navy diver acts as the operator for the rescue chamber, which in an emergency can deliver up to 15 people at a time to the surface, or two injured submariners on stretchers.

But today special guests are moving the other way. Squashed together in the back of Nemo, their heads bent forwards and knees touching from benches on either side, are military VIPs from Russia, the U.S. and other Nato nations, who cross from the module into the submarine, led by General Nikolai Makarov, Chief of Defence Staff of the Russian Armed Forces.

This exercise comes 11 years after the Kursk disaster, when 118 Russian submariners were left to die 350ft down in the Barents Sea. Back then the Russian government refused to ask for assistance after an explosion onboard sank the submarine.

It is still unclear how many died in the initial explosion and how long the other survivors stayed alive, although grim tales have since come out of tapping being heard from inside the hull. What remains a possibility is that some of those men might have been saved.

'The Russians learned many lessons after that,' says Captain David Dittmer of the U.S. Navy.

'But when a Russian auxiliary sub with seven men on board became entangled in lines and stuck on the Pacific Ocean floor in 2005 they did ask for help, and a British remote vehicle was sent to cut them free. They were just one hour short of their oxygen running out.

'Now the Russians have changed further and are very enthusiastic to participate. They publicly want to be portrayed as leaders in this field. Submariners are a family too; we all understand that we have an enemy in common: the sea.'

Nato's submarine rescue system is the most advanced in the world and is based in Faslane just north of the Firth of Clyde.

Nemo was built in North Yorkshire and Britain is a world leader in this technology. The system is jointly owned by Britain, France and Norway, and is now managed by Rolls-Royce. The £75 million cost for development, construction and the first ten years of its life is shared three ways.

Nemo can operate in heavy seas, in waves up to 16ft high, and can rescue from depths of 2,000ft beneath the surface. Beyond that, submariners recognise that there is no hope – their boat will simply implode and be blasted into pieces.

This latest 'free-swimming' vehicle replaced an earlier LR5 rescue vehicle, the idea for which came to former Royal Navy submariner Roger Chapman after he almost died when he was trapped 1,575ft down in a civilian mini-submarine in 1973. He and a colleague had been laying a telephone cable in a two-man sub on the bed of the Atlantic, 150 miles off the cost of south-west Ireland. After three and a half days they were found and pulled to safety.

The LR5 has since been leased to Australia, while the British have also sold systems to Singapore, South Korea and the LR7 rescue vehicle to China. At a recent submarine rescue conference a Chinese admiral made it clear to members of the British contingent, through an interpreter, that China would have bought more had our defence export rules not forbidden it.

For the 'Bold Monarch' exercise in the Mediterranean, diesel submarines from Spain, Portugal, Turkey and Russia were 'bottomed', with rescue vehicles from Italy, the U.S., Russia and Sweden as well as Nemo, along with specialist divers and hyperbaric medical teams working to help rescue them.

The 2,000 participants in the exercise included representatives from more than 20 nations; so as well as a historic meeting for Russian submariners with Nato, it also gave a Greek officer the chance to go onboard a Turkish submarine.

'By their very nature submarine missions are secretive, except in the conduct of search and rescue, which brings nations together,' says Rear Admiral Ian Corder, commander for allied submarine operations in the north Atlantic region.

He is based in the Nato building at the high-security military headquarters in Northwood, just outside London. Down a spiral staircase from his office and below ground is the Maritime Operations Centre, with one side wall covered in giant screens.

At the moment counterpiracy is a major focus here, but if a sub were to get into trouble in the north Atlantic region, for which he is responsible (from the North Pole as far south as Gibraltar), then this is where the rescue operation would be co-ordinated.

If a submarine is in danger it will release UHF/VHF indicator buoys, which broadcast using reserved maritime frequencies. They can also release buoys linked to satellites which send signals with an ID for the submarine which can only be recognised by its own country's authorities.

Rescuers can then log on to a password-protected website, which holds details of all the potential rescue systems around the world, and their availability, and they can plan via instant messaging and in secure chat rooms.

But it's once they are alerted that the problems begin: how deep is the stricken submarine, how bad is the damage, what is the state of the sea, how is the submarine positioned, is there debris around it, and how many injuries are there?

Submariners can evacuate via escape locks if it is not too deep, but nowadays they are encouraged to wait – they can survive for up to seven days on a bottomed boat, unless something catastrophic has happened. Nemo is designed to make its first rescue within 72 hours.

First, a 'vessel of opportunity' has to be chartered. This must have at least 4,400sq ft of deck space, and will deliver Nemo to the location of a stricken submarine. A total of 1,007 such vessels are being tracked at the moment, most of them working in the offshore oil industry. They cost between £17,000 to £40,000 per day to charter. Today's 'mother ship' is Norwegian, the second biggest tug in the world, which is so new it still smells of paint.

But Nemo is just one part of an entire rescue system. First an ROV (Remotely Operated Vessel) is sent to check the state of the sub, look for debris and, if required, deliver a pod containing equipment for oxygen generation and carbon dioxide extraction, as well as water and food.

If a submarine is damaged then those on board will more than likely be experiencing high levels of pressure deep under the sea – so the other vital part of the Nato set-up is the TUP (transfer under pressure) system, which is designed to prevent rescued men suffering decompression sickness, or the bends. If Nemo acts like an ambulance then this is the hospital.

When it returns to the surface and is raised into its cradle it docks with two decompression chambers, which can house 72 crew members. A special medical chamber holds up to six. If required there are also two pods, which look like Apollo capsules, which can be used to air-transport under pressure anyone seriously injured to a hospital.

A control room above the chambers is manned by British and French divers who together monitor those inside using CCTV cameras, and watch gauges that measure the oxygen, carbon dioxide and pressure levels. It takes 28 lorries and seven giant transport planes (four C-17s and three Antonov AN124s) to carry the entire system.

The Affray was the last British submarine to be lost with all hands, off the coast of Alderney in 1951, but there have been many accidents since.

'Most of these have been in relatively shallow water,' says Commander Charlie Neve, the UK authority on submarine escape and rescue.

'Accidents are most likely to happen in busy shipping lanes when a submarine is on the surface and also at night when the black submarine is difficult to see.

'There have been plenty of potential disasters. In 2002 Trafalgar hit the seabed off the Isle of Skye, in 2008 Superb struck an underwater pinnacle in the Red Sea, and then last year the new Astute ran aground. There's also the memory of the Thetis in Liverpool Bay in 1939, which stunned people at the time. The water was not that deep, only about 150ft, and her bow became wedged on the bottom while her stern was sticking up in the air. People couldn't believe that we couldn't get the men out – it just seemed unbelievable – but we lost 99 men there.'

Once the Alrosa has surfaced again, some of the submariners come out into the light to gather on the upper deck of the Spanish ship Galicia, to mingle with other nationalities and shake hands in the early evening sun. One Royal Navy medic, who is back from a trip to see how Russian sailors live and work aboard one of their ships, says they were 'surprisingly welcoming. It was just like one of ours really, with family pictures everywhere and lots of dead pot plants.'

The next time they will all gather will be in three years' time in the seas around Poland.

'We all hope never to have to use these skills but it does give confidence that it won't matter who or where you are, help will be there,' says Captain Damiar Shaykhutdinov of the Russian navy.

'Maybe one day Russia can host a similar exercise in our waters.'

Then, for his submarine crew, it's back down below to return to Sevastopol or wherever the Alrosa is ordered to go, once more unseen and unheard.

Israel's Boomers On the Rise

By Joe Buff, Defense Tech Undersea Warfare Contributor, July 24, 2011

The State of Israel has long followed what early nuclear war-fighting theorist Henry Kissinger called a policy of nuclear ambiguity. Israel, officially, neither confirms nor denies possessing any nuclear arms, although many defense analysts, politicians, and diplomats the world over have long considered Israel an undeclared nuclear power. To have nukes for strategic deterrence would make sense for such a small nation surrounded by enemies. These enemies don't just include today's dangerously volatile nuclear aspirant Iran but also Saddam Hussein in the first Gulf War (he did have some WMDs then and fired Scud ballistic missiles into Israel), Egypt's unpredictable Soviet-backed Gamal Nasser in the '60s, and even unsuccessful but aspiring nuclear power Nazi Germany coincident with Hitler's Holocaust – a direct precursor to modern Israel's birth as a sovereign nation.

Since 1948 the Israeli Navy has had mixed success, helping protect the country's relatively long, two-part coastline from invasion from the sea by terrorists, defending its vital interests in the Med and Red Seas, but also losing vessels and crews to land-launched anti-ship missiles and tragically losing a diesel sub with all hands in the '60s (to what was later shown to be a collision at sea). Don't forget it's been at the center of PR crises involving losses inflicted on foreign neutral warships and activist non-combatants alike.

Against this background, Israel has, for decades, maintained a small submarine force – interestingly, in partnership with Germany — maker of "frighteningly effective" (as Winston Churchill called them) diesel subs in WWI and WWII. Germany has since manufactured the Type 206, then the global best-seller Type 209 and most recently, the Howaldtswerke-Deutche Werft AG's state-of-the-art Type 212 U-boats. (Type 214 designates the export-model 212; Dolphin-class is Israel's name for their customized 214s.) From the 209 on, these are available with conventional diesel-electric power plus air-independent propulsion. The fuel cell AIP system allows quiet, continuously submerged and non-snorkeling, low-speed cruising for up to 84 days at a time.

Israel is reported to have deployed, for some time, three pure-diesel Dolphin-class boats, and will expand via a total now of three additional Dolphins with AIP to a total of six subs by 2013. Each of these is supposedly armed with nuclear-tipped, torpedo tube-launched cruise missiles in addition to a handful of German-made wire guided high explosive torpedoes. An early version of such cruise missile was derived from the U.S. Navy's Sub-Harpoon, with a rather small nuke payload and a range of some 75 miles. The boats patrol submerged (as much as each design permits) mostly in the Med but more recently also in the Red Sea and Persian Gulf. They serve as a second strike capability, a sub-launched nuclear deterrent analogous to, for instance, the U.S. Navy's current SSBNs; the aging nuclear propelled Ohio-class which usually go out for 70-day "Hide with Pride" patrols.

That is, except for the first 4 Ohios, which were modified into highly successful SSGNs for conventional cruise missile barrages and heavy special ops deployment and support. The basic German designs and/or the customizations for Israel can be SSGs too, since their (up to ten?) cruise missiles can certainly be conventionally armed. The subs can also carry a few (ten?) commandos with their gear, and deploy and retrieve them via an internal lock-in/lock-out chamber. Swimmer delivery vehicles (up to four?) can be carried in the wider of the torpedo tubes (25.5-inch vice 21-inch) serving as ersatz dry deck shelters. These Israeli U-boats can also deploy undersea mines, useful in extremis in the littoral waters with heavy shipping where the IDF supposedly sends them.

Just last week, more information was released officially in Berlin and Jerusalem regarding Israel's latest submarine deal; the purchase of a modified "Type 212" (does the media mean Type 214?) from Germany, with – as with prior deals – a substantial level of cost subsidization and financing by the German government. The new sub is also "nuclear capable," a term generally meaning it has been equipped with the additional electronics and mechanical systems needed for nuclear weapons safety, surety, and firing.

The media is saying this sub can launch ballistic missiles, though almost certainly this should say cruise missiles — such as Israel's new Popeye Turbo with a range of nearly 1,000 miles at a Tomahawk-like speed of maybe Mach 0.7. The design limitations of both the small sub (22-foot beam) and a big, heavy theater ballistic nuclear missile (Scud B is 372†x 35") seem to preclude the one fitting inside the other. A ballistic missile's fast warhead delivery time, via high hypersonic (Mach 16?) speeds and a necessarily trans-atmospheric trajectory (like the old V-2's), though valuable for a second-strike weapon, comes at substantial cost in length and mass. The problem is like trying to deploy Trident strategic ballistic missiles inside a lengthened and/or

(noisy, unstable) hunch-backed Virginia-class SSN, as some sort of poor man's Ohio-replacement SSBN. However, in Israel's case, theater-wide ranges with up to 90-minute delivery times, such as Popeye Turbo's, are truly strategic.

Chinese Missiles and the Walmart Factor
By Lieutenant Commander Matthew Harper, U.S. Navy

Scenarios of a military conflict with a rising China are pointless if they leave out a glaring detail—the global economy.

Multiple news outlets recently carried stories about a Chinese antiship ballistic missile (ASBM) that could target U.S. aircraft carriers at sea.1 It was just the latest in a long-running stream of news coverage and concerned dialogue over China's expanding military capabilities and influence. As China's growing strength gains greater global attention, more and more time, energy, and money will be spent asking how the United States will counter an increasingly capable Chinese military. For some within defense circles, this is a routine question and a question the U.S. Navy (particularly Pacific Command) is expected to answer.

But fear of China's perceived martial intentions is both overblown and unproductive for the United States and its military. Focusing solely on Chinese military capabilities clouds the critical challenge of preventing a catastrophic Sino-American conflict. Furthermore, this distraction obscures the real work of guiding China's rise as an open, self-confident, fully integrated member of the world community.

Anti-Access Angst

In the Winter 2010 issue of the Foreign Policy Research Institute's journal Orbis, Commander James Kraska forecasts a growing and aggressive China and provocatively describes a hypothetical encounter: The year is 2015, and a Chinese Dong Feng-21D (DF-21D) ASBM sinks the USS George Washington (CVN-73). The United States is caught by surprise and, because of the military's decline and the distraction of various other priorities, the nation is unable to muster an effective response for weeks. By this time, the world community has interceded, rendering America unable to take unilateral action.2

The weapon at the heart of Kraska's cautionary tale, the DF-21D (also known as the CSS-5), is a medium-range ballistic missile theoretically able to target U.S. carriers at sea. It is currently a cause of significant concern in U.S. military circles. The common belief is that the ability to draw a bead on the centerpiece of American power projection will prevent any effective U.S. response in a conflict over Taiwan. The DF-21D, along with China's increasing numbers of modern quiet submarines, long-range air-defense surface ships, and fourth-generation fighter aircraft, is at the forefront of the U.S. Navy's, and to a lesser extent the U.S. Air Force's, consciousness. Andrew Erickson and David Yang articulated the worries in the Naval War College Review, claiming "even the mere perception that China might have realized an ASBM capability could represent a paradigm shift, with profound consequences for deterrence, military operations, arms control and the balance of power in the Western Pacific."3

Whether the concern is over the status of Taiwan or Chinese territorial ambitions in the South China Sea, U.S. strategic thinkers, academics, and military planners are increasingly apprehensive over China's growing ability to prevent U.S. naval freedom of movement in the region—often referred to as China's "anti-access capability."

Through a Spyglass, Distortedly

In a strategic sense, "How should the United States counter Chinese anti-access capabilities?" is the wrong, or at least incomplete, question. Looking at relations with China through a naval-warfare lens alone clouds our strategic thinking, which prevents analyzing the issue effectively.

In the 21st century, qualifying naval tonnage or tallying up missile ranges and submarine numbers does not adequately inform our overarching view of the situation. In a world where a Taiwanese company in mainland China makes half of the consumer and business electronics in the world, it is insufficient to scrutinize military actions alone.4 To further our strategic understanding, a Sino-American confrontation scenario must scrutinize military timelines, and more important, implications for the U.S. and world economies.

We live in Thomas Friedman's "flat world," one of increasing interconnectedness. But do we really understand what this implies?

In the current literature surrounding the Chinese military threat, there is little to indicate our methods of strategic thinking have changed. Kraska's piece clearly highlights the shortcomings of our current mindset regarding Chinese military capabilities. He describes the buildup to the sinking of the George Washington in one sentence: "The incident—could it really be called a 'war'?—had been preceded by a shallow diplomatic crisis between the two great powers."5 While Kraska warns of a Chinese rise and U.S. decline, he fails to fully examine factors that led to his scenario and therefore continues to hamper our analysis.

Erickson and Yang ask whether Chinese leaders have considered the dangers of a lopsided focus on technical capabilities, "without a proper understanding of the potential strategic risks involved."6 While they ask if the Chinese leadership understands the strategic risks, they fail to ask if the United States has considered the strategic and, more important, the economic risks resulting from any conflict with China.

In Red Star Over the Pacific (Naval Institute Press, 2010), Naval War College professors Toshi Yoshihara and James Holmes examine the rise of the Chinese military. However, they also appear to dismiss the wider ramifications of a Sino-American conflict. In describing the Chinese advantages of firing antiship missiles deep from inland China, the authors write, "the United States would risk a limited naval conflict escalating into a full-blown war against China, its leading trading partner."7 While they note that China is America's largest trading partner, they still imply a limited naval conflict over Taiwan is possible.

Globalization touches every facet of our modern world and would play a central role in the event of U.S.-China hostilities. It is not enough to posit "a shallow diplomatic crisis" or to believe there could exist a limited naval conflict around Taiwan. Highlighted by the preceding examples, present-day literature examining possible U.S. conflict with China over Taiwan entirely dismisses the notion of an integrated world, and the larger economic risks and consequences of those actions. Whether we are analyzing this issue from a strategic, great-power, or military perspective, understanding of globalization and the interconnected nature of the United States and China is critical.

Economic Links to China and Taiwan

U.S. concern over China's anti-access capabilities primarily center on a China-Taiwan scenario. A number of military options are open to China in responding to a Taiwan crisis. The Department of Defense report, Military and Security Developments Involving the People's Republic of China 2010, examined four conventional military methods China could use to force Taiwan's acquiescence: blockade, limited force or coercive option, air and missile campaign, or invasion. However, all of these options require, at minimum, some preparation if for no other reason than to fuel ships, assemble soldiers, and prepare rockets. There is no feasible way to immediately attack or invade Taiwan overnight.

If there can be no instantaneous coercion of Taiwan, then there must be an understanding of the buildup to a China-Taiwan conflict and a wider Sino-American war. If we appreciate the interconnected nature of the world and recognize how a conflict might occur, we will better comprehend how our strategic questions must change.

Most people know that we rely on China for much of what we consume, yet perhaps few fully understand the immensity of that reliance. Writing in The Atlantic, James Fallows gives a partial run-down of what China produces:

computers, including desktops, laptops, and servers; telecom equipment, from routers to mobile phones; audio equipment, including anything MP3-related, home stereo systems, most portable devices, and headsets; video equipment of all sorts, from cameras and camcorders to replay devices; personal-care items and high-end specialty-catalog goods; medical devices; sporting goods and exercise equipment; any kind of electronic goods or accessories; and, for that matter, just about anything else you can think of.8

U.S. angst over the outsourcing of jobs overseas rests primarily with the label "Made in China." Tainted dog food, lead-based paints on children's toys, and the recent suicides at high-tech assembly plants all keep Chinese production in our consumer consciousness. As the steady march of global integration continues, the U.S. public is continually surprised by what else it learns. Only after a number of suicides in Shenzhen did many become aware that a Taiwan-based electronics manufacturer named Foxconn employs more than 920,000 people in China and produces electronics for IBM, Cisco, Microsoft, Nokia, Sony, Hewlett-Packard, and Apple.9

While Foxconn is the Taiwanese and Chinese face of globalization, Apple Computer, which is inexorably linked to both China and Taiwan, is an international face of the United States. The backs of iPads, iPhones, and iPods are all stamped "Designed by Apple in California, Assembled in China."

For Apple, currently the second largest company in the world by market capitalization, most of its parts and final production travels through the Western Pacific. An iPod's hard drive is built in both China and the Philippines, its display module is built in Taiwan, and all of its components are shipped to China for final assembly. A Foxconn plant in Longhua, China, produces 137,000 iPhones a day, or about 90 a minute. And if the iPod and iPhone are not enough to illustrate the importance of China, the Apple iPad begins its shipping route in Shenzhen, China, and then goes to a Federal Express shipping facility in Hong Kong.10

These examples, which do not even account for the $900 billion that China holds in U.S. government debt, along with countless other globalization facts, dictate that easy separation between military analyses and wider economic and political factors is insufficient in advancing our strategic thinking. To accurately examine a possible military conflict over Taiwan, a full understanding of the buildup to a conflict is required. Here is one way a Taiwan Strait Crisis might unfold.

Sino-American War = Plummeting Economy?

A blockade or invasion of Taiwan likely would arise from a regional diplomatic or military incident, or a return to the policies of former Taiwanese President Chen Shui Bian. While a declaration of independence by Taiwan is widely seen as the catalyst for a Sino-American conflict, an unforeseen episode between China and Taiwan is perhaps just as likely to escalate into an international incident. As evident in the November 2010 diplomatic confrontation between China and Japan after a Chinese fishing vessel rammed into a Japanese coast guard ship, relatively minor episodes in this region can quickly escalate into international crises.

In the event of such escalation, domestic tensions in both China and Taiwan would fuel diplomatic rhetoric, preventing either government from backing down. As Susan Shirk, a former deputy assistant secretary of State, has written, "it is universally believed in China that the Chinese Communist Party would fall if it allowed Taiwan to become independent without putting up a fight."11

Therefore, the Chinese would have to make an overt statement and convey their resolve to prevent a unilateral declaration of independence emanating from Taiwan. One way to show such resolve would be to announce increased readiness of Chinese rocket forces, and preparations to put People's Liberation Army Navy surface ships and submarines to sea. This would demonstrate the seriousness of the military threat to Taiwan and make a clear statement to a domestic audience that only China will decide the fate of Taiwan. The United States would respond in kind militarily, if for no other reason than to ensure an adequate deterrence posture.

International economic markets would watch these events closely, and any announcement of military activities would set off a downward spiral in the international stock markets. Both Apple and Walmart, which receive most, if not all of their production from China, would see their stock prices plummet. Although a majority of Americans do not watch the stock market regularly, approximately 50 percent of the U.S. population owns stocks either outright or through mutual funds and 401Ks. Companies such as Apple, Walmart, and hundreds of others are heavily invested in China, Taiwan, and the rest of the Western Pacific. The resulting dive in the stock market would make Americans acutely aware of just how connected their financial well-being is linked to China and Taiwan.

As tensions mount, it is not hard to imagine a lone commander making a rash decision that escalates the situation. In response to such an act, or out of a need to please a domestic audience, either China or Taiwan might pursue a military option. If events continue to spiral, Chinese leadership would feel they have no choice but to take steps to ensure Taiwan remained part of One China, thus ensuring the Communist Party remained in power. In this scenario, China would declare a maritime- and air-inspection zone (or to the rest of the world, a blockade) around Taiwan.

The U.S. government would not be immune to the nationalist pressures confronting the Chinese Communist Party. Right-wing bloggers and political pressure groups would wave the Taiwan Relations Act (regardless of what it says) and use this opportunity to confront China and protect U.S. hegemony.

The American political establishment would not allow China to forcibly coerce a multiparty democracy to bend to its will, and in the worst-case scenario, U.S. political pressures and the need to reassure allies would force a retaliatory trade embargo. Both Chinese and U.S actions would significantly impact seagoing and airborne trade in the vicinity of China, Taiwan, South Korea, Japan, and the Strait of Malacca. Even without a formal blockade, the civilian response to this scenario would be the same. Once a threat of a military strike against Taiwan became a possibility, or if Chinese submarines were to put to sea in large numbers to enforce a blockade, commercial shipping in the area would drop off dramatically of its own accord.

Instant Fallout

The impact to the world economy would be instantaneous. Apple, along with other technology firms that rely on China, would face disaster. Foxconn could not be expected to continue production, even if it were somehow able to get to its components during the crisis. As a Taiwanese company, Foxconn would have no room to maneuver. Within days, if not hours, half of the world's supply of consumer and business electronics would dry up.

Walmart, even more broadly reflective of the wider U.S. economy, would fare little better. In the era of "just-in-time logistics," when shipping companies act as Walmart's warehouse, it only would be a few days before the United States would start seeing eerily empty shelves, not only at Walmart but at other stores across the country. Companies in the Dow Jones Industrial Average that are dependent on sales and growth in China—including Alcoa, Caterpillar, General Electric, McDonald's, and Boeing, to name a few—would see huge losses. The technology-heavy NASDAQ companies would lose even more of their stock-market value.

This scenario is not meant to be a scare tactic, and it is not based on the fear of a militarily capable China. It simply represents the reality in which we live. The vital economic links between the United States and China mean that even the buildup to a military conflict would have dire effects. The United States should be alarmed about "Chinese strategic writings, which often express considerable confidence that China can manage strategic escalation in measured increments with a high degree of certainty."12

Conflict with China would not be an isolated or limited affair. In any type of Sino-American war scenario there should be no expectation that political leaders could manage the economic fallout. Both sides, and the entire world economy, would be devastated by the economic consequences, and the ramifications would affect all facets of U.S. society.

Asking the Right Question

Concerns over China's ostensibly peaceful rise still highlight how critical it is for the United States to manage its relations with China. As China analyst Andrew Scobell states, "To China's leaders the potential for a conventional conflict with the U.S. is highly unlikely in the near future, with the notable exception of Taiwan."13

So where does this leave the vital discussion about U.S.-Chinese relations? As China becomes more of a potential military rival, U.S. strategic thinking needs to evolve beyond the age-old question of "How do we counter?" Perhaps the real question is, "How do we prevent any type of military conflict with China?" While this may appear a subtle distinction, it cannot be dismissed, given 21st-century realities.

The United States cannot allow the DF-21D missile to dominate and deflect its strategic thinking about China. A Taiwanese businessman and his company, Foxconn, have taken care of any "carrier-killers." What the United States truly needs to fear, and do everything in its power to prevent, is a China that believes it has nothing to lose by opposing America in some type of military engagement. In this case no amount of deterrence would prevent a catastrophic conflict.

The United States must make it clear that if China were to try to use coercive military means to prevent Taiwan from declaring its de facto independence, there would be no strategic winner. Once this is understood, then the question of how to prevent a military conflict with China takes on new importance.

According to Susan Shirk, "preventing war with a rising China is one of the most difficult foreign policy challenges our country faces."14 Ensuring the development of a mature, self-confident China is the responsibility of the U.S. government through the State Department. Providing specific recommendations for this delicate and long-term task is beyond the scope of this article, but as a minimum, the U.S. military needs to ensure it does not stand as an impediment to this crucial task. The United States will need to do everything it can to help manage China's transition and ensure it is done with minimal disruption to the world's political and economic order. The world has changed dramatically since the fall of the Soviet Union.

Nations are intertwined as never before, and the dynamics of the world economy and international society have changed the way we interact with the world community. The United States needs to ensure its strategic thinking changes in response.

Before We Gut The Navy, Think
Daniel Goure, Ph.D., Early Warning Blog, Lexington Institute

15:09 GMT, July 21, 2011 Proposals for deep cuts in military forces are swirling through Washington. Among the ideas being put forward just for the Sea Services are to reduce the number of nuclear-powered aircraft carriers from 11 to 9 and delay the start of the next Ford class aircraft carrier, cancel the next generation ballistic missile submarines, reduce the planned production rate for nuclear attack submarines from two to one, eliminate a large portion of the amphibious warfare fleet and cancel both the Navy and Marine Corps variants of the advanced, stealthy F-35 Joint Strike Fighter.

