APPROACHES TO THE REQUIREMENTS AND OPPORTUNITIES FOR INTEGRATING THE ROMANIAN ARMED FORCES' KEY CAPABILITIES IN ALLIED MULTI-DOMAIN OPERATIONS

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The complexity of the contemporary security environment and the realities of global strategic competition compel NATO member states to develop interoperable multi-domain capabilities capable of addressing both hybrid and conventional threats. Positioned on NATO's eastern flank and in close proximity to strategically contested areas such as the Black Sea, Romania plays a critical role in the Euro-Atlantic defensive architecture. This article explores the doctrinal foundations of Multi-Domain Operations (MDO), NATO interoperability requirements, and Romania's modernization efforts, including key acquisition programs such as Patriot, HIMARS, F-16, F-35, and unmanned aerial systems. It highlights the doctrinal, organizational, and technological challenges facing Romania's integration into allied MDO frameworks, concluding that success hinges on synchronized doctrinal reform, sustained technological investment, and enhanced joint training. Romania possesses the potential to become a significant MDO contributor, provided a coherent and sustained national approach is adopted.

Keywords: Romania; capabilities; operations; multi-domain; integration;

INTRODUCTION

The evolution of the international security environment is currently marked by a high degree of complexity, volatility, and interdependence, driven by intensified strategic competition among major powers, the proliferation of regional conflicts, and the rapid acceleration of technological progress. Within this context, Multi-Domain Operations (MDO) have emerged as a critical operational paradigm for adapting modern military structures to new types of threats. The MDO concept entails the integration and synchronization of capabilities across multiple domains - land, air, maritime, space, cyber, electromagnetic, and informational – in order to achieve decisive operational advantage. For NATO, this approach constitutes a *sine qua non* for maintaining strategic superiority and defensive cohesion along its exposed flanks. The implementation of a multi-domain operational framework has become a core objective reflected in joint doctrinal developments and consistently reaffirmed in NATO summit declarations since 2020.

Positioned on the Alliance's eastern flank, with the Black Sea representing a space of strategic interest, Romania faces a unique set of challenges and opportunities in adapting to MDO requirements. Its proximity to increasingly contested areas, particularly in the face of Russia's assertive posture, combined with the geostrategic relevance of national territory, necessitates the strengthening of national capabilities and their coherent integration into NATO's security architecture. In this regard, the Romanian Armed Forces have initiated an accelerated modernization process, including the procurement of advanced air defense systems, artillery and missile platforms, aircraft, and multi-domain compatible unmanned aerial systems – all aimed at supporting participation in joint and allied operations. However, the absence of a dedicated national doctrine for MDO, alongside budgetary and organizational constraints, remains a limiting factor in fully leveraging these capabilities.

In this context, the present article aims to analyze the doctrinal, technological, and organizational requirements for integrating the capabilities of the Romanian Armed Forces into allied Multi-Domain Operations (MDO), to assess the potential of key capabilities acquired over the past decade, and to identify strategic opportunities for strengthening interoperability with NATO. The research adopts a qualitative methodological approach designed to provide a comprehensive and structured analysis.

First, a document-based analysis of NATO's doctrinal and conceptual framework is employed to identify operational requirements and interoperability principles that shape the integration of national capabilities. Second, a comparative method is applied by examining Romania's doctrinal evolution in relation to similar experiences and approaches adopted by other allied states. Additionally, major national military modernization programs are analyzed through a case study focusing on key capabilities acquired in the past decade, in order to evaluate their compatibility with MDO requirements.

Through this methodological framework, the article seeks to offer both a theoretical foundation for understanding the issue and a practical assessment of the Romanian Armed Forces' operational realities. The research findings aim to generate practical recommendations relevant to Romania's doctrinal and institutional transformation, as well as to the strengthening of NATO's collective posture on its eastern flank and in the Black Sea region.

NATO'S DOCTRINAL FRAMEWORK ANDTHEREQUIREMENTS FOR MULTI-DOMAININTEGRATION IN THEALLIED CONTEXT

The United States Armed Forces have emerged as the undisputed leader in the development of modern operational doctrines, leveraging extensive experience in various theatres of operations, substantial resources, and a highly advanced research and experimentation infrastructure. This capability has enabled the testing and real-world validation of innovative concepts, providing a doctrinal model of reference for Western militaries. One such example is the Multi-Domain Operations (MDO) concept, grounded in the successfully validated principles of Air Land Battle, but adapted and formulated as a response to global strategic competition and the challenges posed by actors such as Russia and China (Wille, 2019). Reinforced by the lessons learned from the Second Nagorno-Karabakh War and accelerated by the outbreak of the Russia–Ukraine conflict, MDO was formally adopted as official doctrine by the U.S. Army with the publication of the revised FM 3-0 Operations manual in October 2022 (U.S. Army, 2022). The MDO concept promotes the synchronized integration of land, air, maritime, space, cyber, and information domains to achieve decision-making and operational superiority in a complex and interdependent conflict environment.

