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Impact of equipping with 155 mm self-propelled howitzer systems from the perspective of combat functions

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Abstract

This article brings into focus a useful way of understanding the impact that 155 mm self-propelled howitzer systems in the prospective equipment of national armed forces could have on the conduct of land force operations. The operational framework described by the warfighting functions is a useful tool to understand how the force commander can capitalize on the available capabilities according to operational needs. In writing this paper, I considered the contribution of 155 mm self-propelled howitzer systems to the fulfilment of each warfighting function from the perspective of friendly forces but, within each function, I have also considered the potential for its disruption, from the enemy's perspective. In the first part of the article, I briefly presented basic aspects of the warfighting functions and then detailed a perspective on the impact that equipping with 155 mm self-propelled howitzer systems can have on the conduct of land forces operations. Given that these self-propelled howitzer systems employ 155 mm NATO standard ammunition, I have explored in this article the possibility of using the full range of such ammunition without limiting myself to those mentioned in the purchase contract with the Korean manufacturer. Analyzing in this article the impact of equipping with 155 mm self-propelled howitzer systems emphasizes in my view, the usefulness and applicability of the operational framework described by the warfighting functions including in analyzing the potential of any existing or prospective capabilities, whether belonging to friendly forces, to the enemy or belonging to another actor of interest present in the area of operations.

Keywords:
warfighting functions; self-propelled howitzer; fire support; operational framework; capability.

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The integration of the new fire support capabilities that will become part of our national land force structures will probably also lead to an in-depth analysis of how these capabilities can be exploited to their full potential in operations – especially combat operations. Warfighting functions are, in my view, a useful tool to understand how the force commander can leverage the available capabilities according to operational needs. As the way in which these warfighting functions are accomplished can also represent a description of the capabilities available at a given moment, this tool can also be exploited to highlight solid arguments to justify the need to provide a certain capability to accomplish the force structure given mission.

By exploring how warfighting functions are performed, one can secure a better understanding of the capabilities` potential available to force structures and, as a logical consequence, can highlight unmet needs that may jeopardize mission success. The usefulness of this tool is also applicable in studying the capabilities of a potential enemy or another actor of interest at a given moment, which will enable commanders and staff members to better understand the confrontation environment and facilitate the determination of centres of gravity for their own forces, for the enemy forces or any other actor of interest in the area of operations.

I have set out, through this article, to bring to attention a novel and useful way of understanding the potential impact on operations of 155 mm self-propelled howitzer systems in the prospective equipping of our national land force structures. For this purpose, I considered the contribution of 155 mm self-propelled howitzer systems, first of all, to the fulfilment of each warfighting function from a friendly forces perspective and, secondly, I took into account the possibility of disrupting the same warfighting functions from an enemy perspective.

For this paper, I have used the method of documentary analysis as I considered it suitable for the systematic selection, review and evaluation of information sources – of an unclassified nature only. In substantiating the article, I explored open sources of information such as websites and authored works, along with specifications of doctrines and field manuals in force at NATO and national levels. Data collection, analysis and interpretation were, as I mentioned, systematically carried out based on documentary analysis (Okoko, Tunison and Walker 2023, 140), a useful research method, but also sufficient in my opinion, for understanding and synthesizing the relevant aspects in the field of study for this paper.

The framework described by warfighting functions in land forces operations

The warfighting functions are a tool that the commander assisted by his staff has at his disposal, to ensure a comprehensive approach to all aspects of land forces operations. The importance of warfighting functions also lies in the fact that, by

synchronizing the effort of available forces in these directions, courses of action and the concept of operation are also developed. Through warfighting functions the commander can visualize the specific activities and actions of his structures within the existing operational framework and, on this basis, he can also describe the actual capabilities of the force. In addition, the warfighting functions assist the commander in determining the force requirements for the conduct of the operation (NATO 2022, 105) and can also argue the modern capability needs of available force structures to perform in the current operational environment.

