

# Army Readiness and Modernization in 2022

by Latashia Bates



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## **In Brief**

- The Army is prioritizing People First by improving the Army's culture and quality of life, including upgrades in housing, barracks, healthcare, childcare, spouse employment and permanent changes of station. Furthermore, the Army is improving talent management, ensuring that the right people are in the right place to ensure readiness.
- The Army's modernization plan is ensuring that its Soldiers have the necessary training, equipment and leadership to conduct multi-domain operations alongside allies to defeat any adversary.
- Modernization continues to be achieved through six main priorities: long-range precision fires, next-generation combat vehicle, future vertical lift, air and missile defense, network and Soldier lethality. Under the leadership of eight cross-functional teams, the Army is leveraging the latest research and technology to ensure that these priorities support the Army's goal of remaining ready to fight tonight while preparing for the future battlefield.

## **Army Readiness and Modernization in 2022**

### **Introduction**

Over the forty years since its last comprehensive modernization in the 1980s, the U.S. Army has demonstrated its ability to rapidly respond to crises across the globe and within the U.S. homeland. As the Army looks ahead toward the next forty years, it must maintain its readiness to fight tonight while preparing for the necessities of the future battlefield. To balance between these competing demands, the Army has identified three overarching priorities to ensure it remains the preeminent global land force: people, readiness and modernization. Guided by its People First philosophy, the Army is ensuring it maintains a healthy, cohesive force, ready to deploy on a moment's notice, while fielding the capabilities required for Soldiers to prevail on the battlefields of the future.

### **People First**

The Army's number one priority is its people. In June of 2021, motivated by input received from Soldiers, the Secretary of the Army and the Chief of Staff of the Army made a joint statement before Congress announcing that the Army would be realigning its priorities to put people first, which would also enable improved readiness by creating a healthier, more cohesive force. This means focusing not just on Soldiers who are currently serving, but also on their families, Army civilians and veterans.

### *Quality of Life Initiatives*

The Army will also continue to move forward with the 2019 Army People Strategy initiatives: supporting Army culture and quality of life. Quality of life initiatives include improving housing and barracks, healthcare, childcare, spouse employment and permanent change of station (PCS) moves. First, through the Tenant Bill of Rights in its Residential Communities

Initiatives, the Army is allocating over \$1.8 billion and reinvesting \$1 billion to improve residential housing; over the next ten years, a projected \$10 billion will be invested in the Modernization and Military Construction fund to renovate or replace over 1,200 barracks. As part of the Army and Housing Campaign, the Army will hold private companies accountable to residents to provide quality maintenance and customer service, to hire additional personnel to prevent any oversights, and will implement 100 percent change of occupancy inspections. The Army will handle environmental hazards through the use of educational materials, a response registry and policies for habitability and displaced residents.

Additionally, it is essential for readiness that the Army recruits and retains the best health-care professionals to deliver top-tier healthcare for beneficiaries across all installations. For example, to ensure that high-quality childcare is in place for personnel, the Army has implemented a strategy to maintain and, if necessary, increase access to childcare with incentives such as \$1,000 bonuses for new providers. Furthermore, with the support of Congress, the Army is also making improvements in spouse employment by providing reimbursement for professional licensing and certification in new states after PCSing, streamlining home-based business applications, strengthening the Employment Readiness Program and pushing initiatives for spousal employment. Finally, the Army is making PCSing easier on Soldiers and their families by informing them of upcoming moves, on average, 30 to 90 days sooner than the previous standard, and the “Army PCS Move” app helps to streamline the process. These quality of life initiatives are a testament to the Army’s commitment to put its people first by creating an environment where all stakeholders are valued and supported.

