REIMAGINE NAVAL POWER

RADM LORIN SELBY
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I'm going to ask you to be creative and help me envision a different future from the one we are currently heading for. When we talk about futures on the distant horizon, like 2050, I've noticed that it does not tend to create much action today. It's safe…because we can opine different outcomes, and there is no urgent drive to be the agent of change.

So, the exercise for today is to "Reimagine" naval power, but let's focus on the near term…what can we do today that we can see measurable results on in two years, which leads to deployed capabilities at scale in five years …maybe ten years at the most, to fully realize a reimagined future?

Why so fast? Well, I feel an urgent drive to implement change. I think this decade, the 2020s, will have special significance for our nation and our role in leading the world. Part of that role is naval forces that have the deterrent force to prevent major conflict in a time of great power competitions.

This is a dangerous time, and the best way to prevent war is to be ready to win it. The 2020s are the time to generate that readiness.

With that end in mind, I'm going to share my vision for reimagined naval forces and ask you to find a role in bringing about this new paradigm. I am also going to introduce the idea of a strategic hedge, which suggests our existing force structure is relevant and likely victorious in great power conflict, but there have been decades of naval debate over the past 30 years to suggest we need a backup plan…what I am calling a "strategic hedge," and that is what we are going to reimagine together.

So, lean forward and think different about naval power as I run you through my vision. We are going to talk about ideas that can shape the future of the way the Navy and Marine Corps defend our nation, and more than just talking about it, I'm going to invite you to join me on the journey to first reimagine, and then more importantly, rebuild naval power in a new paradigm.

I am Lorin Selby and I'm the Chief of Naval Research…for a little while…like 1000 days or so! I'd like to share a few thoughts about my personal journey that don't come out from reading my Navy bio.

As a submariner, I was selected, and entered the Rickover developed training pipeline. If you don't know what being "Rickover trained" is all about, I encourage you to go to the internet on that one, but you can guarantee I was taught to not only follow the procedure – or the rules – but to also understand all of the assumptions and initial conditions that each rule or procedure is based on. I was also trained to know my systems well enough so that I could anticipate what the response of any given action – or stimulus – should be. And foundational to successful operations, it taught me to relentlessly pursue the root cause when the response didn't match my expectations – whether the response was good or bad. This resulted in my relentless pursuit of knowledge, and I think that's exactly what the world needs more of today. When I think about the challenges we face as a Navy and Marine Corps, and the "responses" we see played out in war games and exercises over and over, I'm driven to want to search for the root cause of why things aren't turning out like we expect. This is why I believe we need a

reimagined future.

I believe we are in one of those pivotal moments when it is vital to throw off old conventions, and my goal is to inspire you to join me on this journey. Our time to innovate is now, and if we lose this decade of progress, I don't think we can make up the lost ground.

So, I like to keep the pressure on by thinking that I've been given one thousand days in this job to make a difference for our country and I'm not going to waste a single one of those days with platitudes.

So, let's jump right in. If you don't see your place in this vision, then contact me because I'm sure I've got something for you to do!

Some of you might know this but rolling on the screen is Public Law 588 signed in 1946, establishing the Office of Naval Research. It states "to establish an Office of Naval Research in the Department of the Navy: to plan, foster and encourage scientific research in recognition of its **paramount importance** as related to the maintenance of future naval power, and the preservation of national security…"

A few of you may know that I have this quote hanging in my office, and I love this concept of fostering and encouraging scientific research. We can achieve great things when we look at problems from a creative standpoint, and if I can convince you that we urgently need to do something bold and do it NOW, then I also want to convince you that the congressional support, the organizational structure, and the capacity to do it resides within ONR.

I'm going to come back to this idea of going bold, but I'd like to point out a quick story by a colleague of mine. We were recently talking about innovation and new ideas, and he said, "The U.S. Department of Defense has the most impressive demos and experiments in the world. On the other hand, the Chinese have the largest and newest Navy." Going bold is about a plan to move ideas from experiments into naval formations that can win "war at sea". The time for half-measures and demos is OVER.

