



BUNDESWEHR OFFICE FOR DEFENCE PLANNING

MULTI-DOMAIN OPERATIONS FOR THE BUNDESWEHR

A Short Introduction



BUNDESWEHR

Introductory Remarks by the Director of the Bundeswehr Office for Defence Planning

Future analysis does not allow us to make predictions. However, it does enable us to identify trends and derive conclusions that should be considered in the development of preventive security. The foreseeable future operating environment (FOE) will be highly dynamic and multifaceted. The only way to meet these challenges is with a comprehensive, holistic approach, including multi-domain operations (MDO).

The ability to conduct MDO requires a comprehensive and profound further development of the armed forces. A top-down approach providing the necessary transparency will be needed to guide appropriate measures in a targeted way. This will be supplemented with a bottom-up approach creating the conditions to accommodate the numerous proposed solutions in specific application areas and to enable a stepwise approach.

This brochure provides an insight into how the Bundeswehr approaches the subject of MDO. It examines the definition of MDO according to NATO and considers possible steps and implications from different perspectives. This gives the reader the opportunity to swiftly gain an overview of the subject matter. The brochure contributes to an overall understanding and enables readers to place the various activities into the context of MDO.

A handwritten signature in blue ink, consisting of the initials 'W.' followed by a stylized 'Gäbelein'.

