ARMY TRANSITIONING TO SUPPORT DEEP SENSING IN MULTIDOMAIN OPERATIONS
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Introduction

The U.S. Army strategic contexts of competition, crisis, and armed conflict correspond to and support the joint competition continuum. Currently, the People's Republic of China and Russia are in a constant state of competition with the United States, seeking to gain superiority through significant military, economic, and political advantages. The operational environment continues to evolve in response to these adversaries' increasing capabilities, and the Army must prepare to fight in contested environments. Therefore, the Army established multidomain operations as its operational concept. Multidomain operations encompass a combined arms approach to operations in the land, maritime, air, space, and cyberspace domains, while maneuvering across the physical, information, and human dimensions. The intelligence warfighting function is key to providing the Army with relative advantages and windows of opportunity to overcome adversary defenses. The extended operational environment poses significant challenges for the intelligence warfighting function. To meet those challenges, the Army must leverage big data and technology solutions to develop new sensing capabilities that can penetrate, survive, and collect information.

The Operational Environment

The operational environment encompasses the human, physical, and information dimensions within each domain. Collectively, the combination of domains and dimensions are analyzed and described through the operational variables: political, military, economic, social, information, infrastructure, physical, and time (PMESII-PT), applied within the context of the mission variables: mission, enemy, terrain and weather, troops and available support, time available, and civil considerations (METT-TC).[1] As the Army shifts strategic priorities from counterinsurgency operations to large-scale combat operations, the operational environment will be increasingly difficult to navigate for the intelligence warfighting function. Peer threats with capabilities across all domains will pose a significant challenge. "The PRC [People's Republic of China] has expanded and modernized nearly every aspect of the PLA [People's Liberation Army], with a focus on offsetting U.S. military advantages."[2] Knowledge of the future operational environment will be imperative to reducing operational uncertainty for fighting and winning in complex environments, and the intelligence warfighting function will play a vital role in supporting operations across all domains. Army intelligence professionals must understand each domain, leverage intelligence architecture, collaborate with other military services, and provide intelligence support to all echelons to be effective.

"In addition to expanding its conventional forces, the PLA is rapidly advancing and integrating its space, counterspace, cyber, electronic, and informational warfare capabilities to support its holistic approach to joint warfare."[3] Intelligence sets the conditions for theater operations; gaining situational understanding of the operational environment will drive success against future threats in multidomain operations and a potentially contested operational environment.

The Tactical Problem

Antiaccess (A2) and area denial (AD) are approaches adversaries use to prevent friendly forces from entering an operational area and then hinder their ability to maneuver within that area.[4] A2 and AD systems combine long-range capabilities, such as antiship, antiair, and antiballistic weapons, intended to impede movement into the operational environment, with short-range capabilities, such as electromagnetic warfare and integrated air defense systems, to decrease maneuverability once inside. Army intelligence faces a series of challenges in adapting to evolving A2 and AD environments and operating successfully in multidomain operations.

Commanders require accurate, relevant, and predictive intelligence to understand the threat across the strategic contexts of competition, crisis, and armed conflict. A2 and AD will pose unique problems for Army intelligence during armed conflict. Future Army intelligence collection systems will need to be survivable aerial platforms that can overcome A2 and AD systems and achieve stand-off through high altitudes. Today's Army intelligence, surveillance, and reconnaissance collection is susceptible to contested airspace and has limited collection ranges. Currently, corps and division intelligence lack sufficient organic assets capable of penetrating peer threat stand-off defenses to support targeting, situational understanding, and decision making. To be successful, the Army must be capable of penetrating the A2 and AD systems in regional areas that have spent the last decade building advanced weapon systems. In future armed conflict, peer adversary defenders will have an advantage because they will be defending specific A2 and AD zones that the United States will need to penetrate to be effective in follow-on operations.

The Tactical Solution

Army 2030 initiatives include significant changes that will enable divisions to be more effective by task organizing for purpose, modernizing key capabilities, and providing future capacities at echelon to defeat peer adversaries.[5] Multidomain deep sensing, along with other information collection, will be instrumental in successfully maneuvering to defeat adversary A2 and AD capabilities. The ability to penetrate, survive, and collect information during multidomain operations will provide early warning, current intelligence, and target intelligence to inform and drive operations. Modernization efforts for collection platforms are necessary to ensure an intelligence advantage in contested environments.

