

The Transformation of the Combined Arms Principle in a Multidomain Operational Environment: Implications for the Training of Mechanized Units

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Abstract

The emergence of multidomain operations (MDO) challenges traditional principles of land warfare, particularly the combined arms principle. Although MDO dominates contemporary doctrinal and academic debates, its relationship to foundational land combat principles remains insufficiently conceptualized. This article examines how the combined arms principle is transformed within a multidomain operational environment and assesses implications for training mechanized units. Using a conceptual-analytical approach grounded in doctrinal analysis and military theory, the article argues that combined arms integration retains relevance but shifts toward cross-domain effects integration, producing significant consequences for command, decision-making, and training design in modern land forces and operational force development.

KEY WORDS: Multidomain Operations, Combined Arms, Land Warfare, Command and Decision-Making, Military Training and Education

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1. Introduction

The contemporary security environment is characterized by increasing complexity, rapid technological development, and the gradual erosion of clear boundaries between individual domains of warfare. The traditional understanding of the battlefield, historically confined primarily to the land, air, and maritime domains, has expanded to include the cyber, space, and information domains. This transformation affects not only the conduct of military operations, but also the conceptual foundations of military thinking, doctrinal approaches, and the demands placed on command, control, and force preparation [1].

One of the fundamental principles of land warfare that has long shaped doctrinal thinking and the employment of mechanized units is the combined arms principle. Traditionally, this principle has been understood as the coordinated employment of different branches and combat and support capabilities in order to achieve synergy and compensate for the vulnerabilities of individual elements [2,3]. In this classical formulation, combined arms integration is closely linked to the physical dimension of the battlefield, a relatively well-defined operational space, and a hierarchical command and control structure.

In recent years, however, the concept of multidomain operations (MDO) has gained prominence as a response to the changing character of warfare. Multidomain operations emphasize the integration of effects across multiple domains, including those that are non-physical in nature and often beyond the direct control of tactical-level commanders [4,5]. This shift fundamentally alters the conditions under which the combined arms principle is applied, raising questions about its contemporary relevance and functional role.

The development of multidomain operations has direct implications for command and decision-making at the tactical and operational levels. Commanders are increasingly required to process large volumes of information, operate under conditions of uncertainty, and coordinate effects generated by capabilities that may be controlled at higher echelons or within different command structures [6,7]. While traditional combined arms operations relied on relatively linear synchronization

of forces and capabilities, multidomain environments demand continuous effects integration and the management of interdependencies across domains.

Despite the growing body of doctrinal and academic literature addressing multidomain operations, the relationship between this emerging concept and traditional military principles, particularly the combined arms principle, remains insufficiently explored [8,9]. Existing discussions tend to focus either on technological innovation or on strategic and operational-level implications, while the consequences for the training and preparation of mechanized units are often treated implicitly rather than analysed systematically [4,1,5].

This article assumes that the combined arms principle does not lose its relevance in a multidomain operational environment but rather undergoes a significant functional transformation. This transformation affects not only the practical application of the principle, but also its role within a broader operational framework. Combined arms integration increasingly shifts from a dominant principle of force organization toward a key component of multidomain effects integration [8,9]. This shift has direct implications for the training, education, and preparation of mechanized units, which continue to represent a decisive element of land power [4,10].

In this context, the article explicitly positions itself within the existing scholarly debate by addressing a dimension of the relationship between the concept of multidomain operations and traditional principles of land warfare that has so far received insufficient analytical attention. Although multidomain operations have been the subject of intensive doctrinal and academic debate over the past decade, their relationship to foundational principles of land combat, particularly the combined arms principle, remains largely implicit rather than systematically conceptualized in the existing literature. Prevailing approaches tend to focus primarily on the technological dimension of multidomain warfare or on its strategic and operational implications, without consistently examining how the function of traditional military principles is transformed in the contemporary operational environment and what consequences this transformation entails for the training and preparation of land forces [4,5].