Wolfgang Gäbelein

Director of the Bundeswehr Office for Defence Planning

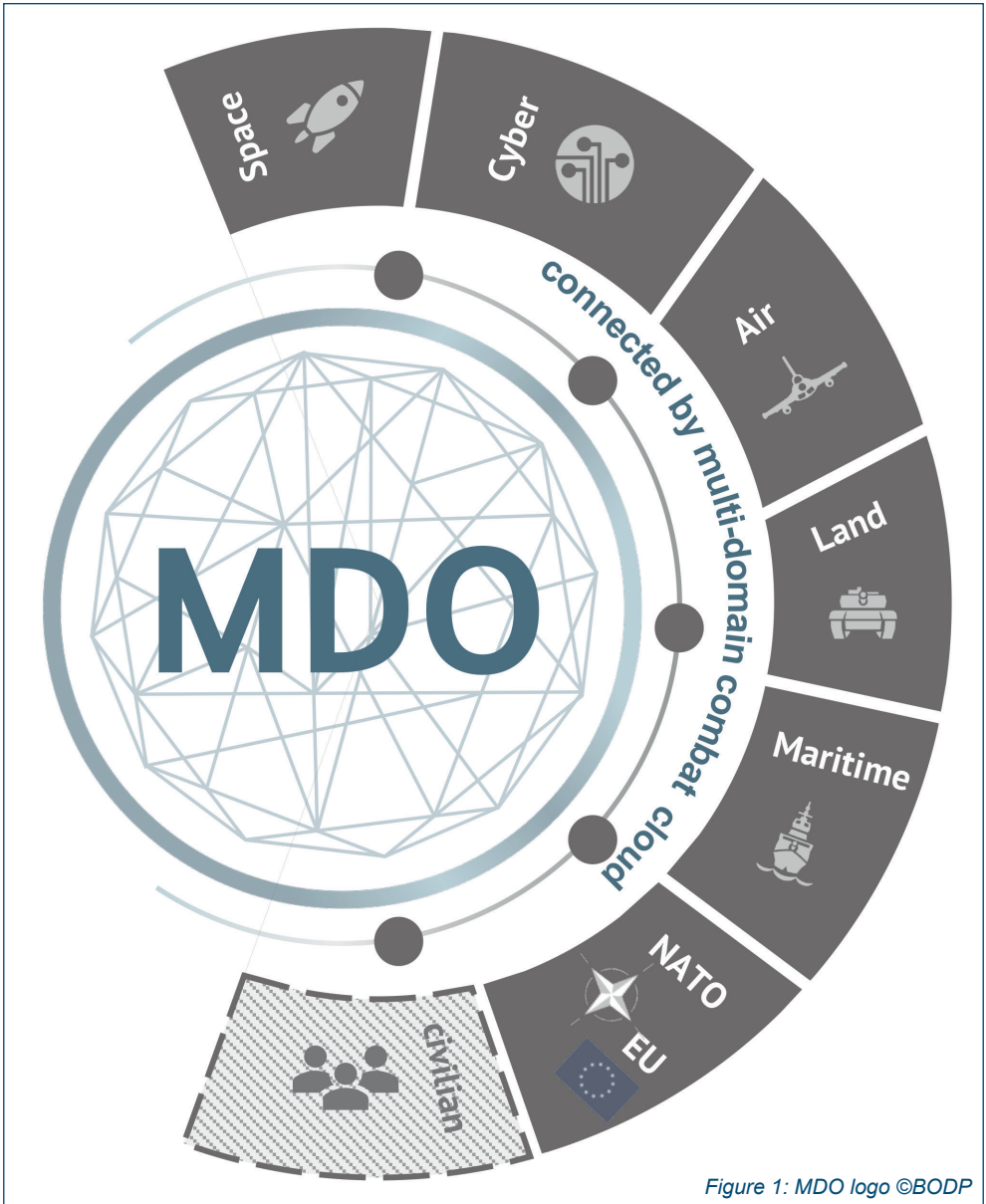


Figure 1: MDO logo ©BODP

CONTENTS

Executive Summary.....	6
Introduction.....	7
Origin.....	8
Terms and Abbreviations	8
NATO-Definition	9
Domains.....	10
Characteristics of Multi-Domain Operations	11
Effects-Based.....	11
Always Joint and Combined.....	12
Networked and Data-Centric.....	13
Dynamic.....	14
Role of the Service Branches and Military Organisational Elements	14
Whole-of-Government Approach	15
Controlling Complexity Requires Architectures	15
Developing an Approach for the Bundeswehr	16
The Way Ahead	16
Key Messages.....	17
Selected Reference Publications.....	18

EXECUTIVE SUMMARY

Multi-domain operations (MDO) have been a topic of discussion since at least 2017, and the trend is increasing. NATO agencies and partner nations have developed ideas and are carrying out their own activities concerning capability development.

The NATO member nations have agreed on the following definition of an MDO:

“Orchestration of military activities, across all domains and environments, synchronized with non-military activities, to enable the Alliance to create converging effects at the speed of relevance.”

This forms the basis for the conceptual approach to MDO in the Bundeswehr. The conceptual work is led by the Bundeswehr Office for Defence Planning (BODP), working in close cooperation with the service branches and organisational elements.

Many descriptions of MDO highlight the technical elements and often include terms such as cloud, edge, artificial intelligence, and mass data handling. It is important to note, however, that MDO are not primarily a technical subject area.

Besides a high-quality material basis with appropriate functions and services, the ability to conduct MDO especially includes operational doctrine and principles, procedures, structures and training.

Enabling the Bundeswehr to conduct MDO will be a task for several generations. In view of the very demanding future face of war, this ability will determine the Bundeswehr’s significance in the Alliance and its capability to contribute to Allied defence.

INTRODUCTION

The term multi-domain operations (MDO) has been increasingly discussed in the military and other interested communities since 2017. The partner nations are closely examining the necessary preconditions for MDO and, in this respect, are cultivating ideas for the development of their armed forces. The term has become highly relevant for the Bundeswehr, especially since the publication of the “Operational Guidelines for the Armed Forces”, which includes a chapter about MDO.

During specialist conferences and discussions, it is often evident that there is substantial knowledge about MDO, alongside very different ideas and opinions. This brochure serves to explain the subject of MDO to interested readers in all due brevity, and to provide context without going into excessive detail at the technical level. This will provide the basis for a common understanding, focused technical discussions and better decisions.

If you have a better understanding of MDO after reading this booklet, we will have achieved our goal.

ORIGIN

There have been several earlier publications on MDO in connection with the terms “network-centric operations” and “effects-based approach for operations”. These publications, in turn, were based on the AirLand Battle concept of the US armed forces from the 1980s that was impressively applied during operation Desert Storm in 1991. It also led countries such as Russia and China to develop defence concepts against its military dominance.

