The Small, the Agile, and the Many
The Navy's Hedge

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The Small, the Agile, and the Many – The Navy's Hedge

One of the most audacious and bold manifestos for the future of Naval innovation has just been posted by the Rear Admiral who heads up the [Office of Naval Research](#). It may be the hedge we need to deter China in the South China Sea.

While You Were Out

In the two decades since 9/11, while the U.S. was fighting Al-Qaeda and ISIS, China [built new weapons and developed new operational concepts](#) to negate U.S. military strengths. They've built ICBMs with conventional warheads to hit our aircraft carriers. They converted reefs in international waters into airbases, creating unsinkable aircraft carriers that extend the range of their aircraft and are armed with surface to air missiles make it dangerous to approach China's mainland and Taiwan.

To evade our own fleet air defense systems, they've armed their missiles with maneuvering warheads, and to reduce our reaction time they have missiles that travel at [hypersonic](#) speed.

Spratly Outpost
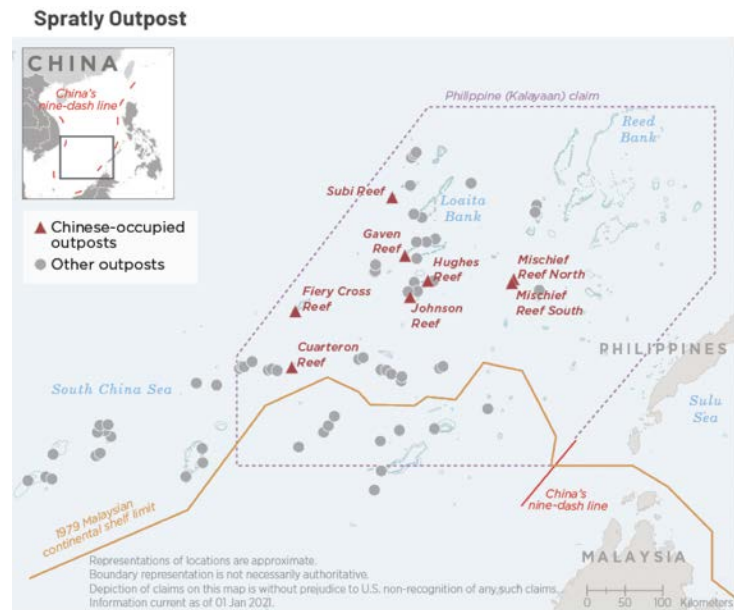
The sum of these Chinese offset strategies means that in the South China Sea the U.S. can no longer deter a war because we can longer guarantee we can win one.

This does not bode well for our treaty allies, Japan, the Philippines, and South Korea. Control of the South China Sea would allow China to control fishing operations and oil and gas exploration; to politically coerce other countries bordering in the region; to enforce an air defense identification zone (ADIZ) over the South China Sea; or to enforce a blockade around Taiwan or invade it.

What To Do About It?
Today the Navy has aircraft carriers, submarines, surface combatants, aircraft, and sensors under the sea and in space. Our plan to counter to China can be summed up as, more of the same but better and more tightly integrated.

This might be the right strategy. However, what if we're wrong? What if our assumptions about the survivability of these naval platforms and the ability of our marines to operate, were based on incorrect assumption about our investments in material, operational concepts and mental models?

If so, it might be prudent for the Navy to have a *hedge strategy*. Think of a hedge as a "just in case" strategy. It turns out the Navy had one in WWII. And it won the war in the Pacific.

