JANUARY 2019 ▪ $9

National DEFENSE

THE BUSINESS AND TECHNOLOGY MAGAZINE OF NDIA

AT THE HEART OF THE MISSION NDIA 1919 100 2019

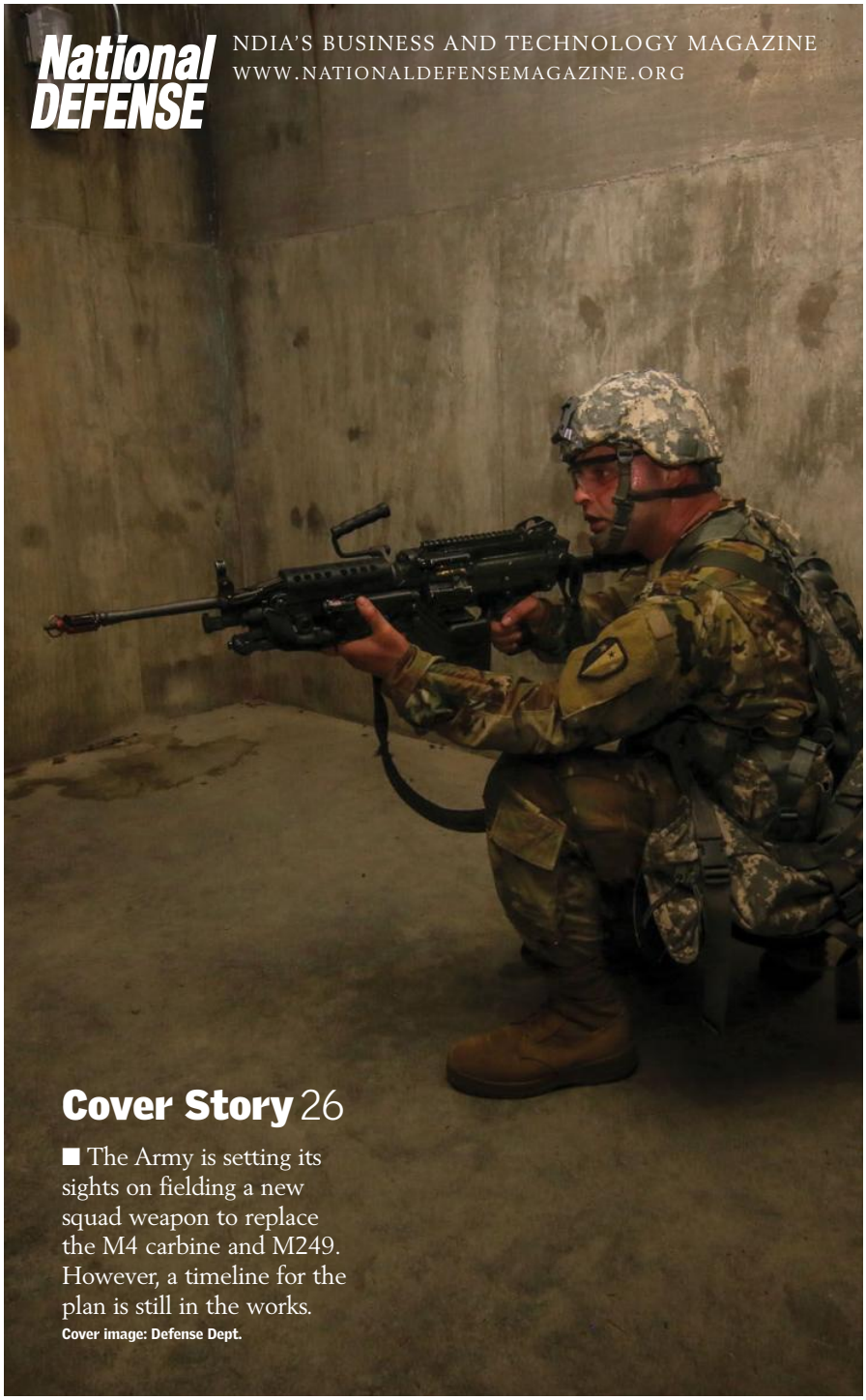
Deadly Collisions Spur New Navy Training

Long-Range Fires on NATO's Eastern Flank

TAKING AIM

ARMY SETS ITS SIGHTS ON NEW SQUAD RIFLE

JANUARY 2019 VOLUME CIII, NUMBER 782



National DEFENSE
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Cover Story 26

■ The Army is setting its sights on fielding a new squad weapon to replace the M4 carbine and M249. However, a timeline for the plan is still in the works.

Cover image: Defense Dept.

Navy 22

■ Following deadly collisions at sea, the Navy is beefing up its simulations and training to prevent future accidents. The service is also pursuing new live-virtual-constructive training technologies.

NATO 24

■ A large-scale military exercise in Poland highlights NATO's need for improved long-range fires. The U.S. Army is working to address this requirement with its long-range precision fires cross-functional team.

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National DEFENSE
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 BY JAMES C. BOOZER

NDIA at 100: Building on a Strong Foundation

I write this as we mark the 100th anniversary of World War I's Armistice and NDIA begins preparations to celebrate 100 years of advocating for American warfighters.

As I research NDIA's foundation, I'm struck by the work done after World War I to identify and correct shortfalls that hampered Allied success. I'm particularly interested in the struggle to harness the creativity and innovation of the Industrial Age to gain a warfighting advantage.

Today's military faces similar challenges leveraging Information Age capabilities to defend our freedom and prevent a national security crisis. We are unlikely to have real strategic warning and an opportunity to test capabilities, tactics or doctrine prior to a future conflict with peer adversaries; this lends a strategic imperative to initiatives like the Army's Futures Command, to ensure we identify and operationalize innovation to deter conflict and protect our nation and allies if deterrence fails.

In many ways, World War I served as an expensive lesson in failure to adapt. Artillery and high-capacity machine guns made 19th century conventional "maneuver" using cavalry and foot soldiers untenable. Despite this, neither side employed new capabilities rapidly at scale. Although 14 years elapsed since the Wright brothers' first flight, neither side developed effective doctrine or tactics to take full advantage of "the ultimate high ground." And although Karl Benz invented the first car in 1885 and rudimentary tanks appeared in 1904, lack of interest and vision prevented development and deployment of a useful tank until September 1916.

Additionally, problems with reliability and mass production limited tanks' impact until the final months of the war. We lacked effective policies and processes to fully exploit these cutting-edge capabilities. We needed to do better. We needed speed and agility.

Recognizing the shortfalls impeding America during World War I, in October 1919 the Assistant Secretary of War and Director of Munitions, Brig. Gen. Benedict Crowell, organized Army officers and manufacturing leaders to address military preparedness. This led to the formation of the Army Ordnance Association, NDIA's precursor, to ensure industrial preparedness that could help deter future conflict and ensure effective manufacturing support to the military when deterrence failed. Crowell was determined to learn from failures to prepare for and exploit change; the same imperative exists today.

The Army's creation of a command to oversee modernization signals a recognition of a system that fails to deliver innovation at speed and scale. Futures Command plans to identify and deliver innovative solutions "at the speed of relevance — at the speed our soldiers deserve." More importantly, the organization will work to attract and retain the best talent, inside and outside of the Army, to identify emerging threats and opportunities to provide the service with a competitive edge.

To succeed, the Army cannot be afraid to fail. Part of the reason tank development took until 1916 was a sense among decision-makers that the technology was too risky. While thousands were dying on the front, First Lord of the Admiralty Winston Churchill, who warned of catastrophic consequences should the Germans develop and deploy the tank before the Allies, oversaw the British Navy's tank development through early failures to ultimate success. Churchill's vision helped end the war; the final Allied counterattack depended on mass-produced tanks overwhelming the 20 tanks fielded by the Germans.

Likewise, Futures Command must fail — smartly — during peacetime because we cannot accept the consequences of slow adaptation. Failure in peacetime, while sometimes costly, provides critical lessons and guidance to increase effectiveness. It allows us to identify and correct deficiencies, and can help us recognize obsolescence as well as game-changing innovation.

Ultimately, failure points the way to productive change to ensure our men and women fight with the best equipment and support. We must overcome our culture of "taking risk and failing is bad." Assuming appropriate risk and failing simply drives better innovation.

Futures Command is necessary but insufficient. As we move deeper into the Information Age, what is the risk our industrial base is as ill-prepared to deliver the equipment and capabilities American warfighters will need, at required scale and speed, as we were in 1916? As advanced technologies, including cyber and artificial intelligence, play increasingly large roles in operations, Futures Command and the broader Defense Department need to find ways to collaborate more closely with American industry, especially with companies not traditionally in the defense space. Government contracting officers need to find creative ways to incentivize innovative companies to participate in addressing tough technical challenges. If the government builds barriers, great companies will walk away.

> "Part of the reason tank development took until 1916 was a sense among decision-makers that the technology was too risky."

Army leadership designed Futures Command to hedge against these risks. It seeks to operationalize innovative capabilities at scale and speed. Thus, NDIA's mission has never been more important. Crowell founded the Army Ordnance Association to ensure the U.S. industrial base was prepared for the future.

Looking back, Crowell and the AOA played a key role in U.S military success throughout the 20th century. Building on this foundation, NDIA will continue to work with all stakeholders — government, industry and academia — to ensure American and allied warfighters enjoy competitive advantage from the outset of any conflict. ND

Retired Army Maj. Gen. James C. Boozer is NDIA chief of staff.

NATIONAL ARCHIVES

UP FRONT COMPILED BY STEW MAGNUSON


Shanahan

Space Force on 'Final Approach'

■ Senior military leaders when encountering the press of late get peppered with inquiries about the so-called space force. And that's because there are still more questions than answers.

But a lot of work is going on in the Pentagon to figure out exactly how to fill President **Donald Trump**'s vision of a separate but equal military service. Where it will initially sit in the Defense Department's structure is a central question and one that reporters asked Deputy Secretary of Defense **Patrick Shanahan** after an NDIA event.

The Pentagon has narrowed it down to one option, but he wouldn't reveal it. The proposal will soon be sent to Congress for lawmakers to comment on.

"If I dare to use an aerospace term, I'd say we're on the final approach," he said.

DoD Wants Help from Wall Street

■ The Pentagon is looking for Wall Street expertise as it pursues improvements to its business practices, Deputy Assistant Secretary of Defense for Industrial Policy **Eric Chewning** told reporters recently.

Chewning, an Army veteran, previously worked at financial giant Morgan Stanley & Co. and later was a partner at management consulting firm McKinsey & Co.

He noted he has an "affinity" for people who have both served in the military and spent time on Wall Street. "I'm looking at ways we can bring in that capability," Chewning said. "If you think about our office … we run a management consulting firm and to a certain degree run an investment firm because we're making investments for the industrial base, and that requires a different skillset."

Public Trusts Military, Not Congress


King

■ Seventy percent of Americans have "great confidence" in the military, according to a recent poll released by the Ronald Reagan Presidential Foundation and Institute.

"Why is that number so high? I think the first reason is the military is competent," **Sen. Angus King**, I-Maine, said at the Reagan National Defense Forum. "They do their job. They perform their mission, and I think there's a sort of unconscious yearning [among Americans] for competence."

There is also recognition that troops are risking their lives to keep the country safe, King said.

Congress didn't fare as well, with only five percent of respondents expressing great confidence in the institution. Why such bad numbers? "We're incompetent," King said of lawmakers, noting a history of failure to pass appropriations bills on time. "We're literally unable to do one of the fundamental jobs … that we're called upon to do." (Read more about Congress on page 10.)

Google: A 'Nonstate Actor?'

■ The term "nonstate actors" in the security world normally has a bad connotation. It's associated with terrorist groups and criminal organizations who are having some kind of bad impact on the world order.

One panelist at the recent Halifax International Security Forum brought up the notion of putting multinational corporations in the same category. **Rosa Brooks**, a law professor and associate dean at Georgetown University, said the day will soon come when these "nonstate actor" companies become "too big to regulate."

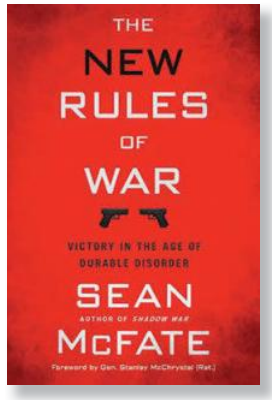
"We are this close to the moment when the Googles and Facebooks of the world say, 'We're global and we don't actually have to listen to what you say,'" Brooks said. That becomes important when nations try to stop the spread of dual use technology, particularly what these companies trade in: artificial intelligence, machine learning, big data analytics, etc.

These are "math-based" companies, said **Janice Gross Stein**, a political science professor at the University of Toronto. How do you regulate math? she asked. And soon enough, "All technology will be dual use." (Read more about the symposium on page 8.)

— Reporting by Jon Harper and Stew Magnuson

FURTHER READING

The New Rules of War: Victory in the Age of Durable Disorder
By Sean McFate



■ **Sean McFate,** a professor at National Defense University and Georgetown University's School of Foreign Service, in his new book outlines 10 new principles of war.

The former Army paratrooper states that "conventional war is dead." Only the United States prepares for conventional war, "which is why we lose," he writes. "We must re-tool our military to fight post-conventional wars, and that means dramatic change."

After his stint in the Army, McFate served as a gun-for-hire in African hotspots and argues that mercenaries — once common and acceptable centuries ago — will be back in a big way even though they are looked down upon today. They are already serving nations in the form of hackers for hire. Any armed civilian serving a military is a mercenary. They just don't like the term, preferring to call themselves "private security," "contractors" and such.

Another new rule: technology will not save us. "Invest in people, not platforms," McFate asserts. "Gray matter is more important than silicon, and focusing on people rather than hardware should be the highest defense priority."

DEFENSE DEPT. CONGRESS

AT THE HEART OF THE MISSION
NDIA
1919 2019

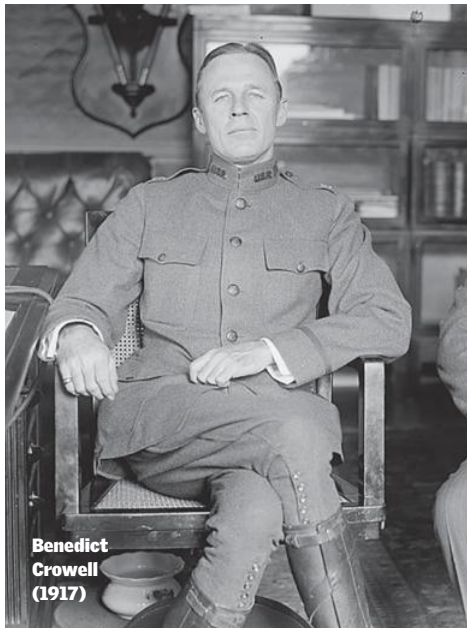
NDIA History Snapshots

A look back at the history of the association as it celebrates its centennial year. For more on NDIA's early days, see page 36.

Without Benedict Crowell, there probably would be no National Defense Industrial Association.

Crowell was an Ohio-born chemical and mining engineer, construction company owner and president of a bank when, in 1916, he was commissioned as a major in the Officer Reserve Corps. In 1917, he joined the General Munitions Board. The task of the board was to manage government contracts so that purchasing agents weren't in competition and there could be a coordinated effort between the U.S. military and its allies to supply the required munitions. He was soon appointed assistant secretary of war and director of munitions.

From that vantage point, Crowell had a bird's-eye view of how totally unprepared America was for modern warfare of any kind: land, sea or air. Two years after founding the Army Ordnance Association (AOA), which would later become NDIA, he wrote about what he had witnessed. *The Giant Hand: Our Mobilization and Control of Industry and Natural Resources, 1917-1918*, paints a portrait of a nation woefully lacking in munitions, men and war materiel.



Benedict Crowell (1917)

Crowell stated that the perception of the world was that America was an untapped reservoir of limitless resources. In reality, "when these foreigners reached Washington, what did they find?" he wrote. "A complete absence of effective industrial preparation for the ordeal ahead. Nothing done. Industry trying to coordinate itself into a single war machine, but groping ahead painfully in a fog of ignorance and misapprehension, without plans, looking for direction to an organization in Washington tragically inefficient and ill-adapted to the effort to come."

Crowell and his co-author were adamant that ". . . there be no repetition of the painful exploration and experiment of 1917," referring to the United States' lack of preparation for entering World War I.

A number of Crowell's peers apparently agreed with him. Enter the idea behind the Army Ordnance Association.

In October 1919, at Aberdeen Proving Ground, 500 representatives from industry and government met to form the AOA. Crowell served as the association's first president.

On Sept. 7, 1920, members received copies of the first constitution and bylaws for approval. A couple of key tenets set the tone for the new organization. First, national officers and directors had to be civilians. And the AOA was a non-lobbying organization that could not be used to promote any product or supplier. It was strictly an informational association, a forum for the exchange of ideas.

Crowell best articulated the essence of the association in a 1929 speech: It "is purely patriotic. It has no commercial interests, no political alliances and no religious affiliations. It is not operated for profit. Its income is expended in furthering its aims."

In recognition of Crowell's efforts, President Herbert Hoover made him a brigadier general in the Army Reserve in 1931. In this position, Crowell was responsible for a new kind of preparedness. Small orders, called Educational Orders, were awarded to private firms so they could become knowledgeable about what tools might be needed to build large numbers of a product quickly in case of wartime buildup.

And as war clouds darkened over Europe in the late 1930s, interest in preparedness heightened. "Speed of production is the need of the hour," he told members in 1940. "Whatever interferes with speed must be pushed out of the way."

By 1944, the AOA had more than 30,000 members, and its influence during wartime was unmistakable. "The Army Ordnance Association . . . has devoted its energies continuously to the advancement of sound principles of industrial preparedness and ordnance development," said Maj. Gen. C.M. Wesson, chief of ordnance of the Army. "These principles are now being followed by our Army and Navy."

As special consultant to the secretary of war during World War II, Crowell was sought out for advice on management and industrial issues. In tribute to his efforts in promoting America's industrial preparedness, the AOA awarded Crowell the Medal for Distinguished Ordnance Service in 1946.

Crowell died at age 82 on Sept. 8, 1952.

— The History Factory

Coming in January

■ The new year kicks off with two big conferences and *National Defense* will be at both with full coverage. First up is the Surface Navy Association's national symposium, Jan. 15-17, in Arlington, Virginia. The following week is the annual SHOT Show in Las Vegas, Jan. 21-25.

Also, don't miss NDIA's Luncheon with Sweden Defense Attaché Mag. Gen. Bengt Svensson at the Army and Navy Club in Washington, D.C. on Jan. 22. ND

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 BY STEW MAGNUSON

Halifax: Where the Spirit of Sen. McCain Lives On

HALIFAX, Nova Scotia — Sometimes called the "Davos of the security world," the annual Halifax International Security Forum takes place the second weekend of November here in Canada's windswept eastern province.

An exclusive group of 300 attendees — diplomats, military leaders, human rights workers, think tank scholars, university professors, journalists and politicians — come from more than 70 nations.

But this was the first meeting after the passing of the gathering's spiritual leader, the late Sen. John McCain, R-Ariz., who led every U.S. congressional delegation to the conference for its first eight years.

Like the late senator, conference organizers spoke bluntly.