One of the reasons I feel fortunate to lead ONR during this period of great change and great power competition is because ONR has such a long and proud history of innovation across all the areas of science and technology, but a few stories really drive this home.

For example, I love telling the story of Roger Revelle, a "plank owner" of the Office of Naval Research in 1946, who published the first research demonstrating that increases in atmospheric carbon dioxide was due to fossil fuel consumption. That seminal research was funded by ONR.

Revelle and his co-author Hans Suess suggested that accumulation of carbon dioxide might raise global temperatures and encouraged Charles Keeling in 1958 to continuously measure CO2 on Mauna Loa in order to establish a time series of measurements to unambiguously detect the hypothesized trend.

The world-famous Keeling Curve showing the rise of atmospheric CO2, now discussed around the world, was the result of ONR's fostering of the scientific community. These pioneering scientists launched the entire field of climate study, and although the global response to their insight may not be happening fast enough for many, we are fortunate that ONR has always invested in understanding the climate and the oceans and shared this research openly with scientists around the world to create a collaborative assessment of our planet, and its environment.

And of course, some investments at ONR are much more focused on national security tools, weapons, and sensors, that lead to dominance in warfare, but more importantly, the preservation of peace so that we do not have to fight.

The key takeaway from this story is that the breadth of ONR's scope, our collaborative tradition, our outreach to the entire scientific community, and the capacity to tackle problems at scale makes this a great place to stop just demonstrating new ideas *and to start developing novel formations that fight differently.*

Our national security strategy, along with every other indicator of global alignment, informs us that we are in a period of great power competition with China and Russia specifically, identified as strategic competitors by our elected leaders.

To that end, we are not talking about reimagined naval power in the abstract. We are focused on the capabilities and operating patterns that will give us, The United States, the ability to deter, and if necessary, defeat any aggression by these potential adversaries. We are talking about augmenting our advanced and effective order of battle with new differentiated formations that complicate and confound the tasks our adversaries must consider. This also gives us greater clarity, freedom of action and effects to implement.

As we consider a reimagined Navy and Marine force to achieve these goals, we must place the innovation required into a world view, that includes these adversaries and their own innovation trajectory. We must then discover the key elements of American technological and social leadership that we can harness for national power. We are talking about fostering change, not only in the military and government hemispheres, but from the commercial sector, from innovators of all kinds, and from our allies that see the world through a similar lens.

Sometimes I say "innovation." I hear it all the time. We all do. It's a buzzword now. If we get beyond the buzzwords and think about what we need to do under the umbrella of innovation in its purest form, we realize that we are talking about a lot more than ideation…we are talking about how to go from ideation to prototyping at sea. We are talking about how to effectively evaluate the idea. How to iterate at scale and at speed. How to take things that meet operational needs and making them part of the force structure, deploying them in novel naval formations, learning their operational capabilities not just their technical merits. Then scaling those things to counter mass. It's really about a collection of ideas, coming to fruition after sometimes years of planning, hard work, failures, and retries. Truth is, it is around us, in examples that change the game, rewrite the rules so to speak. And it isn't always the United States that is doing this.

To start with, let's set our world view to accept that potential adversaries are going bold and being creative.

This video is a time lapse over the course of 1 year, in which China built an island in the middle of the South China Sea. I know many of you have seen or heard about this before, but let's repeat it again slowly to think about this as an example of going bold. "They – built – a new -island!" Bold…new…idea.

but really…they just copied us!

Eighty or so years ago we demonstrated the power of aircraft carriers when we won World War II in the Pacific. The Chinese don't have a good aircraft carrier infrastructure yet, so they converted their islands into unsinkable aircraft carriers in the South China Sea. So, this is kind of …reimagination of an old idea.

Not only are they doing this on the Fiery Cross Reef, but they are doing it all over the South China Sea in every location you see marked here in red. Troubling, a little bit.

