

Multi-Domain Operations at Division and Below

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When critics disparage the multi-domain operations (MDO) concept, they rarely attack the ideas that it proffers; rather, they challenge the maturity or feasibility of its recommended solutions. For instance, one of the most common criticisms of MDO is that the concept ostensibly applies to echelons above division and thus does not describe the employment of the majority of the force that serves at the division or lower. As the operating concept for the entire Army, this is a damning indictment indeed. It is also not true; MDO applies to all echelons.

Division Assault and Gap Crossing

The MDO concept defines solutions that enable the Army to act at corps echelons and higher. For echelons at and below the division, the concept reads like a problem statement. This is not necessarily a new phenomenon. Successive generations of warriors have encountered practical challenges that concepts do not fully elaborate and for which their predecessors can provide useful but insufficient advice. The only way to understand these dilemmas is to develop new operational approaches that enable the effective integration of untested ideas under emergent environmental conditions. The Futures and Concepts Center, using events like the Joint Warfighter Assessment and other experimental environments, has done just that. In the process, concept developers have identified some initial tactical implications that a description of the unique conditions divisions encounter in MDO can explain.

Before providing a description of a division in MDO, it is worth reviewing current doctrine to enable a comparison of contemporary and future approaches to conflict. In current doctrine and division-level training events referred to as Warfighter exercises, a division usually has time to move to and stage in attack positions in

preparation for large-scale combat operations. With critical capabilities pre-positioned, the situation transitions to conflict. The division and its subordinate formations uncoil from their attack positions and begin maneuvering along designated avenues of approach in a simulated six-week operation.¹ The division fights between one and three enemy divisions that have superior fires capabilities. Roughly halfway into the fight, the division postures for and executes a deliberate wet-gap crossing using one or more brigade combat teams.² Over the course of half a day (roughly thirty-six hours in the simulation), the division completes the crossing, usually losing significant combat power and bridging assets as the threat masses its capabilities to contest this priority operation. After completing the crossing and consolidating forces, the division continues the assault, decisively defeating or isolating critical threat formations.³ While complicated and dangerous in its own right, this process is comparatively simple and does not replicate the complex operations or requirements inherent in a multi-domain battlefield.

Within MDO, a division must maintain situational awareness and influence for potentially hundreds of kilometers within a seventy-two to ninety-six-hour time span.⁴ With little or no warning, the division moves directly from a theater port or training base into the fight. The division and its brigades fight while uncoiling, while an army or corps converges multi-domain capabilities to degrade threat long-range fires and air defenses (both with ranges greater than four hundred

Next page: A U.S. Army UH-60 Black Hawk flies over Yamaguchi Bay, Japan, 9 September 2019 during Orient Shield 2019, which is a premier U.S. Army and Japan Ground Self-Defense Force bilateral field training exercise that is meant to increase interoperability by testing and refining multi-domain and cross-domain concepts. (Photo by Staff Sgt. Jacob Kohrs, U.S. Army)

kilometers). U.S. theater-level long-range fires directly influence tactical maneuver operations by degrading the threat's ability to interdict division-level maneuver. The division rapidly maneuvers to within 150 kilometers of the front, where threat mid-range fires become the primary problem, when enemy long-range systems are sufficiently degraded.⁵ This maneuver is significantly easier if the division begins movement during the final phases of competition.⁶

Moving to the point where threat mid-range fires interdict movement is not easy. According to current templated rates of advance for a corps or division in contact, a movement of roughly 300 kilometers (roughly the length of maneuver from initial interdiction from threat long-range fires to the start of enemy mid-range fires effective ranges) should take between two to three days.⁷ In MDO, however, the division has one to two days to complete this maneuver, and the next stage requires greater speed in convergence and maneuver.⁸

Enemy extended stand-off capabilities are few in number but exceptionally lethal and effective, requiring less time and more expensive capability to penetrate. More numerous mid-range fires, however, take significant time and capability to attack and degrade sufficiently to open windows for maneuver. The corps, converging as much multi-domain capability as is

available, times attacks against enemy mid-range fires to enable seamless divisional maneuver to the front to contest threat fait accompli operations.

