

Service Chiefs: 'Keep Your Eye on China'



All three service chiefs discussed the newly released defense budget, which Marine Corps Commandant Gen. David Berger described as “strategy-driven.” *LISA NIPP*

NATIONAL HARBOR, Md. – The top leaders of the Navy and Marine Corps sought to justify their force structure decisions, arguing April 4 that it was necessary to cut some current platforms and systems to be able to buy the capabilities they believe will be needed for a likely future fight against a new peer competitor.

“I think the three of us are saying, keep your eye on China,” said Chief of Naval Operations Adm. Michael Gilday, which was echoed by Marine Corps Commandant Gen. David Berger and Coast Guard Commandant Adm. Karl Schultz in the opening session of the Navy League’s 2022 Sea-Air-Space exposition.

All three of the maritime leaders highlighted their priorities in the newly released 2023 defense budget, which Berger noted was released within days of the new National Defense Strategy and the Nuclear Posture Review.

“It’s very clear to me this is a strategy-driven budget,” Berger said. “If we need to fight in the South China Sea, the force has to be relevant.”

“In order to understand how you resource the fleet, you have to think about how you plan to use the fleet, how you will fight the fleet,” Gilday said, adding that that was done “in the content of strategy.”

The new Navy budget proposes deeper cuts in the surface fleet than previous proposals, and the Marine Corps’ funding plan continues the reductions and changes in the Corps’ forces to

make it lighter and more mobile to operate in a contested littoral environment.

Gilday said the Navy needs “a more ready force rather than a less ready larger force. If you look at the budget, we’re trying to buy back a ready force,” that has ammunition in its magazines with a priority on longer range weapons.

“I personally think we are on the right path.,” he said, while acknowledging that the budget “is not popular with many in the fleet and in this room.”

If you are going to match the change in the character of warfare, Berger said, “you have to divest some resources.”



Meredith Berger, performing the duties of Undersecretary of the Navy, kicked off the opening ceremony prior to the chiefs panel on Monday. She said the Navy’s priorities “are empowering our people” with a focus on warfighting and “strengthening our maritime power.” She noted the areas the Department of Navy is operating in are changing to include the information environment and cyberspace. *LISA NIPP*

Schultz noted the recent signing by all three of the maritime leaders of a new maritime security strategy, which continues the growing integration of his service with the Navy and Marine Corps in the efforts to counter a stronger and more aggressive China.

Schultz said the changing national security and global economic growth has put unprecedented demands on the Coast Guard.

He emphasized the Coast Guard’s uncommonly strong shipbuilding program, which includes finishing the National Security Cutter fleet, buying more of its Offshore Security Cutters and planning a new ice breaker.

Gilday said the long-term shipbuilding program would produce

increased capabilities in the surface and undersea fleets with the new models of the Arleigh Burke destroyers and Virginia-class attack submarines, the future guided missile frigates and a wide variety of unmanned surface and subsurface systems.

High-Powered Lasers Boost Anti-Ship Cruise Missile Capability

NATIONAL HARBOR, Md. – The Navy is making considerable progress in the drive to field a high-energy laser system that can meet the demand for a directed energy system capable of defeating anti-ship cruise missiles called for in Chief of Naval Operations Adm. Michael Gilday's 2021 Navigation Plan, Christopher Lloyd, distinguished scientist for Laser Weapon Lethality at Naval Surface Warfare Center, Dahlgren Division, Dahlgren, Virginia, said Wednesday.

After at-sea trials of a 30-kilowatt laser aboard the USS Ponce in 2014-2017, a "150-kilowatt class" system was tested on the USS Portland, a new amphibious transport dock, including the destruction of an unmanned aerial vehicle target May 16, Lloyd said at a Navy League Sea-Air-Space expo briefing.

"We think we're getting to the point where we can actually start building these," Lloyd said. "No one thinks directed energy can solve all problems, but it's another tool we can use." A big advantage of a laser weapon, particularly in the key mission of killing anti-ship missiles, is expanding a surface combatant's magazine and replacing expensive missiles, "which puts us on the right side of the cost curve" against

cheap enemy weapons, he said.

