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Writing: A Way to Maximize Returns on the Armys Investments in Education

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100% of the requirements in the future. If defense acquisition improves its ability to adapt to changing battlefields, the Warfighter will have new and better equipment faster, thereby improving operations.

The last JECP off the production line will be better than the first.

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Category: Future Operations

WINNER

Future Conflict: Adapting Better and Faster Than an Adversary

By Maj. Hassan M. Kamara
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"There are no crystal balls that can predict the demands of future armed conflict. That is why I believe our ability to learn and adapt rapidly is an institutional imperative."

—Gen. Martin E. Dempsey (U.S. Army, Retired Chairman of the Joint Chiefs of Staff)

A. Introduction

This paper studies how the U.S. Army can technologically adapt better and faster than a peer or near-peer adversary in a future conflict. The Army cannot predict future wars with certainty, thus it should ensure that it can rapidly adapt to the changing realities inherent in war. The need for this study is underscored in part by the 2015 National Military Strategy of the United States, which states that the potential for U.S. "involvement in interstate war with a major power" is growing, and mandates that the U.S. military "be able to rapidly adapt to new threats."[1] Technology alone will not suffice to defeat an adversary in a future conflict, but it is vital to doing so. According to Sir Michael Howard, technology is but one of the dimensions in which war has been conducted in the past—the others being operational, logistical and social—"but technology, as an independent and significant dimension" cannot be disregarded.[2]

So how can the Army technologically adapt better and faster than a peer or near-peer adversary in a future conflict? The Army can technologically adapt better and faster than a peer or near-peer adversary in a future conflict by manipulating the process of wartime adaptation. The study uses John Boyd's OODA framework for fast, dynamic transitions—Observe, Orient, Decide and Act (OODA)—as a lens to analyze the process of wartime adaptation and highlight ways the Army can manipulate this process for faster evolution.

This study is relevant because U.S. technological superiority in a potential conflict with a peer or near-peer adversary is not guaranteed. In a 2015 statement underscoring the need for greater Research and Development investment, the acting Assistant Secretary of the Army for Acquisition Logistics and Technology [ASA(ALT)] the Honorable Katrina McFarland voiced concern that U.S. "technological superiority is not assured."[3] In a RAND study, Roger Cliff examined China's military and technological growth, and warned that "the U.S.

military, including the U.S. Air force must prepare for the possibility of conflict…with a Chinese military that by 2020 will be significantly more advanced than it is at present."[4] It is highly possible that in a future conflict with a peer or near-peer adversary—despite current peacetime innovation efforts—the Army could realize it lacks technological superiority, and will have to rapidly adapt to regain a technological edge, or mitigate an adversary's technical advantages. Such was the case with tank technology during Operation Overlord in World War II. According to General of the Army Omar Bradley, the Army had to adapt both tactics and capabilities to compensate for the technological inferiority of its main battle tank—the U.S. M4 Sherman tank—relative to German tanks.[5] According to Bradley, the 50-ton German, Mark V Panther tank with its "long-barreled high-velocity 75mm gun… and its tapered hull was more than a match for our Shermans."[6] This was because the Sherman's 75-mm gun was ineffective against the heavy frontal plate of the Panther tanks, so according to Bradley it was "only by swarming around the panzers to hit them on the flank, could our Shermans knock the enemy out."[7] Bradley wrote that the Army adapted by designing and fielding 76-mm guns on its M4 Sherman tanks, as well as dual use long-rifled 90mm guns.[8]