If, for instance, the wet-gap crossing occurs during this move from 150 kilometers to 70 kilometers from the front, the division has twenty-four hours to move 80 kilometers and conduct a wet-gap crossing. Assuming that it takes twelve hours to accomplish the maneuver, the division has twelve more hours to move a minimum of two brigade combat teams with a minimum of seven thousand people and a thousand pieces of equipment across a water obstacle. That is less than a minute per vehicle just for the crossing, and it does not account for set up or tear down of the crossing site. This type of rapid crossing would be difficult under ideal crossing conditions. Under future conditions, however, tactical maneuver units probably cross multiple bridging sites that move every forty-five minutes to an hour to mitigate the threat of enemy precision attacks.

If the corps is unable to maintain a window of opportunity for twelve or twenty-four hours, the division commander faces a decision. Does he or she consolidate forces for a contested deliberate gap crossing that slows the advance but enables concentration of protection assets?⁹ Or does he or she divide forces in the hope that small elements gain greater speed and



survivability?¹⁰ The second option is faster but rapidly depletes available bridging assets. Further, if the enemy destroys those assets, the corps risks culmination. The risk of culmination increases as the corps leverages significant multi-domain resources to conduct multiple convergence operations in support of numerous axes of advance. Without converging multi-domain resources, however, the division is unable to deliver replacement bridges to dispersed brigade combat teams. In order to reduce the risk of culmination, the next generation of fighting vehicles must have advanced swimming capabilities, which would considerably reduce the complexity and increase the speed of gap-crossing operations.

Once to the other side, the division continues to advance. Now, within seventy kilometers of the enemy's position, the division—largely on its own as the army- and corps-level assets continue to focus on long- and medium-range threat capabilities—leverages its organic capabilities to lead tactical convergence operations. With limited visibility of and access to multi-domain capabilities, the division and its brigades identify targets for army and corps engagement. Concurrently, they engage the enemy's short-range capabilities and the densest part of the anti-access/area denial (A2/AD) system. At this point in the fight, actively employing all available assets becomes essential to success.

Ensuring each tank, mobile protected fire platform, cannon, and multiple launch rocket system effectively engages enemy forces as fast and as often as possible becomes critical. It is at this phase in the operation that more multi-domain capability enters the battlespace through convergence operations at all echelons, overwhelming the enemy and halting its advance.

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Simultaneously, units rush to cross the last phase line and prevent the *fait accompli* while progressing deeper into enemy electronic warfare capabilities and further down the primary, alternate, contingency, and emergency (PACE) communications plan. This point also delineates the period when

clearing and deconflicting fires becomes vital but exceptionally difficult. To manage the volume of effects and the dynamic nature of the environment, a combination of control measures and artificial intelligence help commanders at all echelons manage risk, integrate multi-domain fires, and protect forces.