Although much of the attention on high-powered lasers is on their role as a weapon, Lloyd said Sailors involved in the tests on Ponce said it was a better sensor than other systems they had.

The laser “enables real-time combat identification and intent determination,” according to a data sheet Lloyd presented. It also provides speed of light delivery, precision engagement and graduated effect. “We want to be able to scale it up,” for different missions and effects, he added. “Bottom line, it addresses mission gaps we have.”

Although Lloyd would not say how powerful the laser tested on Portland was, he said “it looks like we have a glide slope for 300 kilowatts.”

Tests on Ponce and Portland used separate batteries to power the lasers, which requires gaps in firing to allow battery recharging. Dahlgren experts are working, along with others, to develop more powerful and higher capacity batteries to alleviate that problem, but also look to the greater integrated electrical power systems being developed in surface combatants as primary or backup power for the lasers, he said.

Dahlgren also is working on other high-energy systems, including a “dazzler” that can provide non-lethal crowd control, Lloyd said.

AI Could Hammer Out Issues

Plaguing Shipbuilding Supply Chain After COVID-19



Rear Adm. Douglas Schofield stated the Coast Guard's top priorities for shipbuilding sustainment include life-cycle engagement with industry. *NAVY LEAGUE / Lisa Nipp*

NATIONAL HARBOR, Md. – A key to alleviating the chronic challenge of better maintainability and sustainability of increasingly complex naval ships is earlier and constant collaboration between the services acquisition officials and industry, starting with upfront dialogue on requirements for new systems, a panel of service and industry leaders said Wednesday.

Those problems have been acerbated by the COVID-19 pandemic's impact on the shipbuilding work force and supply chain, the lack of clarity in the Navy's future shipbuilding plan, the cybersecurity threat and the reoccurring budget uncertainty, the panel members agreed. But help may be in sight with the push for artificial intelligence, which could improve predictability of component failures and demand for spare parts, the leaders told a Navy League Sea-Air-Space expo forum.

"Success for us is working with our industry partners," looking for feedback, starting with setting requirements for new programs and "getting it right up front," said Tom Rivers, executive director Amphibious, Auxiliary and Sealift programs at PEO Ships.

Among the top priorities for the Coast Guard is interoperability and "life-cycle engagement with industry and our sister services," said Rear Adm. Douglas Schofield, Assistant Commandant for Acquisition.

Improving efficiency and savings depends "a lot on

collaboration and feedback with the services,” said Larry Ryder, vice president Business Development and External Affairs, Austal USA. “We have put forward ideas that can reduce cost, increase reliability. But we need to work with the services.”

To avoid logjams in major maintenance, “we need industry to tell us where those tricky spots are. ... Tell us up front so we knew” how to schedule the work, Rivers said. If they get “feedback up front from industry” where they expect problems, “we’ll change our requirements.

“New programs have a lot of requirements” and we need to “work with industry from the start to get right, Rivers said. “We really need to build ships faster.”

Rivers said the Navy also is making internal change, including adopting a plan for data analysis of systems and creating a “war room” that will provide focus and contact with industry partners. And they are designing for maintainability and flexibility in new ships. “We’ve never done that before.”

The Navy major new start is the DDGX, the next-generation major surface combatant, Rivers said. It will draw heavily on technologies and lessons learned from the Arleigh Burke DDG-51 program, he said. His office is engaged in developing the new light amphibious ship to meet the Marine Corps’ need for a cheaper, more mobile platform for its distributed operations in contested littoral. And to alleviate a serious lack of dry dock capacity on the Pacific coast, Rivers said the Navy will put out a contract this year for a new dry dock.

The three officials agreed that there are concerns with the fragility of the shipbuilding and repair industrial base, with major problems with the second- and third-tier suppliers, some of whom went out of business because of a slowdown in orders during the pandemic. Ryder said industry needs greater stability in demand from the services in order to build and

retain a work force.