"There are conferences in Europe and in Asia that attract everyone from every country as if democracies and dictatorships were equals," said the president of the forum, Peter Van Praagh.

"Halifax International Security Forum is not like that. We are certain when we say that democracies and dictatorships are not equal. That is what makes us different. We say clearly here at Halifax: democracies are better."

In years past, the enemies of democracy and globalism at the conference were obvious: Russia, China, ISIS, and so forth. But new internal ones have emerged: populists and isolationalists.

As far as the conference's tone, McCain was there in spirit. What would John McCain do? "WWJMD?" was the question — to borrow from the "WWJD?" bumper sticker that was popular about a decade ago. The "J" being Jesus for those who don't remember.

Van Praagh said: "It is not enough to condemn populists as if they have arisen out of a vacuum. The challenge is to properly identify those issues that allow populists to thrive and for us to address those issues head on. Only this can push the populists back into the shadows where they belong."

Main topics included China's growing military and political influence, Russian election meddling and the alleged murder of Saudi Arabian journalist Jamal Khashoggi.

It is not hard to imagine what McCain would have said about Khashoggi's death. WWJMD?

The flagrant murder of Khashoggi was just one of the many indications that the world is trending away from the ideals of Halifax and McCain. The weekend prior to the forum, President Donald Trump angered allies and potentially comforted foes while in France during ceremonies marking the end of World War I. NATO again seemed to be the target of his ire, and he has stated in the past that the United States may not come to the aid of a NATO member if they were under attack.

A few weeks prior to that, Brazil was the latest domino to fall as the nation elected a far-right populist president Jair Bolsonaro. Hungary, Poland and the Philippines have come under the sway of similarly minded leaders.

WWJMD?

Marine Corps Gen. Joseph Dunford, chairman of the Joint Chiefs of Staff, was the highest ranking U.S. official on hand. He told Cindy McCain that her husband was always tough on him and other senior leaders in public and in private, but he knew it was because the senator wanted the best for the rank-and-file warfighters.

"I miss him and I miss his voice," Dunford said. "And I would just speak for all of us in uniform: he made us better leaders."

It was left to Dunford to assure participants that the United States will meet its international security commitments. For 70 years, the United States has been the "leader of the free world" and — along with its allies — has guaranteed the survival of the international order, he said.

The previous session saw Cindy McCain present the John McCain Award for Leadership in Public Service to the people of Lesbos, Greece, who had welcomed 500,000 refugees to its shores. Dunford was seen applauding the recipients. He was asked how he squared that with the deployment of American troops on the U.S. border with Mexico.

U.S. forces were only doing support jobs, he said. "Our job is not to deny access for migrants in the United States. Our job is to support the Department of Homeland Security in doing their job. I think it's important you understand that."

> "It is not hard to imagine what McCain would have said about Khashoggi's death. WWJMD?"

WWJMD?

Adm. Philip S. Davidson of Indo-Pacific Command reiterated the globalist sentiment. "The United States is an enduring Pacific power. That will not change and we could not leave the region even if we wanted to. Our historical, structural, and economic and institutional ties are indelible."

Unlike at some conferences, reporters at Halifax aren't treated as adversaries or a nuisance. They are a part of the conversation and appreciated for being a vital part of the Western-style democracies the organization extolls. *National Defense* is honored to be invited every year.

The U.S. congressional delegation met the press and were asked about the disconnect between what was said by U.S. military leaders at the conference and the rhetoric from the White House. Ignore the president's words and the tweets and look at the actions, lawmakers said.

"It is the president's statements versus American actions and commitments. That's where the disconnect is. ... There is a bipartisan commitment in Congress to invest in the world and to continue to be engaged," said Sen. Jeanne Shaheen, D-N.H.

Sen. Roger Wicker, R-Miss., said: "The president says he's not a globalist; he's a nationalist. Yet, he's sending his secretary of state all over the world trying to solve problems."

What would McCain have said? ND

 BY YASMIN TADJDEH

5G Wireless Network Could Revolutionize AI

■ Wireless network carriers have been spreading the news far and wide: 5G is coming. And when the next generation of cellular mobile communications arrives, they promise, so will more bandwidth to pipe in data to devices at lightning-fast speeds.

While 5G — which is slated to be introduced in 2020 — is creating buzz in the commercial sector, it will also have defense applications, particularly as it relates to the development of cutting-edge artificial intelligence systems that have to crunch through vast amounts of data.

Five-G, when combined with the multitude of sensors that make up the internet of things, will give users the ability "to collect real-time data that allows AI to do real-time analytics," said Mei Zhou, a business development executive with Dell EMC. Users will be able to not just employ historical information to make decisions, but to combine it with real-time data for a more holistic view, she said.

Dell EMC is working closely with network equipment manufacturers and carriers to help prepare for 5G, she noted during a panel discussion at the National Training and Simulation Association's annual Interservice/Industry Training, Simulation and Education Conference in Orlando, Florida. The panel was organized by Women In Defense's Central Florida chapter.

While there are challenges, establishing 5G connectivity is key to moving forward, she added.

"It's a really critical piece that is building the underlying … communication infrastructure where AI will be layered on top," she said. "Without this networking infrastructure, you're not going to be able to move the … [data from] the edge into the different networking infrastructures to be able to make predictions and make analytics."

That kind of capability is not only a "must have" for the military, but for the commercial sector, she added.

Yasir Saleem, a senior consultant at Adobe, said getting to those real-time decisions is key. A next-generation communication network would allow AI systems to "look at real-time events that are happening, the decisions that are being made, what's coming up, what's happened in the past and really put all that data together."

Verizon Wireless has said that in its 5G trials, it achieved download speeds that were 30 to 50 times faster than with 4G. Additionally, latency could drop from the current 15 to 60 milliseconds to just 1 millisecond or less with 5G, making lag times nearly impossible to detect.

Lindsey R. Sheppard, an associate fellow at the Center for Strategic and International Studies' international security program, noted that while the military has its own communication networks that are separate from the commercial lines that will be upgraded with 5G capabilities, it will still reap benefits.

"There will be commonality, lessons learned, technology transfer between the commercial equipment, the commercial infrastructure, that can be then used in defense systems," she said in an interview. "If you can leverage the commercially developed equipment, the commercially developed standards and the commercial form factors, then … you can get that benefit of" 5G networks.

Five-G comes with two major improvements over legacy capabilities, she noted. The first includes a higher bandwidth that allows for more data to be transferred between platforms or from a platform to a network. The second is lower latency.

Latency is the time delay of processing the data across the network, she said. "Lower latency means that you're getting nearer to real-time."

The combination of those two factors means information can be consumed and digested faster, Sheppard said. That, along with an increased availability of data, more access to computing power and a push for electronics miniaturization, will be significant for artificial intelligence systems and machine learning in particular, she said.

"Five-G fits in with that confluence of factors that allow artificial intelligence to work in ways that it hadn't before," she said. "It opens up this additional space where we can start thinking about how can we do things differently."

AI capabilities powered by 5G networks could help military operators fly swarms of unmanned aircraft, Sheppard said. "That high bandwidth, low latency network allows for … algorithmic alignment during operations," she said.

> "While there are challenges, establishing 5G connectivity is key to moving forward."

It could also aid autonomous truck convoys where one manned vehicle is followed by a number of unmanned platforms, she noted.

"That careful coordination between the leader and the followers require that network connectivity," she said. Upgrading systems to a 5G connection would allow for increased and faster data transfer, making the process more efficient.

Five-G will be a boon for fields associated with the electromagnetic spectrum, such as electronic warfare, signals intelligence and communication intelligence, she said.

"All of these fields, I think, are getting some much-deserved attention as 5G [comes online and opens] … up this new space for them," Sheppard said.

Five-G can help with spectrum management, she said. "Essentially what you're doing is using artificial intelligence to coordinate and … optimize the way that all of the devices on the network utilize the available spectrum."

However, there are still a number of issues to resolve before the potential of 5G can be fully realized, she said.

"We have an engineering challenge," she said. "How do we leverage this new availability of data, this new access to computing power, this network that supports a transfer of a lot more data, a lot quicker?" she asked.

Additionally, developers still need to tackle how to ensure that AI systems are being fed quality data, she said. Labs must create better processes to verify and validate data, models and outcomes. ND

BUDGET MATTERS

BY JON HARPER

Big Defense Budget Cuts Not a Given, History Shows

After a strong showing in the 2018 midterm elections, Democrats will take control of the House of Representatives in January. Republicans, meanwhile, will retain the majority in the Senate and occupy the White House. Although House Democrats will likely push for lower defense spending than their GOP colleagues, the new Congress is unlikely to pass large cuts to military funding, analysts said.

"What does divided government mean for the defense topline? Probably not as much as one would think," retired Marine Corps Maj. Gen. Arnold Punaro, CEO of the Punaro Group, said in a recent white paper which looked at historical trends in military spending stretching back to the 1950s when different parties controlled the two chambers of Congress and the White House.

"Previous periods of divided government show that both the president and Congress have ultimately worked together when it came to how much money to spend on defense even though they would communicate and advertise their policy differences up to the last moment," said Punaro, who serves as vice chair of the board for the National Defense Industrial Association.

For example, during the six years of the Reagan administration when Republicans controlled the White House and Senate, and Democrats led the House, the defense base budget increased $25 billion annually on average, he noted.

Rep. Adam Smith, D-Wash., who is expected to become chairman of the House Armed Services Committee, has said that current levels of defense spending — $716 billion in fiscal year 2019 — are too high.

"With history as a guide, the Democratic majority in the House will likely set a lower defense topline than requested" by the White House, Punaro said. There will also be predictable differences over policy issues such as nuclear weapons programs and arms control, he noted, and major weapons programs might receive extra scrutiny.

However, when Democrats control the House under a Republican administration, the final passed budget has usually been closer to the Senate's proposed funding levels for defense, Punaro said.

Senate Armed Services Committee Chairman Sen. Jim Inhofe, R-Okla., has said the defense budget should be at least $733 billion in fiscal year 2020, the amount that Pentagon officials had been planning for.

A few months ago, President Donald Trump directed the department to prepare a $700 billion budget blueprint for 2020, raising alarm bells in the national security community. However, as of press time media reports said Trump might request as much as $750 billion. The White House press office did not respond to a request for comment.

"Given the historical patterns of House reductions to the topline, administrations should start with the highest number possible," Punaro said. The president's 2020 budget is expected to be delivered to Congress in February.

While Democrats might propose lower numbers, party leaders are unlikely to push massive cuts to military programs to avoid being branded as soft on defense, said Elaine Kamarck, a senior fellow for governance studies at the Brookings Institution.

"Majority-makers tend to be people from marginal districts" that tip the balance in who controls Congress, she said during a panel discussion. "Those are the people that the new leadership … need to protect.

"That means that the correct strategy for the new Congress is to be critical, do oversight, but not make any far-left broadsides against the military establishment," she added. "It might make the solid blue districts happy, but it's going to put into jeopardy those 30 to 40 seats where … the results were so close."

Democrats will try to score political points by opposing Trump's border security initiatives including troop deployments, Kamarck said. "But I do not think you're going to see the Democratic leadership taking them down a road where they are massively critical of a lot of things that the Pentagon is doing or wants to do."

Secretary of Defense Jim Mattis expressed optimism that lawmakers will provide robust funding.

"The Congress … will take [defense officials'] input onboard," he said in December at the Reagan National Defense Forum. "I'm optimistic that at the end of day we'll have what we need to keep our country safe." ND

ISTOCK

Quantum Computing Bill Stalls in Senate

■ A bill that would boost the United States' quantum computing technology is stuck in committee in the Senate, creating uncertainty about whether the legislation will make it to President Donald Trump's desk anytime soon.

The National Quantum Initiative Act passed the House unanimously in September. It would provide $1.3 billion, subject to annual appropriations, to the Departments of Energy and Commerce and the National Science Foundation over the next 10 years for research and development. It also aims to enhance cooperation between government and industry.

"With competition from abroad, America must increase and accelerate efforts to secure leadership in the quantum sector for our national security and economic prosperity," Rep. Lamar Smith, R-Texas, who introduced the legislation, said in a statement when the bill made it through the House.

Traditional computers use electrical signals to process bits in the form of 1s and 0s. Quantum computers, on the other hand, use physical photons known as "qubits" to process information, which could make them thousands of times faster than today's supercomputers, according to experts.

Such a capability would have major implications for the military, intelligence agencies and other organizations, especially when it comes to encrypting and decrypting critical information, said Arthur Herman, a senior fellow and quantum computing expert with the Hudson Institute. That's why it's critical for the United States to make major investments in the technology, he noted.

"Developing the atomic bomb and then the hydrogen bomb demanded huge devotion of resources and scientific expertise and engineering skill," he said. "The same is true with regard to quantum computers" that could be weaponized.

The United States' biggest competitor in this field is China, he noted, which is currently outspending its great power rival about 30 to 1. The National Quantum Initiative Act could help narrow the gap, and it would be "a shame" if it didn't become law, Herman said.

Losing the quantum computing race to Beijing would be "catastrophic" when it comes to cybersecurity, he said. "If the Chinese get there first and we're not prepared to protect our most advanced weapons systems from that kind of intrusion and from that kind of penetration, then by the time we find out that we've lost the quantum computer race, it will be too late."

Staffers for the Senate Commerce, Science and Transportation Committee did not respond to requests for comment about when the committee plans to vote on the legislation. ND

ISTOCK, DEFENSE DEPT.

Growing Demand For Smaller Drones

■ The market for unmanned aerial systems is projected to reach $7 billion within five years, with the biggest percentage growth in smaller platforms, according to a recent study.

Based on Pentagon budget documents and trends in overseas contingency operations funding, Defense Department spending on drones between fiscal years 2017 and 2023 is estimated to have a compound annual growth rate of 4.6 percent, said the report by Frost & Sullivan, "U.S. DoD UAS Market, Forecast to 2023."

The growth can be attributed to "an insatiable need for that 24/7 intelligence" gathering capability, report author Michael Blades, research director for North America, said in an interview.

Because they cost more, larger drones with long endurance — known as UAS groups 4 and 5 — will still account for the bulk of overall unmanned aerial system spending in the coming years. Today, they account for about 70 percent of the market. But there is heightened interest in smaller platforms, Blades noted.

"If you look at what's spent now as opposed to what's spent in the future, it's going to be a much higher percentage increase in the [smaller] group 3s and 2s and 1s than there will be in the group 4 and 5s," he said.

For example, there is growing investment in off-the-shelf quadcopters and other systems that troops can easily deploy, he noted.

There's also a major push to improve group 3 UAS to give them capabilities similar to what groups 4 and 5 have today, Blades said.

"A lot of the investment is going to see how can we make these things have more endurance" while reducing logistical and manpower requirements, which could lower operating costs, he said.

As the Pentagon pursues manned-unmanned teaming abilities, and machine learning for intelligence data processing, exploitation and dissemination, there is strong growth potential in the market for advanced payloads such as sensors, data links, software and artificial intelligence systems, he noted.

"There's all kinds of opportunities," Blades said. "It's just a matter of who has the best equipment and has the proven capabilities that the DoD or … [other] U.S. government agencies need."

Industry can also provide UAS operations as a service rather than selling the equipment to the Defense Department, he noted.

"There's other ways to meet requirements without actually having to establish an entire program where drones are built and managed by the government," he said. "You have contractor-owned/contractor-operated" systems. ND

Services Declare Breakthrough in LVC Training

ORLANDO, Fla. — Air Force and Navy officials are declaring success for a joint technology demonstration that tied jet fighters in the air with pilots operating simulators on the ground, who could all fly against computer-generated adversaries.

A final report on the Secure LVC (live-virtual-constructive) Advanced Training Environment (SLATE) demonstration was due at the end of December, but organizers a month earlier said that the exercise went better than expected.

"We're not supposed to say that it was a very successful technology demonstration — that's supposed to come from our senior leaders — but it was a very successful technology demonstration," said Wink Bennett, SLATE research lead at the Air Force Research Laboratory.

"It was beyond our wildest hopes," he added.

A team lead by the Air Force's 711th Human Performance Wing of the Airman Systems Directorate, Warfighter Readiness Research Division took more than four years to set up the exercise. The demonstration then took place over an eight-month period at Nellis Air Force Base, Nevada.

This was created out of "unobtanium." It had never been done before, said David Noah, AFRL's program lead for the demonstration.

To make live-virtual-constructive training a reality, the team had to develop several key technologies.

One was the fifth-generation advanced training waveform (5G-ATW) developed by the MIT Lincoln Laboratory to serve as the datalink. In addition to the new waveform, the training system was served by Link-16 and UHF/VHF voice communications.

The second hurdle was ensuring that all three links were cyber secure and encrypted.

The aircraft also carried a SLATE pod that contained the necessary software and allowed for "untethered" operations.

"Tethered" training used the 5G-ATW to connect to a ground station, where pilots could operate simulators and take part in the exercise virtually. That also allowed for more robust scenarios with an almost unlimited number of enemy aircraft or surface-to-air missile sites.

"No kidding, the aircraft was actually seeing the things that we're putting on the net as legitimate threats, legitimate targets and different things," said Noah.

Pilots could actually fly to the edge of the training range and "see" computer-generated aircraft far beyond the base's boundaries, thus expanding the range virtually.

"They could see them, they could react to them, they could lock them up, they can take shots at them outside the range. So now imagine that you were doing that on a daily basis. I can put all kinds of really bad stuff outside the range, have it pushed towards me and I have all the rest of my range to fight it out," Bennett said.

When flying untethered, the pod can generate about eight different scenarios and four to six constructed aircraft. However, since there are no links to the ground station, simulators cannot participate.

"There is an incredible capability that we demonstrated in untethered ops during SLATE," Noah said. A pilot could start out operating as an F-15 Eagle, then switch over to be part of the red team and fly as a member of an enemy formation: "You can change it literally on the fly: it was gorgeous."

The exercise used F-15s, F-16s and Navy F/A-18s. Next will be creating links for fifth-generation fighters such as the F-22 and F-35. That will be challenging, but doable, the organizers said.

"That is yet to be solved, and it is a horse of a different color, but we have a plan to go fix that," Bennett said.

The underlying technology is platform agnostic, Noah said. It could work on other types of aircraft, ships or space systems.

- STEW MAGNUSON

AIR FORCE

Lockheed Upgrading Radar Systems for Hypersonic Threats

MOORESTOWN, N.J. — Lockheed Martin is working to upgrade its radar systems to detect emerging threats such as hypersonic weapons and swarms of unmanned aerial vehicles, executives recently said.

The U.S. military faces not only asymmetric threats — as characterized by warfare fought in Afghanistan and Iraq — but those from near-peer competitors such as Russia and China, said Paul Lemmo, vice president and general manager of Lockheed Martin's integrated warfare systems and sensors division.

"We're really working throughout our portfolio to help our customers deal with all of those," he said during a media briefing at Lockheed's Moorestown, New Jersey, facility.

The company is currently working on upgrades to its Aegis advanced combat system, which is used extensively by the U.S. Navy as well as international partners. They include a powerful radar system to track and counter hypersonic missiles, he noted.

Jim Sheridan, Lockheed's director of Aegis U.S. Navy programs, said the company recently conducted an experiment focusing on hypersonics. "The results were very promising," he said, while keeping specific details close to the vest. The company focused on defensive capabilities, Sheridan added.