Designing a new multi-domain operational architecture required the prioritization of next-generation capabilities, such as long-range precision strike systems, integrated air and missile defense, next-generation manned and unmanned aerial platforms, high-firepower and highly mobile armored vehicles, resilient

communication infrastructure able to function in contested and electromagnetically degraded environments, as well as enhanced soldier lethality (Roper, Grassetti, 2018). In parallel, the creation of dedicated force structures capable of employing these capabilities became another key line of effort in the implementation of the new concept. To this end, the five Multi-Domain Task Forces (MDTFs) established and equipped by the U.S. Army to date (Feickert, 2025) represent organizational structures that bring all five warfighting domains under a single command, capable of delivering synchronized effects across time and space (Borne, 2019).

The influence of Multi-Domain Operations (MDO) on NATO is deep, prompting the Alliance to recalibrate its planning processes and operational concepts in order to maintain cohesion and interoperability. As such, MDO functions not only as a U.S. doctrinal construct but also as a driver of allied transformation, steering Western forces toward an integrated, flexible, and adaptive operational model.

NATO's doctrine for joint operations, the Allied Joint Doctrine (AJP-01), updated in 2022, incorporates the multi-domain dimension as a natural extension of the joint operational concept. This development reflects the Alliance's recognition of the decisive influence of the cyber and space domains on military operations, as well as the need for their convergence with traditional domains – land, maritime, and air. Unlike the U.S. approach, NATO's vision also integrates the complementary actions of non-military actors (political, economic, industrial), which can be embedded within allied campaigns to generate converging effects (AJP-01, 2022).

The NATO Concept for Multi-Domain Operations, adopted by member states in May 2023, constitutes a foundational doctrinal pillar for the Alliance's future transformation. The document defines MDO as *"the orchestration of military and non-military activities across all domains to produce converging effects"*, and emphasizes the need to operate at *"the speed and scale of modern operations."* (NATO ACT, 2023). This orientation is designed to provide allied forces with the flexibility required to confront adversaries capable of employing hybrid strategies, anti-access/area-denial (A2/AD) capabilities, and tools of competition that operate below the threshold of armed conflict.

A report published in July 2023 by military experts and strategists from the Atlantic Council, titled *"NATO Multidomain Operations: Near- and Medium-Term Priority Initiatives",* outlines the main directions for implementing the Allied concept of Multi-Domain Operations (MDO) at the level of NATO member states. The document also offers an assessment of the capabilities considered essential for the future conduct of MDO, based on lessons identified from the Russia-Ukraine conflict. In this regard, the report establishes a prioritization framework focused

on objectives that are feasible in the short and medium term and accessible to all allies. Specifically, the study highlights the need to achieve the following capability objectives (Kramer et al., 2023):

- the development of multi-domain surveillance networks and low-cost, integrated sensor-to-shooter systems based on unmanned aerial, land, and maritime platforms;
- the enhancement of multi-domain capabilities aimed at neutralizing enemy air defense systems;
- the integration of cyber and kinetic strike capabilities targeting adversary logistics and critical infrastructure supporting the war effort, alongside the development of robust cyber defense capabilities, both governmental and private, focused on the protection of critical military infrastructure;
- the implementation of dynamic logistical support solutions, including the use of artificial intelligence, to ensure operational sustainability during high-intensity conflicts;
- the development of multi-domain support capabilities for forward-deployed forces, aimed at increasing their survivability and lethality during the initial phases of conflict;
- the assurance of wartime access to space-based capabilities provided by the private sector, in support of NATO's Alliance Persistent Surveillance from Space (APSS) initiative;
- the establishment of Multi-Domain Task Forces (MDTFs) to coordinate and integrate available capabilities across all operational domains.

In parallel with the alignment of member states' doctrines to multi-domain principles, a second strategic priority is the acquisition and development of modern, interoperable, and complementary multi-domain capabilities that enable allied force structures to achieve information superiority and create the conditions for timely and convergent responses to adversaries' multidimensional challenges.

The successful integration of multi-domain capabilities depends on the development of resilient digital networks capable of linking sensors and engagement systems through an *"any sensor – any shooter"* model. Initiatives such as Federated Mission Networking (FMN) and Combined Joint All-Domain Command and Control (CJADC2) form the technological foundation for this interoperability, enabling rapid information sharing and decision-making at operational speed (Jaspreet, 2023).

A core requirement of the allied doctrinal framework is the ability to integrate traditional means with emerging technologies, including unmanned systems, hypersonic missiles, artificial intelligence, cloud-based data architectures,

and electromagnetic spectrum capabilities. This integration must occur not only at the technical level but also procedurally, through the adaptation of common tactics, techniques, and procedures.

