

Soldiers at Fort Irwin, California utilize advanced technology including the SkyDIO unmanned aerial vehicle and different types of Remote Piloted Vehicles in collaboration with the Infantry Trials and Development Unit (ITDU). (U.S. Army photo by Staff Sgt. Matthew Lumagui)

Future Weapons Technology of 2040

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The U.S.'s ability to fight and win future wars will depend heavily upon technological advancements in weapons and technology. Advancements in next-generation weapons will allow our safety and security while deterring adversaries worldwide. These advancements will ultimately give U.S. Army Soldiers an edge against adversaries on future battlefields.

Our government and the Department of Defense (DOD) will continue building and developing nextgeneration weapons to maintain military dominance. The U.S. will spend trillions of dollars building infrastructure to develop technologies needed to succeed on battlefields. The men and women of future wars will be inside a secured facility using computers to employ munitions on hostile targets (Hickman, 2020). Soldiers will employ autonomous weapons, some with lasers, which utilize Artificial Intelligence (AI) to execute targets according to mission plans.

AI and Autonomous Weapons

Artificial intelligence will be a crucial development for the U.S.'s drone platforms. Next-generation drones will fly autonomously without interference from end users, but end users can assume or override controls if needed (Hecht, 2006). Drones will fly in any weather condition and track enemy activity while sending back intelligence and video feed to end users (Hickman, 2020). Operators will be able to track and detect

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personnel through facial recognition and determine whether they are friendly or hostile. Facial recognition will increase our ability to track specific combatants and allow Soldiers to engage targets directly with lethal fires (Cooke, 2019). The technology will also help reduce collateral damage and prevent civilian deaths, which we might have perceived as hostile in past engagements. Laser availability will also enhance next-generation drone capability.

Laser technology provides drones with another level of sophistication, similar to hellfire missiles' lethality. New laser lethality will have lasting effects on enemy targets. Future drones' sophisticated and enhanced lethality will use laser-penetrating energy to take out vehicles, aircraft and other weapon systems. Laser energy provides a powerful heat signature and can burn through targets rapidly (Hecht, 2006). Lasers will be cost-effective and deliver a significant blow to enemies by disabling and preventing their ability to advance during operations. Smaller drones could selfdestruct if needed (Russell, 2017). Self-destructing will allow drones to take on smaller targets within buildings or vehicles when ordered (Russell, 2017).

Autonomous drones equipped with laser-focused energy will be able to adapt to any situation, provide surveillance and be decisive on battlefields. Drone teams will work together and provide intelligence, enabling commanders to make critical decisions on battlefields. Small drones will travel in teams, transferring data on battlefields and gaining knowledge through each other (Russell, 2017). According to Anderson (2018), "drone swarms, consuming everything in their path like a biblical plague, will be the stuff of psychological warfare

long before they became reality" (para. 17). Artificial intelligence delivers fear and uncertainty to enemies and will also give the U.S. the operational reach it requires to succeed in any environment. One way the U.S. Army ensures the security of our systems is by employing both offensive and defensive cyberwarfare.

Cyberwarfare

Cyber infrastructure is critical to maintaining security systems. By 2040 the cyber branch will be the most in-demand profession within the military because of increased cyberwarfare threats worldwide. According to User (2021), everything is now digital and accessible electronically. Defending against computer warfare can be mentally demanding. According to Silva (2017), a computer virus in 2010 spread worldwide, ultimately disrupting a secret Iranian nuclear weapons plant. Symantec Corporation analyzed the virus's data and could not identify which country developed it but knew it came from a nation-state (Silva, 2017). In the future, the U.S. will be able to stop nations such as Iran from building centrifuges without putting anyone in harm's way.

Creating the next generation of cyberwarfare will be cost-effective and have long-lasting effects, which will give the U.S. the ability to shut down entire power grids (Silva, 2017). The sophistication and skills required to accomplish these critical tasks will shape future battles. Cyberwarfare is changing, and creating a platform to exploit the enemy's weakness will significantly disrupt adversaries' communications and critical infrastructure. By 2040, the U.S. will be able to take satellites offline, disrupt infrastructure, and disable enemy equipment and technology. This technology will also allow the U.S. to control digital information anywhere.



Combined-fiber lasers show potential for use in combat and tactical platform weapon systems because they efficiently convert electrical power into power on target. However, current modules only produce slightly over a kilowatt, necessitating merging multiple modules into one beam. This diagram shows the process. (SOURCE: SMDC/ARSTRAT)

Information Warfare

Misinformation and overloading systems and critical infrastructure will allow the U.S. to deliver decisive blows to its adversaries. Overloading enemy networks and disrupting their communications helps shape narratives and disseminate effective disinformation to adversary populations. According to Hecht (2006), "expert computer hackers, called crackers, might break into or overload military computers and networks, or spread computer viruses. Jammers might also block radio and television transmissions." According to Hickman (2020), "if the last fifteen years are any indication of the next, we will continue to see incremental.



Future Soldiers will partner with autonomous systems to accomplish missions. (U.S. Army illustration)

evolutionary increases in capability even as we approach 2035 and the 50th year of the information age of warfare." Information is key to the U.S.'s success on battlefields; next-generation weapons are the implements to achieve battlefield success.