Against this backdrop, the article seeks to delineate its original analytical contribution, which can be summarized in four interrelated points:

- **Functional reinterpretation of the combined arms principle in the MDO environment**
In contrast to approaches that conceptualize multidomain operations as a qualitatively new framework replacing traditional military principles [4], the article argues that the combined arms principle does not lose its relevance but undergoes a functional transformation. Combined arms integration no longer serves as the dominant organizational principle for force synchronization; instead, it becomes a subsystem within a broader architecture of cross-domain effects integration, oriented toward compatibility, interoperability, and the sequencing of effects across domains.
- **Shift from force synchronization to effects integration**
Whereas classical combined arms doctrine assumes the possibility of direct coordination of most relevant capabilities within a unified space and command structure [3,11], the article demonstrates that in a multidomain environment, key effects are often generated outside the direct control of land force commanders. This results in a systematic shift from spatial-temporal force synchronization toward effects-based integration, an aspect that the existing literature has tended to acknowledge implicitly rather than examine analytically [12,13].
- **Linking doctrinal transformation with the training of mechanized units**
A significant contribution of the article lies in its explicit linkage between theoretical-doctrinal analysis and the training of mechanized units, which are frequently treated as separate domains within the literature [10]. The article demonstrates that the transformation of the combined arms principle has direct and hitherto insufficiently explored implications for the structure, content, and objectives of training, particularly with regard to the development of commanders' cognitive skills and their ability to operate under conditions of uncertainty in complex operational environments.
- **Emphasis on the human factor and decision-making processes in MDO**
In contrast to technologically deterministic interpretations of multidomain operations, the article emphasizes the central role of the human factor, situational awareness, and decision-making under cognitive stress. In doing so, it builds upon classical works on command in complex systems [6,7] and situates the transformation of the combined arms principle within a broader theoretical framework of command and control under conditions of high complexity.

In this way, the article contributes to the contemporary debate not only by extending theoretical understanding of the relationship between multidomain operations and traditional military principles, but also by establishing an analytical bridge between doctrinal innovation and the practical requirements of land force preparation.

The aim of this article is to analyse how the meaning and function of the combined arms principle change within a multidomain operational environment and to identify the implications of this transformation for the training and preparation of mechanized units. The study is designed as a conceptual-analytical analysis based on qualitative examination of NATO and national doctrinal documents, relevant military theory, and a critical comparison between traditional combined arms operations and contemporary multidomain approaches. The article seeks to contribute to the ongoing doctrinal debate on the adaptation of traditional military principles to modern operational environments and to provide a theoretically grounded framework for further discussion in the fields of doctrine development and military training.

2. . Literature Review

The review of relevant literature constitutes a necessary starting point for analysing the transformation of the combined arms principle in a multidomain operational environment. The purpose of this chapter is not merely to summarize

existing scholarship, but primarily to systematically delineate the theoretical and doctrinal frameworks within which the combined arms principle and multidomain operations are currently conceptualized. Attention is devoted to identifying dominant interpretive approaches and thematic strands that shape contemporary discourse on land operations and their adaptation to the evolving character of warfare.

The literature review is structured to first address traditional interpretations of the combined arms principle in military theory and doctrine, then to introduce multidomain operations as a new conceptual framework for operational thinking, and finally to highlight key debates related to command, decision-making, and training in complex operational environments. In this way, the chapter establishes an analytical foundation for identifying the research gap addressed by this article.

The intent of this chapter is not to evaluate individual approaches in isolation, but to situate them within the broader trajectory of military thought. The literature review thus serves as a bridge between traditional military principles and contemporary operational concepts, preparing the ground for the subsequent analytical section of the article.

2.1 The Combined Arms Principle in Theory and Doctrinal Thinking

The combined arms principle represents one of the fundamental conceptual pillars of land warfare and has long occupied a central position in both military theory and doctrinal thinking within modern armed forces. Its essence lies in the coordinated employment of different branches and combat and support capabilities to achieve synergistic effects and to minimize the vulnerability of individual components [2,3]. In its traditional formulation, combined arms integration is closely associated with the physical dimension of the battlefield, a spatially defined operational framework, and a hierarchical system of command and control.

