Pulse and Pace:
Two Desirable Attributes Extending Legacy Systems Effectiveness

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May 2022
Paper Submission #047, Topic 6
27th ICCRTS, Quebec, Canada
October 2022

POSSIBLE ABSTRACT

27th ICCRTS

CONCEPT PAPER

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Topic 6

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There are many announcements of the immediate obsolescence of several weapons systems managed by C2 systems. The tank currently is the most popular candidate for the warfighting scrap heap. Their alleged obsolescence seems foreordained by their centralized and vulnerable C2 systems (human commanders) which are certain to be aboard any given armored platform. However, there is systems evidence that we may be throwing the baby out with the bathwater. Tanks, like manned aircraft or manned vessels of any type (air, ground or sea), have a common C2 characteristic: a centralized C2 function or process (brain.) Incapacitate the brain, incapacitate the weapon and its capabilities. This paper proposes an alternative for land systems: distributed AI with human in the loop C2. The proposed system creates a information "fog" that can be adjusted and adapted to the relevant operational environment. The system is well within known computational and algorithmic limits, and can be quickly attached. What should follow are simulation experiments to identify plausibility and possibility of the efficiency and effectiveness of such systems.

PROLOGUE: South China Sea, night, Summer 203X.

The flight of 4 Chinese J-20s flew low at high subsonic speed over the darkened South China Sea. Their destination was an aiming point some 100 miles north of the Malaysian/Bruneian oil and gas fields off the northwest coast of Borneo. At that point, they would launch their air-to-surface missiles that would destroy or damage many of the oil and natural gas platforms in those fields. It would be quick and quiet work.

Between the J-20s and their aiming point was a virtually unmarked point in the ocean, except for two US Navy surface ships of the new small combatant class that carried a small (8 tube) missile capability, two small islets just large enough to accommodate a Marine Stand-In-Force contingent with missile (4 tube) capability, a few long loiter sensor UAVs, and two USAF F-22s also loitering at high altitude in maximum stealth mode. Completing the scene, an underway replenishment ship bound for US forces on Borneo, supporting Malaysian and Bruneian forces dealing with a Chinese supported Grey Zone campaign opposing the existing governments, sailed at a modest 15 knots. This ship contained a Command and Control module (CONEX) on its deck that was very active this night. The joint task force commander aboard had been alerted to the possibility of a Chinese strike some hours ago – long enough to position those Marines, get those F-22s from an advanced airbase, and sail his two small surface combatants into a good-enough intercept position. The task force launched their UAVs about an hour earlier to provide early warning verification; the commander expected to have his communications degraded very soon, and used some of the UAVs as alternate routing of communications among his forces. That was just an ounce of extra protection as the commander had well briefed his subordinate commands on what his intent was, where, when and how he intended to conduct his intercept, and provided the subordinates with the authority to engage if communications were thoroughly disrupted.

The J-20s were less than five minutes from their launch points; the flight commander gave the command to disperse to launch altitudes. Just then, his threat indicators, and those on all his aircraft, began ringing – in reality, it sounded like screaming. The apparent threats were on all axes. The commander, initially and for perhaps a fatal second, was overwhelmed with information; then he started to order defensive maneuvers – when the first missile exploded off his left wing. He ejected sideways, and knew it was futile. His last sights were of all four strike aircraft plummeting into the sea.

On board the replenishment ship, there was no time for back-patting. The command and control system had shut down; the ship had increased to flank speed (25 knots) and changed course, the first of several random course changes. The task force chief of staff poked his head into the commander's cubicle – "Time to go, boss. The helo's waiting for you." As he headed for the helo, which contained a barebones communications suite, he thought of what his forces were doing right now. The Marines likely already were rigging their gear for vertical lift from the islets; the surface combatants had gone maximum quiet, total EMCON. And the F-22s just continued their racetracks in the now empty sky.