Such proposals are ill-advised from a strategic, operational and even industrial base perspective. The world's oceans are once again becoming a contested domain which ought to concern Americans since we are a trading nation and dependent on the movement of materials and goods by sea. China, which is deploying a ship-hunting ballistic missile, has also sent its first aircraft carrier to sea. Beijing is seeking control over the South China Sea despite equally valid claims from several other Asian countries. Iran, whose naval operations were once restricted to the Persian Gulf, has recently been seeking to significantly extend its naval reach. The regime in Teheran sent a naval squadron through the Suez Canal. An Iranian admiral recently declared that it is his country's intentions to deploy warships as far away as the Atlantic Ocean. Russia is acquiring four Mistral amphibious warfare vessels from France and has planted a titanium flag at the bottom of the Arctic Ocean, asserting a claim over contested territory.

Operationally, naval forces provide flexibility, continuous forward presence and sheer military power. Inherent in the way we have designed and built our ships and structured naval forces is the ability to conduct a wide range of missions from humanitarian assistance and counter piracy to major combat operations. The reality is that virtually all U.S. military operations are away games. Regardless of how the U.S. seeks to engage, influence or fight states and non-state actors alike it must first get there and protect its lines of communication and resupply from the United States. The most straightforward and cost-effective way to bring power to bear across vast oceans is with naval forces. Reducing naval forces means a disproportionate loss of U.S. influence, combat power and security.

Naval forces also provide tremendous inherent operational flexibility. Due to their large volumes, U.S. aircraft carriers, large deck amphibs, SSGNs and cruisers allow commanders to employ them in novel ways, carry unusual cargoes and support a wide range of operations. This can include deployment of Army units and helicopters, the movement of humanitarian relief supplies and the operation of SOF. With the STOVL variant of the JSF, the F-35B, the Navy will double the number of ships that can deploy advanced combat aircraft. In the aftermath of the Japanese tsunami the aircraft carrier Ronald Reagan (CVN 76) went from conducting combat training to providing emergency assistance in the blink of an eye. No other navy or branch of the U.S. military could have done this.

Proposals to delay ships and reduce build rates will have significant negative consequences on the entire shipbuilding industry. This is particularly true for the nuclear ship construction. Delay the next aircraft carrier and not only will its price rise but so too will the price of nuclear attack submarines and potentially the next generation ballistic missile submarine. Like proposals to eliminate the Jones Act, which requires that ships carrying cargo between U.S. ports be built in U.S. shipyards, cutting back on planned construction rates for nuclear-powered naval vessels actually could result in greater expenditures in the long-run. It is clear that those making such proposals have no clue about the integrated nature of the naval construction industry.

Finally, the idea of foregoing the next generation of ballistic submarines is the height of silliness. The SSBN force is the truly secure retaliatory portion of the current nuclear triad. It provides two-thirds of the available warheads under the New START Treaty. The existing Ohio class boats will need to be retired starting around 2020. There is no alternative to building a new class of SSBNs, at least until we reach the nirvana of a verifiable global nuclear disarmament regime.

The Devil We Know
By Miguel Silva, Atlantic Sentinel, July 21, 2011

The balance of power in the Indian Ocean rim has been degrading for some time but China's recent decision to sell submarines to Pakistan threatens to further upset South Asia's fragile nuclear balance. The question we must ask ourselves is who do we want counterbalancing India's naval might in decades to come?

Pakistan is weak and not getting any better. It is an artificial polity and much of its problems stem from that very fact. It lacks a cohesive core ethnicity, it lacks geographical coherence (the Indus valley having never been an easily defensible position without strategic depth) and its demographic-raw materials proportion is worsening due to population growth.

What Pakistan has in abundance is geostrategic relevance. All those interested in counterbalancing India (China), Iran (Saudi Arabia) and Russia (the West) have a permanent and vested interest in propping up Pakistan.

For this reason, Pakistan's military apparatus always has been and always will be powerful. While the Pakistani army and air force have made the difference in their wars with India and in small deployments to the Middle East (against Israel and later in support of Saudi Arabia in Yemen), Pakistan's navy has long been the weaker branch. India always managed to control the sea lanes when in conflict with its rival.

The Pakistani navy however, has had another role to play—that of anti-Indian ambassador in the Indian Ocean. Islamabad's navy is the only one in the Indian Ocean armed with air independent propulsion submarines and has been known to make port calls to Sri Lanka and Saudi Arabia.

In other words, the maintenance of an alternative sphere of influence to that of New Delhi's in the Indian Ocean requires Islamabad. Throughout the Cold War, India's partnership with the Soviets threw America into the arms of Pakistan but as the relationship between America and India warms up in this century, those in the Indian Ocean rim who seek an alternative to India are running out of options.

The war conducted in Afghanistan by the United States and their allies has greatly destabilized the region. Pakistan is now fighting a war of its own on its western border and is failing to keep up with the growth of India's armed forces. Recent earthquakes and India's military lead has only exacerbated the equation.

For all these reasons, one might have predicted that Beijing would sooner or later move to rebalance the situation and this month it was revealed just how it decided to do so. India's Force magazine reported that Pakistan may soon add to its arsenal Chinese diesel submarines carrying nuclear cruise missiles.

It is not a first in Asia for Israel has had them for some time as deterrence. Has this worked? To a certain extent. Jerusalem's threat is enough for regional hegemons such as Iran to tread carefully. Confined only to a land based ballistic deterrence, Israel would have had little in the way of second strike capability. The range of its deterrence would be limited moreover.

Thus Pakistan's threat to India would be considerably upgraded—especially considering that India is developing a ballistic missile submarine class and that Pakistan can only afford so much in terms of submarines (having previously cancelled a contract with German shipyards for a conventional diesel class of submersibles).

Pakistan's weakness may now have been plugged by an influx of technology from its patron but this is a temporary solution at best. China trusts its ally to bounce back once the Westerners leave Afghanistan alone.

This development speaks of the growing competition for this very important ocean but let there be no sense of triumphalism for power monopolies are unstable. Either China will be forced to keep a naval detachment in the southern seas or America's alliance with fellow democratic India is not meant to be. Time now to ponder which of those two possibilities is worse.

Nuclear Subs to Defend Oil, Project Global Power
By Fabiana Frayssinet, IPSnews.net, July 21, 2011

ITAGUAÍ, Brazil, Jul 21, 2011 (IPS) - Plans for a Brazilian nuclear submarine that had been postponed since the 1970s are beginning to materialise, as the nuclear-propelled sub is regarded as a strategic necessity to guard Brazil's deep water oil reserves, and to project global power.

Steel plates piled up in a warehouse at Nuclebrás Equipamentos Pesados (NUCLEP), a mixed capital company in Itaguaí, about 80 km from Rio de Janeiro, are labelled "submarine plates."

President Dilma Rousseff made the symbolic "first cut" of a steel plate Jul. 16 at a ceremony marking the start of operations at the shipyard where the submarine hulls will be built.

"This is a very special moment," she said in her speech launching the Brazilian navy's submarine development programme (ProSub), which will initially produce four conventional S-BR submarines using French technology.

"Brazil is taking another step toward affirming its status as a developed country with sophisticated industry capable of absorbing, mastering and using advanced technologies," she said.

ProSub originated in a December 2008 agreement between French President Nicolas Sarkozy and former Brazilian President Luiz Inácio Lula da Silva.

Under the accord, France will transfer technological know-how to Brazilian industries involved in developing and building the submarines.

In addition, work has begun on building a shipyard, a naval base and a metal structures factory, and according to the navy, over 30 Brazilian companies are to start producing the more than 36,000 different components needed.

Brazil formed a company, Itaguaí Construçoes Navais (Itaguaí Naval Construction), as a partnership between the French state company DCNS (formerly Direction des Constructions Navales et Services), the Brazilian construction giant Odebrecht, and the Brazilian navy, which has veto rights.

The project is part of a more ambitious plan. According to the Defence Ministry, it is "the first step towards building a Brazilian nuclear-propelled submarine (SN-BR)," with delivery expected in 2023.

Brazil already has the uranium enrichment technology required for producing nuclear fuel, and wants to use it to power the submarine.

This is highly sensitive technology, mastered so far by only a select group of countries: China, France, Russia, the United Kingdom and the United States.

In the view of political scientist Mauricio Santoro of the Rio-based Getulio Vargas Foundation, this is the Brazilian navy's most important and symbolic undertaking in recent decades.

Developed countries like the United States consider nuclear propulsion essential to their war fleets, Santoro told IPS. Therefore, mastering this technology is "essential" for the Brazilian navy to create "a production prototype" that can subsequently be used in other naval vessels like aircraft carriers.

The Brazilian navy describes nuclear submarines as "one of the most complex naval vessels" ever invented, because of their tactical and strategic advantages over diesel-electric submarines, such as greater diving autonomy and speed, which allow them to undertake longer patrols of larger ocean areas.

As Santoro recalls, Brazil has historical reasons to pursue this technology. The country joined in the First and Second World Wars because of German submarine attacks on Brazil's merchant navy in the South Atlantic, at a time when Brazil had no means of defending itself.

Moreover, as naval officers in Brazil never tire of arguing, the 1982 Malvinas/Falkland islands war between the UK and Argentina would have had a different outcome if Argentina had had a fleet of nuclear submarines to back up its claim to the islands.

"From a strategic point of view, they are probably a navy's most effective defensive weapon," Santoro said.

Their use in defence, not attack, is always emphasised by the Brazilian government.

"The primary goal of this project is to modernise the navy and give it the tools to master the technology for the production of nuclear-propelled submarines, in a defence context, not an attacking role, because our country is committed to the principle of peace," Rousseff stressed.

William Gonçalves, an international relations expert at the Rio de Janeiro State University, said this is an important clarification that demonstrates that "Brazil has no expansionist or aggressive intentions," especially towards its South American neighbours.

The message is intended for these countries to "be aware that Brazil has specific strategic needs, but it is not fuelling an arms race, nor does it want to become a military power," he told IPS.

In Gonçalves' view a nuclear submarine is justified because "Brazil's strategic needs have changed."

This country of 190 million people needs to protect its maritime exclusive economic zone of 3.6 million square kilometres, especially since the recent discovery of huge oil deposits located deep below the sea bed under a thick layer of salt, which could provide its future domestic supplies and oil exports.

Rousseff said: "It's only fair that our navy should possess one of the means of guaranteeing this country's sovereignty and protecting its riches."

Gonçalves added that Brazil "has increasingly broad international responsibilities" related to political, energy, trade and environmental affairs. "Brazil is not a military power, nor does it aspire to be, but it is an increasingly influential international player," he stressed.

Santoro said there were other strategic motives, such as the need to watch over the 95 percent of Brazilian foreign trade goods that are transported by sea.

A nuclear submarine would show "the importance Brazil attaches to its defence agenda," and to improving its technological capabilities.

The analyst also mentioned Brazil's aspiration to a permanent seat on the United Nations Security Council. In his view, the country would need "armed forces that are better equipped to exercise that role."

Like Gonçalves, Santoro believes that ProSub's defensive role is emphasised "to assert the idea of a traditionally peaceful country that does not harbour expansionist aims, does not wish to enlarge its territory or conquer other countries, and does not want an imperialist arms race."

Robotic Subs Threatened By Somali Pirates
Strategy Page, July 20

The Somali pirates, who now prowl most of the Indian Ocean (west of India) have not only interfered with merchant shipping, but with oceanographic research as well. For example, an international effort to distribute and maintain 3,000 instruments into the world's oceans is now under attack off Somalia. The scientists use these 3,000 buoys and robotic mini-submarines to assist in predicting the weather and gaining a better understanding of the oceans in general. But the scientists can no longer travel into the western Indian Ocean, because of a the risk. The small research ships have already had a few close calls with pirates. So the task of dropping off (and sometimes picking up) these robotic research devices will be carried out by some of the warships operating off Somalia, and points east.

This global use of robotic sensors has been growing more extensive and important, over the last decade. Much of the progress was made possible by the development of highly efficient AUVs (Autonomous Underwater Vehicle). The U.S. Navy developed one of these nearly a decade ago for monitoring the underwater "weather". This SeaGlider is a two meter (six foot) long, 52 kg (114 pound) device that looks like a torpedo with wings. It can stay at sea for up to six months (before needing a battery recharge) and glides through the water at up to 20-25 kilometers a day. The AUV is propelled by a system of shifting weights (the battery pack) an air tank that is emptied and filled to adjust depth, and a pair of wings that provide life, as wings do for an aircraft in the air. The SeaGlider moves forward by diving, and comes back up in a forward glide as well, collecting data all the way.

SeaGliders main mission is to measure of the water, and use its built in satellite phone, every four hours or so, to send the information to anyone in the navy that needs it. SeaGlider also uses the satellite phone to get new orders, and has a built in GPS and other navigation sensors to enable it to find its way to areas it has been ordered to monitor. SeaGlider also collects information on currents, and uses that to help it glide from place to place.

SeaGlider was not built to help with weather prediction, but to improve American anti-submarine capability. The composition (temperature, salinity, oxygen content, quantities of biomatter, and so on) of the water in oceans changes slowly. Those characteristics influence the effectiveness of sonars (both active and passive.) If you can monitor the water composition more accurately, your sonars will be more accurate. SeaGlider can be dropped by aircraft or helicopter and spend days, weeks, or months collecting water information (at depths of up to 3,000 feet) before friendly subs show up for action.

At $100,000 each, SeaGlider was a cheap way to keep an eye on large chunks of the ocean. SeaGlider works because its onboard electronics draw very little power, as does its movement mechanism. SeaGlider isnt fast, but it has that most prized UAV/AUV characteristic; persistence. SeaGlider can hang around for a long time, waiting for the enemy to show up. This was a mission submarines were originally designed for. But manned subs were too expensive to put enough of them out there to cover large areas of the ocean. SeaGlider is cheap, efficient, patient and never has to worry about crew morale. What the navy is not discussing is a future version of SeaGlider that wanders around an area looking for hostile submarines as well. Meanwhile, devices similar to SeaGlider are being used on an even larger scale to monitor a larger number of ocean characteristics. Apparently the Somali pirates have not captured and held for ransom one of these robotic subs, but they may have simply shot some to pieces as it surfaced near them (to transmit data). The scientists will continue to drop off and pick up their stationary and self-propelled sensors near pirate-infested waters. But in pirate territory, only warships will perform what is now a dangerous duty.

Could The Navy Opt For A Mini-Boomer?
DOD Buzz (Blog), July 20

In certain quarters inside the Beltway, there's a prophecy as bleak as the Mayans' beliefs about the year 2012: In the not-too-distant future, the Navy's next-generation ballistic sub, SSBN(X), will become so expensive it'll swallow up almost every shipbuilding dollar the service has. A nuclear submarine is the most complicated machine ever built, more sophisticated than the space shuttle, as bubbleheads like to say, and building a new class from scratch to carry a brace of world-ending nuclear missiles could cost $70 billion or more. (Almost certainly more.)

But if the Navy tried to modify its existing Virginia-class fast attack submarines to carry Trident missiles, that might save a lot of money. This idea has been kicking around for years, and the Navy brass doesn't like it — the Virginias weren't built for this job, they's require a different, smaller version of the missile than today's Ohio-class boomers carry, and building a new SSBN from scratch ensures no compromises in its ability to conduct its silent patrols for decades. The Navy hates it so much, in fact, that you might have been forgiving for believing the Virginia-boomer idea was dead. The Defense Acquisition Board even gave the green light to a new-design SSBN(X) last year.

However, it appears the mini-boomer idea survives. Marine Gen. James Cartwright, the outgoing vice chairman of the Joint Chiefs of Staff, broached it during his breakfast meeting with reporters last week, which prompted the baring of fangs by America's submarine-builders up in Connecticut, home of the Electric Boat shipyard.

Here's how reporter Jennifer McDermott of The Day newspaper broke it down:

[Cartwright] told reporters in Washington last week that "nothing is off the table" as the Pentagon looks to cut at least $400 billion from the budget through the 2023 fiscal year, according to a transcript.

Instead of building the new ballistic-missile submarine, Cartwright said, the Navy could make the Virginia class of attack submarines longer so they could carry ballistic missiles, according to published reports from the meeting.

EB spokesman Robert Hamilton said he could not comment on the issue.

Connecticut Rep. Joe Courtney, the Democrat whose district includes EB and is an staunch submarine supporter on the House Armed Services Committee, tells McDermott the HASC has studied the Virginia-boomer idea and rejected it — by the time you buy different Tridents to ride in the smaller sub, you don't get any real savings over SSBN(X), he says.

No way, argues America's most famous naval personality:

Norman Polmar, a naval analyst and submarine warfare expert, said he has been advocating for a smaller submarine based on the Virginia design for years because the replacement program, which he believes could add up to $100 billion with research, development and construction costs, is simply unaffordable.

The Virginia design could be enlarged to add a missile compartment so the submarine could carry about a dozen of the smaller missiles, for a cost of between $3 billion and $3.5 billion to build each modified sub, said Polmar, who has served as an adviser to several top Navy officials.

The highly capable ballistic missile submarine is certainly warranted, he said, but the Navy would have to compromise too many of its features to bring down the cost. The best solution is to build the modified submarine until the Navy can afford the proper ballistic-missile submarine, Polmar said.

It's hard to know what to make of it all — if the Navy considers this a done deal, why is the vice chief offering up an alternative strategy on how to build this submarine? Rule number one of Washington is that no decision is ever final, so this may not be the last we hear of the mini-boomer.

Slashing Defense Makes America Less Safe While Allowing Politicians To Kick The Can Down The Road On Entitlement Reform
The Heritage Foundation (Blog), July 20

Today, America is asking its military to do more than ever before. In the past 24 months alone, U.S. military forces have conducted their 10th year of combat operations in Afghanistan, wound down operations in Iraq, started a new no-fly zone in Libya, dramatically escalated counterterrorism operations in Yemen, maintained counter-piracy operations off the coast of Somalia and elsewhere, sent troops to aid in disaster relief in Haiti and Japan, and even maintained the commitment to keep 1,200 National Guard troops along the southwest border—to name a few things keeping the military busy these days.

As long as politicians continue asking the military to shoulder ever-increasing burdens in pursuit of America's national interests, Washington cannot expect those in uniform to simply get by or "make do" with lower budgets.

Trying to Repeat 1990s Defense Cuts When the World Is Much Different, Risks Growing

Defense cuts in the 1990s led to direct consequences and casualties when America went to war after 9/11. When U.S. forces were sent to Iraq without adequate body armor protection or up-armored vehicles, the country was outraged. Families were forced to mail body armor to soldiers overseas, troop transports lacking modernized armor were left unnecessarily vulnerable to roadside bomb attacks, combat operations were doubled in length and possibly cost lives, and conditions at medical centers such as Walter Reed reached inexcusable levels.

Moreover, America's ground forces were too small to prosecute well both Iraq and Afghanistan simultaneously. The result was a shift in focus on Iraq while U.S. forces tried to hold the line in Afghanistan. The cost to the taxpayer was a dramatically lengthened operation, and the cost in national treasure is still being paid.

Unfortunately, all of these outcomes were entirely predictable and their roots formed in budget-driven decisions made by Congress and the President just a few years prior.

Implications of a Half-Trillion-Dollar Military Cut, for Starters

Booms and busts—that is the typical funding pattern for America's military. And it almost never saves money in the long run. Trying to force another "bust" while the military continues fighting is much riskier today. The Reagan buildup created a cushion that allowed defense investment to be deferred in the 1990s and even in this decade while military operations escalated.

But defense budget increases since 9/11 have generated little cushion. They have largely been consumed by current operations, not on future preparedness. Exacerbating the strain is the fact that the war in Iraq was not preceded by a mobilization.

In April, President Obama denounced his own 2012 budget request sitting on Capitol Hill and called for $400 billion in security cuts over the next decade. One of the first consequences of $400–$500 billion in military cuts would be to slice soldiers and Marines from the force and return the Army and Marine Corps to their 1990s levels. These personnel levels would allow the nation to sustain only one protracted operation overseas, but they would be insufficient to conduct two simultaneous ground efforts. This would eliminate the Pentagon's longstanding two-war force planning construct through the back door. Most worrisome, this size force would immediately reduce options available to the commander in chief if a crisis arises while American forces are already committed elsewhere.

This level of cuts would also see the elimination of many overseas bases that serve as stops on a global highway the U.S. military needs to access forward assets and evacuate and treat the wounded from the Central Command region. This would increase the cost and length of time to surge forces from the continental United States.

These cuts would also see the cancellation of what is left of the Pentagon's meager modernization plans for future military equipment. Some of the many pending long-term projects crucial to winning future conflicts—as well as deterrence, which saves money—such as a new bomber, next-generation stealthy helicopter, new nuclear submarine, and various space, satellite, and missile defense capabilities could become victims of this plan.

Not only would this effectively turn the nuclear triad into a diad or worse, but it could essentially leave submarines as the only realistic long-range strike platform to confront the growing threat of anti-access and area-denial capabilities. Since submarines face long trips back to port after firing their missiles, the sortie generation rate of a long-range strike force consisting almost exclusively of submarines would be extremely low. In this kind of scenario, the United States could easily be "locked out" of the vital Asian littorals.

Implications of Up to $1 Trillion in Defense Cuts

As in the $400 billion scenario, Army and Marine Corps end strength return to 1990s levels, reducing capabilities to conduct any operations, including humanitarian aid and allied partner capacity building.

Many other vital elements of force structure would also disappear, such as one or two Navy carrier strike groups. A large part of America's missile defense program would be scaled back as well. This means not only cuts to missile sites on U.S. soil but also to sea-based missile defense platforms, such as Aegis cruisers and destroyers needed to maintain America's nuclear umbrella.

Nuclear forces would be a major casualty under these reductions. Not only would the nation see drastic reductions in stockpiles of ground-based nuclear weapons, but nuclear modernization programs—like those promised as part of a deal to pass the New START treaty—would be left behind. It would become ever more likely that the Air Force's next generation bomber would be eliminated entirely, along with the Navy's Ohio-class replacement submarine.

The so-called Bowles–Simpson plan implicitly assumes that the U.S. will be engaged in one medium-sized conflict in 2015 and does not achieve savings by end strength reductions. Instead, most of the cuts come from modernization accounts or procurement and research and development.

This plan, along with several others like it, reduces procurement spending by 15 percent through 2015. Much of this is achieved through the cancellation of the Marine Corps's Maritime Prepositioning Force, the Expeditionary Fighting Vehicle, and the V-22 Osprey.

Procurement of the much-needed F-35 Joint Strike Fighter takes a large hit, as well. The Air Force and Navy versions of the F-35 are cut by fully one-half, while the Marine Corps version is outright cancelled—even though this is the only aircraft set to replace three different Marine air capabilities today.

These cuts would only increase the looming technological gap between the United States and others, such as India, Russia, and China, all of which are seeking to build fifth-generation-plus tactical fighters. Even before the introduction of China's stealthy J-20, multiple simulations of air combat scenarios in the South China Sea have the United States losing to China because of a sheer disadvantage in numbers.

The F/A-18E/F Super Hornet is a stop-gap capability but cannot serve as a next-generation air superiority and strike fighter in combat environments where stealth is increasingly rendered less effective. The F-18 is not organically stealthy, and it lacks the electronic warfare suite of the F-35.

Ironically, these types of program cuts are typical of those policymakers should want to keep if they are trying to save money. President Eisenhower cut defense spending and the size of the Army in the 1950s, but he bolstered America's strategic nuclear arsenal. He knew that the deterrent factor of nuclear weapons would cover for the military's reduced force levels. The strategy behind defense cuts today is of opposite and dangerous logic: cut end strength, eliminate long-range strike, and slash the offensive and defense strategic forces arsenal.

Unkind Cuts

The sheer magnitude of these additional defense cuts would undercut everything from the number of people in uniform, to readiness and training, to base facilities and infrastructure. Weapons systems alone will not come close to meeting these cutting targets for the military.

Washington must remember that those who demand scaling back military size, structure, and capabilities in the name of fiscal prudence ignore the fact that the nation will have to spend more later to rebuild.

Unfortunately, it does not take a "hollow force" to harm national security. Even comparatively small cuts in defense—if applied to the wrong areas—can harm America's capacity to project power abroad, guarantee the defense of its allies, and meet international commitments.

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Pentagon Could Scrap New Ballistic-Missile Submarine

The Day, July 20

Groton - Electric Boat President John P. Casey has repeatedly said the work on a new class of submarines that is ramping up at the shipyard is critical to the company's success.

And EB is hiring hundreds of engineers for its growing New London design and engineering campus, many of whom will work on the new ballistic-missile submarine.

Now this work could be in jeopardy as the Pentagon considers scrapping the plans to build the class.

Marine Corps Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff, told reporters in Washington last week that "nothing is off the table" as the Pentagon looks to cut at least $400 billion from the budget through the 2023 fiscal year, according to a transcript.

Instead of building the new ballistic-missile submarine, Cartwright said, the Navy could make the Virginia class of attack submarines longer so they could carry ballistic missiles, according to published reports from the meeting.

EB spokesman Robert Hamilton said he could not comment on the issue.

This idea has been floated before but dismissed by many as unworkable due to the size of the ballistic missiles.

The latest generation of submarine-launched ballistic missile measures 44 feet and weighs 130,000 pounds. Ohio-class ballistic missile submarines, at 560 feet in length and 18,750 tons submerged, can carry up to 24 of the missiles. Virginia-class submarines are only 377 feet in length, with a beam of 34 feet, and weigh about 7,800 tons submerged.

"You cannot just take a Virginia-class submarine, drill a couple of holes and throw some missiles in it," said U.S. Rep. Joe Courtney, D-2nd District, explaining that it would take a "huge overhaul" of the submarine for it to be able to "fire these massive rockets."

The Navy would have to buy a smaller version of the missile, which would be expensive since it hasn't been produced in years, Courtney said.

"If you incorporate those costs into this modified Virginia-class sub, the hoped-for savings really start to diminish," he said.

Courtney said the House Armed Services Committee studied the issue over the past two years because of concern over the hefty price tag for the 12 new ballistic-missile submarines and the pressure it would put on the Navy's shipbuilding budget.

According to the Navy, each submarine is estimated to cost approximately $5 billion in 2010 dollars except for the first one, which is estimated to cost $7 billion because design costs are factored in.

The Navy plans to buy 12 to replace the 14 current Ohio-class ballistic-missile submarines that will reach the end of their service lives, with the lead ship purchased in 2019.

Norman Polmar, a naval analyst and submarine warfare expert, said he has been advocating for a smaller submarine based on the Virginia design for years because the replacement program, which he believes could add up to $100 billion with research, development and construction costs, is simply unaffordable.

The Virginia design could be enlarged to add a missile compartment so the submarine could carry about a dozen of the smaller missiles, for a cost of between $3 billion and $3.5 billion to build each modified sub, said Polmar, who has served as an adviser to several top Navy officials.

The highly capable ballistic-missile submarine is certainly warranted, he said, but the Navy would have to compromise too many of its features to bring down the cost. The best solution is to build the modified submarine until the Navy can afford the proper ballistic-missile submarine, Polmar said.

Earlier this year, the Defense Acquisition Board endorsed the initial plans for the new ballistic-missile submarine and the planning was recognized as an official Department of Defense program. The House of Representatives has passed the fiscal 2012 defense appropriations bill, which includes $1.3 billion to continue developing the replacement submarine.

The potential for a change in direction rattled the state's senators, who are strong supporters of submarine construction given its importance to the local economy and to national security. Electric Boat employs about 10,000 people.