Tony DeSimone, chief engineer at Lockheed's integrated warfare systems and sensors division, said the company writ large is making big investments in hypersonics technology.


AN/TPQ-53 radar

"We're looking at multiple opportunities from both the defensive posture and then … the offensive posture," he said.

Lockheed is also exploring ways to better detect swarms of unmanned aerial systems, said Tish Rourke, who works with the company's radar systems business development division.

The AN/TPQ-53 radar system — which is currently used by the Army — can detect rockets, artillery and mortars. The company has so far delivered 100 systems to the service in addition to its international customers, she noted.

"The architecture of that radar was designed such that we could …. [integrate] additional capability to the radar through software upgrades," she said.

Lockheed is under contract with the Army under a joint urgent operational need to incorporate that capability, she noted. It is currently working alongside the service to test and validate that, Rourke added. **- BY YASMIN TADJDEH**

DEFENSE DEPT., ISTOCK

Silicon Valley Showing Support for Military

SIMI VALLEY, Calif. — Google generated a lot of headlines recently when an employee protest led to the company's withdrawal from Project Maven, a Pentagon initiative to utilize artificial intelligence to mine intelligence data. But there are plenty of companies in Silicon Valley and other commercial tech hubs who want to help the military, observers noted at the Reagan National Defense Forum in Simi Valley, California.

Michael Brown, director of the Defense Innovation Unit — a military outpost headquartered in Silicon Valley to help the Pentagon better tap into commercial innovation — noted the opposition at Google.

"That's not necessarily [a view held by] a majority of folks in Silicon Valley," he said during a panel discussion. "Every month we're surveying which commercial companies can help us solve this important military problem, and we're seeing an increasing number of companies that respond to that. … People do want to support the troops."

Brown noted that businesses also have a financial incentive to work with the Defense Department because it has the potential to be a large customer.

Brad Smith, president and chief legal officer at Microsoft, said his company has had employees sign petitions saying they don't want to work on Pentagon-sponsored projects.

"We've met it head on by saying … we want the people of this country and especially the people who serve the country to know that we have their back and we are going to provide our best technology to the U.S. military," he said. Meanwhile, the company will "engage actively as citizens in the democratic process" to address issues that are raising people's concerns such as AI, he noted.

Palmer Luckey, founder of Anduril Industries, said many observers in Washington don't have an accurate gauge of Silicon Valley sentiment.

"They read the press coming out of the tech industry and they're like, 'Why do you guys all hate the military so much?'" he said.

"The reality is that most people … actually do support a strong military," Luckey said. "They believe that it's important for the United States to have better military technology than Russia and China. … But if you're not actually in Silicon Valley you get this distorted view because you're only hearing from this kind of radical minority that is controlling the dialogue and controlling the narrative."

Of greater concern in the commercial tech world is doubts about whether working with the Pentagon will be worthwhile from a business perspective, he noted. **- JON HARPER**

University to Open Cyber Lab in Central Florida

ORLANDO, Fla. — The University of Central Florida is establishing a new cyber center with financial and mentoring support from Lockheed Martin, the organizations announced in December.

The facility — known as the cyber innovation lab — is poised to open in February, said Michael Georgiopoulos, dean at the college of engineering and computer science at UCF. Lockheed has pledged to donate $1.5 million toward the effort.

"We have [had] a tremendous partnership with Lockheed Martin over the last 50 years and we hope that this gift for the cyber innovation lab at our university will be the beginning of another future relationship," Georgiopoulos said during remarks at the National Training and Simulation Association's annual Interservice/Industry Training, Simulation and Education Conference in Orlando, Florida.

The center — which will be located on the school's main campus in Orlando — will be particularly useful for the university's Hack@UCF club, where participating students hone their offensive and defensive cybersecurity skills, he said in an interview. The club has won a number of national accolades, he added.

Tom Warner, director of Lockheed Martin's cyber defense, range and resilience organization, said: "The investment in UCF is an investment in the future of the students, of the city of Orlando and also the global cyber community."

Lockheed's cyber business has grown by 400 percent over the past five years, Warner noted. That is creating a workforce issue, challenging the company's ability to fill its cyber talent pipeline, he said.

The company has a duty to partner with academia "to make sure we provide the resources to inspire and prepare our youth for jobs in this very exciting and challenging career," he said.

UCF in particular has served as a "feeder school" for Lockheed in the past, Warner said. Besides funneling in promising talent, academia brings a lot to the table when it comes to cyber innovation, he said.

"The research and perspective that they bring in that partnership is really what helps us … get ahead of the curve in terms of new technologies that are coming, new techniques as it relates to what to do for network defense or offensive cyber," Warner said. **- YASMIN TADJDEH**

Company Offers Exoskeleton With Upgraded Power

Sarcos Robotics announced a new battery-powered robotic suit that can operate using lithium-ion batteries and enable the wearer to lift up to 200 pounds for several hours.

The Salt Lake City-based company, which has spent 17 years and invested more than $175 million in exoskeleton research and development, is touting the system for its reduction in power consumption.

"We are seeing 400 watts of power being used instead of 3,500 or 6,800, which now allows us to use fairly traditional lithium-ion batteries to get up to eight hours of usage," Ben Wolff, chairman and CEO of Sarcos Robotics, said in an interview.

There are three batteries mounted on the back of the machine, each of which weighs between 10 and 15 pounds, Wolff said.

"We've designed the suit so you can hot swap the batteries in the field so that you can continue the mission," he noted.

It should take a user anywhere from 30 to 60 seconds to suit up. Once on, the equipment is fully mobile, able to traverse smooth or challenging terrain, he said.

"Our machine is intended not only to enhance endurance, but also strength and dexterity," he added. "Inclement weather, mud, snow — those kinds of challenging environmental conditions are what this machine was intended to be able to work in."

While the company is pushing to get the suit out to commercial customers by the end of 2019, it continues to develop systems for the Defense Department.

Sarcos is working with the Air Force to modify its exoskeleton to fit the military's needs. It has two contracts with the service so far.

"We are working with the Air Force on a logistics version of our suit," Wolff said.

The company is also working with U.S. Special Operations Command to help deliver a prototype of the highly-anticipated tactical assault light operator suit, Wolff confirmed.

The suit, also known as TALOS, has been in development since 2013. The exoskeleton is intended to protect special operators during raids. It is expected to thwart small arms fire or bomb blasts. It would also provide support for physically exhausting activities such as climbing multiple flights of stairs or carrying heavy loads.

A TALOS prototype is slated to be demonstrated in 2019, SOCOM leaders said last year.

Wolff declined to provide further details on the company's work with the command. **- BY MANDY MAYFIELD**

LOCKHEED MARTIN. SARCOS ROBOTICS

 BY ALEXANDRA BERGE

AI Legislation Languishes in Congress

When the general public hears the term "artificial intelligence," minds often race to scenes from movies like *Terminator* or they begin to think about popular rhetoric predicting robotic infiltration of the workplace and the accompanying human job displacement.

These unscientific notions represent the U.S. public's fascination and unfortunate misunderstanding of these advanced technologies. Complex AI is a transformative advanced technology used to complete tasks traditionally requiring human intelligence. It encompasses an array of computational capabilities often classified as "narrow" or "general" depending on the complexity of the assigned tasks, making it difficult to create one standardized, inclusive definition.

Poor comprehension of AI also extends to Congress. Unlike the public, however, Congress' policymaking responsibilities make its knowledge deficit harmful to the country, hindering progress on policy, leaving the nation disadvantaged in the global competition for technological supremacy, and possibly creating unanticipated consequences for citizens.

To shrink its knowledge deficit, Congress should establish a joint advisory committee composed of private sector technology experts and top public sector research-and-development professionals by passing the proposed bill, "Fundamentally Understanding the Usability and Realistic Evolution of Artificial Intelligence Act of 2017," or FUTURE of AI Act. Whether Congress creates legislation or not, AI will continue to develop transforming Americans' way of life for better or worse.

In December 2017, Rep. John K. Delaney, D-Md., along with eight cosponsors, introduced the bipartisan act into Congress. Along with formally defining AI, the legislation also proposes establishing a federal advisory committee. The committee would consist of two member classes: non-governmental professionals from academia, research, private industry, civil society and labor organizations, and governmental professionals from federal agencies and departments.

The committee would educate and inform policymakers on the implications and functions of AI and recommend policy options. The proposal includes private sector participants because they enjoy substantially more research and funding opportunities in advanced technology.

Collaboration among government personnel creates opportunities to clearly define a standardized government strategy. This partnership also allows the public sector to leverage commercial expertise while avoiding recruiting wars over talent it would almost certainly lose due to salary differentials.

Finally, the arrangement benefits the private sector by allowing its experts to collaboratively craft policy impacting their organizations' strategy, research, technology and product lines.

Since the introduction of the act, congressional interest in AI has surged, producing numerous hearings, white papers and research studies attempting to define a standard policy agenda. As the Center for Strategic and International Studies noted in a recently published report, "an expertise gap persists in technical authorities at the strategic level, with non-specialists often issuing technical decisions." The report, "Artificial Intelligence and National Security: The Importane of the AI Ecosystem," concludes that to create strong, effective policies, Congress must become better informed about AI.

Lawmakers' lack of technological knowledge came to light during the widely watched House and Senate Facebook hearings. Policymakers convened to determine the company's role in Cambridge Analytica's controversial use of Facebook users' personal information. For two days, Congress' questions to Facebook CEO Mark Zuckerberg portrayed a clear lack of understanding of the platform and its underlying technologies. The result? Zuckerberg dodged the data breach questioning by littering his answers with buzzwords like "machine learning" and "artificial intelligence," confident those asking the questions would not understand. A video of Sen. Orrin Hatch, R-Utah, asking Zuckerberg how Facebook sustains a business model in which users don't pay for services went viral after Zuckerberg responded with a chuckle, "Senator, we run ads."

Lack of appropriate background knowledge prevents members from asking pertinent investigative questions. Without the expertise or understanding, both policy-making and oversight will be inadequate at best and potentially harmful.

In contrast to Congress, the executive branch has already acted. Recognizing the knowledge deficit, President Donald Trump signed an executive order creating a select committee on AI under the National Science and Technology Council. However, this committee only includes government officials, limiting its value. Without expert input from outside the government, regulations and policy will lag technological innovation, either slowing growth and hindering the economy or failing to ensure the U.S. implements effective guidelines for new capabilities. While this action demonstrates progress, it is insufficient.

> "The government has a responsibility to the nation to incentivize the advancement of AI ..."

Lawmakers introduced the FUTURE of AI Act of 2017 more than a year ago; while it languishes in Congress, the United States and its adversaries continue to push technological boundaries with little input or oversight from the U.S. government. Congress needs to prioritize passage of the act to effectively legislate and regulate AI in a manner that fosters innovation, grows the economy, protects U.S. citizens from unanticipated consequences of ungoverned research and development, all the while keeping the United States as the leader in this transformative technology.

The government has a responsibility to the nation to incentivize the advancement of AI in the right direction while ensuring the United States is prepared for the technological demands of tomorrow. ND

Alexandra Berge is a junior fellow at NDIA's policy division.

Viewpoint BY ASHLEY G. JOHNSON

Pentagon Needs to Start An 'Energetics Renaissance'

NAVY

■ Sometimes, as T.S. Eliot said, "the end is the beginning."

The final comment in a June 2018 *National Defense* article, "Pentagon Set to Boost Spending on High-Tech Armaments," was perhaps the most telling: "If anybody tells you that the future is nothing but lasers on the battlefield … they are not very well informed. There is a place for directed energy and there is a place for missiles and there is a place for guns."

This insightful comment was made by Michael Holthe, the Army's director for lethality in the office of the deputy secretary of the Army for research and technology.

The comment is remarkably similar to statements by Michael Griffin, the undersecretary of defense for research and engineering: "I would urge us not to think that one size fits all. … I would urge us to keep a lot of arrows in our quiver as we go forward."

As we return to great power competition, we need to recognize that while we have been fighting insurgents and terrorists in Iraq, Afghanistan and elsewhere for most of the past two decades, we have not only depleted our weapons stockpiles, we have lost some of the advantages in weapons overmatch compared to near-peer or peer competitors. We need to refill our quivers with the weapons we need to win the next war, not the last.

While the United States has focused science-and-technology development investments on near-term solutions for ongoing fights and far-term advancements such as directed energy weapons, adversaries have caught up to — and in some cases surpassed — existing chemical energetics-driven weapons capabilities.

The opening of the same *National Defense* article states: "The U.S. military is looking to enhance the lethality of its weapons as it prepares for high-end warfare against advanced adversaries. A wide range of modernization needs includes everything from small arms all the way up to long-range precision missiles."

That summary describes the need; what the article does not address is the source of most new conventional munitions S&T development. It is not industry.

The simple fact is that for advanced energetics technologies such as propellants; rocket and missile motors, engines and fuels; explosives; reactive materials; and energetic material systems such as fuzes and primers, there is little or no commercial market. So the expectation that industry will allocate adequate internal research-and-development funding to create the advanced energetics needed to significantly increase conventional munitions' performance is a false hope.

All the military branches maintain government energetics enterprise organizations and facilities to develop the science and technology needed to improve munitions and then transition them to industry for production. For example, the Navy's energetics enterprise includes the Indian Head Explosive Ordnance Disposal Technology Division at Indian Head, Maryland, and the Naval Air Warfare Center Weapons Division at China Lake, California. Together, they provide most of the development for naval energetics in all warfighting domains.

The problem is these organizations have been underfunded since the early 2000s, when the Navy shifted focus to the development of advanced electrically-powered weapons such as the electromagnetic railgun and laser weapons system. At that time, the U.S. military enjoyed overmatch in conventional weapons almost across the board. Now, after almost two decades of significant investment in conventional energetics by China and Russia, we have lost this overmatch, and in some areas adversaries' weapons outperform ours. Meanwhile, the workforce and infrastructure at both these Navy organizations have atrophied due to the lack of investment.

So when military research-and-development leaders call for advancements, in this case during a defense armament forum, such as, "for everybody in this room that's involved in the lethality business, whether you're guns, whether you're missiles, whether you're directed energy … I think it's fair to say all of you are the right people at the right time to come together to provide new capabilities," we all need to recognize that in the area of energetics, the "right people" are not all in industry, particularly for science and technology.

Interestingly, the examples of advancements being provided by industry were all small arms or advanced materials such as improving barrel life, suppressing signatures or reducing recoil. These advancements are necessary, but they are not sufficient.

Defense officials are calling for the capability advancements U.S. forces need to enable the National Defense Strategy's vision of a more lethal joint force. Those advancements include extended range, more lethal warheads, specialized weapons such as drone-defeat munitions, and other advanced technologies. Energetics can't solve all the problems, but investment in energetics needs to be part of the solution.

It is not too late to regain an edge, and the cost of so doing is relatively small compared to the investment levels discussed in the article that explained, "the fiscal year 2018 omnibus spending bill passed by Congress included $16.2 billion for munitions, about $1.9 billion above the president's budget request. In fiscal year 2019, the Defense Department plans to spend more than $20 billion on the technology."

Recently, the Navy's energetics subject matter experts conducted a yearlong study to address what would be needed to enable an energetics renaissance to reestablish and maintain the edge in naval energetics, and developed a 30-year plan for such a renaissance in conventional energetics. They concluded it is possible to do so, and the result would include substantial gains in range, speed and lethality of conventional energetics weapons — in terms of multiples, not marginal percentage improvements.

They also estimated the investment required to regain our edge as a steady-state of $60 million per year, which would be divided between the two energetics warfare centers, basic

research in academia and targeted investments in the energetics industry. This represents less than one percent of the $16 billion to $20 billion planned — in short, a small part of the overall investment in armaments.

Furthermore, these energetics experts estimated this modest annual investment would provide advances in energetics technologies and modernize the tools they need such as models and simulations to predict future performance, or advanced test and evaluation techniques to develop new science and technology and then transition it to industry for incorporation into the production of advanced weapons.

So while recognizing the "energetics renaissance" only addresses the Navy, even if the Army and Air Force made similar increases in investments, the total pales next to the overall armaments funding and some of the naval investments. Improvements in naval gun capabilities would be easily transferable to other services, such as Army and Marine Corps artillery capabilities. It simply makes sense to leverage the potential capability improvements offered by a return to reasonable investment in conventional energetics.

Consider the impact of advanced versions of conventional weapons that fit and function within current weapons systems. The naval energetics experts accepted the challenge of developing improved versions of weapons for existing Navy weapons platforms, including vertical launch system missile tubes and missile form factors, current torpedo tubes and torpedoes, existing aircraft and naval guns. In short, once developed and tested, these munitions could immediately be used on Navy ships, submarines and aircraft without any modifications.

Being able to do this while doubling, or more, the range, speed and/or lethality of these weapons provides a capability hedge while waiting for the completion — and then installation — of advanced naval weapons such as the railgun and the laser weapon.

A recent Congressional Research Service report estimated that while the Navy has made considerable progress in these two advanced weapons, they are not yet ready and it will likely take years to complete the development. Once development is complete, given ship maintenance cycles, it could be decades before these weapons are installed or back-fitted on all Navy combatant ships.

Investment in conventional energetics will enable the Navy to regain advantages in the near term and also enable a graceful transition to more advanced weapons once they are completed and become widely available to warfighters.

The bottom line is that the United States won the Cold War with balanced capabilities in nuclear, conventional and precision weapons. It will need balanced capabilities to enable the more lethal joint force called for in our National Defense Strategy. Modest increases in conventional energetics development can provide the advances in capabilities we need to complement other advanced technology areas such as directed energy weapons.

> "It is not too late to regain an edge, and the cost of so doing is relatively small..."

Conventional energetics will continue to be critical components of our nation's arsenal for decades. It is possible to improve our conventional energetics-enabled capabilities, but we must revitalize the energetics enterprise — begin the energetics renaissance — to do so. **ND**

Ashley G. Johnson is the technical director at Naval Surface Warfare Center Indian Head's explosive ordnance disposal technology division.

 BY JEFFERY A. GREEN

Industrial Base Gears Up for Great Power Conflict

For decades, free-trade ideology has dominated discussions about manufacturing and economic development in the United States, even with respect to the defense industrial base. Though policies stemming from this ideology have succeeded in generating great wealth for the U.S. economy, they have also led to a number of unintended consequences, including the erosion of the manufacturing segment of the defense industrial base.

With new authorities included in this year's defense authorization bill, however, the Pentagon is well-equipped to reverse the decline in U.S. defense manufacturing and to provide secure supply of crucial military components for the future.

The Defense Department is, of course, unlike any private sector business. It is responsible for responding to unforeseen events worldwide and is also subject to threats and challenges that no private sector actor confronts.

A mistaken emphasis on free-trade ideology and a selective aversion to "picking winners and losers," however, has led to the false conclusion that the department, which has a budget larger than many midsize European countries, cannot and should not attempt to shape the commercial sector that supplies it. This mindset has produced weak points in the supply chain that potential adversaries have recognized and exploited.

A recent op-ed by retired Air Force Gen. Hawk Carlisle, former commander of Air Combat Command, and current president and CEO of the National Defense Industrial Association, argues that today's industrial base is vastly different than the one that propelled the United States to military greatness in World War II and throughout the Cold War. Even as defense spending increased following 9/11, the defense industrial base has continued to shrink and consolidate.

