Government Business Council

MILITARY PERISCOPE

FORECAST INTERNATIONAL

Insider Insights

Key Defense Industry Trends and Projections

July 2023

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INTRODUCTION

Rising geopolitical tensions, active military conflicts, and new innovations have ensured that the defense industry is constantly evolving. To help navigate this intricate landscape, we asked GovExec defense experts for their thoughts on some key questions. This report includes their insights along with supplemental articles and data.

EXPERTS

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EXPERT INSIGHTS

1. What is one trend that you're seeing pop up most often in the defense industry?

Dan Darling

Director of Military and Defense Markets, Forecast International

DAN'S ANSWER:

Currently, the main trend involves supply chain pressures on the U.S. defense industrial base. The obvious reason is the ongoing war in Ukraine. Support for the effort has involved drawing older equipment and ordnance reserves from existing Army stockpiles. Munitions are being spent on the Ukrainian front at rates far exceeding normal lean-production/just-in-time delivery models exercised by industry in recent years. The Russia-Ukraine war is showcasing just how unprepared the U.S. is for state-on-state high-intensity industrial warfare and the requisite scaling up of capacity and sourcing of necessary materials needed to conduct successful operations versus a peer foe.

A second order effect is a rise in demand for U.S.-sourced hardware, particularly in the case of the Lockheed Martin M142 High Mobility Artillery Rocket System (HIMARS), whose success in combat operations in the Ukrainian theater has resulted in greater interest in acquiring the system among NATO partners. Demand is now outpacing production capacity, with one close Washington ally — Poland — moving to plug immediate firepower requirements through an industrial cooperation agreement with South Korea.

But the reality is that the U.S. has been outsourcing its own defense industry supply chain for years and now finds itself confronting a national security risk. And while an influx in investment by the Pentagon will help ramp

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up munitions production in the near-term, vulnerabilities will persist without significant concerted effort between government and industry.

A hot war with China will likely result in the loss of at least one aircraft carrier, multiple surface warships and significant numbers of combat aircraft. Missiles and rockets and loitering munitions would be fired at extraordinary rates. Right now, replacing any of these under current production capacity and cycles would prove to be extremely insufficient.

Jeremiah Cushman

Senior Editor,
Military Periscope

JEREMIAH'S ANSWER:

Command and control, communications and information management have become of increasing importance to armed forces preparing for the battlefields of the future. The need to link previously disparate systems to build comprehensive situational awareness, protect data moving among different units and precisely strike adversaries, whether militants with assault rifles, tanks or various aerial threats, has militaries looking at new capabilities and equipment that can meet these demands. While this has always been a demand on the battlefield, there is growing readiness to invest in the latest capabilities.

The U.S. military services are pursuing their own capabilities, while also seeking to ensure that communication systems across the armed forces can work together, something that has not always been the case. The ambitious Joint All-Domain Command and Control (JADC2) program to link all sensors and shooters receives a lot of attention, but lower-level systems may be more important in the immediate future. The Army, for example, is preparing to field the Integrated Air