Schofield raised the new threat of cyberattacks, saying the Coast Guard is working with its service partners and industry on cybersecurity, "making sure industry can facilitate security," a concern echoed by the other two speakers.

USMC Force Changes 'Wicked Hard,' but Essential, Lt. Gen. Smith Says



Lt. Gen. Eric Smith discusses U.S. Marine Corps force design changes at Sea-Air-Space 2021. *NAVY LEAGUE / Lisa Nipp*
NATIONAL HARBOR, Md. – The Marine Corps' drastic changes in force size, composition and weapons to meet the emerging threats, primarily from China, is going to be "wicked hard," but the Corps' top officer driving those changes said it is both essential and achievable.

"We have to find out how to go after a pacing threat that is moving. How a small force can hold something at risk. ... We have divested what we can divest. We will produce the force we need by 2030," Lt. Gen. Eric Smith, commanding general Marine Corps Combat Development Command and Deputy Commandant for Combat Development and Integration, said Aug. 3.

Smith added that the Marines' effort to rebuild a smaller, more mobile but lethal force by the date set by Gen. David Berger, the Marine Corps Commandant, will depend on "stable funding." A continuing resolution on defense funding, which is expected, "is a gift to an adversary," he told Sea-Air-Space

2021.

Smith and the Marine Corps headquarters are rapidly shedding legacy systems, including the M-1 Abrams main battle tanks, much of its tube artillery and other heavy weapons to produce a much lighter force capable of sending small units into dispersed locations, most likely in western Pacific littoral regions, to counter China's area-denial, anti-access capabilities that could nullify the Navy's power projection efforts.

"The Corps' purpose is to support the naval forces efforts," Smith said. "It's all about supporting the naval force in a conflict with a major adversary."

Under intense questioning by moderator Dakota Wood, a retired Marine officer now a senior military analyst with the Heritage Foundation, Smith rejected the idea the Corps is sacrificing heavy systems, such as tanks, that would be useful in other parts of the world to focus solely on the Indo-Pacific theater and China. Smith noted recent experiments that used a mobile rocket artillery system mounted on a Humvee to hit distant targets.

"I can recreate the ability to kill armor," he said. But "we have to get it there ... we have to move things," he said.

Challenged on how the Marines would support their dispersed light forces in a contested area, Smith said, "the first thing about having the logistical enterprise able to support you is need less. Why do I need water in the Indo-Pac theater?"

Smith was supported in his confidence in the Corps' dramatic redesign efforts by William Williford, executive director of the Marine Corps Systems Command, which is fielding the new weapons and systems needed for the new force, and by Scott Lacy, executive director of the Marine Corps Warfighting Laboratory, which is running extensive wargames and experiments to develop and test the new formations and gear.

“Starting with the individual Marine, we are putting resources out there to make the Marine more lethal.” Wilford said.

“Don’t bet against us. If there is a concern it’s that the adversary will move faster than us,” Lacy said.

Smith also rejected Wood’s challenge the Corps is putting pressure on the other services to make up for the Marines’ cut in heavy forces, stating the Navy is all in on this and the Corps is working closely with the Army and Air Force to develop and field the right equipment. He also denied the Marines are sacrificing their ability to deal with current threats.

“You have to be able to fight today. I think we’re capable of doing that today,” he said, and noted that he and at least 14 other Marine generals, including Berger, “have skin in the game” by having sons currently serving in the Marines.

FRCs Gets Hornets Back in Action Quickly, Now Turning Attention to Other Aircraft



An F/A-18 Hornet assigned to the Gladiators of Strike Fighter Attack Squadron (VFA) 106 prepares to launch from the flight deck of the aircraft carrier USS Theodore Roosevelt (CVN 71) in this 2014 photo. *U.S. NAVY*

NATIONAL HARBOR, Md. – Intense and extended efforts by the command of naval aviation’s Fleet Readiness Centers have cut the time to get F/A-18 Hornet fighters out of maintenance and back to the flight line by half.