The implementation of Multi-Domain Operations (MDO) undoubtedly requires a revision of allied force structures and command-and-control arrangements. Following Russia's invasion of Ukraine and the activation of NATO's Graduated Response Plans in February 2022, the Alliance adopted a new NATO Force Model, one of its key components being the Allied Reaction Force (ARF) – a multinational, multi-domain high-readiness force composed of land, air, maritime, special operations, cyber, space, logistics, and strategic communications elements (NATO. INT, 2025). This structural shift materialized through the tripling of forward-deployed forces on NATO's eastern flank. Specifically, the four original battalion-level Enhanced Forward Presence (eFP) battlegroups deployed in the Baltic States and Poland were supplemented by four additional battlegroups in Bulgaria, Hungary, Romania, and Slovakia, with plans to upgrade these to brigade level (Monaghan et al., 2024). This posture reflects the application of a key MDO doctrinal principle – *"forward positioning of calibrated force packages"* (TRADOC, 2018).

In line with the U.S. Army's restructuring of land forces into theatre – corps – division echelons, NATO may increasingly consider the creation of combined structures akin to Multi-Domain Task Forces (MDTFs), integrated into the broader allied force architecture. Such formations would offer a practical foundation for MDO implementation at the alliance level, drawing on lessons learned from the U.S. Army's second operational MDTF, already activated under U.S. European Command (EUCOM) in Wiesbaden, Germany.From the U.S. perspective, MDTFs serve as theatre-level formations centered on deep fires capabilities, strategically positioned and specifically designed to support penetration and disintegration of Anti-Access/Area Denial (A2/AD) systems. A typical MDTF structure includes a precision fires battalion, an air and missile defense battalion, a logistics support battalion, andcritically, a Multi-Domain Effects Battalion (MDEB). The MDEB plays a central role through its employment of reconnaissance satellites, space-based sensors, unmanned aerial vehicles (UAVs), and radar systems, enabling the integration and analysis of multi-source intelligence. It also conducts operations designed to disrupt adversary activities using non-kinetic means such as electronic warfare, cyberattacks, and psychological operations (Ki-Chul, 2025). A possible organizational model for an MDTF assigned to a Combined Joint Task Force at the theater level is illustrated in *Figure 1*.
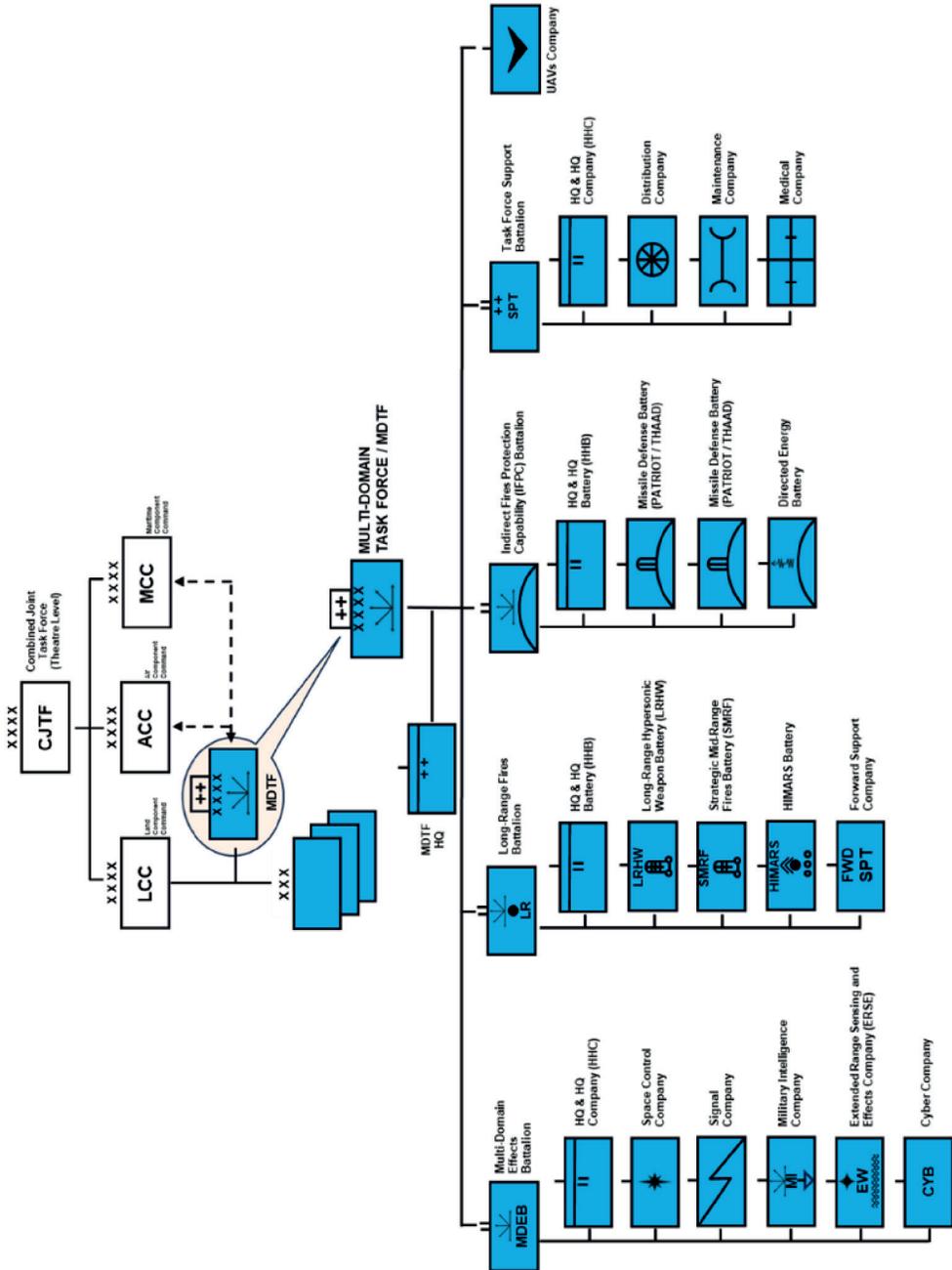
Figure 1: Organizational Model for an MDTF assigned to a CombinedJoint Task Force at the Theater Level, adapted from (Higgs, 2025, p. 81)