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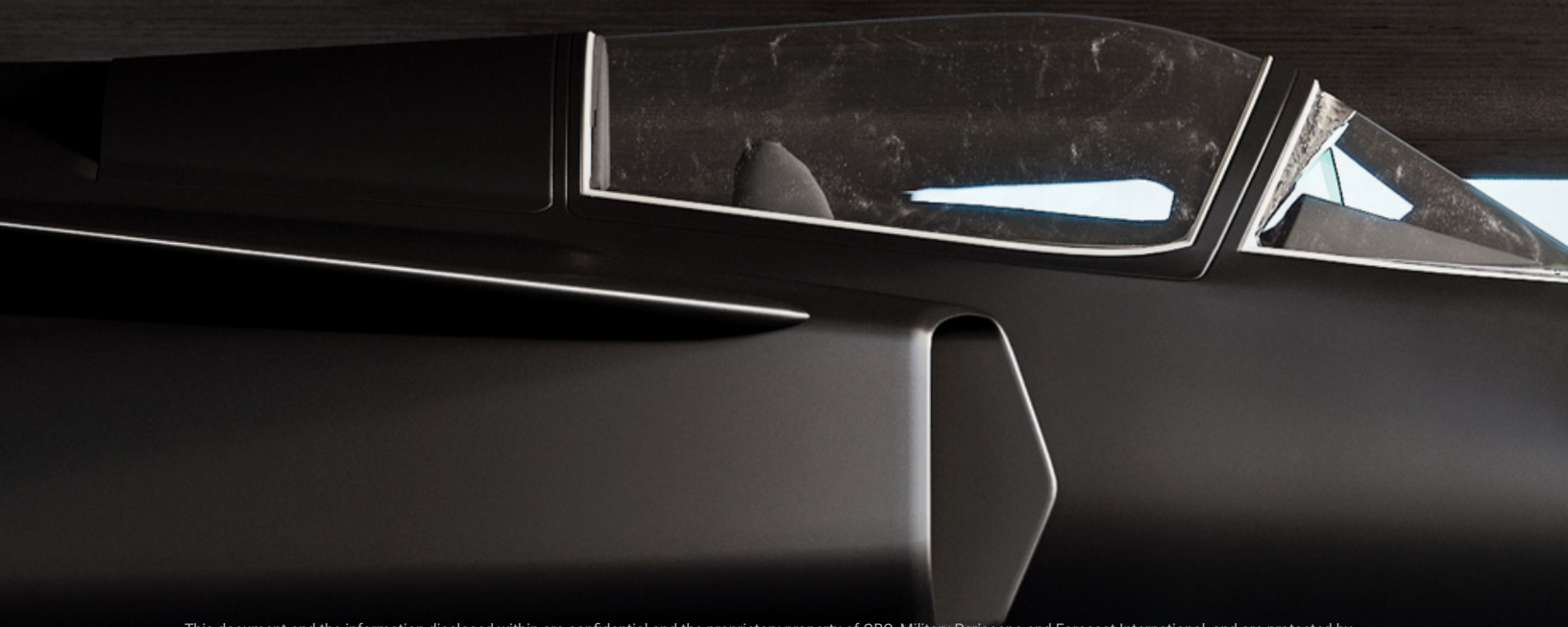
and Missile Defense Battle Command System (IBCS) to link its air and missile defense systems. The IBCS has been exported to Poland. Ensuring such systems can also communicate safely with allies is an important consideration since most future conflict scenarios envision working with coalitions at some level.

Cybersecurity is an important element of these capabilities. Cyber threats range from adversaries seeking to steal or disrupt the development of all types of equipment to seizing control of hostile drones or other vulnerable systems. Hardening military, civilian and industrial systems against such threats, which can change rapidly, will be important for future battlefield success.

Finally, the military is working on artificial intelligence tools to help human operators sort through the vast quantities of data gathered by increasingly sophisticated and linked intelligence and surveillance systems. Managing data, whether on the battlefield or in the Pentagon, is a growing challenge. Current AI tools may be best positioned to enable efficiency across the defense enterprise in areas that don't garner headlines but are nonetheless vital.



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David Hutchins

Senior Industry Analyst, Government Business Council

DAVID'S ANSWER:

The number one defense industry trend that I've witnessed is the increased focus on China as a potential military adversary and the subsequent emphasis on deterrence. The Pentagon recognizes China as a pacing challenge that has become increasingly ambitious as it seeks to rival the U.S. as a global superpower. While competition between the two powers is currently being waged via non-kinetic means — economic competition over resources, geopolitical alliances, strategic financial investments, etc. — there is a growing concern that military conflict with China is on the horizon. In fact, the 2022 National Defense Strategy places a primary focus on the need to sustain and strengthen U.S. deterrence against China, particularly in the Indo-Pacific region where China's coercion is most acute.

Even as the U.S. supports Ukraine in an ongoing conflict with Russia, Washington has one eye firmly focused on the Indo-Pacific. As emphasized by the Biden Administration's Indo-Pacific Strategy, Washington plans to counter China's growing assertiveness in the region by strengthening its relationship with regional partners — such as Taiwan, Japan, South Korea, the Philippines, Thailand, India, Australia, and New Zealand. To bolster these relationships, the U.S. has ramped up combined military drills, increased arms trade, and stationed additional troops in the region.

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The DoD also aims to deter China by enhancing capabilities within the U.S. Indo-Pacific Command (USINDOPACOM). For example, the Marine Corps plans to increase its effectiveness in the Indo-Pacific by transitioning back to its roots of amphibious assault under Force Design 2030. More broadly, Congress is investing billions to enhance U.S. deterrence and defense in the Indo-Pacific through the Pacific Deterrence Initiative. The U.S. is of course not alone in this trend. The elevated risk of conflict in the Indo-Pacific has led to the increased defense spending of several countries in the region, most notably China, India, and Japan which together accounted for 73% of regional military spending between 2021 and 2022.

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EXPERT INSIGHTS

2. Are there any trends that you'd like to see get more attention?

Dan Darling

Director of Military and Defense Markets, Forecast International

DAN'S ANSWER:

The U.S. Navy's shipbuilding woes represent a longstanding concern for shipbuilders, policymakers, and Navy planners alike. While these woes are reported on regularly, another major issue — the potential impact of underestimated costs — often falls off the radar.