### *21st Century Talent Management System*

The Army is not only prioritizing quality of life initiatives; it is also updating its talent management system to a “21st-century, data-rich and people-centric approach” that leverages the diverse talents of Soldiers and improves culture.<sup>1</sup> The Army’s success on the battlefield requires cohesive teams “(1) that are highly trained, disciplined and fit, (2) that are ready to fight and win, and (3) in which each person is treated with dignity and respect.” The 21st Century Talent Management System will ensure that the Army is able to maximize the potential of every Soldier. An integral part of the refinement of this system is the launch of the Integrated Personnel and Pay System-Army (IPPS-A), which will eventually complete the Army’s transition to a single system that will track needed talent and manage Soldiers’ careers across all components, from accession to transition. Ensuring the right people are in the right place at the right time creates pathways for the Army to increase readiness.<sup>2</sup>

Because leadership is an integral component that sets a team’s culture, the Army is changing the way its leaders are selected. While acknowledging the importance of trust and confidence in its leaders, the Army has worked to improve the selection process for future leaders and is working with climate assessment teams to address issues before they turn into systemic problems. The Army currently uses a Commander Assessment Program to select battalion and brigade commanders and command sergeants major, which are the most significant leadership positions related to retention. These leaders are expected to promote cohesive cultures within their units through initiatives like This is My Squad, whose “values call for empowerment of first-line leaders, ownership, accountability, morale and unit cohesion.”<sup>3</sup> Ultimately, putting the right people, with the right talents, in the right place among cohesive teams will ensure the Army is ready to fight tonight.

## Readiness

Ensuring Army readiness is a constantly evolving process, transforming as required by foreign and domestic affairs. No matter the state of the world, American forces must be ready to conduct military operations and, if necessary, defeat all enemies. Readiness is essential to the Army and is dependent on how well units are manned, equipped, trained and led. The Army Readiness Model is the process used to “generate ready forces that are made available to Combatant Commanders for operations.”<sup>4</sup>

To maintain a state of readiness, the Army requires support. The Army is responsible for over half of the global demands that are placed on the U.S. military—including contingencies related to threats such as climate change, violent extremism and cyberattacks, as well as the global attack on democracy and the changing distribution of global power.<sup>5</sup> The Army has Soldiers deployed in 140 countries, with over 69,000 in the Indo-Pacific, 25,000 forward deployed on the Korean peninsula and more than 30,000 in Europe supporting NATO and the European Deterrence Initiative, including the newly reactivated V Corps. Despite all these demands and troop commitments, the Army is allocated only 25 percent of the total Defense budget, even though it constitutes 35 percent of the active force and 45 percent of the combined active and reserve forces. In the past two years alone, the Army has faced difficulties such as COVID-19, the evacuation and withdrawal from Afghanistan, various natural disasters, domestic security needs during periods of social unrest and the provision of the bulk of forces to reassure NATO allies in the wake of Russia’s invasion of Ukraine. The Army has responded to these demands while simultaneously executing its modernization plan. These challenges require a multi-domain Army that is agile and ready to work with allies and partners.

With a focus on building capability to compete aggressively in the Indo-Pacific and Europe, the Army will dedicate over \$35 billion to modernization priorities in support of joint all-domain operations. This new model includes dedicated time for conducting missions, training and modernization. Prompted by the 2018 *National Defense Authorization Act*, the Army is set to provide a modernized Army by 2028 and a transformed, multi-domain Army by 2035.<sup>6</sup>

## Force Rotations

In 2017, the Army began implementing the Sustainable Readiness Model, which included a plan to reach two-thirds combat readiness for the Regular Army and National Guard brigade combat teams by 2023. At that point, no fixed progressive cycles were in place for the Regular Army, and reserve components (RCs) were on a five-year train-up and deployment cycle. The Sustainable Readiness Model resulted in challenges to the operational tempo. Lieutenant General Leopoldo Quintas, then Deputy Commander of Army Forces Command, described the challenge: “Today, Army units operate in an environment of unpredictability, and arguably even instability. Units are placed on rotational missions based on their availability, and these missions vary in location, length, manning, readiness requirements, and equipment. . . . Our Soldiers and families can deal with a lot of tempo, but unpredictability results in an incredible amount of stress on the force.”<sup>7</sup> The Army is moving toward alleviating this challenge with the latest readiness model, the Regionally Aligned Readiness and Modernization Model (ReARMM); its implementation began in 2021.<sup>8</sup> It brings with it the following advantages:

- Aligning units against regional priorities;
- optimizing time available to plan, train and modernize;
- creating predictable windows to field capabilities to units;

- enabling the Army to transform into a multi-domain force and provide a steady supply of ready units for the Army and the joint force; and
- building predictability for the RC, equippers and personnel managers.