B. Concepts

A brief discussion of military adaptation in war, peacetime innovation, and the OODA framework is essential to understanding the ensuing analysis. Military adaptation is transformation that occurs amidst war, typically in response to the actions and capabilities of an adversary relative to one's operational objectives. Military adaptation differs from the generally slower-paced innovation that occurs during peacetime. Williamson Murray similarly characterized and distinguished military adaptation and peacetime innovation; he wrote that "while there are similarities between the processes of innovation and adaptation, the environments in which they occur are radically different."[9] Murray explained that while peacetime innovation enjoys the luxury of time to consider transformational objectives and challenges, and gradually evolve, wartime adaptation sees less time for transformation due to the "the terrible pressures of war as well as an interactive, adaptive opponent who is trying to kill us."[10] Wartime adaptation is an enduring challenge for militaries. According to Williamson Murray "the problem of adaptation in war represents one of the most persistent, yet rarely examined problems that military institutions confront."[11]

Observe, Orient, Decide, and Act, commonly referred to as the "OODA loop" are interrelated actions of a construct for dynamic and fast transitions that can disorient an adversary. According to John Boyd, "without OODA loops…and without the ability to get inside other OODA loops (or other environments), we will find it impossible to com-

FIGURE 1 The OODA "loop" sketch[12]

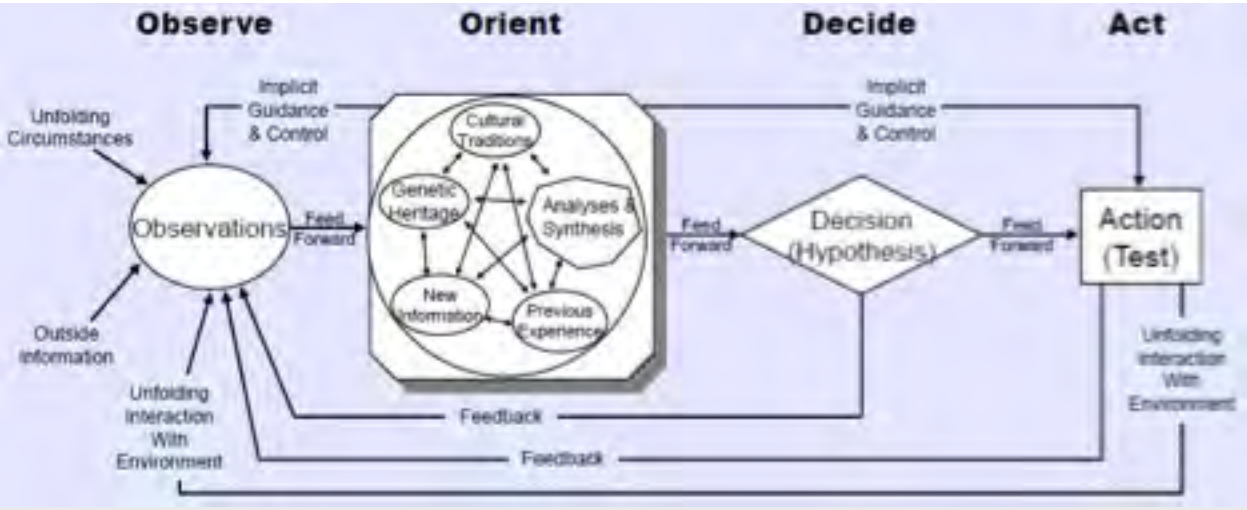
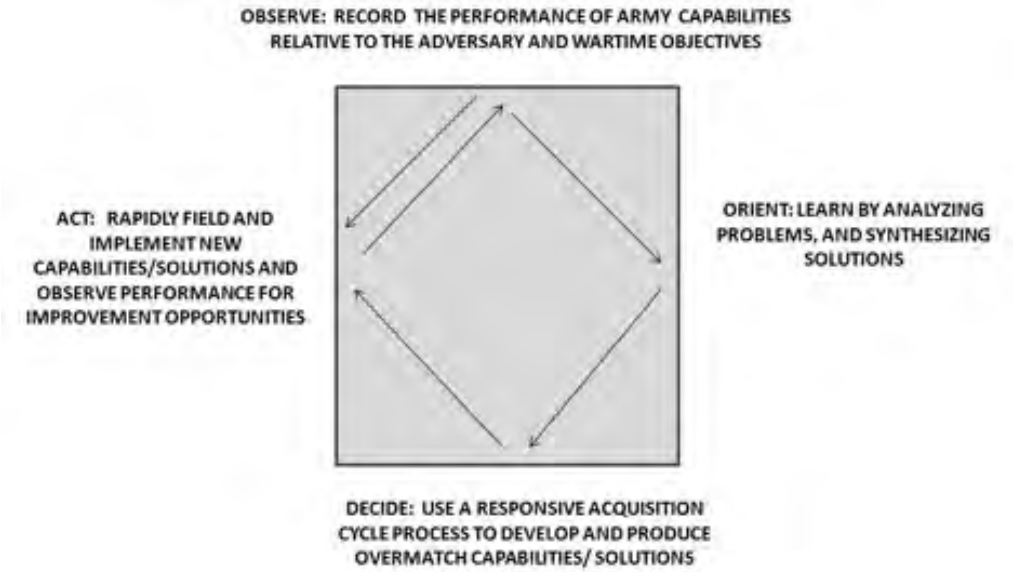


