21st Century Reconnaissance

Battlefield key component of maneuver warfare

by The Ellis Group

The ubiquity and availability of surveillance assets on the modern battlefield is unprecedented in the history of warfare. The "unblinking eye" of satellites orbiting the globe and observing every inch of its surface is available to anyone, not just military forces. Aerial surveillance systems are available off-the-shelf in department stores. The battlefields of the 21st century will occur on a global stage with an audience of billions. Despite this quantum leap in the capability and presence of surveillance, the need for military forces to conduct reconnaissance and prevent enemy forces from doing so will not diminish. In fact, the ability of such forces to interrupt or deceive enemy surveillance measures will become even more important.

Simultaneously, advancements in electronic warfare and cyber warfare mean units on the battlefield can be detected in a variety of ways, not just visually. As precision-guided munitions proliferate, units that can be detected will be fired upon. The "battle of the signatures" cannot be won simply by mitigating our own emissions—reconnaissance forces must be detectors and the MAGTF must actively and passively counter both enemy reconnaissance and the impact of social media. The ability to detect, analyze, and understand complex terrain, especially in urban megacities and among local populations, will not end with U.S. involvement in Iraq and Afghanistan. Such information will be vital for Marine commanders in every future fight. Reconnaissance forces are ideally suited to lead the fight for information.

The use of reconnaissance to find and enable the exploitation of enemy surfaces and gaps and counterreconnaissance to prevent enemy forces from doing the same will not change, but the means and capabilities required to be effective will. Indeed, that change has already occurred. Maneuver warfare in the 21st century demands a modern concept of reconnaissance and counterreconnaissance operating alongside units tailored to fight and win the battle for information.

Do we choose unity of command over information collection? *(Photo by LCpl Brianna Gaudi.)*

Horses and Tanks

For centuries before and after the gunpowder revolution, horse cavalry performed two general tasks: 1) reconnaissance and counterreconnaissance, and 2) direct shock via a charge to break the enemy line and the exploitation thereof. Traditionally, the cavalry arm was simultaneously the eyes of a general and a striking force. It was not coincidence that the Romans carefully selected their general's second-in-command, his Master of Horse. Reconnaissance and counterreconnaissance was of the utmost importance. As gunpowder firearms improved in lethality, however, the ability of cavalry to perform these missions began to decrease. During the Crimean War, the famous "Charge of the Light Brigade" heralded the end of horse cavalry's effectiveness as a shock force. By World War I, cavalry could not reliably perform reconnaissance nor conduct charges. During August 1914, both German and French cavalry reconnaissance units proved unable to operate in their traditional roles. As the war dragged on, the tank was developed and eventually filled the shock role while aircraft began to fill the reconnaissance role.

In some ways, reconnaissance and counterreconnaissance capabilities

vastly improved as aircraft began to fill the role. More ground could be covered faster than ever before—and in a much safer manner—as aircraft could avoid ground units by simply flying higher. Military forces, however, lost some of the detail that cavalrymen were able to acquire on horseback. The defeat of enemy reconnaissance units, now that they were aircraft, became the business of air forces. Motorized and mechanized reconnaissance units proliferated before and during World War II, but they have largely remained unchanged while aerial surveillance has changed dramatically.

Drones and Satellites

Aircraft, unmanned aerial vehicles, and satellites are now the dominant means for reconnaissance. As advanced as the technology is, however, ground commanders are still bereft of the feel for the ground provided by a cavalry commander that knows his business. Aerial surveillance is an excellent, but insufficient, capability.

Unmanned systems are proliferating at a rapid rate; in any future conflict, they will be in use by our adversaries as well as ourselves. Even non-state actors now possess sophisticated unmanned aircraft systems' capabilities. In October 2016, Islamic State militants used an armed drone to kill two Kurdish fighters and injure two French Special Operations troops in Iraq.[1] Unmanned systems will increasingly be employed like a line of skirmisher's—simultaneously observing and preventing the enemy from observing. Part of reconnaissance and counterreconnaissance then will be to punch holes in that line. Marine Corps reconnaissance units will not just need the ability to operate against an enemy on the ground but across all domains.

Potential adversaries are well aware of American over reliance on aerial surveillance. The Iranian Revolutionary Guard Corps (IRGC), for example, has copied the success of Hezbollah when it comes to the camouflage and masking of positions. During the 2006 Israeli offensive into Southern Lebanon, the Israeli Defense Force was confronted with a defense-in-depth of squad-sized anti-tank and rocket teams that aerial surveillance could not locate. Hezbollah teams use both caves and buildings while employing low signature weapons systems in order to avoid detection.[2] To further minimize their signature, teams did not communicate with each other; each team leader was charged with fighting the fight as he saw fit within his assigned area. The IRGC plans to replicate Hezbollah's success on the Iranian shore of the Persian Gulf. This so called "mosaic" defense cannot be accurately mapped and analyzed through aerial surveillance alone. To be overcome, it will need to be probed by the MAGTF and forced to react.

Fighting for Information

In late 1950, Chinese forces streamed across the border between China and North Korea straight toward American lines on the peninsula. Despite daily surveillance flights, American aircraft never spotted the incursion. In late October and early November, Chinese forces attacked Republic of Korea and U.S. Army forces in the west and the 1st MarDiv in the east.[3] Then, the attacks stopped. In late November, they attacked again, this time flowing around American strong points and then attacking from the rear. The initial attacks had located surfaces and gaps in the American positions.

The Chinese forces, by attacking the American forces for a short time, were fighting for information. The Chinese military was new and had never faced Americans before. After the initial phase of fighting, Chinese leaders wrote a pamphlet about how the Americans had reacted and distributed it to their forces.[4] Then they attacked again, this time with a plan designed for their strengths and American weakness. By fighting for information and then planning based on that information, Chinese forces pushed the U.S. Eighth Army all the way back to the 38th parallel and forced the U.S. X Corps to trek through the Chosin Reservoir to be evacuated by the Navy.

The First and Second Phase Offensives—as the above attacks were named—are an excellent example of how intelligence can, and should, drive operations. But passive intelligence collection does not provide enough decisive information to drive operations and depends wholly on the enemy to make mistakes in protecting their information. The Marine Corps requires both a concept and a force tasked with the proactive reconnaissance and counterreconnaissance fight.