This process was greatly accelerated by budgetary uncertainty during the Obama administration. A study on the impacts of budget sequestration by the Center for Strategic and International Studies and the Aerospace Industries Association, "Measuring the Impact of Sequestration and the Defense Drawdown on the Industrial Base, 2011-2015," notes that over 17,000 companies left the defense industrial base during those years. This greatly reduced the scope of competition within the industry and left the defense supply chain with a large number of single points of failure.

Looking at U.S. industry more broadly, it is clear that while certain segments of manufacturing output are doing well, industries that supply defense manufacturing have sustained deep declines in recent years. The mining of non-fuel resources, for example, peaked in early 2006 and has declined ever since. The decline in textile production has been even more dramatic. At a time when the economy is increasingly dominated by service businesses, both the executive branch and Congress must take a hard look at the ideological underpinnings driving our industrial policy.

Thankfully, the 2017 National Security Strategy acknowledged the deeply troubling decline of the defense industrial base. The document notes: "A healthy defense industrial base is a critical element of U.S. power and the national security innovation base. The ability of the military to surge in response to an emergency depends on our nation's ability to produce needed parts and systems, healthy and secure supply chains, and a skilled U.S. workforce. The erosion of American manufacturing over the last two decades, however, has had a negative impact on these capabilities and threatens to undermine the ability of U.S. manufacturers to meet national security requirements."

One of the best-known single points of failure in today's defense industrial base is the near sole-source dependence on China for rare earth elements. Due to their unique properties, this select group of minerals is essential for the construction of much of the U.S. military's high-tech hardware, including everything from radars to night vision goggles. The lack of viable domestic sources for the elements creates a significant strategic vulnerability.

An incident in 2010 shows just how dangerous this dependence can be. In the midst of an international dispute over control of fishing waters, China abruptly cut off rare earth element exports to Japan, only resuming them a month later after Japan declined to prosecute the Chinese ship captain involved in the incident. Had the export restrictions continued, the impact on the Japanese high-tech industry could have been catastrophic.

Concerningly, there are indications that China may try to use the export of critical raw materials to gain geopolitical leverage over the United States. At a public forum in Beijing in September, China's former finance minister Lou Jiwei reportedly told an audience that China could restrict exports of core items for the U.S. manufacturing supply chain. This speech was after the Communist Party's *People's Daily* printed a story stating: "We are looking forward to a more beautiful counterattack and will keep increasing the pain felt by the U.S." This statement is an important reminder that our strategic materials vulnerabilities are real, and our senior government officials must heed this call to action to build on the advances made this year.

> "The push to secure the defense industrial base was advanced greatly by the recently-passed National Defense Authorization Act."

Thankfully, government policy is rapidly changing to create a more secure industrial base, highlighted by efforts to create a more favorable business climate to sustain potentially low-volume, high priority production of key materials. This process started with a number of executive orders issued by the administration.

For instance, Executive Order 13806, "Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States," mandated a comprehensive study of the defense industrial base. Likewise, Executive Order 13817, "Presidential Executive Order

on a Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals," initiated an intra-governmental strategy to end U.S. reliance on foreign suppliers of 35 critical mineral commodities.

The push to secure the defense industrial base was advanced greatly by the recently-passed National Defense Authorization Act. For example, section 871 of the NDAA prohibits the Defense Department and its contractors from acquiring certain sensitive materials, including rare earth magnets, from non-allied foreign nations including China, Russia and Iran. Once fully implemented in regulations, this language will help catalyze a resurgence in U.S. domestic production of critical minerals and components.

As production scales up under the stimulus of steady demand, downstream consumers of these products are likely to find that U.S. producers can outcompete foreign suppliers on both price and quality. As it reviews the results of the administration's industrial base study, Congress should consider adding more materials to the list in future years.

This year's NDAA, coupled with sustained attention from the executive branch, is the best thing to happen to the defense industrial base in years. However, Congress and the executive branch must do more to get this vital sector on solid footing for the era of renewed great power competition. As Congress gears up for the next authorization act, it should use the recently-released executive branch assessment of defense industrial base vulnerabilities as a template for action. The report highlights numerous single points of failure in the defense supply chain. Though some can be fixed through executive branch action alone, others will require legislative support.

First, Congress must increase funding for the programs that directly support the industrial base, including Defense Production Act purchases, Industrial Base Analysis and Sustainment and Manufacturing Technology.

Second, Congress needs to provide targeted relief from regulatory restrictions applicable to key industries that support the defense industrial base. For example, language included in the original House-passed version of the NDAA, introduced by Rep. Mark Amodei, R-Nev., would have sped the mine-permitting approval process for strategic and critical mineral projects. Unfortunately, this language lacked sufficient support in the Senate and was stripped out in conference. Without such language, a revival in the defense industrial base will be significantly delayed.

In addition to addressing specific areas of concern such as mine-permitting reform, another area where Congress could be helpful is in addressing the substantial overlap in regulations at the federal, state and local levels. Many regulations, which pertain to areas such as worker safety and environmental health, are duplicative and add no real value. They do, however, substantially increase costs. These are felt most strongly by smaller producers who lack the economies of scale necessary to afford an office of full-time compliance specialists. By working in a collaborative manner, Congress can help reduce this overlap and thereby improve the business environment for small- and medium-sized producers.

Third, Congress should encourage the use of long-dormant tools such as loan guarantees and conversion of key facilities to government-owned, contractor-operated centers of excellence for low volume, but critical, strategic materials like specialty chemicals. The authorities for these types of projects already exist — they are present to some extent in programs such as the Defense Production Act and Industrial Base Analysis and Sustainment program — however, Congress needs to increase funding for them to be effective.

Finally, Congress should continue to include domestic sourcing requirements in future bills, recognizing that the inherent market demand to drive lowest cost production may not always be in our national security interest.

This year, the government made significant progress in addressing a number of strategic vulnerabilities. Even more welcome, there appears to be a growing consensus that the free-market mindset that has worked well in other policy areas is not optimal for the defense sector. Support for the defense industrial base has been, and should continue to be, an area of bipartisan agreement. In the years ahead, Congress and the administration should work together to find additional ways to strengthen the defense industrial base. **ND**

ISTOCK

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 BY JAMES B. MARCEAU

Industry Consolidation: What Will it Mean for DoD

There has been an uptick in industry consolidation and mergers and acquisitions activity in recent years. The recent announcement that Harris Corp. and L3 Technologies were coming together in a "merger of equals" is a notable example.

While mergers such as this are eventful for industry and financial markets, what does the trend mean for the Defense Department?

At best it may help it a little, but much more profound change across the entire industry is required to help speed technology and innovation to the warfighters — better, faster and cheaper. The department is hungry for real innovation. In the past, large mergers and acquisitions generally hurt innovation, agility and speed as large firms focused on protecting established business areas and large programs.

But is this time different? Firms of all sizes recognize the department's demands, and have been experimenting — some more than others — with more creative, higher-risk agile business models. They realize that if they don't deliver innovation the Pentagon is getting better at finding it from nontraditional industry competitors and smaller prime contractors.

The stakes are high, and with the nation's technological dominance being seriously challenged and threats growing more complex, the Defense Department is more serious about innovation. Underscoring threat complexity, the battlespace is now far broader — from the heights of space to the bottom of the oceans, in the cyber domain as well as the physical — a further blurring of military and non-military realms, and increasingly overt political and public opinion battlegrounds.

The department is determined to better engage industry to help deliver better results. Achieving these improvements requires commitment and investment by industry, deeper collaboration and a different framework of performance-driven financial incentive. Those contractors who are willing to transform their businesses to meet new demands will be the winners — regardless of their size.

While traditional prime contractors will and must protect revenue streams on legacy platforms, they must leverage the profits to invest and prepare for market disruption. Industry consolidation and strategic mergers and acquisitions can help support the mission but only with effective execution, a dramatic change in industry and government's view of research and development, and innovation in business models.

Large primes must find new and better ways to work with smaller industry primes and nontraditional industry players to deliver better solutions — trying to maximize workshare with use of in-house suppliers exclusively will not be as successful a strategy as it has been in the past as the threat of being out-innovated is real.

The demands and complexity of today's defense challenges are technology and innovation-driven and require very different business models to successfully execute. Adding to the challenge is the aerospace and defense industry's risk aversion and historical reluctance to invest in research and development. While government business models have limited research, there are more opportunities to do so now. And the defense industry lags far behind nearly all other industries in R&D investment by a significant margin. With the department opening up to nontraditional firms, this gap will hurt primes. Industry must develop a culture of intelligent risk-taking in research as the Pentagon has made it easier for companies to leverage innovation into higher returns.

The future of defense innovation will be profoundly different. Large, leading-edge companies and venture-backed startups in the private sector are solving complex problems through massive-scale big data, artificial intelligence, blockchain, machine-human learning, adaptive learning, augmented reality, cybersecurity, supply chain resiliency, robotics, autonomy, sensor technologies, advanced electronics and additive manufacturing.

These massive investments — and the ruthless value assessment of different offerings by commercial clients — are creating strong, high-value capabilities that the Defense Department is and will increasingly leverage. New offices continue to be stood up across the department with descriptors like rapid, development, innovation, experimental and future. These terms underscore that the department's innovation focus is not going away.

Back to mergers and acquisitions, we are seeing signs that this time is different, and firms are appreciating the need to adapt to deliver on innovation demands. Whereas the consolidation of the 1990s was dominated by full integration of acquired firms into a "one firm" approach, we are now seeing more tailored approaches. Some acquired groups are fully integrated to achieve efficiencies, while others are seen as critical sources of innovation and are allowed to operate more autonomously so as not to disrupt the culture and mindset.

Of course, mergers and acquisitions are driven by an insatiable demand from shareholders for growth and profitability. Unless firms can see a clear expedited path to profitable revenue streams and long-term government contracts, it will be difficult to justify and sustain increased R&D investment. Shareholders demand profit growth and use of free cash to buy back stock, pay dividends, or both. Industry needs business leaders with the skill and vision to focus these accounts effectively into disruptive new capabilities that can deliver high value, long-running programs.

ISTOCK

Although industry will continue to use mergers and acquisitions as an important part of their growth strategies, that alone cannot deliver results. Prices are high and the opportunities for economies of scale are reduced. Few acquisition targets remain, and capital markets are likely to tighten. Thus, the primary industry strategy must be focused on improving innovation for the Defense Department, achieved through a mix of acquisitions — typically smaller and more differentiated — and internal investments in development programs and innovative capabilities.

And the classic challenges remain: good capability synergies between entities; excellent change management and post-merger integration; aligned leadership and vision; disciplined review and shaping of the business portfolio and divesting capabilities; and businesses that are not aligned with the strategy.

The department is working to improve the incentives for industry to reward innovation. But there is much more to do to convince companies and shareholders that the prize is real. Incentives for industry can be enhanced by clearly defined and jointly developed requirements; a more efficient and effective acquisition process with shorter award cycles; collaborative planning and execution across the entire lifecycle between industry — broadly defined — and government; an environment of experimentation and joint development; smarter use of performance-based contracts; and, of course, financial rewards that are aligned with stakeholders' expectations.

All of this is needed to ensure that industry will devote more investment in research and development, and that shareholders ensure that corporate leaders are capable of leading the investment to innovation to profit journey. The path to innovation success will depend on government's ability to shorten requirements to award cycles, embrace new and creative business models, reward intelligent risk-taking, and a willingness to think differently and embrace paying an incentive-based premium for performance and results.

"The department is working to improve the incentives for industry to reward innovation."

More efficient development programs and optimized lifecycle costs will surely more than offset the profit premium for innovators, and the premium is essential to incent industry to deliver.

Aerospace and defense industry consolidations and strategic mergers and acquisitions are not new, but this most recent round comes at a time when industry is adapting to a change in the defense business model. Delivering on the next generation of big bets and speeding technology to warfighters requires a different mindset and strategy that requires traditional prime defense contractors to consider nontraditional companies, technology startups and innovation leaders as a sustained part of the department's ecosystem.

The race is on and the stakes are even higher. Successful execution of the mission will require the best thinking and the best execution from both industry and government. The nature of our threats is evolving. The Defense Department recognizes this, and if traditional contractors fail to evolve they will be left behind. **ND**

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A Navy virtual training demonstration

NAVY

Navy Turns to Simulators Following Deadly Collisions

BY CONNIE LEE

Two high-profile collisions involving U.S destroyers have sparked new concerns about how the Navy prepares its sailors for overseas operations. The service sees improved simulations and training as a way to avoid future accidents.

On June 17, 2017, the USS Fitzgerald collided with a merchant vessel off the coast of Japan. Two months later on Aug. 21, the USS John McCain turned into the path of the Alnic MC, a Liberian-registered tanker. The Navy's "Comprehensive Review of Surface Force Incidents" found that during both accidents, the watchstanders did not work together effectively or comply with standard procedures.

When operating at sea, the Navy usually has watchstanders both on the bridge and in the combat information center. But Capt. Sam Pennington, surface training systems program manager at Naval Sea Systems Command, said this was not how sailors were being taught.

"We were only training the bridge teams, historically," he said at the Interservice/Industry Training, Simulation and Education Conference in Orlando, Florida, which was hosted by the National Training and Simulation Association.

Pennington said his office began working to upgrade current navigation, seamanship and shiphandling trainers (NSSTs) — which are bridge simulators used to train ship crews — to reflect real-world operations.

"Soon after the collisions … my office put together some interim solutions to incorporate watch standards in combat," he said. "We've already begun implementing those changes to the existing NSSTs — we've modified them."

A statement by a Naval Sea Systems Command spokesperson notes that modifications to the legacy NSSTs are slated for completion by May 2019.

Longer term plans include pursuing a new maritime skills training program that includes the installation of new simulation systems and instructors, Pennington said. The program will provide a "holistic approach" to training, Pennington noted.

The Navy will deliver simulators to six locations in fiscal year 2021, which include Yokosuka, Japan; Sasebo, Japan; Pearl Harbor, Hawaii; Everett, Washington; San Diego; and Mayport, Florida. Simulators will be delivered to Norfolk, Virginia; Rota, Spain; and Bahrain in fiscal years 2022 and 2023, the statement said.

"The technology that we're going to bring … is going to be outstanding," Pennington said. "In the interim, we're going to try to get as much capability to the left [of schedule] to modify the existing NSSTs to ensure that we have that integrated training."

The Navy reprogrammed $24 million to kick off the initiative, but the overall price tag will likely be higher, Pennington said. Because the improved simulators are expected to be larger, new facilities will have to be installed at every home port, he noted. The number of systems will vary depending on the needs of the location.

"The other thing about installing them at every home port is we need to install enough of them," he said. "That's facilities costs. In some cases, it's going to be military construction … dollars. The cost is significant."

The initiative will also require additional support personnel and instructors, he noted. Previous systems only needed one instructor, but the new simulators will require a minimum of three "due to the amount of injection that we're going have to do to provide a very realistic scenario," he said.

Future simulation tools will also have an improved playback capability to allow students to see their performance after completing training exercises. He envisioned having a separate room dedicated to conducting debriefings. This format would allow instructors to point out specific mistakes made during the exercise on a screen rather than rely on memory and notes, he said.

"A lot of times, what we have found is that during the debriefs, the watchstanders [would say,] 'No, I didn't do that.' … We used to have these debates, and it was always a bad feeling at the end," he said. "As an instructor, I could never prove to that watchstander, 'No you really did.'"

Bryan Clark, a senior fellow at the Center for Strategic and Budgetary Assessments and a former Navy submarine officer, said simulators allow sailors to create habits for using the equipment.

"You can use a simulator to help teams develop the muscle memory to understand where all their different systems are, where the controls are, how the controls can be operated and manipulated," he said. Sailors can also practice operating any backup equipment that may be needed during unexpected situations, he noted.

Kent Gritton, live-virtual-constructive training team lead at the Naval Air Warfare Center Training Systems Division, said the Navy is also opening a new LVC facility to encourage the development of advanced simulation training tools.

Operating on a first-come, first-served schedule, members of the defense industry, academia and government will be able to use the space to work on their burgeoning technologies, he said. LVC training leverages simulation and virtual reality products.

The space will be located at the Naval Air Warfare Center Training Systems Division in Orlando, Gritton said. A soft opening is scheduled for January 2019, with plans to open the space for wider use in April. Users would be charged a yet to be determined fee, he noted. If they choose to set up a cooperative research-and-development agreement to work with the government, they may be required to discuss their work with others, he said.

"We need to be able to give back to this community within I/ITSEC in an [unclassified] forum and be able to tell people what we did," Gritton said. "That way, we continue to raise the tide of everybody that's working in LVC."

The facility will contain 14 workstations, according to a news release. Gritton said the hope is to improve the process for developing live-virtual-constructive systems and shorten technology timelines.

"I don't want to look back in 25 years and see LVC activities the way that we're doing them now, which is the way — basically — we were doing them 25 years" ago, he said. "It is an imperative so we can then raise the readiness bar and the proficiency bars of our warfighters as we go forward."

However, the key to improving live-virtual-constructive training is to boost interoperability and integration capabilities of these technologies, Gritton told *National Defense*. The Navy is pursuing this with a new interoperability toolkit that shows users inconsistencies between systems, he said.

"The concept here is that it will automatically detect disconnect between different [simulators], whether they be virtual or constructive or even live assets," he said.

The kit contains four different views that allow operators to examine potential discrepancies between the training systems, he noted.

"In the virtual space, there may be a specific threat icon represented that's supposed to be there, but when you look over at the [toolkit] picture it's not there," he said. If that happens, "you know that there's a disconnect between the two systems, so you're going to have a problem with training on that."

> "The Navy has said it wants features that would allow sailors to use multiple senses, such as smell."

The Navy is improving its simulators for aviation training as well, said Ray Duquette, president of CAE USA. CAE provides the Navy with a suite of MH-60S and MH-60R helicopter trainers.

The company is working to provide users with higher immersion and higher fidelity systems, Duquette said. The biggest change in training over the last couple of decades is the ability to network training activities, he noted.

"When you're networked on together — so you're going outside the confines of the facility — it requires a significantly more enhanced [protection from] cybersecurity threats," he said. "We're making sure that that's included in the solutions that we're providing the Navy."

Duquette predicts simulators will evolve to the point where users will be able to face off against more sophisticated threats. While trainers today do simulate enemy forces, they are still "archaic, more of a dumbed-down version," he added.

"In the real world, if they're fighting the threat, that threat will continue to evolve and learn by the … U.S. Navy's tactics," he added.

Technology is also advancing to provide sailors with more realistic simulated environments, he noted.

"It's not just about the [out] the window scene, the terrain," he said. "That's all been improving. It improves every year and it will continue to improve. I always say we're not done until [there is] no discernable difference to the human eye."

To improve the realism of the virtual environment, the Navy has said it wants features that would allow sailors to use multiple senses, such as smell, he noted. While these may not largely affect aviation simulators, these could be especially useful for training for ground and sea operations, he said.

However, Clark warned against putting too much focus solely on LVC initiatives.

"The Navy is rightly increasing the amount of simulator time and simulator availability by building some more, but I think they risk … putting too much emphasis on simulation and not giving ships enough time to train their watch teams," he said.