FIGURE 2 Wartime adaptation within the OODA framework



prehend, shape, adapt to and in turn be shaped by an unfolding evolving reality that is uncertain, ever changing, and unpredictable." War is such a reality, which makes the application of OODA to the challenge of wartime adaptation particularly apt. [13]

The OODA is not always a neatly sequenced loop or cycle. It can be compressed with increased understanding of an environment or situation—resulting in direct transitions between observation and action (see Figure 2). According to Robert Coram, "understanding the OODA Loop enables a commander to compress time—that is time between observing a situation and taking an action."[14] This ability to compress time is invaluable in wartime adaptation.

C. Wartime Adaptation and the OODA

The components of the OODA construct correlate to the process of wartime adaptation—reference Figure 2—which makes OODA an excellent tool for analyzing wartime adaptation. There is a sensing and learning component to the wartime adaptation process that correlates to the Observe and Orient components of the OODA construct. The acquisition cycle, and the capability fielding and integration aspects of the wartime adaptation process respectively correlate to the Decide, and Act components of the OODA construct. This fundamental correlation facilitates the ensuing analysis of wartime adaptation using the OODA construct, and underscores the OODA's applicability to comprehending and enhancing the wartime adaptation process.

1. OBSERVE: The Army can adapt faster than an adversary by improving its ability to rapidly record and analyze data from military operations to foster learning. Faster technological adaptation during war requires optimizing the Army's ability to gather equipment performance data and war-fighter experiences during combat operations. The U.S. Navy understood this imperative in World War II. According to Stephen Peter Rosen, the Navy understood that

"scientists also needed to be in the field to measure the combat performance of new equipment and to refine and adjust the new technology and operating practices developed for it…[so] it sent 464 scientists to field commands to help…develop antisubmarine warfare and tactics, and to refine the electronic warfare capabilities of the Army and Air forces."[15]

In lieu of prudently exposing the scientific community to military operations, commercially available telemetry technologies can be leveraged to help the Army gather data on equipment performance during ongoing operations to foster organizational learning.

2. ORIENT: The Army can adapt faster than an adversary by developing and enforcing mechanisms that promote organizational learning. The latter is a central component in the process of wartime adaptation, and requires taking what is being observed in military operations, and rapidly disseminating them to Army decision makers and defense industry partners to synthesize solutions. According to Meir Finkel,

"an important factor in recoverability from technological and doctrinal surprise is the ability to derive lessons while the surprise is taking place…devising immediate solutions and circulating them throughout the Army."[16]

Rapid wartime adaptation requires organizationally supported mechanisms for rapidly disseminating the lessons being learned from the ongoing fight.