At the allied level, NATO's efforts to operationalize MDO concept also focus on integrating multi-domain principles into planning, training, and multinational exercises, with an emphasis on preparing forces to conduct simultaneous operations across interdependent environments. Major exercises such as Trident Juncture and Steadfast Defender serve as real-world laboratories for testing these concepts and identifying interoperability gaps across nations and service branches. For example, Steadfast Defender 2024, the largest NATO exercise since the end of the Cold War, demonstrated the strength of the transatlantic bond and NATO's ability to conduct complex collective defense operations across all domains. The exercise tested the mobilization and employment of allied forces in a high-end conflict scenario, leveraging NATO, national, and multinational multi-domain capabilities across continental Europe (SHAPE, 2024).

Scientific research in the MDO domain reveals that while some NATO members possess advanced infrastructure, including integrated C4ISR systems, space capabilities, and combat-use AI, others face doctrinal, technological, or budgetary limitations. Key challenges identified include the absence of a common digital architecture among allies, difficulties integrating cyber and space capabilities into operational chains of command, and the resilience of command-and-control systems in contested environments. Moreover, recent operational challenges, particularly the war in Ukraine and conflicts in the Middle East, have accelerated efforts to effectively integrate multi-domain actions and offer critical lessons for shaping a coherent, integrated, and effective approach within contemporary allied military structures.

KEY CAPABILITIES OF THE ROMANIAN ARMED FORCES RELEVANT TO MULTI-DOMAIN OPERATIONS

The challenges and tensions generated by the increasingly aggressive actions of the Russian Federation along NATO's eastern border have prompted member states – and Romania in particular – to redefine their strategic posture for deterrence and defense. The war in Ukraine has underscored the urgent need for an accelerated doctrinal transformation of the Romanian Armed Forces to ensure alignment with the demands of high-intensity, multi-domain, and hybrid conventional warfare. This transformation seeks to shift from a predominantly reactive posture to a more proactive role within the European defense architecture by strengthening interoperability with NATO, enhancing ground mobility, air defense, and rapid reaction capabilities.In this context, Romania has intensified the military capability development process initiated in 2015, with immediate priority given to long-range

precision strike systems, air defense platforms, modern aerial assets, and new ISR (Intelligence, Surveillance, Reconnaissance) capabilities. These elements represent the core pillars of Romania's contribution to the allied defensive posture on the eastern flank.

The acquisition of High Surface-to-Air Missile (HSAM) systems – Patriot – has provided Romania with a modern and robust air and missile defense capability, fully compatible with NATO's Integrated Air and Missile Defence System (NATO IAMD). These systems are capable of simultaneously intercepting short- and medium-range ballistic missiles, cruise missiles, and combat aircraft. Their integration into the NATO defense structure enables Romania to respond promptly to Anti-Access/Area Denial (A2/AD) threats and to conduct joint air defense operations alongside allies operating the Patriot system, including the United States, Poland, Germany, the Netherlands, Italy, Spain, and Greece. The Patriot system's contribution to NATO Multi-Domain Operations (MDO) scenarios is highlighted by its role as a critical node within NATO IAMD, and by its ability to interoperate with Aegis systems, allied radar platforms, and integrated command-and-control solutions such as the Integrated Battle Command System (IBCS). Furthermore, these systems enhance the cyber and electromagnetic resilience of command architectures and support digital interoperability, including compatibility with NATO networks such as Link 16, which enable real-time target data sharing and a common operational picture of the battlespace.