In 2014, just such a concept was proposed in the *Marine Corps Gazette*. In an article titled "Operate to Know," LtCol Drew Cukor, Col Matthew L. Jones, Capt Kevin Kratzer, and 2ndLt Sy Poggmeyer proposed a four-point concept designed to ascertain and utilize intelligence to drive operations. The article states,

> We effectively ask our most important expeditionary combat forces to operate nearly blind, relying primarily on limited theater and national surveillance capabilities to develop a meaningful picture of the battlespace.[5]

Such tools are important but can never in and of themselves unveil the entire picture of an operating environment. The four aspects of the concept intended to alleviate this problem are: 1) intelligence and operations integration, 2) pervasive and persistent surveillance and reconnaissance, 3) a continuous operations and intelligence picture, and 4) integration with the global knowledge environment (GKE).[6]

The key is a multifaceted approach that analyzes both the enemy and the environment through a variety of means: aerial and satellite surveillance, reconnaissance, interaction with the human terrain, the electromagnetic spectrum, signals and human intelligence, and the GKE. Once the information from those means is analyzed, it then needs to influence the decision making of commanders. Currently, the MAGTF has no one unit that can leverage all of those different means and then disseminate the knowledge resulting from the analysis thereof.

The MAGTF does, however, have a variety of means available to conduct reconnaissance and counterreconnaissance. *MCDP 1-0, Marine Corps Operations,* defines reconnaissance as,

> A mission undertaken to obtain, by visual observation or other detection

Force reconnaissance units from platoon to battalion will need to strengthen interoperability relationships–both joint and combined. *(Photo by Nelson Duenas.)*

> methods, information about the activities and resources of the enemy or adversary, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area ...[7]

and counterreconnaissance as, "All measures taken to prevent hostile observation of a force, area, or place."[8] It also describes the various means available to the MAGTF to conduct both missions, such as radio battalion, reconnaissance battalion, and light armored reconnaissance battalion. While the MAGTF has a wide variety of such means, they do not fall under one command authority; the fight for information violates the principle of unity of command. A MAGTF WARRIOR exercise found that, during the execution, there were seven entities with responsibilities in the security area of the MAGTF, all of which had a different chain of command and none of which had any authority over the others.

The problem identified at MAGTF WARRIOR is twofold. First, the employment of reconnaissance/counterreconnaissance assets in such a manner is a detriment to the security of the MAGTF as information and action is fuzzed at the MAGTF headquarters, which in turn hampers initiative and the bold action required by maneuver warfare. Second, any information garnered by such units is filtered through various staff processes impeding unity of effort and rapid dissemination throughout the MAGTF—if that information proliferates at all.

While fighting for information is vital, so is preventing the ability of the enemy force to probe and test friendly positions as the Chinese did in 1950. The purpose of screening and guarding missions is to prevent just such a situation; however, screen and guard must be applied in all domains. Marine Corps reconnaissance assets must therefore be invested with full-spectrum intelligence capabilities while retaining their current ability to fight and win if need be while simultaneously falling under a single commander tasked with the mission.

21st Century Reconnaissance and Counterreconnaissance

To conduct reconnaissance and counterreconnaissance in the 21st century, the detailed information formerly available to the cavalry or infantry unit must be combined with the full spectrum of modern sensing, acquisition, and intelligence collection capabilities while retaining sufficient combat power. This requirement is not limited to major combat operations. In "small wars" or counterinsurgency fights, there is a need for effective reconnaissance to map the human and urban terrain and assess insurgent actions. While reconnaissance assets must surely be prepared to fight, their proper role is much less "shoot, move, and communicate" and more "sense, make sense, and communicate." Such assets are not currently employed and equipped to accomplish the latter.

MCDP 1-0 describes reconnaissance operations as those that, "Use visual observation or other detection methods to obtain information about the activities and resources of an enemy or adversary," and counterreconnaissance as, "All active and passive measures taken to prevent hostile observation of a force or area."[9] For the 21st century, reconnaissance will have to rely much more on other detection methods—such as electronic and signature detection—rather than visual observation. Counterreconnaissance will have to employ more active measures to "ping" and "probe" the enemy in order to either deceive them as to the whereabouts and plans of friendly forces or unmask their force employments.

Fighting for and generating intelligence, preventing the enemy from doing the same, and leading the MAGTF's military deception efforts is a task as daunting as it is necessary and thus will require a maneuver commander assigned mission and employing a task-organized force combining reconnaissance, information and electronic warfare assets, and all source intelligence capabilities into one command. This will better enable the MAGTF to identify enemy critical vulnerabilities, protect its own, and exploit that knowledge through decisive action.

The role of reconnaissance forces in the future will resemble the "Long Patrol" of the 2d Raider Battalion on Guadalcanal in 1942. The battalion, led by LtCol Evans Carlson, initially landed at Aola Bay, east of the main American position protecting Henderson Field. Then-MajGen Archer Vandegrift tasked Carlson to

> scout west toward the perimeter to determine the strength of enemy forces between Aola Bay and Henderson

> Field, as well as to interdict any of the fifteen hundred Japanese troops ... [10]

During its month-long operation through Japanese-held territory, the battalion fought dozens of skirmishes and small fire fights with enemy troops as well as a major battle at Asamana village.[11] After eliminating Japanese artillery positions and locating the main Japanese movement corridor, the Raiders then eliminated Japanese positions overlooking Henderson Field by attacking their hill top positions from the rear. All told, the Raiders inflicted 488 casualties on the enemy while suffering only 16 killed and 18 wounded themselves, although malnutrition and disease plagued the unit as well.[12]

Carlson's patrol simultaneously conducted reconnaissance, disrupted enemy movements and attacks, and prevented the enemy from conducting its own reconnaissance. The Raiders' specialized training allowed them to move quickly and evade enemy counterattacks, but when a fight could not be avoided, they were able to prevail. Modern reconnaissance forces need to be able to do the same but will need assets to do so which were not available to Evans Carlson.

Conclusion

Modern reconnaissance forces are the heirs to the horse cavalry's mastery of fighting for information on land. Increasingly though, both reconnaissance and counterreconnaissance efforts will need the ability to detect and fight for information in the air, sea, space, and cyberspace realms. Capabilities such as unmanned aircraft systems, the ability to counter them, electromagnetic sensing and detection, and the full spectrum of intelligence gathering will need to be brought together on a routine basis. All of the capabilities needed to conduct 21st century reconnaissance and counterreconnaissance are currently housed throughout the MAGTF: task forces tailored and devoted to the fight for information will be necessary.

The changing nature of the fight for information leads to a few questions that should drive Marine Corps efforts to modernize its reconnaissance/counterreconnaissance concepts:

UASs are only one part of our reconnaissance capability. *(Photo by Cpl Ricky Gomez.)*

- How can we best equip the MAGTF to conduct reconnaissance and counterreconnaissance in all domains?
- How can we organize, train, and equip the MAGTF to achieve surprise on the 21st century battlefield?
- How can we organize, train, and equip the MAGTF to deceive our adversaries?
- How can we best protect our intent and determine the intent of our adversaries?
- How can we conduct the reconnaissance/counterreconnaissance to control and manipulate tempo?