War Plan Orange
In the 1930s U.S. war planners thought about a future war with Japan. The result was "War Plan Orange" centered on the idea that ultimately, American battleships would engage the Japanese fleet in a gunnery battle, which the U.S. would win.
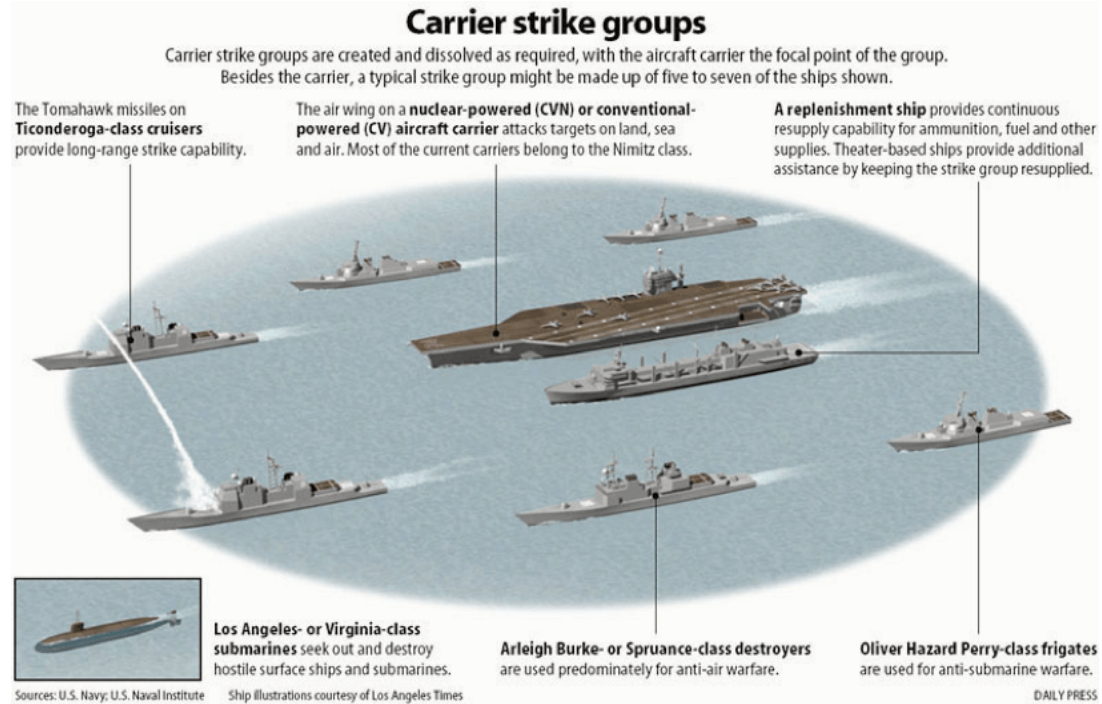
Unfortunately for us Japan didn't adhere to our war plan. They were bolder and more imaginative than we were. Instead of battleships, they used aircraft carriers to attack us. The U.S. woke up on Dec. 7, 1941, with most of our battleships sitting on the bottom of Pearl Harbor. The core precept of War Plan Orange went to the bottom with it.

But the portfolio of options available to Admiral Nimitz and President Roosevelt were not limited to battleships. *They had a hedge strategy in place* in case the battleships were not the solution. The hedges? Aircraft carriers and submarines. While the U.S. Navy's primary investment pre-WW2 was in battleships, *the Navy had also made a substantial alternative investment- in aircraft carriers and submarines*. The Navy launched the first aircraft carrier in 1920. For the next two decades they ran fleet exercises with them. At the beginning of the war the U.S. Navy had seven aircraft carriers (CVs) and one aircraft escort vessel (AVG). By the end of the war the U.S. had built *111 carriers*. (24 fleet carriers, 9 light carriers and 78 escort carriers.) 12 were sunk.

As it turned out, it was carriers, subs, and the Marines who won the Pacific conflict.

Our Current Plan

Fast forward to today. For the last 80 years the carriers in a Carrier Strike Group and submarines remain the preeminent formation for U.S. naval warfare.

Carrier strike groups

Carrier strike groups are created and dissolved as required, with the aircraft carrier the focal point of the group. Besides the carrier, a typical strike group might be made up of five to seven of the ships shown.

The Tomahawk missiles on **Ticonderoga-class cruisers** provide long-range strike capability.

The air wing on a **nuclear-powered (CVN)** or **conventional-powered (CV) aircraft carrier** attacks targets on land, sea and air. Most of the current carriers belong to the Nimitz class.

A replenishment ship provides continuous resupply capability for ammunition, fuel and other supplies. Theater-based ships provide additional assistance by keeping the strike group resupplied.

Los Angeles- or Virginia-class submarines seek out and destroy hostile surface ships and submarines.

Arleigh Burke- or Spruance-class destroyers are used predominately for anti-air warfare.

