Modern Warfare Tendencies and Implications for the Baltic Region: Adapting to a New Era of Conflict

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Abstract

This article argues that the character of war has shifted toward cheap, smart mass—drones across air, sea, and land—integrated into fast kill-webs that compress detect-decide-deliver cycles. Layered ground-based air defense (guns / lasers / SHORAD / MRAD) and rigorous counter-UAS have displaced assumptions of persistent air dominance and restored affordable protection against swarms and cruise missiles. The electromagnetic spectrum now decides outcomes: forces that train "GPS-degraded by default," enforce EMCON, and field EW-resilient control (including fiber-optic / tethered links) retain combat effectiveness. Maneuver endures but is conditional—successful advances SEAD, engineer breaching, smoke/ EW screens, deception, and drone overwatch to exploit narrow windows. Industry has re-entered strategy: sustained conflict rewards states that can produce, repair, and reload at scale (from 155 mm and interceptors to FPV kits and USVs/ UGVs). AI is a cross-cutting enabler today—improving C-UAS detection/ classification, target correlation, spectrum sensing, and predictive sustainment—while remaining human-on-the-loop. Evidence from Ukraine and Israel shows fusion in practice: drones to blind and fix; precision deep fires (e.g., ATACMS, Storm Shadow) to shatter high-value targets; and aviation and/ or maneuver to break through and / or finish.

Keywords: *drone warfare (air / sea / land), Air and Missile Defense, Counter-UAS (C-UAS), Electronic Warfare (EW), Multi-Domain Operations (MDO), Precision strike & deep fires, Maneuver, Baltic region, kill-web integration.*

Introduction

"War is the realm of uncertainty; three-quarters of the factors on which action is based are wrapped in a fog of greater or lesser uncertainty," wrote Carl von Clausewitz in *On War* nearly two centuries ago [42]. Today, that fog has taken new forms: GPS spoofing emanating from Kaliningrad, in Ukraine swarms of First Person View (FPV) drones hunting individual soldiers, and artificial intelligence algorithms deciding which targets to strike within seconds. Yet Clausewitz's fundamental insight remains valid—the side that can penetrate this fog fastest, turning uncertainty into actionable intelligence, will dominate the battlefield. As General Sir Nick Carter, former Chief of the UK Defence Staff, noted in 2021: "We're on the brink of a fundamental change in the character of warfare... The winners will be those who adapt fastest" [44]. In the 2020s, that rate of change has accelerated beyond what most defense establishments imagined possible just a decade ago.

The February 2022 Russian invasion of Ukraine marked a watershed moment—not because it introduced entirely new weapons systems, but because it validated and accelerated trends that had been emerging since Russia's annexation of Crimea in 2014. The 2020 Nagorno-Karabakh conflict had already demonstrated the devastating effectiveness of drone swarms against conventional armor. Israel's multi-decade experience with missile defense had proven that layered air defense could work, even against saturation attacks. Ukraine, under the pressure of existential war, has industrialized these lessons at scale, creating a laboratory of innovation that has compressed what might have taken decades into mere months [28].

For the Baltic States and Poland, the implications are direct and urgent. The same GPS jamming that grounds civilian flights in Estonia and Finland could blind military operations [23; 24]. The same Iranian Shahed-136 drones striking Ukrainian cities could be launched from Kaliningrad or Belarus against critical infrastructure in Vilnius, Riga, or Warsaw. The same Russian electronic warfare

systems that have degraded Ukrainian precision weapons operate continuously from bases less than 100 kilometers from NATO territory [22]. The Suwałki Gap—the 65-kilometer corridor, at its narrowest, connecting Poland to the Baltic states—remains one of NATO's most vulnerable geographic chokepoints, where Russian forces could theoretically sever the alliance's land connection to its northeastern members within hours of conflict initiation.

This article distills the most critical lessons from ongoing conflicts—primarily in Ukraine and Israel—into five essential warfare tendencies and five corresponding recommendations for adapting to these changes. The goal is not comprehensive coverage of every weapon system or tactical innovation, but rather identification of the patterns that will shape warfare in the Baltic theater over the next 5–10 years.

As we examine these five tendencies—drone proliferation, air defense imperatives, electromagnetic warfare, fires fusion, and the evolution of maneuver—we must remember that they do not exist in isolation. They are interconnected elements of a broader transformation in which warfare is simultaneously becoming more lethal, more precise, more distributed, and more dependent on the electromagnetic spectrum and artificial intelligence than ever before.

First Tendency: Drone Warfare – Unmanned Systems in the Air, Sea, and Land

What distinguishes the current drone (r)evolution is not just technological capability but accessibility. A $500 commercial quadcopter fitted with a 3D-printed release mechanism and a single anti-tank charge can destroy a $4 million tank. This inversion of the cost-exchange ratio has transformed both offensive and defensive warfare, especially in theaters where peer adversaries face each other across relatively static front lines [28].

Aerial Evolution: From Bayraktar to FPV Swarms

The 2020 Nagorno-Karabakh war foreshadowed this shift. Azerbaijan's systematic use of Bayraktar TB2 uncrewed aerial vehicles (UAVs), Israeli IAI Harop loitering munitions, and small reconnaissance drones created a layered surveillance and strike network that devastated Armenian forces. In just 44 days, Armenia lost nearly 200 tanks, over 90 infantry fighting vehicles, and multiple Buk and S-300 air defense systems—the very capabilities intended to prevent such losses [1].

Ukraine has since industrialized this model. By 2024, Ukraine was producing over 100,000 drones per month across several categories: long-range one-way attack drones, medium-range reconnaissance platforms, and most importantly, First Person View (FPV) strike drones. FPVs now dominate tactical engagements at the company and platoon levels, with Ukrainian units employing 10–15 per day in active sectors to destroy tanks, artillery, and personnel. Russian soldiers describe the constant buzzing overhead as more psychologically taxing than artillery because drones "see and adjust in real time" [28].

Technical Adaptation and Resilience

Early FPV drones relied on radio control, making them vulnerable to Russian jamming systems such as Pole-21 and Leer-3. By mid-2023, Ukrainian designers introduced fiber-optic-controlled drones, trailing thin fiber-optic cables to maintain unjammable connections. Though the range is limited to 10–15 km, they are virtually immune to electronic warfare. Shorter-range systems (3–5 km) now employ autonomous terminal guidance, using computer vision to identify vehicles or personnel during the final attack seconds. These innovations have turned small drones into precision-guided munitions accessible to infantry.

Picture No. 1. Drone swarm integration into maneuver

Source: https://www.linkedin.com/pulse/assessing-recent-tank-survivability-against-fpv-drone-robi-sen-7fymc

Maritime Innovation: From Improvisation to Dominance

Ukraine's most unexpected success came at sea. After losing most of its navy to Russian attacks in 2014 and 2022, Kyiv developed multiple classes of uncrewed surface vessels (USVs)—notably the MAGURA V5 and upgraded V7 [2]. These 1,000–1,500 kg craft can reach 40+ knots over 80 km, carrying 200–300 kg of explosives.

From Ramming to Multi-Mission

Early (2022) USVs conducted simple ramming attacks, achieving mixed results. In 2023, second-generation tactics introduced swarming, launching multiple drones from different angles to overwhelm the Russian Black Sea Fleet defenses. On September 22, 2023, a coordinated USV strike on Russia's Black Sea Fleet headquarters in Sevastopol killed or wounded 34 officers and crippled fleet command [5; 6].