Hypersonic Technology

Imagine missiles or anything flying faster than the Testing is critical to ensure new systems meet all speed of sound; it is already a nearly unfathomable imposed requirements. For the U.S. to succeed on future speed. By 2040, hypersonic weapons will be equipped battlefields, artificial intelligence, autonomous weapons, with nuclear munitions traveling up to 20 times the drones, cyberwarfare, information and hypersonic speed of sound (Endowment, 2020). These speeds will weapons must have the best and brightest working ensure surprise on enemies. If proven dependable, on their development. As the science behind weapon these hypersonic weapons will help deter threats systems improves, current critical systems infrastructure from any country. Development has already begun. will also improve organically. Once distributed, the DOD Hypersonic weapons will be configured in three will accomplish testing and training of new technologies versions: guided ballistic missiles, hypersonic cruise in military training areas across the country. missiles and boost-glide missiles (Endowment, 2020). These will give the U.S. the capability to employ **Weapons Training** conventional or nuclear weapons anywhere in the Embracing new systems will give commanders world in mere minutes. Our need to protect our essential assets to improve their formations. These new forces doesn't stop with exploding munitions though. technologies will allow Soldiers to develop new and better techniques, tactics and procedures (USAWC, Continued development in next-generation aircraft will also help the U.S. maintain air superiority worldwide. 2020). Through experiences and training, commanders

Like hypersonic munitions, U.S. aircraft will provide the same desired speed to the fight (Hecht, standard operating procedures. These systems will 2006). Next-generation aircraft will be able to employ allow Soldiers to gather intelligence from afar and traditional munitions, but their speed and capability guide weapon systems as necessary to accomplish missions without the threat of physical harm. will allow them to fly undetected. According to Hecht, the hypersonic engine, "the scramjet scoops up air Commanders will develop requirements, and NCOs and mixes it with fuel, so it burns as the mixture flows will ensure full implementation into the enlisted ranks. through the engine at supersonic speeds" (2006). Depending on their design, some aircraft will have the Weapons Implementation The DOD will be responsible for assigning the capability to deliver satellites into space. Hypersonic engines will create greater thrust and allow aircraft to right equipment at the right time to the correct unit.

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2

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travel to places a traditional plane is limited. However, military weapon systems must go through critical development, testing, training and implementation stages to be available on modern battlefields.

Weapons Development

The DOD spends a lot of money developing new weapons technologies. According to Peterson (2020), the U.S. outspends adversaries 11-to-one on new technology and defense. By 2040, the DOD will spend more than one trillion dollars annually to secure and defend the nation. The U.S. must develop these

new weapons in remote locations to ensure the security of plans and production. New technologies could also bring unwanted public attention, much like the secret aircraft development at Area 51 created countless reports of UFOs in the area.

Weapons Testing

will gain critical knowledge to update their units'

July 2023

Military departments decide which units will receive and implement the latest technology into their force (USAWC, 2020). Once military departments sign for and receive the new equipment, the actual training and implementation will start. Soldiers will assume responsibility for the next generation of equipment and begin setting conditions for success during future operations. NCOs will lead individual and collective Soldier training, and test assigned equipment. Across the force, Soldiers will become experts in their new equipment and continue to develop the skills required to be lethal on battlefields. Once complete, Soldiers will be combat-ready.

Conclusion

The defense department will continue to strengthen its forces thanks to the U.S.'s commitment to reinforce our military with the best weapons systems in the world. This enables the military to stay ahead of adversaries by utilizing innovative technologies in artificial intelligence, autonomous weapons, cyberwarfare, information and hypersonic weapons. Soldiers will develop the skills required to succeed during future operations in concert with these technological advancements. This future technology will give the U.S. the ability to defeat any enemy on any battlefield during future conflicts. ■

References

- Anderson, D. (2018, December 11). *The grim future of urban warfare*. The Atlantic. <u>https://www.theatlantic.com/</u> <u>technology/archive/2018/12/technology-will-make-war-</u> <u>even-worse/577723</u>
- Cooke, G. (2019, June 11). *Magic bullets: The future of artificial intelligence in weapons systems*. Army AL&T Magazine. <u>https://www.army.mil/article/223026/magic_bullets_the_</u> <u>future_of_artificial_intelligence_in_weapons_systems</u>
- Endowment, C. (2020). *Hypersonic missiles arms race: What you need to know* [Video]. YouTube. <u>https://www.youtube.com/watch?v=s5Cj9oGkN8k</u>
- Hecht, J. (2006, September 4). *Top 10: Weapons of the future*. New Scientist. <u>https://www.newscientist.com/article/</u> <u>dn9979-top-10-weapons-of-the-future</u>
- Hickman, P. (2020). *The future of warfare will continue to be human*. War on the Rocks. <u>https://warontherocks.</u> <u>com/2020/05/the-future-of-warfare-will-continue-to-behuman/</u>

Peterson, P. (2021, July 9). U.S. Defense spending compared to

other countries. In Peter G. Peterson Foundation. https:// www.pgpf.org/chart-archive/0053_defense-comparison Russell, S. (2017). Drones of the future are here! AI, autonomous weapons [Video]. YouTube. https://www.youtube.com/ watch?v=u3n38GAVXGA

- Silva, J. (2017). The future of cyberwarfare | Origins: The journey of humankind [Video]. YouTube. National Geographic. https://www.youtube.com/watch?v=L78r7YD-kNw
- United States Army War College (USAWC). (2020). How the Army runs: A senior leader reference handbook, 2019-2020. https://sgm-a.blackboard.com/bbcswebdav/ pid-1312470-dt-content-rid-29594429_1/institution/ USASMA/SMC/AY%2021-22/SMC-RES%20CL72/DFM/ DFM%20Student%20Resources/F100%20Force%20 Management/F104/Readings%20and%20Handouts/ HTAR%202019-2020%20%28Online%20Version%29.pdf
- User. (2021, July 19). *The future of war is cyber!*. In Explore the Operational. <u>https://madsciblog.tradoc.army.mil/340-the-future-of-war-is-cyber/</u>

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