"The Navy has concluded the Ohio Replacement Program best meets the country's future strategic deterrent needs," said U.S. Sen. Richard Blumenthal, D-Conn., adding that other options, including the one mentioned by Cartwright "have been reviewed by the Navy and determined to be less attractive, less affordable and less technically feasible and effective."

In this austere budget environment, Blumenthal said, the focus should be ensuring that the replacement program meets "aggressive operational and affordability goals."

U.S. Sen. Joe Lieberman, D-Conn., is also skeptical of any proposal to replace the program with a modified Virginia-class submarine, according to spokeswoman Whitney Phillips.

He is concerned that it would neither save money nor produce a submarine with the same capability, she said.

Report: Parts-Swapping Is Common Across Navy

DOD Buzz, July 19

Crews aboard one in every two ships across the Navy "cannibalized" spare parts from their neighbors in order to get operationally ready or pass an inspection, according to a report Tuesday in Jane's Defence Weekly. According to data obtained by naval correspondent Sam LaGrone in the wake of last week's House hearing about Navy readiness, the Navy's submarine force — legendary for its preoccupation with safety and detail — is the biggest culprit in the fleet.

Top Navy officials admitted to the House Armed Services readiness subcommittee last week that the fleet's cannibalization rates were high, but at the time, neither they nor lawmakers gave details. Now, here they are.

Wrote LaGrone:

The US Navy (USN) is relying heavily on a maintenance option the service considers "a drastic measure to only be utilised as a last resort" to allow its ships to pass their basic inspections and maintain the operational effectiveness of its fleet, according to previously unreleased data provided to the US Congress and obtained by Jane's .

In four consecutive quarters in 2010 the USN reported a rate of so-called "cannibalisation" of components between ships of on average twice the current allowable maximum allowed limit (MAL) of about one instance per four ships (.28), according to the data.

He continues:

Across the fleet in 2010, the USN saw an average rate of cannibalisation of .48, or about one instance per two ships across the entire year. Across the nine ship classes identified in the data, five ship classes exceeded the MAL.

The US submarine force had by far the highest instances of cannibalisation, according to the data. In the first three months of 2010 US nuclear attack boats (SSNs) and Ohio-class nuclear ballistic missile submarines (SSBNs) saw a collective cannibalisation rate of 1.4, or about one-and-a-half instances per ship …

Submarine tenders, auxiliary ships and amphibious warships had the least instances of cannibalisation in the data, well below the current MAL. Many of the cases were justified by the navy in reaction to an October 2009 order from Commander, Naval Surface Forces (NAVSURFOR), to maximise readiness rates of deployed or soon-to-be deployed surface ships, according to an explanation that accompanied the data; NAVSURFOR sought to minimise equipment casualty reports on so-called "deployers". Additionally, ships undergoing USN Board of Inspection and Survey (INSURV) inspections raided nearby ships' equipment for supplies in order to pass, the USN said in its explanation to Congress.

"Often times cannibalisations occur with potential assets available. However, the timeframe prior to training events or operational requirements do not support the needed order and shipping time (current system goal is 10 days)," read an 18 July statement provided to Jane's from the US Office of the Chief of Naval Operations (OPNAV). The statement indicated that fleet cannibalisation numbers have decreased to .20 for the first quarter of 2011. The navy also defended its supply lines and systems.

"An evaluation of all cannibalisations for Fiscal Year 10 did not identify any particular weapon systems as the primary cause and determined that the supply system is performing at or above goals," read the USN statement.

Wait, what? If ships across the fleet, including nuclear-powered submarines, can't get spares in time through the normal supply chain and need to borrow them from one another under an informal swap-process the Navy itself calls a "drastic measure" and "last resort," how could the supply chain be "performing at or above goals?"

Why, in fact, does the Navy have official data about a practice it condemns? Here's one theory: In the rough and ready, pirate's-life-for-me world of the surface force, crews may have been swapping parts and keeping pretty loose about their documentation, under the Navy Standard You-Scratch-My-Back-I'll-Scratch-Yours Doctrine. But when you've got a bunch of nukes trying to get their submarines ready for an inspection or a deployment, their pure nuke hearts just can't accept parts from another boat on the waterfront without pristine, extensive, signed-in-triplicate documentation. So Big Navy learned about it one way or another and someone said, well, no way we can stop this, so we might as well monitor it.

Since it's a last resort and it's discouraged, that probably means it goes on even more than these numbers indicate.

One team, one fight, right? These guys are all on the same side, you could argue, and it's a testament to sailors' dedication that they're willing to beg, borrow and steal to stay ready and get the job done. Maybe there's no way to build a bureaucracy such that it can get components on time to everywhere they're needed, forcing some crews to do without in order to help their colleagues. From the way the Navy's statement to LaGrone sounds, it has given up trying.

China Defense Industry Faces Homemade Engine Troubles
The China Post, July 20

SINGAPORE — China can send a man into space and a rocket into lunar orbit but, paradoxically, its defense industry cannot build a top-end aircraft engine. Or an engine sophisticated enough to power advanced surface ships and armored vehicles. But this broad statement requires a caveat: China's defense industry can indeed design, develop and produce propulsion systems for relatively simple military platforms — certain transport aircraft, patrol boats, some types of main battle tanks and armored personnel carriers. But high-performance combat aircraft, destroyers and similarly demanding platforms are another matter.

Only submarines appear an exception to this general rule. Most new types are fitted with locally developed propulsion systems, although the technology's origins are not known.

This technical shortcoming was most recently highlighted in a report in the Russian newspaper Vedomosti stating that Beijing last month bought 123 AL-31FN turbofan engines from Russian manufacturer NPO Saturn. These cost over US$500 million. The order follows earlier tranches that since 2001 have totaled 930 engines.

The AL-31FN currently powers China's J-10 multirole fighter and J-11A/B air superiority fighter, as well as the J-15 carrier-based fighter which is under development. Russia's Klimov RD-93 engine is fitted on the Chinese JF-17 multirole fighter and FC-1 attack fighter. A French engine drives the Z-11 helicopter and an American one powers the civilian ARJ-21 jet airliner.

Indicative of this trend elsewhere in the People's Liberation Army, the navy's Song-class submarine has MTU diesel engines from Germany, while the Luhai-class destroyer has Ukrainian gas turbines and German diesels. Among ground forces, the ZBL-09 8x8 infantry combat vehicle is fitted with a Deutz engine from Germany and the Type 99 main battle tank has a locally produced power plant derived from German technology.

Just a handful of companies worldwide have truly mastered the engineering challenge of developing high-performance engines, and China's dependence on foreign suppliers is deeply problematic for Beijing. But a new report concludes that change may be imminent.

Gabe Collins and associate professor Andrew Erickson, in a comprehensive study published recently by specialist website China SignPost, focus on military jet power plants.

"The Chinese aerospace industry is driven by four strategic imperatives as it pursues the ability to manufacture large volumes of high-performance aircraft engines — parts dependence avoidance, Russian supply unwillingness, aircraft sales autonomy and poor Russian after-sales service," the authors state.

They say that quality control remains spotty, resulting in problems with reliability, and key weak points include turbine blade production and process standardization. Beyond these issues, "(China) appears to remain limited with respect to components and systems design, integration and management ... and to making logistical and operational plans at the force level based on reliable estimates thereof." Progress is uneven but, the authors add, China's dominant aerospace conglomerate — the Aviation Industry Corporation of China (AVIC), with 10 subsidiaries and 400,000 employees — has now placed a high priority on engine development and plans over the next five years to invest 10 billion yuan (US$1.5 billion) in jet engine research and development.

This is particularly significant because Russia looks to be an increasingly reluctant supplier, partly because of production pressures due to heightened domestic requirements, but also because of China's rising international sales competitiveness. Such reticence could seriously impede Beijing's push to upgrade its air force with J-10, J-11, J-15 and J-20 fighters — the last of these a fifth-generation fighter under development, with Moscow seemingly hesitant to provide the 117S engine it needs for sufficient power.

"We estimate that, based on current knowledge and assuming no major setbacks or loss of mission focus, China will need two to three years before it achieves comprehensive capabilities commensurate with the aggregate inputs in the jet engine sector and five to 10 years before it is able to consistently mass produce top-notch turbofan engines for a fifth-generation type fighter," said the study.

"If China's engine-makers can attain the technical capability level that United States manufacturers had 20 years ago, it will be able to power its fourth-generation and fifth-generation aircraft with domestically made engines. These developments would be vital in cementing China as a formidable regional air power and deserve close attention from policymakers."

Collins and Erickson characterize China's inability to domestically mass produce advanced jet engines of consistent quality as an enduring Achilles' heel in its military aerospace sector. And there are important strategic and commercial implications inherent in overcoming this problem.
Presumably, if more priorities arise, doing so through AVIC's new initiative may also provide lessons that could be applied to ground and naval platforms.

Awesome News: Iran To Deploy Naval Task Force To The Atlantic Ocean
Hotair.com (Blog), July 19

It is one of Dyer's Axioms that a nation doesn't change its naval posture because it is content with the status quo. Iran continues to validate the axiom, and the latest announcement from her busy naval leadership is that the Islamic Republic will deploy a naval task force to the Atlantic in the near future as "part of a program to ply international waters."

The development is not surprising, considering that Iran has maintained an antipiracy task force presence off Somalia for nearly three years now, sent a two-ship task force on an expedition to Syria earlier this year, and announced the deployment of a submarine to the Red Sea in June.

Granted, the Iranian navy hasn't precisely bolstered its credibility with a near-simultaneous Pyongyang-style announcement that "enemies are dazed (amazed/surprised) by Iran's huge naval achievements." But an Atlantic deployment will be no particular stretch for the seamanship or technical capabilities of the navy (Iranian civil mariners ply all the world's oceans anyway). Iran can get a three-ship task force – two warships and an auxiliary – over to the Atlantic without exhausting her capacities. The question about this deployment, assuming the political leadership remains constant, is not "if" but "when."

There is another question about the deployment, however, and that is what the waypoints will be. To begin with, Iran will have a choice of going through the Suez Canal versus going around Africa. The task force may very well go around Africa – not because of any real concerns Iran would have about the Suez Canal or the Mediterranean, but because her navy is likely to find a readier welcome in sub-Saharan African ports along the way.

With Syria and Libya in turmoil, Iran's (previous) most-likely port-call stops in the Mediterranean are effectively out of the running. The Mediterranean, while perfectly safe for a non-stop transit, is not a hospitable route for a show-the-flag progress to the Atlantic. On the East coast of Africa, on the other hand, Iran probably has a choice among Kenya and Tanzania, at the very least, and possibly Mozambique and South Africa, as ports of call for refueling, military-relations events, flag-waving, and R&R.

Iran has been cultivating these and other African nations intensively in the last several years: with Kenya, for example, Iran has signed a number of cooperation agreements (including one on maritime cooperation and sea routes) since 2008, and exchanged several high-level visits with Prime Minister Raila Odinga (yes, the socialist radical whom Obama campaigned for in 2006, and who signed an agreement with Islamic leaders before his election to establish shari'a law). With Tanzania Iran has centuries-old ethnic and Shi'a religious ties, but in the full-court press since 2008, Tehran has concluded plenty of new agreements with Dar Es-Salaam, including a defense cooperation agreement signed in 2009. As with neighboring (landlocked) Zimbabwe, Iran plans to buy uranium from Tanzania; it remains to be seen if Iran will establish a helicopter repair "base" in Tanzania like the ongoing project in Zimbabwe, or train Tanzanian security forces under an agreement like that with the Mugabe regime.

With South Africa, Iran has had long and intensifying ties. Tehran's ties with Africa as a whole are extensive and growing. To ensure port call and refueling opportunities, the Iranians are likely to route a naval task force around Africa to get to the Atlantic.

If they cross the Atlantic, which seems likely, they will probably make stops in Venezuela and Cuba at a minimum. To visit Ecuador, another of Iran's BFFs in Latin America, the task force would have to transit the Panama Canal, an expense Tehran won't necessarily want to go to. Another potential stop, however, particularly since it has a maritime "hook," is Nicaragua, where Iran has been eyeing a joint project to develop a port and a cross-isthmus transportation infrastructure (a putative "rival" to the Panama Canal). The two nations professed continued enthusiasm for their interhemispheric romance last month. (For more on Iran in Latin America, see here and here.)

That an Iranian naval task force wouldn't be able to "do" very much, naval-power-projection-wise, isn't actually the point with a deployment like this. An embarked helicopter, a few naval guns, a few anti-ship missiles and torpedoes – these weapon systems don't amount to much in an order-of-battle comparison with the Navy. But the important point is that Iran won't be venturing out into friendless waters. The geopolitical infrastructure is there to make a deployment like this look like any other major naval power's task force deployment: with port calls, politicians, pierside ceremonies, bilateral exercises, and youth outreach activities all along the way.
The path may not lie through the Mediterranean, but it is there. That's what has changed – and from a strategic point of view, it sends an even more powerful message to Europe and North America if Iran approaches the Atlantic by another route.

Submarines And A Battle Of Minds

By Vice Admiral John Richardson, The Diplomat (Blog), August 7

Following is a response from US Vice Admiral John Richardson, Commander of US Submarine Forces, to James Holmes' entry 'A Navy's Vital Silent Service.'

Prof. James Holmes' entry last week on our new papers, the Design for Undersea Warfare and its companion piece Undersea Warfighting, was excellent. But I'd like to add a few things.

First, Holmes captured our intent exactly right as it pertains to our emphasis on the human element of warfare. War is a battle of minds, pitting one learning, adaptive team against the other. In the end, the team that out-thinks the other – before, during, and after the conflict - wins.

I also strongly believe that our tactical commanders must be able to think, adapt, and seize fleeting opportunities to operate safely, securely, and effectively in peacetime and to suffocate and defeat the enemy in wartime.

This approach of autonomous action, using 'command and feedback,' is the strength of our Navy and our Submarine Force. Our (the US Navy's) submarines are able to endure lengthy deployments concealed far from home waters while maintaining power, material readiness, and most importantly warfighting proficiency. This ability to remain on station is our unique competitive advantage in the maritime domain. But to be meaningful, these attributes must be trained and practiced, and that's where our attention is focused.

I would also like to directly address the comments about engineering skills and warfighting skills. Often, these two skill sets are juxtaposed – framed in an 'either/or' type of discussion - particularly when nuclear engineering is discussed.

I would offer that it's closer to 'both/and' – we need to think of these skill sets as different but complementary. Particularly in submarining, it has always been so. When studying the history of submarine warfare, one quickly finds that understanding the details of the boat's construction and operation – the engineering – has always been a necessary prerequisite to 'fighting' that boat.

Necessary, but not sufficient. We need to build on that strong foundation of engineering by learning how to synthesize the full physical capability of the boat, manned by a superbly talented crew, trained to a high state of readiness, commanded by creative and passionate leaders. That's the secret to achieving the sustained warfighting superiority discussed in the Design for Undersea Warfare and Undersea Warfighting.

Is it difficult? Yes! That's why the US Navy, and particularly the Submarine Force, strive to recruit and retain the very best. And even with that talent base, there's not a moment to lose – we must begin on day one to build the submarine leaders we need almost 20 years hence. It's a fast pace, but extremely rewarding, and it delivers an undersea force that will serve to keep our potential enemies awake long into the night.

We're excited to be moving out along the lines of effort described in the Design for Undersea Warfare. I appreciate the very thoughtful article by Prof. Holmes and look forward to earning that third cheer he withheld as we execute.

John M. Richardson is Commander of the US Submarine Forces. As commander, Allied Submarine Command, he also acts as the principal advisor to NATO on submarine plans, operations and doctrine.

Dolphins, Sea Lions Answer Navy's Call

Mammals trained to retrieve objects, intercept intruders

Chicago Tribune, August 8

SAN DIEGO — In a little-known part of the counterterrorism world, one of the most effective detection systems works for about 20 pounds of fish a day.

Since the 1960s, the United States and a handful of other countries have trained dolphins and sea lions to detect sea mines and swimmers, and to recover inert torpedoes and testing objects used in naval exercises.

Program officials estimate that the sea lions in the Marine Mammal Program have recovered millions of dollars of naval torpedoes and instrumentation dropped on the sea floor.

The program, which the Navy kept secret until the 1990s, trains about 75 Pacific bottlenose dolphins, with natural biosonar that tracks better than any man-made device, and 35 California sea lions, with superb underwater eyesight.

Besides retrieving military equipment, the mammals also help to save lives.

The Navy won't disclose whether the dolphins and sea lions have intercepted terrorists. Either way, "it serves as a deterrent effect," Christian Harris, operations supervisor for the program, said.

The mammals can be deployed via C-130 cargo aircraft for missions anywhere in the world within 72 hours and can operate off vessels, working in great temperature and environmental ranges.

Dolphins most recently were deployed in the Iraq War, performing mine detection and clearance operations in the Persian Gulf. Some of these Iraq War "veterans" are now helping to guard nuclear submarines in their home ports of Bremerton, Wash., and Groton, Conn.

A key part of the training is how to intercept potentially hostile swimmers.

Combat diving or swimming is practiced by a small contingent of special operations forces around the world. The German Kampfschwimmers, Israel's Shayatet 13 and the U.S. Navy SEALs are generally considered the premier units.

The Marine Mammal Program was conceived to defend against these kinds of attacks. The program is also positioned to defend against lone-swimmer terrorist attacks.

In 2002, classified reports from the intelligence community, gleaned from interrogations of suspects in Afghanistan, warned that al-Qaida was planning to use scuba divers to attack U.S. Navy vessels in port or at anchor. More recently, the Facebook page of Oslo, Norway, terror suspect Anders Behring Breivik showed him in what appears to be diving gear, holding a modified assault rifle.

In the 1960s, the Navy began studying the hydrodynamics of a Pacific white-sided dolphin in an effort to improve torpedo performance. The Navy quickly realized that the efficient biosonar of the dolphin was excellent for detecting hard-to-find objects — and people — underwater.

For the next quarter-century, the Navy secretly honed the technique of using mammals to find underwater objects, detect mines and combat swimmers. The Navy deployed dolphins to Vietnam and the Persian Gulf for the swimmer interdiction mission.

In the 1990s, the U.S. declassified the Marine Mammal Program and since then, it has been headquartered at Naval Base Point Loma in San Diego.

The program is managed by the Naval Warfare Systems Center Pacific and military explosive experts. In addition, civilian marine biologists, veterinarians, scientists and handlers are involved; institutions ranging from Sea World to the University of California at San Diego regularly collaborate for research purposes.

The program has an annual operating budget of $20 million, said Mike Rothe, director of the Marine Mammal Program.

Nothing in today's high-tech world can compete with these mammals' biosonar abilities, Rothe said.

"I hope that one day there is a robot or a UUV (unmanned underwater vehicle) that makes the mammal program obsolete," he said. "But right now this is the best thing out there."

Mock 'attacker' no match for animals

Armed with an inert limpet mine, a reporter dove into San Diego Bay to perform five mock attacks on an experimental Navy ship docked at a pier.

The reporter — a former Navy SEAL trained in combat diving — would move toward the ship and feel an aggressive bump, indicating a dolphin had marked him for security forces on their way.

Later, the reporter was intercepted by a sea lion that attached a clamplike device to his leg, allowing security to reel him in.
The day's final score: Mammals 5, Human 0.

Florida's Nuclear Energy Scamming: It's Not Rickover's Atomic Power Program Anymore

Flagler Live (Blog), August 7

I was fortunate enough to be accepted into the Navy nuclear power program in the early 1970s. It was run at the time by a man the entire world owes an unpayable debt to, Admiral Hyman Rickover—Uncle Hymie. He was charged with taking the knowledge gained from the Manhattan Project and Enrico Fermi's experiments at the University of Chicago in the 1930s and developing a safe and reliable nuclear reactor to power the first nuclear submarine, the USS Nautilus. He did. He built it from scratch. The Nautilus was reliable, safe and awesome.

In doing so, Rickover learned that a nuclear reactor is the most efficient means ever invented of making steam to power turbines, but also the most dangerous. A nuclear reactor straddles the razor's edge between a boiler and the Bomb that, in its crudest form, flattens cities. A reactor can be controlled only if the utmost standards are insisted upon with absolute and unwavering resolve. Anything less was a certain path to eventual disaster.

And boy, did Rickover insist. He made sure that anyone who designed, built, controlled or even worked on one of his nukes was without question the Best, capital B. After we blew up two cities with the prototypes, and scared the world (and the Soviets) at Bikini, showing what the new fusion model would do, who was going to question anyone with balls enough to try to actually harness this thing?

So Hymie had carte blanche to be the biggest bully in the world to safely bring this power to heel. So he did, in spades. He insisted on absolute power over every detail of the submarine fleet, from the captain of the boat to the kid who greased the bearings, taking only the cream of the fleet. From the start of the project in the late 1940s to the time he was forced out in 1981, you had to be in the top 1 percent on any given test to start the program. He made every course so tough that 96 percent of those that entered did not finish. You do the math. A back-breaking year and a half series of schools that exceeded a four-year engineering course at MIT just to work in the engine room, and you wash out 96 percent?

Rickover was just as hard on the companies that built his boats. In the 1980s, that was his downfall. General Electric had enough. But I'm getting ahead of the story.

After his success and renown from the Nautilus project, the country was sold on the promise of peaceful uses of nuclear reactors to generate electricity. Think about it: no fuel costs. We were told that electricity would be so cheap, we wouldn't even bother to meter it, it would come to your house for free.

Well, maybe. But Rickover had learned what this would require ensuring the safety of the American people. He basically invented the whole process. He knew these promises would never be kept unless the process was controlled by the government without the temptation to cut corners on the construction, operation, maintenance or lifespan of every plant. In short, he understood that you do not surround every city in America with slow-motion atomic bombs to provide electrical power in exchange for a profit to investors. That would invariably lead to cutting corners and disaster.

Rickover did what would be unthinkable today. He used his prestige to insist that any reactor used to generate electricity in the United States should be built and operated by the U.S. Navy to ensure its safety. After all, you did say the electricity would be free, so why would Wall Street want to build nuclear plants anyway?

So the first reactor in the country, Beaver Valley1 at Shippingport, just south of Pittsburgh, went operational in December 1957 and operated under contract to the Atomic Energy Commission from day one until the original reactor was dismantled in 1986 and Beaver Valley 2 was commissioned through 2047. Of course, it was designed and built as well as operated with Rickover for Westinghouse Electric Corporation (Owned by the Mellon family out of Pittsburgh). Most of the $110 million cost (close to $1 billion in today's dollars) was subsidized by the government's Atomic Energy Commission. And every kilowatt of the 60,000kw-capacity plant was sold by Duquesne Light (Owned by the Mellon family out of Pittsburgh).

Instead of being too cheap to bother charging for, it seems that Duquesne Lights rates were close to triple the other electric company in Pittsburgh, West Penn Power. Who could have guessed that 30 years later, building nuclear power plants on top of the world's largest coal field might not be the most cost-efficient way to go? Rickover, of course.

But after it came on-line, it was on ever magazine cover and TV and newspapers all saying how safe it turned out to be after all! Nothing to worry about here, you silly gooses. Uncle Hymie was directed to supervise the construction of a few hundred ICBM subs GE and Westinghouse were building to keep us safe. Surely these two American icons can be trusted to put safety ahead of profits.

And they sort of could for a while. But every year, the pressure from stockholders on the Jack Walshes of the world put dividends first, leaving it to the actuarial bean counters to worry about the exposure-danger vs. maintenance-costs formula. Those operating licenses good for 40 years and extended for 20 got yet another 20-year extension thanks to the retired senator lobbying the energy subcommittee overseeing the now toothless Nuclear Regulatory Commission.

Meanwhile, even the Japanese, engineering geniuses and the world's most experienced radiation victims, build nuke plants on the coast in tsunami zones, and put back-up generators on ground level and fuel tanks underground, right on the beach, because it would have cost more to put them on the roof, what could possibly go wrong with that?

Uncle Hymie must be spinning in his grave.

Florida Power & Light and Progress Energy know that their own nuclear plans previously on the table are not do-able after the Japan debacle. Even the Germans plan on permanently shutting their entire fleet of 17 nuclear plants by 2022. It's almost unthinkable that the United States would build new ones any time soon. Lag time between approval and start up would be measured in decades. Witness the ever-lengthening delays surrounding Progress Energy's and FPL's plans.

So these two will ask the Florida legislature to let them continue charging us all today, as they have for the past three years, for the nukes they plan to build in the future. And of course the lawmakers who enacted the scheme and the Florida Public Service Commission acting as lackey will let them. Energy independence, rah rah, Hugo Chavez, Arabs, Blablabla. In return for a few campaign contributions, a few rounds of golf, a consulting contract and a paid speech or two, we all know we are going to get screwed.

After a few years, we'll probably forget all about the money. They'll keep it. Our elected whores will let them use it for the crisis du jour. If we're very, very lucky, we will get a small credit dribbled out on our monthly bill for the money they'd have been grabbing for years for the plants that will never get built, minus engineering and planning costs, minus lost profits, minus interest, minus lobbying costs. Nuclear kabuki and the old corruption two-step. Same as it ever was here in the land we stole from the mosquitoes. But then they didn't need nuclear-powered air conditioning to live in this swamp, as our nuclear-tipped overseers tell us we do.

M.H. Rindskopf, Submarine Commander, Dies At 93

The New York Times, August 6

Rear Adm. Maurice H. Rindskopf, the youngest commander of an American fleet submarine during World War II who directed the sinking of 15 Japanese vessels, one of the highest totals in the war, died on July 27 at his home in Annapolis, Md. He was 93.

The cause was prostate cancer, said his granddaughter, Amy Rindskopf.

Admiral Rindskopf was 26 when, as a lieutenant commander, he took over the U.S.S. Drum after its captain fell ill and had to undergo surgery. Fleet submarines like the Drum were, at that time, the Navy's top-of-the-line long-distance subs, built just before the war and during it. The Navy still had World War I-era submarines, but they were primarily used as patrol vessels.

The future admiral was an ensign when he was first assigned to the Drum in 1941 and was the officer in charge of torpedo targeting (and later executive officer) before being named commander in June 1942. In his three years aboard, he was directly involved in the firing of 125 torpedoes, leading to the confirmed sinking of 15 ships — most of them cargo vessels — with a total tonnage of more than 80,000. Of all the submarines in World War II, the Drum ranked No. 8 in confirmed tonnage sunk. Eleven other Japanese ships were damaged by the Drum.

"He basically ran the fire-control party for the entire time," James Scott, the author of "The War Below," a soon-to-be-published book about America's submarine battles against Japan, said Friday. "The submarine war was an economic war, and the Drum played a vital role in destroying Japan's ability to have the natural resources needed to prosecute the war."

Admiral Rindskopf would receive the Navy Cross, the Silver Star and the Bronze Star for his wartime service. He later served as commander of two submarine flotillas and of the Navy's submarine school in New London, Conn. After being promoted to admiral in 1967, he was assistant chief of staff for intelligence to Adm. John S. McCain Jr., commander of the United States Pacific Command during the Vietnam War and father of Senator John McCain of Arizona.