Warfighting functions in land forces operations are derived from joint functions which, from a NATO (NATO 2022, 105) as well as a national perspective (SMG 2011, 70; SMG 2014, 26), cover *manoeuvre, fires, command and control, intelligence, force protection, information operations, sustainability* and *civil-military cooperation*. The actual characteristics of land operations have led to an adaptation of the joint functions and, at the national level, according to the Land Forces Operations Doctrine F.T.-1 of 2017, which implements the provisions of the Allied Joint Doctrine For Land Operations AJP-3.2 of 2015, these functions are (SMFT 2017, III-13):

- Command and control;
- Intelligence;
- Maneuver;
- Fire support;
- Mobility and protection;
- Information Operations;
- Sustainment.

Given the purpose of this paper, to analyze the impact of a new fire support capability based on these warfighting functions, I will briefly present their fundamental ideas.

Command and control represents the central warfighting function which involves the exercising commander's authority over available force structures to accomplish the established mission. By *command,* we understand the commander's authority and the art of commanding forces in operation, but the command is also the basic element that ensures that the full potential of the available capabilities is explored. *Control* is the process by which the commander, assisted by his staff, organizes, directs and coordinates the activities of force structures. Control is exercised by using standard operating procedures and operating communications equipment within information systems (NATO 2016, 2-16). A key issue, in my view, is the reliance of the command and control architecture on visible capabilities in the electromagnetic spectrum, an increasingly contested and congested environment in today's conflicts.

Intelligence is indispensable to a coherent understanding of the operating environment and supports decision-making. This warfighting function integrates actions and activities conducted at the command level and collection elements to elaborate intelligence products resulting from the information cycle. Thus, the data

collected is processed and analyzed to generate and disseminate information about the enemy, friendly forces, terrain, weather, etc., as directed by the commander's intelligence requirements.

Maneuver as a warfighting function integrates tasks and systems that involve the movement and employment of forces to secure an advantageous position over the enemy (Department of the Army 2022, 2-2). Through manoeuvre, combat power is concentrated where it has a decisive effect on enemy operations by preventing, neutralizing, or disrupting them (NATO 2019, 1-21). An important aspect is the fact that manoeuvre, although manifested in the physical space, can produce psychological effects and influence the enemy's morale by creating situations of uncertainty or confusion.

Fire support as a warfighting function integrates lethal and non-lethal systems fires in coordination with manoeuvre forces both to physically destroy available enemy capabilities and to neutralize or disrupt enemy actions. In fact, *manoeuvre* and *fire support* are essential complementary functions to accomplish mission objectives. Although engagement by fire can be exploited independently, in combination with manoeuvre effects like destroying or neutralizing the enemy's forces and disrupting the enemy's manoeuvre to facilitate the action of friendly forces are achieved. Similar to manoeuvring, engagement with fire can have physical effects such as destruction, but also psychological effects as lowering enemy morale.

Mobility and protection as a warfighting function is about ensuring freedom of movement and force protection by reducing the vulnerability of military personnel and equipment to threats or situations that may jeopardize mission accomplishment. Mobility has two components: on the one hand, it involves ensuring favourable conditions for the movement of friendly forces in the tactical field through specific actions such as ensuring the viability of communication routes, crossing or bypassing obstacles, etc., and, on the other hand, it aims to prohibit or limit the mobility of enemy forces (countermobility) by exploiting friendly fire support assets, by carrying out destruction works, setting up barricades, etc. Force protection is the responsibility of commanders and all personnel to eliminate or reduce the risks and effects of threats that could diminish combat power, operational effectiveness or freedom of action for friendly forces. Specific to force protection are activities such as camouflage and force dispersal, engineer support, air defence, CBRN (Chemical, Biological, Radiological and Nuclear) or electronic protection.

Information Operations integrate actions and activities aimed at modifying information in order to create effects on the enemy's capabilities, will to fight and ability to understand, thus supporting the achievement of friendly forces objectives. I would mention as representative in this field misleading, psychological operations and the physical destruction of information system elements (SMG 2014, 33).