Oliver Hazard Perry-class frigates are used for anti-submarine warfare.

Sources: U.S. Navy; U.S. Naval Institute   Ship illustrations courtesy of Los Angeles Times   DAILY PRESS

China has been watching us operate and fight in this formation for decades. But what if carrier strike groups can no longer win a fight? What if the U.S. is underestimating China's capabilities, intents, imagination, and operating concepts? What if they can disable or destroy our strike groups (via cyber, conventionally armed ICBMs, cruise missiles, hypersonics, drones, submarines, etc.)? If that's a possibility, then what is the Navy's 21st-century hedge? What is its Plan B?

Says Who?

Here's where this conversation gets interesting. While I have an opinion, think tanks have an opinion, and civilians in the Pentagon have an opinion, RAdm Lorin Selby, the Chief of the Office of Naval Research (ONR), has more than just "an opinion." ONR is the Navy's science and technology systems command. Its job is to see over the horizon and think about what's possible. Selby was previously deputy commander of the Naval Sea Systems Command (NAVSEA) and

commander of the Naval Surface Warfare Centers ([NSWC](#)). As the chief engineer of the Navy, he was the master of engineering the large and the complex.

What follows is [my paraphrasing RADM Selby's thinking](#) about a hedge strategy the Navy needs and how they should get there.

Diversification
A hedge strategy is built on the premise that you invest in different things, not more or better versions of the same.

If you look at the Navy force structure today and its plan for the next decade, at first glance you might say they have a diversified portfolio and a plan for more. The Navy has aircraft carriers, submarines, surface combatants, and many types of aircraft. And they [plan for a distributed fleet architecture, including 321 to 372 manned ships and 77 to 140 large, unmanned vehicles](#).

But there is an equally accurate statement that this is not a diversified portfolio because all these assets share many of the same characteristics:
- They are all large compared to their predecessors
- They are all expensive – to the point where the Navy can't afford the number of platforms our force structure assessments suggest they need
- They are all multi-mission and therefore complex
- The system-to-system interactions to create these complex integrations drive up cost and manufacturing lead times
- Long manufacturing lead times mean they have no surge capacity
- They are acquired on a requirements model that lags operational identification of need by years...sometimes decades when you fold in the construction span times for some of these complex capabilities like carriers or submarines
- They are difficult to modernize - The ability to update the systems aboard these platforms, even the software systems, still takes years to accomplish

If the primary asset of the U.S. fleet now and in the future is the large and the complex, then surely there must be a hedge, a Plan B somewhere? (Like the pre-WW2 aircraft carriers.) In fact, there isn't. The Navy has demos of alternatives, but there is no force structure built on a different set of principles that would

complicate China's plans and create doubt in our adversaries of whether they could prevail in a conflict.

The Hedge Strategy - Create "the small, the agile, and the many"
In a world where the large and the complex are either too expensive to generate en masse or potentially too vulnerable to put at risk, "the small, the agile, and the many" has the potential to define the future of Navy formations.

We need formations composed of dozens, hundreds, or even thousands of unmanned vehicles above, below, and on the ocean surface. <u>We need to build collaborating, autonomous formations</u>...NOT a collection of platforms.

This novel formation is going to be highly dependent on artificial intelligence and new software that enables cross-platform collaboration and human machine teaming.

To do this we need a different world view. One that is no longer tied to large 20th-century industrial systems, but to a 21st-century *software-centric agile* world.

The Selby Manifesto:
- Digitally adept naval forces will outcompete forces organized around principle of industrial optimization. "Data is the new oil and software is the new steel"
- The systems engineering process we have built over the last 150 years is not optimal for software-based systems. Instead, iterative design approaches dominate software design approaches
- The Navy has world-class engineering and acquisition processes to deal with hardware but applying the same process and principles to digital systems is a mistake
- The design principles that drive software companies are fundamentally different than those that drive industrial organizations. Applying industrial-era principles to digital era technologies is a recipe for failure
- The Navy has access to amazing capabilities that already exist. And part of our challenge will be to integrate those capabilities together in novel ways that allow new modes of operation and more effectiveness against operational priorities

- There's an absolute need to foster a collaborative partnership with academia and businesses - big businesses, small businesses, and startups
- This has serious implication of how the Navy and Marine Corps needs to change. What do we need to change when it comes to engineering and operating concepts?