Romania currently possesses 54 HIMARS (High Mobility Artillery Rocket System) launchers, organized into three battalions, each capable of launching GMLRS (Guided Multiple Launch Rocket System) munitions with a range of 70-80 km, as well as ATACMS (Army Tactical Missile System) missiles with ranges of upto 300 km. HIMARS interoperability has already been validated during U.S. and NATO multinational exercises. For example, Romanian launchers and radar systems deployed at Mihail Kogălniceanu Air Base were successfully integrated into allied C4ISR networks during the *"Arcane Thunder 23"* exercise, led bythe U.S. Multi-Domain Task Force (MDTF) assigned to the European theater (Orjanu, 2023).

HIMARS has proven interoperable not only with U.S. forces, the system's primary developer and operator, but also with European allies such as the Baltic States and Poland, where it is lready in use. Successfully employed in the kraine conflict, HIMARS demonstrated its ability to engage long-range targets with rapid, precise, andreliable fires, reinforcing NATO members' interest in adopting the system as a core capability for territorial defense support. Its relevance to MDO stems from its integration within *"sensor-to-shooter"* networks such as

the Integrated Battle Command System (IBCS) and broader allied communication and information sharing frameworks like NATO's Federated Mission Networking (FMN). These support the *"any sensor – any shooter"* principle (Richardson, 2025), enabling HIMARS to receive and integrate targeting data from a wide range of ISR sources, including drones, satellites, and ground-based sensors to coordinate land fires with air and cyber actions, there by generating synchronized, cross-domaine ffects. Furthermore, the system's high mobility and survivability allow for rapid deployments and engagements from unexpected positions – critical attributes for dispersed operations and for maintaining sustained operational tempo in dynamic battlespaces.

The Romanian Air Force has made significant progress in modernizing its operational capabilities through the acquisition of three full squadrons of F-16 Fighting Falcon multirole aircraft, 48 units in total, of which 35 have already been delivered. In line with its international commitments, Romania is set to receive an additional F-16 squadron from the Royal Netherlands Air Force, following the latter's transition to the fifth-generation F-35 Lightning II platform. This acquisition is expected to bring Romania's fleet to approximately 70 modern aircraft, there by strengthening the country's strategic relevance and deterrence posture in the regional security context. Beyond their role in NATO Air Policing, these aircraft allow for direct integration into joint aircampaigns, being interoperable with tactical data networks such as Link 16. Looking ahead, the planned procurement of 32 F-35 Lightning II aircraft, with deliveries scheduled to begin in 2030, marks the most significant step toward enhancing Romania's airpower projection capabilities. The F-35 introduces stealth characteristics, integrated sensors, and advanced data fusion, transforming it into a multi-domain network node capable of detecting, prioritizing, and transmitting target data to other allied platforms (Defense omania, 2024). This capability enables seamless integration into allied multi-domain operations by enhancing situational awareness, survivability, and joint engagement potential across domains.

In the context of contemporary warfare, marked increasingly by the widespread use of unmanned aerial systems (UAVs), the Romanian Armed Forces have initiated a procurement program focused on Medium-Altitude Long-Endurance (MALE) platforms, while simultaneously pursuing the development of indigenous production solutions. In this regard, contracts have been signed for 7 Watchkeeper X systems (21 drones) and 6 Bayraktar TB2 systems (18 drones), most of which have already been delivered and incorporated into Romanian Land Forces units. These systems are used for reconnaissance, target acquisition, artillery and air support

coordination, and precision engagement using onboard munitions (Minculete, Păstae, 2023).

From both operational and conceptual perspectives, unmanned aerial systems contribute significantly to cross-domain synergy and the generation of high-impact, combined-action effects through the following means:

- *Dispersed ISR Sensor Networks* – UAVs enable the distribution of intelligence collection capabilities across multiple platforms and domains, offering a more complete, continuous, and disruption-resilient operational picture;
- *Integration into Multi-Domain Targeting Loops* – ISR data collected by UAVs can be rapidly integrated into command-and-fire control chains for platforms such as the F-16 or HIMARS, facilitating coordinated effects across the air, land, maritime, cyber, and electromagnetic domains;
- *Extended Surveillance Persistence* – Compared to manned aircraft, UAVs provide prolonged coverage over extended periods, enhancing the continuity of operational awareness;
- *Tactical-Level Autonomy* – Strike-capable platforms may execute rapid engagement decisions at the tactical level, reducing the need for centralized approvals where rules of engagement and C2 architectures allow;
- *Complementarity in Electronic Warfare* – UAVs can support or amplify electronic jamming, electronic intelligence, or counter-detection operations;
- *Swarm and Distributed Autonomous Operations* – UAVs may operate in coordinated formations, powered by distributed artificial intelligence algorithms, for missions such as air defense saturation, distributed ISR, or synchronized strike packages—thereby increasing operational flexibility and resilience.