Maurice Herbert Rindskopf was born in Jamaica, Queens, on Sept. 27, 1917, the only child of Herbert and Amy Baumgarten Rindskopf. After graduating at the top of his class from Poly Prep Country Day School in Brooklyn in 1934, at 16, he was accepted into the Naval Academy, where he was a star player on the lacrosse team. After retiring from the Navy in 1972, Admiral Rindskopf was a marketing manager for Westinghouse.

Besides his granddaughter, Amy, he is survived by two great-grandchildren. His wife of 69 years, the former Sylvia Lubow, died before him, as did his son, Peter.

Not all of the sinkings during then-Commander Rindskopf's time at the helm of the Drum were of large vessels.

On his first patrol as commander, the targets were two sampans — small, flat-bottomed wooden boats — that were being used as spy vessels off the islands of Palau. Using a torpedo would have been overkill, so they were sunk by gunfire.

"There were two survivors swimming in the ocean and rather than kill them, which he was authorized to do, he took them on board and put them to work in the kitchen," the admiral's granddaughter said. "He said they ended up becoming very good cooks."

China's Censors Meet Their Match

Revelations about a submarine accident and a rail crash show that China's powerful state censors are losing their grip

The Times, London, August 8

BEIJING — Reports of a radiation leak on a nuclear submarine have led China to impose tight censorship on more than 1,000 Chinese-language websites, in a further sign that hardliners hold the upper hand in Beijing.

The defence ministry issued a curt denial that any accident had occurred but the Chinese public has lost faith in official pronouncements, after attempts to stop "negative" reporting of a recent rail disaster. Many citizens, hiding behind online anonymity, have accused the authorities of another coverup.

"Why not deny it earlier and why delete all the reports online?" one wrote.

The high-speed rail crash, in which at least 40 people died, was a blow to a gigantic project which, like China's nuclear strike force, is linked to the Communist party's prestige.

It prompted open argument over a rush to development that many Chinese now dare to say has cut corners, cost lives, ruined the environment and steeped the state in corruption.

After the crash, Wen Jiabao, the prime minister and sole "liberal" in a highly authoritarian government, was swift to pledge truth and transparency. Instead, the reports of a submarine accident — which could not be independently verified — soon brought out the party's ingrained Soviet-style instincts.

Word of the nuclear mishap at a top-secret naval dockyard in Dalian, in the northeast of the country, appeared first on Boxun.com, a Chinese-language website based in the U.S., then on a microblogging service, Sina Weibo, which has more than 140 million subscribers.

Reports said a radiation leak happened as technicians from a private firm, China Era Electronics Corporation, installed an electronic system on board the 8,000-tonne Type 094 Jin-class nuclear submarine.

The submarine is one of about six nuclear vessels in the Chinese fleet. Experts believe it has a small reactor about one-sixth the size of a nuclear power plant. Two Jin-class subs were photographed in the area by a commercial satellite in 2007.

The last known accident involving a Chinese submarine was an explosion on board a diesel-powered vessel in 2003 that claimed 70 lives.

After the latest alleged incident, the military sealed off the Dalian dockyard area and imposed a ban on any news, according to numerous microblog postings.

In response to faxed questions from the Global Times, a newspaper published by the government-owned People's Daily, the defence ministry said: "No such accident occurred." The paper, which is aimed at a foreign audience, gave no further details and there has been complete silence from the rest of the state-controlled media.

It was a classic example of how the regime handles a story causing international concern and appeared to highlight a habit of covering up bad news.

The response also caused outrage in South Korea, a near neighbour, where there were calls on China to come clean about any radiation.

"Chinese authorities must waste no time in providing Korea with credible information," declared the conservative Chosun Ilbo newspaper. The government has so far done the opposite. A survey of Chinese-language websites showed that access was blocked to every site that reported the incident.

The reports from Dalian emerged on July 29, the day that censors decided to stop a torrent of critical reporting and comment on the rail disaster, which turned it into a national scandal.

The collision of two new high-speed trains on July 23 not only killed at least 40 passengers and injured 191 but was also a political and public-relations disaster for the Communist party.

The immediacy of the first reporting and the stark images of two gleaming bullet trains that smashed into each other on a viaduct near the city of Wenzhou astounded the Chinese public. It may also have wrecked China's plans to sell the rail technology to Britain, the U.S., Malaysia and Brazil.

Investigations by Chinese journalists soon turned up stories of substandard cement, shoddy construction, hasty training and a culture of graft that went right to the top of the Ministry of Railways, a mighty state within a state whose minister was recently sacked for gross corruption.

Six days after the disaster the propaganda department forbade any negative coverage or inquiries into the crash. It contained typically crass instructions to focus on "touching stories" and "great love."

It was too late to turn the tide of opinion, after cameras caught workmen trying to bury some of the torn cars, just as it emerged that some passengers may have lived for hours after officials claimed there were no more survivors.

China 'Unaware' Of Reported Radioactive Leak From Nuke Sub

DongA.com, August 5

China is known to have told Korea that it does not know about a reported leak of radioactive materials to the Yellow Sea from a Chinese nuclear submarine moored in the Chinese port of Dalian in Liaoning Province.

The Korean Foreign Affairs and Trade Ministry told a regular news briefing Thursday that it has asked Beijing to confirm reports about the rumored leak. "We`re waiting for China's answer," said a ministry official.

Another ministry official said, however, that the ministry asked China through a diplomatic channel Tuesday to confirm the leak. The Chinese Foreign Ministry replied that it had no knowledge of the incident, adding that it was not under its jurisdiction.

The Korean Foreign Ministry is trying to confirm the incident though various channels other than the Chinese Foreign Ministry. Chinese authorities reportedly failed to provide a clear answer, however, simply saying such an incident cannot be confirmed easily.

"Radioactive leaks are a sensitive issue that can directly affect the Korean Peninsula, so we continue to ask China to inform us of the facts about the incident," said a Korean government official.

Last month, China came under fire for its explanation on an oil spill in Bohai Bay. Beijing simply said the oil was unlikely to spread to the Yellow Sea but did not provide details on how much oil was leaked.

Despite a series of incidents that could negatively affect the Korean Peninsula, experts say China's insincere responses to Korea's inquiries hardly befit a country that is supposed to be a responsible member of the international community

Run Silent, Run Cheap

The Star, August 3

A new problem with Canada's bargain-basement submarines underlines the perils inherent in buying a major weapons system on the cheap. This time it's rust, weakening the hull of HMCS Windsor and restricting its ability to dive as deep as it otherwise should.

But that's just the latest in list of flaws and foul-ups that has effectively torpedoed our submarine service. Canada's four Victoria-class subs seemed a good deal when they were purchased from Britain in 1998 for about $890 million — roughly a quarter of what they had cost to build. But since their delivery, starting in 2000, they've experienced leaky torpedo tubes, turbine breakdown, cracked valves, faulty ventilation systems and an electrical fire that killed one sailor and injured eight others aboard HMCS Chicoutimi.

That stricken vessel still hasn't been repaired following the 2004 blaze. It remains in dry dock, which is also the status of HMCS Windsor. Extensive work was recently done on HMCS Victoria and it is still undergoing testing. Only HMCS Corner Brook is currently cleared for service at sea.

It is possible to eliminate the rust problem plaguing HMCS Windsor and restore its original diving depth, but that repair option was deemed too slow and expensive, according to research done by The Canadian Press. So — of course — a fix is being done on the cheap, depriving the sub of its full operational capability.

All this nautical nonsense might be laughable if it didn't involve hundreds of millions of tax dollars, Canada's maritime security, and the lives of dedicated sailors. As they go about their work, each member of the bureaucracy in charge of military procurement would do well to keep a photo of Canada's woebegone subs close at hand, as a caution against false economies.

In the words of Dwight D. Eisenhower, supreme Allied commander in the Second World War: "There is no victory at bargain basement prices."

US VS China Undersea

The Diplomat, August 3

China's submarine fleet is largely limited to a coastal defensive role, but still could not prevent infiltration by US undersea boats, according to a recent analysis by Owen Cote Jr. of the Massachusetts Institute of Technology's Security Studies Programme.

Only big shifts in doctrine and technology could alter the current equation, Cote explained.

Cote's assessment is a fresh reminder of the obstacles China faces in securing its own waters – to say nothing of extending its influence farther into the Pacific. The report is also a reminder that, despite the high visibility of aircraft carriers, jet fighters and ballistic missiles, submarines are still the most decisive weapon in the evolving rivalry between Washington and Beijing.

With their stealthiness and tremendous firepower, submarines pose a serious threat to surface vessels. For that reason, they are ideally suited to so-called sea denial – that is, keeping enemy fleets out of a given patch of ocean.

That's precisely what Beijing intends for its force of roughly 50 small diesel-electric submarines and 10 or so larger nuclear boats. 'China plans on using its diesel attack submarines...for coastal defence,' Cote wrote.

Likewise, the nuke boats could be used in an attempt 'to deny or limit the access of Western navies to the larger sea space between what (Chinese officials) call the 'first and second island chains' – or, roughly speaking, the Philippine Sea.'

But the US Navy's own submarines plus its patrol planes, helicopters, surface ships and underwater 'listening' arrays, concentrated in geographic choke points, could probably detect most Chinese subs attempting to reach the US fleet beyond the first island chain, Cote asserted.

At the same time, 'China has very limited (Anti-Submarine Warfare) capabilities and appears not to be making major investments to improve them.'

So while the submarines of the People's Liberation Army Navy might be able to deny US and allied surface vessels access to the South China Sea, they can't reliably extend that denial into the Philippine Sea. Nor could they even detect American undersea vessels anywhere. 'US submarines can currently operate freely in Chinese coastal waters.'

This imbalance is a result of the United States' huge investment in submarine technology during the decades of the Cold War. The US has demonstrated 'the ability to establish and consistently maintain significant acoustic advantages for its nuclear submarines in a competition with a peer competitor.'

The United States' 55 nuclear attack subs are so quiet 'that their passage at close range can actually cause a dip in noise levels because background noise is being blocked by the submarine's hull.'

The superiority of US subs could severely limit the potential of China's own undersea fleet in a prolonged conflict, even degrading its coastal defence capability. Cote described US boats taking up positions outside Chinese ports, tracking and destroying PLAN subs as they left or entered.

There's a catch. The US Navy maintains only 10 submarines on routine forward deployment all over the world during peacetime. Many more boats could 'surge' in the event of hostilities, but would require days or weeks to reach Chinese waters. For that reason, 'the US can do little to stop an initial sortie by a large portion of the Chinese submarine fleet.'

The American sub fleet's advantage would increase over time as more vessels arrived.

Whether Chinese subs could exploit their moment of relative freedom is debatable. Even US submarines with their highly sophisticated sensors and combat systems rely on 'cueing' by land-based over-the-horizon radars, satellites or high-altitude surveillance aircraft that can steer them towards their targets.

China possesses a rudimentary cueing capability in the form of several OTH radars and a small constellation of surveillance satellites. Beijing is also developing drone spy planes. The United States could find a new role for its submarines in destroying some of these cueing assets, further handicapping an already inferior Chinese undersea fleet.

US subs are already armed with land-attack cruise missiles. For their own cueing against OTH radars on land, US boats could deploy small aerial drones – a capability already in development.

Thus equipped, US submarines would also be capable of destroying a wider range of land targets, including China's hundreds of mobile missile launchers.

'Just as I argue that the US could seek new areas of military competition with China by giving its submarines new missions, the Chinese might seek to do the same,' Cote explained. 'But the situation for the Chinese is different because they would not be building on a situation of current or inherent advantage like the US would be.'

What Could Austerity America's Defense Posture Look Like?

DoD Buzz, August 1

The Pentagon is staring at the prospect of as much as $850 billion in budget reductions over the next 10 years and beyond — which, as DoD and service officials keep saying, will require some major strategic recalculations. Even now, we can only imagine what's in the PowerPoint slide decks rocketing back and forth across the Building as staffs come up with alternatives and scenarios for absorbing those kinds of cuts. The only upside, from DoD's perspective, is that it sounds as though the White House and Congress are sold on the idea of a grand strategy that lays out how to move forward and where to accept risks.

Two old caveats remain in effect, though: First, whatever the Pentagon comes up with has to survive Congress, where defense lawmakers in the age of austerity will fight harder than they ever have to keep their pieces of the military-industrial complex. And second: The Pentagon needs a better bad guy than "persistant global instability" when it's fighting to keep budgets and hardware, and we all know what that means: China. It's a fair bet that the Mother of All Reviews will call for the military to keep or increase its focus on the Western Pacific, even as it dials back the U.S. forces positioned elsewhere around the world.

Here's one vision for how this movie plays out:

U.S. Army and Air Force units stationed in Europe, with less of a constituency in Congress, might be the first to go; in fact, DoD might just cut them altogether as opposed to spending the money to relocate them in the U.S. That doesn't mean the American presence would be dialed all the way back to zero: Commanders almost certainly would keep open Landstuhl Regional Medical Center in Germany, which is essential for helping troops wounded in the war zone, and they might try to collapse all the remaining Army and Air Force units onto nearby Ramstein Air Force Base, which would become a BRAC-style megabase and keep a U.S. toehold on the Continent. Meanwhile, the U.S. could make clear that it would continue to cover Europe with its nuclear umbrella, just in case, but NATO would be on its own as far as future conventional operations.

With thousands of troops cut from the Army and Marine Corps despite the continued need for a U.S. presence in Iraq and Afghanistan, those countries would probably join Yemen, Pakistan and Somalia as venues in America's indefinite campaign of drone strikes. The biggest increase would probably take place in Afghanistan, where a few thousand U.S. special operators would keep the pressure on terrorist leadership, and where American budget cuts would mean Afghanistan's army and police would probably disintegrate from lack of funds and corruption. With smaller budgets and a lower political profile for the war, given that the violence in Afghanistan wouldn't be claiming American lives, U.S. commanders would need to rely on drone strikes in the places where they before had used full-scale, hearts-and-minds counterinsurgency tactics.

If DoD used the magic of strategy to determine that land-based Air Force jets and UAVs could provide all the air support necessary, the Navy might be spared from having to supply at least one aircraft carrier to support operations in Afghanistan. But that might cost the Navy that ship altogether, rather than freeing it up for other duties. (The brass already wants the 50 year-old USS Enterprise out of the fleet yesterday, so that would probably be the ship that goes away.) The rest of the Navy's fleet, along with the Air Force's, would continue to age and shrink from the combination of budget cuts and expensive acquisitions programs.

Some major weapons programs, however, would probably survive. Although the F-35 Lightning II is everyone's favorite candidate for the guillotine, it may prove too big to eliminate — we've seen how many lawmakers have a stake in its survival, and how cancellation would leave the Air Force, and especially the Marines, completely in the lurch. But the F-35, along with a little help from that old magic of doctrine and strategy, could imperil the Air Force's next-generation bomber. If DoD decides that it can "service" the targets the bomber would have with a combination of cruise missiles, new combat UAVs and land– and sea-based F-35s (under an "Air-Sea Battle" concept, let's say) it might decide there's no need to buy a new stealth bomber and try to get some savings from that program.

The Air Force's KC-46A tanker seems non-negotiable; due to the age and condition of the KC-135s, it would probably win in a Sophie's Choice situation over the bomber. Would the Navy persist with its next-generation ballistic missile sub over replacing its aging cruisers and destroyers? Probably, in the belief its comparatively cheaper littoral combat ships could be repurposed to take additional jobs in the surface force.

The biggest loser, as we've written before, would be the Army: Not only would it lose tens of thousands of soldiers, it would have to justify the funding it wants to recapitalize its Humvees, buy its Joint Light Tactical Vehicles, its Ground Combat Vehicle, and a new helicopter — all after it had just spent billions on a new fleet of Mine-Resistant, Ambush-Protected Vehicles. (And spent a decade wasting as much as 45 percent of its acquisitions budget per year.) Look, the Army brass would say, we've got "capability gaps," and that's why we need all this stuff. But so long as Americans stay allergic to ground interventions for the next long while, that will be hard sell. Then again, Vietnam followed Korea as the second Iraq war followed the first, so you never know.

Austerity America would probably keep its forces positioned against China; in fact, it might increase them, with more submarines based in the Pacific, an aircraft carrier moved forward to Guam, or some other changes. Everywhere else, however, both at home and abroad, the force would likely be thinned out or pulled back, and be able to count less on getting the newest, expensive gear. As flare-ups or crises took place around the globe, policymakers in Washington might have to bite their tongues and lower their ambitions, to bring their rhetoric more in line with America's reduced reach.

What do you think? How would you block out America's strategic posture after $850 billion in defense cuts?

'Fluid Cloak' To Help Submarines Leave No Wake

New Scientist, July 29

SUPER-STEALTHY submarines may one day glide through the water without creating a wake, if a plan to channel fluid intelligently around objects can be made to work.

A vehicle moving through a fluid normally disturbs the medium in two ways. First, some of the fluid gets dragged along with the vehicle, sapping its energy and slowing it down. Second, a turbulent wake forms behind it where fluid rushes in to fill the vacant space. The churning fluid in the wake in turn creates noise that reveals the vehicle's presence.

But channelling the fluid around the object in just the right way could solve both problems at once.

To do this, Yaroslav Urzhumov and David Smith of Duke University in Durham, North Carolina, propose encasing it in a mesh shell.

Crucially, the permeability of this mesh casing should vary from place to place to alter the speed of fluid flowing through it. This means that the shell and the object it contains would leave no lasting impression in the fluid - the fluid would exit the shell at exactly the same speed and in the same direction as it entered.

They modelled the pattern of permeability needed to make a sphere undetectable in fluid. The pattern was complex, with some spots having to accelerate the fluid flowing through it. To do that, the researchers propose embedding tiny pumps in the material to boost the flow rate. Pumps that are mere millimetres across already exist for biomedical devices.

The overall effect of their pattern is to initially accelerate the incoming fluid near the front of the shell, then to let it slow back down to its original speed at the back of the shell before it exits (Physical Review Letters, in press).

Since there is no net change to the motion of the fluid when the vehicle passes through it, there is no drag and no turbulent wake. The fluid closes seamlessly around the vehicle, as if it had never been there. “It’s possible to have this structure glide through the fluid without disturbing it at all,” says Urzhumov.

For the pattern in the mesh to work, there is a trade-off between the sphere’s size and its speed. Steven Ceccio of the University of Michigan in Ann Arbor cautions that the “fluid cloaking” is only complete for small and slow-moving objects. For example, a vehicle 1-centimetre across could only stay drag and wake-free at speeds of less than 1 centimetre per second, he says: “If the object gets bigger, the [limiting] speed goes down even more.”

But Urzhumov says it might be possible to develop mesh patterns that will work for larger objects or different shapes. And he argues that the fluid-cloaking pattern in this study could still reduce drag and weaken the wakes of larger and faster vehicles, even if it does not completely eliminate them.

Undersea Warfighting

July 2011

Undersea Warfighting

The Navy's undersea warfighters bring a set of tools and capabilities to U.S. national security that are unique and indispensible. Enabled by stealth, surprise and boldness, undersea forces provide military impact and deterrent influence that is far out of proportion to their size and quantity. When our lethal and undetected undersea force operates in concert with the visible and intimidating power of carrier strike groups and the expeditionary capacity of the Marine Corps, the Navy-Marine Corps team provides a formidable, flexible and daunting conventional power projection force.

The role played by the undersea forces on this team is centered upon the military advantages provided by undersea concealment. Whether the water is deep, cold and empty arctic waters or shallow, warm and crowded tropical waters; whether it is peacetime or wartime; whether it is calm or stormy -- virtually everything our undersea forces do is to exploit concealment to enhance deterrence or warfighting capability. This concealment enables a wide variety of undetected operations, permits the penetration of enemy defenses, allows attacks to be conducted with surprise at the time and place of our choosing, promotes survivability and creates uncertainty and ambiguity that greatly complicate enemy planning and operations. But none of these advantages or attributes can be achieved without the tireless efforts of smart, audacious warriors. Our undersea forces must be manned by a cadre of undersea professionals with special technical and military expertise, skill at employing stealth, self-sufficiency, initiative, a penchant for tactical innovation and aggressive warfighting tenacity. These bold undersea warriors ensure that our exceptional undersea forces are ready to fight on short notice, can gain non-provocative early access far forward, exploit the full undersea maneuver space, seize the initiative with offensive action, and quickly adapt to changing situations including the dynamic chaos of war.

As undersea warriors, it is important that we understand the nature of this unique role we play, and the importance it has for the security of our Nation. Although the technologies, the adversaries and the locations have varied over history, the fundamental military purpose of our undersea forces has remained constant: *to leverage the concealment of the undersea environment to provide military advantages for the United States.* The skill set of the undersea professionals that deliver this military advantage is likewise unchanging. The purpose of Undersea Warfighting is to provide our undersea warriors with a shared professional foundation and perspective that will serve as a common bedrock upon which we build training, exercises and peacetime operations. This robust foundation will enable a smooth transition from peace to war should that be necessary. And to minimize the chance that such a war should be necessary, this foundation will help ensure that there is no question in the mind of any potential adversary about the lethality, survivability and effectiveness of U.S. undersea forces.

Our undersea warriors are professionals characterized by:	**Our undersea systems exploit the advantages provided by undersea concealment:**	**Our undersea forces support their role in national security by demonstrating :**
-- Technical ingenuity & integrity		-- Sustained readiness to fight
-- Military expertise	-- Undersea domain reach	-- Non-provocative early access far forward
-- Skill at exploiting stealth	-- Undetected operations	-- Full exploitation of the undersea maneuver space
-- Self sufficiency	-- Penetration of adversary defenses	-- Ability to engage at the time/place of our choosing
-- Initiative	-- Surprise	-- Emphasis on offensive firepower
-- Tactical creativity	-- Survivability	-- Adaptability to changing situations
-- Aggressive tenacity	-- Ambiguity and uncertainty	-- Ability to exploit chaos and confusion

Part 1

The Necessary Attributes of U.S. Undersea Warriors

Success in undersea warfare is dependent upon the skilled employment of technically complex machinery in an environment that is both physically and militarily hostile. Although the Joint Force leadership integrates the effects of undersea warfare with the broader efforts of the U.S. armed force, it is inescapable that undersea warfare is a type of solitary warfare that must by its very nature be conducted with little or no external support. Undersea combat requires a special breed of warrior who is technically and militarily expert, stealthy, self-sufficient, ready to exercise initiative, creative and aggressively tenacious.

Undersea warfare, first and foremost, is about the undersea warrior. It is not enough for the U.S. Navy to equip itself with fast, quiet nuclear-powered submarines with superb endurance and offensive capacity and sophisticated payloads and off-board vehicles and systems. In addition, the Navy must be manned by undersea warriors with the proper attributes and training to make the best possible military use of these expensive and capable assets. In order for us to sustain the kind of attributes we need as a force to be effective, it is necessary to have undersea warriors with a special set of attributes. The U.S. Navy requires a professional cadre of undersea warriors who are characterized by:

- Technical ingenuity and integrity
- Military expertise
- Skill at exploiting stealth
- Self-sufficiency
- Initiative
- Tactical creativity
- Aggressive tenacity

Developing undersea warriors with these skills is a continuous process that begins with recruiting the highest quality personnel, providing them with the right training and operational experience and then steeling their leadership in the crucible of combat. This skill set is one that we practice during day-to-day operations in peacetime so that we will be prepared in wartime. Initiative does not suddenly show up in combat if it has not been nurtured and rewarded in peacetime. Self-sufficiency cannot be magically acquired during warfare – it is practiced routinely, so that operators gain a full appreciation for their capabilities. Innovation and creativity are expected in exercises and in routine operations so that we are confident that we will be able to innovate during war patrols.

Technical Ingenuity and Integrity

Undersea warfare platforms and systems are machines, and there is no possibility for success in undersea warfare if the machines and technical systems are not safely operated and do not reliably perform as designed. Like aviation, undersea warfare is totally dependent on the satisfactory performance of the equipment that carries us into harm's way. Undersea warriors know that machines exact their own punishment for those who do not practice the necessary discipline in maintaining and operating equipment properly – that punishment may show up today or it may show up tomorrow, but poor maintenance will lead to trouble. Indeed, the failure to properly maintain equipment today may not result in an immediately observable impact, but it could lead to the premature failure of the equipment years down the road when some future warrior is depending on that equipment in wartime.

Undersea warriors then, first and foremost, are competent and disciplined operators and maintainers of their equipment. We know that achieving this level of excellence requires careful training and qualification and then adherence to rigorous standards of performance on the ship. We also know that this technical expertise is the *essential foundation* for warfighting effectiveness. It teaches us the limits of our equipment and gives us experience with designed-in redundancy and reliability enhancements.

It is easy to see how technical expertise applies to systems such as sonar, atmosphere control, torpedo and missile tubes, fire-control and propulsion.. But the need for technical expertise also applies to other areas that are not as obvious. The warfighting effectiveness of a submarine can also be quickly undermined by spare parts that are missing due to poor storekeeping, by food-borne illness due to poor sanitation, by injuries sustained underway due to unsafe work practices, or by a rattle in the sail due to a lost tool. The need for technical expertise in the performance of duty extends across all parts of a submarine crew and across all parts of the undersea force.

Just as technical expertise is at the core of avoiding material problems, it is also at the core of damage control. Practicing back-up modes of operation and exercising manual control of systems normally operated automatically are essential parts of building our technical expertise foundation. Drills to test teamwork and organized response have been an essential element of our success. Aggressive drilling and the careful collection of lessons-learned has been practiced within our best crews and institutionalized in the submarine force since before World War II. Our accumulation of best practices as a force over the decades has been one of our greatest strengths.

The hostility of the undersea environment places special demands on the character and integrity of undersea warriors. The safety of the entire crew often depends upon the word of an individual. Safely operating deep underwater in a complex machine with high-pressure fluids, nuclear power, lethal voltages, and high explosives requires a shared

culture of integrity, personal responsibility, teamwork and interdependence. Generations of submariners have passed these lessons down to us and we work hard to pass them along to each new undersea warrior. These ideas are a part of who we are – they are part of our undersea DNA.

Military expertise

In addition to this essential technical foundation, undersea warriors have a firm foundation in the military practice of undersea warfare. This warfighting base includes a solid historical appreciation for what has been done in the past and how that heritage continues to impact the way we operate today. This historical underpinning includes an appreciation for how undersea forces have been used by other navies as well as our own and serves as a starting point for anticipating the potential military application of undersea forces in the future.

There are many aspects of modern warfare that have become highly automated in the computer age. On an Aegis-equipped warship, for instance, radars and sophisticated fire control and weapons systems can detect, track and intercept multiple aircraft automatically if desired. Undersea warfare, however, though highly supported by complex computer systems, continues to be fought in the battlespace of the human mind. The opaque nature of the undersea environment, the distortion of sound paths, the presence of interference and the active efforts of adversaries to confuse and deceive combine to place tremendous demands on the expertise of the undersea warrior. As we will discuss more in a later section, the ambiguity and uncertainty of the undersea are fundamental contributors to this.

Undersea forces often operate far forward without the support of other friendly forces. This means that undersea forces are often the only available asset in the area. As a result, since the First World War, submarines have been asked to exploit their solitary access to conduct a wide variety of military operations in those forward areas. Each of these categories of warfare has its own relevant military elements. Our submarine crews are small, with one half to one quarter the number of Sailors per ton of ship as our typical surface warships. The small crew on a submarine must be capable of performing each of the several different missions, such as anti-submarine warfare, anti-surface warfare, strike warfare, special operations forces support, information operations, intelligence collection or mine warfare. Often these separate operations must be conducted at the same time.