As reconnaissance is a vital part of maneuver warfare, these questions should guide Marine Corps concepts and force structure in order to conduct maneuver warfare in the 21st century.

Notes

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Light Infantry Problems and Bicycle-borne Solutions

Ranger, endurance, and speed

by Maj John E. Kivelin & 1stLt Cameron Jones

"Some Marines overlook one of their most powerful weapons, one that creates advantage for infantrymen, aviators, and logisticians equally. That weapon is speed."

—MCDP 1-3

Leaders have published countless books and articles about three frustrating topics that plague our infantrymen: lightening his load, increasing his speed, and the atrophying of his skills to operate among restricted terrain. Every infantryman is acquainted with the crushing weight of a sustainment load and the sweltering exhaustion of a live fire attack. Military literature is riddled with examples of infantrymen sustaining demoralizing loads day-after-day, such in as Tuchman's *The Guns of August* or Rommel's *Attacks.* In the most recent *Infantry Training and Readiness Manual*, the CMC prescribes that infantrymen must be able to complete a 20-mile march in less than 8 hours with an approach-march load of 114 pounds. In our doctrine, he also mandates that infantrymen must maneuver to decisive positions of advantage. Many authors recommend costly and technologically complex solutions, while others recommend improving tactics or physical training. We propose, however, that modern bicycles with carts provide infantrymen with decisive advantages in the infantry trinity of shoot, move, and communicate.

Bicycle-equipped infantry possess several advantages, including greater range, greater endurance, and greater speed. They are capable of carrying heavier loads of weapons and ammu-

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Marines sustain demoralizing pack weights day-after-day. *(Photo by Sgt Joseph Scanlan.)*

nition while utilizing a fraction of the logistical and maintenance support required by a conventional unit. Modern infantry readers may find the concept odd, but bicycles have been employed in a military capacity many times over the last 100 years.

Shoot.

With the aid of bicycles and carts, Marines can haul superior combat loads and more powerful weapons over protracted distances without succumbing to the human factors of similar foot movements. At the assembly area, Marines stage bicycles with sustainment loads and, if desired, use carts to haul crew-served weapons and extra ammunition to firing positions.

During the Vietnam War, the North Vietnamese Army (NVA) used the Ho Chi Minh trail to infiltrate the Republic of Vietnam and logistically support their forces. Each porter, equipped with a bamboo-reinforced bicycle, hauled hundreds of pounds of supplies and equipment to troops in the south. The trails were invisible to aircraft overhead. The NVA negotiated these bicycles through the restricted terrain along 18-inch trails.

Move.

Excellent movement is the bicycle infantry's greatest advantage. Bicycle infantry move stealthily, farther, and faster with larger equipment and ammunition complements. Following the attack, infantrymen can use carts to facilitate tactical resupply, redistribution, and casualty evacuation.

During the Malayan campaign, the Japanese Army overwhelmed the British Army in a series of rapid advances despite their numerical inferiority. Equipped with bicycles, the Japanese infantry moved rapidly through the thick jungle terrain. The retreating British demolished hundreds of bridges in the wake of the Japanese advance, but were unable to slow their momentum. Ultimately, 130,000 British soldiers surrendered to the Japanese.

On the Allied side, the British employed bicycles successfully during a daring raid in Northern France. While a bombing raid distracted German air defenses, a company of airborne troops parachuted a few miles away from their objective: the German radar station at Bruneval. Equipped with bicycles, the British troops biked quietly to their objective. The British raid force seized critical components from the radar array and fought to the beach where Royal Navy boats extracted the raid force to Britain. The raid was an enormous morale boost for the British. Using the components seized from the radar array, the British developed an effective radar countermeasure, codenamed "Window."

Porters for the NVA used bicycles to move hundreds of pounds of munitions on the Ho Chi Minh trail. *(Photo available at armchairgeneral.com.)*

As an infantryman waiting in the wash system south of the Range 400 line of departure, how do bicycles and carts help me? The answer is, "A little, but not that much." However, as an infantryman standing at an assembly area in vicinity of Camp Wilson, tasked to conduct the same light infantry attack with an approach-march load with associated crew-served weapons and supplies, the answer becomes more clear: "I have to move 20 km with hundreds of pounds of equipment and ammunition. Bicycles and carts are instrumental to my attack."

Communicate.

Marines can carry more batteries and heavier, more powerful radios using the additional lift capacity. Also, infantrymen can use even lighter radios in the foot mobile assault by setting up powerful radios as repeaters.

Bicyle infantry move stealthier, father, and faster. *(Photo by Sgt Mapham, No 5 Army Film and Photograph Unit.)*

Conclusion

Your platoon, reinforced with crew-served weapons, inserts into the LZ at 0100 to conduct a raid on a small compound containing three high-value targets. You disembark one of the three MV-22s and supervise hasty security. The MV-22s lift off and the NCOs quietly account for all of their Marines. You landed six miles from the objective to prevent the enemy from hearing the approach of the MV-22s. The Marines unfold bicycles and use mounted KILSWITCH tablets on an Adaptive Networking Wideband Waveform network to guide them to attack positions through the intricate trail network. Two hours later, you arrive at your attack position with conserved stamina, ready to conduct actions on the objective. You are reassured by the fire power provided by the additional two Mk-19s and extra 60mm mortar support because of the excess lift capacity provided by bicycles and carts. Following the successful raid, the platoon retrogrades two miles to the nearest LZ for extract with two casualties and one target. During the withdrawal, a buddy's bicycle is disabled. He quickly places his assault load and flak jacket in your cart, jettisons his bicycle, and helps you push your bicycle and cart along at a light jog. With folded bicycle in hand, you extract 25 minutes later via the same MV-22s that inserted your platoon.

Bicycles may be the innovative solution to extend the range of light infantry combat power. *(Photo by Roland Hoskins, Mobilised British Household Battalion.)*

Before bicycles are acquisitioned and distributed to units, the infantry community must establish measures of performance to compare dismounted and bicycle-borne unit performance. The infantry community must also experiment with different bicycle variants to determine how individual performance is affected by different bicycle models. Following the measures of individual performance, a commander must outfit a platoon-reinforced element to compare unit-level performance standards. Finally, units can integrate bicycles into tactical scenarios during MCCRE/MRXs to establish measures of effectiveness against opposing force units.