The modernization of the Romanian Air Force fleet, the acquisition of HIMARS and Patriot systems, along with the strategic procurement of unmanned aerial systems (UAVs), strengthens Romania's profile as an essential operational node within NATO's multi-domain architecture. Romania actively contributes to NATO's deterrence and defense posture by deploying national forces to two of the eight Enhanced Forward Presence (eFP) battlegroups and by permanently assigning units for joint training with the eFP battlegroup stationed on its national territory. Romanian F-16 aircraft conduct airpolicing missions along NATO's eastern border, operating in coordination with aerial and airdefense systems of other member states, there by reinforcing collective defense against threats emanating from Russia. Additionally, units from all branches of the Romanian Armed Forces regularly participate in large-scale multinational exercises, such as Defender Europe, Steadfast Defender, Dynamic Front, and Sea Shield. The Saber Guardian 25 exercise

provided Romania with the opportunity to lead, alongside U.S. forces, a multi-domain operation involving ground maneuver, river crossings, missile launches, and the validation of interoperability among command structures (MoND, 2025). Furthermore, during Steadfast Dart 2025, Romania hosted the Allied Reaction Force, a multinational formation integrating cyber and space capabilities with conventional forces, underscoring NATO's ability to conduct coordinated and effective actions in complex multi-domain operational environments (SHAPE, 2025).

Overall, the key capabilities acquired by the Romanian Armed Forces over the past decade reflect a clear trend toward alignment with Multi-Domain Operations (MDO) requirements. However, the bsence of a dedicated national MDO doctrine, along with budgetary and organizational constraints, may currently limit the full exploitation of these capabilities. As a result, Romania must continue its process of doctrinal transformation and strengthen joint and allied training in order to fully harness its potential as an active contributor to NATO's multi-domain operations.

MULTIDOMAIN INTEGRATION OPPORTUNITIES AND POTENTIAL OPERATIONAL PARTNERSHIPS FOR THE ROMANIAN ARMED FORCES – A CASE STUDY

The capability portfolio previously outlined demonstrates that Romania is already aligned with NATO's requirements for operating within multi-domain architectures and can credibly integrate into dedicated allied formations, ranging from Enhanced Forward Presence (eFP) battlegroups within the Allied Reaction Force, to theatre-level Multi-Domain Task Forces (MDTFs). The decisive factor is not the isolated acquisition of platforms, but rather their integration into federated C4ISR networks capable of delivering short sensor-to-shooter loops and enabling the rapid convergence of kinetic and/or non-kinetic effects within a tactically relevant timeframe.The case study presented below will examine the main opportunities for integration, identify key NATO-compatible operational partners, outline the expected multi-domain effects, and assess the strategic relevance of Romanian capabilities in hypothetical allied MDTF scenarios.

a. *The PATRIOT System – A Key Element of NATO'sIntegrated Air andMissile Defence System*

- *Integration Opportunities*: Romania's Patriot batteries could be integrated as the air and missile defense unit within a Multi-Domain Task Force (MDTF) assigned to a Combined Joint Task Force (CJTF), connected to NATO's Integrated Air and Missile Defence (IAMD) system and, where available, to Integrated Battle Command System (IBCS) architectures.

- *Key Operational Partners*: The United States and Poland currently operate Patriot systems already integrated into emerging IBCS frameworks. Other NATO allies –Germany, the Netherlands, Italy, Spain, and Greece – also operate Patriot systems for the protection of airbases and long-range fires support units, presenting potential for enhanced interoperability.

- *Multi-Domain Effects*: Patriot batteries contribute to securing freedom of maneuver for allied ground-based missile systems, ISR platforms (manned and unmanned), and air campaigns aimed at suppressing or destroying enemy air defenses (SEAD/DEAD). This air superiority creates a time window to deliver cyber and electromagnetic effects as part of a synchronized, multi-domain offensive.

- *MDTF Integration Scenario:* Romanian Patriot systems could form the core layer of air and missile defense for a deployed MDTF, providing protection for long-range fires assets such as HIMARS launchers and artillery units, as well as for airbases from which platforms like the F-16 and, in the future, the F-35 operate.

b. HIMARS Systems in "Any Sensor – Any Shooter" Targeting Loops

- *Integration Opportunities:* Romanian HIMARS battalions or batteries could be integrated into MDTF/CJTF structures and connected to FMN, IBCS, or Link-16 networks, enabling multi-source targeting and rapid sensor-to-shooter coordination.