### **Six Army Modernization Priorities**

For nearly three decades following the Cold War, U.S. military capabilities were virtually uncontested. However, Russia and China have undertaken significant military modernization, including advances in long-range rockets and missiles, cyber capabilities and air defenses, that put U.S. military supremacy at risk. As a result, the Army is modernizing to ensure it maintains overmatch against any adversary by providing the joint force “with speed, range, and convergence of cutting-edge technologies that will generate the decision dominance and overmatch required to win the next fight.”<sup>9</sup> The Army does this through the leadership of its eight cross-functional teams (CFTs) with a focus on six priorities: long-range precision fires (LRPF), next-generation combat vehicle (NGCV), future vertical lift (FVL), air and missile defense (AMD), network and Solider lethality. Since their designation and subsequent alignment with Army Futures Command (AFC) in 2018, these six priorities have continued to be the focus of Army research, development and modernization. With the proper resources and support to fully develop these priorities, the Army and the joint force will maintain its ability to deter, and if necessary, defeat, any adversaries.

#### *Long-Range Precision Fires*

In response to: Russian and Chinese development of artillery with longer-range systems and a wider variety of munitions and innovative target acquisition techniques; deterioration of U.S. artillery capabilities;<sup>10</sup> and prompting from the combatant commanders of U.S. European Command and U.S. Indo-Pacific Command; the Army has designated LRPF as its top modernization priority.<sup>11</sup> In a summary presented to Congress on 16 March 2021, the Army emphasized the need to improve its ability to deliver LRPF by upgrading current artillery and missile systems, developing new, longer-range cannons and hypersonic weapons, and modifying existing air- and sea-launched missiles and cruise missiles for ground launch by Army units. It is on track to produce LRPF with improved range, lethality and survivability at a fraction of the cost of the Army Tactical Missile System (ATACMS). In addition to rocket and missile systems such as ATACMS and the High Mobility Artillery Rocket System (HIMARS), the Army uses a variety of means to deliver long-range fires, such as attack helicopters, unmanned aerial vehicles (UAVs) and air support from the U.S. Navy and Air Force. However, these methods are not always reliable due to adverse weather, terrain obstacles and availability. The Army has presented the following programs to improve LRPF capabilities:

- The Extended Range Cannon Artillery (ERCA) program plans to develop a system capable of accurately firing at targets more than 70 kilometers away, an improvement over the 30-kilometer target distance of current systems.
- The Precision Strike Missile (PrSM) is a surface-to-surface, all-weather, precision-strike guided missile fired from the M270A1 Multiple Launch Rocket System (MLRS) and the M142 HIMARS. PrSM is intended to replace current MLRS and HIMARS missiles and doubles the current rate of fire, with two missiles per launch pod.
- The Army, Navy, Air Force and Missile Defense Agency (MDA) are developing a common hypersonic glide body (C-HGB), which the Army plans to use as part of its

long-range hypersonic weapon (LRHW) program, enabling the C-HGB to be launched from mobile Army ground missile launchers.

- Finally, the Army is attempting to modify existing Navy SM-6 and UGM-109 land attack missiles for ground launch to provide the Army with a mid-range missile capability.<sup>12</sup>

Additional improvements to the ERCA will also include the XM113—a new rocket-boosted shell—and a longer howitzer barrel adapted to the current M-1097A. The longer barrel will hold rapidly expanding propellant gases longer, allowing the projectiles to accelerate at an increased speed before exiting the muzzle. Improvements to the howitzer include an autoloader that will increase the rate of fire to 10 rounds a minute, and a communication system that will work in areas with denied or degraded GPS access.<sup>13</sup> In December 2020, at the Yuma Proving Ground, the ERCA cannon was able to hit a target 70 kilometers away using an Excalibur extended-range guided artillery shell. Plans are in place to begin fielding the ERCA system in 2023.<sup>14</sup>