One result of these considerations were integrated air and maritime defence systems that connect modern sensors with powerful weapon systems via a fast network to deny superior Western forces their freedom of operation.

In response, the first basic features of MDO were developed, and these became more widely known with the publication of a US Army concept in 2018¹. Today, MDO have become a paradigm of Western warfare. The objective is military dominance over opponents who are at the same level as the Western armed forces regarding military and technological aspects, also known as peer adversaries. The collaboration between individual service branches practiced so far in conventional joint operations is no longer sufficient to achieve this objective.

TERMS AND ABBREVIATIONS

The overall subject of MDO is accompanied by numerous terms and abbreviations that sound similar and are related, such as Joint All-Domain Operations (JADOs), Multi-Domain Integration (MDI), Combined Joint All-Domain Operations (CJADOs), Multi-Domain Command & Control (MDC2), Multimilieux et Multichamps (M2MC), and Multinational Multi-Domain Command & Control (M2MC).

These terms differ slightly in terms of content, although their core meaning, which is also precisely covered in the NATO definition, is largely identical.

¹ The US Army in Multi-Domain Operations 2028 – also see the reference publications at the end of this brochure.

NATO-DEFINITION

In its *“Initial Concept for Multi-Domain Operations”* of 2022, NATO provides the following definition:

“Orchestration of military activities, across all domains and environments, synchronized with non-military activities, to enable the Alliance to create converging effects at the speed of relevance.”

MDO must always be seen in the context of all government activities. The NATO definition primarily refers to military actions, however, because non-military activities are not subject to a military chain of command, even if they create effects that are desirable from a military perspective. MDO are not intended to orchestrate all national instruments of power², but only the military components. This restriction is also intended to limit complexity. Nevertheless, one must always keep in mind the interfaces with other security-relevant ministries.

² National instruments of power (IoP) are often divided into four categories according to the DIME concept (diplomacy, information, military, economy).

DOMAINS

NATO distinguishes between a total of five operational domains:³ land, air, maritime, space, and cyber.

Currently, neither Germany nor NATO have formulated a coordinated definition of the term *domain* in the sense of an operational dimension. The US Army *Field Manual 3.0* gives the following definition of *domain*:

“A physically defined portion of an operational environment requiring a unique set of war fighting capabilities and skills.”

Alternatively, the following appropriate definition can also be considered:

*“Critical Macro Maneuver Space whose access or control is vital to the freedom of action and superiority required by the mission.”*⁴

Whereas the four domains of land, air, maritime and space are suitable differentiated from each other in their context, there is no uniform understanding among other nations as to which sub-areas belong to “Cyber as a Military Domain of Operations”. The Bundeswehr uses deliberately a broad definition for the cyber and information domain (CID). It consists of the information environment, cyberspace, and the electromagnetic environment. CID extends into the domains of land, air, maritime, and space and is inextricably linked into it. It is the only domain that also covers the effect dimensions¹ *cognitive* and *virtual*, according to the NATO definition, in the sense that it enables direct effects within them. Since the technical and human handling of information (for instance obtaining, transmitting, storing, processing and using information) mainly takes place in the cyber and information domain, the focus on information or information centricity is the shared characteristic of all components in this domain.

³ The English term *domain* corresponds to the German *Dimensionen*, which are divided into land, air, maritime, cyber and information, and space. The German term *Domänen*, on the other hand, covers the following four areas: command and control, reconnaissance, effects and support. German speakers reading or writing texts in English should pay attention to this distinction.

⁴ Donnelly, Jared and Farley, Jon: “Defining the domain in Multi-Domain”, <https://overthehorizonMDO.wpcomstaging.com/2018/09/17/defining-the-domain-in-multi-domain/>; last accessed on: 30 June 2023

CHARACTERISTICS OF MULTI-DOMAIN OPERATIONS

The characteristics of MDO cannot always be clearly distinguished from each other, since they are often interdependent. The following explanations provide a rough outline of the most important characteristics.