We already see the proliferation of adversary intelligence, surveillance, and reconnaissance capabilities combined with nested technology to deliver precision fires. In this evolving environment, combat will be characterized by the increased vulnerability of conspicuous weapons and equipment—artillery, armored personnel carriers, cargo transport trucks, tanks, and aircraft. In the 21st century, modern combat will largely be fought by unsupported light infantrymen with limited lines of support. Currently, the Marine Corps seeks innovative solutions to extend the range of light infantry combat power. Advanced robotics, autonomous all-terrain mules, and multi-million dollar Defense Advanced Research Projects Agency programs may develop feasible answers to these problems, but the authors believe that the low-cost, readily available solution will be found in bicycles. Bicycle-borne infantry are capable of reaching farther, faster, and more ready to fight without the logistical tethers associated with conventional assets.

UBMC

Innovation, Status Quo, or Relative Regression?

The peacetime military

by MAJ Adam K. Greene, U.S. Army

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Dr. Don Snider claims that as militaries downsize in the future, they will likely become increasingly bureaucratic, and "bureaucratization is the antithesis of the profession."[1] He discusses this issue because the military is on the cusp of an interwar period, and the institution will have the tendency to make decisions, such as bureaucratization, that actually cause harm to the organization. Military leaders need to be prepared to make tough decisions to prevent reclusion of the force rather than accelerate it. The future may be uncertain, but the interwar period between World War I and World War II created different challenges. Arguably, the three most significant obstacles confronting military organizations during the interwar years were public policy, budgetary constraints, and inability to properly prepare for war. These are the most significant because they place considerable restrictions on military innovation, preventing effective preparation for national defense and the military's ability to fight and win the Nation's wars.

The first obstacle was that interwar public policy prevented military progression because allocating significant defense resources seemed needless in the face of perceived global peace. During the interwar period, many politicians and their constituents adopted and fiercely enforced isolationism as policy due to the absence of existential threats.[2] This policy is logical but shortsighted. As history perpetually demonstrates, national security threats continue to arise even during prosperous eras. Policy makers need to balance short-term requirements with long-term goals. Use a family budget as a simple analogy. Families need to plan for both short-term (daily expenses) with long-term spending (lifetime longevity). A short-term family crisis or prosperous period may affect longevity planning, but a family that ends long-term financial planning may suffer doom in the future. Since this public policy focused on the present rather than balancing

Budget constraints also impact force readiness and can't be ignored during budget tightening periods. *(Photo by LCpl Dorian L. Utsinger.)*

the present with the future, political leaders left militaries with few options to prepare for potential conflicts.

Militaries learned few operational and tactical lessons during World War I leading to public distrust and ultimately limited military innovation.[3] Political leaders essentially practiced the opposite of mission command. It seemed like World War I events gave politicians little reason to trust the military. Democratic nations seemed to be hit the hardest because the vast majority of citizens did not realize benefits that theoretically emerge after winning large-scale total war.[4] The events around World War I created the perfect storm of political distrust and isolationism, resulting in public policy handicapping militaries' ability to prepare for future battle.

The second interwar obstacle was fiscal policy. Funding cutbacks commonly led to drastic defense spending reductions. Superficially, this sounds similar to the first obstacle, but it is not. The first obstacle relates to public policy, especially with the view of isolationism. This obstacle relates directly to funding. Research and development funding waned, resulting in obsolete and mechanically unreliable tanks as well as immature mechanized doctrine at the onset of World War II.[5] This is a solid prelude to the infamous quote by Defense Secretary Donald Rumsfeld at the onset of Operation IRAQI FREEDOM, "you go to war with the Army you have, not the Army you might want."[6] Both situations conclude with sending unprepared service members to war.

Fiscal constraints provided an easy excuse for military leaders to practice lazy strategies and focus all efforts into a single method or process, such as the Royal Navy's antisubmarine device.[7] It became easy for military leaders to avoid innovative ideas because they could not afford to do as desired. As Ori Brafman stated, "no one ever gets fired for not innovating."[8] Innovative leaders find ways around fiscal constraints, but since most training events require some degree of money, leaders avoided activity that spent money, even the when decisions defied logic. For example, UK leaders

We have to prepare for the next war, not train for the last one. *(Photo by Cpl Sarah Anderson.)*

focused great effort to substitute unlike units, such as air power for land power in an attempt to raise a cheaper military force without loss of capability. The obvious problem is that the military lost symbiotic forces, and the policy would prove ineffective.[9] By the end of the interwar period, funding limitation took its toll on the military, and the allied powers entered World War II largely undertrained and underequipped.

The first two listed obstacles manifested a third: military organizations lacked resources to properly prepare for war through realistic training. Even though intellectual decentralization allowed many leaders to theorize about doctrine and develop military improvements, they were unable to test these theories to refine military doctrine and prepare for the next war.[10] A present day military staple is combat training centers. Even eastern European militaries presently understand the utility of training centers, and many have either established one or are working to establish one.[11] Even in the face of constrained resources present militaries are capable of practicing innovation. Interwar militaries were not as fortunate. Without the ability to test military theory in the field, leaders simply guessed or even gambled that their methods would work.

As part of the third obstacle, many countries trained for the enemy they wanted to fight rather than the enemy they would likely fight. For some nations, training devolved into merely a ceremonial demonstration rather than combat preparation.[12] Numerous examples of early World War II battles support this claim where the undertrained allied powers often lost to the tough and realistic German training. One example is the British defeat in North Africa. Due to decentralization, British military leaders were unable to fight and win with large organizations, and the German military easily defeated the British forces.[13]

During the interwar period between World War I and World War II, the three most significant obstacles confronting military organizations were public policy, fiscal constraints, and lack of preparation for future war. Peacetime periods potentially place significant restrictions and stifle innovation in military organizations. As mentioned earlier, current militaries will likely centralize unlike the decentralization of interwar militaries. Large, centralized military units on large bases have cost saving and resource pooling potential. In resource-constrained environments, units can depend on support from other units, unlike the interwar period. How-

Training and exercises can be impacted by policy and budget constraints. *(Photo by LCpl Austin M. Livingston.)*

ever, bureaucratic units will likely stifle innovative ideas before testing the ideas. The result is a military exercising status quo rather than innovating for the next fight. The challenge that militaries must overcome is the gravitation toward status quo.

LTG Edward Cardon stated that "major is the toughest rank [in the Army] because you are committed to the Army, but you don't know if the Army is invested in you."[14] Majors, like peacetime militaries, seek survival; they want to prove their strengths to remain relevant. This problem sets conditions for good units and leaders to make bad decisions in the name of surviving in the military. For example, three years ago, many leaders did not necessarily demonstrate great concern for their evaluations. The result is a cohesive group of majors working to the betterment of the unit less than the individual's. Presently, strong evaluations have become the most important tool regarding promotion potential. The result is at least a subtle, maybe even overt competitive environment, which degrades command climates and tears apart teams. The challenge becomes to develop innovative methods to thwart negatively competitive undercurrents so units, rather than individuals, worry about performance.