Classical military theory emphasizes the integration of firepower, manoeuvre, and sustainment as a basic prerequisite for the successful conduct of land operations. Although Clausewitz (1989) did not explicitly formulate the concept of combined arms [2], his emphasis on the concentration of forces, cooperation, and the management of friction provides a theoretical foundation upon which the combined arms principle was subsequently developed [8]. Modern authors have further systematized this principle and embedded it within the framework of operational art, particularly in relation to mechanized and armoured formations [3].

Doctrinal documents of NATO and national armed forces have long regarded the combined arms principle as a key instrument for achieving decisive superiority at the tactical–operational level. Combined arms integration is conceptualized as a fundamental method of force organization, command, and coordination within land operations [8,9]. This approach, however, implicitly assumes a relatively stable operational environment in which capabilities are primarily integrated within the physical battlespace.

2.2 Multidomain Operations as a New Conceptual Framework

The concept of multidomain operations has gained prominence in both academic literature and doctrinal documents as a response to profound changes in the character of contemporary and future warfare. These changes are closely linked to technological development, the digitalization of the battlefield, and the growing significance of non-physical domains such as cyberspace, space, and the information environment [4,5]. The multidomain approach emphasizes the necessity of simultaneous and integrated action across all domains to generate cumulative operational effects.

Literature addressing MDO focuses primarily on issues of strategic and operational adaptation, the development of new capabilities, and transformations in command-and-control systems. Contemporary conflicts are increasingly characterized by the blending of military and non-military instruments of power [1], which requires new ways of thinking about war and strategy. The NATO Warfighting Capstone Concept (2021) explicitly underscores the need to integrate effects across domains in near real time and to respond to rapidly changing operational conditions [5].

While multidomain operations are often presented as a qualitatively new way of conducting warfare, some authors emphasize continuity with traditional military principles. Emerging operational concepts represent evolution rather than revolution in military thought, with fundamental principles such as cooperation and the concentration of effects remaining valid [3]. This perspective opens analytical space for examining the relationship between MDO and traditional principles, including the combined arms principle.

2.3 Command, Decision-Making, and the Human Factor in Complex Environments

A substantial body of literature addresses the impact of increasing operational complexity on command, decision-making, and the human factor. Multidomain operations impose significantly higher demands on commanders' ability to process information, maintain situational awareness, and make decisions under conditions of uncertainty and time pressure [6,7]. Traditional hierarchical models of command and control are therefore increasingly strained in highly dynamic and interconnected operational environments.

As early as the 1980s, scholars identified the limitations of centralized command in complex and rapidly changing environments characterized by information overload and compressed decision cycles [7]. At the same time, the concept of situational awareness emerged as a critical cognitive capability for effective decision-making in dynamic systems, emphasizing the processes of perception, comprehension, and projection of the operational environment [6]. These theoretical

approaches are now frequently applied in contemporary analyses of command in multidomain contexts, where the speed and quality of decision-making have become decisive determinants of operational effectiveness.

The relationship between technological development and the human factor represents another key theme in the literature. While modern technologies enhance transparency of the battlespace and enable rapid information sharing, they simultaneously increase the risk of cognitive overload and fragmentation of situational understanding [14]. This paradox has direct implications for the application of traditional military principles, including combined arms integration, which remains heavily dependent on commanders' ability to effectively coordinate diverse capabilities within a complex operational setting.

2.4 Training of Mechanized Units in the Context of New Operational Concepts

Literature addressing the training and preparation of mechanized units primarily reflects the need to adapt to the evolving character of the battlefield and emerging operational requirements. Processes of professionalization and lessons derived from contemporary conflicts have contributed to a gradual shift away from predominantly procedural training toward the development of adaptive skills, critical thinking [10], and decision-making under uncertainty [10]. Within NATO doctrinal thinking, training is increasingly conceptualized as a process of developing complex competencies rather than merely technical proficiency [9].