By 2024, Ukraine fielded third-generation USVs, turning them into multi-role platforms. The MAGURA V7 variant can now launch

aerial drones and/ or missiles from its deck, operating 50–80 km offshore. On May 15, 2024, Ukrainian forces used a V7 to launch aerial drones that destroyed a Russian Podlet-K1 early-warning radar,-a complex multi-domain attack from an uncrewed vessel costing under $250,000 [3, 4]. Recent images even show MAGURA V7s equipped with AIM-9X Sidewinder air-to-air missiles, threatening Russian military aircraft over the Black Sea [2; 3].

Strategic Impact

The results have been decisive. By early 2024, Russia's Black Sea Fleet had withdrawn most vessels from Sevastopol to Novorossiysk, 300 km east, rendering it "functionally inactive" for power projection, according to British intelligence [7]. Ukraine—without a traditional navy—has achieved de facto maritime superiority using uncrewed systems that cost a fraction of conventional warships.

Land-Based Systems: The Quiet Evolution

While aerial and maritime drones dominate headlines, uncrewed ground vehicles (UGVs) are transforming battlefield logistics, engineering, and direct fire support—capabilities particularly relevant for the Baltic region [40].

Combat Engineering and Breaching

The most mature UGV applications are in combat engineering. Systems such as the Ukrainian Ratel-S, modified from commercial ATVs, deliver explosive breaching charges or tow mine-clearing lines under fire. During the 2023 Zaporizhia offensive, heavy engineer casualties prompted Ukrainian brigades to adopt UGVs for obstacle clearing and even casualty retrieval from no-man's-land—tasks too dangerous for human soldiers under FPV and artillery threat [41].

Micro-Resupply and Casualty Evacuation

Small, remotely controlled vehicles now handle last-kilometer resupply—moving ammunition, food, and medical supplies 1–3 km

between fighting positions and rear nodes. Ukrainian units use modified UTVs and golf carts (radio or tether-controlled) to sustain isolated positions without risking drivers. The effect on morale is significant: soldiers are more willing to hold positions when resupply and evacuation no longer require human sacrifice [41].

Direct Fire Support

Since early 2024, Ukraine has tested armed UGVs mounting RPGs, PK machine guns, or automatic grenade launchers for urban and close-terrain combat. These prototypes resemble WWII "Goliath" tracked mines, but in a precision weapon way. While control lag, limited ammo, and vulnerability remain issues, improvements in tethered control and autonomy could soon enable UGVs to conduct urban clearing, forest defense, and counter-reconnaissance—crucial missions for Baltic geography [28; 40; 41].

Strategic Implications for the Baltic Region

1. Air Superiority Assumptions Must Change. The belief that NATO airpower guarantees uncontested skies is outdated. Ukrainian experience proves that drone swarms operate effectively below radar and fighter engagement envelopes. Even local air superiority does not prevent small drones from striking troops, vehicles, and logistics. Thus, ground-based counter-UAS systems, such as the Kongsberg CORTEX Typhon, must become organic to every maneuver battalion and critical site [35].

2. Terrain Favors the Defender Using FPV Tactics. The Baltic landscape—open farmland interspersed with forests—may favor defenders employing mass FPV drones. Instead of static trench lines, Baltic Defense should rely on dispersed strongpoints anchored on towns, crossroads, and forest edges. FPV drones excel at this mode of warfare, disrupting enemy concentration and punishing movement. Even limited drone coverage would delay mechanized

assaults long enough for reinforcements or an artillery response.

3. Domestic Production is a Strategic Necessity. Drone warfare consumes hardware at unprecedented rates. Ukrainian forces deploy around 9K drones daily, making dependence on NATO supply chains untenable [32]. The Baltic States must therefore establish local drone production or secure a guaranteed foreign supply. Domestic manufacturing not only ensures availability but also allows rapid design iteration based on frontline feedback—critical in a technology cycle measured in weeks.

4. Drone Proficiency Must Become a Basic Military Skill. Drone employment can no longer be the domain of specialists. In Ukraine, infantry squads now include one or two trained FPV operators as standard. Similarly, Baltic territorial defense forces, likely to lead initial resistance, must train thousands of reservists in piloting, maintenance, and tactical employment. Basic proficiency can be achieved in 20–30 hours of simulator training and 10–15 hours of live flight—a manageable requirement if incorporated into existing military education. The real barrier is institutional adaptation, not technical difficulty.

Second Tendency: Air, Missile, and Counter-Drone Defenses Become Essential

The proliferation of aerial threats—from high-altitude ballistic missiles and sea-skimming cruise missiles to $500 commercial quadcopters—has created what defense planners now describe as a 360-degree, all-altitude threat environment. Ukrainian and Israeli experiences since 2022 demonstrate that modern military operations—and even civilian normalcy—cannot be sustained without layered, integrated air and missile defense systems capable of engaging threats across the full altitude spectrum.

For the Baltic region, where Russian strike assets operate within 100–200 kilometers of NATO territory and where warning times are measured in minutes rather than hours, this capability is not optional but existential.

Ukraine: Survival through Layered Defense

When Russia launched its full-scale invasion in 2022, Ukraine's air defenses consisted primarily of Soviet-era systems—S-300 variants, Buk-M1, Tor-M1, and short-range Osa and Strela units. Russian planners assumed these would be neutralized within 48–72 hours through Suppression of Enemy Air Defense (SEAD) operations. That assumption proved catastrophically wrong.

Ukrainian units ensured survival through dispersion, mobility, deception, and strict emissions control. S-300 batteries operated from temporary positions, fired, and were quickly relocated. Decoy radars and launchers drew Russian strikes, while genuine systems hid in forests and urban areas. Operators activated radars only briefly, preventing Russian electronic warfare systems from achieving accurate targeting.

Between October 2022 and March 2023, Russia launched over 1,000 cruise missiles and Iranian Shahed-136 drones against Ukraine's energy infrastructure. Soviet systems—optimized for high-altitude aircraft—struggled against low-flying, slow targets. The arrival of NASAMS, IRIS-T SLM, and Patriot PAC-3 systems from Western partners transformed Ukraine's defensive capacity. NASAMS, using AIM-120 AMRAAM missiles, achieved over 85% success against cruise missiles at ranges of 25–30 km. IRIS-T SLM, guided by infrared sensors, proved highly effective against radar-evading or terrain-hugging targets. Patriot PAC-3 interceptors, though expensive ($4–6 million each), successfully defeated Russian Kinzhal hypersonic missiles, disproving Moscow's claims of their invulnerability [14; 15; 16].

Each system covers a distinct operational envelope. NASAMS excels at medium altitude but is uneconomical against drones; the S-300 remains capable but vulnerable to jamming; and short-range Gepard gun systems, supplied by Germany, demonstrated exceptional efficiency against low-flying drones using AHEAD programmable ammunition [35].