An essential part of the military application of undersea forces is an understanding of the geography of key hot spots throughout the world. These crossroads have shown up again and again as critical battlefields throughout history. There are certain attributes of these locations that impose key constraints on warriors. This is particularly true of undersea warriors, who operate in a manner that takes full advantage of the "three dimensional" undersea volume.

That certain places show up repeatedly in naval history is driven by the steady nature commercial shipping routes, trade centers, and choke-points. Undersea warriors must have a firm grasp of the constraints imposed on other platforms so that they can best exploit the available geography. Even with the advanced systems we have today, the implications of geography are timeless and a firm understanding of their character is critical for the undersea warrior.

Skill at Exploiting Stealth and Pressing the Attack

Submarines operate in an environment of data-starvation rather than data overload. Fragments of information are examined carefully to extract the most possible meaning from them. Most critically, our undersea forces are routinely operated in a manner that refines and sharpens the ability of the warriors onboard to appreciate the degree of stealth that they have available to them. Stealth is an un-measurable effect that results from the interaction of a platform and a sensor, each operated by human beings, in a variable environment made up of natural and man-made effects. There is no "stealth meter" that glows yellow when risk gets high and red when our submarines are being counter-detected. Undersea warriors know that the only sensor for stealth is in the brain and guts of the warriors on the submarine. Our operating experience has proven that it is essential to carefully calibrate this "stealth judgment" of undersea warriors during peacetime so that it can carry over to wartime.

Prior to World War II our submariners were taught using canned exercises that were stacked in favor of the attackers, and as a result they mistakenly learned that they needed to take extreme stealth precautions in order to survive. They learned to make it standard practice to transit submerged during daylight, to conduct daytime attacks using sonar data from deep depths without aid from a periscope, and to minimize time on the surface. Transits were slow and time on station was reduced. Torpedo attack accuracy was very low. Too many Commanding Officers were not aggressive. At the start of World War II the average war patrol was conducted by a Commanding Officer with 15.7 years of service and by the end of the war, the average CO had 9.8 years of service, of which 3.5 years were in combat.

The unrealistic peacetime exercises had calibrated many of the first generation COs' internal "stealth meter" to be very sensitive and this limited their aggressiveness and success. Of the 465 submarine COs who served during World War II, it was the top performing 15 percent who accounted for more than half of the ships sunk. Out of these 70 COs, only four were killed in action (Morton, Dealey, MacMillan and Gilmore) and only four of their ships were lost while they

were in command (*Wahoo, Harder, Thresher* and *Tang*).[1] This means the most successful COs and their crews as a group had a much higher survival rate than the submarine force as a whole. The submarines under the most successful 15 percent COs were three times as likely to return safely from patrol as were the submarines under the other 85 percent. Competence in pressing home the attack tended to co-exist with competence in surviving to return home again.

Today's undersea warriors make themselves ready for wartime operations by practice during peacetime that teaches the right lessons and rewards the right behaviors. Among the skills practiced are the exercise of stealth and deception. Stealth is about more than having a quiet ship. It includes operating that ship in the manner most appropriate to the mission so as to extract the most value for the smallest risk. Stealth is about more than being resistant to detection. Stealth is also about not being recognized or classified even in the event one is detected. Stealth is about exploiting techniques that prevent localization even if one is detected and classified. Undersea warriors work to ensure that all of these tools are in their toolkit because wartime may require the ship to take risks that result in detection, and the survivability of the platform will depend on the degree to which a crew leverages other tools that remain available even after detection.

Consider the example of a Marine sniper. A sniper in a camouflage ghillie suit is not *undetectable*. Indeed, in many cases the stealth of a sniper is not a function of avoiding detection, it is about avoiding *classification*. Sometimes when new snipers are entering training, the trainees are surprised when they are taken into the field and find that the "bush" that they have been next to for a half hour is actually a lethal marksman. Undersea warriors have the same appreciation for the layers of stealth available to them and the same skill and expertise at exploiting each of those layers.

During the First World War, the United Kingdom conducted an amphibious assault at Gallipoli in an attempt to break through to the Black Sea and Russia, thereby dividing the Ottoman Empire in Asia from the rest of the Axis in Europe. To aid in the defense of the forces at Gallipoli, submarines penetrated into the Sea of Marmara to operate against Turkish shipping, including the port of Constantinople at the eastern end of the Sea. These operations, undertaken during the first 20 years of submarine development and part of the first ever combat employment of these platforms, included a full range of operations: minefield penetration through a choke point, shore bombardment, swimmer attack with explosives on land facilities and rail lines, torpedo attacks on ships, the insertion and extraction of agents and the classic submarine mission of surveillance and reporting. Even at this early stage, submariners understood instinctively how to exploit their stealth. In a classic illustration that shows how effectively stealth can be used, submariners deployed artificial broomstick buoys to act as fake periscopes. These would draw the attention of Turkish destroyers, which would maneuver to ram the vulnerable "submarine," and thereby stumble unwittingly into a trap by creating a perfect broadside set-up for the lurking real submarine, ready with a torpedo attack. The creativity, innovation and cunning of deception and attack are at the heart of our undersea warrior training.

Self-sufficiency

Because the nature of U.S. submarine operations will require extended operation far forward, it is axiomatic that undersea forces are self-sufficient and that the warriors that operate them must be capable of making due with what they have. Self-sufficiency is really as much about careful preparation as it is about creative repair work with limited supplies. The thoroughness with which the storekeepers stock the lockers is as much a factor in the endurance of the platform as the skill of the machinist with a lathe or the electronics technician with a solder gun. Likewise, routine proper maintenance will result in fewer maintenance challenges and go a long way to creating a force more capable of conducting its scheduled operations without the need for unscheduled external support.

Undersea warriors know that every stop in a port provides the enemy with a datum point to fill in his intelligence awareness. Every stop for maintenance requires a block of time away from the mission. Every period of time with a system down is a period of time with reduced redundancy and reliability, forcing the ship to take greater risk. There are military implications for unplanned schedule changes and the need for unplanned external support. These implications apply during peacetime as well as wartime. Avoiding unplanned maintenance port visits complicates the enemy's intelligence picture. The ability to execute the planned schedule during local operations is important to enabling other assets to stick to their plans. All experienced submariners know the challenge of revising a schedule at the last minute due to a materiel problem on another platform. Reduced time to prepare means less effective inport maintenance time, increased chances of the exercise being disrupted, and forfeiture of precious underway training time. It is an essential skill of undersea warriors that they be self-sufficient: they must minimize the occurrence of problems by sound maintenance and operational practices and they must practice their ability to repair those material problems that do occur with minimum disruption to operational schedules.

Readiness to seize the initiative

Undersea warfare, by its nature, is fought far forward and with limited connectivity. In addition, undersea warriors often have access to insights about the posture, location and nature of forces that are not available to

[1] The four COs do not match the four ships because Gilmore was killed in action by gunfire but the *Growler* was not lost and O'Kane was not killed in action although the *Tang* was lost to a circular run of its very last torpedo. O'Kane as on the bridge and survived the war in a Prisoner of War camp. See Blair, Silent Victory appendices.

commanders in the rear. It is essential that undersea commanders understand that they have the latitude to exercise judgment and act based upon independent knowledge gained while operating far forward. As a result, flag leadership relies upon defining priorities and a "commander's intent" and then depends upon the initiative and judgment of the on-scene undersea commander to do the right thing. This latitude enables submarine commanding officers to make dynamic decisions during rapidly changing chaotic situations to best accomplish the intent of the overall commander.

The development of confidence in these on-scene undersea commanders is critical to the overall capability of U.S. undersea forces to deliver the effects expected. Initiative is practiced and expected during exercises and peacetime operations, and it is expected of junior personnel within the crew as they grow in seniority and maturity. Submariners are well known for pushing initiative down the chain of command. Like all other skills, the exercise of initiative is practiced and honed to keep it sharp.

There is little room for error in the operation of submarines, particularly in a combat environment. This is why the submarine force has long had a systematic training program leading to qualification in submarines and the awarding of dolphins. In 1924, a few years after aviators introduced wings as a recognizable device, the submarine force introduced a dolphin pin to signify qualification in submarines. Part of this training is recognition of the need for all submariners to have intimate knowledge of their platform and its systems so that they might be able to take the necessary action in any urgent situation that may arise during combat, casualties or routine operations. Submariners are expected to exercise initiative based on a technically sound foundation. Just as submarine commanders must exercise judgment and initiative in operating their ships, so must junior submariners exercise initiative in the conduct of their own actions within the ship. Initiative is a fundamental part of forceful back-up – an essential element of life on a submarine.

A junior helmsman on a submarine – an E4 perhaps – if given an order by the Captain at battle stations to put the rudder over right to reach a course that can be arrived at more expeditiously going left, is likely to notify the Captain that he is going the "long way around." This gives the skipper an opportunity to correct his order if that was not his intention. A submarine commanding officer welcomes this kind of initiative because it shows that even one of the most junior Sailors on the ship has his head in the game and is thinking. This is the kind of teamwork that results in the best kind of warship, and it is the hallmark of a good submariner.

Tactical Creativity and Innovation

Undersea warriors demonstrate tactical innovation as a habit. It is a recurring element in the history of submarine warfare that actual combat, once undertaken, is always very different than what was anticipated prior to the start of hostilities. The rules inevitably change. Prior to the attack on Pearl Harbor, American submarines anticipating combat operations would have had to expect to operate under rules that required warnings to any civilian ship prior to attack. Six hours after the attack on Pearl Harbor, COMSUBPAC received the order from the Navy Department "Execute unrestricted air and submarine warfare against Japan." This required quick adjustment to the operational employment of submarines and to how those submarines would conduct their patrols.

As discussed earlier, submariners anticipated far more capable anti-submarine warfare capabilities than they actually encountered, which led anti-submarine forces to have inappropriately high confidence in their abilities and submariners to have, on the other hand, inappropriately little confidence in their stealth. Winston Churchill described in his history The Second World War how he had been taken to sea in 1938 and shown how effective Asdic (active sonar) was in locating submarines underwater. He commented that he was surprised at the "clarity and force" of the return, as if it were "one of those creatures asking to be destroyed." He lamented later, "No doubt on this occasion I overrated, as they did, the magnitude of their achievement, and forgot for a moment how broad are the seas."[2] It is unclear what changes will await those embarking on the next war patrols, but undersea warriors should rest assured that the tactics, the rules and the military situation will be different than they expected, and that they will have to adapt themselves to the change or put themselves and their ships in peril.

Tactical innovation should be practiced on every ship, in every squadron and in every wardroom. The idea of the Ekelund range was born at sea and then confirmed and refined in Submarine School trainers. The idea of rapid torpedo reload during combat rather than after disengaging was developed and practiced by a young torpedo officer on the *Parche* in World War II, and was essential to the success of the ship against a Japanese convoy on July 31 1944. Red Ramage had entered the middle of the convoy at night on the surface and, clearing the bridge or all personnel but himself, shot 19 torpedoes in 48 minutes, in the process making himself the only living submarine Medal of Honor winner up to that time.

"Tactical innovation" is not necessarily confined to combat. In 1972, the *USS Barb* was sortied from Guam on one hour notice into a developing typhoon to make a 300 nm flank speed transit in an attempt to rescue the 8-man crew of a B-52 that had crashed into the ocean shortly after departing Andersen AFB. The heavy seas forced all other ships to clear the area, but *Barb* put together an innovative plan that succeeded in pulling 6 airmen from the 40-foot seas. With only the sail hatch open, *Barb* used men strapped to the fairwater planes and a team of six men below decks as the

[2] Winston Churchill, The Second World War, Vol I (Boston: Houghton Mifflin, 1985), p. 147.

"hoist" to pull the exhausted and injured fliers from the sea. A Torpedoman Chief who swam to the first group of lifeboats earned the Navy-Marine Corps Medal for heroism in lifesaving. This kind of creative employment of the systems on a submarine or on other undersea systems will continue to be essential in the future, and undersea warriors must practice it routinely if we are to depend on it.

The need for tactical innovation will grow in the future with the introduction of new undersea technologies, especially unmanned systems. The need for coordination among undersea systems will become increasingly important. Submariners are the Navy's specialists in "undersea warfare" or warfare from the undersea. It is the responsibility of the submarine community to manage this warfighting area, ensure its completeness, and coordinate the capability set. Just as aviators enforce rules for the prevention of fratricide against aircraft, and surface warriors define the procedures for the mutual protection of surface assets, it is our role as submariners to define the rule set that governs the use of the undersea – to include the prevention of mutual interference, water space management, and the coordination of undersea systems to maximum effect.

Unmanned Undersea Vehicles (UUVs) will be a growing part of U.S. undersea forces, and it will be necessary for that growth to take place smoothly and effectively. For instance, the proliferation of UUVs may necessitate the emergence of a cadre of specialists or alternatively may be accommodated by adding UUV-expertise to the skill set of personnel already in the force. There may be UUV detachments that deploy to host platforms like submarines, ships or shore bases and employ UUVs from the host command. Or UUVs may be an organic part of each ship's complement of systems. These are some of the challenging issues that undersea warriors will have to confront and solve in the coming years. One thing is sure: it is clear that in the near future, some approach will be necessary to identify and professionally develop a suitably expert group of personnel to employ UUVs and related systems. The undersea warfare cadre that is currently made up of submariners will have to be a part of that team.

Aggressive Tenacity

The concealment of the undersea will likely mean that undersea warfare will continue to involve ordnance exchanges and evasion. The success of the submarine force in the past has been built on a stubborn will to persist with repetitive re-engagements until the job is done or the opportunity is irrevocably past. Mush Morton famously told Dick O'Kane after a long sequence of engagements, "Tenacity Dick. Stay with the bastard till he's on the bottom."[3] This attitude of aggressiveness has been essential to effective undersea warfighting. There is an essential advantage to exploiting the chaos and disorder that follow an initial engagement. Nerves are on edge and Sailors – like all humans – will be more likely to make snap emotional decisions. This urge can be exploited for good.

In general purpose forces, audacity and boldness are constrained by the fact that it is generally accepted that exploiting the order and discipline of a coordinated formation with mutually cooperating platforms is best. This environment of mutual dependence and collaborative effectiveness is appropriate for surface forces but is not the world of undersea forces. Surface forces and air forces create "concentration" and "mass," but not so of submarines. Undersea forces operate with the objective of creating effects that coordinate with those of the broader Navy and Joint Force effort, but the best way for them to create those effects is generally to operate independently. Coordination and order require time and communication to create, and it is into those windows of uncoordinated disorder that the undersea force throws itself in order to keep the adversary off balance. It is the objective of the undersea force, far forward, to operate in such a manner as to create and sustain in the mind of the adversary a sense of disorder, vulnerability, chaos and uncertainty.

As with each of the undersea warrior traits discussed thus far, tenacity and aggressiveness are traits that must be practiced. This is not to say that peacetime operations merit the kinds of risks that wartime objectives might deserve. But it is to say that creative application of persistence within the appropriate bounds of the current exercise or operation is welcome and expected.

As Desert Storm approached, CDR Chip Griffiths, the CO of *Pittsburgh*, was in maintenance and was not scheduled to get out in time to participate. As one of only a few vertical TLAM shooters in the submarine force, *Pittsburgh* would be missed. CDR Griffiths, demonstrating the kind of aggressive tenacity that marked the great COs in submarine history, gathered his wardroom and the repair activity and asked "What is it going to take to get this ship out in time to be on the gun line?" The creative energies of an entire crew and tender were brought to bear on the problem and the *Pittsburgh* was out early, loaded with missiles, and deployed in time to participate. That is tenacity. That is the kind of unwillingness to fail that has marked great undersea warriors.

While having exceptionally talented and well-trained operators is essential to the success of undersea forces, it is not, by itself sufficient. Our undersea forces also must be equipped with the right kind of systems if they are going to effectively and fully contribute to national security. The next section addresses the advantages provided by undersea concealment that our undersea systems are capable of exploiting.

[3] Richard O'Kane, Clear the Bridge (Novato, CA: Presidio Press, 1977), p. 267.

Part 2

The Military Advantages of Undersea Concealment

Undersea warriors must have a firm appreciation for the set of military advantages that come from undersea concealment. The exploitation of these advantages is the common bond that connects today's submariners with those of World War I, World War II and the Cold War. The Navy employs undersea forces in ways that best enable these advantages to be leveraged to achieve the broader military and geostrategic aims of the Joint Force and the Nation.

Whether one is talking about today's undersea force consisting of predominantly submarines or tomorrow's force with an increased emphasis on UUVs and other systems, undersea forces will be expected to provide a set of unique military advantages. Undersea forces are characterized by their ability to operate underwater, which carries with it the attribute of undersea concealment, which leads to a range of different military advantages. These advantages, consistent with the CNO-approved "Concept for Leveraging the Undersea Environment," include:

- The ability to reach into the undersea domain
- The ability to conduct undetected operations
- The ability to penetrate adversary defenses
- The ability to conduct operations exploiting surprise at the time and place of our choosing
- The ability to survive without significant defensive payloads
- The ability to leverage the uncertainty and ambiguity of the undersea.

These advantages can be illustrated by a variety of historical and contemporary examples.

Undersea Domain Reach: Undersea domain reach is the most basic of advantages and it often can be achieved without an undersea platform. Undersea domain reach consists simply of the ability to put a system in the undersea environment, perhaps with no need or care for the degree of detectability or concealment. This system may be a sensor that needs to be underwater to perform properly or most effectively, it may be a recovery system that collects objects, it may be a system that drills for oil, it may collect fish, or it may dredge silt out of a shipping channel.

Some tasks requiring undersea domain reach are best done by undersea platforms. For instance, after the space shuttle *Challenger* was lost, undersea assets like the submarine NR-1 and various Remotely Operated Vehicles (ROVs) were employed to locate and recover the pieces of the vehicle off the coast of Florida. Stealth was not an issue, but the ability to put high resolution sensors near the bottom and operate recovery equipment was essential. Another common example of undersea domain reach is placing a sonar system at a given depth, favored by the physics of acoustic propagation, to ensure its superior acoustic performance. Similarly, a surface ship exploits undersea domain reach when it adjusts the depth of a variable depth sonar. A submarine exploits undersea domain reach when it places its hull sonar and towed array sonars at the best search depth.

Undetected Operations: Undersea platforms enable operations in which the maximum effect occurs if they are undetected. Such operations include intelligence collection and surveillance, which by their very nature have special additional value if the adversary is unaware that the information or posture of its forces has been compromised. If collection is overt or detected, the adversary has a variety of courses of action available that can reduce the value of the intelligence. These include modifying plans that have been compromised, revising operating procedures or adjusting system technical performance. Most importantly, when an adversary is aware that certain information is being collected, it may exploit this fact by feeding misinformation or deliberately deceptive information to the collector. As a minimum, an adversary can just restrict the nature of its operations to limit what is compromised. Exercises can be cancelled or delayed, movements can be altered, or system employment can be limited to modes that are not being protected. These steps are costly and inefficient however. Most importantly, an adversary loses the ability to selectively employ these mitigation tools when surveillance is performed by undersea forces.

In addition to intelligence and surveillance, other operations benefit from remaining undetected. Changing the posture of the submarine force to move more assets to an area of potential conflict in advance of need can be done without provocation. This permits leadership to "lean forward" prudently without having media outlets report on the location or nature of the operations being performed. Another example of operations that benefit from remaining undetected are missions in support of Special Operations Forces. Such forces, if detected, could be placed at great risk and the success of their mission could be fatally undermined without the benefit of undetected support operations.

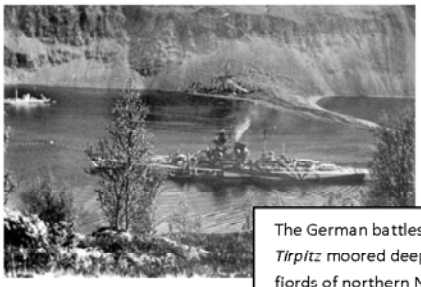
Penetration of Adversary Defenses: Undersea concealment greatly enhances the ability of forces to penetrate an adversary's defensive perimeter and take up positions within the adversary's "secure haven." This interior position enables access to higher value targets that are less well protected than when they are outside the defensive perimeter. Interior position enables increased potential for disruption. The fact that this penetration can occur without requiring the asset to fight its way in permits several second order advantages: (1) greater availability of offensive ordnance once the interior position is reached, (2) greater availability of targets in a relaxed security posture that are therefore more vulnerable, and (3) greater flexibility for U.S. leadership, which need not commit to kinetic measures as early and which can expect greater effects more quickly from assets that have achieved interior positions.

Harusame after *Wahoo*'s "down the throat" torpedo shot in Wewak Harbor

An important and pertinent illustration of penetration from World War II was Mush Morton's bold exploitation of undersea concealment to penetrate Wewak Harbor in January 1943. In an operation that became legend and galvanized U.S. submariners, Morton aggressively interpreted his orders to "reconnoiter" Wewak. LT George Grider, a member of the wardroom, remembered being asked by Morton to define "reconnoitering" and said he thought it meant submerged periscope surveillance from far out at sea. Morton replied "Hell no. The only way you can reconnoiter a harbor is to go right into it and see what's there."

Grider later wrote, "... a submarine, as anybody knew in those days, was a deep-water ship that needed broad oceans and plenty of water under its keel to operate. And harbors are often treacherous at best, even when you enter them in surface ships handled by experienced pilots equipped with the very latest charts. It would be madness for the *Wahoo* to submerge and enter an enemy harbor whose very location on the map we didn't know." Once they were inside and a destroyer was spotted, a Sailor joked "We've reconnoitered Wewak harbor now. Let's get the hell out of here." Morton responded, "Good God no. We are going to go in and torpedo him...We'll take him by complete surprise. He won't be expecting an enemy submarine in here." [4] In the engagement that followed, *Wahoo* sank the Japanese destroyer *Harusame* and cleared the harbor. The next day, *Wahoo* sank an entire four ship convoy headed for Wewak. Clay Blair, in his history of the U.S. submarine war in the Pacific, Silent Victory, wrote that "This patrol, one of the most celebrated of the war, gave the whole submarine force a shot in the arm – or a kick in the pants."[5]

In the Atlantic that September, the United Kingdom provided another example of leveraging the concealment of the undersea to penetrate robust defenses and gain access to a high value target. Three midget X-craft submarines were towed by submarines to northern Norway to penetrate a fjord and attack the German battleship *Tirpitz* in September 1943's "Operation Source." The mini submarines penetrated the minefields and submarine nets and avoided the surface searchers in Norway's Kaafjord long enough to place at least four two-ton charges underneath the *Tirpitz*'s hull which were detonated, flooding 1400 tons of water into the ship and crippling it for six months. The X5 was lost with all hands, but the X6 and X7 were attacked after placing their charges and the crews were captured.



The German battleship *Tirpitz* moored deep in the fjords of northern Norway

In a similar operation, on the night of 6 December 1941, the Japanese launched five midget submarines that had been towed to Hawaii to participate in the attack on Pearl Harbor. At least one of these submarines succeeded in penetrating the inner harbor and launching its two 2100 pound torpedoes at the battleships *Oklahoma* and *West Virginia*. The *Oklahoma* capsized. After transmitting a "mission complete" message the night of 7-8 December, the midget submarine was destroyed with scuttling charges by its crew in West Loch and was not discovered until 1944 by Navy salvage operators, who quietly disposed of the wreckage at the seaward mouth of the channel, where it was lost to history until it was rediscovered in 2009.

These penetration operations all underscore the success that undersea forces in the hands of bold seamen can have in bypassing complex defenses to gain access to high-value targets. These examples include evidence of some of the other undersea advantages such as surprise and survivability.

Surprise: The ability to strike the adversary at the time and place of one's choosing affords a number of fundamental military advantages, each of which amplifies the effect of an attack. First, the undersea attacker is able to choose the circumstances of the attack to fit the military need. Attack may be immediate or it may be delayed for various reasons.

During the Falklands campaign, the *HMS Conqueror* located and shadowed the Argentinian cruiser *General Belgrano* for a day while waiting for permission from the British War Cabinet to attack. In contrast, during the same campaign, when a possible submarine was detected, it was attacked with dispatch because submarine contact was so tenuous and fleeting that no time could be wasted. Of the scores of urgent attacks conducted against possible submarines, none achieved a kill. Attacks by undersea forces might be delayed to enable maneuver to create more optimal

[4] George Grider and Lydel Sims, "Mush the Magnificent" in The United States Navy in World War II, S.E. Smith, editor, (New York: Ballantine, 1967), pp. 440-446.

[5] Clay Blair Jr, Silent Victory, (Annapolis: Naval Institute Press, 1975), p. 386.

geometry for maximizing damage probability and minimizing counterattack risk.

A second advantage of attacking with surprise is that the attack can be undertaken at a time when the target is at less than full readiness, enabling greater probability of inflicting more damage. The surprise attack on Pearl Harbor was timed to coincide with the lowest military readiness of the U.S. fleet, thereby increasing the likelihood of inflicting greater damage at less military cost to the attacker.

A third advantage of surprise is that it creates chaos, an effect which can result in second order damage such as collisions as well as degraded military efficiency. Orderly and systematic response is difficult when under the threat of continuing attack, thus reducing counterattack effectiveness. Surprise is one of the undersea warriors best tools.

Survivability: Undersea concealment enables submarines to move about without detection, creating vast areas of uncertainty and greatly complicating the problem of an adversary that desires to hold them at risk. This has the effect of "defending" the submarine from attack without necessitating any significant degree of payload volume being dedicated to defensive weapons. This, in turn, enables greater offensive punch by utilizing available payload space almost exclusively for offensive capabilities. In addition, concealment greatly complicates battle damage assessment by an attacker. An attack may be undertaken on a possible submarine and, afterward, when no submarine is detected, the attack is judged successful. In fact, an unscathed submarine may be moving away and may still be vulnerable to attack, but the fact that its location and condition are unknown protects it from this follow-on attack.

Our SSBNs rely upon undersea concealment to provide them with the survivability that enables them to provide an "assured response" even after an adversary first strike. Survivability is the combined result of reduced detectability (stealth) and operations in broad ocean areas, placing a huge geographic burden on searchers.

In addition to stealth and the search challenge provided by broad ocean areas, undersea forces also employ defensive systems such as countermeasures to reduce the chance of damage from an adversary attack. Shock hardening, damage control, redundancy and robust construction add further survivability.

Operational Ambiguity: The final military advantage provided by undersea concealment is not widely recognized, but it is in many ways one of the most important advantages of all. The fact that ocean is opaque makes it difficult to know what is going on underwater, and this obvious fact has profound implications that distinguish the undersea domain from the air or the sea surface. In the air and surface domains, the un-aided human eye is capable of long-range detection of targets and, as a result, even unsophisticated adversaries can monitor those domains. Not only can targets be seen, but they can be quickly recognized and tracked with sufficient precision to enable making confident decisions. The contrast with the undersea environment could not be starker.

Undersea, only those adversaries capable of skillfully employing highly specialized and expensive sensors are capable of making detections. Even when detections can be made, they are often uncertain, foggy impressions that lack firm classification, offer little position or movement information, and do not enable prompt action.