The PrSM will be used to attack threat air defense systems, missile launchers, C2 centers, troop assembly/staging areas and high-payoff targets across the battlefield. Operational testing is set to begin in August 2024, with the goal of achieving initial operational capability in August 2025. The missile was originally constructed not to exceed a range of 499 kilometers, in accordance with the guidelines set out in the 1987 Intermediate-Range Nuclear Forces Treaty with Russia; however, the United States is currently outgunned and outranged because of advancements made by its opponents in exactly this regard. Both China, which was never a signatory, and Russia, which is accused of repeatedly violating the treaty, have fielded several rocket and missile systems with ranges exceeding 500 kilometers.<sup>15</sup> Consequently, the United States withdrew from the treaty in 2019, and the range of the PrSM is now expected to exceed 500km. The increase in range is significant; according to Lockheed Martin, which is developing the missiles for the U.S. military, a flight test was conducted on 13 October 2021 at the Vandenberg Space Force Base in California in which the PrSM broke its distance record, though the exact distance was not made public.<sup>16</sup>

The Army has plans to field a ground-based long-range hypersonic weapons (LRHW) battery in Fiscal Year 2023 (FY23) with a reported range of 1,750 miles. LRHW is anticipated to have the capability to fly five times faster than the speed of sound and operate at multiple altitudes with a range of 1,750 miles—qualities which make it exceptionally difficult to intercept. According to the Army, the development of LRHW will require cross-service coordination. The Army, Navy, Air Force and Missile Defense Agency are all working toward “accelerating initiatives to field hypersonic weapon systems using a common hypersonic glide body” to meet the objective of designing the weapon for air, land and sea. The Navy is leading the design of the C-HGB, while the Army is heading production to build a commercial industrial base.<sup>17</sup>

### *Next-Generation Combat Vehicle*

The Army is working on NGCVs that will give land forces the advantage during future operations, with increased firepower, speed and survivability. The Army is developing the following systems:

- The Optionally Manned Fighting Vehicle (OMFV), which is the M-2 Bradley IFV replacement;
- the Armored Multi-Purpose Vehicle (AMPV), which is the M-113 vehicle replacement;

- Mobile Protected Firepower (MPF), which is a light tank for Infantry Brigade Combat Teams (IBCTs); and
- Robotic Combat Vehicles (RCVs), which will come in three versions—light, medium and heavy.

**OMFV.** The Army announced its plan to replace the M-2 Bradley in June 2018. It has been used since 1981 as the Infantry Fighting Vehicle (IFV) on the battlefield for infantry transportation, fire support and to engage enemy fighting vehicles. Although there have been several updates over the years, it is no longer able to support advances in technology. The Army attempted to replace the M-2 Bradley twice, first as part of the Future Combat Systems program and next with the Ground Combat Vehicle Program. Both attempts were canceled by the Secretary of Defense—the first in 2009 and the second in 2014—due to issues with the industry-led management approach, failure of technology to perform as planned and Army leadership’s changing requirements. This resulted in \$21.4 billion spent on the program during the preproduction stage.

The Army expects the first unit to be equipped in the fourth quarter of FY28. At this time, specific details related to the specifications of the OMFV have not been released to the public.<sup>18</sup>

**AMPV.** The AMPV’s three variants (general purpose, mission command and medical treatment) are set to offer improvements in survivability, force protection, weight, size, power, cooling and compatibility with future technologies. However, several setbacks have delayed its progress. BAE Systems, which is developing the AMPV, was unable to meet the original July 2020 delivery date because of production challenges brought on by COVID-19. Additionally, the Army noted 24 problems during the limited user test; including unresolved hatch and roof leaks, difficulty in opening the mortar carrier and seating configuration issues in the medical treatment vehicle that limited the ability to treat patients while the vehicle is moving. Solutions to these problems are in various states of development.<sup>19</sup>

**MPF.** The MPF system is intended to provide the Army’s IBCT with the ability to “neutralize enemy prepared positions and bunkers and defeat heavy machine guns and armored vehicle threats during offensive operations or when conducting defensive operations against attacking enemies.” Two Section 804 Middle Tier Acquisition Rapid Prototyping contracts for MPF were issued to General Dynamics Land Systems (GDLS), Inc., and to BAE Systems Land and Armaments, LP, on 17 December 2018, with an expectation that prototyping would not exceed \$376 million. A Soldier Vehicle Assessment began at Fort Bragg, North Carolina, in January 2021. The Army plans to decide on a vendor and begin production around the end of FY22.<sup>20</sup>