Despite the growing emphasis on preparing units for operations in complex and multidomain environments, explicit linkage between these requirements and the transformation of the combined arms principle remains limited in the literature. Training is frequently discussed as a standalone activity, detached from broader conceptual debates on the evolution of military principles and operational concepts. This separation contributes to a persistent gap between doctrinal innovation and the practical preparation of mechanized units.

2.5 Summary and Identification of the Research Gap

The review of relevant literature indicates that both the combined arms principle and the concept of multidomain operations occupy prominent positions in contemporary academic and doctrinal discourse. However, these bodies of literature are most often addressed separately. While studies focusing on combined arms primarily emphasize traditional approaches to land operations, multidomain operations are typically examined through the lenses of technological development and strategic or operational adaptation.

Systematic reflection on how the combined arms principle is transformed within a multidomain operational environment, and on the implications of this transformation for the training and preparation of mechanized units, remains underdeveloped. This identified gap creates space for a conceptual-analytical approach that links traditional military principles with emerging operational concepts and offers a theoretically grounded framework for their application in the training and education of land forces.

3. Main Part

The main part of the article focuses on the core analysis of the transformation of the combined arms principle within the context of a multidomain operational environment. In line with the conceptual-analytical nature of the study, the "results" are not understood as empirical data obtained through interviews or experiments, but rather as systematically derived analytical conclusions resulting from critical engagement with doctrinal documents, scholarly literature, and their mutual comparison [1,3]. This understanding of results corresponds to common practice in military studies and doctrinal analysis, where the primary objective is the interpretation and explanation of structural changes in operational thinking.

The chapter is structured to first define the selected methodological approach and subsequently develop the analytical argumentation. The analysis builds on the traditional understanding of the combined arms principle and examines how this principle is disrupted, reinterpreted, and functionally transformed under the conditions of multidomain operations. Attention is devoted to structural changes in capability integration, command, and decision-making processes, rather than to the description of specific tactical procedures, which corresponds to the level of abstraction typical of conceptual-analytical studies [5].

The aim of the main part is to formulate theoretically grounded conclusions regarding the contemporary role of the combined arms principle and to identify their implications for the training and preparation of mechanized units. This chapter thus represents the analytical core of the article, upon which the subsequent interpretative discussion and concluding synthesis are built.

3.1 Methodological Approach

This article is conceived as a conceptual-analytical study, the objective of which is not empirical generalization based on quantitative data, but rather the systematic interpretation and theoretical examination of the transformation of a traditional military principle within a new operational context. The chosen methodological approach corresponds to standard practice in military studies, strategic analysis, and doctrinal research, where normative and conceptual documents are regarded as legitimate and relevant sources of data [7,3].

The primary sources of data consist of NATO and national doctrinal documents, which represent the normative framework of contemporary military thinking and practice. These documents are analysed as institutional expressions of officially accepted operational concepts, principles, and modes of application [8,9]. Supplementary sources include relevant scholarly publications in the fields of military theory, operational art, and security studies, which allow doctrinal approaches to be situated within a broader theoretical and historical context [2,1].

Methodologically, the study employs qualitative content analysis and critical comparison, focusing on the contrast between traditional conceptions of combined arms operations and the multidomain operations concept. The analysis concentrates in particular on three key areas:

- the integration of combat and support capabilities,
- the understanding of command and control,
- the role of the combined arms principle within the broader operational framework [4,5].

An integral component of the methodological approach is structured professional reflection on training practice, which serves to illustrate and interpret the theoretical conclusions. This reflection is not presented as empirical research, but as an analytical tool enabling the linkage of doctrinal and theoretical findings with practical requirements imposed on the training of mechanized units. The study deliberately avoids the use of sensitive or classified information and is based exclusively on open and publishable sources.