Sustainment is the warfighting function responsible for providing required resources for the execution of the operation throughout its development. The importance of sustainment is obvious in any type of operation since it aims as a warfighting function to provide logistical support (supply, maintenance, transportation, etc.), to maintain or restore the combat power of force structures and has a direct impact on the tempo (rhythm) and intensity of actions.
Any of the available capabilities of the force can be exploited and utilized in one or more warfighting functions. The actual way in which forces and assets are combined and integrated into warfighting functions is usually detailed in the operation order.

The impact of equipping land forces with 155 mm self-propelled howitzer system

According to the national equipment programs, published on the Ministry of National Defense website, we have a program in preparation for equipping with a Battalion level 155 mm howitzer system in order to provide direct fire support to manoeuvre structures (MApN 2024). The nationally agreed version of this capability is the K9 Thunder 155 mm self-propelled howitzer of Korean production (Curtifan 2024a). According to the same source, the contract with Hanwha Aerospace provides for the acquisition of 54 K9 howitzers and 36 K10 refuelling vehicles. A notable aspect, from my point of view, is the production of such systems including at the national level where, according to the same sources, the Korean manufacturer will build a specially designed factory.

In analyzing the impact of equipping with this type of self-propelled howitzers, I also took into account the components of these systems as described in open sources of information. Thus, each of the self-propelled howitzer system has at battalion level, the following components (Soare 2024):

- 155 mm self-propelled howitzer, tracked (K9) - 18;
- 155 mm spare barrel - 9;
- Specialized ammunition carrying and loading machine (K10) - 12;
- Self-propelled artillery observation post - 9;
- Meteorological auto station - 1;
- Technical Evacuation of Damaged Equipment (TEHE-VAC) - 3;
- Acoustic reconnaissance system - 3.

Another important and novel aspect in the realization of this work is the fact that, in the impact analysis, I considered all types of ammunition that such a self-propelled howitzer system can employ. I have thus ignored the current range of ammunition included in the value of the purchase contract which is limited, even elementary in my view, including only 155mm explosive, smoke, illumination and inert rounds for training. Being a system that can use 155 mm NATO standard ammunition, I have

taken into account both the basic explosive ammunition - with a maximum range of 30 km, as well as other types of 155 mm NATO standard such as the M982 Excalibur guided projectiles (Orjanu 2024), those with DPICM (Dual-Purpose Improved Conventional Munition) or RAP (Rocket-Assisted Projectiles) - with a maximum range of 40 km (Global Defense News 2024b). According to other sources (European Security & Defence 2022), some versions of 155 mm RAP-type munitions can have a maximum range of over 50 km.

TABLE NO. 1

SWOT analysis on equipping national land forces with 155 mm self-propelled howitzer system