Picture No. 2. Modern air defense components

Source: https://en.wikipedia.org/wiki/Anti-aircraft_warfare#/media/File:DGLC_systemen.jpg

Ukraine's Defense evolved into a five-layer architecture:

1. Upper Tier (40–100+ km) – Patriot PAC-3 MSE for ballistic missile defense.

2. High Tier (10–25 km) – SAMP/T and S-300 against aircraft and cruise missiles.

3. Medium Tier (2–10 km) – NASAMS, IRIS-T, and Buk-M1 against cruise missiles and aircraft.

4. Low Tier (0–2 km) – Gepard and MANPADS against drones and helicopters.

5. Point Defense (0–500 m) – RF jamming, directed energy, and small-caliber weapons.

This layered system imposes a cumulative attrition effect on incoming raids. Even partial success can reduce an attacker's strike efficiency by 60–80 %, rendering large-scale bombardments economically unsustainable [28].

Israel: From Iron Dome to Iron Beam

Israel's conflicts with Hamas in 2023 and the Iranian missile attacks of April 2024 validated technologies that many Western militaries still regard as experimental. Facing persistent rocket and missile threats from Hezbollah, Hamas, and Iran, Israel has built the world's most combat-tested integrated air defense network.

Iron Dome and David's Sling

Operational since 2011, Iron Dome has intercepted over 4,500 rockets and missiles, maintaining success rates above 90 %. Each Tamir interceptor ($50,000–80,000) is vastly cheaper than the economic damage it prevents. During the October 2023 escalation, over 1,500 targets were engaged in 72 hours, with ammunition resupply (not system performance) becoming the limiting factor [11; 12].

David's Sling bridges the medium range (40–300 km) using the Stunner missile, jointly developed by Rafael and Raytheon. Its hit-to-kill mechanism with a small fragmentation warhead proved highly effective during the April 2024 Iranian strike, which included more than 300 ballistic and cruise missiles and drones [11; 12].

Arrow 3: Exo-Atmospheric Defense

In November 2023, Israel's Arrow 3 achieved its first combat intercept against a Houthis' ballistic missile launched from Yemen toward Eilat. The intercept, occurring above 100 km altitude, demonstrated Israel's ability to engage intermediate-range ballistic missiles outside the atmosphere. It not only expands engagement opportunities but also provides early warning and civil defense advantages [11; 12; 14].

Iron Beam: The Laser Revolution

The most transformative innovation is Iron Beam, a 100-kilowatt-class laser system that entered service in 2025. Capable of destroying drones, mortars, and rockets within 7 km, its per-shot

cost—around $1–3—marks a fundamental shift in the economics of air defense. Whereas Iron Dome's missiles are cost-effective only against high-value targets, Iron Beam's near-zero marginal cost makes mass drone attacks economically untenable for adversaries. Israel projects that widespread deployment could reduce the need for missile interceptors by 50–70 %, enabling virtually unlimited defensive endurance as long as power is available [11; 12; 13].

The system's limitations — very similar to those of drones — degrade performance in rain, fog, or storms, and its need for line-of-sight is outweighed by its potential to provide persistent, low-cost protection for critical sites. Directed-energy weapons thus represent a paradigm shift in affordable, sustainable air defense.

Poland's IBCS Integration Model

Poland's modernization of its air defenses provides a template for Baltic regional integration. Replacing Soviet-era systems, Warsaw launched two major programs: Wisła (Patriot PAC-3+) and Narew (CAMM-ER), covering high and medium altitudes respectively. Both are integrated through the Integrated Battle Command System (IBCS), developed by Northrop Grumman. IBCS enables any sensor to cue any launcher, regardless of origin. A Patriot radar in eastern Poland can detect a threat and direct a Narew battery 150 km away to engage it. The system fuses data from ground radars, airborne early warning aircraft, fighters, and satellites into a single air picture and calculates optimal engagements using AI-assisted algorithms. In September 2024, Poland successfully conducted a live-fire demonstration integrating Narew with IBCS—the first outside U.S. forces—achieving an engagement effectiveness of over 95 %. The first IBCS-enabled brigade reached operational readiness that December, ahead of schedule [16; 17; 18]. For the Baltic States, integration with Poland's IBCS would extend a shared defensive umbrella across the region.

Counter-Drone Defense: The Neglected Layer

While high-end air defense has received the most investment, the expansion of small drones has exposed a dangerous capability gap. Ukraine's experience shows that every unit and necessary installation requires organic counter-UAS systems. Russian reconnaissance drones continuously orbit Ukrainian positions, adjusting artillery fire. Units lacking anti-drone defenses suffer 3–4 times higher casualties [35].

Effective counter-UAS systems already exist:

a. Kongsberg CORTEX Typhon (Norway) combines RF detection, electro-optical tracking, and either kinetic or jamming defeat. It can autonomously engage drones up to 3 km away within 10 seconds of detection [35].

b. Rafael Drone Dome (Israel) employs radar tracking and laser or kinetic interceptors, achieving over 90 % success against drones. Overlapping deployments create robust coverage [36].

c. Leonardo Falcon Shield (Italy/UK) integrates RF, radar, and electro-optical sensors with jamming, spoofing, and kinetic defeat options. It can distinguish hostile drones from civilian or biological objects, crucial for operations in populated areas [37].

Implications for the Baltic Air Defense Architecture

1. Layered Defense is necessary. No single system can address threats from ground level to space. Baltic States must supplement NASAMS with low-altitude gun and laser systems and upper-tier defenses such as Patriot and Arrow 3, potentially through partners.

2. Integration Outweighs Individual Performance. As Poland's IBCS experience shows, a networked defense ecosystem of moderate systems can outperform isolated high-end systems. Regional adoption of IBCS—or a NATO-standard equivalent—would enable shared situational awareness and coordinated response.

3. Ammunition Depth Defines Endurance. Ukraine's constraint lies in its interceptor stockpiles, not in its launchers. Sustained

Defense requires pre-positioned reserves of thousands of missiles—AIM-120, GEM-T, MSE, CAMM-ER—and large quantities of AHEAD ammunition.

4. Organic Counter-Drone Protection is Essential. Even a single reconnaissance UAV increases artillery lethality by 300–400 %. Every unit, military installation, logistics hub, and air defense site must possess its own counter-UAS capability. For Lithuania, adequate coverage may require 200–300 systems across military and key civilian infrastructure.

5. Directed-Energy Weapons Merit Immediate Investment. Israel's 2025 deployment of Iron Beam will provide operational data. If performance meets expectations, early Baltic participation in laser defense programs could yield decisive cost and endurance advantages.

Third Tendency: Electronic Warfare & Spectrum Dominance

Electronic warfare (EW) is now as decisive as kinetic firepower. While missiles destroy physical targets, EW can neutralize entire formations by disrupting their ability to communicate, navigate, or employ precision weapons. In Ukraine, both sides describe the front not merely as a physical line but as an "electromagnetic wall" where GPS signals vanish, radios fail, and drone control links collapse within seconds. For the Baltic region, this is not theoretical. Russian EW systems based in Kaliningrad already interfere with civilian aviation, maritime navigation, and GPS-dependent infrastructure across northern Europe.

Kaliningrad: Russia's Western EW Fortress

Since 2022, NATO intelligence and civilian monitoring organizations have documented sustained GPS jamming and spoofing originating from Kaliningrad. Finland's Transport and Communications Agency reported over 1,500 GNSS interference incidents between 2023 and 2024, traced to emitters in Kaliningrad

and the Kola Peninsula [23]. Estonia and Norway recorded similar disruptions affecting air and maritime navigation [22; 23].