3.2 The Combined Arms Principle in the Traditional Operational Framework

Within the traditional operational framework, the combined arms principle is understood as a fundamental method for organizing and employing land forces, aimed at achieving synergistic effects through the coordinated employment of different branches and capabilities. Combined arms integration is closely associated with the physical dimension of the battlefield and with the need to synchronize fires, manoeuvre, and sustainment within a specific time–space framework [2,3]. A key assumption underlying this approach is the existence of a relatively clearly defined operational environment and a hierarchically structured system of command and control.

Doctrinal documents have long defined the combined arms principle as the dominant means of achieving superiority at the tactical–operational level, particularly in the employment of mechanized and armoured units. Within this framework, the commander is perceived as the central integrative actor who ensures coordination among individual components through planning and command [9]. This model assumes that most relevant capabilities are directly or indirectly subordinate to a unified command structure and that their effects can be planned and synchronized with a relatively high degree of predictability.

From an analytical perspective, however, it is evident that the traditional conception of combined arms implicitly rests on assumptions of limited operational complexity. Capability integration is primarily oriented toward physical effects and conducted within a single dominant operational space. While this approach remains effective in certain types of conflict, its applicability is increasingly challenged in environments characterized by growing multidomain complexity, particularly in the areas of command, coordination, and decision-making [5,7].

3.3 Multidomain Operations and the Disruption of the Traditional Logic of the Combined Arms Approach

The multidomain operational environment represents a qualitative shift from the traditional understanding of the battlefield, which was historically conceived primarily as the physical space of land, air, and maritime operations. The expansion of the operational framework to include the cyber, space, and information domains fundamentally alters the character of military action and disrupts the linear logic of force coordination upon which the combined arms principle has long been based [1,5]. Effects generated in individual domains are often indirect, temporally dispersed, and spatially dislocated, and their control and synchronization are not always fully within the authority of land force commanders.

In a multidomain operational environment, capability integration can no longer be understood exclusively as the synchronization of physical forces in space and time. Instead, an effects-based integration approach increasingly prevails, encompassing both kinetic and non-kinetic means of action across multiple domains [4,5]. This approach places significantly greater demands on commanders' ability to understand interdependencies among domains, identify their mutual relationships, and manage their effects under conditions of high uncertainty, information overload, and time pressure [6,7].

From an analytical perspective, this context reveals a fundamental tension between the traditional combined arms approach and the multidomain operational concept. Whereas the combined arms principle assumes a relatively stable force structure, clearly defined command relationships, and the direct coordination of subordinate elements, multidomain operations are characterized by high levels of decentralization, dynamism, and dependence on capabilities that are often controlled beyond the immediate authority of the land commander [5,3]. This reality calls into question the feasibility of applying the combined arms principle in its traditional form without significant conceptual adaptation.

3.4 Transformation of the Combined Arms Principle in a Multidomain Operational Environment

Analysis of doctrinal documents and scholarly literature indicates that the combined arms principle does not disappear in a multidomain operational environment but rather undergoes a functional transformation. Instead of serving as the dominant principle for force organization, combined arms integration increasingly becomes one of the key components

of a broader multidomain operational architecture. Its significance lies less in the direct coordination of all available capabilities and more in ensuring compatibility, interoperability, and the alignment of effects across multiple domains [5,3].

This transformation is most clearly manifested in the shift from force synchronization to effects integration. While the combined arms principle continues to ensure coordination among land forces and their internal cooperation, its effectiveness increasingly depends on the ability to link land force actions with effects generated in other domains, particularly in intelligence, cyberspace, and the information environment [4]. The commander of a mechanized unit thus increasingly assumes the role of a manager of dependencies and a coordinator of effects rather than the sole integrator of all relevant capabilities under direct command.

From the perspective of training and preparation of mechanized units, this transformation has profound implications. Emphasis gradually shifts from procedural mastery of combined arms techniques toward the development of cognitive skills, situational awareness, and decision-making capabilities in complex, dynamic, and uncertain environments [6,14]. The combined arms principle therefore retains its relevance as a foundational element of land warfare, but its effective application is contingent upon the adaptation of training and educational approaches to the realities of the multidomain operational environment.