STRENGTHS	WEAKNESSES
- The most common self-propelled howitzer system worldwide in the last decades; (Namuwiki 2024) - Combat proven system with versions being exploited in the Ukrainian conflict (e.g.: Poland provided Krab); (Ukrinform 2024) - Equipping with such self-propelled howitzer systems contributes to Romania's deterrence strategy of armed aggression; - It contributes to achieving national capability targets assumed within NATO; - As self-propelled systems, they have a high degree of mobility ensuring both increased survivability - in case of counter-battery fire, and increased flexibility in executing fire missions; - They have the required level of technical interoperability with allies from both command and control systems and exploited resources – 155 mm NATO munitions, fuel and lubricants, spare parts, etc.; - It can execute *shoot and scoot*, ensuring an adequate level of survivability in the evermore transparent confrontation environment; - It can engage targets at longer ranges than current towed artillery systems; - They use automated fire control systems that allow a high rate of fire; - Systems include K10 vehicles for resupply with munitions which are automated (robotized) even under enemy fire; (Global Defense News 2024b) - It can use a wide range of 155 mm NATO standard ammunitions with different payloads, including submunitions; - They can execute fire missions in a MRSI (Multiple Rounds Simultaneous Impact) fashion so that one howitzer can strike a target with multiple rounds simultaneously as they travel on different trajectories; - The system integrates acoustic systems for battle space reconnaissance.	- As they represent an important capability for land force structures in all types of operations, 155 mm self-propelled howitzer systems will `become` high-value target/high pay-off target from the enemy perspective that, most likely, will assign additional resources to destroy or diminish their combat power; - The need to assign specialized resources for systems, physical protection and air and missile (drone) defence because, as I mentioned these performant systems will be hunted throughout the entire operation; - The need to provide multispectral protection for such systems – beyond classical camouflage against optical sensors – to protect them against sensors that exploit the infrared, acoustic or electromagnetic spectrum; - Standard operating procedures for using self-propelled howitzers include a higher dispersion in the land forces area of operations, with implicit risk of enemy counter-battery fire upon other friendly structures elements – manoeuvre, command and logistic support, etc.; - Reduced number of crew members can be problematic for exploiting systems over extended periods of time. Towed artillery systems they will be replaced have a higher number of personnel that can also operate in shifts; One other challenge will be organizing the close defence of firing positions with a reduced number of crew members; - National acquisition contract for 155 mm self-propelled howitzer systems does not currently include specially designed antiarmor rounds for both maximum range and in close combat, especially for the close defence of firing positions. Replaced towed 152 mm howitzers and gun-howitzers have the possibility to use armour-piercing rounds and shaped charges for fighting armour.
OPPORTUNITIES	**THREATS**
- Possibility of producing the systems locally with the implicit possibility of operational maintenance through national effort; - Possibility of producing 155 mm NATO standard ammunition locally, as part of partnerships with various dedicated companies in the field; (Curtifan 2024b) - Potential access to future versions of the K9 system, more performant in engaging targets at over 80 km in autonomous conditions (with no crew) (Global Defense News 2024b) - Possibility to participate in multinational exercises capitalizing on Romania's member status in the ASCA (Artillery System Cooperation Activities) community; (Orjanu 2023) - Possible use of entire 155 mm NATO standard ammunition, including those guided type M982 Excalibur; (Orjanu 2024)	- Partial capitalization of systems potential due to current limitations in national ISR (Intelligence, Surveillance and Reconnaissance) capabilities; - Over time reduced effectiveness of self-propelled howitzer systems due to lessons learned by potential hostile actors in recent conflicts such as the Russo-Ukrainian war; (Newsweek 2024) - If nationally provided consumables (including munitions) and component elements are not available, exploiting self-propelled howitzers can become problematic in a crisis and conflict situation, when access to external supply sources would be limited or prioritized; - Some 152 mm munitions, used by current artillery systems, have no equivalent in the 155 mm munitions range that the K9 self-propelled systems use (e.g.: concrete-piercing and armour-piercing rounds, shaped charges or leaflet shells).

Given thus the full scope of fire support capability offered by the 155 mm self-propelled howitzer system I was able to explore how to exploit them according to the operational framework described by the warfighting functions. First of all, I found it useful to provide a perspective on the equipping of national land forces with such systems in the form of a SWOT analysis.

To address the contribution that 155 mm self-propelled howitzer systems can have to the warfighting functions, I have also taken into account the possibility of disrupting the conduct of the same functions from the enemy's perspective, realizing, in my view, a more comprehensive analysis of the potential within studied capabilities in this paper. This approach is based on the elementary role of any fire support system - to engage by fire high-value targets in the enemy's combat formation, with the effect of diminishing his possibilities to fulfil warfighting functions.

Command and control

Equipping land force structures with 155 mm self-propelled howitzers comes with certain advantages in terms of performing the *command and control* warfighting function. The maximum target engagement rate, in conjunction with the performance of the automated fire control systems howitzers have, determines superior efficiency in the execution of counter-battery fire, thus providing superior protection for the command and control systems of friendly forces. This assertion is based mainly on the ability of self-propelled howitzers to effectively combat enemy fire support systems since these assets can endanger both command posts and other components of information systems or communications centers, involved in the command and control of friendly force structures.