The Multi-Domain Sensing System (MDSS) will provide the Army with extended endurance over wide areas, enabling it to counter A2 and AD systems. Its sensors will collect, process, correlate, and analyze using artificial intelligence (AI) and machine learning (ML) technologies. "MDSS will use quantum communication and information technology, AI, and other autonomous solutions to rapidly ingest, sort, process and archive data at speeds and measures of performance far beyond human capacity."[6] Deep sensing capabilities will provide a military advantage on the battlefield because future collection platforms will be able not only to penetrate A2 and AD systems' defenses, but also to collect at stand-off distances, providing intelligence support to multiple echelons. The Army is currently piloting the MDSS High Accuracy Detection and Exploitation System (HADES). "HADES will address Army requirements for medium to high altitude aerial ISR [intelligence, surveillance, and reconnaissance] capabilities to rapidly gain and maintain situational understanding,

freedom of maneuver, information overmatch, and decision advantage in the MDO [multidomain operations]."[7] Deep sensing capabilities will be imperative to enable the Army to generate combat power for deep operations.

The Army is also adopting the Tactical Intelligence Targeting Access Node (TITAN), a system that leverages AI and ML to process sensor data, providing direct support to targeting and battlefield situational awareness during multidomain operations. TITAN will increase the speed and accuracy of intelligence collection, processing, and dissemination. HADES and TITAN both support the Department of Defense's fiscal year 2023 data, analytics, and AI adoption strategy to accelerate decision advantages over near-peer and peer threats. "The Department's investments in data, analytics, and AI will address key operational problems identified in the 2022 NDS [National Defense Strategy], fill validated gaps to enhance the warfighting capabilities of the Joint Force, and strengthen the enterprise foundation required to sustain enduring advantages."[8]

Fighting For Intelligence

The intelligence warfighting function task list is a comprehensive but incomplete listing of the Army intelligence warfighting function's responsibilities, missions, and operations. It includes providing intelligence support to force generation, providing support to situational understanding, conducting information collection, and providing intelligence support to targeting.[9] The intelligence warfighting function faces a significant challenge when attempting to provide effective and flexible intelligence during multidomain operations due to the potential contested environment across all domains. This challenge, referred to as fighting for intelligence, drives actions by the commander and staff "to identify and ultimately open windows of opportunity at the right time and place to leverage one or more capabilities across domains,"[10] leading to exploiting a relative advantage.

Integrating AI and ML technologies is necessary to collect intelligence and provide deep sensing capabilities in A2 and AD environments. Threat A2 and AD capabilities will directly impact the Army's ability to collect intelligence on threats, challenging the ability to fight for intelligence during competition, crisis, and armed conflict. MDSS will provide the Army with a tool to fight for intelligence across echelons and facilitate intelligence support to ground commanders through deep, close, and rear operations. Although multidomain operations will present numerous challenges, the intelligence warfighting function can successfully navigate these challenges if the Army capitalizes on the advantages that AI and ML technologies will bring to intelligence collection platforms. ✴

Endnotes

1. Department of the Army, Field Manual (FM) 5-0, *Planning and Orders Production* (Government Publishing Office [GPO], 2024), 5, https://armypubs. army.mil/epubs/DR_pubs/DR_a/ARN42404-FM_5-0-000-WEB-1.pdf.

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3. Ibid., 4.

4. Department of the Army, FM 3-0, *Operations* (GPO, 2025), 33.

5. John Dolan et. al, "Enabling the Division in 2030: Evolving Division Reconnaissance and Security Capabilities," *Armor* CXXXVV, no. 2 (Spring 2023): 13-17, https://www.benning.army.mil/Armor/eArmor/content/issues/2023/Spring/2Dolan_Pelham_Sickler_Speakes_Frederick23.pdf.

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7. Daniel Baldwin, "The Future of Army Deep Sensing," News, U.S. Army website, January 19, 2024, https://www.army.mil/article/273077.

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9. Department of the Army, FM 2-0, *Intelligence* (GPO, 2023), B-1.

10. Ibid., 1-28.

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