Those efforts are now are being used to do the same with other Navy aircraft, and to reduce the cost of those updates and maintenance, officials at the command said Aug. 3.

The series of reforms to accelerate the turn-around of aircraft were driven by the chronic shortfall of tactical planes, particularly fighter jets, a decade ago. The program also stemmed from the revised National Defense Strategy, which turned the military's focus to the return of great power competition due to rising threats from China and Russia, Rear Adm. Joseph Hornbuckle, Fleet Readiness Centers commander, told a Navy League Sea-Air-Space 2021 briefing.

The initial effort was focused on the F/A-18, the key to the carrier air wings' strike capabilities. By applying industry best practices, largely copied from the airlines, FRCs were able to cut the typical 120 to 150 day average turnaround time in half, said Roy Harris, the command's executive director.

The command established an operations center that looked at all elements of FRC's operations and prioritized allocation of resources, Harris said. A key element of the reforms was setting targets for the centers to meet important milestones in the repair and maintenance process and pushing the centers to meet those goals, Hornbuckle said.

One of its early achievements was meeting the chief of naval operations' goal of putting 341 mission-capable Hornets on the flight line. The effort then turned to the EF-18G Growler electronic warfare aircraft and now is extending to other Navy aircraft, including E-2C Hawkeyes and H-60 helicopters.

The reform efforts now are focusing not only on producing "mission-capable aircraft quicker, but also at the lowest possible cost," Hornbuckle said.

FRC operates nine readiness centers and 25 other tenant sites and employs nearly 22,000 individuals, Navy, civilians and contractors, Hornbuckle said. It annually works on 300

aircraft and 150,000 aviation components.

As with most naval systems, a major problem for FRC is fighting corrosion, which “can eat our lunch,” Harris said. They are working to collect data on the problem to find the most effective and efficient solutions.

Emerging Capabilities Like Unmanned and AI Can Aid Cyber Threat



Capt. Jeff Morgenthaler, Maritime Operations Center director at the Navy Expeditionary Combat Command, speaks at The Future of Naval Expeditionary Warfare in All-Domain Operations panel. *NAVY LEAGUE / Lisa Nipp*

NATIONAL HARBOR, Md. – The challenge for naval expeditionary forces in the emerging threat environment is how to integrate all the elements operating in a distributed role when they may not be able to control the communications domain, a panel of experts said Tuesday. All the challenges of mobility, survivability and combat effectiveness in distributed expeditionary operations are aggravated by the threat of cyberspace interference, the panel told a Navy League Sea-Air-Space forum.

“We’ve been talking about distributed ops for a long time,” but doing that in a large geographic area “introduces serious challenges to our architecture on how we knit that together, particularly in a distributed environment where we may not control the spectrum. ... We may not control the cyberspace environment,” said Gregory Breazile, a retired Marine colonel,

now CEO of Breazile Cyber & C4I Solutions. "We want to dominate, but we have to work through that competitive space," and it becomes more complicated, Breazile said.

But industry is working to bring capabilities, including artificial intelligence, that can help overcome those challenges, Breazile said. The good news, he said, "is that AI is making it able to bring things together. ... All these AI capabilities are there."

Navy Capt. Jeff Morganthaler, Maritime Operations Center director at the Navy Expeditionary Combat Command (NECC), and Col. David Odom, director Expeditionary Warfare on the Navy staff, also cited the emerging capabilities, including artificial intelligence and unmanned systems, that can ensure the integrated, multi-domain operations they are working to achieve.

Morganthaler listed the ability to supply integrated information and communications systems among the capabilities that NECC brings to the integrated expeditionary operations. In talking about assured command and control, "I'm confident of what we have today." But for the future, "I don't need it bigger. I need it smaller and more capable." He described a proposed communications and intelligence system that could be flown in on a MV-22 Osprey and mounted on an unmanned vehicle.