Available automated fire control systems alongside the possibility of rapid execution of fire missions using self-propelled howitzers, can be exploited more effectively in comparison with the towed artillery systems they will replace, particularly in engaging targets of opportunity or targets arising in the dynamics of combat actions and against targets classified as TST (Time Sensitive Target).

From a different perspective, the increased range, the automated fire control system and the specific firing rate of self-propelled howitzers allow friendly forces to effectively engage enemy command posts - especially those at the tactical level, as well as elements of information systems or communication centres that these command posts exploit, thus ensuring the disruption of enemy's *command and control* warfighting function.

Intelligence

The equipping and combat employment of 155 mm self-propelled howitzers imply using available automated fire control systems. Thus, the *intelligence* warfighting

function is assisted by the contribution of the fire command and control subsystems to creating the operational picture, exploiting as well the specific data collection capabilities, such as the optical and acoustic battle space reconnaissance kits - integral components of the 155 mm self-propelled howitzer system. Another contribution to the intelligence function is materialized in the form of artillery fire for reconnaissance purposes, where the advantages of increased mobility and rapid execution of fire missions can be exploited for the timely collection of data and information regarding the structure of the enemy's operation in all its aspects – displacement of forces, available fire system or engineer support.

The disruption of the enemy's *intelligence* warfighting function is achieved by degrading its ability to understand the real operational situation by depriving him of information while performing specific lethal tasks with friendly fire support systems. Thus, the destructive potential of self-propelled howitzers can be harnessed against elements of the enemy's reconnaissance systems (radars, radiolocation stations, observation posts, etc.), against elements of high-precision striking systems (e.g., drone launch platforms, laser guidance systems for guided munitions, etc.), as well as against the enemy's electronic warfare assets. Another way to disrupt the enemy's *intelligence* function is to exploit 155mm self-propelled howitzer systems within the framework of deception plans, developed at the task force level, in order to "provide" him with information describing an altered operational picture, favourable to the actions of friendly forces.

Maneuver

One of the essential roles of any fire support system is to support the maneuver of fighting elements, therefore equipping with modern artillery systems will have a major impact on the combat power of these forces. The main characteristics of the 155 mm self-propelled howitzer system, such as maximum target engagement range, firepower or high degree of mobility, determine an increased capability of the systems to provide permanent and timely fire support to manoeuvre forces in all forms of combat they adopt in the operation.

Another aspect that may influence the *manoeuvre* warfighting combat is that the availability of modern artillery systems, such as the 155 mm self-propelled howitzer systems, will also provide, in my opinion, a moral boost for the manoeuvre forces that will benefit from the fire support provided by these systems in achieving their set objectives.

From the enemy's point of view, disrupting the *manoeuvre* warfighting function is achieved by prohibiting the concentration of forces, and therefore their effort, in certain important directions or on the objectives targeted by friendly forces. Manoeuvre disorganization can be facilitated by exploiting the potential of 155 mm self-propelled howitzer systems to mass fire rapidly, at considerable distances and

with high accuracy on various targets in the tactical depth of the enemy combat formation. This highly destructive potential of a 155 mm self-propelled howitzer is mainly due to the technical characteristics of the gun and ammunition used, as well as the availability of automated fire control systems. The use of these self-propelled howitzers will reduce the enemy's combat potential, both in terms of achieving physical effects on military personnel and equipment and achieving psychological effects reflecting on the morale of enemy troops.

Fire support

Self-propelled howitzer systems are primarily intended to provide fire support for the force structures they will be a part of. They will also form the basis of the strike system available to the force, through which it is planned to achieve effects, especially lethal, on enemy personnel and fire systems in accordance with friendly forces' operational requirements. The contribution of 155 mm self-propelled howitzers in the *fire support* warfighting function is closely linked to the *manoeuvre* function as the fire support systems available to the force are a power multiplier of manoeuvre structures in all types of operations. Whether we talk about fire preparation for the attack in an offensive operation, the execution of a defensive fire barrage in front of friendly positions or we consider covering fire for a forward base in a stability operation, the scheme of manoeuvre at the force level has the fire support system as a combat power multiplier, where the superior possibilities of the 155 mm self-propelled howitzer systems can be timely exploited.