But my message is simple. If the Chinese want to copy our 80+ year old idea on aircraft carriers, go for it. We're gearing up for something truly novel and they are not going to like it.

And frankly, this story about China and their little islands just reminds me that it is time we go back to our roots. America celebrates bold technology pioneers. It is time that we remembered we are at our best when taking bold actions that rewrite the rules and drive paradigm shifts that change the world.

The next element of our world view that I'd like to acquaint you with looks at sustained competition over time.

What you will see on the next video are the largest companies globally by market cap from 1980 to today, and you might be asking why the Chief of Naval Research is showing you a stock chart.

Companies, like militaries, are by nature competitive organizations affected by changes in technology. For militaries, the outcomes of this competition—the winners and losers—are determined only in discrete periods of conflict. The results of competition between companies, however, are determined on a nearly continuous basis and reflected in this video.

Therefore, it makes sense that we might look at the stock market to gain insights about how changes in technology alter the competitive landscape for organizations in general.

In the 80's you will notice familiar industrial titans like Exxon, GE, General Motors, and early computer companies like IBM.

As the 80's transition into the 90's we see a wave of the rise and decline of Japanese giants and the creation of a new entrant, Microsoft, that competes for the top of the chart along with an industrial giant GE.

As the early 2000's progress we see a struggle for a new digital paradigm take hold with the largest companies in the world moving fluidly between industrials and sectors like finance, oil, retail and software.

But as we move past 2010 something fundamentally changes. Industrials are pushed off the chart. Oil and gas move below the top ten. There is an ascendency of digitally native companies. These companies are organized around different value chains than their predecessors and they are more successful in a global, competitive endeavor.

Look again at the list. Six out of the ten largest companies by market capitalization globally were founded in the past 30 years. In 1980, that number was 0. What were these companies that rose from inception to domination in less than 30 years? Facebook, Tencent, Google, all software-focused companies that didn't even exist 30 years ago. Amazon, Alibaba, and Chase utilized software-expertise to completely disrupt traditional industries like retail and banking and define new standards for

competition in those sectors. What's more, these companies displaced industrial giants like GE, AT&T, and IBM—innovative companies that maintained their dominance even thru the shifting technological landscape of the second half of the 20th century. These companies were poised to maintain that dominance in the 21st century, so why didn't they? How did they allow newcomers to arise and displace them from right under their noses? For organizations like the United States Navy and Marine Corps, which have not seen active conflict with a great-power competitor since the 1940s, the question of how an analogous organization like GE failed to capitalize on numerous resource advantages and a legacy of innovation is an important one.

The business sector is one of only a few competitive environments that can be continuously monitored over the decades, when there has been no peer-to-peer military conflict and we have seen a new paradigm take hold. This paradigm clearly indicates that digital organizations have supplanted, surpassed, and in some cases, even defeated adversaries that utilized industrial principles of organization.

AND…it is worth pointing out that there is strong AMERICAN leadership in this global digital revolution.

So, the next element of our world view is that any effort to reimagine naval forces should seek to partner with and optimize for an organizational form that puts software and digital capabilities at the heart of the concept, because I see a future world where digitally adept naval forces will outcompete forces organized along the principles of industrial optimization.

So, let's talk about how to build a reimagined naval formation with a beating digital heart.

The first step on this journey is acceptance of a world view that embraces the new reality that "Data is the new oil and software is the new steel".

The bottom line is that software and digital technologies operate on radically different principles than the physical technologies that defined most of the 20th century. The success of the companies at the top of the chart I just showed you replaced physical capital with human capital, supply chains were replaced by digital infrastructure, production capacity by computing power, and oil by data.

I want to put an example in your mind. I need you to understand that **"Sears with a website is not Amazon, right?"** There is something fundamentally different about Amazon…and Sears…well…Sears filed for bankruptcy in 2018.