Year after year, the Congressional Budget Office (CBO) says the Navy is significantly underestimating the cost of its long-term shipbuilding plans. In the 2022 report, which assessed the Navy's fiscal year 2023 (FY23) shipbuilding request, the CBO found the service was underestimating shipbuilding costs by up to 18 percent. This gap raised serious concerns about an updated shipbuilding strategy that is already being received negatively by Congress.

The FY24 shipbuilding plan includes three alternative options, two of which fall short of ever reaching the Navy's goal of attaining a fleet of 355 battle force ships of varying types and classes. Only one of the proposed alternatives would meet that goal, but it would require investments in industrial expansion that aren't even covered in the strategy document. The baseline plan supported by the president's FY24 budget would only achieve a 331-ship maximum, and that comes with rosy assumptions regarding programs remaining on time and within budget — generally a longshot expectation. The Navy's shipyard modernization cost estimates also elicit dispute with the Government Accountability Office calling them "wildly off point."

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When viewed in full, such discrepancies raise serious questions about the U.S. Navy's ability to not only maintain its current fleet, but to build to a capacity necessary to counter the growing might of China's own naval modernization. By 2021, the Congressional Research Service estimated that China had 348 ships and submarines in service, versus the aforementioned 296 battle force ships for the U.S. Navy. That gap only continues to widen.

Jeremiah Cushman

Senior Editor,
Military Periscope

JEREMIAH'S ANSWER:

I think a lot of the discourse on AI in the military is swept up in sci-fi visions of autonomous combat vehicles and swarms of drones when the most important tools may be behind the battlefield. In the near future, well-trained AI tools will make it easier to consolidate and understand vast quantities of information to inform decision-making of all kinds. On the battlefield, leaders may have AI decision aids that offer different courses of action based on the latest data from a variety of sources. Farther up the chain, similar tools may help commanders more quickly react to adversary actions or plan operations.

On the backend, such tools may help logistics personnel manage fuel, ammunition, parts and everything else that helps a military force move; monitor equipment; and ensure that stuff gets to where it is needed in the fastest, most efficient way. AI tools that help reduce administrative loads may also allow military forces to reduce personnel in the tail, freeing up troops for combat tasks. It just may be that AI will have the greatest impact on defense in areas that do not get much public attention.

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David Hutchins

Senior Industry Analyst, Government Business Council

DAVID'S ANSWER:

I'd like to see the DoD's push for alternative energy generation and storage get more attention. From powering military bases to fueling vehicles, aircraft, and ships, energy is essential to every aspect of military operations. It's no secret that the Achilles heel of modern militaries — including the United States — is their reliance on fuel. Using approximately 30 terawatt-hours of electricity per year and more than 10 million gallons of fuel per day, the DoD is the largest institutional consumer of energy in the world. The Air Force alone consumes roughly two billion gallons of jet fuel annually. Moreover, the DoD's energy consumption is only expected to increase due to the anticipated electrification of the non-tactical vehicle fleet and the maturation of future energy-intensive capabilities.

To avoid being hamstrung by a reliance on fossil fuels, the DoD is implementing more hybrid and electric propulsion systems — such as the Navy's hybrid drive ships — and investing in alternative energy sources. The DoD is also seeking to leverage new technologies that enable warfighters to generate, store, and use renewable energy sources, both inside and outside of combat zones. For example, the U.S. military is already experimenting with solar blankets, hydrogen-based fuel cells, and body-worn energy harvesting equipment that can charge radios, night vision optics, tablets, and communications equipment while in the field. Ultimately, the ability to harness alternative energy sources and reduce dependency on fossil fuels will likely prove advantageous in the years to come.

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EXPERT INSIGHTS

3. What will be the most important defense system in the next few years and why?

Dan Darling

Director of Military and Defense Markets, Forecast International

DAN'S ANSWER:

With the proliferation of cheaper unmanned aerial systems (UASs) and loitering munitions, the aerial battlespace has been drastically altered. The U.S. has long been accustomed to control of the skies in its military operations, with the last American ground troop casualty from enemy aircraft occurring on April 15, 1953, at the end of the Korean War. But with low-cost UASs and loitering munitions proliferating in military theaters from Nagarno-Karabakh to Ukraine, the risk to ground forces from small, undetectable drones continues to increase.

Swarms of small, munition-carrying drones present challenges for ground and naval forces alike and create vulnerabilities for critical infrastructure, fixed strategic posts, and mobile forces. Furthermore, intelligence-surveillance-reconnaissance (ISR) collection from mini-UASs provides enemy forces with early warning and location information creating another layer of increased risk for U.S. forces. Therefore, development of reliable counter-UAS (C-UAS) capabilities — whether involving standalone systems or an interwoven collection of systems — becomes an essential military requirement from the strategic down to the tactical level.