1. INTRODUCTION:

Today's and the near-future battles will reflect the pace of the Prologue's vignette. Conventional military force planners and designers find themselves bedeviled by seemingly insurmountable execution problems. Capabilities that proved to be the foundation of victory in the past have overnight become critical vulnerabilities. Tanks, the weapon of mobility and decision in ground campaigns have now become targeted weapons systems repeatedly by cheap anti-armor defense.[1] Surface ships of any class or type, from carrier to corvette, that have been critical strike assets in maritime combat now find themselves in the crosshairs, exposed to an increasing number of various lethal long-range striking capabilities.[2] Even high-performance fighter aircraft, like those doomed J-20s in the vignette, that have been hunters in the sky have now become the hunted, exposed to sophisticated artificial intelligence (AI) supported defense systems.[3] These legacy systems traditionally have been the core of conventional striking power on land, sea and air. Now they appear to be more the prey than predator. Equally disturbing is the trend towards disrupting decision-making and decision support systems for command and control; by itself such disruption at least interrupts the execution of operations causing fatal delays in the application of weapons systems.[4] The defenses and counters to these systems are

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[1] Vincent Delany, "On Killing Tanks," *Modern War Institute*, March 23, 2020, accessed on line on 18 May 2022 at https://mwi.usma.edu/on-killing-tanks/.

[2] Bryan Clark and Timothy A. Walton, Taking Back The Fleet: Transforming the U.S. Surface Fleet for Decision-Centric Warfare: Washington, D.C.; Center for Strategic and Budgetary Assessments, 2019.

[3] Torben Schuetz; Christian Moelling; Zoe Stanley-Lockman, A New Dimension of Air-Based Threats: Germany, the EU and NATO need New Political Initiatives and Military Defense Systems: Berlin: German Council for Foreign Relations, June 3, 2019.

[4] Consider three sources for Decision System Disruption: (1) Frank Hoffman, "Defeat Mechanisms in Modern Warfare," *Parameters* (51/4), Winter 2021, pp. 49-66; (2) Heather Venable, "Paralysis in Peer Conflict: The Material Versus The Mental in 100 Years of Military Thinking," *War On The Rocks*, December 1, 2020 accessed on line on 5 September 2022 at https://warontherocks.com/2020/12/paralysis-in-peer-conflict-the-material-versus-the-mental-in-100-years-of-military-thinking/; (3) Captain Nicholas Dubaz, "Analysis from The Edge: Information Paralysis and Decision Making in Complexity," The Civil Affairs Association essay, Feb. 26, 2016, updated Feb. 8, 2020, accessed on 5 September 2022 at

terrifically varied but also share a common trait: they are all based on increasingly capable, small, and inexpensive information sub-systems built into the striking weapons that have become the basis for 21st Century military capabilities.

This paper will discuss this problematic phenomenon in brief, describe some current American and allied efforts to counter the vulnerabilities that result from the dense information environment, and then propose two attributes, pulse and pace, that effectively summarize what makes up necessary and sufficient solutions to the problem. The paper will conclude with the observation that, to put it quaintly, if what an enemy can sense, can be targeted and therefore destroyed, then best to make the enemy astigmatic.

2. THE PROBLEM:

All weapons and decision-making systems have a certain heft to them. They center on the human to be operational, to make decisions, to act on the sensing information that is provided them. The older weapons systems also tend to be less stealthy and obvious. Consider the tank. Typically, the generic tank is between 40-60 tons, noisy, electromagnetic spectrum (EMS) emanating (think of the infrared spectrum and the radio frequencies' spectra), and relatively clumsy. It does not maneuver well in urban environments where experts forecast most fighting in the future will occur. The Armenian-Azerbaijani War of 2018[5] and the current Russo-Ukraine War clearly have demonstrated the extreme exposure that tanks face in an operational environment rich with sensor/strike AI (on UAVs), and relatively low tech, but AI enhanced

https://www.civilaffairsassoc.org/post/2016/02/28/analysis-from-the-edge-information-paralysis-and-decision-making-in-complexity.

[5] Jack Detsch, "The U.S. Army Goes to School on Nagorno-Karabakh Conflict," *Foreign Policy Online*, March 30, 2021, accessed on line on 18 May 2022 at https://foreignpolicy.com/2021/03/30/army-pentagon-nagorno-karabakh-drones/.

defensive systems like portable infantry anti-armor (e.g. Javelin).[6] Some of these defensive systems outrange the tank's main armament, meaning they can be used as stand-off weapons with minimal exposure to effective counter-fire.