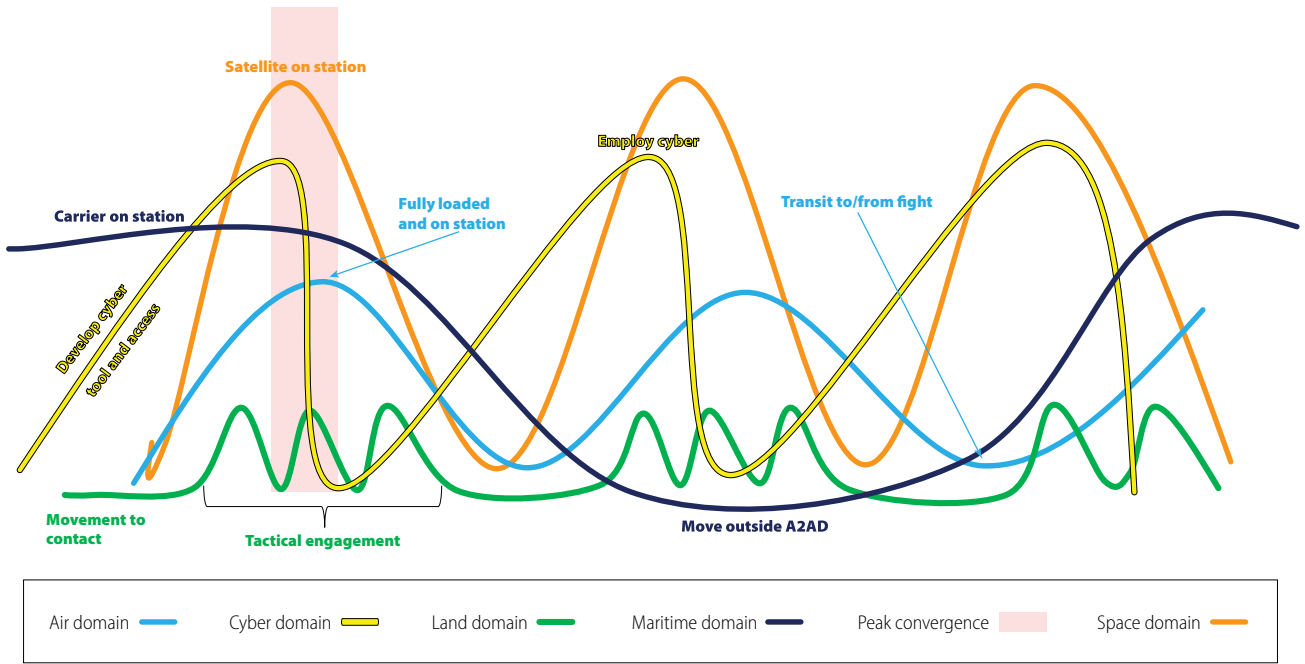
It is important to remember, however, that convergence operations are not the end but the means necessary to achieve specific operational objectives. Convergence enables penetration and dis-integration of enemy defenses, thus allowing divisions and brigades to maneuver and control the essential terrain, which prevents the enemy from achieving its objectives.

Tactical Implications

Obviously, a division advance under MDO creates unique demands. Convergence, specifically, presents many challenges at both the operational and tactical levels, particularly in terms of resource availability. During MDO experimentation, analysts became aware of the fluctuating availability of capability in all domains.¹¹ Each domain has physical limitations such as the speed of satellite orbit; closed cyber networks that require physical penetration; or refuel, refit, and reload times for forces operating in air, sea, and land domains. These physical constraints reduced the availability of forces in all domains. As a result, commanders can choose either to mass all forces for a short period of time or employ some percentage of his or her forces indefinitely. Using the latter approach, operations lasting more than a few hours create cyclical waves of resource availability. By aligning the zenith of multiple domain “sine waves” with tactical operations (see figure, page 71), a commander leverages windows of domain superiority to gain overmatch and achieve mission objectives.

Between these periods of peak convergence, optimization heuristics enabled commanders to identify ideal combinations of multi-domain assets to use against key enemy nodes as opportunities presented themselves. The consistent characteristic of convergence is that it leverages all domains, improves utilization rates of otherwise latent capacity, enhances the overall lethality of U.S. forces, and increases the number of dilemmas that an enemy encounters.

However, it is still unclear how this works and, as importantly, who does this work. This poses significant



(Figure by author)

Figure. Peak Convergence of Resource Availability in Domains

tactical problems for the Army. For one, how do divisions and brigades understand and observe windows of opportunity provided through convergence operations of army and corps headquarters and exploit them in communications-degraded environments? Once through a convergence window, how does a brigade or division converge its organic capabilities to penetrate and dis-integrate tactical threats? Perhaps most importantly, if any command and control node can employ any shooter at any time for convergence, do divisions and brigades fight using their own capabilities?