In addition to kinetic options, work is underway on defeating UASs by using various forms of directed energy, like lasers and microwave bursts. Envisioned as a more affordable option, directed energy can potentially be used more effectively against drone swarms than their kinetic counterparts.

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Jeremiah Cushman

Senior Editor,
Military Periscope

JEREMIAH'S ANSWER:

The development of "loyal wingman" type uncrewed vehicles (air, ground and sea) has the potential to significantly change how we plan and conduct military operations. Attritable platforms with roles from intelligence, surveillance and reconnaissance to electronic warfare and weapons carrier, will enable new tactics, with the goal of better protecting crewed systems and reducing costs. It will require a new comfort with losing equipment to achieve missions and finding the balance between autonomy and human control.

Such systems appear to be most advanced in the aerial domain, with the U.S. B-21 stealth bomber and Next-Generation Air Dominance (NGAD) fighter and European Future Combat Air System (FCAS) programs all relying on relatively autonomous drones to accompany the crewed aircraft.

The U.S. Navy has been using autonomous underwater vehicles for years and has begun experimenting with larger surface vessels, while European navies have begun moving toward motherships hosting various autonomous vehicles for mine warfare missions.

On the ground, there has been significant work on uncrewed vehicles for various missions from cargo transport and medical evacuation to weapons carriers and mine-clearing. Small drones have been used for tactical reconnaissance for some time but larger vehicles capable of more complex missions have yet to make it to the battlefield. Concerns remain about the control of weapon systems on such vehicles.

Nevertheless, as technology continues to develop, more of these systems can be expected to be fielded, changing how battles are fought and creating new challenges for militaries around the world.

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David Hutchins

Senior Industry Analyst, Government Business Council

DAVID'S ANSWER:

I am confident that autonomous systems will be the most important defense systems in the years to come. Robotics and drones are already widely used for military purposes. However, fully autonomous systems represent the future of warfare and will be essential to prospective military operations as the technology advances and proliferates around the world.

Autonomous systems offer advanced speed and precision and can replace human operators for a variety of mission sets from analyzing data to piloting vessels. These systems reduce risk to human life while also offering a more versatile — and potentially cheaper — alternative to long-range munitions. Through the development of robotic combat vehicles (RCVs), unmanned surface vessels (USVs), unmanned underwater vessels (UUVs), unmanned aircraft systems (UASs), and man-portable drones, autonomous systems are rapidly becoming an integral part of military operations. As the U.S. military experiments with drones on land, in the air, and at sea, the development of fully autonomous systems is the logical next step in military robotics.

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EXPERT INSIGHTS

4. What will be the most important defense modernization priority in the next few years and why?

Dan Darling

Director of Military and Defense Markets, Forecast International

DAN'S ANSWER:

Autonomous capabilities rank atop the list of defense modernization priorities. Each U.S. service branch has ongoing autonomy projects that will help determine the very nature of warfare in the future: robotic combat vehicles for the Army, collaborative combat aircraft for the Air Force, and unmanned surface vessels and undersea vehicles for the Navy.

If autonomy solutions fail to advance in a way that makes them practical on the battlefield, then it would act as a setback for unmanned markets. Conversely, if these programs flourish, then the next conflict the U.S. participates in could look very different than any we've seen in the past. We are reaching an inflection point in AI development, and the next few years will help determine how far these new systems can advance.