Yet, tanks are simultaneously the most mobile and well protected ground offensive weapons systems ever invented. Modern armored vehicles include counter-measures to these threats, like increased and more protective armor (e.g. Chobham armor), reactive armor plates, and chemical smoke grenades to masquerade its location.[7] However, these systems in large part depend upon the human-in-the-loop to make timely decisions to employ them. For example, in the case of the physical and reactive armor, to rapidly reposition the tank to expose its least vulnerable angles to the incoming weapon.[8]

The specifics for other legacy systems are similar on the general level though they vary widely in particulars. Weapons systems move into engagement ranges, sensory information is exchanged, targets engaged, and some targets destroyed. Decision systems provide common planning and sensing, provide explicit knowledge necessary to maneuver and fire weapons systems. The cycle is completely dependent on information processing especially in the early stages of the cycle. This is not new or news; opposing forces have dealt with this cycle (sense, maneuver, target, engage, assess, repeat) as long as there has been war. What has changed is the pace of the cycle and the scale (geography, force size, and information) in which the cycle is

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[6] David Johnson, "The Tank is Dead; Long Live The Javelin, The Switchblade, The…?"*War On The Rocks*, April 18, 2022, accessed online on 18 May 2022 at https://warontherocks.com/2022/04/the-tank-is-dead-long-live-the-javelin-the-switchblade-the/.

[7] Rob Lee, "The Tank is Not Obsolete, and Other Observations About The Future of Conflict," *War On The Rocks*, September 6, 2022, accessed on 6 September 2022 at https://warontherocks.com/2022/09/the-tank-is-not-obsolete-and-other-observations-about-the-future-of-combat/.

[8] Todd South, "Tanks are here to stay; What the Army's future armored fleet will look like," *The Army Times*, July 14, 2021, accessed on 18 May 2022 at https://www.armytimes.com/news/pentagon-congress/2021/07/14/tanks-are-here-to-stay-what-the-armys-future-armored-fleet-will-look-like/.

exercised. Using a historical comparison, consider Gettysburg in the American Civil War in 1863 and Operation FORTITUDE in Europe in 1943-44. At Gettysburg, General Lee, having sensed the Union line less than two miles away, tried unsuccessfully to maneuver his forces to effectively engage the weakest part of the line for the better part of three days; Lee never obtained sufficient information to successfully focus his forces at the Union's most vulnerable points. In FORTITUDE, the Allies spent over six months, hundreds of thousands of individuals, thousands of pieces of equipment, and untold billions of dollars, to successfully deceive the German Command and Control (Hitler) concerning a small part of the French Coast in Brittany for about four hours on one day, June 6th 1944.[9] The Allies applied literally hundreds of thousands pieces of false information across Scandinavian, Atlantic and Mediterranean Europe in pursuit of this temporal and spatial window for invasion. From days to hours, from a local field of shallow ridges to the entire continent of Europe, the change of scale in sensing has been immense. Especially note the change in scale of command and control: from one individual (Lee) to an entire staff (HQ, SHAEF which numbered over 25,000 personnel.) The extension of this change phenomenon to the present is this: from hours to micro-seconds, and from a region on Earth to the entire planet and surrounding local physical and digital space. Rapid information processing enabled by the technological advances that have defined the current generation has both expanded the range of sensing and reduced the manpower requirements associated with processing. Decision-making now has global reach that can be executed with extreme precision within seconds of the decision by minimal personnel. As an illustration, consider the targeted assassination of Ayman al-Zawahiri on July 31, 2022. An American intelligence drone, deployed and controlled to Zawahiri's apartment from a yet unknown base at least hundreds of miles from the apartment, sensed and struck the target with little collateral

[9] Roger Hesketh, FORTITUDE: The D-Day Deception Campaign: Woodstock, NY: Overlook Press, 2000.

damage to the apartment, let alone the building and neighborhood. The decision to strike, once sensed, was made in the United States, over 10,000 miles away.

3. SOLUTIONS: PULSE AND PACE

Martin Van Creveld provides the key clue to the solution with his classic description of what commanders must do in war: "Uncertainty being the central fact that all command systems have to cope with, the role of uncertainty in determining the structure of command should be…decisive."[10] Uncertainty, like Clausewitz's concept of Culmination, must be managed by command. It has two sides: the attacker and the defender, or friend and foe. We and our allies try to maximize uncertainty for enemy commands; it creates a fatal slowness that enables us to penetrate their decision cycle(s) – and therefore targeting cycles – so that we have the edge. At the same time, we must simultaneously act to minimize our own uncertainty of action to enable us to make effective decisions. The two sides must be in balance. Creating uncertainty among the enemy requires exposure of one's forces to disruption and/or destruction – our forces become chaotic actors. Minimizing uncertainty among ourselves risks too much information reporting that slows down our decision cycle(s); we become predictable. Command must tread along the edge of chaos, seeking a "Goldilocks"-like solution(s) to uncertainty.[11]