**RCV.** The Army envisions the RCV as a system which will allow the operator to remotely control several RCVs or include RCVs that operate semi-autonomously. Plans include light, medium and heavy variants that will serve as “scouts” or “escorts” for manned fighting vehicles. The RCV-L variant is designed to be expendable, weighing no more than 10 tons and capable of being transported by a rotary wing aircraft. The RCV-M variant will be more durable and lethal, weigh between 10 to 20 tons and be transported by a C-130 transport aircraft. The RCV-H will weigh between 20 to 30 tons and will have on-board direct fire weapons capable of defeating all known enemy armored vehicles. It is intended to be transported by a C-17 transport aircraft. Operational experiments for the light and medium RCVs are scheduled to take place from June to August 2022 at Fort Hood, Texas. The Army plans to decide how to proceed with the light RCV in FY23 and the medium RCV in FY24.<sup>21</sup>

### *Future Vertical Lift*

FVL consists of a family of systems intended to replace the existing vertical lift fleet while also reestablishing the United States' tactical overmatch against its competitors.<sup>22</sup> Modernization via the Army's FVL program is intended to "reshape military operations by surpassing the limits imposed by today's systems."<sup>23</sup> When addressing modernization through the FVL program, the Army is facing the reality that it is time to work toward a new generation of rotorcraft technology, noting that its current inventory of rotorcraft platforms—such as the Chinook, Black Hawk, Apache and Kiowa Warrior helicopters—are based on designs from the 1960s and 1970s. The Army's goal for the FVL program is to surpass current platforms in "maneuverability, range, speed, payload, survivability, reliability, and reduced logistical footprint." New platforms will include "a medium transport platform capable of succeeding the Army UH-60 Black Hawk and Marine H-1 'Huey' utility helicopters—the Future Long-Range Assault Aircraft (FLRAA)—and a scouting platform roughly in the role of the current Apache, now called the Future Attack and Reconnaissance Aircraft (FARA)."<sup>24</sup>

Sikorsky is working with Boeing on the SB-1 Defiant, "a compound helicopter, using twin coaxial rotors to provide lift and a pusher propeller to enhance speed."<sup>25</sup> On 18 January 2022, the Lockheed Martin Sikorsky-Boeing team announced the first successful flight of DEFIANT X. During the test flight, DEFIANT X was able to reach 236 knots in level flight and quickly decelerate to the landing zone. According to the chief flight test pilot at Sikorsky, "This type of level body deceleration allowed us to maintain situational awareness and view the landing zone throughout the approach without the typical nose-up helicopter deceleration." The DEFIANT team has also released a YouTube video where the FLRAA demonstrated its ability: "Complete 60-degree banked turns, low-altitude operations in trees, and low-level speed, maneuverability and agility."<sup>26</sup> The joint team noted that DEFIANT X will outperform the Army's current helicopters by flying Soldiers and cargo into battle at twice the current range.<sup>27</sup>

Bell is also working on the V-280 Valor tilt-rotor demonstrator, a third-generation tilt-rotor vertical lift helicopter intended to meet the requirement of the Joint Multi-Role Technology Demonstrator program and support the FVL modernization plan.<sup>28</sup> This vertical lift aircraft is designed to carry 11 Soldiers plus a crew of four. The V-280 Valor "integrates a clean sheet design with a V-tail configuration and fuselage of composite construction. The wings are made of a large cell carbon core."<sup>29</sup> The helicopter offers improved safety and handling through its triple redundant fly-by-wire flight control system which reduces the workload of pilots, the weight of the aircraft and the maintenance cost in comparison to traditional flight control systems. Two non-revolving turbocraft engines combined with three-bladed tilt-rotor and drive units provide more stability and enhanced control to the helicopter. Overall, it has twice the speed and range of existing vertical lift helicopters, with a maximum cruise speed of 518km/h and a combat range of 500 to 800 nautical miles. It can operate in temperatures up to 95 degrees and fly at an altitude of 6,000 feet.<sup>30</sup>

Bell completed its first flight in December 2017, and, as of March 2021, the V-280 Valor has clocked over 200 hours of flight time across 160 individual tests.<sup>31</sup> During the first phase, program manager Ryan Ehinger noted that, "Cruising at twice the speed of legacy helicopters, with double the range, really changes the way the U.S. military can enable multi-domain operations. By eliminating forward refueling points alone, leaders can focus on operational goals while minimizing logistical burdens."<sup>32</sup> On 24 June 2021, the company announced that the V-280 had completed its flying career and is moving to its second phase of the risk-reduction effort.<sup>33</sup>