- *Key Operational Partners*: The United States, through the MDTF operating under EUCOM; Poland and Estonia, which currently operate HIMARS; and the United Kingdom, France, and Italy, which operate MLRS systems and possess robust ISR, electronic warfare, and cruise missile capabilities suitable for coordinated fires.

- *Multi-Domain Effects*: Interconnecting HIMARS with land-based, aerial, and space-based ISR sensors enables timely engagement of enemy command-and-control nodes, logistics infrastructure, and air defense assets, while simultaneously supporting electronic warfare and cyber effects targeting adversary networks.

- *MDTF Integration Scenario:* Romanian HIMARS systems could be employed for deep interdiction strikes against critical infrastructure and force concentrations, synchronized with aerial strikes and cyber operations, contributing directly to the disintegration of adversary A2/AD systems and enabling freedom of action for joint forces.

c. F-16 (Current) and F-35 (Future) Aircraft as MDO-Capable Air Power Vectors

- *Integration Opportunities:* Integration into combined air packages connected via NATO Link 16, enabling real-time data exchange across a broad range of weapon systems and sensors—including those of integrated air defense, artillery, and long-range strike platforms.

- *Key Operational Partners:* For F-16, partners include Poland, Greece, Turkey, and Portugal. For F-35, Romania is poised to join the global F-35 coalition alongside the United States, Italy, the United Kingdom, the Netherlands, Norway, Denmark, Belgium, Poland, Germany, and Finland, facilitating cooperative target management and interoperability in complex air operations.

- *Multi-Domain Effects*: Both F-16 and F-35 serve as central nodes for coordinating sensors, information channels, and effectors across all domains. They support real-time targeting prioritization, resource allocation, and the generation of combined and optimized effects in multi-domain operational environments.

- *MDTF Integration Scenario:* Romanian F-16s—and in the future, F-35s – could provide information superiority, designate targets for HIMARS and UAV strikes, and conduct precision strikes against adversary command centers, playing a critical role in shaping the multi-domain battlespace.

d. MALE-Class Tactical UAVs: Providing Continuous ISR and Distributed Effects

- *Integration Opportunities:* Romanian UAV detachments (Watchkeeper X, Bayraktar TB2) can be integrated into the Multi-Domain Effects Battalion of an MDTF or embedded in targeting and reconnaissance cells at brigade and division levels.

- *Key Operational Partners:* The United Kingdom (Watchkeeper), Poland and Turkey (Bayraktar TB2 and other tactical UAV families), France, Italy, and Spain (national MALE UAV programs), and the Baltic States, which operate tactical UAS and anti-UAS capabilities.

- *Multi-Domain Effects:* UAVs enable persistent ISR synchronized with HIMARS strikes and air support missions involving F-16s or F-35s. They also contribute to UAS swarming, electronic reconnaissance, and counter-UAV operations in coordination with air and missile defense systems.

- *MDTF Integration Scenario:* Romanian Army UAVs could be integrated into the Multi-Domain Effects Battalion of an MDTF for ISR missions, coordinated target engagement with missile batteries, or direct involvement in *"any*

sensor – any shooter" loops – for example, UAVs identify and track mobile targets, HIMARS executes precision strikes, and Patriot systems secure freedom of action against aerial threats.

With the introduction of these newly acquired systems, the Romanian Armed Forces are shaping a set of capabilities that are increasingly aligned with the standards required for integration into an allied multi-domain architecture. For instance, one can reasonably assess that an allied MDTF deployed in the Black Sea region could benefit from Romanian HIMARS for deep interdiction, Patriot systems for air and missile defense, F-16/F-35 aircraft for synchronized air campaigns, and UAVs for ISR and precision strikes – all supported by national and allied cyber and communications capabilities.A hypothetical scenario illustrating the integration of these key Romanian capabilities into a multi-domain force structure under a Combined Joint Task Force (CJTF) is presented in *Figure 2.*

The analysis indicates that Romania can position itself at the core of NATO's multi-domain mechanisms, not merely through its inventory of platforms, but through clearly defined roles within combined force packages – such as providing air and missile defense coverage for forward-deployed units, operating long-range artillery and missile systems integrated with multi-source sensors, enabling centralized coordination with aerial platforms (particularly in the future with the F-35), and delivering persistent ISR through UAV systems. Strategic convergence with allies such as the United States, Poland, Germany, the Netherlands, Italy, the United Kingdom, France, the Baltic States, and Turkey would enable the formation of flexible, multinational, and multi-domain battle groups under a potential Combined oint Task Force (CJTF) structure, capable of delivering decisive effects on NATO's eastern flank. The key to transitioning from potential to operational performance lies in the institutionalization of interoperability and the regular rehearsal of multi-domain procedures within realistic scenarios alongside these strategic partners.

CONCLUSIONS

Although Romania has made significant progress in its military modernization efforts, the integration of key capabilities into NATO's multi-domain architecture is accompanied by doctrinal, organizational, technological, and logistical challenges.