3. DECIDE: The Army can adapt faster in wartime by studying, developing, and implementing alternatives to reduce acquisition cycle times. These alternatives should orient on some of the institutionally recognized contributors to long acquisition cycle times. In his work examining Department of Defense, and US Air Force efforts to reduce acquisition cycle times in the 80s and 90s, Ross T. McNutt highlighted some key contributors to slower acquisition cycle times as: lower prioritization of schedule relative to cost and performance by program managers, extensive pre-acquisition Milestone A review processes, poor transition of technology from the scientific, research and development community to the war-fighters, funding limitations based on funding processes, and little to no workforce training on acquisition cycle time reduction.[17]

Some alternatives to counter the above contributors to slower acquisition cycle times include greater emphasis on schedule as a variable, streamlining requirements in the review processes for milestone decisions, and utilizing mature and viable emerging technologies in concert with a modular open system architecture. Consistent with the latter, Dan Ward advocates taking advantage of existing, and mature emerging technologies during design, versus over-relying on longer development of immature technologies (specified as those at DoD and NASA's Technology Readiness Level 6), to help reduce acquisition cycle times and cost, as well as deliver viable capabilities.[18]

Congress and the Defense industry are critical stakeholders in wartime adaptation. Consistent with the spirit of the 2016 Acquisition Agility Act, Congress can institute war-activated provisions that curtail the myriad of funding and bureaucratic regulations that slow the contracting and acquisition lifecycle process. The Army should also build industry partnerships that can rapidly produce the capability solutions vital to overcoming technological surprise, and operational challenges.

4. ACT: In terms of wartime adaptation, this aspect of the OODA construct deals with the rapid fielding, integration and sustainment of new capabilities into army operations. The Army can adapt faster than an adversary by improving its ability to rapidly field, integrate and sustain the paradigm-changing solutions generated in response to the lessons learned in ongoing operations. Adapting to German tanks wielding superior armor and guns, the U.S. Army in 1944 introduced a new Hyper Velocity Armor-Piercing round (HVAP), but according to David Johnson, even by the spring of 1945 the HVAPs were still in short supply to forces in Europe; delaying its benefits to ongoing operations.[19] This underscores the importance of rapidly fielding and integrating paradigm-changing capabilities to the wartime adaptation process.

D. Conclusion

This study—by framing the process of wartime adaptation within Boyd's OODA construct—has highlighted how the U.S. Army can manipulate said process to evolve faster than a peer or near-peer adversary in a future conflict. Meanwhile, as the Army continues to innovate in largely peacetime conditions at home—despite fighting low-intensity conflicts overseas—ensuing studies should focus on ways to expedite the peacetime innovation process to deliver viable, low-cost capabilities.

Endnotes

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HONORABLE MENTION

Expeditionary Situational Awareness at the Tip of the Spear: Preparing for Future Operations through Innovation

By Lt. Col. James Howell

Department of the Army System Coordinator (DASC) for Defensive Cyber and the Handheld, Manpack, Small Form Fit Program

The U.S. Army's Global Response Force (GRF) remains ready to conduct joint forcible-entry airborne assaults with little or no warning. Flying out to seize an enemy airfield or port facility requires state-of-the-art doctrine, cutting edge leaders, aggressive training, a tailored communications support package, adaptive logistics processes and functions, and rapidly deployable capabilities. The Army is providing the GRF with new highly-adaptable, scalable and tailorable expeditionary technologies, such as Enroute Mission Command (EMC), which provides inflight network connectivity, the Transportable Tactical Command Communications system (T2C2) as well as developing the new Two Channel Leader Radio which will support both early entry and tactical edge operations. Technologies like these enable an advanced mission command network and provide the situational

Paratroopers from the XVIII Airborne Corps and 82nd Airborne Division successfully utilized Enroute Mission Command Capability (EMC2) during the Joint Forcible Entry (JFE) exercise at the National Training Center/Fort Irwin, Calif., August 5-6, 2015.
(U.S. Army photo)

Paratroopers from the XVIII Airborne Corps and 82nd Airborne Division successfully utilized Enroute Mission Command Capability (EMC2) during the Joint Forcible Entry (JFE) exercise at the National Training Center/Fort Irwin, Calif., Aug. 5-6, 2015. EMC2 provides inflight network communications, situational awareness and mission command capabilities to Global Response Force Commanders and Paratroopers, giving them a comprehensive understanding of the potential challenges waiting for them on the drop zone. (U.S. Army photo)

awareness required to rapidly seize an initiative and dominate our nation's enemies on the battlefield.