One of the critical insights about companies like Amazon and software-based organizations is that the design principles that drive success are fundamentally different than they are for industrial companies. This idea might best be embodied in the phrase "software is never done." Immense effort and resources go into building a physical system, and yet more resources are required to change one after it is built—not to mention the need for a suitable working environment. Software systems, on the other hand, can be built and changed at the press of a button. All that's needed to push changes to a modern system is a connection and a design pattern that allows continuous updates. At the same time, the solution space for software systems is virtually limitless, unbounded by the laws of physics that dictate the form and function of physical systems. As a result, the systems engineering process we have spent the past 150 years perfecting is not optimal for the design of software-based systems. Instead, iterative design approaches have come to dominate software design philosophy. Instead of releasing a single monolithic

software product, software system capabilities can be built out in small additions and changed over time. Taking advantage of the fact that software is so easy to refactor, a single change may go through multiple iterations each improving on the last to optimally meet the needs of the user.

The organizations that thrived in the early digital era recognized that software systems represent drastic changes in design, capabilities, economics, and logistics when compared to physical systems, and they innovated entirely new processes and business models to account for that fact. On the other hand, industrial giants, like GE, recognized that they needed to change, and still despite the efforts of their leadership to make GE Digital a success, failed to make the transition.

This has serious implications for how the Navy and Marine Corps need to change…how "WE" need to change when it comes to engineering and operating. When we design a ship, we try to think about every scenario and edge case and combine the design process with rigorous testing and requirements because once we lay down a ship's keel, it is extremely difficult and costly to re-engineer its physical design. A defect discovered in the hull of a ship after it has been launched, for example, is an engineering disaster. We have developed a world-class engineering and acquisition process to deal with these issues, but to apply the same process and principles to digital systems would be a mistake.

APPLYING INDUSTRIAL ERA PRINCIPLES TO DIGITAL ERA TECHNOLOGIES IS A RECIPE FOR FAILURE. WHEN POWERFUL NEW TECHNOLOGIS CAUSE A PARADIGM SHIFT, ORGANIZATIONs ADAPT OR FACE IRRELEVANCY.

So, our world view is further shaped by the imperative that we are going to bend and mold these raw materials of data and software to create our reimagined naval formation and hedge against irrelevancy.

Next, our world view about creating a reimagined naval formation is about partnerships and teams that celebrate American ingenuity and industry.

This is NOT NEW…and remains essential. I like to point this out because our push for the new cannot step away from the reality that the government does not actually build very much of our national security apparatus, American businesses build the Navy and the Marine Corps.

For a tangible example, NASA did not get a us to the moon by themselves. NASA was part of a team that included companies like McDonnell Aerospace who built the early Mercury capsules. Boeing who built the Saturn V, and Grumman who built the lunar module. These were innovative young companies coming out of World War II, and they helped inspire a nation and win the space race.

They were also descendants of the commercial innovation you see in this video that depicts "Freedom's Forge". This video is a montage of a plant cranking out the flood of machines we used to win the last great power competition.

In that competition, the conflict was governed by industrial output. Americans Henry Ford along with Frederick Winslow Taylor invented the science of production and that global leadership resulted in the global capacity to generate more military power than anyone else in the world.

America is at its best when our government and our businesses are aligned with common goals. And here's that public law 588 quote again, a shared sense of, "scientific research in recognition of its paramount importance related to the maintenance of future naval power and the preservation of

national security." That's what I've got on my wall!

So, our world view of reimagined naval power is shaped by the reality…the absolute necessity….of fostering a collaborative partnership with academia and businesses, both big businesses and small businesses to create the force we will reimagine together.

Lucky for all of us, the spirit of American innovation and entrepreneurship is alive and well. I am so impressed with SpaceX and their ability to "land a rocket booster on a barge." Let's all pause and think that over, "SpaceX launched a rocket and then landed the used rocket on floating barge." Very cool and exactly the sort of reimagination we need.

But it is NOT just about the famous innovators or rich billionaires. Our reimagination MUST also include individual contributors from every sector of our nation.

So let me introduce you to Gloria McPherson.