The service should also ensure that watchstanders are prepared to work outside of their primary location, he noted.

"You've got to have time underway to train not just your primary team, but also kind of your backup teams," he said. "So that when you do end up in these situations where you get underway and somebody's sick or somebody had to stay in port for some reason, you don't end up with a big gap in your watch team." **ND**

MH-60R helicopter trainer

CAE

Exercise Illustrates NATO's Long-Range Fires Problem

BY HAL FOSTER

CHELMNO, Poland — The sky over the Vistula River was slate-gray, but there was no rain — so the Polish Army's 12th Mechanized Division had to improvise.

The troops had wanted to ferry some of their heavy equipment across the Vistula as part of NATO's Anakonda 2018 exercise in November. But the river had fallen so much overnight that sand bars had appeared in its middle, creating the danger of the motorized ferry running aground. So the soldiers practiced landings only on the staging-area side of the river.

The ferry would make a loop on that side, then land, dispatching an armored personnel carrier and a dozen troops to clamber up the bank toward an imaginary enemy.

In addition to armored personnel carriers and tanks, the 12th has an array of big guns — self-propelled howitzers, multiple-rocket-launcher systems, anti-aircraft systems and surface-to-air missiles.

Nearby, the 12th Mechanized Field Artillery Battalion conducted a joint fire exercise with troops from the U.S. 82nd Field Artillery Regiment out of Fort Hood, Texas.

Lt. Col. Daniel Noga, who led the Polish troops, enthused that his country would soon be getting the American-made M142 HIMARS multiple-rocket-launching system in order to gain more big-gun range. With extended-range guided munitions, M142 rockets can reach targets up to 100 kilometers away, experts say.

With Russia fielding artillery with increasingly longer ranges, the U.S. Army has named long-range precision fires as its top modernization priority. Here, where Poland is part of the forces protecting NATO's eastern flank, which side has the most effective artillery is of vital concern.

Half a world away at Fort Sill, Oklahoma, Col. John Rafferty, director of the long-range precision fires cross-functional team, is spearheading the creation of the Army's next generation of long-range artillery, rockets and missiles. He's also a key player in ushering in a task force approach to equipment development that is aimed at putting weapons in the field years earlier.

Rafferty joined the new Army Futures Command in August. An important component of his job is getting the key players in the development of big guns working simultaneously rather than in sequence — an approach aimed at reducing weapons delivery time, he said.

The traditional equipment-development model is linear, Rafferty noted. That is, one player completes their development task before the next starts theirs.

With a linear model, "first we develop a concept, then the requirements for the weapon, then it takes several years to develop the science and technology, then we turn it over to the acquisition people, who work with industry" to deliver the product, Rafferty said in an interview. This step-by-step process takes too long when you need something to counter a superior weapon that an adversary has fielded, he said.

Last year the Army introduced the task force concept — weapons-development players working on their tasks simultaneously — to try to reduce delivery times. It calls the task forces cross-functional teams.

The Fort Sill portion of the team consists of 50 people. Several dozen others — including science and technology experts — work at places like the Picatinny Arsenal in New Jersey, the Redstone Arsenal in Alabama, and the Army Test and Evaluation Command at Aberdeen Proving Ground, Maryland.

"Most of the work goes on elsewhere, and our job [at Fort Sill] is to pull it all together," Rafferty said.

Army Futures Command wanted someone with big-guns field experience — as opposed to a science and technology background — to head the cross-functional team.

The idea was that, as the development process moved forward, a hands-on artillery officer was more likely to keep the bigger picture in mind: Would a particular weapon meet the troops' needs?

With seven tours in the Middle East, Rafferty fit the bill. His last job in the region was field artillery brigade commander. "We had HIMARS units in Jordan, the UAE, Kuwait, Iraq and Syria," he said.

Rafferty's Fort Sill team has established ambitious delivery goals for the next generation of big guns. It wants to get the new weapons in soldiers' hands up to four years earlier than if they were being developed under a non-task-force approach.

Some of the fires it is developing are tactical, some operational and some strategic. Tactical weapons are for a traditional battlefield, operational weapons are for denying an enemy an operational capability such as air defense, and strategic weapons are for knocking out command-and-control targets far from the front.

The main objective of modernizing long-range fires is leapfrogging the superior ranges of some adversaries' weapon systems, Rafferty said. Other goals include increasing fires' punch and precision.

The tactical weapon the Army is developing is the Extended-Range Cannon Artillery, or ERCA. Its range of 70 kilometers will more than double the 30 of today's self-propelled howitzer, the Paladin.

Importantly, 70 kilometers will far outstrip the 44 kilometers that Russia's 2S35 cannon reaches.

John Gordon IV, a former Army colonel who is a senior policy analyst at the RAND Corp., said in an interview that a key reason why armies need longer-range artillery these days is that units must

cover a much larger piece of ground than in the past.

Armies are a fraction of the size they were in the 1980s, when NATO had 25 divisions, he said.

"In 1985, a cannon with an operational range of 25 kilometers could support a brigade battle with a front of 35 to 40 kilometers," he said. "Now a brigade would be expected to cover a lot more area." Longer-range artillery would help do that.

ERCA will sport a 58-caliber — or 30-foot — gun, versus the Paladin's 39-caliber — or 20-foot — tube. And it will have a redesigned chamber and breach.

A rocket-assisted, extended-range projectile will combine with the greater muzzle velocity that ERCA's longer tube will offer to generate the range the Army wants, Rafferty said.

Anakonda 2018 exercise

POLAND ARMED FORCES

"Right now we're testing that extended-range projectile, called the XM1113," he said. And "we're getting it out in excess of 70 kilometers."

Because ERCA will have a much longer barrel, the Army is also testing the mobility of the platform that will carry the gun.

So far, so good, Rafferty said. "I just came back from a test shot at the Yuma Proving Ground that was very impressive," he said.

If the development effort stays on track, the plan is "to field the first battalion of this weapon in 2023," he said, adding: "That's a pretty aggressive path."

The operational weapon that Rafferty's team is developing, the Precision Strike Missile, or PrSM, will have a range of 499 kilometers.

It will replace the Army Tactical Missile System, or ATACMS, whose early models have a range of around 190 kilometers and later variants 300 kilometers.

About 490 kilometers is the maximum range that NATO and Russian forces are allowed under the Intermediate-Range Nuclear Forces treaty. On Dec. 4, however, Secretary of State Mike Pompeo warned the Kremlin that it had 60 days to stop violating the treaty or the United States would no longer abide by it. Russia, which has repeatedly denied violations, warned that it would retaliate.

Scrapping the treaty would open the door to both the West and Russia developing longer-range conventional and nuclear missiles for the European theater, Gordon said.

At the moment, the Russians' "very formidable, extremely accurate SS-26 Iskander, launched from sites in Kaliningrad, could reach most of Poland and part of eastern Germany," he said. If the 499-kilometer limit is lifted, "future Russian missiles are going to be able to strike targets in a lot more of Europe." Kaliningrad is a Russian enclave between Poland and Lithuania.

PrSM will be deadlier than the ATACMS and do a better job of sidestepping enemy countermeasures, Rafferty said.

It will also have two launch pod containers, compared with ATACMS's one. "This will cut our supply chain in half — and it's cheaper," he said.

The two companies competing for the PrSM contract will begin test-firing their versions of the missile in August 2019.

If the tests prove the basic missile concept feasible, "then we'll spiral in new technologies — sensors, smarter munitions and submunitions," Rafferty said.

A revised, shorter timetable for rolling out the PrSM is one indication of the Army's confidence in the cross-functional team approach.

"The original plan for the Precision Strike Missile was to field an urgent materiel release of it in 2027," Rafferty said. That has been shaved to 2023.

The two strategic-fires systems the Army is developing are a long-range cannon and a hypersonic missile.

The missile is a major departure because "the Army has not been working on strategic fires since the Pershing missile" was developed in the late 1950s and early 1960s, Rafferty said.

The new cannon and missile will be used in tandem against targets such as air defense systems. The cannon would knock out thin-skinned structures and equipment, including radar, and the missile would hit sturdier infrastructure and hardened targets.

"You need a mix of weapons" to knock out strategic targets, Rafferty said. "The strength of these systems is that they're integrated. Between these two systems, we'll be able to create these windows of opportunity that a joint force would need to gain access to the operating area."

Rafferty hopes the Army's cross-functional team approach reduces the number of weapons projects that slip into what developers call the Valley of Death.

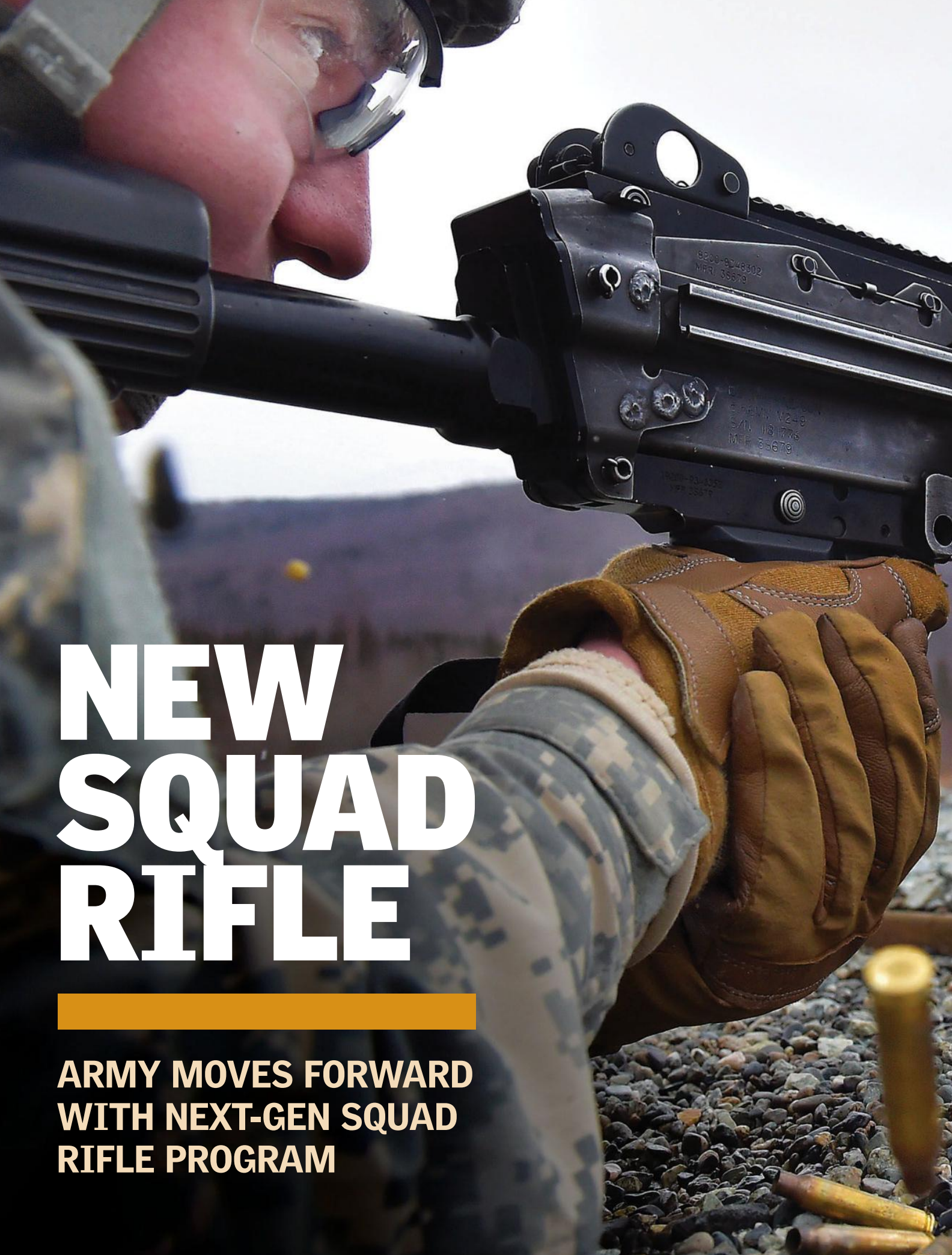
"That's an expression that refers to something coming out of science and technology and reaching a certain level of performance, and if there's nobody there to grab it to move it to the next process of the program — the management and acquisition phase — it just dies," he said.

"Our job is to make sure we don't let anything fall into the Valley of Death and to make sure that everything we are doing contributes to these modernization priorities."

Behind it all is a sense of urgency, Rafferty added.

"This is about future readiness," he said. "We can't let off the gas. We've got to deliver."

Half a world away in Poland, the 12th Mechanized Division's Noga would be nodding his head in agreement. **ND**



NEW SQUAD RIFLE

ARMY MOVES FORWARD WITH NEXT-GEN SQUAD RIFLE PROGRAM

BY NICK ADDE

Now that the Army is set upon going forward with plans to field a new squad automatic rifle, the service is committing to proceed as expeditiously as possible to move the project from the testing stage to the field.

Exactly how soon soldiers should expect to use their new Next-Generation Squad Weapons (NGSW) in combat, with variants that would replace both the M4 carbine and the M249 squad automatic weapon, however, is still to be determined.

The new weapon would fire a 6.8 caliber round, which both the service and representatives from industry who are vying for the contract to build it are embracing. The round, they say, would provide the right balance of lethality required in both close- and long-range fights. Proponents say it is both lighter and deadlier than the

A soldier qualifies with an M249 squad automatic weapon. (ARMY)

5.56 mm NATO round, the ammunition it would replace (See story on page 30).

"Ninety percent of our casualties are coming from 4 percent of our force," said Daryl Easlick, small arms deputy at the lethality branch of the maneuver capabilities and integration directorate, at Fort Benning, Georgia. "This means those close-combat [military occupational specialties] that close with and destroy the enemy are the most likely to be injured. Those are the ones we're concentrating on the most when looking at these modernization efforts."

But while the Army team that is working on the new weapon's development is optimistic that they are on the right track, they fully understand that more testing will be necessary before the project emerges from its present prototype stage.

Factor in the current political and budgetary climate, and any visions of a closing date for the project become even murkier. In essence, if the money is there, testing would be completed sooner. If not, that date would slide to the right accordingly.

"Budget cycles are painful at best," Easlick said. "We try to read the tea leaves and make sure we have some sort of plan. It's dependent upon our senior leaders going back to lawmakers, and making sure they're dotting I's and crossing T's."

The cost concerns cannot be underestimated. In time, every soldier, Marine and special operator who directly engages the enemy would need the new weapon, delivered as close to the same time across the spectrum as reasonably possible. Otherwise, troops could be forced to fight under circumstances in which units would be carrying different ammunition.

Additionally, supply chains would have to change accordingly to ensure that new weapons and replacement parts are readily available.

As such, Army Chief of Staff Gen. Mark A. Milley told an audience at the Association of the U.S. Army's annual conference in Washington, D.C., last October that the new weapons would be distributed first to the 100,000 troops who engage in close-quarters combat.

"Right now, the feedback looks like we are going to a 6.8 caliber round," Milley said last fall. The service selected five contractors to develop prototype rifles: AAI Corp.-Textron Systems; FN America LLC (producing two rifles); General Dynamics-OTS Inc.; PCP Tactical LLC; and Sig Sauer Inc.

The prospective manufacturers are largely cautious in discussing their plans to meet the Army's requirements. Most declined to be interviewed.

"Textron Systems has developed automatic rifles and rifles in a variety of configurations and calibers, ranging from 5.56 mm to 7.72 mm, and is supporting the Army's current efforts to revolutionize its small arms capability," Wayne Prender, a senior vice president with the company, said in a written statement.

"The Army has outlined a set of requirements that demand a new technology baseline in small arms — one that more accurately reflects the demands on users today in mission and environment. We are confident that our CT [case-telescoped] weapons technology meets, and in many cases exceeds, its requirements in the areas of lethality, weight reduction and overall performance."

Textron began producing CT weapon systems and ammunition in 2004, with ammunition encased in polymer rather than brass. The technology results in lighter, lethal and proven ammunition, Prender stated.

FN America released an announcement in July, stating that the company would produce prototypes of both a lightweight machine gun and a heat adaptive modular rifle — both of which would meet Army weight-reduction requirements.

"The Army has tried this on a number of occasions, and has not brought a new weapon into the field," said Mark Cancian, senior adviser with the Center for Strategic and International Studies, a Washington, D.C.-based think tank.

"The problem with a new infantry weapon, particularly if you adopt a new caliber, is it can be extremely disruptive and expensive," said Cancian, who retired from the Marine Corps as a colonel after a 30-year career.

Cancian also cited the overall unease and unwillingness to rush a new weapon out too soon, because leadership is still "haunted by the experience of Vietnam."

Specifically, Cancian is referring to the Pentagon's decision to introduce the M16 during the conflict, before it was adequately tested.

"The result was [the M16] had a bad reputation and caused both problems and casualties because of unreliability," Cancian said.

A soldier fires an M249 light machine gun

The Army, for its part, is moving forward on a course that balances the cross-purposed needs for speed and caution. Indeed, when the service began soliciting ideas from industry last October, it did so in a draft prototype opportunity notice rather than a formal request for proposal. The listing on FedBizOpps specifically sought "industry questions and comments to assist in shaping the NGSW program strategy to rapidly develop and deliver prototype weapons and ammunition."

At this point, the service is moving accordingly along this somewhat open-ended timeline.

"We are in a prototyping effort [now], not production," Easlick said. "We can do what we say we need to do."

Prototype testing would take place at a host of Army installations and facilities. Aberdeen Proving Ground, Maryland, and Picatinny Arsenal, New Jersey, will play key roles. Combat soldiers at major U.S. Army Forces Command installations like Fort Bragg, North Carolina, will get the opportunity to provide their input as well.

Project managers want to determine if the weapon prototypes allow soldiers to do the same tasks they now must perform in the same or a shorter time duration, based on the load they must carry. Such tests can be performed anywhere,

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Easlick said. Determining when and where they would take place would depend upon scheduling, costs and the amount of temporary duty time.

Possible concerns about making the weapon suitably effective at both close range and longer distances are being addressed throughout the development process, Easlick said. He realizes, however, that the related concerns are well founded.

"We understand [the rifle will have to] do short- and mid-range engagements and still meet long-range requirements. If I want to get better at long range, it's a push-pull on other requirements. That's just the way it is — physics," Easlick said.

To approach a solution for this issue — and any other they are encountering — entails meeting the threat-based requirement and "walking it backwards, to put it into a soldier's hands so that he will be able to do the tasks he's supposed to do," Easlick said.

Subject-matter experts in Easlick's shop — former non-commissioned officers, retirees, National Guard and reserve-component types — are working on capability development. These experts have a "high degree of ability to conduct infantry tasks," he said.

They are using their expertise to understand what industry has that is technically feasible, and will be both controllable and able to be fired during any of the maneuvers and movement techniques soldiers use during engagements, Easlick said.

"That's the crux of being able to figure this out," he said, adding that any final product would have to fit in with the concept of treating each soldier as an individual platform — akin to the way services regard larger systems such as tanks, aircraft and Navy ships.

The approach to the new squad weapon must be developed based on both operational needs and emerging technologies in other areas. It is no longer acceptable, he said, to "hang stuff on the soldier like a Christmas tree."