America's Guard of Honor, the 82nd Airborne Division, is the Army's GRF unit. The GRF must remain ready to adapt to unpredictable security environments, which requires operational flexibility and versatility. To prepare for its unique mission set in support of Geographic Combatant Commanders' urgent operational needs, the GRF continually conducts readiness exercises, mission planning, and rehearsals, while staging combat power at Fort Bragg's Pope Army Airfield in North Carolina.

Joint Forces Make These Exercises Operationally Relevant

After an initial call to duty, Commanders and support units immediately begin to plan an operation. Once on the tarmac at Pope Army Airfield, Jumpmasters load Air Force C-17 Globemaster aircraft in "chalk order." Designing a chalk order supporting an airborne assault requires a great deal of planning and attention to detail. Planners must thoroughly examine the drop zone, understand and plan for potential enemy actions, and comprehend the command and control (C2) network, the mission and its players. Paratroopers with C2 capabilities will be placed in specific positions in the chalk order to ensure they land close to command post assembly areas strategically placed on the drop zone.

The C-17s quickly become airborne, assembling in assault formation. Then Commanders and the GRF staff use their EMC systems to conduct operational coordination and receive the latest intelligence, which they share with other aircraft in the formation. Paratroopers view full motion video from Unmanned Aerial Vehicles of the evolving situation on the drop zone on large LED screens throughout the aircraft. Amid the hum of the C-17s, Commanders and Paratroopers leverage mission command functions and plane-to-plane and plane-to-ground communications for a common operating picture shared throughout the entire brigade and with the rest of the Joint and coalition forces that may be supporting the operation.

Paratroopers stand in their chalk lines in the aircraft as the assault force arrives at the drop-zone armed not only with weapons, but with night vision goggles, radios and early entry network communications equipment. One at a time over the drop-zone, they hand their static lines to the Jumpmaster controlling the door and then jump. The assault force may hear gunfire on the drop zone as they keep a sharp lookout for fellow jumpers, but they know what to expect, having already seen video of the battlespace below and having received mission updates from the Commander through the EMC back on the plane. Once on the drop zone, troops immediately place weapons into operation and move quickly to their

Paratroopers prepare to jump during the large-scale joint Army/Air Force Joint Forcible Entry exercise in December 2015, where Soldiers successfully employed Enroute Mission Command capability (EMC), while en route from Fort Bragg, N.C., to Nellis Air Force Base, Nev. This network communications capability enabled the unit to obtain the inflight mission command and plane-to-plane, plane-to-ground communications needed for a successful parachute assault. (U.S. Army photo by Cpt. Lisa Beum, 1st BCT, 82nd ABN DIV, PAO)

The Army will use two sizes of the inflatable satellite antenna for the Low Rate Initial Production of Transportable Tactical Command Communications (T2C2) Lite (v1) and T2C2 Heavy (v2). During Joint Forcible Entry operations at Network Integration Evaluation 16.1 in October 2015, the 82nd Airborne Division successfully utilized the capability to provide early entry network communications during the mission. (Photo by Jett Loe, Sun-News)

Because the T2C2 solution is inflatable, it can provide a larger dish size with increased capability and bandwidth efficiency in a smaller package. The Army will use two sizes of the inflatable satellite antenna for the Low Rate Initial Production of Transportable Tactical Command Communications (T2C2) Lite (v1) and T2C2 Heavy (v2).
(U.S. Army photo)

pre-designated command post sites. Paratroopers establish a communications link for accountability on their software defined Rifleman Radios, which also provide situational awareness and input into mission command systems and the common operational picture. Accountability following an airborne operation is critical to the assault forces, as the units begin to mass combat power to seize the objective. Soon the Army will employ the Two Channel Leader Radio which will significantly enhance the GRF's ability to C2 to the tactical edge of the battlespace.