None of this discussion concerning uncertainty, balance, chaos and complexity is new. Others, including and especially Van Creveld, have explored the applications and threats associated with uncertainty.[12] For example, those smoke grenade canisters on tanks are a technological application that seeks to sufficiently increase uncertainty of a anti-armor capability

[10] Martin Van Creveld, Command in War: Cambridge, MA; Harvard University Press, 1985, page 268.
[11] Van Creveld, Command…, pages 269-275.
[12] For example, Karl von Clausewitz introduces the idea of "the fog of war" in his On War: Princeton, NJ; Princeton University Press, translated by Peter Paret and Michael Howard, Book 1, Chapter 3, pages 119-120.

in sensing, targeting and engaging tanks. What distinguishes the current and future case is time: time to sense, target, engage, and act. Each component of the cycle now takes up such small increments of time that human information processing is exceeded. Remember, the human brain is a 100,000-year-old biological technology. That technology evolved to deal with the threat axes associated with sabretooth tigers, not sensors on the head of a Javelin missile.

Specifically, the solution to the time compression challenge of electromagnetic sensors is to further integrate the human-AI interface in weapons systems.[13] This paper argues that interface needs to be automatic in response to a threat and limited to the existence of the threat. In the case of a relatively close-range anti-armor missile engagement with a tank, the defensive (tank) span of time would be fractions of a second. With stand-off weapons like anti-ship or anti-air missiles, that span increase to many seconds, although the introduction of hypersonic weapons will reduce the available time by a magnitude. The integration should be governed by two attributes or factors: pulse and pace.

By pulse, I mean that the affected (targeted) command and control system and the associated weapons system must be able to generate repeated and concentrated manifestations of uncertainty across a sufficient and variable set of electromagnetic frequencies appropriate to the incoming threat. Uncertainty can be expressed in terms of information available for processing, force(s) available for action, space available for movement and maneuver, and time for action/reaction to threat. The manifestation must be of sufficient strength to create a *momentary* doubt in the incoming enemy's command and control and weapons system. That moment must be long enough for our systems to effectively adapt. In the example of the tank, physically this

[13] Sue E. Kase, Chou P. Hung, Tomer Krayzman, James Z. Hare, B. Christopher Rinderspacher, and Simon M. Su, "The Future of Collaborative Human-Artificial Intelligence Decision-Making for Mission Planning," *Frontier (Online)*, 04 April 2022, accessed on 19 May 2022 at https://www.frontiersin.org/articles/10.3389/fpsyg.2022.850628/full.

means movement forward or backward by at least a meter; alternatively and/or additionally, applying virtual camouflage, the tank could simply disappear to the sensors of the incoming missile and the firer. The manifestation would repeat until either the threat is addressed or the "ammunition" for generating the uncertainty manifestation is exhausted.

By pace I mean the *rhythm or tempo or pattern* of both the pulses and our decision and weapons system(s) themselves; pace exclusively is a temporal phenomenon. The tempo must be sufficiently random as to induce *moments* of uncertainty in enemy command and control and weapons systems as to the pattern and intention of our actions. Achieving a successful pace of uncertainty is analogous to inducing an epileptic seizure from luminal sources; lights of a certain pattern and rhythm can cause paralysis in susceptible individuals.[14]

The two attributes are scale-able and applicable to humanware, software or hardware. They can work, as illustrated by our example of tanks, at the individual level; they can also work, as illustrated in the vignette, in larger engagements and organizations. The example of FORTITUDE provides an extreme scale in which the attributes can be applied; the Allies introduced possible plans and fictitious forces (pulses), leaked to the Germans, to invade at various different beaches (pulses), in different countries (pulses), at different times (pace) from Scandinavia to the Balkans. Contrast this with Lee's situation at Gettysburg: he maneuvered his forces three times over three days (pace) to find or create and attack (pulse) Union weaknesses while his opponent, Meade, also used his forces to counter these maneuvers. Lee had time and force to achieve his breakthrough, but he never obtained sufficient information to be successful.

4. SERVICE EFFORTS TO APPLY PULSE AND PACE:

[14] Consult sources at https://www.epilepsy.com/what-is-epilepsy/seizure-triggers/photosensitivity accessed on 30 August 2022.