Creative thinkers must develop methods to innovate during these austere periods. Less funding actually presents opportunities for greater creativity because leaders have more time to develop methods to operate with constrained resources. Current military downsizing is inevitable, but progressive thinkers mitigate risks associated with constrained resources. Like the interwar period, the challenge currently in front of the military is how to innovate and overcome obstacles such as public policy, budgetary constraints, and diminished war preparations. Some previously encountered obstacles may not repeat themselves, but new ones will arrive, and innovative leaders, soldiers, and units will bear the burden to move into the future without regressing to the past.

Notes

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Robotics in Infantry Battalions

Ready to be incorporated

by Maj Ted W. Schroeder

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With recent improvements of optics, software, and the addition of weapons to ground robotics, the unmanned ground vehicle (UGV) has matured to the point that it is ready to be incorporated into the Marine infantry battalions. As the technology will only continue to develop, it is important that the infantry battalions do not ignore the importance that UGVs will play in the future of warfare. John Pike of GlobalSecurity.org put it best, "when they start fighting, no organized force could stand against them."[1]

In World War I, politicians, military leaders, and scientists worked tirelessly to develop a weapon that would break the stalemate on the western front. As the Allied forces worked to develop a "machine-gun destroyer," there were many who rejected the idea of the tank, including Lord Kitchener, the British Secretary of State for War. He had good reason to reject the early systems. The early prototypes were slow, unreliable, and prone to destruction by artillery fire, which inspired Lord Kitchener to call the tank a "pretty mechanical toy but [of] very limited military value." The early advocates and developers worked tirelessly to find solutions to the tank's defects and, on 15 September 1916, were able to put it into combat at the Battle of the Somme. Despite there being hundreds of tanks employed by both sides during the war, there was very little understanding about how to use the tank to its fullest.

In the years building up to World War II, designers were able to refine the tank so that it was the centerpiece of the fighting on both European fronts.

Like its tank predecessor, it will take time before UGVs are appreciated for both their capabilities and limitations. *(Photo by LCpl Julien Rodarte.)*

To get to this point, developers refined the tank by increasing its speed, armor, and armaments. They also added radios and reduced the crew required to man the tank. Commanders developed the table of organization (T/O), the gunnery techniques and, just as importantly, techniques to destroy other tanks. Strategists saw how the speed and armor protected firepower could help them mass fires and then exploit the opportunities created on the battlefield. By the end of the war, tanks had solidified their place in the world as a standard part of every major army in the world.

Today, the UGV is in the same place the tank was at the end of World War I. The DOD has purchased thousands of UGVs, but the Marine Corps has yet to integrate them into its organization, develop techniques to employ them, or developed techniques to destroy enemy UGVs. P.W. Singer reports that, "by the end of 2008, there were about 12,000 robots of nearly two dozen

varieties operating on the ground in Iraq."[2] According to Total Force Structure Management System (TFSMS), a Marine Corps infantry battalion has four unmanned aerial vehicles (UAVs) and zero UGVs as part of its table of organization and equipment (T/O&E). The Marine Corps tank battalions and assault amphibious battalions also lack UGVs. The only units in the Marine Corps who have any type of ground robotics in significant numbers are the explosive ordnance disposal companies and combat engineers. Some of these systems are armed; however, most of these systems are weapons specifically designed for addressing unexploded ordinance.

There are some good reasons why the infantry battalions lack UGVs. It takes time to understand a new system and fully appreciate its capabilities and limitations in the modern battlefield. UGVs are now more than just a new system but have expanded into a new family of systems and a potential replacement for many of the weapons used today across the Marine Corps. The wide range of options makes it difficult to identify which designs will or will not become viable. It also takes time for a new weapon to mature enough to be viable on the modern battlefield. While the tanks had their debut in September 1916, they still had major changes enacted over the next 25 years. The wide range of options and the lack of a fully mature UGV is a potential reason why the Marine Corps has not fully accepted UGVs into its organization.

As the Marine Corps moves forward in developing its integration of UGVs, it needs to start with a few basic designs. The process of integration needs to focus its warfighting doctrine on how UGVs will help Marines in the execution of the doctrine. The Marine Corps could start with a few basic infantry supporting systems to solidify the requirements of UGVs in combat. This will help drive the design of future systems, thus producing a better product. As the Marine Corps continues to work through the development, it will need to put the systems to the test. The Marine Corps will also need to test a UGV-equipped infantry battalion against a pure human battalion. The goal would be to answer several questions. First, does the UGV have the potential to be beneficial to an infantry battalion, enough so that it could replace a Marine in a fight? If a UGV is good enough to replace a Marine, then what would a future T/O&E look like as newer UGVs come on line? Additionally, what are the techniques of integrating UGVs into the battlefield? Further, what changes in design are necessary to produce a refined product in the future?

Whether it is battery life, fuel capacity, or ammunition storage, none of the current UGVs can compete with the length of time that a Marine can stay in the fight ...

The tests of the manned verses partially manned battalions should take on two phases. First, the two units should be tested on live fire ranges to see how well they could integrate fires and maneuver to close with and destroy an enemy target. This will clarify which battalion is able to produce the most effective fires and the quickest maneuver against targets. The second test should be force-on-force. The Marine Corps needs a definitive answer of how a battalion with fewer Marines reinforced by unmanned systems can handle fighting a thinking enemy. This test will bring to light how UGVs will work as a part of warfighting doctrine. The Marines should know if these systems are either benefiting or limiting a battalion engaged with a thinking enemy. Further, the manned battalion should be able to develop techniques of countering UGVs. As other countries develop their UGVs, the lessons learned will become invaluable.

There is no doubt that the current UGVs lack the ability to participate in a sustained battle. Whether it is battery life, fuel capacity, or ammunition storage, none of the current UGVs can compete with the length of time that a Marine can stay in the fight (although this will change). Current UGVs do have their advantages. A UGV only needs fuel and ammunition to continue its mission, which means a commander can get more "man-hours" out

Marines with a weaponized multi-utility tactical transport (MUTT) vehicle during experimentation at Camp Pendleton. *(Photo by LCpl Julien Rodarte.)*

Like UGVs, modern day tanks—such as the M1A1 Abrams tank—are the result of post-World War II innovations. *(Photo by LCpl Careaf Henson.)*

of a UGV, making it a preferred asset for an economy of force mission. They are never suppressed by enemy fire, and they never allow fatigue to affect their fires or willingness to continue fighting. Current UGVs are very tough, a "Talon [UGV] serving with the Marines was once hit by three rounds from a .50-caliber heavy machine-gun" and continued working.[3] These attributes make UGVs very effective in a support by fire role or checking a danger area. In early marksmanship tests, one UGV "hit the bull's-eye seventy out of seventy tries," making it an excellent weapon in an ambush or when attacking by fire. UGVs have been built with ability to detect and "see the sniper before the smoke disappears from the shot," according to the program lead, making it invaluable in a counter-sniper mission.[4]

Without using UGVs in operating units today, it is hard to account for maintenance hours. UGVs will require maintenance time, but as long as they require fewer than six hours of maintenance for every day of operation, a commander will be able to increase the unit's man-hours by using UGVs.