The Army would like to field an FLRAA by 2030. The engineering and manufacturing development phase is scheduled for around October 2023; the following phase will consist of the critical design review in early 2025, with the first prototype delivery in the summer of 2025. Five additional prototypes will be delivered through the summer of 2026.<sup>34</sup>

In addition to development of FLRAA, the Army has plans to procure an FARA; they have acknowledged that the schedule to do so by 2030 is ambitious, but believe that it is realistic. The Army has made several attempts to replace the OH-58D Kiowa Warrior, ultimately deciding to retire it in 2013 and to replace it with the AH-64E Apache attack helicopter and an unmanned aircraft. When asked about the Army's areas for flexibility in relation to FARA's weight, speed, payloads and weapon system, Colonel Matt Isaacson, the Army's FVL Chief of Operations, responded:

The FARA competitive prototype effort began with a list of desired attributes, outlined in the Initial Capabilities Requirement Document (ICRD). The seven 'desired' attributes focus on agility, speed, rotor diameter, power plant design, weapon system, weapons launcher and modular open systems approach. Ultimately, the innovative approach of rapid prototype design and development, coupled with early weapon system trades analysis, ensures achievable capabilities are developed as efficiently as possible.<sup>35</sup>

Isaacson also noted that the Capabilities Development Document is set to be presented to the Army Requirements Oversight Council in FY23. Colonel Greg Fortier, the Army's FARA program manager, reported that design refinements will occur as they learn from prototype development and testing. In FY22 and FY23, the Army plans to gather an analysis of alternatives sufficient to release an engineering and manufacturing development request for proposal, complete the initial weapon system preliminary design review and to proceed to prototype flight.<sup>36</sup>

### *Network*

The demands of future warfare require a resilient communications network that allows the Army to rapidly send data between echelons and to respond faster than the adversary. The network is the linchpin modernization priority that will enable the rest of the Army's modernization programs to reach their full potential. After the 2018 *National Defense Authorization Act* prompted the Army to submit a report to the Congressional Defense Committee on its strategy to "modernize air-land-ad-hoc, mobile tactical communications and data networks," the Army redoubled its efforts to modernize communications.

Through the Network CFT, the Army is enhancing acquisition by using rapid prototyping and experimentation, with a focus on four primary components:

- **Unified Network:** This will improve resilience through path diversity and dynamic routing. It consists of an integrated tactical network, an integrated enterprise network and unified network-enabling capabilities.
- **Common Operating Environment (COE):** The COE will use data standards to deliver mission command capabilities to all leaders through the inclusion of computing technologies, integrated data and databases, common graphics and a unified set of mission command applications.
- **Interoperability:** This includes joint interoperability and coalition accessibility through a network that enables appropriate collaboration with all unified action partners.

- **Command Posts:** The Army wants to improve the mobility and reduce the signature (visual, acoustic, thermal and electromagnetic) of expeditionary command posts.<sup>37</sup>

Further efforts include modernization of GPS technology to provide advanced assured precision, navigation and timing (APNT) systems to the joint force capable of handling current and emerging threats. The Army plans to release second-generation mounted APNT systems in FY23 and is working with the intelligence community and private industry both to enhance Army access to low-Earth orbit space-based sensing and to link with national-level capabilities to provide tactical-level sensor-to-shooter capability to combat formations.<sup>38</sup>

### *Air and Missile Defense*

In contrast to its experience in post-9/11 conflicts, the U.S. military is unlikely to achieve uncontested air superiority in wars against near-peer competitors. China and Russia have invested in a range of air and missile capabilities. Likewise, lower-tier threats, such as Iran, North Korea and some terrorist organizations, have also further improved their aerial capabilities. Thus, protecting the joint force on battlefields of the future requires the sophisticated air and missile defense systems that the Army is developing through its modernization plan.