Simple jamming overwhelms GPS signals with noise, forcing fallback to inertial navigation. Spoofing, however, emits counterfeit signals that deceive receivers into misreporting their position—potentially placing aircraft or ships hundreds of meters off course. In April 2024, Finnair suspended flights to Tartu, Estonia, after GPS spoofing caused positional errors exceeding 300 meters during approach [24]. Riga and Vilnius experienced similar disruptions but continued operations using non-GPS procedures.

The interference extends beyond military use. Commercial vessels in the Baltic increasingly report GPS anomalies, forcing them to rely on radar and visual navigation. Agriculture reliant on GPS-guided tractors experiences intermittent positioning errors, while emergency services report dispatch disruptions requiring manual navigation [22; 23; 24].

Tactical Electronic Warfare: The Ukrainian-Russian Duel

The Ukrainian battlefield has become an unprecedented EW laboratory—a continuous cycle of adaptation and counter-adaptation. Russia's early dominance in 2022 stemmed from systems like Pole-21, Leer-3, and Tirada-2, which jammed communications, drones, and satellite links across vast areas. The Leer-3, mounted on KAMAZ trucks and employing the Orlan-10 drone as an airborne jammer, generates a 6 km "dead zone" where cellular, GPS, and radio communications collapse. Orlan-10's altitude and mobility extend this jamming bubble beyond the horizon. Ukrainian soldiers describe Leer-3 zones as areas where "nothing digital survives."

Meanwhile, Tirada-2S targets Ukraine's reliance on Starlink satellite communications. By jamming specific satellite frequencies, Russian forces force Ukrainian units to constantly reposition terminals or adopt mesh networks, where the loss of a single node does not collapse the system. Ukraine countered by using burst transmissions—sending compressed data in seconds, then shutting

terminals to evade direction finding [22; 28].

Ukrainian adaptation evolved through three generations:

1. *Emissions discipline:* limiting radio use, employing frequency hopping, and separating transmitters from command posts by 100–200 m to prevent geolocation. Effective but at the cost of tempo and coordination [28].

2. *Technical hardening:* adoption of fiber-optic drone control, digital burst radios, and NATO-standard frequency hopping. Western-supplied systems like the WARMATE loitering munition now target active Russian jammers directly—turning EW emissions into homing beacons [28].

3. *Autonomous operations:* drones and uncrewed vehicles increasingly operate without electromagnetic links, guided by inertial navigation, visual terrain matching, or AI-based computer vision. Ground UGVs use tethered cables immune to jamming; artillery integrates inertial guidance and terrain contour matching to strike even under complete GPS denial [22; 28].

Both sides experience dramatic declines in precision under heavy EW pressure. In high-interference zones, the accuracy of GPS-guided artillery (e.g., M982 Excalibur, GMLRS) drops by 60–80%, often reverting to unguided trajectories. Russian GLONASS-guided Krasnopol rounds show similar degradation when targeted by Ukrainian jamming. The result is a partial reversion to World War II–style artillery practices—massed fires, preplanned barrages, and time-on-target methods [22; 28].

Implications for the Baltic Region

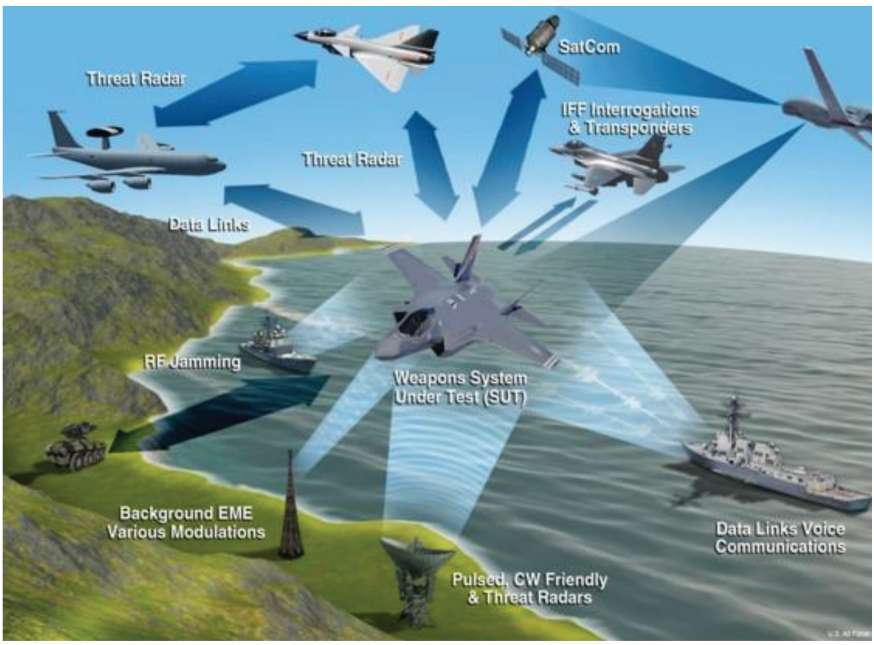
1. Prepare for GPS Denial. Baltic defense planning must assume GPS denial from the outset of any conflict. Military units, civilian infrastructure, and emergency services should maintain functionality under complete signal loss. It requires:

a. Alternative navigation systems: integration of eLORAN, advanced inertial navigation, and terrain contour matching.

b. Training and exercises: practice GPS-denial drills across

armed forces and critical agencies to expose vulnerabilities and refine manual procedures [22; 23; 24].

2. Decentralized and Organic EW Capabilities. EW must be integrated at every echelon. Ukraine's experience shows that spectrum survival cannot depend solely on specialized units. Battalion-level forces need organic direction-finding, jamming, and cyber-electronic specialists capable of autonomous operation. NATO's current model—concentrating EW assets at the brigade or division level—must be restructured to achieve distributed resilience [22; 28].



Picture No. 3. Electronic Warfare integration

Source: Quest Global

3. Redundancy and Network Diversity. Resilient communication depends on redundant, multi-path networks. Baltic military C2 should employ concurrent channels—satellite, HF/VHF radio, and civilian networks—with automatic failover mechanisms. Though complex and costly, this approach prevents total C2 collapse during

the critical opening hours of a conflict [25; 26; 27].

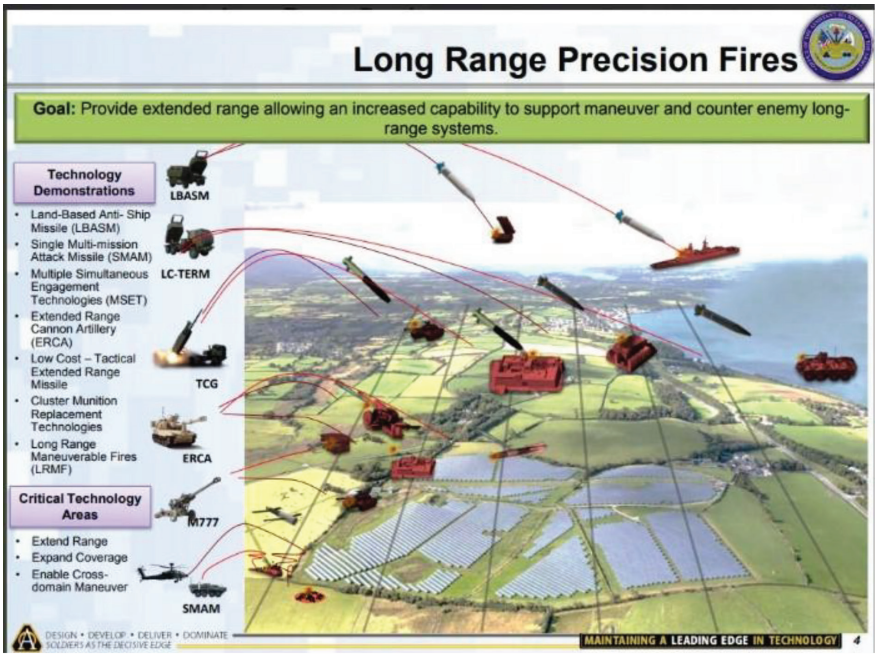
4. Develop Offensive EW Capabilities. Defensive hardening is insufficient. Baltic forces must acquire offensive EW systems capable of locating and neutralizing Russian emitters. Capabilities should include anti-radiation missiles, loitering munitions with EW seekers, and cyber-electronic attack tools that inject false data rather than simply jamming signals [22; 28]. Creating temporary "windows of electromagnetic opportunity" will be essential to restoring GPS-guided weapon functionality.