Among the other advances the expeditionary forces need, Odom mentioned bringing the fifth-generation F-35 capabilities to the big-deck amphibious ships, the less expensive but capable LPD Flight II amphibs and the proposed light amphibious ships. The challenge for the smaller amphibs, he said, is to make them "affordable, so we can get as many as possible. We are working with industry to bring what we need."

Emerging Tech Will Change the Character of War, and the US Must be Ready, Milley Says



Gen. John Milley, chairman of the Joint Chiefs of Staff, told Sea-Air-Space that America must master emerging new technologies. *NAVY LEAGUE / Lisa Nipp*

NATIONAL HARBOR, Md. – The rapid development of a vast array of new technologies is changing the fundamental character of war and if the U.S. military fails to adapt, it could mean future generations would suffer massive casualties in the next major power conflict, the nation's top military officer said Monday.

About 40 to 50 new technologies will evolve very rapidly in the next 15 to 20 years and will fundamentally change the character of war, Army Gen. John Milley, chairman of the Joint Chiefs of Staff, told a luncheon audience at the Navy League's Sea-Air-Space expo. He cited unmanned systems, artificial intelligence, 5G technology and other concepts that will be available to all major powers. The nation that masters those technologies "is likely to have a distinct advantage," he said.

Recalling the heavy military casualties that America suffered due to its lack of preparation for both World War I and II, Milley said, it is the responsibility of the current leaders to make the right investments "so that future generations of Americans don't have a disadvantage in the next war."

"It's not about the amount of money we're spending, it's what we're spending it on," he said.

Milley said he has "a great deal of pride" in the Navy because both of his parents served in the Navy during World War II –

his father as a Navy corpsman with the Marines in the bloody battles in the Pacific and his mother as a Wave. He noted that America has always been a maritime nation and the Navy has played a major role in the nation's military power with its mastery of sea control and power projection.

"That is the role of the Navy and no one has ever done it better. ... The Navy today is the best in the world and we want to keep it that way," Milley said.

"The decisions we are making today – which are mostly economic – will determine the future of the U.S. Navy, and how we manage sea control and power projection," he said.

In addition to the challenges of the rapidly changing technologies, Milley said the international order, which has been relatively stable since the end of World War II, "is under tremendous stress" because of international terrorists, crime cartels and the rise of new national powers. He singled out the growing economic and military power of China, which has developed "a world-class navy ... China will be a major agent of change to the current international order, there is no doubt," he said.

Milley said the U.S. military currently is ready for combat and "we have to maintain that readiness. But we must also modernize. Preparing for war is very expensive. But even more expensive is losing a war. ... Our task as the military is to prepare for war," because if war breaks out, "we must be prepared," he concluded.

Esper, Milley Reject Assertions in 'Afghanistan Papers'



Soldiers load onto a Chinook helicopter to head out and execute missions across the Combined Joint Operations Area-Afghanistan. U.S. Army/1st Lt. Verniccia Ford

The U.S. defense secretary and its top military officer rejected the premise of the recently published "Afghanistan Papers" in The Washington Post – that defense leaders engaged in a deliberate effort to deceive the public on the lack of progress in the 18-year-long war. And Joint Chiefs Chairman Army Gen. Mark A. Milley, who repeatedly led forces there, emotionally insisted that none of the troops killed in Afghanistan died in vain.

In a Dec. 20 media briefing at the Pentagon, Defense Secretary Mark T. Esper and Milley also defended the prolonged military engagements in Afghanistan, Iraq and Syria as necessary to protect the nation from terrorists and said U.S. forces would be there until that mission was completed.

But Esper, citing the new National Defense Strategy's recognition of "great power competition" with Russia and China, said his aim is to determine "how can we reduce our presence in other parts of the world to

either return troops home to retrain and equip for those bigger missions or to allocate to the Indo-Pacific.” Esper has said he is considering removing about 5,000 of the 13,000 U.S. troops now in Afghanistan.

And Milley, speaking for the military, said “none of us want forever wars. It has to do with the national interests.”