Modernization of the Army's AMD includes Maneuver Short-Range Air Defense and Indirect Fire Protection Capability initiatives.<sup>39</sup> AFC is striving to guarantee that Soldiers are prepared and armed with the latest technology with the support of the U.S. Army Combat Capabilities Development Command (CCDC). CCDC is helping to shape future concepts by synchronizing and integrating science and technology across the future force modernization enterprise. By doing so, the Army is ensuring it integrates the right balance of near-, mid- and far-term air and missile defense technology to create a tiered, layered defense able to provide overmatch against the variety of air and missile threats from near-peer adversaries.<sup>40</sup> CCDC is supporting the Army's AMD strategy by providing technology and engineering expertise that will increase range and lethality to create six layers that will work together to create tiered domes of protection.

The first layer of protection is the Ballistic Low-Altitude Drone Engagement (BLADE), the smallest, most mobile dome of protection. BLADE has an easy-to-use interface and provides Soldiers with local protection against moving targets such as UASs. The BLADE system can be mounted on the Common Remotely-Operated Weapon Station (CROWS), which uses advanced fire control and precision targeting to detect, track and defeat UASs. Ultimately, BLADE will alleviate the difficulty that Soldiers face when they attempt to hit a moving aerial target, as demonstrated during an engineering test on prototypes in June of 2019 in Fort Dix, New Jersey, when BLADE hit a small UAS with a short burst of fire.<sup>41</sup>

The second layer of protection is the Multi-Mission High Energy Laser (MMHEL), a critical component to the Army's goal of delivering high-power laser technology with efficient output, reduced size, weight and complexity. The Army wants to deliver solid-state-energy lasers with the capability to destroy incoming munitions and drones with low cost per kill, as opposed to fielded air and missile defense systems.

Layers three and four consist of a combination of the Maneuver Air Defense Technology (MADT) and Next-Generation Fires Radar. MADT will increase protection through its predicted ability to target larger aircraft at increased ranges once it is integrated into Short-Range Air Defense Systems (M-SHORAD). The Army is working to deliver a government-owned,

test-bed and open architecture software that will elevate its competitiveness for best-of-breed upgrades with the ability to field new capabilities swiftly. This will increase readiness by providing Soldiers with the ability to perform maintenance and upgrade cycles, mainly through software changes.

The fifth layer of protection consists of the integration of the High-Energy Laser Tactical Vehicle Demonstrator (HEL-TVD), a 100 kilowatt-class laser system on a family of Medium Tactical Vehicle platforms. The goal is a higher-power system that provides protection against rockets, artillery, mortars and UASs. Alongside similar efforts by the Navy and the Office of the Secretary of Defense, the Army Rapid Capabilities and Critical Technologies Office is developing a prototype, the Army's Science and Technology program is working on next-generation capability, and the Army Research Laboratory is developing proof-of-concept fiber lasers and components. Plans are in place to reach technology readiness level four (technology that has been validated in a laboratory environment) or higher by 2028.

The final layer of protection consists of the Low-Cost Extended-Range Air Defense (LOW-ERAD), a smaller missile interceptor technology that will utilize critical technologies to defeat subsonic cruise missiles and lethal UASs. This will alleviate the need to use the Patriot missile system—currently used for protecting forward-deployed forces, friends and allies against incoming air and missile threats—and allow Patriot interceptors to focus on more stressing threats.<sup>42</sup>

### *Soldier Lethality*

Soldier lethality is a critical component of the Army's modernization plan, as DoD leaders expect ground close-combat formations to play a crucial role in "any peer-on-peer fight."<sup>43</sup> Modernizing Soldier lethality will provide Soldiers with the critical weapons, sensors, body armor and training required to understand, react and ultimately overmatch opponents in any situation.<sup>44</sup> In this effort, the Army is relying on continued support from Congress for "rapid prototyping, development, and procurement of the Next Generation Squad Weapon (NGSW), Integrated Visual Augmentation System (IVAS), and the Synthetic Training Environment (STE), among others."<sup>45</sup> The Army plans to field these capabilities in FY22 and FY23.

NGSW is set to have a 6.8mm projectile that will outperform the 5.56mm and 7.62mm ammunition at a lighter weight. In addition, it will also include optics such as a "ballistic computer" with future ability to connect the goggles to the weapon sight by use of night vision devices for target acquisition and engagement. The NGSW will increase Soldier lethality at the squad level through improvements in accuracy, range and signature management, increasing the probability of successfully engaging enemy forces.