5. Continuous Spectrum Monitoring. The Baltic States must maintain 24/7 electromagnetic surveillance to map Russian EW activity, catalog system signatures, and track changes in deployment. Persistent monitoring supports both operational planning and intelligence warning. Continuous data collection also informs diplomatic engagement and regional safety coordination [22; 23; 24].

6. Regional Coordination and Integration. EW effects transcend borders. Kaliningrad's emissions affect Poland, Lithuania, Latvia, Finland, and Sweden simultaneously. A regional shared electromagnetic operating picture (EOP)—integrated through NATO and Nordic frameworks—should mirror Poland's IBCS air defense integration. Shared threat intelligence, synchronized offensive targeting protocols, and collective defensive measures are essential to manage cross-border interference [16; 17; 22].

Forth Tendency: Fusion of Fires – The Kill-Web Paradigm

Traditional warfare followed a linear "kill chain": detect, decide, deliver, assess. Each phase relied on manual handoffs, which often took hours or days. The kill-web replaces this with distributed, parallel decision-making. Multiple sensors—satellites, aircraft, UAVs, radars, SIGINT nodes, or human observers—feed a shared targeting picture. Any available shooter—artillery, rocket systems, aircraft, or drones—can engage any target within range. Decision authority is decentralized to whoever holds the best situational position [39].



Picture No. 4. Land component long-range fires system

Source: U.S. Army

Tactical Kill-Web: Artillery–Drone Integration

At the tactical level, Ukraine has operationalized kill-web principles by integrating artillery and drones, transforming how fires are planned and executed. Artillery batteries now deploy organic drone teams—typically, three to five UAVs per battery—to detect, target, correct, and assess without higher-echelon coordination [28].

1. Detection: Reconnaissance drones (R-18, DJI Mavic) patrol at altitudes of 300–800 m, using EO/ IR sensors to spot targets.

2. Targeting: Software such as KROPYVA and DELTA automatically convert visual bearings into precise coordinates, cutting the sensor-to-shooter cycle from 30 minutes to under 90 seconds [25; 28].

3. Engagement: Digital fire missions are transmitted directly to systems such as the M109 Paladin or the M777. Guns fire within two minutes of detection.

4. Adjustment: Drones observe impacts and relay corrections ("left 50, add 100"), enabling accurate fires within 8–12 minutes from first contact.

5. Assessment: Drones verify destruction; FPV drones or precision munitions engage surviving targets.

This rapid cycle enables Ukrainian artillery to respond in near real time. Russian troops report that Ukrainian guns can strike within minutes of detection, forcing continuous dispersion, deeper entrenchment, and near-constant air-defense vigilance—reducing operational mobility and morale [28].

Deep Fires and Strategic Integration

Fusion of fires extends beyond tactical engagements to deep operations targeting command, logistics, and air-defense infrastructure. Ukraine employs a tiered strike network combining Western and domestic systems:

1. HIMARS/M270 (GMLRS, ATACMS): precision strikes up to 300 km, used to destroy Russian airfields and logistics hubs.

2. Storm Shadow / SCALP-EG: 250+ km range cruise missiles enabling high-precision strikes on command centers and naval facilities in Crimea.

3. Modified Neptune missiles: repurposed anti-ship weapons for land attack, providing domestically produced long-range capability.

4. Long-range UAVs (Beaver, Morozko, Sapsan): one-way attack drones reaching 1,000 km, striking airfields and refineries deep inside Russia at minimal cost [28; 33; 34].

The logic of deep fires is cumulative paralysis: destroying command nodes delays decisions, eliminating depots depletes supplies, neutralizing air defenses opens corridors for follow-on strikes, and attacks on airfields erode air superiority. When

synchronized, these effects cascade—forcing adversaries into reactive cycles of repair and relocation rather than initiative [28; 39].

Picture No. 5. Long-range fires

Source: https://www.defenceconnect.com.au/joint-capabilities/16248-us-army-successfully-demonstrates-joint-integrated-fires-capability

Implications for the Baltic Region

Despite progress, the Baltic region lacks a fully functional fire-fusion architecture. Lithuania, Latvia, and Estonia operate primarily short-range systems, while Poland fields more robust rocket and artillery forces. To achieve credible deterrence and rapid response, the following measures are essential:

1. Acquire Long-Range Precision Fires. Given the narrow geography and short warning times, long-range precision fires—HIMARS (185 km with GMLRS-ER, 300+ km with ATACMS), European EuroPULS or similar—should be top priorities. The ability to engage targets in Kaliningrad or Belarus before border crossings could decisively delay aggression.

2. Institutionalize Artillery–Drone Integration. Each artillery battalion should maintain organic UAV reconnaissance and digital

fire-direction capabilities. The required investment ($200K–$400K per battalion) yields exponential gains in responsiveness and accuracy [28].

3. Develop Indigenous Deep-Strike Options. The Baltic States should explore long-range drones or shared access to cruise missiles, such as Storm Shadow, to strike targets within 300–500 km. The capability to threaten key Russian nodes—particularly in Kaliningrad or Belarus—enhances deterrence and autonomy.

4. Integrate Fires Planning with Poland and NATO. Fusion requires shared targeting data, synchronized timing, and de-confliction across national boundaries. Integration with Poland's artillery command systems and NATO's joint fires networks would enable coordinated strikes against high-priority targets.

5. Exercise "Blind → Strike → Exploit" combat sequence. Regular multinational exercises should replicate a combat sequence—drones blinding defenses, precision fires striking, and maneuver forces exploiting. It builds interoperability and procedural fluency necessary for real combat.

Fifth Tendency: Maneuver Under Fire — Combined Arms Must Reboot

The dominant defensive effects witnessed on Ukrainian battlefields since 2022 have led some observers to proclaim the "death of maneuver." That conclusion is premature. Maneuver remains possible but conditional: it now requires deliberate creation and preservation of enabling conditions through integrated combined-arms effects. The failures and limited successes of 2023–2024 operations reveal what must change—doctrine, organization, equipment, and training—if offensive maneuver is to survive in a high-intensity, ISR-saturated battlespace.

1. Maneuver Is Conditional, Not Obsolete

Modern defensive lethality—dense mines, precision fires, ubiquitous reconnaissance (FPV drones, loitering munitions), and pervasive electronic warfare—has raised the cost of traditional mechanized assaults. Where once the combined-arms recipe (artillery suppression, tanks leading, IFVs following) worked under air superiority and friendly ISR, today those tactics can be catastrophic unless enabling conditions (suppressed sensors, cleared lanes, local EW control, and effective counter-UAS) are established and maintained throughout the operation [28].