EFFECTS-BASED

The essence of MDO is the broadly coordinated and mutually supportive interaction of effects from more than one domain. As a whole, their purpose is to overwhelm the processes of an opponent, to generate priority conflicts,⁵ and to thereby achieve advantages for own forces.

This overload is achieved through the speed of own actions, the number of effects, and their direction from and into all domains. These actions do not always have to be lethal kinetic effects. In the cyber and information space, for instance, non-lethal and non-kinetic effects may also produce the desired result. The principle that information superiority leads to decision superiority and, therefore, to effects superiority also applies to MDO.

The positive synergy of effects is based on the interaction of coordinated and compatible procedures across different domains, in combination with appropriate technology and qualified personnel. We therefore see that MDO are not only based on a technical system, but require a comprehensive approach to warfare, with considerable implications for operations, organisation, personnel, infrastructure and training.

The effects are generated by the various service branches and military organisational elements. The MDO approach is not limited to active combat activities but covers the entire range of conflicts from (peaceful) competition to conflicts and armed conflict.

⁵ This means the objective is to only give the opponent a choice between poor response options and to overstrain his resources in terms of time, personnel and material as much as possible.

ALWAYS JOINT AND COMBINED

Joint operations are operations in which two or more service branches work together. In conventional operations, domain-related component commands command their forces, i.e. the Land Component Command commands all forces in the land domain, the Maritime Component Command commands all forces in the maritime domain, etc. The coordination between the domains lies with the higher-level Joint Force Command.

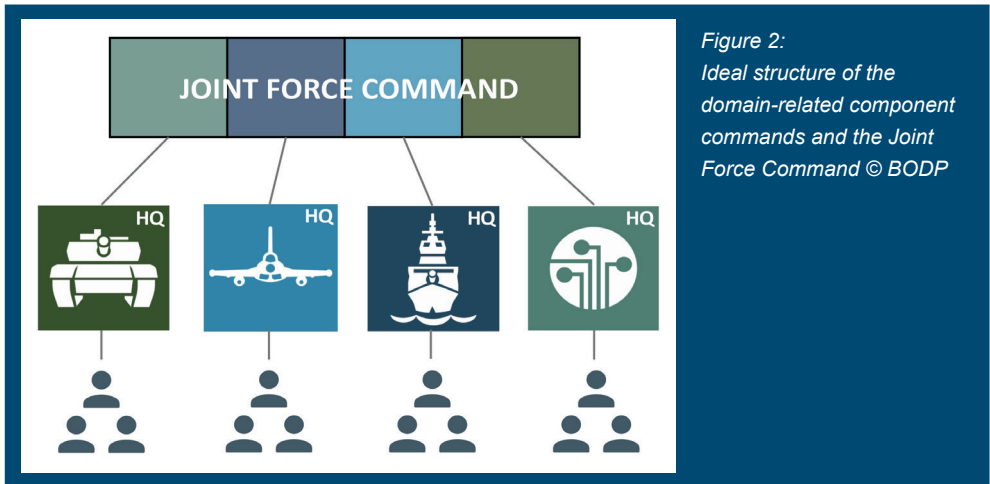


Figure 2:
Ideal structure of the
domain-related component
commands and the Joint
Force Command © BODP

Collaboration between service branches is also a key element of MDO. These operations are always joint operations. The main difference in quality between joint and multi-domain operations is the depth and quality of integration. While the cooperation between service branches in joint operations usually only applies to one domain and for a certain period of time, the integration for MDO is permanent and designed to include all operational dimensions. That is why the *Alliance Concept for Multi-Domain Operations* talks about an evolution of joint operations. In MDO, the boundaries between the operational and the tactical level are even more blurred than in joint operations.

With the exception of the United States, none of the allies alone has all the capabilities required to conduct MDO to the necessary extent. It is therefore useful to always consider and design MDO as combined operations, i.e. multinationally.

NETWORKED AND DATA-CENTRIC

The precondition and determining feature of MDO is comprehensive and uninterrupted networking. The aim is to shorten the time between the target being detected by sensors, the decision on required effects, and the triggering of the effector. This sensor-decider-shooter chain should take place as quickly as possible. It does not matter which sensor detects the target and which service branch provides the effector. The most important aspect is the speed of engagement. Networking is not an end in itself: the data generated by sensors, its distribution, analysis and use for own forces' effects are the key to success. MDO therefore require a data-centric approach.