Also in development for Soldier lethality is the Enhanced Night Vision Goggle (ENVG), which began fielding in the second quarter of FY19. It gives Soldiers the ability to see and maneuver in all weather and visibility conditions. ENVG is an improvement over previous night vision devices; its thermal capability allows it to be used day or night, providing visual detail in low light and the ability to see through fog, dust and smoke. Furthermore, its Rapid Target Acquisition capability allows Soldiers to detect, recognize and engage targets accurately with reduced exposure to enemy fire from any carry position.<sup>46</sup>

The purpose of the IVAS is to consolidate critical technologies to allow Soldiers to fight, rehearse and train with one platform. The IVAS goggles use augmented reality to overlay

digital information on the screen that soldiers look through. The screen can display information such as “training and on-the-spot language translations; high-resolution night and thermal sensors; facial recognition software; and the ability to see what a location or objective looks like before they get there.”<sup>47</sup> Soldier-centric design—via direct feedback from Soldiers—is key to the development of IVAS and realizing the improved lethality it is expected to enable.<sup>48</sup> As testing and research continue, the Army has requested \$462 million in total for IVAS in FY23, which will fund the procurement of over 7,000 IVAS goggles.<sup>49</sup>

Finally, providing realistic training opportunities for Soldiers is also a critical step to Soldier lethality. Close-combat ground units face increasingly complex battlefields that beget increasingly perilous and sophisticated missions.<sup>50</sup> While training in the physical world remains vital, virtual technologies allow the Army to bypass some of the inherent constraints of real-world training. As stated by then-Major General Maria Gervais, “From wherever they may be located—home station, armories, institutions or deployed locations—we want our Soldiers to enter into a Synthetic Training Environment [STE] that immerses them in diverse complex operational environments that replicate where they will fight; whom they will fight with; on the terrain they will fight on.”<sup>51</sup>

STE modernizes the way Soldiers train, transporting them from the classroom to any location on a virtual globe, allowing them to train in any possible environment they may encounter in combat. The STE provides collective, multi-echelon training by combining live, virtual and constructive training environments.<sup>52</sup> The initial iteration of the STE reached a group of Soldiers in 2021, with plans to continue training in 2022.<sup>53</sup> The Army plans for the STE to reach Initial Operational Capability in FY 2023.<sup>54</sup>

Improved Soldier lethality is achieved not just through new weapons and better training, but also through a focus on what—and how much—each Soldier carries when operating in a combat environment. With this in mind, efforts are underway to lessen the weight that Soldiers carry during missions (currently anywhere from 60–120 pounds), while simultaneously keeping safety at the forefront. One area where progress is being made is with Soldiers’ food supply. The CCDC Soldier Center Combat Feeding Directorate is creating the Close Combat Assault Ration, with plans to deliver a ration that uses vacuum microwave drying and ultrasonic agglomeration to reduce weight, allowing Soldiers to have food that is compressed and moist. Final specifications and delivery are expected during 2022. Other advances are coming in lightweight batteries, such as the Conformal Wearable Battery. Prototypes of the battery demonstrate equal power and 29 percent less weight when compared with the current standard. In this vein, CCDC’s center for Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance is working toward a centralized wearable power supply for small-arms weapons. Currently, Soldiers use separate batteries for each device.<sup>55</sup> In combination, these Soldier lethality modernizations will ensure that U.S. Army retains tactical overmatch against near peer adversaries.

## **Conclusion**

Through prioritizing people, readiness and modernization, the Army is working toward a transformed, multi-domain-capable force by 2035. Ultimately, readiness and modernization focus on Soldiers, and the Army will continue to put its people first by prioritizing initiatives to alleviate the stress on those Soldiers, their families and Army civilians. Improvements in Army culture and team cohesion will field a force that is ready to respond to threats and contingencies

at home and abroad. Simultaneously, the service continues to aggressively pursue its six modernization priorities to ensure the Army, alongside the joint force, maintains all-domain overmatch against all adversaries in future fights. Modernization of the Army ensures that it maintains the organization, leadership, training and conviction, weapon systems and resources necessary to execute its duties in collaboration with the joint force and allies. For centuries, and particularly since its last significant overhaul in the 1980s, the Army has demonstrated its ability to protect the United States both domestically and abroad. However, constantly changing threats and unpredictability create an environment where the Army must modernize to ensure it can continue to protect the American people for the next 40 years and beyond.

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