Some would say that these experiments are not necessary and that UGVs have a limited future in war. It is easy to empathize with their feelings that it is difficult to predict what weapons will be a part of the future of war. However, the same argument was made against the early tank. UGVs will be a part of any future war. Current off-the-shelf technology enables any country in the world to produce their own systems. The armed forces that develop, train, and implement UGVs today will be ready for the wars that they will fight tomorrow.

Like any new weapons system, it is hard to know if UGVs are the modern version of black powder and will change the face of warfare or if they will come and go having little effect. A third option is that the weapons system is so horrific that countries vow to never use it, similar to chemical, biological, radiological, and nuclear weapons. It is early in the development and integration of the UGV and, therefore, hard to say where in the spectrum of new weapons it will fall. What is clear is that the U.S. is not the only country with UGVs. The Marine Corps must prepare for the inevitability of facing UGVs in future combat. Heinz Guderian said it best by stating:

> On many there still exist differences of opinion of us sometimes quite fundamental nature. Only time will tell who is right ... Actions speak louder than words. In the days to come the Goddess of Victory will bestow her laurels only on those who prepared to act with daring.[5]

Notes

1. P.W. Singer, *Wired for War,* (New York: Penguin Books Ltd, 2010), 109.

2. P.W. Singer, "Military Robots and the Laws of War," *The New Atlantis*, (Winter 2009), accessed at www.thenewatlantis.com.

3. Singer, *Wired for War,* 29.

4. Ibid., 111.

5. Heinz Guderian, *Achtung-Panzer!*, (London UK: Orion Books Ltd, 1993), 212.

The Warfighter

Chapter 5

by LtCol J.J. Mullen

"Like war itself, our approach to warfighting must evolve. If we cease to refine, expand, and improve our profession, we risk becoming outdated, stagnant, and defeated."[1]

The preface of *MCDP 1, Warfighting*, charges us to read it, reread it, understand it, and take its message to heart. I struggled with that last part. Warfighting is a state of mind.[2] In order to take it to heart, it must be reconciled with existing personal philosophies.[3]

Marines are more than warriors, or leaders, or captains, or mechanics, or riflemen: Marines are *warfighters*. The warfighter subsumes our Corps' values (honor-courage-commitment), our core competencies, our rank or MOS, and our leadership traits and principles. Currently, *MCDP 1* explains our warfighting philosophy but does not define the warfighter.

This article is an attempt to define the warfighter. It is written as a draft of a possible Chapter 5 of *Warfighting* in order to remind the reader of our foundational philosophy.

Maneuver warfare requires a well-definied mission ...

"Knowing yourself is the beginning of all wisdom."

–Aristotle

"... no amount of subsequent planning can solve a problem insufficiently understood ..."

–MCWP 5–1

Chapter 5
The Warfighter

Maneuver warfare requires a well-defined mission, decentralized command and control (C^2), and competent warfighters.[4] We have discussed mission and C^2. Since human will is the driving force of war, we must dig deeper to define the *warfighter*.[5]

The Warfighter

War, and maneuver warfare, is characterized by the interaction of physical, moral, and mental forces.[6] These forces are inherent in the warfighter as well. (See Figure 1).[7] Warfighters should seek to identify, understand, refine, and maximize these forces within themselves.

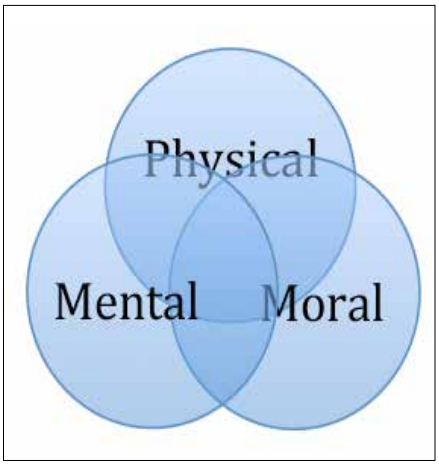

Figure 1. The Warfighter.

The Physical Force

The physical force is the easiest to define and measure. It is the power or strength possessed by the body and the endurance to apply it during hardship or adversity.[8] We build the physical force in tangible ways: we run, perform pull-ups, or lift weights.

There are defined standards for individual physical strength, and because it can be easily assessed, it is sometimes given more attention than the other forces. It is essential to remember that a certain level of physical force is required because physical force is the *means* of war.[9] However, physical forces are often

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inseparable from the moral and mental ones. It is the moral force that drives our physical selves to cover a grenade for our fellow Marines and our mental faculties that calculate the chances of survival.[10]

The physical force lends strength to our knowledge and a sharp edge to our moral convictions.

The Mental Force

The mental force can be thought of as knowledge. Knowledge is the combination and application of experience and education.[11] Experience is practical knowledge or skill derived from direct observation, the sum of everything lived through. Education is training by formal or informal instruction, whether through self-paced reading or classroom instruction.[12]

Warfighters must pursue knowledge. The more we know and understand, the more we will effectively and rapidly exploit decisive opportunities.[13] Knowledge builds awareness and is a key ingredient in judgment, dependability, and decisiveness.

The mental force directs our physical force and gives depth to the moral.

The Moral Force

The moral force consists of the intangible pieces of humanity that are left over when you have sorted everything else into the physical or mental categories.[14] The moral force is both personal and collective, and it is a key ingredient in all those traits the Marine Corps wants a warfighter to posses but cannot issue: justice, integrity, unselfishness, courage, enthusiasm, and loyalty.

Fortunately, our collective moral force has a name: *Semper Fidelis (Always Faithful). Semper Fidelis* is the invisible, but indelible, mark upon the spirit of every Marine who has ever earned the title. Faithful is a good word for the warfighter: faith is an allegiance to duty or a person; firm belief in something for which there is no proof; complete trust.[15] Warfighters are *always faithful*: to each other, to their god, and to their country.

Each warfighter uses different words to define their personal moral force.[16] A warfighter codifies it in writing, reflects upon it, and remains faithful to it. Our moral force guides us; if we believe in nothing, we go nowhere.