Visualizing Multi-Domain Operations

Identifying and exploiting windows of advantage in a dispersed and highly lethal MDO battlefield requires rethinking current visualization and situational understanding approaches. Today, simply gaining situational awareness of all domains requires stacks of computer servers, top secret intelligence processing facilities, and special technical operations vaults, most of which reside in static positions. Further, sharing information with subordinate organizations; allies; and joint, interagency, intergovernmental, and multinational partners is difficult

due to the limited data rates of the current tactical networks, insufficient access due to security clearance requirements, and intelligence-sharing limitations. Ideally, access to all domain data is ubiquitous, mobile, and shared with allies and partners; in reality, it is not.

Solutions to the above gaps must be identified and developed in order to exploit windows of opportunity generated by converging effects. Further, any solutions must account for growing communications-related constraints as the force integrates better automation and autonomous systems. Quantum-computing, cloud-based big data, and advanced high-speed computers require sizeable, largely immobile, and vulnerable infrastructure. These new technologies could also limit the employment of forces and headquarters if they require the addition of large facilities and air-conditioning or even refrigeration for processing of multi-domain information.¹²

However, the U.S. military cannot trade mobility for data processing. Doing so would prevent tactical formations from exploiting windows of advantage. Less mobile divisions, brigades, and battalions enabled by advanced but immobile automation would be able to anticipate fleeting advantages. Yet, these maneuver



formations would be unable to rapidly accelerate to and through gaps opened in threat defenses.¹³ Further, protecting less mobile formations would require the concentration of forces to defend critical infrastructure, gutting the Army's ability to present a threat with multiple dilemmas. Semi-independent maneuver is critical in the MDO environment. The ability to disperse and maneuver based on immediate tactical conditions increases the rate of advance and the number of dilemmas that the threat's centrally commanded A2/AD forces must confront. Convergence combined with the speed of independent maneuver approximates the impact of the blitzkrieg attacks, which rapidly penetrated defenses and defeated the enemy in depth.¹⁴

Complicating both convergence and maneuver is the need to anticipate short-lived gaps in enemy defenses, which requires a thorough understanding of the physical limitations and domain "sine waves" described above. Timing the advance of a corps or division moving at three-to-five kilometers per hour against prepared defenses degraded by convergence operations is difficult. Exploiting peak convergence opportunities requires the effective integration of strikes from a jet

Polish soldiers with 12th Mechanized Brigade reach land in an amphibious tank 11 June 2020 during exercise Allied Spirit at Drawsko Pomorskie Training Area, Poland. Allied Spirit is a Defender-Europe 20-linked exercise involving approximately six thousand U.S. and Polish soldiers. The modified exercise tested a division-sized unit's ability to conduct a deliberate water crossing, integrate with alliance capabilities, and establish a common intelligence operational picture. (Photo by Sgt. Randis Monroe, U.S. Army)

moving the speed of sound, hypersonic weapons and satellites moving multiple times the speed of sound, and cyber strikes transmitted along fiber-optic cables at the speed of light into maneuver operations. While some of these capabilities are available at all times, others are not, and maneuver forces must be prepared to exploit ninety-minute windows provided by a capability only available for a brief five minutes. Degraded communications environments further complicate this process by disrupting near real-time coordination.

Once that ninety-minute window opens and friendly forces begin operations, access to multi-domain information and support diminishes. Tactical formations must operate independently. During these periods,

divisions and brigades must become much more opportunistic, leveraging their organic systems and formations to identify and exploit emergent advantages.

Maneuver forces at echelon must first operate according to the original plan and then rapidly transition to decentralized execution to gain and maintain the initiative in an MDO campaign. This transition requires assured access to critical information at tactical echelons throughout operations because advancing units must understand changes to the higher mission and intent, targeting priorities and plans for the next phase of the operation in order to seize and maintain the initiative.

There are various methods of providing sufficient information to operate in a contested information environment. These methods may include communications systems that are more mobile, smaller data packets, and transmission assured through multiple paths over low-bandwidth systems. Then the rapid, wide distribution of information can occur across the force to enable shared understanding and disciplined initiative.