Gloria is a US Army wife, and a retired quilt-store employee. When the coronavirus hit, she set about to slow the spread in her community by sewing face coverings. When materials like elastic and fabric ran thin, she took to cutting strips of tee shirts to use as the ear loops. She was sewing 15-20 masks per day, giving them out to those who needed them, When she realized how high the demand for her masks were, and how quickly she was running out of materials, she began charging people the cost of materials. As the need for masks subsided, she began making more creative and stylish masks.

It's stories like these, and people like Gloria, who are producing creative solutions to problems that come up quickly and adapting to what's thrown their way.

We need Glorias on our team helping us figure out new approaches. We need every aspect of the creative engine embodied in the entrepreneurial spirit of American business.

Our community of innovators will also include our partners and our allies who are creatively pushing boundaries with us.

Here is a quick look at our Royal Navy and Royal Marine colleagues reimagining how to board a ship from a boat.

Our close ties with likeminded nations who possess important capabilities remind us that much of what we will reimagine is about integration not just synthesis.

There are some amazing capabilities that already exist, and part of our challenge will be to bring those capabilities together in novel ways that allow new modes of operation, and more effectiveness against operational priorities. This video is an example of jet packs and a boarding...both have been around for a while, but the integration of the two looks like it has a lot of potential.

I also like to think about the iPhone. When Apple and Steve Jobs brought the iPhone to market in 2007, cellular telephone technology, digital camera technology, GPS, and the Internet already existed. Apple integrated these technologies into a handheld device that enabled an entirely new social construct and market category.

So, our reimagined naval formation will not be reliant on science and technology investments alone…many of which will not bear fruit for decades or more. We are getting started this year with

integrated battle problems through opportunities like HACKtheMACHINE, which is about getting new people engaged and excited to work with us, and our SCOUT event coming up next year. We are going to work on building out the systems-of-systems integration to allow for new operating paradigms and augment these integrated formations with science and technology to continuously deploy new capability into the fleet and marine forces.

The last element of our world view that shapes our reimagined naval formation is about managing risk. As a Naval officer, I was trained in exercising operational risk management. And as an acquisition professional I was trained to manage risks in cost, schedule and performance. So, managing risk is at the heart of our Navy leadership paradigm, but I have grown concerned with another type of risk. Specifically, portfolio risk, and I'd like to share this by telling a story.

On the screen, you'll see an image from 1940 touting the "Battleship of the Future." This same year war planners in the United States were thinking about and preparing for a potential conflict with the Empire of Japan. The resultant "War Plan Orange" centered on the idea that the powerful, exquisite battleships of the Allied fleets would sail forth and crush the Japanese navy leading to a quick and decisive victory.

Then we woke up on day 2 of that war on December 8, 1941 and realized that almost all our battleships were sitting on the bottom of Pearl Harbor and the plan was invalid.

But most of us know what happened next. The portfolio of options available to Admiral Nimitz and President Roosevelt were not constrained to the main plan, battleships. They had a hedge strategy in case the battleships were not the solution.

A hedge strategy is a portfolio management technique to minimize risk in a primary asset class. A hedge takes a position in an asset or derivative that will thrive if the future does not bend toward the preeminence of the primary asset. I want you to think about our World War II force structure in terms of a primary asset, the battleships, and a hedge strategy in aircraft carriers and submarines.

If we think of the U.S. Navy's order of battle as portfolio investments of the taxpayers' dollars, then the order of battle for the United States Navy in 1941 was a primary investment in battleships.

But...and this is critical...there was a substantial alternative investment in aircraft carriers and submarines that came to dominate the conflict over the next few years. The performance of these alternatives to the main plan eventually came to be regarded as the preeminent formation for naval warfare and our force structure is still modelled on Carrier Strike Groups and submarines 80 years later.

But what if that doesn't work? If we think back to the pre-World War 2 era, the 1920s-30s, the dominating thought in Naval Warfare was that the battleships would sail West, win the war, and we would sign the treaty. And then, on Dec 8, 1941, everything changed, but the hedge investments the United States and the Navy made in carriers and submarines provided an alternative when the future of battleship was starkly evident in 1942.