2. The 2023 Ukrainian Offensive: Lessons in What Not to Do

Ukraine's June 2023 counteroffensive toward the Sea of Azov began with modern westernized brigades (Leopard 2s, Bradleys, NATO training) and plentiful artillery. Despite advantages, by September the advance stalled—fewer than 20 km gained against an 84-km objective, heavy equipment losses, and no sustained breaches of prepared Russian defenses [28].

A representative tactical disaster (June 8, 2023, near Mala Tokmachka) highlights systemic failures. Approximately ten Leopard 2A6 tanks, 20 Bradley IFVs, and engineer vehicles advanced along a predictable axis into mine belts (500–1,000 m deep), pre-sighted artillery, overlapping ATGM ambushes, and constant FPV/drone overwatch. Mine immobilized vehicles; Lancet loitering munitions and FPVs struck immobilized platforms; infantry could not dismount in the kill zone. Result: multiple tanks and IFVs destroyed or disabled within minutes, no breach achieved, and the assault force forced to withdraw with heavy losses [28].

Identified flaws:

a. Insufficient breaching assets. Few MICLICs, no integral mine rollers/ plows on lead vehicles—engineer support was too scarce and fragile.

b. Inadequate suppression. Preparatory fires failed to neutralize

deeply dug, overhead-covered ATGM and gun teams positioned outside their engagement corridors.

c. EW / counter-UAS gaps. Battalion- and company-level counter-drone and EW capabilities were limited, allowing enemy drones to target and direct fire with impunity.

d. Predictable tactics and timings. Assault axes and timings followed doctrinal templates easily anticipated and prepared for by defenders.

3. Russian Offensive Struggles: Quantity ≠ Decisive Breakthrough

Conversely, Russian offensives from late 2023 through 2025 demonstrate that numerical superiority and artillery mass do not guarantee decisive maneuver. Operations such as Avdiivka (Oct 2023–Feb 2024) yielded scant territorial gains at extremely high casualty rates—thousands of personnel committed for incremental advances—illustrating how modern defenses blunt mechanized breakthroughs even against massed fires [28].

Russian adaptations included:

a. Small-unit infiltration (night, terrain exploitation) to reduce exposure to drones.

b. Artillery mass to suppress and attrit rather than achieve precise destruction.

c. Glide bombs (FAB-500/FAB-1500 kits) to defeat hardened positions.

d. Attritional acceptance: committing large numbers of infantry despite heavy losses to achieve incremental ground.

These tactics yielded occasional success but at social, political, and human costs that challenge long-term sustainability.

4. Where Maneuver Still Works: Enabling Conditions

A successful maneuver persists when attackers create or exploit enabling conditions.

a. Kharkiv counteroffensive (Sept 2022) — rapid operational

surprise, deception drawing Russian reserves elsewhere, and swift exploitation produced a 50–70 km advance in 48 hours. Success depended on surprise, speed, and thin, unprepared Russian defenses [28].

b. Israeli raids in Gaza (2023–) — limited, time-bounded incursions succeeded where ISR and fires suppressed enemy observation and strike capabilities ("blind → strike → exploit"), combined with robust engineer, C-UAS, and medevac support to reduce exposure [29; 30].

c. Vuhledar (Oct 2024) — Russian capture followed extensive breaching, envelopment, and sustained suppression rather than frontal shock: deliberate engineer preparation, multi-axis maneuver, and continuous fires produced results with fewer catastrophic losses than prior assaults [28].

These examples share core enablers: deception and surprise; rapid exploitation; robust, organic breaching and engineer assets; integrated EW and counter-drone measures; and synchronized fires and mobility.

5. Principles of Combined-Arms 2.0

Derived from recent operations, a successful modern maneuver requires doctrinal and structural changes:

a. Maneuver must be enabled, not assumed. Attackers must deliberately create windows—suppress sensors, neutralize fires, breach obstacles, and control the electromagnetic environment—often hours to days before movement, and sustain those conditions during exploitation [28; 39].

b. Engineers must be organic and abundant. Breaching is a routine combat requirement. Mechanized battalions need integral mine-clearing line charges, plows/ rollers, explosive breaching capability, and specialist teams amounting to a much higher fraction of force structure than current NATO norms—possibly ~15–25 % of maneuver strength [28].

c. Counter-drone and EW are integral. Every company (possibly

even every platoon) requires counter-UAS; every battalion needs EW assets. Dependence on corps-level or external EW is insufficient when small drones and loitering munitions operate at platoon-company scale [28; 35].

d. Obscuration and tempo management. Smoke, aerosols, and movement in limited-visibility windows are essential. Accepting reduced friendly situational awareness may be necessary to deny enemy observation and targeting.

e. Systematic deception. Realistic decoys, signature simulation, and movement discipline are essential to draw enemy fire and waste it.

f. Exploit quickly and ruthlessly. Breakthroughs must be exploited within the short window before defenders reconstitute—often within 6–12 hours. It requires risk tolerance: bypassing some threats, operating with tenuous supply, and accepting isolated cut-off elements to maintain tempo.

Implications for Baltic Defense and Counterattack Capacity

For Lithuania, Latvia, Estonia, and Poland, these lessons translate into concrete priorities:

a. Build mechanized counterattack formations optimized for rapid, short-warning exploitation: modern MBTs, heavy IFVs, organic engineers, and embedded EW/ counter-UAS. One or more brigade-equivalent maneuver formations, not just territorial defense battalions, are necessary to counter and restore territory credibly [19].

b. Integrate maneuver tightly with fires and air defense. Counterattacks must operate under a protective umbrella: suppressive fires, continuous EW/C-UAS, and layered air defense to enable movement and shield logistics [16; 17; 39].

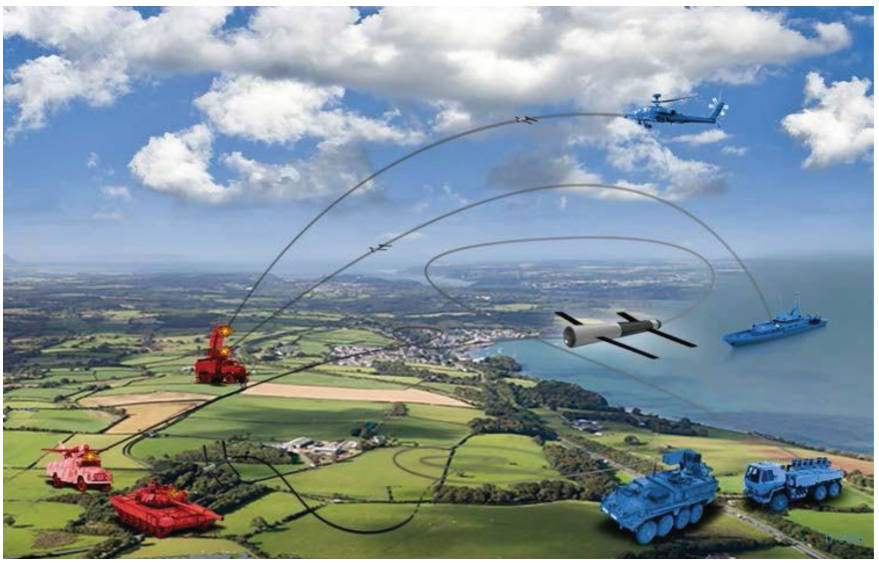
c. Institutionalize engineering and breaching at low echelons. Equip battalions with MICLICs, rollers/ plows, demolition capability, and trained assault breaching teams.

d. Prioritize night and limited-visibility operations. Invest in

thermal optics, night training, and doctrine emphasizing dusk/night exploitation windows where ISR effectiveness is reduced [28].

e. Regular offensive exercise program. Annual brigade-level offensive exercises—breach, exploit, link-up—are essential for building doctrinal competence and the command-to-unit muscle memory required for rapid combined-arms maneuver [39].

f. Scale C-UAS and EW distribution. Field organic counter-drone suites at the platoon-company level and battalion EW cells to contest enemy ISR and protect movement corridors [28; 35].