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Jeremiah Cushman

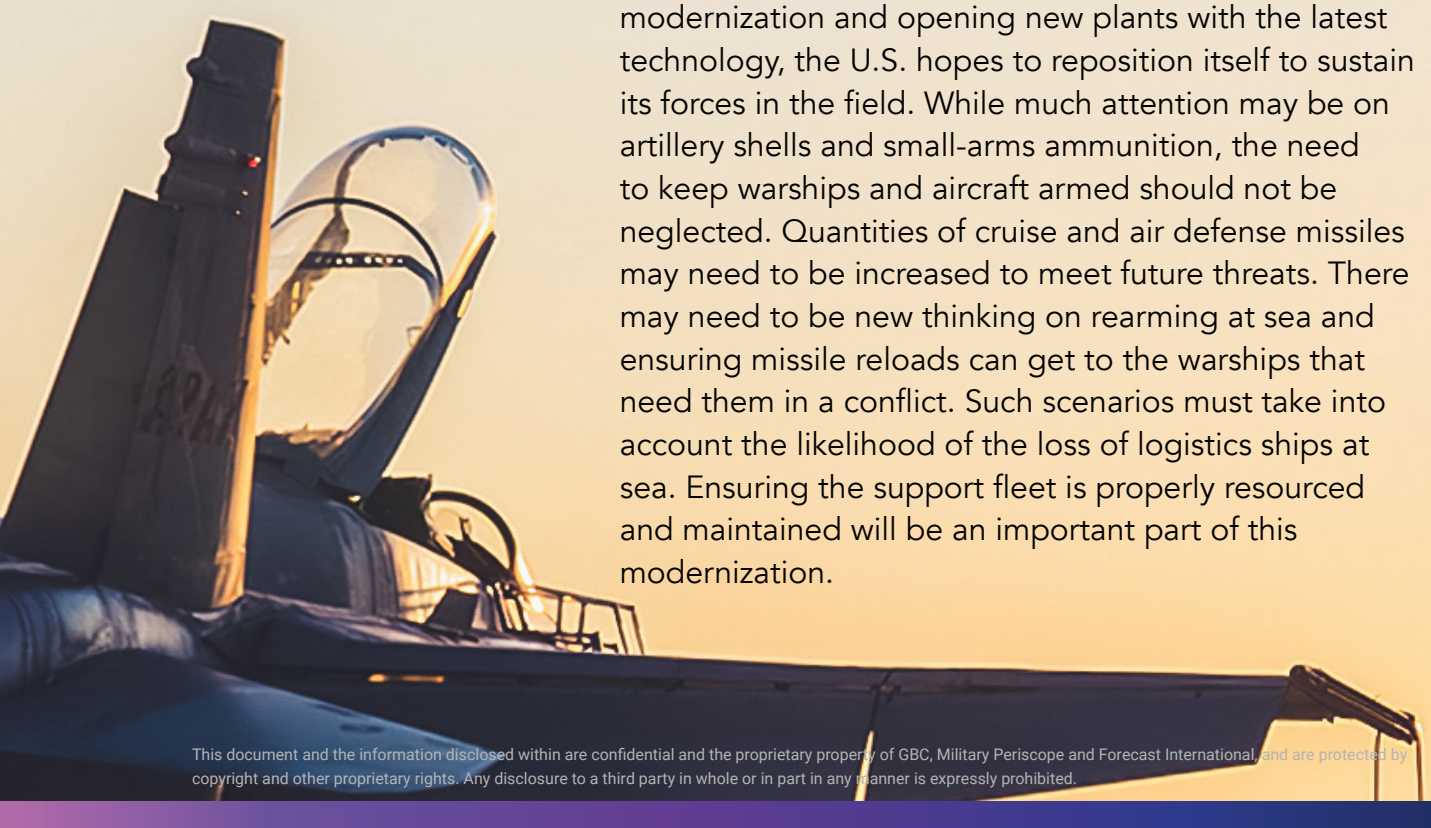
Senior Editor,
Military Periscope

JEREMIAH'S ANSWER:

The most important defense modernization priority in the next few years will be rebuilding the U.S. (and European) industrial bases for modern warfare. The war in Ukraine has exposed weaknesses in stockpiles of vital munitions and brought new attention to the need to modernize and expand production of ammunition, components and parts for battlefield equipment.

The conflict in Ukraine has been a good reminder that war is incredibly destructive and requires deep stockpiles of equipment, munitions and parts. Increasingly survivable vehicles mean that surviving crews can be quickly rotated into new vehicles if they are available, reducing the loss to combat power. At the same time, while onboard guidance, drones and other ISR capabilities make artillery more precise, war requires large expenditures. It has become increasingly clear that existing estimates of sufficient stockpiles have underestimated the need.

U.S. arsenals have been neglected, with many operating with obsolete technologies. With a new emphasis on modernization and opening new plants with the latest technology, the U.S. hopes to reposition itself to sustain its forces in the field. While much attention may be on artillery shells and small-arms ammunition, the need to keep warships and aircraft armed should not be neglected. Quantities of cruise and air defense missiles may need to be increased to meet future threats. There may need to be new thinking on rearming at sea and ensuring missile reloads can get to the warships that need them in a conflict. Such scenarios must take into account the likelihood of the loss of logistics ships at sea. Ensuring the support fleet is properly resourced and maintained will be an important part of this modernization.



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The modernization of the arsenal will take some time but will also offer opportunities for new ideas to be implemented to ensure that the U.S. can act where and when it wishes and sustain such action as long as needed.

David Hutchins

Senior Industry Analyst, Government Business Council

DAVID'S ANSWER:

A common thread among the Army, Navy, and Air Force modernization priorities is the need to develop next-generation combat systems. I find the importance of this priority to be two-fold. First off, the next generation of combat systems is needed to replace aging systems still in use. Second, it will strengthen deterrence against near-peer adversaries. This is a critical priority as revisionist powers like Russia and China are investing heavily in modernizing their own military capabilities.