The weapon likely would be able to provide a soldier with information about signature suppression — making it harder for him or her to be spotted by adversaries — fire control, or interaction with other nearby friendly weapons systems.

At this point, the discussion and experimentation becomes quite conceptual, Easlick said.

"What if the next-generation weapon system can send reports for me, so that the ground commander in a fight doesn't have to [do it] anymore. The soldier can concentrate on the fight, rather than [telling higher-ups] what's going on around him," Easlick said.

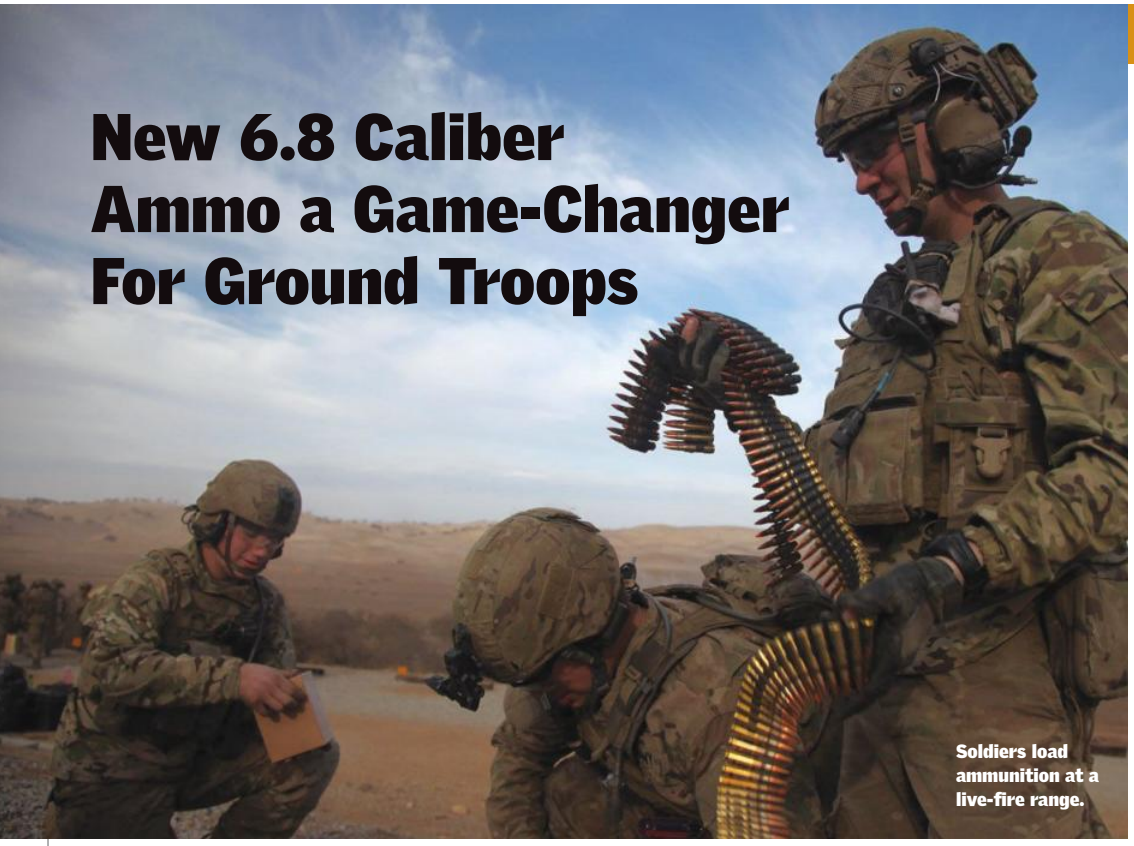
The weapon itself could interact with other systems contained in future combat uniforms — telling the soldier, comrades in arms who are nearby, and commanders who monitor the fight if help is needed in supplying more ammunition, or treating and evacuating casualties.

Night-vision goggles and other visual-augmentation systems and sensors on display inside helmets all would function with the weapon as a single system.

The weapon's self-contained systems would also be seamlessly integrated with other systems so that initial indoctrination and fostering familiarity with future upgrades would not require extensive bouts with new learning curves. Soldiers would be able to adapt to changes with "no training detriment," Easlick said, as they move through their infantry careers.

"A lot of this sounds very next-century — very far out there," he said. "We're being realistic. It's not going to happen soon. But we have to make sure we have the ability to integrate things into the system, instead of hanging things onto the soldier. It's difficult to do when you don't know what's technically achievable." The visual-augmented integration systems Easlick refers to are not available yet. As such, the concepts are "pretty aggressive, pretty imaginative," he said. "Even so, we're being realistic about what's able to be fielded in a short period of time." ND

New 6.8 Caliber Ammo a Game-Changer For Ground Troops



Soldiers load ammunition at a live-fire range.

DEFENSE DEPT.

BY NICK ADDE

Army leadership is committed to moving toward the adoption of 6.8 caliber ammunition for the Next-Generation Squad Weapon. However, its development hinges upon addressing two key concerns.

The round must be suitable for close- and medium-range conflicts, such as house-to-house urban engagements. Likewise, it must function properly in long-range environments, such as those found in the mountains of Afghanistan.

Additionally, the larger ammunition should not add to the weight — and ideally, would lessen the burden — soldiers now currently carry. Of equal importance, it must be lethal.

The Army team responsible for the project believes that while it will take some time to come to fruition, they are on the right track.

"We're looking at it holistically. We want our soldiers to never go into a fair fight, and always have an overmatch with their adversaries," said Col. Travis Thompson, chief of staff for the soldier lethality cross-functional team at Fort Benning, Georgia.

Under the holistic approach, the three components — ammunition, the weapon and fire control — all must function together, in any and all combat situations, Thompson said.

The ammunition and weapon must perform within 200 meters — where history shows most combat confrontations take place — and at distances, where present-day enemies are increasingly seeking to engage U.S. and allied soldiers, he said.

The decision to settle upon a 6.8 caliber round resulted from extensive testing and research by Army laboratories, staffed by experts who closely examined factors such as threats, target sets, weight, performance and controllability, Thompson said.

The research entailed looking at a multitude of combinations of barrel and weapon lengths, weights and calibers of both commercial and military systems.

"A lot of effort was done by our labs in looking at what's the right caliber for the next-generation weapon," Thompson said. "The decision was not taken lightly."

Mark Cancian, a senior international security advisor with the Center for Strategic and International Studies and a retired Marine Corps officer, said the Army "is trying to fix a tension that has existed in small arms for a century."

Cancian noted the institutional desire on the Army's part to improve the lethality of small arms, with the focus on ammunition. When the service published a semi-formal request for ideas on FedBizOpps last October, it specifically mentioned the intent to move to the higher caliber from the current 5.56 NATO round now in use with the M4 carbine and M249 squad automatic weapon.

In the announcement, contractors were told to submit their ideas under an other transaction agreements authority, which is used specifically to solicit prototype ideas. The service would then review the proposals after 27 months, and then award a follow-on production contract.

The plan to adopt the higher caliber represents a "compromise" on the Army's part, Cancian said, but not one without inherent challenges.

"It's very expensive and very hard to change calibers," he said. "Improving the ammunition is by far an easier way to improve lethality."

The "tension" exists between proponents of ammunition suitable for short-range and longer-range fights. This, he said, is what the lethality team is coming to terms with today as it seeks to develop the new round and its corresponding weapon. (See story on page 26.)

"The marksmen in the services would like to optimize long-range precision fire, and they point to engagements where that is important. These people say that in Afghanistan, particularly, there are opportunities to take long-range shots," Cancian said.

Even though the history of infantry conflict shows that most engagements happen at close ranges, he said, shooters who want to hit a target at ranges of 500 meters or greater would need larger rounds with heavy bullets.

"But if you're going to be fighting close in — at 100 meters or under 50 meters — you want something that can fire rapidly and then quickly," Cancian said. "The 5.56 is very good for that."

The compromise to which Cancian refers would entail development of a bullet that would fit in a relatively small weapon like the 5.56 does, but also

could reach out to long ranges and still hit targets.

"That is what the Army is trying to do," Cancian said. He believes the service is taking the right approach.

"If you don't do anything, you're more optimized for close-in. If you adopt a heavier caliber, you have to replace everything in the inventory. That gets very expensive," he noted.

Moreover, once the U.S military makes such a change, allies and partner nations would feel compelled to follow suit, he said.

"It's hugely problematic, and it's not clear that you're going to improve your performance close-in. You might get better at the long shot, but worse at the shots that are more common," Cancian said.

Army Chief of Staff Gen. Mark Milley, a strong proponent of the round and new rifle, believes the weapon system will prove to exceed any military rifle in existence, and penetrate any body armor in use now and in the next 25 years.

"This weapon has an accurate range far in excess of any known existing military rifle today," Milley said during a speech at the Association of the United States Army's annual meeting in October in Washington, D.C.

The lethality branch team also is well aware of the issue of compatibility with the NATO round.

"We're not ignoring it," said Daryl Easlick, the branch's small arms deputy. "First of all, the U.S. Army is going to have 5.56 and 7.62 weapons systems for the foreseeable future."

Easlick and his team are in continuous contact with NATO allies. "They know what we're looking for and why we [want] different calibers. They understand it's threat-based, and that we're trying to improve our capabilities," Easlick said.

Also, NATO countries do not have the research-and-development capabilities inherent in the U.S. military, he noted.

"They sit back and watch what we do. Once we get the [research and development] out of the way they will … see about piggy-backing," Easlick said.

6.8 mm Remington special purpose cartridge

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Likewise, the team is aware of the concerns about efficacy at divergent distances. "Finding that balance in an acceptable way is the entire intent of the program," Easlick said. "An infantryman's engagement range is not fixed. Nor is it very predictable. He has to be proficient in that entire engagement band that he is subjected to."

Easlick noted that commercial, off-the-shelf products exist that can provide long-range fires. Such ammunition, he said, may not necessarily be suitable for other scenarios. These products tend to be specific in what they are designed to do, he said. That specificity may prove of little use under the stress and duration of combat.

Thompson said that comparisons of military-grade 6.8 and 5.56 ammunition with civilian ammunition of the same ilk are irrelevant. Commercial manufacturers make good products for consumers, but "they're not in the business of making bullets that kill our enemies," he said.

Adaptation of the new round and weapon will follow guidelines set forth by the Close Combat Lethality Task Force, the group of experts Defense Secretary James Mattis established last March to respond to what he sees as an erosion of close-combat capability as it relates to threats U.S. forces now face.

Improvement in training and equipment is one key element among many, Mattis believes, that is necessary to counter threats from adversaries that are becoming more capable at a pace the United States may not be able to match unless changes are made.

Mattis specifically ordered the task force to "identify or develop options for investment that include more lethal and discriminating individual weapons systems, while recognizing the imperative to lighten load for infantry squads."

Individual soldiers are carrying too much weight, Mattis' directive stated. The result is a negative impact on an infantry squad's ability to move, survive and destroy the enemy.

"This is all about the ballistics of a heavier bullet, moving at a high velocity," Easlick said. "We did look at multiple calibers, and determined that we [wanted] something somewhere between the 5.56 and the 7.62. That landed us in the realm of 6.5 to 6.8."

Based on that understanding, the team wants to emerge from the project with the right capability, and something that soldiers accept and use, and are able to do what they can do today with their automatic rifles, Easlick said.

> "This weapon has an accurate range far in excess of any known existing military rifle today."
>
> **Army Chief of Staff Gen. Mark Milley**

With testing likely to take place at Aberdeen Proving Ground, Maryland, Picatinny Arsenal, New Jersey, and other sites, Easlick and his team want to see how prototype weapons and ammunition fare as soldiers carry and use it on load effect assessment program courses, which are designed to assess the effects equipment and clothing have on performance.

"It's a measure to see if soldiers can do the same tasks in the same amount of time, or maybe a little less, based on what their load is," Easlick said.

The lethality branch performs such tests frequently, to conduct proof-of-concept assessments and ensure they are moving projects in the right direction. The 6.8 caliber round will undergo such tests, Easlick said, but the Army is choosing to keep the testing schedule close to the vest.

All of this is evolving, Thompson said, with a mindful effort to minimize costs and maximize value for the taxpayer. Hence, the initial focus is to deliver the new ammunition and weapon to the 100,000 soldiers who do 90 percent of the fighting.

"We need to have an overmatch for the soldiers who look into the eyes of the enemy," Thompson said. "The 6.8, and the Next-Generation Squad Weapon, will do just that." ND

New Wave of Night Vision Tech to Boost Soldier Lethality


ENVG-B

BY NICK ADDE

When Billy Fabian was serving as an infantry officer in Iraq a little more than a decade ago, the U.S. Army had a decided advantage when it came to pursuing the fight at night. It was not, however, without flaws. The goggles he and his fellow soldiers used were sophisticated, but simplistic. At times, they were ineffective.

Though they amplified ambient light, the goggles did not work in complete darkness. They were drowned out by bright light as well. Moreover, although the gear still provided a distinct advantage to troops who wore them, the tactical-advantage gap was closing. Insurgent forces were getting their hands on night-vision goggles. Additionally, soldiers who wore them would use infrared lasers to target adversaries bearing small arms — effectively providing these foes with an indicator of their enemies' locations.

Though much has changed since then, Pentagon leadership still views regaining the night-vision advantage as a critical goal. Defense Secretary James Mattis has prioritized improving the lethality of close-combat warfighters. Better night-vision goggle systems are a key element of the secretary's push. Though the armed forces and industry are making steady forward strides, challenges remain.

"A key question is, how do you balance performance with soldier load?" said Fabian, now a senior research fellow at the Center for Strategic and Budgetary Assessments, a Washington, D.C.-based think tank. "As our dismounted soldiers get more protection — body armor, etc. — as well as advanced optics such as night vision, it adds a lot of weight."

The next generation of night-vision technology will address these issues, Fabian believes. Such capabilities would amount to a "pretty huge step," he said. "All of the improvements would make the dismounted soldier and Marine more lethal and survivable."

The Army's soldier lethality cross-functional team, headquartered at Fort Benning, Georgia, is conducting the main work in advancement of night vision.

"We're looking at improvements across the board," said Col. Travis Thompson, the team's chief of staff for soldier lethality.

"With an increase in situational awareness, you may not have to call in on the radio to identify where friendly units are," Thompson said. "You're more likely to detect the enemy and be able to engage them in that close fight faster."

The Army wants new equipment that would increase field of view and depth perception for soldiers in a close fight, and allow soldiers to manipulate the gear "in quick order" when operating, for instance, inside a building, Thompson said.

The effort focuses upon moving toward a binocular system, to replace the monocular one that has been in use for roughly two decades.

Last June, the Army awarded L3 Technologies a three-year, $391 million contract to produce and provide the next-generation Enhanced Night Vision Goggle–Binocular (ENVG-B).

For its part, L3 is following the Army's "system of systems" approach, Lynn Bollengier, vice president and general manager for the company's warrior missions solutions division, said in a written statement to *National Defense*.

"There is greater integration amongst the equipment the soldier is carrying, much like the commercial world has integrated consumer products. As a result, our customers are very interested in next-generation and leap-ahead technologies that can improve lethality and reduce warfighter workload," Bollengier wrote.

L3's ENVG-B is a prime example. It would allow soldiers to view maps from the Army's Nett Warrior integrated situational-awareness system, as well as video from their weapons' sights.

Its binocular capability will increase field of view and depth perception for soldiers involved in close fighting, said Thompson. The visual itself also is changing to white phosphorus from the familiar green phosphorus.

"It will help us as we start to overlay [the display soldiers see] with color from augmented reality. SOCOM [Special Operations Command] soldiers have been using this for quite a few years," said Thompson.

Fused thermal capability would allow troops to have day-night capability that would function in all environments, Thompson said.

"If you look around a dark corner with no light, unless you have some [enhancement], you won't identify anything. With thermals, [objects will] stick out quickly," said Thompson. "You know the enemy is out there. You have to poke your head up to look for him, but the last thing you want to do is expose yourself to the enemy [and] you don't have a choice."

The technology, which would include augmented reality as well, has been available for combat vehicles like the M2/M3 Bradley fighting vehicle and M1 Abrams tank for awhile, but only now is making its way to the soldier level. Once it is available, the system would allow soldiers to view everything they would conceivably need to see while looking straight ahead.

No longer would they have to look downward to discern information, as they do with present systems. Besides a visual of what is in front of them, they would know their compass heading, locations of friendlies and potential enemies, and a host of other readings.

The first prototypes should make their way into the field sometime within the next 11 months. Which units would get them still has not been determined. Army Forces Command will make that call in due time, Thompson said. The

ARMY

idea is to place it among the dismounted troops who would need it the most — infantry, combat engineers, combat medics, special operators and scouts.

Also, the new devices would be issued to entire squads rather than two or three members, so that everyone is fighting at the same level of capability. Throughout the process, soldiers will provide their assessments of which components work well and which do not, he said.

A second system under development, the integrated visual augmentation system, or IVAS, would include significantly more sophisticated notification and identification capabilities than the current technology affords.

Instead of a goggle system through a tube, the new system would allow for what Thompson calls "true see-through display" — that is, goggles and glasses that include artificial intelligence and machine learning.

It would be more powerful and robust, but maybe slightly heavier because it entails two lenses instead of one. Still, developers are acutely aware of the weight factor and are working to make it more manageable.

"One system we're actually looking at [would determine] where we put chips to process information," Thompson said. If the soldier's head is closer to the data source, less energy is needed to transfer it from source to user.

"We're taking this holistic approach to power demand, the amount of power soldiers need, in a package that makes sense," said Thompson. "This whole process is not about the next, newest and coolest thing. It's about providing soldiers what they need on the battlefield today and in the future."

More details about the program should begin to emerge within the next two years, as the system is being developed.

Because the night-vision enhancement initiative would apply to Marines as well, the two services are working closely together and with Special Operations Command to ensure that such systems are acceptable to their missions.

"In the long term, we want improvements and capabilities and are working with the Army and SOCOM … to see where, we align and leverage with each other," said Billy Epperson, the Marine Corps' infantry weapons and optics capabilities integration officer.

"It's no secret that the PDS-14 (night vision monocular) we have currently deployed through the Marine Corps first entered the service with the Defense Department in the mid- to late-1990s," Epperson said. Input from Marines is essential, he added.

"We always have representatives from warfighters and operating forces as a voice — from the beginning all the way to final selection," Epperson said. "The last thing we want to do is field something they absolutely hate and refuse to carry."

Industry participants who are vying for roles in future night-vision development understand that their main goal is to enable individual soldiers and Marines to see better in the battlefield.

"When the [most recent] requirements for the enhanced night vision goggle came out, we immediately started developing a binocular system that would meet them," said Darrell Hackler, Harris Corp. senior director of global business development for night vision.

The team at Harris is applying its experience in infrared technology and light amplification to "turn night into day for operators," said Christian Johnson, who manages the company's Army account.

The Harris system incorporates image-squared technology — which the company touts as having superior capabilities than the past and current night-vision iterations.

"If there is no ambient light to be amplified, [the user] can switch to the thermal camera. Or, in an area where it's freezing cold and nothing seems to be giving off a thermal image, [it can] put in a thermal image," Johnson said.