One might look at our 2021 force structure and see a diversified portfolio and there is good reason for that perspective. We have aircraft carriers, submarines, surface combatants, and many types of aircraft in this impressive photo. These assets make a lot of sense for all the reasons the battleships made sense at the time and there is no definitive proof that this force structure is not ideally suited to future warfighting requirements.

But there is an equally accurate statement that this is not a diversified portfolio because all these assets share so many of the same characteristics.

- They are all large compared to their forbearers
- They are all expensive – to the point where the United States cannot afford the number of platforms our force structure assessments suggest we need
- They are all multi-mission and therefore complex – all these platforms do many missions, and the system-of-system interactions to create these complex integrations drives up cost and manufacturing lead times if we critically need force structure surge capacity
- They are all 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
- They are difficult to modernize - The ability to update the systems aboard these platforms, even the software systems, still takes years to accomplish.

So, in this sense it might be accurate to see this force structure as a prudent primary investment, but a single asset class of the large and the complex. Our adversaries have been closely watching us operate and fight in this formation for decades.

If they discover a way to relegate the large and the complex to the fate of the battle ships, then what is our hedge?

If the primary asset of our fleet is the large and the complex, then there must be an alternative but look around. We have demonstrations of alternatives, but no force structure built on a different set of principles fully aligned to the world view we discussed earlier.

We need to critically ask ourselves; do we have an alternative that is bold and creative like Space X's boosters?

Do we have digitally native formations organized around information and software like the ascendant digital companies controlling the global economy?

Are we building to the processes and practices like the future defined by software as the new steel, and data as the new oil would require?

Is our interaction with industry an effective acquisition strategy aligned to the velocity of the digital age?

In essence, we have no organized hedge strategy if the large and complex fall short or are made irrelevant.

BUT...and this is the silver lining...I'm going to demonstrate one to leadership and prove that it works so we can begin to adopt it at scale.

So, what is the big idea here? We are going to talk about a hedge against an alternative future where our primary investment is not effective.

Moreover, we are going to talk about leveraging the United States global leadership in 2021, to generate a novel formation of "the small, the agile, and the many."

And we are fortunate to have 30 years of thought leadership to draw upon to set the guiding principles of what this force structure should be.

For the last 30 years, there's been a growing school of thought about alternatives and one of the most articulate voices in this discussion was Vice Admiral Art Cebrowski. He was a visionary that saw the power of sensors, decision nodes, weapons, and delivery platforms collaborating in a network. The power of the network was the dynamic and ad hoc composition of force and decision superiority that was distributed and difficult to target. Art Cebrowski was a visionary that got all of us thinking about the small and the way they would connect and collaborate.

In a similar vein, Dr. John Arquilla from the Naval Postgraduate School has been a clarion voice on the rise of digital capabilities and the nature of future conflict and the cyber war that it will entail. John's vision of the agile, and the ability to adapt our digital tooling in real time to meet the adversary's innovations with force and creativity at pace also guide us. For decades, Dr. Arquilla has been articulating the power of distributed forces, coordinated via effective communications, ability to outperform, outmaneuver, and outfight other organizations of forces

And more recently Dr. Tim Chung first from the Naval Post Graduate School, and now at DARPA, continues to amaze and inspire us with ways that swarms of the many can collaborate and achieve definable objectives.

What these visionaries, and so many others are telling us is that the small, the agile, and the many have the strong potential to define the future in a world where the large and the complex are either too expensive to generate in mass or potentially too vulnerable to put at risk.

These visionaries, and their students, and theoreticians have shown us this concept in wargames, exercises, simulations, and small demonstrations. Yet, we have not built a formation of these systems that can fight alongside our leading assets or independently if required.

We are going to have to change that.

If the theory, simulations, and wargaming about power of the small, the agile, and the many prove to be accurate; then we need formations composed of dozens, hundreds, or even thousands of unmanned vehicles above, below, and on the ocean surface.