All American military services have initiatives in weapons and decision systems development that seek to manage uncertainty; these initiatives appear, from open sources, to apply the two attributes of pulse and pace.

The United States Air Force has the most mature doctrine, called Agile Combat Employment or ACE. The program envisions shifting air operations from a few centralized main operating bases to many and dispersed or decentralized small bases, some of which are within the enemy threat envelope. ACE seeks to establish and maintain an engagement cycle (in USAF parlance, find, fix, track, target, engage, assess) that is more intense than any operation(s) in its history.[15] The USAF seeks, through ACE, to maintain an unrelenting tempo of operations, based on existing organizational structures that function in both centralized and decentralized modes. It seeks to create uncertainty in the enemy's command and control through this operational tempo that results in what the basic ACE manual calls "Analysis Paralysis."[16] The USAF currently is training units and people in this doctrine; it is unclear whether any units are deploying using ACE practices.

The United States Marine Corps, beginning in 2018, has developed a transformational strategy that returns the service to its expeditionary base routes. Indeed, the Marine doctrine is called Expeditionary Advanced Base Operations (EABO). The Marines nor are engaged in re-equipping its units, converting from tube artillery and tanks to missile batteries, light agile amphibious craft, and many more unmanned systems. They have developed an organizational and doctrinal idea, the stand-in and stand-off force, that envisions the repeated deployment and redeployment of small, agile and capable forces (the stand-in force) inside the enemy threat

[15] Air Force Doctrine Note 1-21, Agile Combat Employment: Maxwell AFB, Alabama; Curtis E. Lemay Center, 1 December 2021, page 3.
[16] Ibid, page 10.

envelope; the idea sounds like a very large and dangerous shell game that confuses the enemy and forces them to make poor employment decisions leading to vulnerabilities that can be exploited by the available Marine forces.[17] General Berger, the Marine Commandant, saw EABO as a way of answering the question, "What can the Marines do for the Navy?"[18] Through EABO, Marines can provide force multipliers to the Navy's Cooperative Engagement Capability (CEC) and Composite Warfare Command (CWC) doctrine for both fleet defense and strike.

The United States Navy (USN) can truthfully state that it has the oldest doctrine that seeks to manage uncertainty at sea. This is the CWC that distributes information among many warfare commanders and functional coordinators located on different platforms all the while executing it CEC doctrine. Distributed Maritime Operations (DMO) takes the CWC/CEC to the next level of integration, creating uncertainty for the enemy by distributing risk among many platforms, including Unmanned Surface (USV) and Undersea (UUV) Vehicles.[19] A recent Naval Postgraduate School Masters' Project put it like this: "the development of DMO as a concept for the operational employment of maritime assets stems from the Distributed Lethality (DL) model of achieving sea control, specifically in the surface domain. The DL concept is comprised of three pillars: the ability to increase the offensive power of individual warships through networked firing capability; distribution of the offensive capability over a wide geographic area; and the allocation of sufficient resources to the surface platforms in order to enable the enhanced combat capability."[20] The Navy already has conducted exercises using the DMO idea in at least

[17] United States Marine Corps, Force Design 2030 Annual Update: Washington, DC: Headquarters, United States Marine Corps, May 2022.
[18] General David Berger, 38th Commandant of the United States Marine Corps, Commandant's Planning Guidance: Washington DC; HQ, United States Marine Corps, July 17, 2019.
[19] Rowden, Thomas S., VADM, Commander Naval Surface Forces. "Distributed Lethality." Surface Force Strategy: Return to Sea Control, January 25, 2017, 8-11.
[20] Christopher H. Popa, Sydney P. Stone, Ee Hong Aw, Choon PeiJeremy Teo, Licun Edwin Cai, Wai Hoe Chong, Rachel Cline, Jiesheng Jackson Hong, Chong Khai Roger Koh, Wee Leong Lee, Jun Jie Lim, Xinhong Lin, Shay Paz Liraz, Kai Boon Eugene Mok, Alex W. Ryan, Boon Hong Aaron Teow, Andrew R. Whitmer, Peter J. Winstead, and

three different fleets. The concept calls for repeated imposition of fleets and task forces into the enemy threat envelope to conduct necessary operations and then departing; these effectively are pulses that are meant to confuse, thus increasing uncertainty, in enemy command and control.[21]