Picture No. 6. Multidimensional maneuver with integrated fires

Source: U.S. Army

Five Recommendations on Adapting to Emerging Warfare Tendencies

Colonel John Boyd's OODA loop insight perfectly captures the essence of military adaptation: "He who can handle the quickest rate of change survives."[43] The five tendencies examined above—drone proliferation, layered air defense, electromagnetic warfare, fires fusion, and conditional maneuver—collectively describe a transformed battlefield where success depends less on platform superiority than on systemic integration, adaptation speed, and institutional agility. The following five recommendations are explicitly outlined for Lithuania. Still, Latvia, Estonia, and Poland should consider them as well, since adaptation for the Baltic region is not merely desirable but existential.

First Recommendation: Build Defense Industrial Capacity and Prioritize Essential Acquisitions

Sustained high-intensity conflict rewards nations that can produce and reload—from artillery shells and air defense interceptors to drones and decoys. Ukraine's experience demonstrates that Western aid, while essential, cannot substitute for organic production capacity. During critical periods in 2022–2023, Ukrainian artillery operations were constrained not by the number of available guns or trained crews, but by the availability of shells. Western production, optimized for peacetime efficiency rather than wartime surge, struggled to meet Ukrainian requirements even as European and American stockpiles depleted to levels many defense officials privately described as "dangerously low" [31; 33].

Ukraine's response provides a model for Baltic adaptation. Beginning in late 2022, Ukraine prioritized domestic production of three critical categories: ammunition components (propellants, fuzes, explosive fills), unmanned systems (aerial and maritime drones), and mines (anti-tank and anti-personnel). By mid-2024, Ukraine had achieved approximately 50 % self-sufficiency

in drone production, manufacturing over 100,000 units monthly across multiple categories. The Sapsan ballistic missile moved to serial production after combat validation. In contrast, Bohdana-BG 155mm howitzer production ramped to a meaningful scale—shortening the demand-to-factory-to-front loop that determines whether battlefield lessons translate into fielded capabilities in months rather than years [31; 33; 34].

For Lithuania, priority investments should focus on:

1. Ammunition Production Infrastructure, potentially in partnership with Germany, Poland, and Nordic states. Initial production could focus on 155mm artillery shells—the highest-volume consumable in modern warfare—using imported explosive compounds but developing domestic assembly and quality control capabilities. Projected requirement: capacity to produce 150,000–500,000 rounds annually, sufficient to sustain prolonged defensive operations without complete dependence on other supply chains [31; 33].

2. Drone Manufacturing: The Baltic region possesses substantial electronics manufacturing and software development sectors that could pivot to military drone production. Estonia's Milrem Robotics already produces THEMIS uncrewed ground vehicles for international markets. Expanding this base to include FPV strike drones, reconnaissance UAVs, and loitering munitions would provide both domestic supply security and potential export revenue. Target capacity for Lithuania: 10,000–30,000 tactical drones monthly—sufficient to support defensive operations by territorial and regular forces [28; 31].

3. Mine Production: Modern anti-tank and anti-personnel mines with remote activation, self-destruct mechanisms, and reduced environmental persistence represent critical defensive capabilities. The Baltic Defense Line concept requires tens of thousands of mines to be effective. Rather than stockpiling foreign-produced systems vulnerable to supply interruption, Lithuania should develop licensed production of proven mine designs. Poland's experience with domestic mine production under license

provides a template [19; 20].

4. Critical Subsystem Imports: Full autarky is neither achievable nor necessary. Lithuanian production should focus on high-volume consumables and items where domestic production provides a strategic advantage. Advanced systems—NASAMS interceptors, precision-guided artillery—should continue as foreign acquisitions, but with contractual guarantees of priority delivery and pre-positioned stockpiles sufficient for 90-day sustained operations [16; 17].

Second Recommendation: Complete the Baltic Defense Line and Integrate with Coalition Air Defense

The Baltic Defense Line represents the most comprehensive defensive infrastructure project undertaken by the Baltic States since independence. Properly implemented, it will create successive obstacle belts, prepared defensive positions, and integrated fire control networks that dramatically increase the cost of any Russian offensive while buying time for NATO reinforcement. However, current implementation risks creating a "Maginot Line" phenomenon—impressive fortifications that enemies bypass or overcome through adaptation—unless several critical elements are addressed [19; 20; 21].

1. Complete the Three-Layer Defense Architecture: Current plans envision obstacle belts, anti-tank ditches, and prepared fighting positions. These must be complemented by:

a. Deliberate Decoy Systems: Every strongpoint should include realistic decoys—thermal-simulators, dummy vehicles, and false communications emissions—positioned to draw enemy reconnaissance and fire away from actual defensive positions. Russian experience in Ukraine shows that decoys, when properly employed, can account for 40–60 % of enemy precision strikes during initial engagement phases [28].

b. Pre-Positioned Artillery Support: Every defensive position should have pre-calculated artillery fire missions, with ammunition pre-positioned at firing batteries. This allows immediate, responsive

fires when enemy forces approach, rather than requiring real-time fire-mission processing during combat.

c. Counter-Drone Protection: Each major strongpoint requires organic counter-UAS capabilities—RF jammers, directed energy weapons where available, and gun systems providing 360-degree coverage. Ukrainian experience shows that defensive positions lacking counter-drone protection suffer 3–4 times higher casualties from artillery compared to protected positions [35; 36; 37; 38].

2. Integrate Layered Air Defense: The Baltic Defense Line's ground obstacles must be protected by airspace denial. Current NASAMS and M-SHORAD deployments provide a foundation, but require expansion:

a. High-Altitude Layer: Integration with Poland's Patriot batteries and potential acquisition of Arrow-3 (following Germany's model) to provide ballistic missile defense over critical nodes—capitals, high-value bases, units and headquarters, logistics hubs [14; 15; 16].