Even when it is clear that "something" has happened or is going on, the concealment of the undersea and the challenge of gaining access to the undersea make confident facts hard to come by. This difficulty and ambiguity impose significant burdens on those who depend on the undersea. It complicates the work of fishermen who must choose where to cast their nets. It obscures what happened to the *USS Scorpion* and the Air France Airbus that disappeared in thunderstorms over the Atlantic. It enables drug smugglers to scuttle their submersibles if they are caught and have confidence that the sunken evidence will not be found. It caused the expenditure of extensive ASW ordnance by the UK against non-submarine contacts during the Falklands War.

On March 26 2010, a North Korean midget submarine torpedoed the South Korean frigate *Cheonan* in the Yellow Sea, breaking it in half and killing 46 sailors. The North Koreans denied making the attack. During salvage operations extending over weeks, the ship and the afterbody of a torpedo of the type used by North Korea were recovered from the seabed. A multi-national group of technical experts reviewed the available information and provided a formal report concluding with confidence that a North Korean torpedo attack was the cause of the sinking. It is the nature of the ambiguity of the undersea that despite all of the data and technical analysis and weeks of work on the part of scores of experts, the media in the United States and other nations continue to refer to the sinking as "allegedly" the work of a North Korean torpedo.

This operational ambiguity can also be exploited to create the impression that undersea forces are in one place instead of another, to imply that accidents or natural factors are at work rather than hostile actions, or to distract, disrupt or slow operations. Each of these act to spread out or divert the attention of enemy forces, reducing their effectiveness and decreasing their confidence.

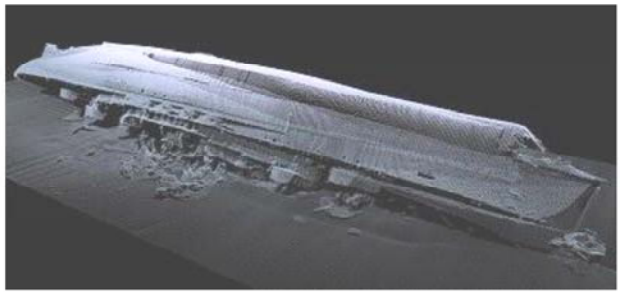
Scapa Flow, October 1939: The early months of World War II provide us with a case study that illustrates all of the advantages of undersea concealment being brought together and exploited in a single operation, sometimes referred to as the most famous German submarine attack of the war.

Looking for a way to rally confidence that Germany could take on the Royal Navy and weaken the British blockade, Karl Doenitz and his staff developed an audacious plan for a German submarine to penetrate the principal port of the British Fleet at Scapa Flow and attack whatever shipping could be found in the massive roadstead. (During World War I two German submarines had been lost attempting such an operation.) Careful staff work and reconnaissance had revealed a potentially exploitable vulnerability – a fifty foot wide gap in the blockships and submarine nets guarding the many entrances to the anchorage. A favorable moon and tidal cycle would create a narrow window the night of 13-14 October.

Gunter Prien, a former merchant marine sailor and Doenitz's favorite submarine commander, was hand-picked for the task and given a weekend to review the plan and tell Doenitz if he could do it. When he announced it workable, the plan was dubbed Operation P. After turning in his enigma machine and all classified holdings not related to the operation, the *U-47* got underway from Kiel on 8 October, bound for the north end of Scotland. The *U-47* transited the North Sea at night, resting on the bottom during the day (undetected operations). After an undetected transit, the *U-47* surfaced the night of 13 October at 2331 to enter Kirk Channel. After one false start, Prien penetrated the gap in the defensive blockship barrier and entered Scapa Flow undetected (penetration of defenses).

Prien found the battleship *Royal Oak* at anchor with the tender *Pegasus* and attacked with two torpedoes each from 3500 yards. The attack was conducted with complete surprise against a totally unalerted target (surprise attack at the time and place of one's choosing). One torpedo misfired, two missed and one detonated against the bow of the *Royal Oak*. The crew of the *Royal Oak* and the admiral onboard interpreted the thump as an internal problem of some sort and did not realize they were under attack. No order was given to action stations or to improve the watertight integrity of the ship (ambiguity and uncertainty). Prien exploited this ambiguity and, seeing no sign of reaction, circled around while reloading to make another attack. He fired three bow tubes at the *Royal Oak*. All three hit the starboard side of the ship and it capsized 13 minutes later, killing more than 800 of the 1200 crewmembers aboard. Undetected during the resulting chaos, the *U-47* had departed Scapa Flow again by 0215 and headed back for Wilhelmshaven (survivability) for a hero's welcome.

In Hitler's U-Boat War, Clay Blair wrote that, "the feat at Scapa Flow had certainly got Hitler's attention and firmly planted in his mind and all German minds that a single cheap U-boat manned by merely forty-four men could sink a huge battleship manned by 1,200 men. From that it was not difficult to imagine what carnage a vast fleet of U-boats could inflict on Great Britain's thinly armed merchant marine. Thus the idea that Germany might, after all, defeat Great Britain at sea with U-boats gained credibility. The long-term impact of Scapa Flow was therefore immeasurably beneficial for the U-boat arm."[6]



This composite image of the *HMS Royal Oak* as it looks today was constructed by stitching together a three dimensional picture from many passes with a modern high-frequency sonar. The ship is resting on the bottom with the starboard side – with the three torpedo impacts – down toward the seabed. The damage to the bow from the first torpedo hit is clearly visible on the right end of the image.[7]

In summary, then, undersea concealment provides an array of military advantages that can be exploited by undersea forces. These advantages can be gained as part of individual operations, such as that of the *Wahoo* at Wewak harbor, or they can be integrated with the operations of other parts of the Joint Force to achieve compounded benefits, as was the case with the Japanese attack on Pearl Harbor.

A failure to properly integrate with the Joint Force can just as surely diminish the impact of a stealthy undersea operation. On October 8th, the day Prien got underway, the British Home Fleet sortied from Scapa Flow to intercept the heavy cruiser *Gneisenau* which appeared to be heading out via the North Sea on a North Atlantic surface raiding mission. The *Gneisenau* did not break out and returned to Kiel, and the Home Fleet anchored briefly at Loch Ewe, in northwest Scotland down the coast from Scapa Flow. The *Luftwaffe*, unaware of Prien's mission, ordered a low level reconnaissance flight over Scapa Flow on the 12th of October, two days before *U-47* arrived, and this was interpreted by the British as a prelude to a bombing attack. As a result, the bulk of the Home Fleet remained at Loch Ewe and only the flagship *Royal Oak* returned to Scapa Flow. Had this coordination error not occurred, Scapa Flow would likely have been crowded with many more ships (potentially four battleships and an aircraft carrier) and the damage inflicted by Prien might have been even worse.

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[6] Clay Blair, Hitler's U-Boat War (New York: Random House, 1996), p. 109.

[7] Image of the HMS Royal Oak from Divernet.com: http://www.divernet.com/Wrecks/159269 /scapa_flow_in_3d.html

The Cooperative Maritime Strategy

In general, it is the role of our undersea forces to exploit the concealment of the undersea to gain a variety of military advantages in engaging adversaries. These advantages can, in turn, be exploited by the Joint Force to aid in the achievement of any number of specific operational or strategic objectives.

Our Cooperative Maritime Strategy emphasizes six "core competencies" that U.S. maritime forces should collectively provide: Forward Presence, Maritime Security, Sea Control, Power Projection, Deterrence and Humanitarian Assistance/Disaster Relief. While the Cooperative Maritime Strategy is relatively new, these core competencies are old and are for the most part the same as they were in the late 1970s when a comprehensive view of "effects-based" missions were first defined.

Undersea forces make valuable contributions to each of these core Navy competencies:

- **Forward Presence:** This refers to the sustained, day-to-day presence of U.S. naval forces in forward operating theaters, aiding in the deterrent value of those forces as well as the speed with which they can be brought to bear in a contingency. Forward Presence enables participation in exercises and operations with other U.S. allies, furthering U.S. regional interests. If the U.S. Navy did not ensure that an influential portion of our forces were kept present forward, then the vast distances that would have to be covered would delay our forces' arrival. This delay would be easy for potential adversaries to exploit, making the need for Forward Presence an essential element of our security guarantees. As we will discuss more below, undersea forces in particular take advantage of forward presence to ensure their early presence in key locations, to conduct undetected operations and to enhance deterrence.

- **Maritime Security:** This refers to the steps necessary to ensure the routine security of U.S. and allied maritime commerce flow, also on a day-to-day basis. It is the result of the collective efforts of naval forces, the intelligence community, law enforcement, allies, and governments. Protections against terrorism and against the use of maritime platforms as terrorist enablers are both key elements of Maritime Security, as are counter-narcotic operations and other law enforcement assistance efforts. Undersea forces provide important intelligence collection and surveillance that helps cue maritime security activities by other parts of the U.S. government and by U.S. allies and friends.

- **"Sea Control"** is the ability of one state to employ the sea for its purposes while denying adversaries the ability to do the same. "Sea Denial" is a subset of Sea Control that usually is limited to the ability to deny an adversary use of the sea, but may not include creating the ability to make full use of the sea. "Sea Dominance" is a more expansive term than Sea Control, and suggests robust and sustained Sea Control over large areas. "Sea Superiority" is Sea Control over a defined geographic area for a defined time period. Undersea forces are exceptional at providing the Sea Denial element of Sea Control, but because undersea forces by themselves have limited ability to fully exploit that denial, it is usually understood that larger general purpose naval forces provide the ability to project power or otherwise leverage the secure environment created by effective Sea Denial.

- **Power Projection** refers to the use of maritime forces to project power ashore, to include strike operations (such as by air or missile) or amphibious operations. Undersea forces carry about one third of the Navy's strike missile inventory, but that striking power is limited compared to the capacity of a carrier air wing or a Marine Expeditionary Force to project power. The real value of the undersea strike capacity is in its ability to be delivered with surprise from close-in against particular high-priority targets. This "little or no-notice" context greatly increases the military value of power projection and may serve an essential role in permitting general purpose forces to gain subsequent access to the theater of operations.

- **Deterrence** includes more than *nuclear deterrence,* which is provided uniquely within the Navy by ballistic missile submarines. Deterrence also acts on a day-to-day basis by influencing other states not to take actions contrary to U.S. interests because of a clear threat that the United States will "impose costs" if that action is taken. The costs that are included extend far beyond the use of military force. Undersea forces greatly amplify the threat of force by the United States because it is not necessary that the U.S. Navy be visible in order for it to be holding an adversary at risk. This creates a deterrent threat even when overt forces are not present. As we will discuss more below, warfighting readiness is a key element to effective deterrence.

- **Humanitarian Assistance and Disaster Relief** (HADR) is an expression that usually conjures up the image of helicopters delivering aid to earthquake victims or rescuing mariners in distress. These are, indeed, the bulk of the HADR efforts for which the Navy is well known. The contributions of U.S. undersea forces to HADR are much narrower and highly specialized but, when submarine rescue or undersea search is needed, there is really nothing else that will suffice. U.S. undersea forces contribute to the United States as a "global force for good" by making available highly

specialized submarine rescue and undersea search capabilities. Other nations need not develop their own capability because they can rely on us to provide if necessary. The international cooperation that we gain working with other nations to be prepared for potential undersea emergencies helps act as a foundation for other areas of cooperation.

Now to gain a fuller appreciation of how these military advantages from undersea concealment have been exploited over the history of submarines and undersea warfare, we will take a brief look at this history, considering not only our own Navy but the navies of other nations as well.

Part 3

A Brief Review of the Historical Application of Undersea Warfare

Submarines around the world have long benefitted from a significant degree of both mission flexibility and ability to adapt to a changing operational environment. As a result, it has been common to use them for many other purposes beyond those for which they were intended. Different nations have used submarines in different ways, each approach tailored to their individual geopolitical situations. The most militarily significant and historically proven wartime role of submarines has been the attrition of shipping. Other roles such as attacking warships, laying mines, supporting the insertion or extracting of personnel, nuclear deterrence, land attack and intelligence collection have also been important. The specific roles of U.S. undersea forces in the future are likely to come from the same list but, consistent with past history, may include other unexpected new missions as well.

Flexibility and Adaptability

Although the broad military advantages created by undersea concealment have been basically the same over the last century of submarine operations, this does not mean that each country has faced the same military situation or needed the same type of undersea forces in its particular time and place. Variations in geography and trade routes, the march of technology, and the constant evolution of threats and international opportunities have resulted in the wide range of undersea platforms and force mixes over the last century.

In addition to diversity in the nature of the hardware in undersea forces, nations have also shown a great deal of variety in how they *employ* their undersea forces. Indeed, nations have used undersea forces of the same type for different purposes, even in the same campaign, theater and battle. This historical practice underlines two key ideas in the use of undersea forces: flexibility (the ability of the same platform to be employed for multiple purposes without reconfiguration) and adaptability (the ability of a platform to be quickly and inexpensively reconfigured or reloaded to later perform a very different role). An example of *flexibility* in U.S. undersea forces is the ability of a commander to use a submarine and its ADCAP torpedoes in an anti-surface role or in an anti-submarine role without missing a beat. An example of *adaptability* in U.S. undersea forces is the ability to load a submarine with a sea control load-out (emphasizing maritime attack) or a strike load-out (emphasizing land attack).

Submarine Roles in the First World War

The appearance of important quantities of submarines in naval forces during the first decades of the 20th century stimulated great debate about their military utility and potential legitimate uses. As late as 1900, many British did not endorse submarines as a legitimate tool because, in the words of Rear Admiral A. K. Wilson in 1900, submarines were "underhand, unfair and damned unEnglish."

The London Declaration of 1909 stipulated the rules under which Britain would play and, although not ratified, this declaration was the accepted code of conduct as war approached. These rules were consistent with long-standing, generally observed rules of warfare regarding "prizes" and required that the civilian crew be allowed to abandon a ship before it was taken over by a prize crew or sunk. These "rules" were observed for much of the war by most on both sides.

Innovative Thinking about Submarine Role: Having procured some Holland boats for "testing," in 1904 the British ran an exercise in which the five small Holland submarines were tasked with "harbor security" but succeeded in "sinking" four warships. Admiral Jackie Fisher later wrote, "It is astounding to me, perfectly astounding, how the very brightest among us fail to realize the vast impending revolution in Naval warfare and Naval strategy that the submarine will accomplish." Theodore Roosevelt, who had written a history of the U.S. Navy and had been Assistant Secretary of the Navy, wanted to see submarines first hand. In 1905 he became the first U.S. president to ride underwater on a submarine when he got underway aboard the *Plunger*. Upon his safe return, he instituted submarine pay in recognition of the hardship and danger of submarine duty.

In 1910, the British began to experiment with more aggressive submarine employment than the original "harbor defense" model. During fleet maneuvers, two D-class British submarines "sank" two enemy cruisers as they left their home port, some 500 miles from the submarines' base.

In 1912, LT Chester Nimitz, veteran of command of three submarines, made a presentation to the Naval War College in which he advocated an innovative tool for drawing warships into a position in which they could be attacked:

"drop numerous poles, properly weighted to float upright in the water and painted to look like a submarine's periscope."[8]

Disproportionate Impact: The First World War began during July and August 1914 with a series of war declarations, counter declarations, and mobilizations. On September 22, 1914, Otto Weddigen, the young German commander of the *U-9*, sank three British armored cruisers off the Netherlands in the course of about 90 minutes. This represented the first loss of major enemy combatants to submarine attack in the history of warfare.

Deception: During much of the war, attacks on merchant ships were governed by the pre-war principles of the London Declaration, requiring "firing across the bow" of a potential victim and then allowing the ship to be abandoned in a controlled fashion prior to sinking. This led to the allied development of "Q-ships" which were armed vessels masquerading as merchants that would draw in U-boats, dramatically "abandon ship" with an artificial "panic crew" and then open fire when the U-boat got within range. The resulting U-boat losses and the increasing pressures of the British blockade on Germany led to the implementation of "unrestricted submarine warfare" in the spring of 1916 and then again in 1917.

Convoying: Britain resisted convoying to protect shipping because of the tremendous inefficiency it was expected to impose on port facilities and vessel movements. Many doubted its effectiveness. By early 1916, the German submarine blockade was sinking more ships in a month than could be built in a year. In the face of these numbers, the British experimented with employing convoying and the results were so much better that it was retained as a practice for the rest of the war.

The *Lusitania:* The sinking of this passenger ship by a German submarine on 6 May 1915 resulted in nearly 1200 deaths and became an iconic image that turned public attitudes against Germany. This case provides a stark example of the military importance of properly constraining attacks to remain within the directed limitations. The *Lusitania*-like sinking of unauthorized targets would recur again and again in World War I and II and would become a major element in morale and diplomacy.

World War I Operational/Technical Innovation: By the end of the war, Germany had lost 45 percent of its submarines but had put Britain under significant pressure with the submarine blockade. Depth charges had been invented and active sonar was being used. Convoying had been practiced and proven. Torpedo problems had been experienced and overcome. Deceptive coloration, false periscopes, Q-ships and other exploitation of detection and classification limitations were part of the toolkit on both sides. Exclusion zones were employed. Radio transmission locating technology was used to cue defensive convoy routing. When attacks on passenger ships or hospital ships occurred and civilians were killed (almost certainly by mistake), the events were sensationalized by both sides. Unrestricted submarine warfare had been employed. Submarines had irreversibly become a part of war, as had radio, aircraft and tanks. Over the course of the war, submarines had grown to be much larger and carried more weapons over longer ranges.

The American submarine force began the war with about 30 submarines and had no measurable impact on the outcome of the war. Short range American submarines were employed almost exclusively for convoy escort.

Submarine Roles: Anti-surface warfare using torpedoes or mines was the dominant submarine mission during the war. Supplementing this role, the British employed submarines in the Dardanelles to support the Gallipoli amphibious operation very creatively, including anti-surface warfare, shore bombardment, the insertion and extraction of personnel (both agents and saboteurs), and intelligence collection. *All of the major roles common to today's submarine force (except nuclear deterrence) had been employed within the first few years of World War I.*

Submarine Roles in World War II

One of the important lessons of the First World War was that a larger submarine force at the start of the conflict might have been enough to change the outcome of the war. The head of the German submarine force, Admiral Doenitz, anticipated that he would need 300 submarines in his total force in order to provide 100 on-station (100 in transit and another 100 undergoing repair, maintenance or training). This anticipated operating cycle was fairly close to what was actually practiced in the Atlantic and was also similar to that used by the American submarine force in the Pacific Ocean.

Uncertainty about intended role: Greater range, payload and endurance likewise would have made an important difference for the kind of commerce raiding role that submarines played in World War I. In the interwar period, however, there was a long-running debate about whether the United States should build a greater number of smaller submarines or fewer larger submarines with greater range. This debate was resolved in favor of the larger submarine on the grounds that the threat of war would enable production increases without having to change the design. Despite this emphasis on large-submarine performance that would be invaluable for independent operations such as commerce raiding, navies still anticipated that the role of the submarines was likely to be more closely aligned with the fleet than in World War I – hence the name "fleet submarine." Based on the Allied treatment of Germany as a "mad dog" for declaring unrestricted submarine warfare,

[8] CAPT Brayton Harris, The Navy Times Book of Submarines, cited online at [http://www.submarine-history.com/NOVAtwo.htm] includes each of the World War I and innovation examples cited above.

there was a general doubt that friendly navies would follow such a policy in any future war. The German Navy, on the other hand, unambiguously anticipated that the role of its future submarine force would likely be the same as it had been in World War I. Indeed, once they abandoned the Treaty of Versailles in about 1935, the Germans undertook a large scale build program which, although it did not provide the 300 submarines by the war's start desired by Doenitz, did provide him with about 54 operational submarines capable of ocean warfare by the fall of 1939.

Maritime Resource Interdiction: In fact, the major role of the submarine forces of the United States and Germany in World war II were very similar. Both saw their submarine forces as tools for interdicting the maritime commerce and resource flow of their principal adversaries. The American submarine forces sought to cut off Japanese industry from raw materials and to cut off Japanese military forces from logistics support (food, fuel, ammunition, parts, troops). The Germans saw the role of their submarines to be interdicting the flow of supplies to Britain and to Russia, principally from the United States. Engagement of warships was undertaken but with less priority.

Torpedo Issues: The United States, the Germans and the Japanese all suffered from torpedo failures at the start of World War II. The parallels were surprising. Both the Germans and the British found their secret magnetic exploders ineffective and retired them. Although this was reported to our Navy Bureau of Ordnance, no action was taken to check the performance of U.S. magnetic exploders. The Germans recognized the problem the soonest and implemented the earliest action to recover. Within three months Doenitz had ordered the magnetic exploders disabled. The United States took almost two years to recognize and recover from three independent problems: torpedo run depth, the magnetic exploders and the contact fuse. It was not until all three problems were addressed that torpedo performance improved. This corrective action depended upon aggressive feedback and experimentation at the fleet level in order to provide sufficiently convincing evidence for the Bureau of Ordnance to acknowledge there was a problem.

Special Missions: American submarines conducted many special missions involving the insertion, extraction, or re-supply of agents or military forces in the broad archipelagos of the Pacific. For example, in early February 1942, shortly before the loss of the island of Corregidor near Manila, the submarine *Seadragon* slipped in to evacuate 25 people (17 of whom were members of the Cast unit associated with the exploitation of communications intelligence (ULTRA)). It was critical to protect the expertise and the gear, and the unit was re-established after evacuation.

Reconnaissance: Submarine reconnaissance became a much larger part of the mission set than had been the case in any Navy in World War I. The terrain of the Pacific was so unknown that undersea reconnaissance was often essential to create a baseline of information. Also, by the end of the war, a large fraction of U.S. submarines were engaged in so-called "life-guard" operations, stationed forward to extract downed aviators and prevent their capture by the Japanese.

Limited Effectiveness of Some Submarine Forces: The Italian Navy provided an Atlantic presence as large as that of Germany, but due to much less effective employment by leadership, the force had a much smaller impact. The Italians avoided wolf-packs and, in general were less aggressively used.

The Japanese submarine force was large and technically capable. It also had at its disposal a wide variety of types of platforms, capable of a diversity of missions. Like the Italian force, however, the Japanese force never delivered on its potential. It began the war with innovative operations, such as the employment of five towed mini-subs in the attack on Pearl Harbor and submarine launched aircraft in attacks on Oregon. By the second or third year of the war, however, the innovation had largely disappeared and the Japanese I-boats were used for resupply, evacuation, and monitoring.[9] Poor communications security and highly structured command and control offering little opportunity for initiative led to the loss of scores of Japanese submarines. They were sunk by American submarines and other naval forces which exploited ULTRA to enable ambushing the Japanese as they executed precisely ordered transits with specific times and places.

The Russian submarine force, although the largest in the world at the start of the war, was largely neutered by platform limitations, geography and aggressive German ASW mining efforts in the Baltic Sea. Russian submarines were largely constrained to short range arctic patrols in the Barents, with few target opportunities. In the Baltic, the force was largely penned in by aggressive German minefield laydowns that exploited constrained Russian geographic options. Most of the major Russian submarine attacks in the Baltic occurred late in the war as the Germans executed a hasty evacuation from eastern Europe.

Submarine Losses: Losses of submarine forces on the Axis-side were huge. The Germans, Japanese and Italian submarine forces lost in excess of two thirds of their front line submarines. Although small in comparison to Axis submarine losses, American submarine force losses were greater as a proportion of those who served than the losses in any other branch of the U.S. military. Half of the U.S. losses were the result of ASW counterattacks following a submarine attack and another quarter were likely losses to mines. The remaining quarter was the result of the diverse range of other causes. Importantly, much of what we know about U.S. submarine losses is the result of detailed postwar analyses and was not information available in real time. Identifying the cause of a submarine loss during the war was challenging and often had to depend on guesswork.

[9] Blair, Silent Victory, p. 553.

Key Role: Maritime Resource Interdiction: In summary, the submarine forces that played the most significant role in determining the outcome of the war – the American force in the Pacific and the German force in the Atlantic – were engaged in unrestricted submarine warfare against adversary shipping. The Russian and Italian forces, although executing the same mission, did so with geographic restrictions and self-imposed operational constraints that hampered their effectiveness. The British submarine force made its biggest mark in the Mediterranean conducting operations against the Italian and German surface forces.

Submarine Roles in the Cold War

The Soviets: The role of submarines changed dramatically in the years following World War II. At the end of World War II, the role of the U.S. submarine force was very limited, overshadowed by the threat of the Soviet submarine force – greatly expanded during the postwar years of our drawdown. If World War III happened, it looked like it would involve a repeat of the Battle of the Atlantic with the Soviets operating the submarines. Since World War II's Battle of the Atlantic had been won by the combined efforts of the surface navy and aircraft, and since there were no Soviet sea lines of communication to cut, it looked as if there was no real need for a robust U.S. submarine force at the dawn of the Cold War.

U.S. Submarines Undertake ASW: As the Russian undersea capability grew with the exploitation of captured German Type XXI submarine designs, the ASW problem began to look even more challenging. The Navy started to look for more effective ASW approaches. The commanders of the Atlantic and Pacific submarine forces had cooperated in undertaking exploratory research to determine if submarines might be useful in ASW and this led to the creation of the Development Squadrons (2 and 12). In 1949, everybody "knew" that submarines could not perform ASW, but within a mere 15 years, submarines had become the cornerstone of ASW. This was due to their combination of access to the undersea environment (with its improved sonar performance) and their stealth (which enabled a submarine to kill without being killed).

Nuclear Power: The emergence of nuclear propulsion, when combined with the advent of robust atmosphere control, precise navigation and improved sonar systems, freed submarines from the need to expose themselves at the surface, enabled them to place their sensors in the best listening depth, and permitted sustained high-speed operation that was previously unimaginable.

Ballistic Missile Submarines: The Cold War saw the introduction of the ballistic missile submarine with the dramatic parallel development of a platform and a launcher and a solid-fueled missile. The speed with which Polaris put to sea on the *USS George Washington* was an engineering feat that set an example for the space program to later follow. The survivability of submarine ballistic missiles fundamentally changed the calculus of nuclear deterrence, virtually eliminating any advantage from a surprise attack, greatly stabilizing superpower interactions.

Submarine Forces in Transition

At the end of the Cold War, the mission of the Navy moved from ASW against a large Soviet submarine force to "From the Sea" littoral warfare and strike operations. In stark contrast to 1948, when "everybody knew" that submarines could not perform ASW, now "everybody knew" that *the principle mission submarines did was ASW*. Again, undersea forces demonstrated their operational agility and adaptability. After firing only 5 percent of the TLAMs in Operation Desert Storm, the submarine force moved to delivering about a third of the missiles for Operation Enduring Freedom and Operation Iraqi Freedom.

The Russian submarine force remains one of the largest in the world, but it is shrinking as older, less-capable submarines are replaced with smaller numbers of more capable submarines. Importantly, however, Russian undersea systems – from submarines to sensors to weapons – are being exported around the world and are a part of the arsenal of many potential U.S. adversaries. This fact alone means that Russian undersea developments continue to require careful attention.

The North Korean submarine force remains among the largest in the world, but because it mostly consists of small mini-subs, this statistic is somewhat misleading. Focusing exclusively on South Korea, the North Korean force emphasizes mining, anti-ship torpedo warfare and the insertion of Special Forces or other clandestine operatives into the south.