How To Get "The Small, The Agile, and The Many" Tested and In The Water?
Today, "the small, the agile and the many" have been run in war games, exercises, simulations, and small demonstrations, but not built at scale in a formation of dozens, hundreds, or even thousands of unmanned vehicles above, below and on the ocean's surface. We need to prove whether these systems can fight alongside our existing assets (or independently if required).

ONR plans to rapidly prove that this idea works, and that the Navy can build it. Or they will disprove the theory. Either way the Navy needs to know quickly whether they have a hedge. Time is not on our side in the South China Sea.

ONR's plan is to move boldly. They're building this new "small, the agile, and the many" formation on digital principles and they're training a new class of program managers - digital leaders - to guide the journey through the complex software and data.

They are going to partner with industry using *rapid,* simple, and accountable acquisition processes, using it to get through the gauntlet of discussions to contract in short time periods so we can get to work. And these processes are going to excite new partners and allies.

They're going to use all the ideas already on the shelves, whether government shelves or commercial shelves, and focus on what can be integrated and then what must be invented.

All the while they've been talking to commanders in fleets around the world. And taking a page from digital engineering practices, instead of generating a list of requirements, they're building to the operational need by asking "what is the real problem?" They are actively listening, using Lean and design thinking to hear and understand the problems, to build a minimal viable product – a prototype solution - and get it into the water. Then asking, did that solve the problem...no?

Why not? Okay, we are going to go fix it and come back in a few months, not years.

The goal is to demonstrate this novel naval formation virtually, digitally, and then physically with feedback from in water experiments. Ultimately the goal is getting agile prototyping out to sea and doing it faster than ever before.

In the end the goal is to effectively evaluate the idea of **"the small, the agile, and the many."** How to iterate at scale and at speed. How to take things that meet operational needs and make them part of the force structure, deploying them in novel naval formations, learning their operational capabilities, not just their technical merits. If we're successful, then we can help guarantee the rest of century.

What Can Go Wrong?
During the Cold War the U.S. prided itself on developing offset strategies, technical or operational concepts that leapfrogged the Soviet Union. Today China has done that to us. They've surprised us with multiple offset strategies, and more are likely to come. The fact is that China is innovating faster than the Department of Defense, they've gotten inside our DoD OODA loop.

But China is not innovating faster than our nation as a whole. Innovation in our commercial ecosystem -- in AI, machine learning, autonomy, commercial access to space, cyber, biotech, semiconductors (all technologies the DoD and Navy need) -- continues to solve the toughest problems at speed and scale, attracting the best and the brightest with private capital that dwarfs the entire DoD R&E budget.

RADM Selby's plan of testing the hedge of "the small, the agile, and the many" using tools and technologies of the 21st century is exactly the right direction for the Navy.

However, in peacetime bold, radical ideas are not welcomed. They disrupt the status quo. They challenge existing reporting structures, and in a world of finite budgets, money has to be taken from existing programs and primes or programs even have to be killed to make the new happen. Even when positioned as a hedge, existing vendors, existing Navy and DoD organizations, existing political