4. Discussion

The analysis of the transformation of the combined arms principle within a multidomain operational environment confirms that contemporary changes in the character of warfare do not represent a discontinuity with traditional military principles, but rather their gradual adaptation to new operational conditions. This conclusion is consistent with strands of the scholarly literature that emphasize the evolutionary nature of military innovation and caution against interpreting new operational concepts as a radical rupture with the historical continuity of military thought [1,3]. In this sense, multidomain operations should not be understood as a replacement for the combined arms principle, but rather as a framework within which this principle is reinterpreted and functionally reshaped.

The conclusion that the combined arms principle does not disappear in a multidomain operational environment, but instead changes its role, can also be defended from a doctrinal perspective. NATO doctrinal documents continue to emphasize the importance of capability integration and cooperation among forces, while simultaneously stressing the necessity of operating across all relevant domains [8,5]. This apparent paradox can be interpreted as evidence that traditional principles remain valid, but that their application is conditioned by a new context that prioritizes the integration of effects rather than the physical synchronization of forces.

The interpretation of the transformation of the combined arms principle is further consistent with openly published Lessons Learned from contemporary high-intensity conflicts, particularly the war in Ukraine since 2022 [15,13]. Open-source analyses produced by institutions such as NATO Allied Command Transformation, the Royal United Services Institute (RUSI), and U.S. military journals repeatedly highlight the massive sensor saturation of the battlefield, primarily through the extensive use of unmanned systems, and the resulting significant compression of decision-making cycles [13,12]. Under such conditions, the ability of centralized command structures to effectively control effects across multiple domains in real time has proven problematic.

Analyses emphasize the structural separation between actors who possess situational awareness (“who sees”), those who generate effects (“who can act”), and those who make decisions (“who decides”). This phenomenon supports the conclusion that combined arms integration in contemporary conflicts no longer rests on the direct control of all components by a single commander, but rather on the ability to connect and harmonize effects generated by different actors across multiple domains. Lessons Learned from Ukraine thus provide not only an empirical context, but also structural support for the argument that the combined arms principle undergoes a functional transformation in a multidomain operational environment [13,15,12].

Similar structural tendencies can also be identified in analytically examined operations of the Israel Defence Forces (IDF) in the Gaza Strip. Open studies summarizing Lessons Learned from IDF operations since October 2023 reflect a range of tactical and operational experiences and provide an analytical context for broader military debates on the adaptation of operational principles [16,17]. Scholarly literature and analytical studies have long pointed to the exceptionally high level of integration of intelligence, fires, and manoeuvre capabilities that characterizes the Israeli approach to land operations [11,18]. This integration is based on extensive use of sensors, networked command systems, and precision-guided munitions, enabling the rapid generation of effects across multiple domains.

At the same time, open analyses indicate that decision-making authority and the control of individual effects are not centralized at the level of the ground commander but rather distributed across multiple echelons of command and specialized structures, particularly in the areas of intelligence, fires, and information operations [19,20]. In practice, the ground commander therefore does not directly control all relevant effects but operates within a network of interdependencies among intelligence systems, fires capabilities, and information instruments, the coordination of which extends beyond the scope of traditional combined arms command.

This model of conducting operations does not negate the importance of the combined arms principle; on the contrary, it confirms its functional transformation toward a principle focused on linking capabilities and effects rather than on their centralized control. The Israeli experience thus provides illustrative support for the conclusion that, in a multidomain operational environment, combined arms integration functions primarily as an integrative framework enabling the alignment

of effects generated across different domains, rather than as a mechanical model of command and control over individual components [19,18].