We need to build collaborating, autonomous formations...NOT a collection of platforms. And we need to build this system aligned to our world view.

- We need to BE BOLD and prove this idea works and that we can build it. Or we need to disprove the theory. Either way, we need to know...NOW...that we can, or we cannot, hedge against the large and the complex with the small, the agile and the many. And most of all we need to conduct this inquiry in a way that is not half-measures.
- We need to build this novel formation on digital principles, with trained and effective digital leaders in place to guide our journey through the complex software and data we will need to realize the vision
- We need to make partnerships with industry simple, effective and still accountable. But we need to EXCITE people to partner with us because our NEW processes are smart, and we get through the gauntlet of discussions to contracting in short time periods so we can go to work

- We need to include our allies in this journey, and we need to find all the ideas already on the shelf whether on government shelves or commercial shelves and focus on what can be integrated and then what must be invented.

If you are ready to join me in this journey, let's move from what we are going to build to HOW we are going to build it.

In addition to the design principles, we inherit from our world view we will also build to a set of digital engineering practices that allow us to move quickly, without losing accountability to the taxpayers.

The first digital engineering practice we will employ is building to the operational need. We are talking to commanders in various fleets around the world and asking them a new question. We are saying, "What is the real problem." We are not saying, "What is your requirement." We are actively listening, using design thinking and many other techniques to hear and understand the problems, to build 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 SHORT MONTHS…NOT YEARS.

We are facilitating this discussion of operational needs by creating models of the operational problem and then evaluating the effectiveness of potential solutions in our model, before we spend our money. When we look at systems in our Intelligent Autonomous Framework we are thinking about those capabilities as composable elements in model-based systems engineering.

Then our concepts are aligned to operational needs which align to our models, and we adjust our learning in real time to update our systems engineering plan for our 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. What we have learned from the way digitally native companies work is that they produce a minimum viable product, get it into the hands of users, collect feedback and then improve the system.

That is exactly what we are going to do.

We are going to demonstrate a novel naval formation virtually and digitally and get feedback from in-water experiments and tests. Then we will digitally redesign our system to go back in the water for more testing to complete the virtuous loop. And we are going to do it quickly.

This physical part is important, and I got to see this firsthand in my last job as the Chief Engineer at NAVSEA.

There is a real sense of collective accomplishment when we crack a champagne bottle over the bow of something new. So, I talk a lot about digital engineering and artificial intelligence, and we are generating novel new ideas in the digital space. However, this must ultimately be about getting out to sea…and doing it faster than ever before.

So, we are going to execute a connected series of digital prototyping events through HACKtheMACHINE and tie those together with our SCOUT series.

We will build a virtuous loop, which iterates quickly between our digital experimentation and in-water testing so they are mutually informative and push the design space forward at affordable cost and

managed risk.

Earlier I talked about all of our national efforts that led to “Freedom’s Forge,” and we also talked about the excitement created by SpaceX and the new space race along with the national call to action during the pandemic represented by Gloria, and thousands like her.

We are going to be building national security tools in the cloud using modern DevSecOps practices to build things that matter.

This is going to be fun, and we are going to ignite American passions to do something amazing, do it at scale, do it with a purpose. AND DO IT NOW!

In total, we are going to find the right balance of collaboration and competition to ignite America’s creative engine and win the race to prove the value of the small, the agile, and the many.

Heed the call...and let’s get started!

There is room for everyone on this journey. We need acquisition professionals, engineers, artists, teachers, scientists, roboticists and even a few really good lawyers. So, let’s get started! Sign up for the HACKtheMACHINE. Get wet with us at our SCOUT events.

And if you don’t see a place in this vision for you, then let’s talk!

To watch the 34:31 speech, visit youtube.com/HACKtheMACHINE

For further information:

ONR Public Affairs
875 North Randolph Street
Arlington, VA 22203-1995
Phone: 703-696-5031
Fax: 703-696-5940
Email: onrpublicaffairs@navy.mil