In terms of disrupting the enemy's *fire support* warfighting function, the superior characteristics of the 155 mm self-propelled howitzer can be used to neutralize (destroy) the enemy's fire support systems throughout the entire operation. Thus, the increased mobility of self-propelled howitzers (especially in *shoot and scoot*) and the increased firepower accurately applied to targets at considerable distances, in conjunction with automated fire control systems and modern enemy artillery detection capabilities (included in the same equipment program or already existing at the national level), will allow these systems to be used effectively for counterbattery fire. The possibility of executing *shoot-and-scoot* fire missions provides self-propelled artillery systems with a much higher survivability rate compared to towed ones, and this is evident even in Ukraine where self-propelled howitzers of an older generation - such as the M109 Paladin donated by the USA, successfully provided fire support to manoeuvre forces even in close proximity to the frontline (Altman 2023), and were very difficult to counter by enemy artillery.

Denying or making ineffective enemy artillery fire (field artillery or anti-aircraft artillery) is a major objective in all types of operations, and these effects can be achieved by using the full range of 155 mm NATO standard munitions, as counter-battery fire does not only involve reactive fire against enemy assets in firing position but also includes a proactive component aimed at blinding enemy sensors (with

smoke or illumination munitions), hitting command points or disrupting the logistic support of the enemy fire support system (with incendiary and precision rounds or using various submunitions).

Mobility and protection

The contribution of 155 mm self-propelled howitzer systems to the *mobility* of forces consists primarily in diminishing the enemy's potential to create explosive or non-explosive obstacles in the area of operations, by destroying/neutralizing specialized military equipment or enemy elements specially designed for countermobility. Here I have in mind aspects like neutralizing enemy special-purpose detachments - such as those intended for destroying infrastructure components in the area of operations, the destruction of military equipment intended for creating minefields or those generally used to shape the battlespace for countermobility purposes (engineering equipment for example). Compared to the classical artillery they will replace, self-propelled howitzer systems have certain superior technical characteristics which will facilitate the surprise engagement of enemy elements mentioned above, at considerably greater ranges, with high accuracy and lethality. Another contribution in the field of mobility can be the actual destruction by fire of explosive and non-explosive obstacles, where the diversity and destructive potential of 155 mm NATO standard munitions can be exploited.

Regarding the countermobility component of this warfighting function, self-propelled howitzer systems will contribute by destroying at long ranges the enemy's military equipment and other elements involved in securing freedom of movement for his forces. In this regard, I am considering aspects such as the destruction of mobile assault bridges and other specialized enemy capabilities used for gap crossing or the restoration (reinforcement) of communication routes in the area of operations. Destruction of infrastructure elements (e.g. bridges, roads, railroads, etc.) can also assist countermobility, but an important contribution, in my view, of self-propelled howitzer systems to countermobility is the use of 155 mm projectiles with submunitions designed to create minefields as an obstacle, both for the purpose of protecting friendly forces and to deny, channel or delay enemy action on certain directions or in certain areas.

The main contribution of 155 mm self-propelled howitzer systems to force protection is their high capability to combat, effectively and from a distance, elements of the enemy fire support system. As mentioned above, within the fire support warfighting function, disrupting this enemy function constitutes an important contribution to eliminating or reducing the risks and effects of threats that could diminish the combat power, operational effectiveness or freedom of action of friendly forces. Thus, 155 mm self-propelled howitzer systems will be used primarily against the enemy's artillery and ground-based missiles, especially those constituting weapons of mass destruction, as well as against enemy high-precision striking systems, which in my view includes combating drone launch platforms.