With augmented reality technology, infantry troops would be able to garner navigational information such as compass headings, Johnson said. Goggle displays also would include a blue-force tracker, an indicator of air asserts on station, a means of marking target reference points, and the ability to share information and send text messages to fellow soldiers, Johnson said.

"U.S. forces will have a capability that no one else has," Johnson said.

Dave Smialek, director of business development, precision guidance and sensing solutions at BAE Systems, said: "The main issue we're trying to address is improvement for the soldier who is looking to see farther in the battlefield."

With its Enhanced Night Vision Goggle III and Family of Weapon Sights-Individual (ENVG III/FWS-I) systems, BAE also would provide sharp imagery through thermal technology and rapid target acquisition. Infantry fighters would be able to fire at foes without having to shoulder their weapons.

Each potential supplier of the next night-vision system would be expected to deliver a package that offers greater range, the ability to see through glass, and manageable weight and size — in addition to the aforementioned display enhancements, said Mark Cancian, a senior adviser specializing in international security with the Center for Strategic and International Studies in Washington, D.C.

"The problem we've always had in the past is weight and power. They're interesting technologies, but if they weigh too much and you have to plug in a battery every two hours, it's not very practical," Cancian said. "These new suites of systems will have to prove themselves in testing and on the battlefield."

What ultimately could determine how quickly new night-vision gear makes its way to ground troops has little to do with shaking down the technology, Cancian believes.

"The whole close-combat lethality initiative hinges on two things: One is Secretary Mattis sticking around. The other is budget and funding," Cancian said. "If one of those were to go away, it might take some of the impetus out of this initiative." ND

U.S. to Streamline Small Arms, Ammo Export Regulations

■ U.S. regulations are being rewritten to remove certain guns and ammunition from defense export controls. A plan has been proposed within the State Department to migrate articles on the first three categories of the International Traffic in Arms Regulations U.S. Munitions List to the less restrictive Department of Commerce's Export Administration Regulations in Spring 2019. The change is expected to become effective by Summer.

Whether the State Department will go so far as to rename the United States Munitions List, the "United States List" remains to be seen. The removal of certain guns and ammunition from the munitions list will be a big change for small arms manufacturers who will soon be able to sell to a number of countries with a lower licensing requirement.

The proposed amendment to the International Traffic in Arms Regulations, or ITAR, first appeared in notes on the Defense Trade Advisory Group meeting on Sept. 8, 2017. For those who don't live and breathe the trade regulations, this is the State Department's working group that provides the bureau of political-military affairs with a formal channel to consult the private sector on all things concerning munitions exports.

On May 14, 2018, the Department of Commerce's bureau of industry and security, in conjunction with the State Department's directorate of defense trade controls, published proposed rules regarding the amendment.

Under the proposed rules, certain articles under USML Categories I (firearms, close assault weapons and combat shotguns), II (guns and armament), and III (ammunition/ordnance) will be moved from the USML to the Export Administration Regulations' commerce control list. Those articles are mainly commercial and not military items. The proposed rule acknowledges that there is a significant worldwide market for firearms in connection with civil and recreational activities such as hunting, marksmanship, competitive shooting and other non-military activities; and that the proposed changes burden U.S. industry without any proportionate benefits to national security or foreign policy objectives.

American gun and ammunition manufacturers will have an increased capacity to reach a larger customer base without as many restrictions on the export of their products. U.S. firearm manufacturers and exporters will likely see a reduction in export compliance administrative burden. Arms sales from the United States will likely grow, and the nation will likely continue to hold and expand its share of the international small arms market.

As just one example of the reduced regulatory burden, firearm, ammunition and ordnance manufacturers would likely not have to register as ITAR manufacturers or exporters. That registration requires yearly renewal and the base cost of registration is more than $2,000. Thereafter, those exporters would not need to apply for ITAR export licenses, which are generally more difficult to obtain than EAR licenses, in order to sell their products to foreign countries.

The change in control does not equate to a free-for-all. The proposed rule creates 17 new export control classification numbers under the commerce control list to control the items moved from the munitions list, and the rule further revises several other numbers. In addition, certain Category II items will migrate to the "600 series" of the commerce control list. Those 600-series items generally require licenses for exports or reexports, except when the item is exported or reexported to Canada or, when operating under license exception, any of the countries party to the Strategic Trade Authorization.

Where a license is required, exporters will still need to apply for a license through the Simplified Network Application Process Redesign (SNAP-R) maintained by Commerce's bureau of industry and security. Customs will also continue to require exporters to file an electronic export information submission. Moreover, exporters will need to continue to control certain information related to the design, development, manufacture, operation and repair of articles still controlled under the State Department's trade regulation.

State Department and Department of Commerce parallel rules to implement the removal of firearms from the munitions list are in the proposed stage. The final regulations may be published around April. Those regulations will likely have a delayed effect with an effective date set in the months following the publication of the final regulations.

As ever, a company's approach to compliance will depend on its risk tolerance. In preparation for the finalized regulations, affected companies may choose to analyze their compliance controls and create logistics plans for exporting Category I, II, or III items under the new regulations.

It may be useful to examine current company procedures and operations to anticipate how to adjust business operations to adapt to the changes. Planning ahead may help companies realize compliance efficiencies and reduce administrative costs. It is important to note, however, that the U.S. firearms industry will remain regulated under the National Firearms Act, Gun Control Act, and other federal and state firearms laws. **ND**

Countries Party to the Strategic Trade Authorization

- Argentina
- Australia
- Austria
- Belgium
- Bulgaria
- Canada
- Croatia
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Iceland
- Ireland
- Italy
- Japan
- Latvia
- Lithuania
- Luxembourg
- Netherlands
- New Zealand
- Norway
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- South Korea
- Spain
- Sweden
- Switzerland
- Turkey
- United Kingdom

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ISTOCK

 BY ANDREW GUY, PETER B. HUTT II AND MIKE WAGNER

Courts Split on False Claims Act Deadlines

■ When does a private party need to file a qui tam action under the False Claims Act? Such a seemingly simple question has resulted in three different answers from six different courts.

On Nov. 16, the Supreme Court announced it would resolve that split by granting a request to review the Eleventh Circuit's decision in United States ex rel. Hunt v. Cochise Consultancy, Inc. The case will merit close attention, as the outcome could help protect government contractors from intentional and prejudicial delay in litigation.

Under the False Claims Act, the United States can bring a suit against a defendant accused of submitting false claims. In addition, a private citizen — known as a "relator" — can bring a qui tam action against that defendant in the name of the United States (31 U.S.C. § 3730).

The act includes a statute of limitations provision, 31 U.S.C. § 3731(b), which states that a civil action may not be brought: (1) more than six years after the date on which the violation is committed; or (2) more than three years after the date when facts material to the right of action are known or reasonably should have been known by the official of the United States charged with responsibility to act in the circumstances, but in no event more than 10 years after the date on which the violation is committed.

This provision has proven controversial. Imagine a relator who files a qui tam action more than six years after the alleged fraud — but the government only learned of the alleged facts two years ago. If the government declines to intervene in the case, can the relator nevertheless rely on the date that the government learned of the facts and argue that the action is timely?

The answer to this question has divided federal appellate courts and resulted in three distinct approaches. The first is that relators must file within six years. The Fourth Circuit, Tenth Circuit and Fifth Circuit have held that section 3731(b)(2) applies to the United States and not to relators. Therefore, relators must file their claims within six years of the alleged fraud.

As these courts have noted, the statutory language refers to the government's knowledge of "facts material to the right of action," and not the relator's knowledge. Accordingly, it would be absurd to apply such a provision when the government is not even party to the suit.

Moreover, it would lead to troubling outcomes. If the longer statute of limitations applied to relators, then they would have an incentive to withhold material facts from the government for as long as possible so that their potential financial recovery could grow.

In light of the statutory text and policy concerns, these appellate courts have refused to allow relators to rely on section 3731(b)(2).

A second approach is that relators can wait until three years after the date when facts are known to the government. Last year, the Eleventh Circuit in United States ex rel. Hunt v. Cochise Consultancy, Inc., ruled that a qui tam action in which the government has not intervened still constitutes a "civil action under section 3730," so relators can rely on the longer statute of limitations set forth in section 3731(b)(2).

This reading is difficult to square with the Supreme Court's recent decision in Graham County Soil and Water Conservation District v. United States ex rel. Wilson, in which the court explained that "[s]tatutory language has meaning only in context" and that Congress "sometimes used the term to refer only to subset of § 3730 actions." Thus, the court chose a more limited interpretation of the term.

A third approach is that relators can wait until three years after the date when facts are known to the relator. The Ninth Circuit and the Third Circuit have adopted an approach that falls somewhere in the middle. These courts are in agreement with the Eleventh Circuit that section 3731(b)(2) applies to qui tam actions. However, according to these courts, the relevant question is not when the government found out about the alleged fraud, but instead when the relator found out about the alleged fraud. Under this view, "because qui tam plaintiffs are merely agents suing on behalf of the government," they can be treated as government officials in these situations. Therefore, the statute of limitations begins after the relator — and not the government — learns of the relevant facts.

> "Under the False Claims Act, the United States can bring a suit against a defendant accused of submitting false claims."

The principal problem with the Ninth and Third Circuits' approach is that there is nothing in the text of the False Claims Act that suggests relators can be treated as government officials for purposes of section 3731(b)(2), and it is not clear that the Supreme Court will be eager to read such an interpretation into the law.

Hopefully, the Supreme Court will soon resolve these questions in a manner that will provide consistency and predictability to False Claims Act litigation. ND

Andrew Guy is an associate, and Peter B. Hutt II and Mike Wagner are partners at Covington & Burling LLP.

ISTOCK

AT THE HEART OF THE MISSION
NDIA
1919 2019

NDIA'S FOUNDING PURPOSE:

PREPARED FOR WAR, IN SERVICE OF PEACE

This is part one of a six-part series looking at the history of the National Defense Industrial Association as it celebrates its centennial year.

"Warfare since 1914 has undergone a tremendous evolution — the change from the mail and harquebuses of the Spanish conquest of the Americas to the ordnance known in the Civil War was not greater. The labor-saving machine has come into warfare, to the immense multiplication of the power of the individual soldier. Soldiers have become machine operatives."

— Brig. Gen. Benedict Crowell, *How America Went to War* (1921)

On April 2, 1917, President Woodrow Wilson addressed Congress to ask for a declaration of war against Germany. Four days later, America joined other allies in what revealed itself to be one of the bloodiest wars in its history.

America went to war with a great sense of mission to save Europe from tyranny, but it was unprepared for the task ahead. The Army was small and lacking in the essentials needed for the battlefields of France — recruits, armaments, munitions, equipment of all kinds.

This shortcoming reflected the nation's industrial base: strong, but unprepared for wartime production. It fell to America's allies to produce the necessary equipment. About 2.1 million American soldiers eventually served on the Western Front, but they fought using equipment produced overseas.

While the Central Powers were defeated in November 1918, many American military and business leaders remained troubled by the performance of the nation's industrial sector. What emerged was a growing resolve to rectify the situation permanently. The brightest light in this movement was Brig. Gen. Benedict Crowell, President Woodrow Wilson's assistant secretary of war and director of munitions.


Crowell

In October 1919, Crowell and Gen. Samuel McRoberts led a meeting of Army officers and manufacturing leaders at Aberdeen Proving Ground in Maryland to address America's lack of military preparedness. That same year, Crowell and his associates formed the Army Ordnance Association (AOA) to assist in "effecting industrial preparedness for war as being one of the nation's strongest guarantees of peace" and "stimulating interest in the design and production of ordnance material."

In his capacity as the AOA's first president, Crowell helped craft the National Defense Act of 1920. The shared goal: "To establish in statute the premise that in peacetime the Army had to maintain a close relationship with industry [which would] allow the Army to create the foundation to rapidly surge manufacturing from peacetime levels to those required in time of war."

That same year, Crowell resigned as assistant secretary of war. He co-authored *The Giant Hand: Our Mobilization and Control of Industry and Natural Resources, 1917-1918*, the first installment of *How America Went to War: An Account from Official Sources of the Nation's War Activities, 1917-1920*. The volume explored multiple failures of American industry, government and the military to cooperate effectively during the war. Such interaction, he argued, was vital to success and survival.

Over the next several years, Crowell and the AOA facilitated creative interaction between military and civilian arms designers and manufacturers. Rapid advances in military technology and corresponding changes in tactics underscored the importance of this endeavor.

But their efforts met with only mixed success. Isolationist citizens and their representatives in Congress weren't very interested in the issue of providing for a strong national defense. As a result, defense spending was slashed and the number of men in the armed services plummeted. In particular, the U.S. Army, which had numbered over 4 million at the end of the war, dwindled to 174,000 in the interwar period.

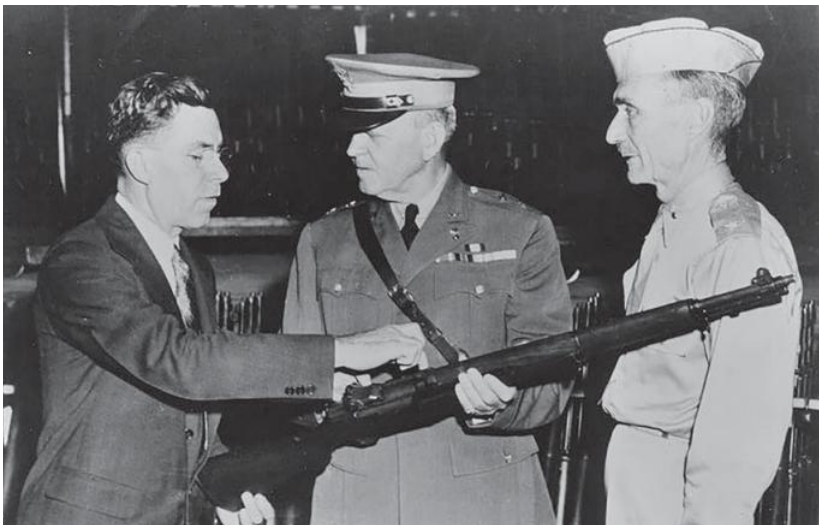
Crowell viewed these developments with growing concern. In 1929, he spoke of the need to "keep alive an interest in and knowledge of the design, production and maintenance of munitions" and cautioned that "in an emergency, time will not permit careful study or long preparation for the production of munitions."

The stock market crash of 1929 and the Great Depression forced further reductions in defense spending. Moreover, a growing isolationist mood blanketed the nation.

During the 1930s, Crowell and the AOA labored tirelessly to prepare America for war — to keep alive what Army Chief of Ordnance Lt. Gen. Levin Campbell characterized as a "feeble and flickering popular interest in national industrial preparedness." AOA local posts assisted the Ordnance Department in a range of national defense activities. These included conducting plant surveys that would guide rapid expansion in the event of an emergency; recruiting young men for reserve commissions in ordnance; providing ROTC training; inspecting work performed in government arsenals; and conducting wargames.

With the situation in Europe deteriorating, the AOA and ordnance procurement officers supported Congress in passing the so-called Educational Orders Act in June 1938. This measure authorized the secretary of war to place small orders with

DEFENSE DEPT.



John Garand, left, points out features of the M1 Garand rifle to senior Army officials. (1944)

A B-25 bomber component being assembled. (1942)

companies for "munitions of war of special or technical design . . . to familiarize [them] with the manufacture of such munitions." Educational Orders essentially taught competing manufacturers how to mass produce each other's designs, so they could collaborate on mass production should the need arise.

One of those "munitions of special design" was the M1 Garand semiautomatic rifle, a weapon that Lt. Gen. George S. Patton extolled as "one of the greatest battle implements ever devised."

The M1 became the standard U.S. Army infantry rifle of World War II, but production capabilities at Springfield Armory were not sufficient to handle the quantities the U.S. military would soon demand. An Educational Order was granted to Winchester, and by mid-1941 Winchester was producing over 100 rifles per day. By war's end, Springfield and Winchester had produced more than 4 million Garands.

This seemingly simple shift in policy and collaboration between military and industrial concerns marked a major shift in AOA's role helping America prepare for war.

World War II started on Sept. 1, 1939, with Germany's invasion of Poland. The conflicts in Europe and Asia prompted the United States to impose the first peacetime draft in its history.

On Dec. 29, President Franklin Roosevelt asserted that America must become the "great arsenal of democracy."

The Lend-Lease Act, which was passed in March 1941, confirmed America in this role. The new law paved the way for loans and donations of supplies to the nations that were battling German, Japanese and Italian aggression.

America's policy of armed neutrality became steadily more difficult to maintain. President Roosevelt continued buying time to garner support for entry into the war while mobilizing the U.S. industrial base. On May 27, 1941, Roosevelt proclaimed an "unlimited national emergency," and the nation began mobilizing in earnest.

Japan's attack on Pearl Harbor on Dec. 7, 1941, followed by the German declaration of war four days later, transformed America from the arsenal of democracy into an active participant on the side of the Allies.

U.S. industry, already in high gear, shifted into overdrive. In effect, the factories and workshops became a kind of battlefront that played a decisive role in the Allies' victory — a victory that would have been impossible without a highly skilled work force and the efforts of the AOA.

The association continued to serve America's warfighters through the rest of the 20th century, including the Korean and Vietnam wars, the Cold War, the invasions of Panama and Grenada, and the First Gulf War. Its mission remained the same, but its name changed to the American Ordnance Association (1948), then to the American Defense Preparedness Association (1973). In 1997, the organization merged with the National Security Industrial Association to form the National Defense Industrial Association, or NDIA.

Today, 100 years after the founding of its initial predecessor organization, NDIA has 1,600 corporate and 85,000 individual members at the center of a vigorous, responsive and collaborative community in support of defense and national security. As was the case a century ago, warfare is again undergoing tremendous changes, and these are taking place in all five domains: air, sea, land, space and information. Warfighters are no longer merely "machine operatives," as Crowell once wrote, but also operators of advanced digital technology.

In keeping with Crowell's original vision, NDIA continues to work with industry and government to keep pace with those changes for the purpose of maintaining a strong defense and providing American warfighters with the means to meet and succeed in addressing the nation's evolving challenges. **ND**

— Article provided by The History Factory

LIBRARY OF CONGRESS

 BY JOHN HANSON

Reasons to Outsource a Chief Compliance Officer

■ The outsourcing of high-level management functions is nothing new. It has been done with chief financial officers, general counsels, internal audit, IT, and even CEOs and chief operating officers for decades.

Similarly, some small- to mid-sized government contractors are finding that outsourcing the chief compliance and ethics officer (CCEO) role is more effective, both as to cost and effectiveness, than hiring one internally. One estimate states that nearly a quarter of firms outsource some or all of their compliance functions.

A contractor may be required by Federal Acquisition Regulation 52.203-13 to have a corporate compliance and ethics program. According to a 2017 survey, the average annual total compensation of a CCEO in the aerospace and defense industry is $198,000, a hefty price for a small- to mid-sized company. Moreover, finding an experienced person to fill that role who really understands what constitutes an effective program, and who has some degree of credibility with government agencies, can be very difficult.

There are several reasons why outsourcing the role may be the better solution. One is immediate confidence in the compliance expert and the expert's advice by stakeholders. Stakeholders may be aware of the current lack of in-house skills and want better assurance regarding the company's compliance measures and program.