Figure 3 is an example of the ideal networking of tactical elements at the lowest possible level, with coordination and synchronisation by higher-level MDO entities (shown in grey). These entities do not necessarily represent a level of command. It is obvious that this network should not have one central hub, the elimination of which would cause the entire network to collapse.

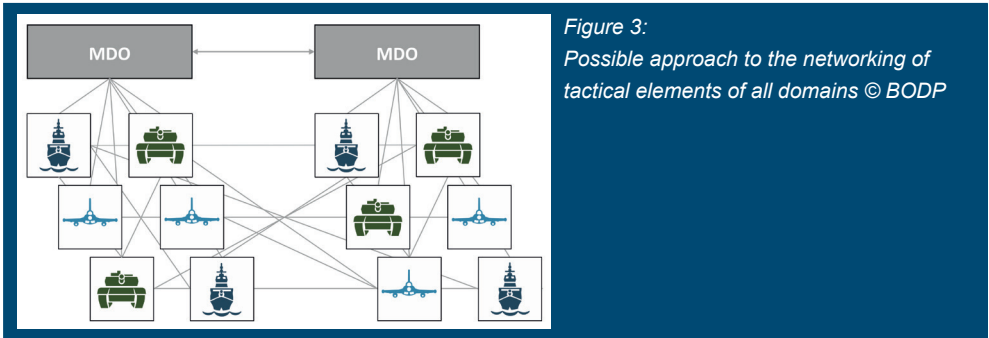


Figure 3:
Possible approach to the networking of tactical elements of all domains © BODP

The operating environment must be as transparent as possible for own forces so that the sensor-effect chains can be initiated as quickly as possible. This requires a large number of different sensors from all domains. Modern technologies such as artificial intelligence (AI) enable fast and purposeful analysis and correlation of the diverse and heterogenous data. In addition, the network between the various sensors, effectors and decision hubs must be as resilient and flexible as possible so that it can remain operational regardless of adversaries' attempts to cause disturbance. It is obvious that time-consuming intermediate levels need to be reduced or completely eliminated in order to maintain the speed advantage.

DYNAMIC

In order to overwhelm the adversary with many different effects coming from all domains and going into all domains, it will in future be necessary to make many events happen almost simultaneously. Likewise, the adversary will try to create similar dilemmas for our forces. This is already the case regarding joint operations, but there will be a large increase under the conditions of MDO due to the many new technical possibilities. MDO are highly dynamic and cut across different domains. A characteristic feature will be rapid changes between the responsible command and control facilities across different domains. Command and control facilities should be prepared to take on supporting roles and also to be supported by others. The network, own procedures as well as command and control processes must be able to withstand these vast dynamics.

There is a huge need for communication with MDO, and determining who is to lead this exchange is an important decision. The highly dynamic nature combined with the enormous complexity can lead to misunderstandings among own forces. The 'fog of war' will not completely disappear, however, even with a wholly transparent operating environment. The own system, from technology to processes and personnel, must be sufficiently resilient to withstand this.

ROLE OF THE SERVICE BRANCHES AND MILITARY ORGANISATIONAL ELEMENTS

The permanent integration of elements of the service branches at the lowest possible level could lead to the conclusion that they are, essentially, no longer relevant. This is not the case, however. Even in MDO, the service branches retain their role as experts for combat in their respective domain. The domains are so different in many respects (e.g. at the legal or geographic level) that a strong expertise still remains necessary. What needs to be further developed, however, in addition to interoperable procedures and appropriate equipment, is the qualification of command personnel. Knowledge and understanding of cross-service aspects must become much broader and, where necessary, also deeper than it is today.