Conversely, development of analog indicators will assist commanders in identifying windows of advantage without computer aids. These indicators include the integration of American or coalition fourth-generation fighters into attacks or the lack of enemy electronic interdiction at certain points in the operation. These indicators help commanders understand the operational environment even if they do not have perfect communications or situational awareness. However, analog metrics are insufficient to support highly centralized decision-making in widely distributed operations. Thus, in MDO, empowered tactical commanders must take on more responsibility in decision-making and execution of operations.

A final method of gathering information for operations may include the delegation of better automation capability to lower echelons and blockchain-like security, which protects information openly communicated across unsecure but ubiquitous communications platforms.¹⁵ In this option, formations leverage artificial intelligence (AI) capabilities that identify and mitigate degraded communications. These AI-based systems then monitor the alignment of domain capabilities and unanticipated changes in the plan. Advanced automation then instantly modifies plans and redistributes new control measures including boundaries and phase lines to forces in contact based on optimal combinations of domain capabilities.¹⁶

There is no single solution to operating in an information-contested environment, and a combination of advanced information systems, analog indicators, and AI-enabled staffs is required for MDO. These solutions simply enable tactical formations to see and exploit windows provided by higher echelons. The next question is how maneuver formations create their own opportunities.

Tactical Penetration and Dis-Integration

While *The U.S. Army in Multi-Domain Operations 2028* highlights echelons above division in its discussion of penetration and dis-integration operations, penetration and dis-integration happen at every echelon.¹⁷ In fact, retired Brig. Gen. Mark Odom, an author of *The Army in Multi-Domain Operations 2028*, acknowledged the direct relationship between proximity to threat forces and density of the defenses requiring penetration.¹⁸ As a result, penetration and dis-integration become more difficult and essential the closer a tactical formation gets to the battle. The following section explains how tactical penetration and dis-integration operations potentially unfold.

Penetration and dis-integration happen in many ways. During competition, Army headquarters pre-position forces based on policy directives and a perception of enemy intentions. By pre-positioning during competition, tactical formations penetrate threat A2/AD coverage prior to armed conflict.

Upon the transition to armed conflict, army and corps headquarters attack and defeat high-value, long-range threat systems, enabling divisions and brigades to maneuver within threat A2/AD coverage. This advantage is temporary, and in a matter of hours, the window of advantage closes. Threat forces, now leveraging operational capabilities, find and attack friendly tactical formations with numerous drones, cyber, and kinetic fires capabilities.¹⁹ Simultaneously, threat forces amplify electronic warfare measures, complicating efforts to distribute data, avoid detection, and coordinate follow-on operations.

Largely reliant on organic capabilities and limited multi-domain means and authorities, friendly tactical units make contact with and probe the enemy's defenses and find vulnerabilities.²⁰ Once identified, smaller combat formations maneuver while engaging the threat with fires, countering longer-range enemy platforms starting with multiple rocket launcher systems and medium range air defenses.²¹ As the army, corps, and

division peel back each layer of the enemy A2/AD system, additional maneuver space opens offering commanders more opportunities to exploit threat vulnerabilities. Simultaneously, divisions and brigades use multi-domain effects to obscure their forces and movement while degrading the command and control nodes in enemy fires and integrated air defense systems.²² With each step, critical enemy nodes are attacked and cohesion destroyed.²³ Simultaneously, more of the joint force enters the fight, exponentially increasing available offensive power and presenting multiple dilemmas to the enemy, tipping the scale toward friendly success.

The approach described above appears similar to unified land operations because it leverages the same operational theory. The scope, scale, and access required, however, are different from what U.S. forces enjoy today. For instance, U.S. forces were able to establish overwhelming all-domain superiority over Mosul during counter-Islamic State (IS) operations in 2017.²⁴ Using these capabilities, land and air component staffs coordinated deliberate actions to exploit a relatively static defense in isolated terrain, enabling Iraqi security forces to retake Mosul.