The Army, Navy, and Air Force have all referenced next-generation systems in their strategic planning efforts. The 2019 Army Modernization Strategy lists next-generation combat vehicles as one of its six modernization priorities. According to the strategy, next-generation combat vehicles increase the firepower, speed, and survivability of land forces, allowing them to maneuver into superior positions on the battlefield and pair with robotic vehicles.

The Chief of Naval Operations 2022 Navigation Plan references the need to invest in next-generation aircraft and surface platforms in order to maintain credible deterrence. According to the Navigation Plan, the Navy will pursue a hybrid fleet that includes next-generation logistics ships and next-generation DDG(X) guided-missile destroyers, which are slated to replace the four-decade-old Arleigh Burke-class beginning in 2028.

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Of the Air Force's 7 Operational Imperatives, perhaps the most important is Tactical Air Dominance. This operational imperative requires the Air Force to achieve Next Generation Air Dominance (NGAD) — the family of innovative platforms and systems that will allow our Air Force to control the sky. The NGAD family of systems acknowledges that the Air Force must leverage uncrewed autonomous aircraft alongside new crewed platforms in order to meet operational needs.

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EXPERT INSIGHTS

5. What will be the most important development in the electromagnetic spectrum of operations in the next few years and why?

Dan Darling

Director of Military and Defense Markets, Forecast International

DAN'S ANSWER:

The most important development in the electromagnetic spectrum of operations in the next few years will be the advancement of connectivity and protection programs and technologies to face emerging challenges and threats. Not only must a nation's different military service branches be able to share vital information, but multinational forces must be able to communicate with one another as they work toward joint military objectives. The increasing use of drones has only added a new battlefield element in the connectivity chain that must be linked to multiple forces and protected from all manner of electronic attack.

Technologies will continue to be developed to improve the precision of command and control among multiple platforms as military forces maneuver across the battlefield, cutting down on friendly fire incidents and increasing the efficiency and accuracy of artillery and airpower.

Meanwhile, all users of the electromagnetic spectrum must address the twin challenges of increasingly sophisticated jamming technologies and the growing threat of electromagnetic pulse (EMP) attack. As demonstrated almost daily in the fighting in Ukraine, all manner of electronic systems, from radios, to computers,

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radar, missile systems and UAVs are under constant attack from jamming systems as small as hand-held, to as large as truck-based. Protecting systems from these technologies will require virtually constant technological advancement.

EMP threats encompass not only weapons of mass destruction or acts by terrorist groups or criminal organizations but also natural events such as geomagnetic storms on the surface of the sun. Protection against such threats is a growing requirement not only of military forces, but also for a nation's vital power grids, data processing and storage systems, and public utilities. R&D into ways to bring this about will be a constant feature of the next several years.

Jeremiah Cushman

Senior Editor,
Military Periscope

JEREMIAH'S ANSWER:

Directed-energy weapons will be the most important development in the electromagnetic spectrum in the next few years. These include lasers, microwaves, and particle and sound beams, which can be employed for various purposes. The U.S. Army is starting to field laser and other electromagnetic weapons for counter-drone missions. This is seen as a vital capability for defeating drones and anticipated drone swarms at low cost in the future. Current air defense systems require large amounts of gun ammunition or expensive missiles, giving adversaries using inexpensive drones the advantage in any exchange. Lasers and other electromagnetic weapons reduce this imbalance in favor of the defender, which can expend energy at a very low cost per shot to shoot down or otherwise defeat hostile drones.

The Navy has also moved down the path of integrating laser weapons on warships, such as the Optical Dazzling

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Interdictor Navy (ODIN), which can defeat drones and missile seekers. Other laser weapons with different capabilities, including the High Energy Laser Counter-Anti-Ship Cruise Missile program focused on defeating anti-ship cruise missiles, are under development.

Combined with other electromagnetic weapons, directed-energy weapons will enable new thinking about defending friendly troops from various types of threats without requiring large amounts of ammunition. It will also enable new capabilities, such as laser-equipped drones that can perform strike, air defense and other combat missions. A swarm of drones could be used to defend an air package from incoming missiles and then shift to the attack to defeat other aerial threats or assist with ground strikes.

Electromagnetic weapons, from lasers and jammers to other capabilities, will play an increasing role in combat in the future. In addition to developing new weapons and tactics, armed forces will need to think about how to defend against such threats.

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David Hutchins

Senior Industry Analyst, Government Business Council

DAVID'S ANSWER:

I believe the most important development in EMSO will be the ability to counter drone warfare. As previously mentioned, autonomous systems (aka drones) will become increasingly important for the future of military operations. As countries around the world develop their own autonomous systems, the technology will continue to spread and proliferate to potential adversaries. Given the relative affordability of contemporary drones, smaller militaries could potentially use drones to supplement an air force. For example, Turkish-supplied drones gave Azerbaijani forces a distinct advantage over Armenian forces in the 2020 Nagorno-Karabakh conflict. The U.S. must be prepared not only to launch drone operations in contested environments but also to counter an enemy's drone capabilities. Domestically, anti-drone capabilities will also be essential for protecting critical infrastructure, such as power plants, dams, or government buildings, given that drones outfitted with munitions provide nefarious actors with a relatively cheap means to cause widespread damage.