The discussed shift from force synchronization to effects integration represents one of the key analytical conclusions of this study. Whereas the traditional combined arms approach assumed that a commander could directly coordinate most relevant capabilities within a single operational space, the multidomain operational environment fundamentally challenges this assumption. A significant portion of effects in contemporary operations is generated outside the direct control of ground commanders, often at higher echelons of command or within domains governed by different operational logics, which limits the feasibility of their direct synchronization [21,22].

Another important area of discussion concerns the impact of this transformation on command and decision-making processes. Studies focusing on modern command highlight that multidomain operations significantly increase the cognitive demands placed on commanders, particularly with regard to situational awareness, managing uncertainty, and decision-making under time pressure [21,6,14]. These insights further support the argument that the effective application of the combined arms principle in a multidomain environment depends less on centralized control of all available means and more on the ability to manage complex relationships and interdependencies, an approach consistent with theoretical perspectives that emphasize the limitations of centralized command in complex environments and the necessity of adaptive decision-making [6,7]. The discussion thus reinforces the argument that effective combined arms integration in a multidomain context is conditioned not only by technical interoperability, but above all by the human factor.

From the perspective of training and preparation of mechanized units, the discussed conclusions represent a significant shift away from traditional approaches. Literature on military education and training increasingly emphasizes the need to develop adaptability, critical thinking, and decision-making skills in dynamic environments, rather than focusing solely on procedural drills [10]. Interpreting the combined arms principle as a component of broader multidomain integration further reinforces this trend and provides a theoretical justification for changes in training concepts for mechanized units.

From the perspective of training and preparation of mechanized units, the functional transformation of the combined arms principle in a multidomain operational environment entails direct and far-reaching consequences. As combined arms integration ceases to function primarily as a mechanical model of spatial, temporal synchronization of forces and capabilities and increasingly operates as a component of a broader architecture of cross-domain effects integration, training approaches must be adapted accordingly. Training can no longer be reduced to the acquisition of procedures and techniques for coordinating individual elements; instead, it must systematically develop the ability of commanders and staffs to operate effectively within a complex, dynamic, and partially uncontrollable operational environment.

Based on the conducted conceptual-analytical analysis, five key implications for the design of training for mechanized units in the context of multidomain operations can be identified:

- Scenario-based training in complex operational environments
Training should be systematically built around scenarios that integrate effects across multiple domains, including the information and cyber domains. The objective is not the rehearsal of specific procedures, but the development of the ability to orient oneself within a dynamic and incomplete operational picture (NATO, 2021) [10].
- Decision games and the development of commanders' decision-making capabilities
Given the increasing decentralization of effects and the compression of decision-making cycles, it is essential to systematically develop the ability to make decisions under time pressure and informational uncertainty. Decision games represent an effective tool for enhancing situational awareness, anticipation, and the consideration of alternative courses of action [14,6].
- Training in effects-based planning rather than purely procedural coordination
Commanders of mechanized units must be guided toward effects-based planning rather than planning solely around assigned means. This includes the ability to identify desired effects, understand their interdependencies across domains, and recognize the limits of one's authority within a broader operational system [13,3].
- Managing cognitive load and information overload
Multidomain operations significantly increase both the volume and the velocity of information flows, placing exceptional demands on commanders' cognitive capacities. Training should deliberately simulate conditions of information overload and develop the ability to filter relevant information and maintain a coherent operational picture [6,7].
- Linking the training of mechanized units with higher command echelons
As key effects are often generated outside the direct control of the land force commander, training must reflect the reality of distributed command and dependence on higher and parallel command structures. This reinforces the understanding of combined arms integration as a coordinating framework rather than a closed system of direct command and control.

These implications confirm that training of mechanized units in a multidomain operational environment cannot be reduced to the technical mastery of tactical procedures. Instead, it becomes a critical instrument for developing adaptive, cognitive, and decision-making capabilities that condition the effective application of the functionally transformed combined arms principle.