From a different perspective, being high-performance systems and, as mentioned in the SWOT analysis, representing an important capability of land force structures in all types of operations, 155 mm self-propelled howitzers will "acquire" the status of high value/high pay-off target and the enemy will seek by multiple means to take them out of the fight. From this point of view, the impact of equipping with such systems on force protection comes in the form of the need to allocate additional resources to providing physical protection of self-propelled howitzers in the modern confrontation environment, especially against drones or loitering munitions. As an argument example, we have the successful use of Lancet drones to hunt down and destroy Krab self-propelled howitzers (Technology.org 2024), similar to those in the national equipping program.

From the enemy's perspective, the disruption of the *mobility and protection* warfighting function involves two aspects. First, the above-mentioned aspects of the mobility and countermobility of friendly forces can be viewed against the respective countermobility and mobility of enemy forces. Second, force protection from the enemy's perspective can be disrupted by the very existence of 155 mm self-propelled howitzer systems. This will impose a considerably greater effort on the enemy to provide force protection over a significant depth within the area of operations where these systems can be employed. From another perspective, the effectiveness of 155 mm self-propelled howitzer systems in counter-battery fire can be an important factor in making enemy manoeuvre forces vulnerable at certain moments of the battle, when they have a greater need for fire support - for advancing towards contact, attacking defended positions, executing a counterattack, etc. Equipping friendly force structures with 155 mm self-propelled howitzer systems will constitute a permanent threat to the enemy's combat power, operational effectiveness or freedom of movement of forces, which will have to be countered or mitigated by active and passive measures throughout the operation.

Information Operations (INFO OPS)

Equipping force structures with 155 mm self-propelled howitzer systems can contribute to the *information operations* warfighting function in various ways. First, the availability of such modern systems can be promoted and exploited to boost the morale and combat readiness of friendly forces, aspects with a direct impact on the combat power of the force as a whole. Secondly, the presence of such systems in the area of operations and their operational effectiveness will be propaganda elements to discourage enemy troops or to influence them psychologically and morally. An example in this respect is the exploitation of the maximum range at which 155 mm self-propelled howitzers can engage targets in the enemy's combat formation to determine deployment of forces or resources concentrations at increased distances from the front line, thus producing effects on the morale of enemy forces in the contact area of operations. Such a role was played by HIMARS systems in the Russian-Ukrainian conflict (Kosoy 2024) and, in my view, access to 155 mm munitions

with a maximum range of 50 km (European Security & Defence 2022) or 80 km (Global Defense News 2024a), will allow even self-propelled howitzers to "push" the concentrations of resources needed by the enemy in the contact area of operations.

From a different perspective, the self-propelled howitzers "status" of high value/high pay-off target for the enemy could be exploited within the information operations function, in order to diminish the enemy's ability to understand the operational environment, stimulating its sensors through specific fire actions and activities, indicating multiple firing positions, false attacks or new directions of effort at the force level. The superior characteristics of self-propelled howitzers can thus be exploited, particularly in the field of mobility and automated fire control. As an example of the exploitation of the high value/high pay-off target status for the enemy, I may mention the role played by HIMARS systems in misleading the Russian forces by concentrating their efforts, initially in the Herson region, followed by a Ukrainian counter-offensive in the Kharkov region (Toroi 2024, 34).

In terms of disrupting the *information operations* warfighting function from the enemy's perspective, self-propelled howitzers can be exploited to combat the enemy's propaganda potential, either by physically destroying components - such as communications systems or by anticipating and countering disinformation in general that involves 155 mm self-propelled howitzers. The essential element, in my view, in disrupting this warfighting function is the awareness of ideas likely to be used in enemy propaganda such as the operational inefficiency of 155 mm self-propelled howitzer systems, their effortless destruction or the wrongful use of such systems by friendly forces in a manner inconsistent with the laws of war, the rules of international humanitarian law or as intended by false flag operations - carried out by the enemy with 155 mm NATO standard munitions. Awareness of these ideas at the force structures level will facilitate their counteraction or even exploitation within the friendly *information operations* warfighting function.