The size, agility, and speed of drones can make them difficult for traditional air defense systems to eliminate. This difficulty is increased when drones are launched en masse toward a target. Rather than using traditional kinetic interceptors — missiles, bullets, or other munitions — the most promising counter-drone methods involve non-kinetic means within the electromagnetic spectrum of operations. These methods include using jamming, hacking, high-powered microwaves, and lasers to counter drones. Further developing these counter-drone technologies will be critical in the years ahead.

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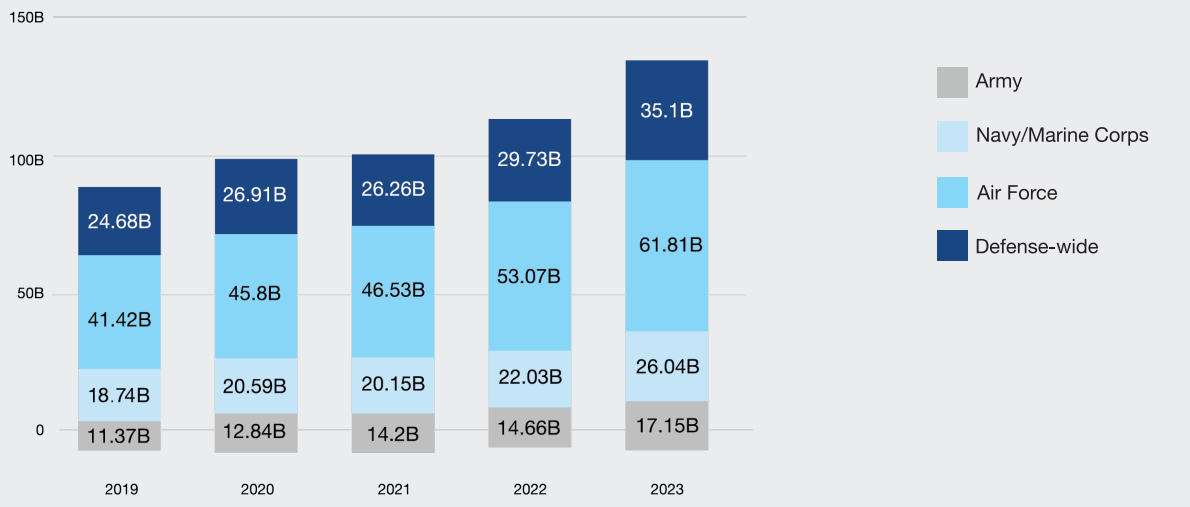
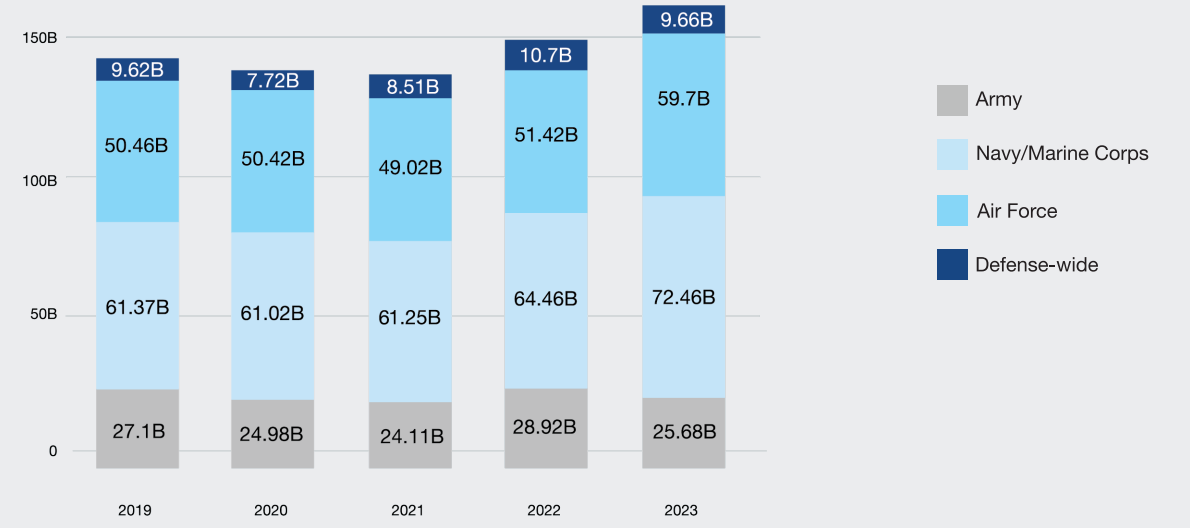
MARKET SNAPSHOT