At the same time, it is necessary to reflect on the methodological limitations of this study. The conceptual-analytical nature of the research does not allow for empirical verification or quantification of the proposed conclusions, which is nevertheless consistent with standard practice in doctrinal and theoretical studies aimed primarily at interpretation, explanation, and conceptualization of structural change rather than statistical generalization [23,3]. The conclusions are

derived from the interpretation of doctrinal documents and scholarly literature, which limits their direct generalizability, but simultaneously corresponds to the nature of the examined problem, situated at the intersection of doctrinal thinking, military theory, and training practice.

The adopted approach provides a legitimate analytical basis for identifying key trends and mechanisms shaping contemporary operational thinking and creates a foundation for subsequent empirically oriented research, for example through case studies, simulations, or analyses of training processes [1]. In this sense, the limitations of the study should be understood not as weaknesses, but as a natural consequence of its focus and methodological choices.

The discussion further suggests that the persistent emphasis on the technological dimension of multidomain operations may lead to an underestimation of the role of traditional military principles and the human factor. Several authors warn that technological determinism in the analysis of warfare can obscure the significance of organizational, cognitive, and doctrinal factors that decisively influence operational effectiveness [1,7]. This article contributes to a more balanced interpretation by emphasizing the need to preserve continuity in military thinking while simultaneously reflecting its adaptation to new operational conditions.

In this context, the transformation of the combined arms principle can be understood as an example of a broader process through which traditional military concepts adapt to the realities of the contemporary operational environment without losing their analytical and practical relevance. Such an interpretation is consistent with evolutionary approaches to military innovation that emphasize the gradual adaptation of existing principles rather than their wholesale replacement by entirely new concepts [1,3].

5. Conclusion

The aim of this article was to analyse how the meaning and substance of the combined arms principle are changing within a multidomain operational environment and to identify the implications of this transformation for the training and preparation of mechanized units. Based on a conceptual-analytical approach, qualitative analysis of doctrinal documents, and relevant scholarly literature, the study has demonstrated that contemporary changes in the character of warfare do not represent the demise of traditional military principles, but rather their functional adaptation to new operational conditions [1,5,3].

The research question of whether the combined arms principle loses its relevance in a multidomain operational environment or instead undergoes transformation can be answered by concluding that the combined arms principle does not disappear but experiences a significant change in its functional role. Rather than serving as a dominant principle for force organization and synchronization, combined arms integration increasingly becomes an integral component of a broader multidomain architecture aimed at linking and coordinating effects across multiple domains. This shift reflects the growing complexity of the operational environment and the limited ability to exercise direct control over all relevant capabilities at the tactical and operational levels [4].

The analysis further indicates that the transformation of the combined arms principle has direct and yet insufficiently reflected implications for the training and preparation of mechanized units. Whereas traditional approaches primarily emphasized procedural mastery of combined arms tactics and the technical coordination of forces, a multidomain operational environment requires the strengthening of commanders' cognitive capabilities, the development of situational awareness, and the ability to make decisions under conditions of uncertainty and information overload [6,14]. Training for mechanized units must therefore be understood not only as the rehearsal of tactical procedures, but as a systematic process of developing complex competencies essential for effective performance in a multidomain environment.

The principal contribution of this article lies in its theoretical grounding of the transformation of the combined arms principle within the context of multidomain operations and its interpretation as a functionally transformed, rather than obsolete, concept. The study contributes to the scholarly debate by linking traditional military principles with emerging operational approaches and by identifying their practical implications for the training and education of land forces. In doing so, it establishes an analytical framework that can serve as a point of departure for further doctrinal discussion as well as empirically oriented research focused on the effectiveness of training systems in multidomain operational conditions [1,3].

At the same time, it must be emphasized that the conceptual-analytical nature of this study constitutes a methodological limitation, as it does not allow for empirical verification of the proposed conclusions. However, this limitation simultaneously opens space for future research that could build on the presented theoretical framework through case studies, simulation-based exercises, or analyses of training processes. In this sense, the article represents not only a synthesis of the current state of knowledge, but also a call for further systematic examination of the adaptation of traditional military principles to the evolving character of the operational environment.

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