Sustainment

The contribution of 155 mm self-propelled howitzer systems to *sustainment* warfighting function is primarily to protect logistic support forces and resource flows by countering enemy fire support systems. As mentioned above, the increased mobility of self-propelled howitzers (especially in *shoot and scoot*), the high firepower accurately applied to considerable distant targets, the existence of automated fire control systems, as well as modern enemy artillery detection capabilities (included in the same armament program or already existing at the national level), will allow these systems to be used effectively in executing counter-battery fire in order to prohibit striking of friendly logistic system elements or the disruption of all type resource flows.

Sustainability is also ensured by the fact that, as mentioned in the SWOT analysis, the new 155 mm self-propelled howitzer systems will be produced locally, thus

making it possible to maintain their operational status through a purely national effort. This aspect is very important and it could be observed also in the Ukrainian conflict where the possibility of continuous supply of sub-assemblies or various components made the M109 self-propelled howitzers active and exploited in combat while other similar more modern systems (PZH 2000 and Caesar) suffered from certain shortcomings in maintaining their operational status (Hooper 2023).

From another perspective, given that fire support systems are generally very resource-intensive, especially due to heavy and bulky ammunition, the ease in supply (resupply) for these systems is beneficial for the entire logistic system of force structures. Hence a number of contributions of the new 155 mm self-propelled howitzer systems regarding sustainability, consisting of aspects such as:

- automated (robotized) ammunition replenishment thanks to the K10 systems included in the equipping program (Global Defense News 2024a);
- use of 155 mm NATO standard ammunition, including guided or with submunitions, leading to potentially higher target engagement efficiency;
- the ability to execute Multiple Rounds of Simultaneous Impact (MRSI) fire missions, which can improve the operational effectiveness of the systems in certain situations.

These contributions to the use and resupply of 155 mm munitions facilitate the exercise of sustainable warfighting function and, as mentioned above, have the potential to influence the rhythm and intensity of action in both self-propelled howitzer systems and the manoeuvre forces they will provide fire support for.

In terms of disrupting the enemy's *sustainment* warfighting function, the main contribution of 155 mm self-propelled howitzer systems consists of "pushing" sources of supply and concentrations of resources of all types to greater distances from the contact area of operations. Equipping friendly force structures with such systems will determine the enemy to deploy certain elements of logistic support beyond the howitzer's range or, alternatively, to take more risks in securing the continued sustainability of enemy forces in the contact area of operations.

Conclusions

The operational framework described by the warfighting functions is usually used as a tool at the commander's disposal to fully address the characteristic aspects of an operation. Through warfighting functions, it is possible to visualize how the available capabilities of the force structures can be leveraged to meet operational requirements. At the same time, the warfighting functions can be exploited to identify and substantiate new force structure requirements for the accomplishment of the assigned mission under the specific conditions of modern confrontations.
The usefulness of this tool is also underlined by the fact that it is also applicable in analyzing the capabilities available to a potential enemy or the capabilities existent on other actors of interest in the area of operations. This aspect allows commanders

and staff to better understand the confrontation environment and will make it easier to determine the centres of gravity for their own forces, enemy forces or any other actor of interest present in the area of operations.

The ways of performing warfighting functions in an operation describe the capabilities available to the force and, moreover, facilitate an understanding of their full potential that can be leveraged to accomplish the mission. The perspective on the contribution of 155 mm self-propelled howitzer systems presented in this paper comes as an exploration of their potential to assist the warfighting functions of friendly forces while also considering the potential of these systems to disrupt the same functions regarding enemy forces. In the analysis, I considered the 155 mm self-propelled howitzer system as a platform to use the full range of 155 mm NATO standard munitions, without limiting myself to those types of ammunition included in the current contract with the systems manufacturer. I have thus presented some arguments on the usefulness of exploring the full potential of these capabilities when coupled with modern reconnaissance systems to the extent possible and employing high-performance munitions – precision munitions such as the M982Excalibur, long-range RAP or DPICM type with submunitions.

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