The moral force drives and unites the physical and mental, for war is driven ultimately by the human will.

We train to the physical and mental preparedness for war. *(Photo by Sgt Sarah Anderson.)*

Combined Arms Application of Physical, Mental, and Moral Forces

The application of combined arms is central to our philosophy of maneuver warfare.[17] All three forces should be applied in such a way that the enemy seeks relief from one only to be struck by another. He may dodge our mental forces (find a way to outsmart our tactics) but be met by increased physical force. Sometimes our enemy is hard to define, and sometimes we are our own enemy. These three forces should be brought to bear as appropriate: confronted by a breach of ethics, we can reinforce the gap with knowledge; physical injury may be assuaged by deeper faith; ignorance can be mitigated by strength.

The Balance

Equilibrium is key: the most effective warfighter maintains a balance of all three forces. The goal is not to be the fastest or smartest or most devoted, but rather to find "a balance between these three tendencies, like an object suspended between three magnets."[18] The balance is different for everyone. Some warfighters are inherently physically stronger or grew up surrounded by people of good character some are exceptionally intelligent. Every warfighter must routinely spend time in self-reflection to determine which force requires attention and shift effort as required. There are many areas where the forces overlap (see Figure 1); for example, moral strength can motivate you up a hill long past the time your legs tell you to quit.[19]

Focusing on two of the three forces is not enough. For example, if a warfighter failed to adequately develop one of these forces:

The goal is not to be the fastest or smartest or most devoted, but rather to find "a balance between these three tendencies, like an object suspended between three magnets."

Physical and mental, without moral. This warfighter is uninspired and lacks focus. All the knowledge and muscle in the world cannot compensate for a lack of moral force. It is the moral force that brings the mental and physical forces to bear on the enemy in the last yards. The warfighter who has physical and mental strength but no faith is deceptively dangerous; they seem competent on the surface, but perceptive subordinates instinctively understand that something is missing. This warfighter wanders into spiritual pitfalls and may break and run during hardship. The moral force guides our decisions and anchors a warfighter during adversity or challenge.

Moral and physical, without mental. This warfighter is ignorant and shortsighted, lacking the mental acumen to apply moral and physical strength efficiently and effectively. Shallow and unimaginative, they flounder when confronted by wicked problems. Education and experience are required to develop a knowledgeable warfighter who can leverage realistic solutions to impossible problems. The mental force tempers moral and physical strength.

Moral and mental, without physical. This warfighter is weak, lacking the physical strength required to endure wars. This warfighter may be intelligent and may even have good intentions and imagination. However, a physically weak person will stumble during adversity. Physical strength is the bulwark of our moral and mental selves.

Conclusion

Warfighters consist of physical, mental, and moral forces. Moral strength can be cultivated, physical strength can be built, and mental strength can be developed. These forces, however, require constant investment; if ignored, they erode. Warfighters must seek self-awareness and work to maximize existing forces in order to become as knowledgeable, physically strong, and morally focused as possible.

Physical strength is the hard work of our moral and mental self. *(Photo by Sgt Sarah Anderson.)*

Education and experience are required to develop a knowledgeable warfighter ...

Notes

1. Headquarters Marine Corps, *MCDP 1, Warfighting*, (Washington, DC: 20 June 1997), Preface by Gen Alfred M. Gray.

2. Ibid., "It [maneuver warfare] is a state of mind," 96.

3. Ibid., "It requires a concept that is consistently effective across the full spectrum of conflict because we cannot attempt to change our basic doctrine from situation to situation and expect to be proficient," 71.

4. While these components of warfighting are not prescribed in a list form in the first four chapters of *Warfighting*, the importance of competent warfighters, decentralized C^2, and a clearly stated mission are reiterated throughout. I would encourage Marines to read and reread *Warfighting*. Marines should be able to articulate the philosophy of maneuver warfare in three minutes or less to a layman. Without a clear understanding of war—and warfighting—it is difficult to understand the *warfighter*.

5. *MCDP 1*, 14 and 19.

6. Ibid., "War is characterized by the interaction of physical, moral, and mental forces," 15. Also, "The aim [of maneuver warfare] is to render the enemy incapable of resisting effectively by shattering his moral, mental, and physical cohesion—his ability to fight as an effective, coordinated whole," 73.

7. Ibid., "Each belligerent is not a unitary force, but a complex system consisting of numerous physical, moral, and mental components as well as the relationships among them," 45.

8. *Dictionary.com*, *s.v.* "strength," accessed on 15 February 2014 at http://dictionary.reference.com.

9. Carl Von Clausewitz, *On War*, translated and edited by Michael Howard and Peter Paret, (Princeton, NJ: Princeton University Press, 1984), 75, "War is thus an act of force to compel an enemy to do our will." Although war is ultimately driven by the human will, the result of that will is either the threat or application of organized violence (physical force).

10. Cpl Jason Lee Dunham (10 November 1981–22 April 2004), USMC, was awarded the Medal of Honor while serving with 3rd Bn, 7th Marines during the Iraq War. While on a patrol in Husaybah, his unit was attacked, and he deliberately covered an enemy grenade to

save nearby Marines. When it exploded Dunham was seriously injured and died eight days later. Accessed on 11 February 2014 at http://en.wikipedia.org.

11. Generalized summation of "knowledge," *Wikipedia*, accessed on 12 February 2014 at http://en.wikipedia.org.

12. This is just a beginning. Clausewitz, *On War*, states "Parenthetically, it should be noted that the seeds of wisdom that are to bear fruit in the intellect are sown less by critical studies and learned monographs than by insights, broad impressions, and flashes of intuition," 85.

13. *MCDP 1*, "Mental forces provide the ability to grasp complex battlefield situations; to make effective estimates, calculations, and decisions; to devise tactics and strategies; and to develop plans," 16.

14. Ibid., "Moral forces are difficult to grasp and impossible to quantify. We cannot easily gauge forces like national and military resolve, national or individual conscience, emotion, fear, courage, morale, leadership, or esprit." For the warfighter, the moral forces boil down to even more individual areas: hope, faith, and justice, to name a few. This is where the mental force collides with the moral: education and research is key to development. Wandering around in our own minds is not enough to develop the moral force; we must also educate ourselves. Aristotle wrote, "We are not studying in order to know what virtue is, but to become good, for otherwise there would be no profit in it," 16.

15. *Dictionary.com, s.v.* "faith," accessed on 15 February 2014 at http://dictionary.reference.com.

16. An inability to articulate personal morals/values/beliefs indicates that they are ill-defined. A Marine should be able to articulate the philosophy of maneuver warfare in three minutes or less to a layman. By the same logic, a warfighter should be able to define their personal moral code in three minutes or less to anyone who asks.