The United States Army is the latest participant in developing capabilities that increase uncertainty in enemy decision-making. The Army also faces the most challenging tasks in this regard. Whereas the Navy and Air Force, as well as Marines with their organic air capabilities, can pulse their powers to increase or create uncertainty through employment and rapid re-employment, the Army cannot. Once employed, its units must remain on employment until the operation or campaign is complete. Thus, Army land operations and campaigns must develop robust and resilient organizational capabilities that effectively enable it to "hide in plain sight." The major concept by which the Army intends to accomplish this Multi-Domain Operations or MDO. According to the Congressional Research Service and the Army's Training and Doctrine Command (TRADOC), "MDO provides commanders numerous options for executing simultaneous and sequential operations using surprise and the rapid and continuous integration of capabilities across all domains to present multiple dilemmas to an adversary in order to gain physical and psychological advantages and influence and control over the operational environment."[22] Note the language associated with creating uncertainty within the quote. However, language is relatively easy; actual training, equipping, and exercising is quite another matter. Army believes that the major way to deal with the problem of persistence within a hostile threat envelope is to widen and deepen the available theater structure and geometry; to do this requires larger command and control formations with adequate capabilities to create room

Yong Jie Chia, Distributed Maritime Operations and Unmanned Systems Tactical Employment: Monterey, CA: Naval Postgraduate School Masters' Thesis Project, June 2018, page 7.

[21] Clark and Walton, Taking Back The Seas…, pages 21-22.

[22] Congressional Research Service, Defense Primer: Army Multi-Domain Operations: Washington; Congressional Research Service, October 22, 2021, page 1.

to do that hiding in plain sight as well as coordinate sensing, targeting and fires to take advantage of uncertainty that is achieved.[23] MDO is in its early stages of development and further discussion of the concept is speculative at best.

5. CONCLUSIONS:

The assault of information through manned and unmanned sensor and weapons systems continues apace. That which can be sensed, can be found; that which can be found, can be targeted; that which can be targeted, (highly) likely will be destroyed. The point of this paper is to use information that holds the engagement cycle together, at most or all points of the cycle, to create uncertainty; the creation can be physical or digital, manned or unmanned. It only needs to be momentary – of sufficient length for the affected system to effectively respond. The paper proposed two attributes for the capability to create and maintain uncertainty: pulse and pace. They are novel only in the sense that this paper combines them with uncertainty. The American armed forces, as briefly illustrated here, all are engaged to one extent or another with formulating doctrine, organizations, and equipment that contribute in different ways to achieving uncertainty in deployment, employment, re-employment, and redeployment of capabilities across the spectrum of conflict.

The management of information uncertainty already occupies a preeminent place in American (and other countries) military thinking, doctrine, and systems development. Much of this effort is both tactical and weapons oriented, like the very new and effective TROPHY armor protection systems developed by Israel, and now beginning to be added to American armor

[23] Ibid, page 2.

equipment.[24] TROPHY uses both pulsing and pacing attributes as part of its design. However, new Department of Defense interest in AI-assisted decision systems, especially in planning and assessment, foreshows the application of at least pacing to the vital aspect of operational and strategic control.[25] One should reasonably expect that those aspects of operational and tactical mission planning that apply human critical thinking will be susceptible to the application of AI in the very near future.

This is fortuitous because those nation states that are America's peer and near peer competitors already have doctrine that support the ideas presented here.[26]

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[24] Arie Egozi, "Army Tries (Again) To Protect Stryker: Rafael or Rheinmetall?," *Breaking Defense*, January 008, 2021 accessed on 6 September 2022 at https://breakingdefense.com/2021/01/army-tries-again-to-protect-stryker-rafael-or-rheinmetall/.

[25] Several sources point to near-future decision system applications. For example, Li Ang Zhang, Jia Xu, Dara Gold, Jeff Hagen, Ajay K. Kochhar, Andrew J. Lohn, and Osonde A. Osoba, Air Dominance Through Machine Learning; Santa Monica, CA; RAND Corporation, 2020. Also, consult the 04 April 2022, Section on Cognitive Science, *Frontiers of Psychology* which contains four articles on the progress of AI assistance in human decision-making in combat situations. Access on 6 September 2022 at https://www.frontiersin.org/research-topics/12014/human-decision-making-in-combat-situations-involving-traditional-and-immersive-visual-technologies#articles.

[26] COL Qiao Liang and COL Wang Xiangsui, Unrestricted Warfare: Brattleboro, Vermont: Echo Point Books and Publishing, 2015. Of special interest is Chapter 6.