The two leaders were asked several times about the week-long series of stories in The Washington Post that extensively quoted senior military and diplomatic officials as privately expressing strong doubts about the way the Afghanistan conflict was going, while giving more positive views in public.

“I know there is an assertion out there of some sort of coordinated lie over the course of 18 years,” but that was “more than a stretch. I find that a mischaracterization,” Milley said. With hundreds of general officers, State Department officials and other involved, “I just don’t think you can get that level of coordination on a lie.” He said the assessments he and others gave were “based on facts that we knew at the time, and those were honest assessments and were never intended to deceive either the Congress or the American people.”

Milley contrasted the Post’s expose on Afghanistan with the 1970s “Pentagon Papers,” which revealed secret documents on the government’s consistently gloom views on Vietnam. He said those were “contemporary papers written in

advance of decision making. These, the Afghan papers, were an attempt by SIGAR in about 2,000 pages to do post-facto interviews, looking back, to determine lessons learned," he said, referring to the reports of the special investigator general for Afghanistan.

"For years, we were clear there is not a reasonable chance of a military victory against the Taliban or the insurgency... and that remains true today." Milley said. "There is only one way this is going to end, in a negotiated solution." Milley conceded that Afghanistan has been "a strategic stalemate," where the Taliban cannot win as long as the United States provides some degree of military support, but cannot defeat the Taliban "so long as they have sanctuary in Pakistan and some degree of popularity with the people."

And, with evident emotion, Milley said: "Our soldiers, sailors, airmen and Marines who have given their lives in Afghanistan did not give their lives in vain."

Esper pointed out that some of the reporters in the audience had been to Afghanistan as had many members of Congress and the SIGAR investigators. "This has been very transparent. It's not like this war was hiding somewhere. For all the folks who have been in this conflict over the years, some insinuation there's been some kind of conspiracy, is ridiculous."

Foggo: Russia, China on the Move, From the Arctic to the Med



The Defense Writers Group on Dec. 18 featured Adm. James G. Foggo III. GW Project for Media and National Security
The commander of U.S. and allied naval forces in Europe and Africa said he is dealing with increased activities by both Russia and China in his vast area of responsibility – which stretches from the Arctic to the southern tip of Africa – despite a shortage of resources.

“We do the best we can with what we have,” Adm. James G. Foggo III, commander, U.S. Forces Europe and Africa, and commander, Allied Joint Forces Command Naples, said Dec. 18.

“It’s an extremely large tactical area” and “setting priorities is the biggest challenge – where do you go,” Foggo said. He must look at the entire theater, which covers all of Europe, the Mediterranean and Black seas, the Baltics, the Arctic and Eastern Atlantic, down to the Cape of Good Hope.

“When there are tensions, you try to go where the tensions are” or respond to something that might threaten allies. “You have to be flexible, agile.”

A career submariner, Foggo said the Russians are operating

some very capable submarines in the Black Sea and the Mediterranean, including new Kilo-class diesel-electric boats, which are very quiet. "It's important we know where they are because they have Kalibr (cruise) missiles that can reach anywhere in Europe." He said Russia also is building anti-access, area-denial capabilities in Crimea, installing anti-ship cruise missiles and S-300 and S-400 advanced air- and missile-defense weapons.

Although he seldom gets a carrier strike group in his theater, due to the focus on the Persian Gulf and the Pacific, Foggo praised the Virginia-class fast attack subs he gets, which "move very fast" so he can put them where he needs them.

"We're very, very busy in the undersea domain, busiest I've ever seen," he said. "We are challenged by resources," although the nation has been "very generous" in defense funding. "But we're in a great power competition," he added, citing Russia and China. "We still maintain the competitive edge and need to do so."

Although Russia is operating frequently all around his AOR, China is mainly active in Africa, buying access and support with loans and construction projects that frequently come with demands for long-term access to ports, such as in Djibouti, where it has a large military facility next door to the U.S. base.