17. *MCDP 1*, "Combined arms is the full integration of arms in such a way that to counteract one, the enemy must become more vulnerable to another. We pose the enemy not just with a problem, but with a dilemma—a no-win situation," 94.

18. Clausewitz, 89. Although Clausewitz was not discussing these three forces (he was discussing his trinity from Chapter One), his idea of balance fits this model well.

19. Ibid., "When we speak of destroying the enemy's forces we must emphasize that nothing obliges us to limit this idea to physical forces: the moral element must also be considered. The two interact throughout: they are inseparable," 97.

Decision Time

Visiting an infantry battalion

by GySgt Paul Nichols, USMC(Ret)

The Spartan helmet, shield, sword, spear, greaves, and breast plate are no longer hanging on the CO's conference room wall. Different pieces of the Spartan gear are now kept at the company offices and displayed front and center on "gear trees" during formations. The right to display the gear is won through competition during the quarterly Spartan Games.

Every day, the OOD gives a TDG to the duty NCOs; every Tuesday at 0500, an Advance Warfighting Seminar is held that is open to all, usually 10–15 Marines attend. Weekly "war counsels" with the officers, SNCOs, and sergeants gather to go over SOPs, discuss tactics, and voice opinions. The sergeants sit up front and are the last to vote since they will be doing the execution. PME is driven from top-down, then bottom-up refined.

The second visit was in August to witness training being done with the decision room, with an ad hoc collection of computers that were scheduled for disposal utilizing software that has been around since 2002. The Office of Naval Research (ONR) had also brought in a project that they were working on—Accelerating Development of Small Unit Decision Making (ADSUDM). I talked to some of the Marines from the battalion and received mixed reviews. They weren't really sure where the battalion was going with this concept. I also saw Marines doing immediate action drills in the quad.

In September, during Marine Week in Nashville, I ran into a lance corporal from Fox Company. I asked him about the decision room. He explained how he worked on fire team, squad, and platoon tactics at 0200 the day before they left for Nashville.

My third visit, in November 2016, was by invitation to attend the Spartan Technology and Innovation Week. From August to November, ten decision rooms had spread through the battalion. The battalion was able to find enough computers to outfit two decision rooms per company with two more in the battalion command post. The Spartan Emerging Technology Week reviewed the capabilities of simulation-based training the battalion created by utilizing readily-available technology. One of the systems the battalion employed was the Augmented Immersive Team Trainer (AITT). The 81mm mortar platoon showcased their ability to train forward observers during the eagle eye challenge utilizing this augmented reality system. Platoon commanders built Interactive Tactical Decision Games (ITDG), the subject being each of their most recent operations during the most recent 10-day field exercise. Honesty traces of each attack were included with each ITDG, provided through overlays collected via the Instrumented Tactical Engagement System II (ITESS II), showing exactly what occurred throughout the entire operation. Importing data from GoPro cameras worn by the Marines, the platoon commanders created scenarios specific to very detailed and complex decision points. I witnessed platoon commanders reviewing each of their own decisions over and over again, like a football team. The commanders then brought their squad leaders and team leaders through each ITDG in the battalion classroom, presenting their leaders with the decision points. Squad and team leaders were forced to make the same decisions as company and platoon commanders through ITDG.

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Fox Company, 2/6, conducting MOUT operations. *(Photo by PFC Angel Travis, 2dMarDiv Combat Camera.)*

Each repetition of a decision builds the recognition primed decision-making capability of the Marine. Throughout the week, squad competitions were held using Bohemia's Virtual BattleSpace II. At the conclusion of the scenario, the Marines would gather and debrief using the recorded video and data of each engagement. Cognitive scientists were never far away, recording and questioning Marines to discover why they made the decisions they did. A sampling of Marines participated in the decision requirements interview, testing the capabilities of individual Marines in a verbal test.

The intelligence office was in the field mapping sections of the local MOUT [military operations on urbanized terrain] facility with a DJI Phantom quadcopter. They took the images, reproduced a three dimension virtual map, and imported the map file onto a couple Microsoft HoloLens. This map was then used, in conjunction with ITDG, in the battalion's planning during the next field exercise.

My fourth visit was only for three hours. I linked up with the battalion at Golf-3 Observation Post to observe forward observer training being conducted with live ammunition against virtual targets using the AITT. After observing the training, I left the hill to talk to some Marines about the training. They pointed out that there wasn't a need for virtual targets because there were real targets on the range. I mentioned that most of those targets were probably on the range 20 years ago; probably still on the old maps that I used back then. This is when we came to the understanding that the virtual targets offered training in locating new targets and the target location could change constantly. I then left for the MOUT facility.

I arrived at the MOUT facility command post about 20 minutes before the main party. I had a chance to get an advanced look at what was about to be presented. The battalion, with help using ONR hardware, had completed the 3D map using a DJI Phantom quadcopter. Using the HoloLens with the 3D map, they were able to discover terrain obstacles that were not present on other terrain data bases. The S-2 used the HoloLens to brief the battalion which then launched reconnaissance assets within two hours and complete the planning in a little over four hours. The Headquarters & Services Company Commander stayed in the ITESS van and focused on data collection while the companies conducted force on force training. All data was fed into the ITDG.

Modern technology allows these Marines to critically examine their TDG choices. *(Photo by LtCol Marcus Mainz.)*

Marines use Tactical Decision Game (TDG) software to practice decision-making repetitions.

In garrison, the Marines have unlimited access the decision rooms. Daily—to include weekends and holidays—Marines use Tactical Decision Game (TDG) software to practice decision-making repetitions. A few days before a FEX begins the Marines start planning using the HoloLens and ITDG. The Company orders are passed down to the platoons using the ITDG. Mission planning is then done out in the field using ITDG and HoloLens. During the execution, ITESS II captures all of the data on movement and engagement. This data is then fed into the ITDG and the small unit leaders are given an after-action review in the field. When the battalion returns to garrison all of the data is accessible as a TDG for the Marines study down to the individual level.

This is, without a doubt, the best training that I have ever witnessed. The finished TDG is an objective assessment of training that was completed and can be easily referenced by anyone in the battalion to build on lessons learned. The ITDG is being used as the "glue" that binds the various training systems into one manageable and recordable training event.

The battalion has managed to merge various training systems into one final product: a robust after-action review/TDG that captures all aspects of the training and affords an opportunity to continuously learn from the event once back in garrison. The TDG gives an objective look at what training actually occurred. While the Battalion managed to do this seamlessly, generally, in my opinion, our training systems stay within well-defined corridors that don't facilitate cross pollination.