The mission of the Chinese submarine force is the most ambiguous of the major submarine forces today. The Chinese force is clearly growing rapidly in both numbers and capability, and it is equally clear that one of its major purposes is the interdiction of U.S. naval warships. What is unclear is whether the Chinese also consider the submarine force a tool for disciplining Japan, South Korea or other states in regional confrontations. In particular, what role do their submarine forces play beyond a blockade role in the Taiwan scenario?

In the Post Cold War world, the role of the undersea environment in the day-to-day economic security of the United States has grown dramatically. The vast majority of oil and natural gas available in the Atlantic basin comes from the sea, either in the North Sea, the Gulf of Mexico, Africa's Gulf of Guinea or off Brazil's coast. In addition, the "information superhighway" can be said to travel along the seafloor, where fiber-optic cables carry more than 95 percent of all international telecommunications and internet traffic. These critical undersea infrastructures will become part of what undersea forces have to defend in the future.

As the threats change in the future, the submarine force's payloads and operating profile must evolve to hold new types of adversary assets at risk. Over history we have seen the payloads change from Mk 14 torpedoes to the Mark 18 electric torpedoes to Regulus missiles to ballistic missiles to cruise missiles to advanced torpedoes to UUVs and UAVs. Today it is clear that the submarine force of the future must be capable of holding both surface warships and submarines at risk, it must hold land targets at risk, and in the future it may need to be able to hold other classes of undersea targets at risk – infrastructure or UUVs or sensors. There will always be a demand for this ability, and as the future places surface platforms at increasing risk, there is a possibility that the Navy and the Joint Force will need to increasingly turn to undersea forces for more of its ability to threaten adversaries.

The Role of U.S. Undersea Forces Today and in the Future

When the history of the missions of undersea forces is considered, there are clear patterns that emerge. We need to carefully consider these patterns as we look forward to the future of our own undersea forces.

Undersea forces have been forced to adapt to new weapons, new operating environments (e.g., under ice or in shallow water), and new missions (e.g., nuclear deterrence, ASW and Strike). Certain roles have remained constant and are likely to remain core missions in the future: anti-ship operations, intelligence collection, and the insertion or extraction of personnel or equipment. Based on historical realities, we should be ready to engage in maritime interdiction. Certain vulnerabilities have recurred in history and will recur unless prevented: torpedo reliability issues, misplaced confidence in the security of communications, poor understanding of losses, and backlash from attacks on protected classes of targets. Extra effort must be taken to protect our force from falling into the same traps past submariners have fallen into. Certain strengths have also recurred: greater stealth than anybody appreciates, greater ability to gain access to "secure places," and greater operational creativity and military flexibility. We must nurture the development of these same attributes and skills today.

As we look forward, it is useful to determine what attributes the U.S. undersea force of the future must possess. We must define a direction for our skilled undersea warriors to go, a target for them to pursue as they train personnel, develop new doctrines and procedures, address new technologies and adversaries and geographic locations. There is a list of key attributes that our force must possess if it is to do the task that is expected of it in an uncertain future.

Part 4

The Necessary Attributes of U.S. Undersea Forces

Informed by the history of undersea warfare and the contemporary international situation facing the United States, it is possible to identify the attributes that U.S. undersea forces will require in the future. As we have seen, individual nations have employed their undersea forces in a variety of ways. Although we cannot see the future, we can see what kinds of undersea capabilities are likely to be of great deterrent and warfighting value to the United States, and we can make sure that our undersea forces deliver those attributes and capabilities to the Navy, the Joint Force and the Nation. These required attributes have a strong linkage to the U.S. submarine force's World War II and Cold War heritage.

Although undersea concealment provides certain theoretical military advantages, a nation's undersea forces must have certain attributes in order to take full advantage of these potential benefits. To extract the maximum military utility out of the advantages provided by undersea concealment, the United States needs undersea forces that possess the following attributes:

- Readiness to fight on short notice
- Ability to quickly and non-provocatively gain early access far forward
- Ability to employ platforms and systems capable of fully exploiting the undersea maneuver space
- Discretion to choose the time and place of engagement for maximum effect
- Emphasis on endurance, self-sufficiency and offensive firepower
- Ability to adapt to changing situations
- Agility to create and exploit chaos, disruption and confusion

Readiness to Fight on Short Notice

U.S. Navy forces have global responsibilities and must be capable of providing global coverage on short notice. In order to provide this global coverage within abbreviated time lines, it is essential that our undersea forces be ready to fight with little or no warning and have the ability to rapidly take up positions that can either deter the further escalation of conflict or intervene effectively. There is inadequate time for undersea forces to be able to finish preparations for war, conduct a slow transit and then conduct a careful, methodical penetration. Nor are our forces so large that we can afford as a nation to have enough forward all the time that we don't need to swing or surge forces in response to contingencies. Our forces must be capable of repositioning or deploying in a war-ready posture on short notice -- the sooner the better.

Our forces must be completely ready on a day-to-day basis for the most likely contingency – the one that would

demand a short-notice deployment for war – and be largely ready for other more specialized missions. These other missions are less likely to be tasked on no-notice and are more likely to involve some preparation or load-out time. Again the principle is, the sooner a submarine can be ready, the better for the military mission and for the success of the submarine. Entering a theater to join a conflict already in progress carries with it inherent disadvantages, and it is far better to be in position early. The more ready submarines are, the sooner they can be deployed and the sooner they arrive in theater, ready for action.

Early access far forward

Submarines must be prepared to penetrate adversary defenses quickly and deeply, in order to gain the preferred firing position against the adversary's most valued assets. Early access means earlier departure, higher speed transits, and prompt penetration. Prompt penetration is enabled by early planning, wardroom discussions and "table top" exercises with exchanges about how one side would defend and how the other should best penetrate. Available charts and resources should be studied in advance and discussed in depth. Even if mission tasking is different from that reviewed beforehand, the practice of having gone through the review will make the "real thing" much more efficient and effective. Practice operations in local operating areas can be undertaken to develop lessons about what approaches are effective.

The kinds of locations that constitute "far forward" vary with the adversary and the scenario. The water may be deep, cold and wide open or it may be warm, shallow and crowded or it may be anywhere in between. Wartime or Phase 0 penetration is unlikely to follow the "middle of channel" route that is favored in peacetime transits. As a force and as individual platforms, we must gain increased confidence in our ability to use *all* of the available water. We must gain experience operating in these waters and systematically validate our bathymetric data and learn what are the best safe methods to gain insight into what works and how quickly we can position. Consciously routing our submarines via unfamiliar routes and then executing the transit safely is an essential skill that must be developed at all levels of the submarine force. At the headquarters level, processes that manage risk and feedback lessons must be institutionalized so that the information gained from each new transit is integrated with past data and fed back to the operating forces. At the squadron and platform level, commanders must have in place methods for both learning and teaching the lessons from these transit demonstrations.

Ability to exploit the full undersea maneuver space

Not only must our individual submarines be capable of effectively using all of the available waterspace, but U.S. undersea forces must include a broad enough mix of platforms and systems such that there is no geographic location or depth of ocean-connected water that is beyond the reach of U.S. undersea forces. For maximum effectiveness, U.S. undersea forces will strive to deny potential adversaries any safe haven at all.

The evolution of unmanned undersea vehicles will further our ability to reach into shallow and dangerous water with sensors or payloads anywhere on earth. This will enable us to both deter more effectively by denying havens that are currently available, and it will also help us provide greater effective coverage from a smaller number of manned platforms as force levels decline in the future.

Ability to engage at the time and place of our choosing

The United States is a maritime power. One of the most fundamental advantages of maritime power over a land power is that of maneuver and movement – the ability to deliver force in a variety of different places with little notice, making defense difficult. Undersea forces take the advantages of maneuverability to the next level by enabling engagements to occur at the time and place chosen to best comport with the military needs of the United States. This does not mean that all attacks will be optimal, but it is a distinct advantage when compared to the condition faced by our surface forces, where there is mutual detection and mutual engagement. When undersea forces prepare to execute an attack, they can delay pulling the trigger until better circumstances can be met. This timing flexibility could enable direct access to the highest value target first, or reduce the likelihood of a miss or enable the submarine to better position for a follow-on attack or a more effective evasion.

By being able to conduct attacks on forces in or near sanctuaries, our attack is less likely to be thwarted, countered or survived by the adversary. In addition, conducting attacks in places that are more "secure" results in greater disruption of the adversary's sense of security and ability to prepare for and execute plans on a schedule and with the required forces. It is more disruptive to attack someone when they do not expect it or when they feel they are safe.

This ability to attack at the time and place of our choosing will enable us to address higher value targets when they are more vulnerable and create a greater disruption to adversary plans. This means that the military utility of each attack is amplified to create greater effects than if the attack had been conducted in a different time and a different place. In World War I the British submarine force went to great lengths to penetrate the Dardanelles and conduct attacks against Ottoman warships moored in Constantinople – a location thought by the Ottoman Turks to be secure. Rioting resulted among the population when it became clear that the British Navy was able to reach the city. The attack by Gunter Prien on Scapa Flow in October 1939 discussed earlier caused tremendous disruption to British security confidence, resulting in investigations, the firing of people in leadership positions and a changed basing posture for the Home Fleet.

Emphasis on offensive firepower

As U.S. naval forces are reduced in number due to fiscal constraints, and as more of the surface Navy is pressed to divert payload volume to defensive weapons – including Ballistic Missile Defense systems – it will be even more important for our undersea force to retain its emphasis on offensive firepower, a long-standing quality of our weapon loadout. With the minor exception of countermeasures, the payload of submarines is dedicated to ordnance used to deliver attacks on adversary land or maritime targets. Well over 90 percent of undersea payload is reserved for offensive weapons. This is especially important because of the degree to which the endurance of undersea forces is payload limited. Because of the risk and time invested in penetrating to a far forward position, it is important to maximize the scope of the offensive impact that a submarine can have once there. This means that a larger offensive payload is better. Unlike surface ships that can replenish many (but not all) of their types of weaponry at sea and forward, submarine forces must retire to the rear to reload. This long-distance, risky transit to resupply is minimized by larger offensive payload volumes.

Adaptability to changing situations

Undersea forces are regularly employed for purposes other than the reason they were built. This is true of U.S. as well as other nation's submarines. Sometimes this mission change requires hardware adjustments and sometimes it just requires creative employment by operators. Sometimes the platform does not change but the payload has to be adapted.

An essential element of this adaptability is being a "generalist" in terms of what kinds of targets can be handled and how. Just as a highly specialized animal that is very specifically matched to a particular type of prey is vulnerable to extinction if that prey disappears, so it is that a highly specialized submarine capable of handling only one kind of target will be of little use if the military situation only serves up other types of targets. A "generalist" -- that is, a predator that is capable of handling many different kinds of prey depending on the situation that presents itself – is the kind of platform that submarines need to be. When submarines operate forward, as we have already discussed, they are often the only platform available in the area and thus, if they are not capable of effective attacks then the enemy can continue to operate with impunity. In World War II, as targets became scarcer, our submarines had to become greater generalists and it became more important for them to employ deck guns against smaller targets.

As adversary platforms diversify from large combatants to smaller, faster, shallower ships capable of lethal attacks on large platforms, we should anticipate that the weapon changes will follow. In addition, as future warfare places greater constraints on the collateral damage allowed, it may become more useful for submarines to have available weapons that are capable of disabling ships without sinking them, thus permitting a sort of increment of damage to cripple the potency of enemy forces. As we saw in the previous section, successfully conducting warfare within the constraints imposed by civilian leadership is critical to the effectiveness of an undersea warfare campaign.

Exploitation of chaos, disruption and confusion

Our undersea forces welcome the disruption and confusion that can be induced uniquely from undersea operations that exploit uncertainty and ambiguity. To do this, undersea forces use decoys and deception to compel adversaries to believe that they are where they are not and to believe they are not where they are. A significant part of the value of attacks conducted with surprise far forward is the fact that they induce the adversary to expend a significant share of its resources in protecting assets that are, in fact, not being targeted. The fact that undersea forces cannot be detected but may be present compels adversaries to take defensive measures against them even when they are not there. This is roughly akin to the significant airport security measures that we must take today to protect against terrorists whether there is a terrorist in the line or not. As we know from our own air travel experience, when an enemy must divert resources to protect against unseen threats, it slows and weakens their ability to exercise various initiatives and may also result in the need to abandon some desirable plans because there are insufficient resources available or because timelines cannot be reliably met. In order to exploit this ambiguity, undersea forces must have the ability to reach out geographically or in time to cause effects at places or at times different from their actual location. This can create the effect of multiple platforms at work when there is only one. This approach is especially valuable when it is desirable to create the military impact of a larger force when only a smaller one is available. At the same time, this compels the adversary to divert his defensive or anti-submarine effort to other locations besides where the platform is, further improving survivability and the psychological impact of undersea operations. In summary, the availability of tools that enable undersea forces to create the impression of diverse locations and operational timing will act to amplify the military value of undersea forces. This is a necessary element of the undersea forces of the United States.

In summary, the long distances and remote location of operating areas require that U.S. undersea forces be ready for wartime employment on short notice, be capable of quickly transiting to and penetrating and adversary defensive perimeter to take up a far forward position, exploit interior positions to conduct attacks with surprise at the time and place best suited to U.S. military needs, sustain an offensive posture by virtue of a heavily offensive load-out, and be equipped to exploit the ambiguity of the undersea to create force-multiplying effects against the enemy's forces, defenses and psyche.

Part 5

Summary

The importance of undersea forces to the national security of the United States and its allies grows with each passing year. Not only are technologies proliferating that will increasingly stress the survivability of our overt forces, but undersea energy and information infrastructure are becoming more and more essential to our way of life. History provides a guide that suggests that there are a handful of missions that will always be expected of undersea forces (such as maritime resource interdiction), that there are recurring weaknesses in submarine forces (such as inadequate appreciation of the ability of adversaries to exploit communications), and that there are recurring strengths (such as greater stealth and ability to penetrate than was expected).

Our undersea warriors will have to use these insights from history as a guide, but not as a crutch. For one other key lesson of the past is that undersea warriors must adapt quickly to changes that may undermine "old truths." Our undersea warriors will have to be innovative and aggressive while carefully avoiding the need to relearn lessons from the past. Effective undersea force employment must rest on the foundation of technical excellence across all aspects of the undersea forces.

The concealment of the undersea provides undersea forces with a range of advantages that can be wisely leveraged to help deliver military impacts far out of proportion to the size of the undersea force. When this lethal and survivable undersea force is coordinated with the full, visible and intimidating power of carrier strike groups and the expeditionary capacity of the Marine Corps, the Navy-Marine Corps team is as formidable, flexible and daunting as any conventional military force in the world. Ensuring that undersea forces continue to carry our share of the burden will require constant attention to the principles and rules that have guided us for decades. We draw our success from lessons learned by generations of undersea warriors, and we include in that lesson the need for the flexibility of mind and spirit to seize new opportunities as they come and prudently skirt both old risks and new ones.

Undersea forces, when used effectively, operate far forward and independently. They exploit stealth for survivability and carry offensive payloads. They penetrate adversary safe havens and hold critical assets at risk, whether those assets are ships, submarines, land targets or even critical information. To be effective, the operators of these undersea forces must practice and drill as realistically as possible, gaining new insights into how best to employ the forces we have against the adversaries we face.

While we cannot be sure what the future holds, by prudent preparations, we can make sure that our undersea forces can fully support any of the many directions the future may take. Accordingly, U.S. submarines are expected to provide the United States with the ability to operate undetected, to assume a wartime posture quickly and non-provocatively, to rapidly penetrate adversary defenses to gain far forward positions of advantage, to conduct early offensive action designed to seize the initiative, and to exploit this interior position, speed, stealth and operational agility to disrupt adversary planning, slow timing, undermine confidence and disrupt operations. This ability – made evident to our potential adversaries – will act as an important deterrent to adversary hostile action inimical to U.S. national security interests.

Undersea warriors by their nature always seek to improve their operational skills and habits, build enhanced wartime readiness, and reinforce initiative and expertise. We in the current generation of American undersea warriors are no exception; we are proud but never satisfied.

Appendix A
Background on U.S. Submarine Operations in World War II

Undersea warriors should have a shared foundation of historical knowledge upon which to draw as they adapt to the changing security environment in the future. The number of stories from history that one finds repeated across time and nationalities suggests that there is great value in studying this history. In addition, undersea warriors will benefit from having a degree of "cultural literacy" or a shared baseline of foundational information from which they can all start. This baseline is critical.

Submarine force contributions and losses in World War II

Summary: The influence of the U.S. submarine force on the outcome of the war in the Pacific was disproportionately great. The official joint Army-Navy report complied after the war concluded: "The war against shipping was perhaps the most decisive single factor in the collapse of the Japanese economy and logistic support of Japanese military and naval power. Submarines accounted for the majority of vessel sinkings and the greater part of the reduction in tonnage." [Clay Blair, Silent Victory, p. 879]

Key Statistics:

- In 1682 war patrols, submarines sank 1314 Japanese ships (5.3 million tons) (55% of all Japanese maritime losses)
- The U.S. submarine force in World War II (including back-up personnel and staffs) was composed in total of about 50,000 officers and men and "represented only about 1.6 percent of the total navy complement. In other words, a force representing less than 2 percent of the U.S. Navy accounted for 55 percent of Japan's maritime losses." [Blair, p. 879]
- Of the 50,000, about 16,000 submariners actually made war patrols and of that 16,000, 3507 were killed in action, a casualty rate of almost 22% -- the highest of any branch of the military. (Even when compared to "all submarine force personnel," the loss rate is 7% -- about double that of the Marine Corps in World War II.)
- Of the 288 submarines that served in World War II, 52 were lost (18%): about half (25) to depth charging and bombing from aircraft, about one quarter (13) probably to mines, and about one quarter due to all other causes, including non-combat operational losses (3), grounding (4), friendly forces attacks (2), circular run torpedoes (2), gunnery (2) and being bombed in port (1).
- Each fleet boat submarine displaced about 1500 tons and carried 24 torpedoes and deck guns
- About 11 torpedoes were expended for each ship sunk, and the average ship sunk displaced about 4000 tons.
- On average, each submarine spent a cumulative total of 109 days on patrols during the war and sank a total of 4.5 ships (about one ship every 24 days on war patrol)
- Seven submarine officers were awarded the Medal of Honor: Howard Gilmore, John Cromwell, Red Ramage, Sam Dealey, Gene Fluckey, George Street and Dick O'Kane
- There were 465 submarine COs who served during WWII, but the top-performing 15% (70) accounted for more than half of all the ships sunk; of those 70 COs, only 4 were killed in action (<6%) (only 3 were lost with their ships: Morton, Dealey and MacMillan)
- In December 1941, war patrols were conducted by COs with an average of 15.7 years of service but by July and August of 1945, the average CO had 9.8 years of service (of which 3.5 were war)
- For comparison, the Axis submarine forces of Germany, Japan and Italy each lost no less than 2/3 of their submariners during World War II

Books to read:

- William Anderson and Clay Blair, Nautilus Ninety North
- Clay Blair, Hitler's U-Boat War
- Clay Blair, Silent Victory
- Eugene Fluckey, Thunder Below!
- Michael Gannon, Operation Drumbeat
- Edwyn Gray, The U-Boat War
- Brayton Harris, The Navy Times Book of Submarines
- Max Hastings and Simon Jenkins, The Battle for the Falklands
- Larry Kimmett and Margaret Regis, U.S. Submarines in World War II
- Richard O'Kane, Clear the Bridge
- Richard O'Kane, Wahoo
- Norman Polmar, Cold War Submarines
- Theodore Roscoe, United States Submarine Operations of World War II
- Jordan Vause, Wolf

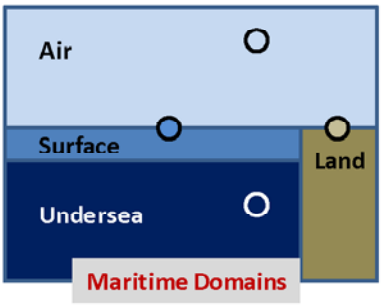
Appendix B

Definitions of Terms and the Undersea Domain

Undersea Forces

The U.S. Navy's undersea force is a subset of the forces available to the Navy for maritime operations. Undersea forces are those elements of the Navy that operate in the undersea domain and exploit it for military purposes. In this way the undersea community is similar to the air and surface communities: each operates in its domain and leverages it for the unique military advantages that the domain provides. Aviation provides the Navy with unique speed and mobility. The surface force provides the Navy with visible weight and sustainable endurance. Undersea forces provide stealth and surprise.

Undersea forces today consist primarily of submarines and, increasingly, Unmanned Undersea Vehicles (UUVs) and Remotely Operated Vehicles (ROVs). Other undersea systems, such as sea-bed sensors and networks, have played and will continue to play critical undersea roles.



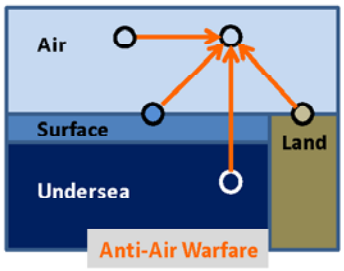
Sorting systems into domain-related categories is not as "black and white" as it may seem at first glance. Almost all platforms have the ability to operate in multiple domains and employ sensors or weapons that can reach across domains. Submarines and aircraft, for example, can operate on the surface of the ocean during a part of their operating cycle. During this time, however, they are not exploiting the advantages provided by their primary domains – speed and mobility for the aircraft and stealth and surprise for the submarine. As a result, they are sub-optimized and have greatly reduced military utility.

The ancient Greeks used the word *telos* to mean the essential nature of something, the feature or characteristic or purpose that makes it what it is. The defining trait of aviation forces is the use of flight to provide the military advantages of speed and mobility. The defining trait of surface forces is the use of the surface of the ocean to support military power with mass and sustainment. The defining trait of undersea forces is the ability to militarily exploit undersea concealment. Some systems, such as undersea surveillance ships (TAGOS), operate across domain boundaries and reach into the undersea but are not, strictly speaking "undersea systems" because they are not able to exploit the most fundamental advantage of the undersea – concealment.

Undersea Warfare Areas

"Undersea warfare" is not a commonly understood term, and in many ways the area of undersea warfare is rendered unnecessarily complex because the terminology is imprecise. It is essential for undersea war-fighters to use a shared set of definitions and terms.

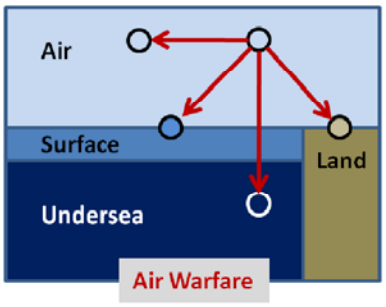
One way to characterize warfare areas is to classify them by reference to a class of targets. Anti-air warfare, for example, is warfare that targets aircraft and missiles and other flying objects. In other words, it is warfare that targets anything in the air domain. Anti-surface warfare is similar to anti-air warfare in that it is about holding at risk targets that operate on the surface of the ocean. One would anticipate that there should be a corresponding term for warfare against targets that operate in the undersea domain, but there is no such term in common usage. "Anti-submarine warfare," sounds like it fits into the same category, but it is different in a fundamental way. It is about holding *submarines* at risk – a platform type -- but it is not about holding at risk "any targets in the undersea domain." Underwater mines, for instance, are not in the ASW target set. UUVs are not ASW targets. Undersea sensor systems are not ASW targets. There is, in fact, no formal, joint term to describe the class of warfare that holds general targets in the undersea domain at risk. To fill this void, the term "anti-undersea warfare" can be used as the undersea equivalent of the anti-air and anti-surface warfare areas, and can be defined as "warfare against undersea systems."



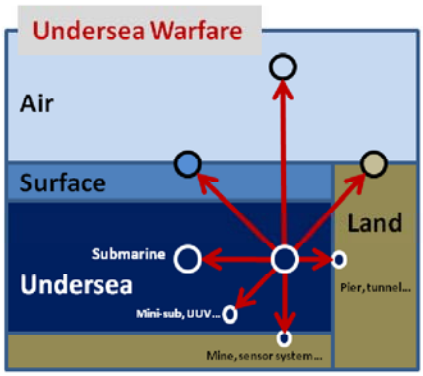
Another way to categorize warfare areas that provides different insights is to divide them by the platform type conducting the warfare. In this way, we have "air warfare" which is warfare from the air, regardless of the target set; "surface warfare" which is warfare from the surface regardless of the target set, and "undersea warfare" which is warfare from the undersea, regardless of the target set. These warfare areas overlap those that are centered on the target set.

Talking about warfare areas by platform type is useful because it gathers together warfare knowledge that needs to be in the professional skill set of different warriors with different platform-based expertise. Aviators, for

instance, need to be concerned about both "air warfare" and about "anti-air warfare." "Air warfare" is the kind of warfare they execute – the kind done from aircraft. "Anti-air warfare" may or may not be done by aviators, but it certainly targets platforms in the air, and aviators have a vested interest in making sure that they are not targeted by other friendly forces. The same interests apply to surface warfare officers and anti-surface warfare and submarine officers and anti-undersea warfare.



Anti-undersea warfare, then, consists of more than anti-submarine warfare. It also includes what is often called "mine countermeasures" but what could also be called "anti-mine warfare." In addition, anti-undersea warfare includes warfare against a variety of other systems that operate or exist in the undersea environment and are worth targeting. These systems might include torpedoes, UUVs, seabed systems of various types, and other undersea infrastructure. For the purposes of completeness, all of the systems other than submarines and mines can be lumped together as targets in a warfare area called "anti-subsea warfare."



Naming these kinds of warfare is not just an exercise in building taxonomic categories, it is important for completeness. For instance, when the Navy assesses its capability portfolios, there is an underlying assumption that the range of warfare areas being used is complete and that, if they are all covered adequately, that our naval capabilities are "whole." However, if there are important areas of warfare that are not included, then the approach for portfolio assessment is flawed because it leaves gaps. Naming these warfare areas is a necessary first step to assessing whether they are dealt with in a complete manner.

Undersea Warfighting

Commander United States Submarine Forces
7958 Blandy Road
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July 2011

Design for Undersea Warfare

July 2011

The work of our Undersea Force is complex, dynamic and vital to national security. With a community as broad and diverse as ours, it is important for us to have a shared sense of our main objectives, and to align our efforts to achieve them. The Design for Undersea Warfare serves these purposes.

The Design for Undersea Warfare is intended to be specific enough to clearly define the objective, while being flexible enough to encourage initiative and boldness throughout the force - at all levels - in the attainment of these goals. As such, it has implications for major commanders, facility commanders, submarine commanding officers, and each of our officers and Sailors.

Main Objectives: *We will be masters of the undersea domain, able to achieve undersea superiority at the time and place of our choosing. We will be the experts for all matters in undersea warfare. Consistent with decades of past performance, our Undersea Force will apply itself along three main lines of effort:*

- ***Ready Forces:*** *Provide undersea forces ready for operations and warfighting*
- ***Effective Employment:*** *Conduct effective forward operations and warfighting*
- ***Future Force Capabilities:*** *Prepare for future operations and warfighting*

It is difficult to separate warfighting from peacetime operations, as they are so closely related. Our undersea forces conduct peacetime operations to prevent war, by deterring and dissuading our adversaries and by assuring our Allies and partners. Peacetime operations further serve to help us understand and shape the battlespace, and to learn the capabilities of potential adversaries. Our goal is that by virtue of our robust and focused operations, we will clearly be ready to prevail in any conflict. The warfighting readiness and effectiveness of our Undersea Force should serve to compel potential aggressors to choose peace rather than war, restraint rather than escalation, and termination rather than continuation.