China also is increasingly active in the Arctic, where

Russia is trying to create dominance as the polar ice cap shrinks, Foggo said.

“We’ve seen much more Chinese activity up there than before,” and Russia and China “are collaborating in the Arctic.”

Foggo noted the value of the allied and partner nations that contribute to security in his command area, the increased defense spending by NATO nations and the recent re-establishment of the U.S. 2nd Fleet in Norfolk and the Joint Forces command in Naples in response to the Russian threat.

While noting the lack of unprofessional or unsafe activities by Russian forces for several months, Foggo cited the “unsafe” activities of a Russian spy vessel currently operating close to the U.S. Atlantic coast and refusing to respond to radio contact and sailing without running lights at night.

Scientists Warn U.S. Running Out of Time to Modernize Nuclear Weapons Systems

America’s current nuclear deterrent force is safe, secure and effective, but the nation is running out of time to modernize the weapon systems in the nuclear triad and the infrastructure that produces and sustains

them, three senior military commanders and a group of civilian managers and scientists warn.

Potential adversaries have modernized, increased and diversified their nuclear capabilities, while the United States has failed to make the necessary investments to counter the emerging threat, the officers and civilian experts said Dec. 12.

As a result, the missiles, strategic submarines and bombers in the nuclear deterrent triad are aging and approaching the end of their effective service lives and the nuclear warheads they employ are suffering from natural decay and obsolescent components, they said.

A prime example of that emerging crisis is the tight time line the Navy faces to have the new Columbia-class ballistic missile submarines operational before the current Ohio-class boomers can no longer submerge for their strategic missions.

The Ohio-class boats were designed for a 30-year service life, but extended to 40 years and "we have no more margin," said Vice Adm. Johnny R. Wolfe, director Navy Strategic Systems Programs. "We have to get Columbia out there to replace Ohio."

Asked about meeting that deadline, Wolfe would not specify how much leeway they have but said the Columbia program managers "do have a margin to get to that operational date."

Wolfe said he was “confident” the program had corrected the problems of faulty welding in the Columbia missile tubes, which badly reduced the program time margin. But, he said, “we can’t allow anything to push (the program) to the right.”

Wolfe is responsible for the strategic systems that arm the boomers, including the Trident D-5 missiles, which have aged rocket engines and guidance systems that are being updated. The Navy test fired five unarmed Tridents this year, two with the new electronics, and all worked as expected, he said. But they will not be able to continue to keep the D-5s flying forever, he added.

Vice Adm. David M. Kriete, deputy commander of Strategic Command, said the command’s primary challenges are “understanding the threat, so we can stay ahead, and modernizing the nuclear forces.” On the threat, Kriete said, “Russia, has continued to develop a whole range of nuclear weapons outside the New Start treaty,” but the United States “has not.” And, “China is moving very aggressively to field new capabilities.” They also are watching North Korea, which has tested nuclear warheads and long-range missiles, and Iran, which currently has no nuclear weapons.

The current nuclear deterrent “is safe, secure and effective. ... We go to great length to ensure those weapons can get the job done. But we can’t maintain those standards in the future,” Kriete

said, citing the age of the Minuteman III intercontinental ballistic missiles, the nuclear-capable B-52 bombers and the nuclear weapons they employ. Despite questioning of the need for the triad, Kriete insisted that the combination of the responsive land-based ICBMs, the survivable ballistic missile submarines and the flexible bombers give national leaders options and create problems for any adversary.

Lt. Gen. Richard Clark, deputy Air Force Chief of Staff for strategic deterrence and nuclear integration, noted that numerous studies, including the 2018 Nuclear Posture Review, confirmed the need for the triad, for which the Air Force provides the ICBMs, the bombers and the nuclear command and control system. They all must be modernized, he said.

Charles Verdon, deputy administrator of the National Nuclear Security Agency, and officials from the nuclear laboratories said a major challenge to sustaining and modernizing the deterrent capabilities is the badly aged infrastructure and the need to rapidly replace the nu