power centers, will all see "the small, the agile, and the many" as a threat. It challenges careers, dollars, and mindsets. Many will do their best to impede, kill or co-opt this idea.
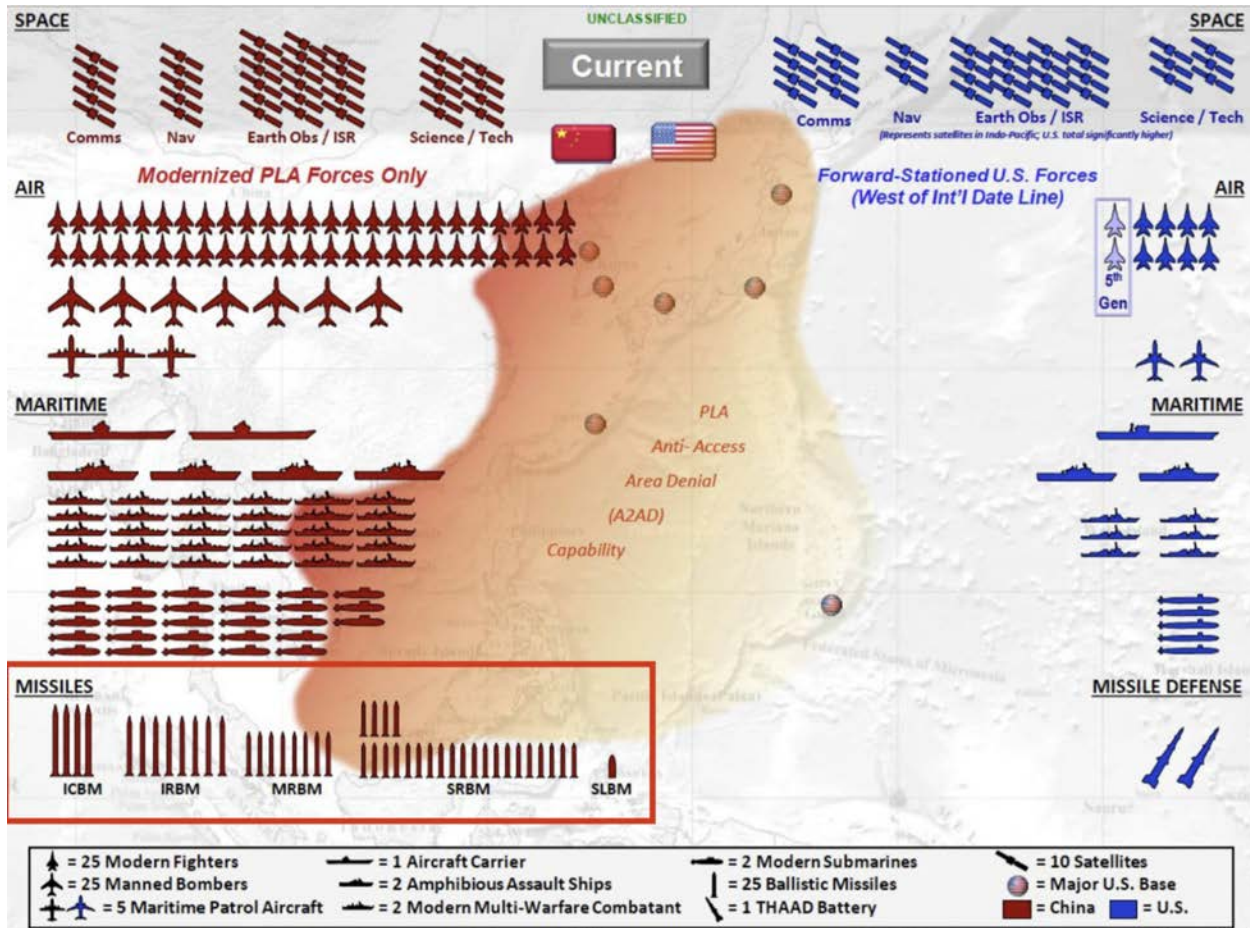
We are outmatched in the South China Sea. And the odds are getting longer each year. In a war with China we won't have years to rebuild our Navy.

A crisis is an opportunity to clear out the old to make way for the new. If senior leadership of the Navy, DoD, executive branch, and Congress truly believe we need to win this fight, that this is a crisis, then ONR and "the small, the agile, and the many" needs a direct report to the Secretary of the Navy and the budget and authority to make this happen.

The Navy and the country need a hedge. Let's get started now.

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Steve Blank is a founding faculty at the Gordian Knot Center, an Adjunct Professor at Stanford and Senior Fellow for Innovation at Columbia University. Steve consults for the DoD and IC on innovation methods, processes, policies, and doctrine.

His book The Four Steps to the Epiphany is credited with launching the Lean Startup movement. He created the curriculum for the National Science Foundation Innovation Corps. At Stanford he co-created the Dept of Defense Hacking for Defense and Department of State Hacking for Diplomacy curriculums.

His follow-on book The Startup Owner's Manual described a process for turning ideas into scale and his Harvard Business Review cover story redefined how large organizations can innovate at speed.

Steve's latest class at Stanford Technology, Innovation, and Great Power Competition, is providing crucial insight on how technology will shape all the elements of national power.

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