WHOLE-OF-GOVERNMENT APPROACH

The *Alliance Concept for Multi-Domain Operations* explains that non-state instruments of power are not subject to the military chain of command, but that non-military measures should be synchronised with military measures. It follows that military and non-military measures should be integrated into one whole-of-government approach as far as possible. MDO are more effective if they are accompanied and supported by non-military actions. Military and civilian situation systems therefore need interfaces through which information can be exchanged without delay. The military and the civilian security organisations must also be familiar with each other's operational doctrine and principles and train in joint scenarios and exercises. Exercise series that are already being carried out today, such as LÜKEX, take this into account, but they must undergo extensive further development to meet the requirements of MDO.

CONTROLLING COMPLEXITY REQUIRES ARCHITECTURES

Multi-domain operations are diverse, extensive and demanding. It will not be possible to control the resulting complexity without providing appropriate recordings and descriptions in the form of models. An appropriate architecture, i.e. the description of correlations using models, makes it possible to establish useful connections between the different areas and their capability development. Therefore, the development of an MDO reference architecture is an important precondition for the targeted analysis and development of MDO.

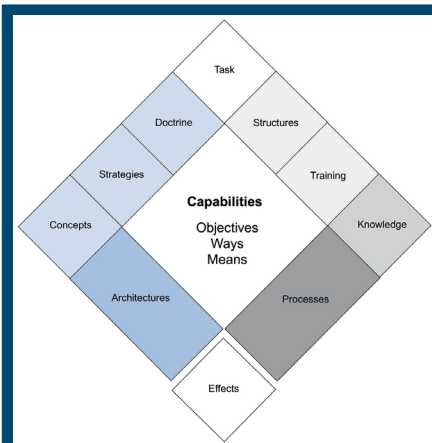


Figure 4:
*Abstract model of an enterprise architecture
at the highest level © BODP*

DEVELOPING AN APPROACH FOR THE BUNDESWEHR

In December 2022, the BODP was tasked by the Federal Ministry of Defence with developing a conceptual approach to MDO for the Bundeswehr by March 2024. The result is to serve as a basis for the preparation of a strategic control document.

The following work packages are being carried out:

- Development of a doctrine and evaluation of allies' documents on MDO
- Development of a reference architecture for MDO
- Development and use of a framework scenario for MDO
- Evaluation of national and multinational exercises from an MDO perspective
- Development of technical foundations, such as cloud/edge/artificial intelligence (headed by the Cyber and Information Domain Service Headquarters)
- Mission command and impact of technical evolution on command and control principles (headed by the Leadership Development and Civic Education Centre)
- Participation in MCDC⁶ project "Multinational Multi-Domain Command & Control (M2C2)"
- Development of a roadmap for the Bundeswehr's MDO enablement

THE WAY AHEAD

Enabling the Bundeswehr to conduct MDO cannot be done by flipping a technical switch. Instead, it is a long road that affects all planning categories. Questions must be answered concerning structures, organisation, operational doctrine and training. Due to the extent and complexity of the challenge, the solution cannot be a 'big bang'. Instead, it is more promising to proceed with small, manageable steps that will gradually develop the ability to conduct MDO. It is difficult to make predictions, but initial abilities should be achieved within the planning period. Achieving the full ability to conduct MDO is expected to take approximately one generation.

⁶ MCDC – Multinational Capability Development Campaign – An opportunity for multinational capability development in which interested states work together on the development of previously determined topics. Participation is not limited to NATO member states. The Bundeswehr's national project management for MCDC projects is performed by the Bundeswehr Office for Defence Planning.

KEY MESSAGES

- In addition to suitable technology, MDO also require adapted procedures, structures and organisations.
- MDO are mainly focused on effects. It is not that important which service branch or weapon system delivers the effect.
- Effects do not need to be lethal or kinetic.
- MDO are always joint and combined.
- MDO integrate military activities conducted in the five operational dimensions land, air, maritime, space, and cyber and information domain.
- The service branches remain key components in MDO.
- The quality of MDO results from a profound and permanent integration of sensors, effectors and command and control elements with as few intermediate levels as possible.
- MDO are data-centric. That is why data is a strategic resource.
- MDO are more effective if non-military effects can be integrated.
- The development of the Bundeswehr's ability to conduct MDO requires architectures.
- The path to enabling the Bundeswehr to conduct MDO is not a sprint, but a marathon.

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