The Airborne Assault, Seizing the Initiative, and Dominating the Enemy

Paratroopers, following the initial airborne assault, seizing the initiative, and dominating the enemy on the battlefield, will soon be able to establish an initial command post with communications enabled by the Transportable Tactical Command Communications (T2C2) "jumpable" Lite and "air droppable" Heavy systems. Utilizing an inflatable antenna, T2C2 enables network connectivity, via satellite to the Army's tactical communications network, Warfighter Information Network– Tactical (WIN-T). These early entry forces can obtain the advanced situational awareness and mission command capabilities needed to conduct an early entry operation and set the stage for follow-on forces, with the scalable buildup of additional network infrastructure. In later operations, T2C2 will extend the Army's network to the tactical edge by enabling command post/forward operating base communications.

Once the airfield is secured, giant C-130 and C-17 aircraft scream in to deliver larger equipment so the unit can set up the Army's mobile tactical WIN-T network. This high capacity satellite and line-of-sight network provides advanced mission command, voice, video and data capability, both at the halt in a command post, and on the move in network-equipped vehicles. As the supply planes fly in, the unit builds up the network with WIN-T as well as Joint Capabilities Release/Blue Force Tracking 2 capability, enabling situational awareness of friendly forces and digital command and control down to the platoon and squad levels. These two capabilities complement one another across the Brigade Combat Team (BCT); even though some echelons may not be connected to the WIN-T network, having both capabilities enables the entire BCT to stay connected and operationally informed. Additionally, the Army will soon be fielding Wi-Fi capability to improve command post agility during maneuver, cutting command post set up and tear down times from hours to minutes and reducing interruption of situational awareness.

The GRF represents "the tip of the spear," our first national large-scale combat ready BCT. The U.S. Joint Forces, the Department of Defense and the Army Staff are continually working to ensure this force presents the most lethal, trained, and equipped unit possible, whether they are supporting combat or

Lt. Col. Mark Henderson, product manager for Warfighter Information Network - Tactical (WIN-T) Increment 1, works with his EMC2 Team onboard a C-17 aircraft in flight during a Joint Forcible Entry exercise in December 2015. (U.S. Army photo by Cpt. Lisa Beum, 1st BCT, 82nd ABN DIV, PAO)

EMC2 provides inflight network communications and mission command to increase the situational awareness of the Global Response Force. In this photo, a Soldier prepares for an EMC2 demonstration on May 14, 2015, at Pope Army Airfield, Fort Bragg, N.C. (U.S. Army photo by Amy Walker, PEO C3T)

humanitarian operations. Joint forces are constantly evaluating, testing, training and evolving the GRF. The Army frequently conducts analysis to ensure the latest and best Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities and Policy (DOTMLPF-P) is employed as the GRF prepares to meet, engage and destroy our nation's enemies.

"If You Know the Enemy and Know Yourself, You Need Not Fear the Result of a Hundred Battles"

In "The Art of War" Sun Tzu writes, "If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle." In essence, information is power and overmatch. U.S. forces require the most advanced mission command, communications and situational awareness possible as we meet with and engage our nation's enemies. Programs like EMC, T2C2, the Rifleman and Leader Radio will provide these new and emerging expeditionary network technologies. As the tip of the spear combat force, it is imperative the GRF know itself, its mission and the enemy that it faces head-on in battle. Today's mission command network technologies are helping to provide that view.

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