At present, the Romanian Armed Forces lack a dedicated national doctrinal framework explicitly regulating participation in multi-domain operations (MDO). In the absence of such a doctrine, adaptation relies on borrowing elements from NATO's conceptual documents and on the experience gained through multinational exercises. This situation limits the coherence of national actions and may generate gaps between NATO requirements and Romanian operational practices.
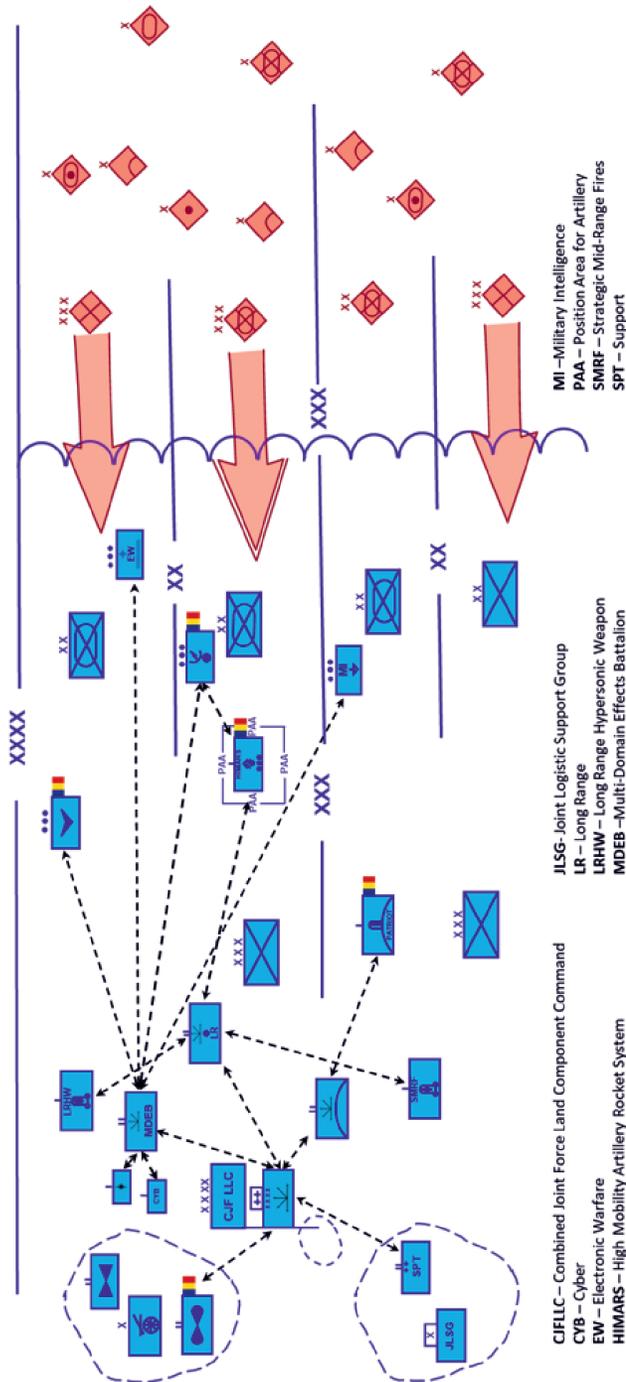
*Figure 2: Hypothetical Scenario for the Integration of Key Romanian Armed Forces Capabilities into a Potential
MDTF Structure within a Combined Joint Task Force* (Author's Concept)

The integration of the analyzed capabilities into NATO's multi-domain networks requires full compatibility in terms of communications, data sharing, and command-and-control processes – all of which demand further technical standardization and additional investments. Budgetary constraints, training shortfalls, and personnel short ages affect the effective employment of new technologies. For example, the integration of UAVs necessitates adjustments in command structures, crew training, and organizational culture. Like wise, the transition to F-35 aircraft involves dedicated infrastructure, tailored logistics, and high operational costs, which may pose short- and medium-term obstacles.

Recent exercises and conflicts demonstrate that the success of Multi-Domain Operations (MDO) depends heavily on the protection of critical command, communications, and logistics infrastructure. In this regard, Romania faces persistent vulnerabilities in ensuring the cyber and electromagnetic resilience of its military networks. Cyber attacks and electronic jamming can degrade the effectiveness of integrated systems, significantly reducing their value in high-intensity operational scenarios.

In conclusion, Romania possesses capabilities that are largely aligned with NATO's requirements for MDO. However, the full exploitation of these assets is contingent upon addressing a series of structural and doctrinal vulnerabilities. Strengthening technical interoperability, developing a national MDO doctrine, enhancing resilience in the cyber and electromagnetic domains, and investing in joint and combined training are indispensable steps for transforming Romania's existing capabilities into decisive contributions within NATO's multi-domain operational architecture.

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