The level of constant domain access and superiority that coalition forces gained over IS will not exist against peer adversaries. Whereas multiple layers of ground-based fires and air support enabled three divisions of partner forces to maneuver against a brigade of IS fighters in Mosul, a corps of American forces will maneuver against several enemy-corps equivalent formations in the future.²⁵ Each threat formation will have its own fires, electronic warfare assets, special purpose forces, partisans, and air defenses.²⁶

The adversary employs these assets nearly simultaneously to present multiple dilemmas to advancing tactical formations, separating ground forces from the close air support and other warfighting enablers on which they have become dependent.²⁷ To counter, divisions must maximize use of other domains and integrate swarms of less exquisite, nonstealth systems while rapidly adapting to shifting operational conditions and weather effects. Brigades must then exploit advantages created by echelons at division and higher, quickly maneuvering against less mobile and tactically proficient enemy formations.

Who Fights What?

Perhaps the most perplexing question of MDO is who fights what capabilities? Currently, the brigade combat

team is the primary unit of action. Under MDO, the division becomes the eminent tactical unit of employment.

While the unit of action changes, expectations for tactical commanders also shifts. Currently, tactical commanders fight their own capabilities, executing tactical tasks in support of broader operational objectives. In the future, however, optimization algorithms may interfere with this process. As divisions maneuver their organic capabilities to exploit emerging opportunities, these assets will become the best option for engaging a broader range of enemy capabilities. Simultaneously, a growing number of headquarters will have access to these increasingly automated effects. Under the any sensor, any command and control node, any shooter paradigm of convergence, optimization heuristics will employ data to identify the best combination of multi-domain assets for employment against specific threat capabilities. Automated systems could then actively recommend the employment of those assets regardless of domain or human perspectives.

This will create a competition for capabilities and resources required to execute and sustain the fight. Weighting optimization processes too heavily toward operational or strategic considerations could rapidly run divisions and brigades out of critical supplies and the ability to execute tactical operations. Conversely, weighting tactical considerations too heavily could reduce options for strikes against critical operational or strategic targets. Thus, the calibration of automation, like force posture, must adequately support strategic and operational priorities while accounting for tactical initiative, protection, and consumption considerations.

Conclusion

This article begins a conversation about the tactical application of MDO, describing the Army's latest operating concept as a problem statement for tactical forces. The description of a division attack helps make explicit three challenges to implementing MDO. Discussing these challenges in detail, the author then introduces potential solutions to each.

The first challenge was the use of data in the MDO environment. Current communications do not allow commanders to rapidly combine and employ multi-domain effects. They do not support the visualization of brief periods of opportunity—referred to as windows of opportunity or advantage—and they negatively affect maneuver and protection operations. Future tools must

provide advanced analytics capable of identifying and employing optimal combinations of domain capability. They must also provide visualization tools that enable commanders at echelon to anticipate windows of advantage. Further, future automation and communications must provide these capabilities without impeding the mobility of tactical maneuver units. This likely requires a first principles review of our current approach to data collection, usage, and communication.

The second challenge was tactical penetration and dis-integration. While operational echelons such as armies and corps converge to penetrate highly capable threat long-range fires and air defenses, tactical echelons penetrate and dis-integrate a dense web of short-range capabilities. This requires the active employment of as many organic capabilities as possible, likely requiring better automation. Convergence of effects is

not the only way to penetrate and dis-integrate. In fact, rapid, semi-independent, and opportunistic maneuver is another and perhaps the best method to defeat centrally controlled threat A2/AD units.

The final tactical challenge was employing the any sensor, any command and control node, and any shooter paradigm without undermining tactical initiative. This required calibration of optimization heuristics to account for both operational and tactical requirements. If managed properly, automated integration of forces will improve both operational and tactical lethality.

If the Army finds effective doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy solutions to these challenges, then MDO, which are infeasible now, will be both a feasible and mature solution to the standoff problem presented by U.S. adversaries. ■

Notes

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