Another is trust among the regulators. An independent, objective, third-party compliance professional may give government officials more confidence in a company's program and demonstrate its commitment to invest in ethics and compliance. This is one of the primary reasons government agencies may require a company to engage an independent corporate monitor when resolving issues involving misconduct.

It might also save time and money. Because the outsourcing of the function may be done using flat monthly rates, the company benefits from more accurate costs for budgeting, as well as on-demand expertise for: compliance policy drafting/revising; training and guidance; hotline investigations; compliance and ethics risk assessments; auditing and monitoring; and reporting — all without the added costs of recruiting, training, orientating, supporting and managing internal compliance staff.

The monthly cost of outsourcing the chief compliance and ethics officer role to an expert can be significantly less than hiring an experienced professional in-house.

Companies should also appreciate that having just a code of conduct, some policies and trainings do not constitute an effective compliance program. Things are made a bit more complex for government contractors in that the Federal Acquisition Regulation provides little to no precise guidance or specifics on how to comply with the mandatory requirements of FAR 52.203-13, and contracting officers and other relevant agency personnel are poorly — if at all — trained on what constitutes effective compliance.

FAR Subpart 3.10, "Contractor Code of Business Ethics and Conduct," obliges all government contractors, regardless of their size, to conduct themselves with the highest degree of integrity and honesty. It further states contractors should have a written code of business ethics and conduct. To promote compliance with the code, contractors should have an employee business ethics and compliance training program and an internal control system that: are suitable to the size of the company and extent of its involvement in government contracting; facilitate timely discovery and disclosure of improper conduct in connection with government contracts; and ensure corrective measures are promptly instituted and carried out.

To ensure that a compliance program meets the FAR requirements and helps protect the company from other enforcement risks, it is best to design and implement one in accordance with §8B2.1 of the U.S. Federal Sentencing Guidelines. This will be what a government contractor's compliance with the Federal Acquisition Regulation will be tested against by agency suspension and debarment officers.

In addition, companies may be vicariously liable for the actions of their employees, subcontractors and others. Should misconduct occur, a company that does not have an effective compliance and ethics program is exposed to corporate criminal and civil liability, as well as suspension and debarment from all federal government contracting.

> "Companies may be vicariously liable for the actions of their employees, subcontractors and others."

Overall, §8B2.1 has two primary requirements for companies: exercise due diligence to prevent and detect criminal conduct, and otherwise promote an organizational culture that encourages ethical conduct and a commitment to compliance with the law.

To meet these objectives, §8B2.1 identifies and elaborates on seven essential elements of an effective compliance and ethics program: standards of conduct, policies and procedures; a compliance officer and committee; education and training; monitoring and auditing; reporting and investigating; enforcement and discipline; and response and prevention.

Small- to medium-sized federal government contractors should seriously consider outsourcing the compliance function — at least for a while. Designing and implementing a compliance program that is effective and meets requirements takes a lot of time, resources and expertise. By bringing in an expert to get the program up and running well — which should take 12 to 18 months — the company can then consider recruiting a compliance professional to work in-house as the chief compliance and ethics officer, or continue outsourcing the role. ND

John Hanson is the executive director of Artifice Forensic Financial Services, a consultancy providing services in the areas of forensic accounting/fraud examinations, corporate compliance and ethics programs, and independent corporate monitoring.

NTSA Bestows Awards For Excellence in Training

Retired Rear Adm. Jim Robb, president of the National Training and Simulation Association, left, presents Tony DalSasso, right, with the 2018 Governor's Award for Lifetime Achievement in Modeling & Simulation.

The National Training and Simulation Association — an affiliate of the National Defense Industrial Association — recently presented a number of awards for excellence.

NTSA presented its annual Modeling & Simulation Awards, as well as the 2018 Governor's Award for Lifetime Achievement in Modeling & Simulation, at a dinner on Nov. 27. NTSA President retired Rear Adm. James Robb, bestowed awards in the acquisition, education/human performance and training/simulation categories to a diverse group of teams tackling an array of tough problems, ranging from large-scale live-virtual-constructive military training exercises to canine medical simulators to the training of police officers in detecting drunk drivers.

The 2018 Governor's Award was presented to Tony DalSasso, chief engineer of the simulators program office at the Air Force Life Cycle Management Center at Wright-Patterson Air Force Base, Ohio.

DalSasso has dedicated 37 years of his professional career to the significant evolution of modeling and simulation for warfighters' training systems. From his early work on visual databases and standards for simulator geospatial data, through the development and management of numerous systems, the story of training system capability advancements cannot be told without mentioning DalSasso's exceptional technical contributions and his leadership in continuously improving the acquisition process. During his time as chief engineer, the simulations program office has grown from around 200 personnel to an organization with over 500 people supporting 50-plus programs.

The M&S Award for acquisition went to the K9 Diesel Design and Fielding Team. The team is recognized for exemplary government-industry collaboration in the rapid development and acquisition of the K9 Diesel Advanced Operational Medical Simulator. Leveraging innovative contracting strategies, imaginative design, cost-saving technologies and singular vision, the team created a high-fidelity, modular canine simulator in less than 18 months that greatly improves veterinary professionals' and first responders' ability to save working dog lives while advancing medical simulation art and science.

The M&S Award for education/human performance went to the Individual Nystagmus Simulated Training Experience, or INSITE, team, which consisted of the University of Texas at Dallas, Sam Houston State University and Eye T Plus. INSITE is a virtual human simulation to help police identify one of the strongest impaired driving clues — horizontal gaze nystagmus. Officers in advanced roadside impaired-driving enforcement training sessions indicated that INSITE greatly increased confidence in HGN test performance, technique and ability to make an arrest decision. INSITE is positioned to help educate up to 500 officers this year alone.

NTSA awarded two M&S Awards for training and simulation. One went to Cubic's secure LVC advanced training environment team. Cubic's air combat training system was validated during testing with the Air Force Research Laboratory and Naval Air Systems Command's SLATE Advanced Technology Demonstration. Cubic delivered a Technology Readiness Level 8, high-fidelity, interoperable, multi-level secure LVC system eight years ahead of Defense Department schedules.

The other award went to U.S. Air Forces in Europe-Air Forces Africa's Warrior Preparation Center Distributed Training Center (DTC). The organization experienced meteoric growth over the course of 2018. The DTC expanded its coalition training capacity with construction of a new exercise facility and acquisition of a number of simulators. Additionally, the DTC increased exercise throughput with several tactical exercises.

During NTSA's Interservice/Industry Training, Simulation and Education Conference in Orlando, Florida, the association awarded its best paper to Jeanette Lin, principal software engineer at Collins Aerospace, for "Understanding Cloud-based Visual System Architectures."

Kevin F. Hulme, a senior research associate at the University at Buffalo, along with co-authors and graduate students Emmanuel Gil Torres of Purdue University, Christopher Hendrick of Pennsylvania State University and Shathushan Sivashangaran of the University at Buffalo were awarded best tutorial for "The Science of Thrills: M&S in the Entertainment Industry." ND

EPNAC, WID MICHIGAN CHAPTER

Women In Defense's Michigan Chapter Hosts 10th Annual Gala

Members of the Women In Defense Michigan Chapter pose for a photograph at the organization's 10th Annual Gala honoring female leadership in national security. The gala took place Nov. 9 at the Royal Park Hotel in Rochester, Michigan.

NDIA CALENDAR

JANUARY

8 Procurement Division Meeting
Washington, DC
NDIA.org/ProcureJan

10 NDIA Washington, D.C. Chapter Defense Leaders Forum Breakfast With Gen. Mark Milley, 39th Chief of Staff, U.S. Army
Arlington, VA
NDIA.org/DCBreakfast

22 The Embassy/Defense Attaché Luncheon Series Featuring Sweden's Maj. Gen. Bengt Svensson
Washington, DC
NDIA.org/AttacheSeriesJan19

29-30 2019 SLAAD Quarterly Meeting
Tucson, AZ
NDIA.org/SLAADJan

FEBRUARY

3-5 Tactical Wheeled Vehicles
Monterey, CA
NDIA.org/TWV19
See ad on page 41

5-7 DSAM
Monterey, CA

5-7 30th Annual SO/LIC Symposium & Exhibition
Arlington, VA
See ad on page 42

6-7 2019 Winter IPM Division Meeting
Palm Bay, FL
NDIA.org/IPMWinter19

7 Electronics Divison Meeting
Arlington, VA
NDIA.org/ElectronicsDivfeb

11 TRIAD
Nashville, TN
NDIA.org/events
See ad on page 43

NTSA
11-15 2019 Simulation Innovation Workshop (SIW)
Orlando, FL

13-14 Manufacturing Division Meeting
Atlanta, GA

21 CBRN Defense Roundtable Breakfast
Arlington, VA

NTSA
25 M&S Leadership Summit
Norfolk, VA
NDIA.org/MSLeadership

26-27 First Coast Chapter Amazing Grace - Defense Innovation Event
Jacksonville, FL
NDIAFirstCoastAmazingEvent.com

27 NDIA Patuxent River Speaker Series
Patuxent River, MD

MARCH

5-6 National Health Symposium
Laurel, MD
NDIA.org/NHS

12-14 Hypersonics Capabilities Conference
West Lafayette, IN
See ad on page 43

13-14 Mastering Business Development Workshop
Arlington, VA
NDIA.org/MBDMarch

18-20 Security Cooperation Management Industry Course
Arlington, VA
NDIA.org/SCMIC

25-27 Undersea Warfare Technology Spring Conference
San Diego, CA
NDIA.org/uswspring

26-27 Cyber-Augmented Operations Division Spring Conference
Austin, TX
NDIA.org/CAOSpring

PSA
26-27 Precision Strike Annual Review (PSAR-19)
Arlington, VA
PrecisionStrike.org

APRIL

1-3 Munitions Executive Summit
Parsippany, NJ

2-4 20th Annual Science & Engineering Technology Conference
San Diego, CA
NDIA.org/SET19

10-11 35th Annual National Logistics Forum
Tampa, FL
NDIA.org/Logistics19

16-17 Human Systems Conference
Aberdeen, MD
NDIA.org/HumanSystems19

NTSA
22-24 MODSIM World 2019
Norfolk, VA

24-25 Robotics Conference & Exhibition
Columbus, GA
NDIA.org/Robotics

30-May 1 2019 Spring IPM Division Meeting
Dulles, VA
NDIA.org/IPMSpring

MAY

NTSA

7 2019 Simulation & Training Community Forum
Fairborn, OH

8-9 Agile in Government Summit
Washington, DC

10 Washington D.C Chapter Swing For Freedom Golf Invitational benefitting the USO-Metro
Clifton, VA
NDIAdcgolfuso-metro2019.eventbrite.com

13-15 34th Annual National Test & Evaluation Conference
Fort Walton Beach, FL

13-15 62nd Annual Fuze Conference
Buffalo, NY
NDIA.org/Fuze19

14-15 Annual Ronald Reagan Missile Defense Forum
Washington, DC

NTSA

14-16 ITEC 2019
Stockholm, Sweden

16 U.S.-Sweden Defense Industry Conference
Washington, DC
NDIA.org/Sweden

20-22 2019 Joint NDIA/AIA ISC Spring Conference
Orlando, FL
NDIA.org/ISCSpring

20-23 SOFIC
Tampa, FL

22-23 Iowa-Illinois Chapter 12th Annual Midwest Government Contracting Symposium
Moline, IL

JUNE

3-6 Armament Systems Forum
Fredericksburg, VA
NDIA.org/Armaments19

NTSA

12-13 Training & Simulation Industry Symposium (TSIS) 2019
Orlando, FL

WID

13 WID National Conference
Arlington, VA
WomenInDefense.net/WIDConference19

26-27 Manufacturing Division Meeting
Washington, DC

2019 TACTICAL WHEELED VEHICLES

WHY ATTEND?
This conference is recognized industry-wide as the premier event focused on the tactical wheeled vehicle industry and its support to the Department of Defense and our nation's warfighters. The information and dialogue which will be presented is invaluable to all organizations which play a role in the design, development, innovation, acquisition, production, delivery and sustainment of tactical wheeled vehicles to our government customers.

Feb. 3-5 | Monterey, CA
NDIA.org/TWV19

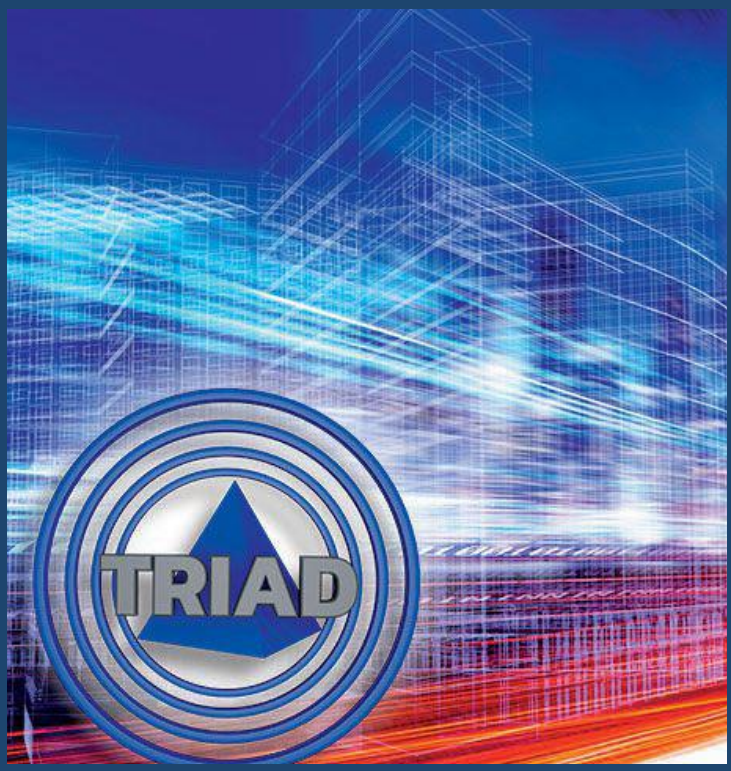
30TH ANNUAL SO/LIC SYMPOSIUM & EXHIBITION

ONE SOCOM, SYNCHRONIZING POLICY, MODERNIZATION, AND OPERATIONS

For 17 years — and counting — of combat operations, the business of special operations has evolved through policy, technology and lessons learned. Emerging threats from near-peer adversaries, changes in administrations, politics and policy all challenge stakeholders in unique ways. Through it all, it remains one SOCOM.

The 30th Annual SO/LIC Symposium and Exhibition will focus on that entire, singular SOCOM enterprise. Operators' success is dependent on collaboration among all contributors, whatever their roles or means of mission.

Feb. 5–7 | Arlington, VA | NDIA.org/SOLIC19



TRIAD

The Tri-Association Small Business Advisory Panel (TRIAD) was formed in 1967 to coordinate the efforts of small business subcontracting representatives. It was formed to serve the best interests of the industry associations and their member companies, affected government agencies, and the small business community.

The meeting provides an opportunity to exchange pertinent information concerning small and diverse business utilization, legislative changes and its impact on government prime contractors.

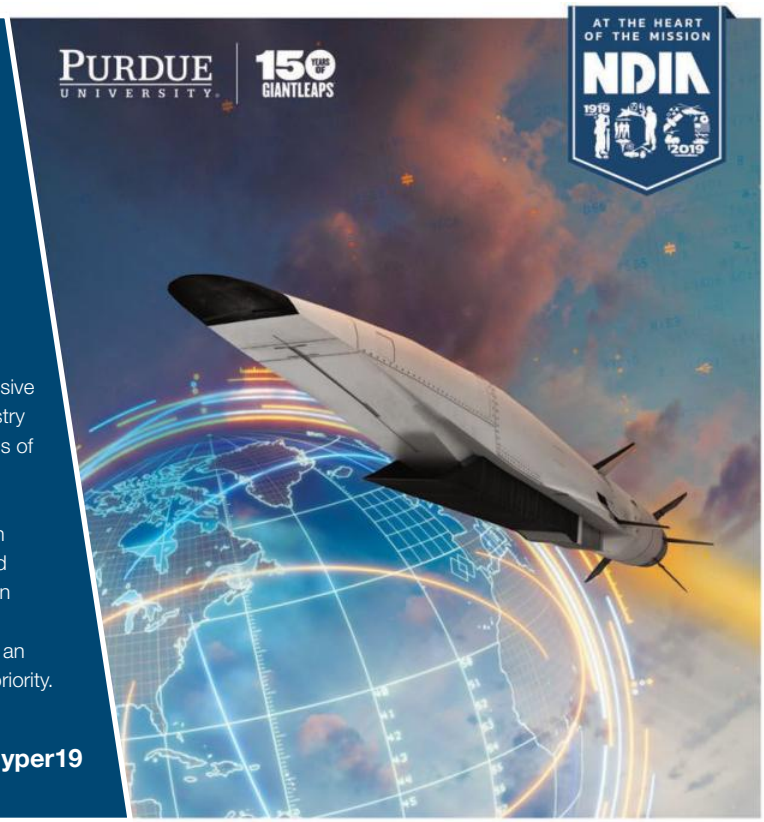
Feb. 11 | Nashville, TN
NDIA.org/events

2019
HYPERSONICS
CAPABILITIES CONFERENCE

ENABLING TECHNOLOGICAL SUPERIORITY: DEFINE. DEVELOP. DELIVER.

NDIA, in partnership with Purdue University, will host a comprehensive program on hypersonic systems. Together with government, industry and academia partners, NDIA will present the technical foundations of hypersonic systems, the current approach to rapidly developing hypersonic capabilities, and the warfighter, policy, and acquisition perspectives to delivering a sustainable operational capability. With keynotes from military, government and congressional leaders, and insightful presentations from industry, policy leaders and acquisition executives, this program will emphasize the importance of joint collaboration in technology development and acquisition to create an affordable and sustainable capability in a critical national security priority.

March 12-14 | West Lafayette, IN | NDIA.org/Hyper19



Next Month

Network Communications

■ The Army is testing a new command post environment that will consolidate multiple applications into one system. During the latest Network Integration Evaluation, soldiers said the system is simplifying communications and maximizing collaboration.

Radios

■ Revamping its network is one of the Army's top modernization priorities as it prepares for great power competition. *National Defense* will look at software-defined radios and other technologies that the service wants to better connect its forces.

Body Armor

■ Improving the survivability of close-combat troops is a top priority for the Defense Department. However, body armor can be bulky and add even more weight to the dismounted warfighter's already heavy load. The military and industry are working on new materials and other solutions to protect troops and enhance their effectiveness.

Autonomous Convoys

■ The Army has set its sight on an autonomous convoy capability for years. Now, the prime contractor for the initiative is working towards a potential operational task demonstration in 2020.

All-Terrain Vehicle

■ As the military turns its attention towards operating in cold conditions, such as in the Arctic Circle, the Army is looking to acquire a new purpose-built vehicle that will allow it to maneuver through deep snow and rugged conditions. The service's previous system has been said to be at the end of its life expectancy.

Electric Propulsion Systems

■ The U.S. military has for years worked to advance electric vehicle technology that will benefit not only propulsion systems but the entire electrical architecture of a platform. Efforts have so far yielded lighter weight systems with increased capability.

JANUARY 2019 Index of Advertisers

Interact with the companies whose products and services are advertised in *National Defense*.