Enduring Attributes: *What has not changed is that the success of our undersea forces depends on dedicated, technically skilled and engaged warriors.*

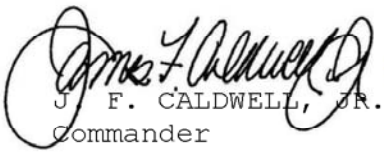
Areas for Greater Emphasis: *There are a number of long-term national security trends that interact to make undersea operations and warfighting capability increasingly important. In light of this, you will find several Focus Areas singled out for renewed dedication within our force. First, there is increased emphasis on the development and certification of relevant warfighting skills at the unit level, at the tactical and operational commander level, at the strategic level, and at supporting commands. Next, you will find increased emphasis on creativity and innovation, sparked by initiative*

and a heightened sense of authority, responsibility, and accountability at the lowest capable level - even to the individual.

This document defines our way forward in a complex and often unpredictable environment. As such, it will evolve - it is not a rigid plan. To ensure that necessary changes can occur, the Design for Undersea Warfare has assessment and learning built in - we will make changes as necessary.

The Design for Undersea Warfare is a framework for action. *Read it, think about it, discuss it and act on it.*

R. P. BRECKENRIDGE
Director
Submarine Warfare
Division



J. F. CALDWELL, JR.
Commander
Submarine Force
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Commander
Submarine Force

Part I
Context for the Design

Assumptions about the world, key trends, threats

1. A **chaotic and disorderly global security environment** will increase demands on the U.S. Navy and U.S. Undersea Forces.
2. **Globally proliferating submarines** are increasing pressure on freedom of the seas and contesting our undersea superiority.
3. **Anti-access, Area Denial (A2/AD) systems** challenge our surface and air forces, placing increased responsibility on our undersea forces to enable Assured Access for the Joint Force.
4. **America's vital undersea infrastructure** (energy and information) is becoming even more critical and more vulnerable.
5. **Our shrinking submarine force size** requires that each platform must individually support more requirements across a broader area.
6. **Deterrence provided by our stealthy, agile, persistent and lethal submarines** (SSBNs, SSNs and SSGNs) will remain important against both state and non-state actors.
7. **Ubiquitous media presence** means we will need to exploit our concealment to provide our leadership options by remaining undetected and non-provocative when desired.
8. **The expanded decision space that undersea forces provide** will be increasingly valued by senior leadership as the security environment grows in complexity, leading to increased requests for undersea support.

Assumptions about the future

1. **The operational environment will become more complex,** further stressing the human element in undersea operations and warfighting.
2. **Adaptive, determined and tenacious adversaries will exploit** our weaknesses with little or no notice.
3. **Survivable U.S. SSBNs will provide nuclear deterrence** for the United States and many of our allies for the foreseeable future.
4. **Combatant Commanders will continue to value** the unique capabilities and conventional deterrence that SSNs and SSGNs deliver.
5. **Unmanned underwater system technology will advance** with increased endurance and capability.
6. **We will need to fight our "Virtual Ship" in the cyber domain as capably as we fight in the undersea domain.** We must protect our information and our systems from attack and take the fight to the enemy.
7. **Available financial resources will decrease** due to budget pressures.

Expectations others have of our Navy and Undersea Forces: We will be expected to achieve undersea superiority at the time and place of our choosing.

1. **We will use the Navy to gain access** despite diplomatic, geographic, and military impediments. (CNO)
2. **We will build appropriate Navy force structure** and provide it with an appropriate strategic lay-down. (CNO)
3. **We will provide forces ready for tasking** to Combatant Commanders. (USFF)
4. **We will sustain our forces** through their Expected Service Life. (USFF)
5. **We will reduce Fleet overhead** and fund deployable units at a higher priority than everything else. (USFF)
6. **We will win wars, deter wars, defeat terrorists, and ease disasters** with our Maritime Forces (Cooperative Strategy for 21st Century Sea Power)(CS-21)
7. **We will secure the US from attack;** secure strategic access and retain global freedom of action. (CS-21)
8. **We will provide persistently present, combat-ready Maritime forces capable of forcible entry** and quick response to other crises. (CS-21)
9. **We will impose local sea control wherever necessary** -- by ourselves if we must. (CS-21)
10. **We will maintain nuclear weapons safety and security.**
11. **We will maintain nuclear reactor safety and security.**
12. **We will maintain security of classified material and information systems.**

Priorities – Enabling Success and Managing Risk

1. **Peacetime Operational Priorities:**
   - Safety: Our operational responsibilities hinge first and foremost on enforcing the highest standards of safety, including the prevention of collision, grounding, serious injury or death.
   - Stealth: Safety is closely followed by a commitment to remaining undetected as we execute highly sensitive missions in support of our Nation's security. We must prevent counterdetection, compromise of mission details, or exploitation of our sensitive classified information.
   - Mission Aim: Mission accomplishment within the bounds of safety and stealth is our highest priority

2. **Professional Behavior:** We must embody the highest standards of character. At sea, we will conduct ourselves as proud warriors, worthy of bearing arms in the defense of our nation. Ashore, we will be ambassadors of the Nation and the Navy, preventing liberty or public incidents at home or abroad. The Commanding Officer must set a powerful example.

What We Must Do: Forces that support our efforts

Our people are the key to our success. The shared "Submarine Culture" running through our undersea community is our strongest supporting force. It provides us with our warfighting focus and our operational readiness. It must NEVER be compromised.

Alignment: Our value as a Force is significantly enhanced when we maintain a coherent alignment amongst our senior leadership and with each other. We must ensure we remain consistent both with our broader strategic responsibilities to the Navy and with the other elements of the Undersea Force.

Warfighting:

- We expect to operate and fight far forward, independently, "behind enemy lines," for long periods of time, without support
- We maintain ourselves as ready as possible to leave soon, move quickly and be among the first to penetrate the enemy's defenses
- We know our potential adversaries and have operating experience in the environments that might become future undersea battlegrounds
- We exploit concealment by the sea as a key to our success, but we respect that the same sea will kill us unless we hold it at bay
- We depend on stealth, surprise and boldness and practice these every day. We safeguard tactical information and avoid exploitable patterns
- We understand that operating undersea is inherently a dangerous business and that only trained and vigilant individuals and teams will keep our ships and crews safe
- We understand "calculated risk" but avoid "unnecessary risk" by thinking ahead, anticipating risk and taking mitigating actions

Readiness:

- We stay ready to operate far forward on short notice by managing manpower, training and maintenance to avoid fluctuating readiness
- Our people are the backbone of our success. Submariners are national treasures.
- We have small crews. Each person has multiple roles. All are responsible for the ship's safety, stealth and mission
- We depend on initiative, de-centralized command and teamwork
- We depend on absolute integrity. We employ back-up and second checks, but each person remains individually responsible.
- We comply with procedures, founded on technical understanding
- We know and use the source requirements and references
- We have no peer in our aggressive approach to improvement through assessment and training
- We candidly face the facts – good and bad – and proceed based on well-known standards that are based on thorough analysis.
- We ensure nobody is indispensible by building depth of expertise
- We incorporate safety and effective work practices into our habits

- We are resourceful. We always have a Plan B, and we can often fix the equipment even if we lack the parts
- We own our ships, taking meticulous care to maintain them in a state of maximum possible material readiness – ready to go to war

What We Must Avoid: Forces that work against us

1. Our current **approach to inspections and assessments rewards cyclic and temporary narrow excellence** instead of excellence which is sustained and broad.
2. **Our TYCOM and ISIC efforts tend to limit a Commanding Officer's freedom and flexibility.** Shared responsibility and accountability between the ship and the chain of command is limiting CO's ability to achieve success. Excessive administrative distractions are burdensome.
3. **We lose sight of the fact that warfare is a human-centric problem. Insufficient emphasis is given to developing creativity and initiative,** both of which are essential to the practice of de-centralized command upon which effective undersea warfare is based.
4. Our solutions to problems can **tend towards bureaucratic, process-dominated approaches.**

Part II
Summary of the
Design for Undersea Warfare

Three Lines of Effort with Associated Focus Areas

Our undersea force has long approached its responsibilities for securing national security along three Lines of Effort (LOEs), depicted in Figure 1. The Design for Undersea Warfare also identifies associated *Focus Areas*, which describe the *emphasis* required within each LOE.

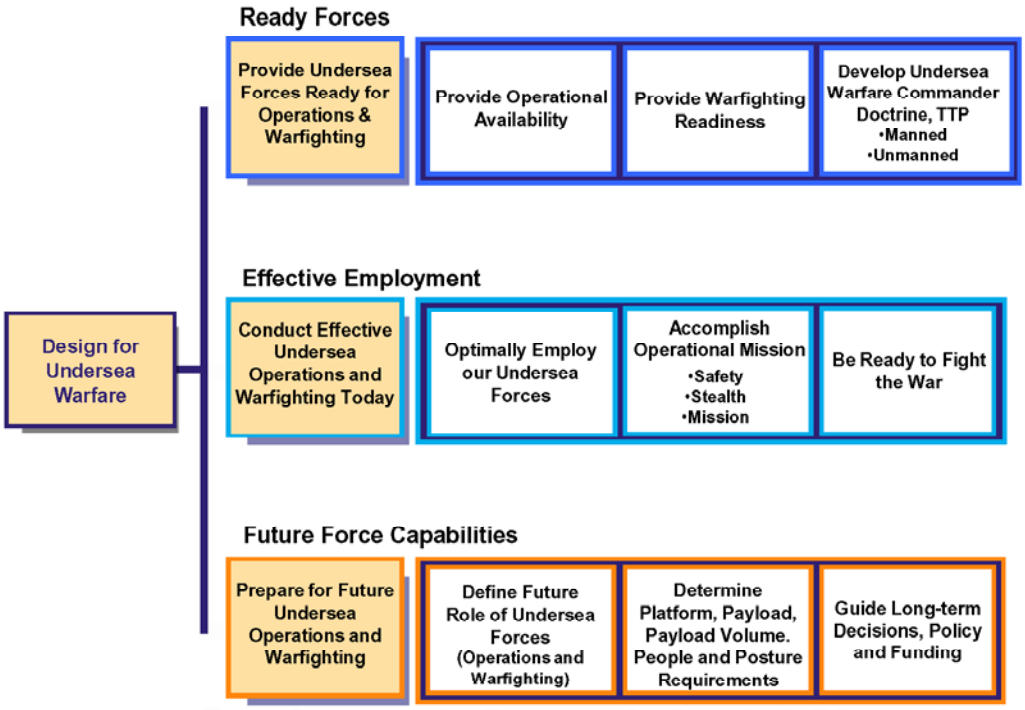

Figure 1 – Design for Undersea Warfare Lines of Effort

Each of the three Lines of Effort has associated Focus Areas:

Ready Forces -- Provide Undersea Forces Ready for Operations and Warfighting: This captures our responsibility to prepare undersea forces for scheduled or emergent deployments as well as warfighting. The time horizon for this Line of Effort is roughly five years.

Focus Areas:

- **Enhance CO initiative and character**, including the responsibility, authority, and accountability to prepare the ship for operations and warfighting; structure the relationship with Squadrons, Groups and Type Commanders to shift the responsibility for preparation, planning, execution, assessment and improvement more to the ship. Maximize CO effectiveness by nurturing character and integrity at every opportunity.

- **Sustain warfighting readiness** during the inter-deployment period; adjust the interaction within the chain of command to reward stable, broad excellence vice short-term, cyclic pulses; return tactical initiative to the operating forces
- **Develop Undersea Warfare Commander Doctrine and TTP**; integrated C2 for both manned and unmanned undersea systems; practices for effective coordination of mixed undersea forces with other forces

Effective Employment -- Conduct Effective Undersea Operations and Warfighting: This captures our responsibility to work with operational commanders to be ready to establish undersea superiority at the time and place of our choosing. Effectively employ undersea forces to reliably and professionally deliver the operational and warfighting performance expected by the Combatant Commanders. The time horizon for this Line of Effort is roughly five years.

Focus Areas:

- Active engagement with Fleet and Operational Commanders to **develop coordinated theater specific campaign plans** that optimally employ our undersea forces; enhance development of innovative strategic and tactical employment of undersea forces (e.g., C7F Submarine Campaign Plan and supporting CSP Submarine Response Plan); tighten our assessment processes with Operational Commanders and supporting players to make us more effective warfighters.
- Increase the **deliberate and planned demonstration of warfighting capabilities** and access at the submarine and force level enhancing confidence in our abilities and systematically proving we can do what's required; lead in development of Theater USW Doctrine and teamwork; improve Mission Assurance to ensure we can fight through a range of C4I challenges in peacetime and war
- **Improve operational availability of undersea forces** while forward (through improved resilience, achieve better reliability, on-board repair, in-theater repair)

Future Force Capabilities -- Prepare for Future Undersea Operations and Warfighting: This defines the future role of undersea forces, the associated requirements for platforms, payloads, manpower and operations, and the decisions, policies and resourcing required. The time horizon for this Line of Effort is roughly five years and beyond

Focus Areas:

- Develop an **integrated approach to future undersea capabilities** that coordinates platform, payload volume, payload, people and force posture plans; link the plan to required near term decisions or investments; take necessary actions to evolve tactical security in the face of anticipated threat improvements
- Outline the strategy to **continue to access, train, and retain the very best people that will fill our ranks.** This will require creative approaches to find and attract the best and the brightest that the nation has to offer - people of character and

integrity, technically skilled, with personal and leadership abilities.

- Define the **future role of undersea forces** to make best use of undersea concealment for national security, incorporating hedging strategies to accommodate uncertainty in global trends, technology and adversary's capability and intent
- Obtain **SSBN, SSGN, SSN and Payload decisions** to address SSBN requirements, SSGN replacement, the SSN force structure shortfall, and emergent payload requirements

Part III
Detailed Discussion of
Each Line of Effort

Ready Forces:
Providing Undersea Forces Ready for Operations and Warfighting

Goals

1. Prepare undersea forces to safely and effectively complete peacetime operations directed by operational commanders. These operations will also support warfighting effectiveness.

2. Prepare undersea forces to effectively conduct wartime operations on short notice as directed by operational commanders.

3. Develop and refine, through experimentation, the command and control doctrine and TTP for the Undersea Warfare Commander for manned and unmanned systems.

In reaching these goals, our process must **certify that the quality** of provided forces meets standards. Furthermore, the process must be **sustainable.** It must not depend on shifting material and manpower excessively from one submarine to another in order to meet short-term commitments.

Ready Forces:
Focus Areas for increased emphasis

- **Enhance CO initiative and character**, responsibility, authority, and accountability to prepare the ship for operations and warfighting; structure the relationship with squadrons, groups and type commanders to shift the center of gravity for preparation, planning, execution, assessment and certification more to the ship; emphasize CO ability to distinguish acceptable risk from undue risk. Enhance CO effectiveness by nurturing integrity and a strong character at every opportunity.
- **Adopt a culture of sustained warfighting readiness** during the inter-deployment period; adjust the interaction within the chain of command to reward stable, broad excellence vice short-term, cyclic pulses; return tactical initiative to the operating forces. *Mindset: "This is the last week of peace before going to war."*
- **Develop Undersea Warfare Commander Doctrine and TTP;** integrated C2 for both manned and unmanned undersea systems; practices for effective coordination of mixed undersea forces with other forces.

Ready Forces:
Detailed Application of the Focus Areas

1. Personnel Readiness: Improve the accession, training, and retention of our people. This will be done through Systematic Rating Deep Dives (FIT), Unplanned Losses (UPLs) Deep Dive, follow-up on Engineering Department Master Chief (EDMC) community corrective actions. Enhance Sailor and Family resiliency with a systematic approach to preparing our Sailors and their families for submarine duty responsibilities. Improve the effectiveness of the officer career training pipeline, providing a more coherent, career approach towards developing a submarine Commanding Officer – including more deliberate emphasis on the developmental role of sea tours.

2. Fleet Readiness and Training Plan (FRTP): Revise the FRTP to increase the amount of time available for the ship's Commanding Officer and ISIC to effectively train their crews. Lengthen FRTP underway periods to increase stable, at-sea training time. Increase CO latitude in tailoring submarine schedules.

3. Training: Update the Continuing Training Manual (CTM) and Continuing Training Support System (CTSS) to provide COs more useful assistance on how to build a successful training program. (Examples: better planning tools, Force Exam Bank use, alignment of qualification and training, and better tracking in CTSS). While maintaining the predominantly human element in training, consider approaches to "distance support" for training, particularly in examinations. Establishing a predominantly watch-team approach to operational training.

4. Assessment: Provide an instruction that describes assessment as a means for improvement. Shift the emphasis from external (ISIC) "exam workups" in support of "snapshot" assessments, to developing and evaluating a submarine crew's ability to assess itself, correct and improve itself, and establish a mindset of sustained, broad superior performance. Adjust engagement at the ship, ISIC and TYCOM levels to focus on developing the mindset and behaviors for sustained performance, while shifting the center of gravity for assessment and improvement to the submarine and CO. As a supporting action, achieve a more "steady strain" approach to readiness by considering more unscheduled exams (e.g. TREs and ORSEs). Ensure that exams include an assessment of the "sustaining" mindset and behaviors on board the submarine.

5. Maintenance/Materiel: As we have throughout our history, we will set and achieve uncompromising standards of material readiness – our environment demands nothing less.

Intermediate Maintenance: Reduce lost operating days and degraded readiness due to maintenance schedule overruns by optimizing the planning and scheduling of maintenance periods within the FRTP and during refits. Manage transitions (first/last 100 hours) more tightly, emphasize planning, strict control of growth/new work and adherence to key events schedule.

Depot Maintenance: Control duration and cost by better planning and transition management. Work with NAVSEA to shorten SSBN ERO duration. Manage depot maintenance transition with rigor similar to deploying a ship. Forecast work package requirements via more accurate Technical Foundation Papers to enable proper Shipyard loading and resourcing. Work with NAVSEA to establish better execution and planning metrics.

Modernization: Focus modernization efforts to more concisely address improved human-systems interfaces and reduced training burdens while improving the capabilities and reliability of key sensors such as towed arrays and photonics masts. Better balance operational requirements, fiscal realities, and sustainability in the COTS strategy.

Supply: Improve sustainment and reduce cannibalization by better supply support (particularly Virginia class) and proactive management of onboard and off hull supply parts with NAVSEA and NAVSUP partners.

6. **Develop Undersea Warfare Commander Doctrine**: Formalize standardized doctrine and procedures for coordinating the operations and effects of the full range of undersea systems with special emphasis on incorporating unmanned undersea systems into broad Navy operations. Anticipate emerging changes in communications, networking and autonomous operations to keep TTP current.

Effective Employment:
Conducting Effective Undersea Operations and Warfighting Today

Goals

1. Optimally employ our undersea forces independently or as part of a team in support of our operational or warfighting responsibilities.

2. Reliably and professionally accomplish the missions tasked by the operational commanders while effectively managing risk and stealth.

3. Upon direction, go to war and immediately execute the combatant commanders' direction.

This objective is about establishing undersea superiority at the time and place of our choosing through the optimum employment of undersea forces. It involves every element from the deliberate advanced planning of forward operations and SSBN patrols to the conduct of combat operations.

Effective Employment:
Focus Areas for increased emphasis

- Active engagement with Fleet and Operational Commanders to **develop coordinated theater specific campaign plans** that optimally employ our undersea forces; enhance development of innovative strategic and tactical employment of undersea forces (e.g., C7F Submarine Campaign Plan and supporting CSP Submarine Response Plan); tighten our assessment processes with Operational Commanders and supporting players to make us more effective warfighters.
- Increase the **deliberate and planned demonstration of warfighting capabilities** and access at the submarine and force level enhancing confidence in our abilities and systematically proving we can do what's required; lead in development of Theater USW Doctrine and teamwork; improve Mission Assurance to ensure we can fight through a range of C4I challenges in peacetime and war
- **Improve operational availability of undersea forces** while forward (through improved resilience, achieve better reliability, on-board repair, in-theater repair)

Effective Employment:
Detailed Application of the Focus Areas

1. Theater Specific Employment Planning – Submarine Campaign Plans:
Formally coordinate and proactively engage Fleet and Operational commanders to thoroughly understand theater OPLANs, required capabilities (including access) and gaps. Encourage creative employment of submarines and undersea assets to conduct forward operations that improve our warfighting readiness and take advantage of our full range of capabilities (e.g., SSGN). Working closely with operational commanders, build a multi-year employment plan and theater-specific Submarine Campaign Plans. By necessity, plans must include solutions to warfighting in communications degraded

environments. Integrate innovative demonstrations of undersea force employment or warfighting capabilities into deployments. Integrate capability development into the preparation of Ready Forces.

2. **Operating Our Ships – Developing Confidence and Demonstrating Operational and Warfighting Excellence:** Exploit opportunities to enable COs and crews to operate in anticipated wartime areas, walk the battlefield, prove access and demonstrate warfighting skills and postures (e.g., operations in degraded C2/GPS, operational agility , application of wartime ROE, in-theater torpedo firings, SSBN patrols uninterrupted by "Brief Stops," etc). Systematically test and evolve guidance based on lessons learned and experience gained. Conduct entire deployments or patrols at heightened stealth postures; assess stealth in-situ with short notice planned events (e.g., P3, SECEX). Exploit real world and exercise opportunities to incorporate unmanned systems (aerial and underwater) into forward operations and warfighting demonstrations. Provide feedback to help evolve USW Commander Doctrine and better leverage the capabilities of our undersea platforms and supporting forces. Include COs in the development of operational orders including proposed tasking, identification of best practices and pitfalls, and required mission rehearsals. Increase attention to "calculated risk" versus "undue risk."

3. **Sustaining Our Advantage – Forward Materiel Availability:** Sustain the availability of essential systems in forward areas by improved reliability, logistic support, at-sea repair capacity and back-up/redundant modes of operation. Increase expected availability of tenders in Phase 0 and wartime. Submarine sensors, antennas, DSE support equipment, fire control and weapons require improved forward availability, as does IUSS-related equipment. Improve forward ordnance availability. Demonstrate warfighting support such as in-theater reloading, at-sea resupply, remote site maintenance and other required skills.

4. **Sustaining the Fight – Mission Assurance:** Ensure our readiness to support the Operational Commander throughout a range of C4I challenges in peacetime and war. Build on existing collaboration and coordination between Submarine Operating Authorities to ensure seamless undersea support to the warfighter. Review, assess, and improve Continuity of Operations Plans.

5. **Assessing Our Performance – Feedback to Make Us Better:** Establish tighter feedback to the submarine preparation process from operational commanders, other forces and the intelligence community regarding forward operations. Formally assess training doctrine, tactical development, tactical security, modernization plans, concepts of operation, system performance, and forward maintenance practices. Scrutinize Tier 2/3 events and formalize lessons-learned. Assess likely future warfighting environments and determine what is necessary for success and make the necessary adjustments across the Force.

Future Force Capabilities:
Preparing for Future Undersea Operations and Warfighting

Goals

1. Define the future role of undersea forces in both operations and warfighting.

2. Determine platform, payload, payload volume, people and posture requirements.

3. Coordinate future missions with other warfare communities.

4. Translate requirements into decisions, policy and funding.

This area of effort deals with the future beyond the next five years and must take into consideration uncertainty about future projections. There are, however, some factors that can be reliably foreseen: by the existing program of record, the number of nuclear submarines will shrink by about 30 percent over the next 20 years. By 2030, our forward presence will decline by more than 40 percent and our undersea strike capacity will drop by almost 60 percent. Despite these trends, there is every reason to believe that the future of naval warfare will place increasing, and not decreasing demands on undersea forces. This divergence of resources and demands places ever greater stress on the importance of an integrated approach for our future undersea capability development.

Future Force Capabilities:
Focus Areas for increased emphasis

- Define the **future role of undersea forces** to make best use of undersea concealment for national security, incorporating hedging strategies to accommodate uncertainty in global trends, technologies and adversaries
- Develop an **Integrated Undersea Future Strategy** to align requirements for platforms, payloads, payload volume, people and force posture
- Obtain **SSBN, SSGN, SSN and Payload decisions** to address SSBN requirements, SSGN replacement, the SSN force structure shortfall, and emergent payload requirements

Future Force Capabilities:
Detailed Application of the Focus Areas

1. Future Role of Undersea Forces – Long Term Undersea Warfighting Vision: Create a clear and broadly accepted vision of the growing importance of undersea forces in a future with increasing anti-access area-denial (A2AD) systems. Refine Navy and Joint Force understanding of the importance of undersea concealment to maritime military success. Advocate the implementation of the "Concept for Leveraging the Undersea Environment." Highlight the distinction between A2AD *defense*, *penetration* and *defeat*.

2. Future Payload, Platform, Payload Volume, People and Posture - Integrated Undersea Future Strategy:

Platforms: Determine requirements for OHIO Replacement SSBN and its impact on SSGN replacement. Determine requirements for SSGN replacement and implications on SSBNs and SSNs. Determine approach for dealing with the SSN shortfall after 2024 and how that impacts SSGN replacement options.

Payload Volume: Consider the merits of the Virginia Payload Module to replace lost payload volume (distributed vs. concentrated firepower). Plan to simplify payload interfaces.

Payloads: Enhance the military utility of existing payloads through incremental evolutionary changes without needing new programs. Plan to resume torpedo production. Determine new payloads required and their impact on payload volume needs. Consider future sonar system requirements. Conduct liaison with SOCOM to determine the way ahead for SOF payloads. Align payloads with evolving tactical security needs.

People: Determine system and payload changes (sonar, fire control, software, etc.) to enable reduced manning. Identify means to promote increased operational efficiency. Anticipate and define necessary new skill sets, then determine how best to recruit, train and retain them.

Posture: Identify the implications to future operations given different force levels, payloads, basing and manning schemes. Determine how best to operationally integrate diverse undersea systems, including UUVs, in the future. Refine the mission area of subsea warfare and the systems/operations needed to carry it out.

3. Long-term decisions, policies and funding - SSBN, SSGN, SSN and Payload decisions:

SSBN: Attain decisions on the OHIO Replacement capabilities, including stealth, survivability, and sustainment model. Ensure long-term continuity of sea-based strategic deterrence.

SSGN: Attain decisions on replacement of SSGN capacity when SSGNs retire, including Virginia Payload Module R&D and procurement funding.

SSN: Attain and sustain two-per-year procurement of Virginia-class SSNs. Gain support for extending the life of selected SSNs to help fill the SSN shortfall without impacting the plan for SSN replacement. Defer the "New SSN" while continuing procurement of additional Blocks of VA-class SSNs with associated incremental enhancements until after completion of OHIO Replacement class procurement.

Payloads: Encourage the development of undersea payloads by other resource sponsors, including Conventional Prompt Global Strike (OSD), Large Displacement Unmanned Undersea Vehicles (LDUUV)(N2/N6), next generation SOF vehicles (SOCOM), and Distributed Netted Systems.