U.S. Research, Development, Test & Evaluation Spending



Source: Forecast International

U.S. Procurement Spending



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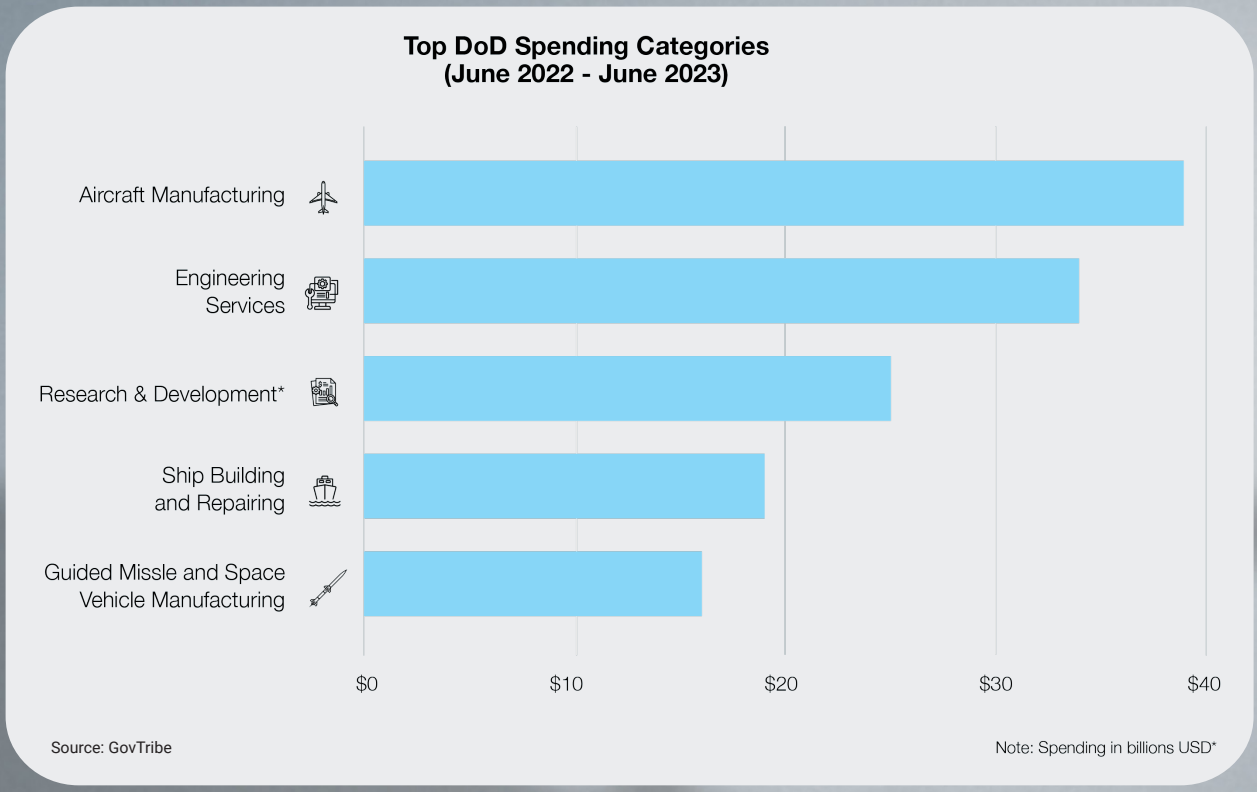
MARKET SNAPSHOT (continued)



*category is for Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)

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RELEVANT GOVEXEC ARTICLES

DEFENSE ONE

- Autonomous Systems Took Center Stage At AFA
- State of Defense 2023

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- Next-Generation Fighter Programs in Europe
- Analysis/Perspective of the U.S. Navy Modernization Plan
- Biggest Gains and Losses in the Pentagon's FY24 Budget

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- Defense Innovations of 2022 and Beyond
- Adapting to Overcome: How and Why the Marine Corps is Adapting to the Future of Conflict

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- Southeast Asian Battleground
- Artificial Intelligence Marches to the Battlefield
- Drones Over Ukraine

UPCOMING EVENTS

DoD Cloud Workshop
Join Defense One virtually on August 8, 2023, from 10am to 1pm ET

Cocktails and Conversations: Air, Space, Cyber
Join Defense One in-person on September 12, 2023 at 4:30pm ET

AUSA National Conference
Join GovExec in-person at our booth from October 9th to 11th, 2023

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