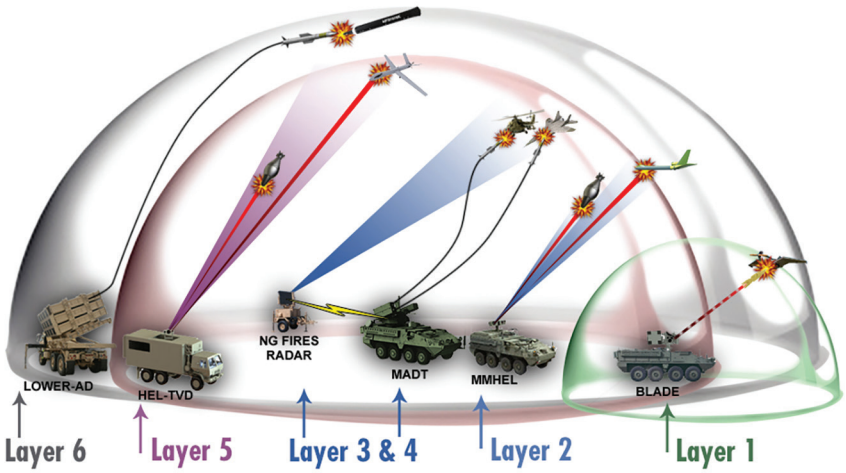
b. Medium-Altitude Layer: Expand NASAMS coverage to provide overlapping engagement zones across the entire Baltic Defense Line. Target: 360-degree coverage at 25+ kilometer range across all territory within 50 kilometers of potential invasion routes [16; 17].

c. Low-Altitude Layer: Deploy gun-based systems (Gepard, SKYNEX, or equivalents) and directed energy weapons at the battalion level and for vital facility protection. Every combat battalion operating along the defense line should have organic short-range air defense [35].

3. Connect to Polish IBCS: Lithuania has already begun integration with Poland's Integrated Battle Command System. Latvia and Estonia must accelerate similar integration, creating a unified air picture from the Polish border through the Baltic capitals to the Estonian-Russian border. This allows any sensor to cue any shooter, maximizing efficient use of limited interceptor inventories [16; 17].

4. Protect Critical Mobility Infrastructure: The Suwałki

Corridor and major bridges across the Nemunas, Daugava, and other rivers represent potential chokepoints. Prepare demolition plans for emergency denial, but equally important, pre-position bridge-laying equipment and materials for rapid reconstruction. The goal is to deny the enemy easy use while retaining friendly mobility restoration capability [19].



Picture No. 7. Example of layered air defense

Source: https://www.armyupress.army.mil/Journals/NCO-Journal/Archives/2020/October/Modernizing-Multi-Domain-Operations-for-Large-Scale-Combat-Operations/

Third Recommendation: Acquire Long-Range Precision Fires and Exercise Fusion

The ability to strike enemy forces before they cross borders, to interdict logistics sustaining any invasion, and to destroy command posts directing operations represents a force multiplier that small nations cannot afford to forego. Ukrainian success in degrading Russian logistics, destroying ammunition depots, and eliminating high-value targets deep in occupied territory demonstrates that long-range fires are not merely helpful but potentially decisive [5; 6; 28; 39].

Acquisition Priorities:

1. HIMARS or European Equivalent: The United States' M142 HIMARS system, firing GMLRS rockets (70–80 km range) and ATACMS missiles (300+ km), has proven itself in Ukrainian service as reliable, accurate, and survivable. European alternatives under development—including the EuroPULS modular launch system—may offer comparable capabilities while reducing dependence on U.S. export controls. Baltic States should acquire sufficient launchers to provide each brigade with organic precision fires: target should be a 12–24 launchers per state, with Poland providing additional fires under integrated planning [39].

2. Stand-Off Precision Weapons: Storm Shadow/ SCALP-EG cruise missiles or equivalent systems (potentially including domestically-produced long-range drones similar to Ukraine's Sapsan) provide capability against heavily-defended targets—air defense radars, command bunkers, logistics hubs—beyond HIMARS range. Even limited inventories (50–100 missiles) provide substantial deterrent value by holding at risk Russian military infrastructure in Kaliningrad and adjacent areas [5; 6; 33; 34].

3. Integration with NATO Deep Fires Network: Baltic acquisitions should prioritize systems compatible with NATO fire control networks, allowing integration with Polish, German, and broader alliance fires planning. The goal is not autonomous capability—Baltic states cannot match Russian mass fires—but rather integration into a coalition fires architecture where Baltic sensors can cue NATO shooters and vice versa [39].

4. Exercise the "Blind → Strike → Exploit" Sequence: Acquiring systems is insufficient without doctrinal development and training. Baltic and Polish forces should conduct frequent exercises practicing the operational sequence validated in Ukrainian and Israeli operations:

a. Blind Phase: Use drones, EW, and, if necessary, anti-radiation weapons to suppress or destroy enemy air defense radars and surveillance systems, creating temporary windows of reduced

defensive capability.

b. Strike Phase: Employ precision fires—HIMARS, cruise missiles, or strike aviation—against high-value targets during the "blind" window, before enemy defenses reconstitute.

c. Exploit Phase: Commit maneuver forces or follow-on strikes to exploit the disruption created, preventing enemy recovery and maximizing operational effect [5; 6; 8; 9; 10; 39].

This sequence requires sophisticated coordination between intelligence assets, EW units, fires cells, and aviation—precisely the type of integration that cannot be improvised during a crisis but must be developed through repeated training.

Forth Recommendation: Develop AI-Enabled ISR Fusion and Decision Superiority

The modern battlefield generates data at volumes that exceed human processing capacity. Ukrainian forces routinely monitor hundreds of reconnaissance drone feeds simultaneously, process thousands of intercepted communications hourly, and track tens of thousands of potential targets across operational depth. Traditional intelligence analysis—human analysts reviewing footage, writing reports, briefing commanders—cannot keep pace with this data flood. The side that can automate intelligence fusion, accelerate decision-making, and compress the OODA loop from detection to engagement wins [28].

Ukraine's AI Implementation Provides Proof of Concept: Ukrainian forces have fielded AI-powered drone swarms in which 3–8 drones coordinate autonomously, with AI algorithms allocating roles in flight—determining which drone strikes, which provides reconnaissance, and which conducts electronic warfare—without constant human control. It reduces operator workload, maintains mission effectiveness even under jamming, and allows operations at scales impossible with purely human control [28].

The DELTA battlefield management system employs AI-assisted target recognition, automatically identifying vehicles,

personnel concentrations, and defensive positions from drone footage and immediately calculating firing solutions for artillery or precision strikes. Ukrainian artillery crews describe detection-to-engagement timelines compressed from 15–30 minutes using traditional methods to 60–90 seconds with AI assistance—a speed advantage that often determines whether fleeting targets can be engaged before they move or take cover [25; 26; 27; 28].

Implementation Priorities:

1. AI-Assisted ISR Processing: Invest in software systems that can automatically process drone footage, identify military vehicles and personnel, classify targets, and cue operators to high-priority threats. Regionally growing technology sector, AI research capabilities, and software development industry collectively provide a foundation for developing or adapting such systems to Baltic requirements [28].

2. Automated Fire Control Integration: Link ISR processing directly to fire control systems, allowing AI-identified targets to automatically generate fire missions for artillery or drone strikes, subject to human approval before engagement. It maintains human decision-making for lethal force while eliminating time-consuming manual coordinate transfer and fire mission calculation [25; 28].

3. Realistic Training Data: AI systems require thousands of hours of training data to achieve combat effectiveness. The Baltic States should establish partnerships with Ukraine to access real combat footage, signals intelligence samples, and operational data to train AI systems on actual battlefield conditions rather than synthetic scenarios [28].

Fifth Recommendation: Establish a National Joint Experimental Unit

The transformation from recognizing emerging warfare trends to fielding effective capabilities requires more than procurement—it demands systematic experimentation, adaptation, and rapid iteration informed by combat feedback. Ukraine's success in fielding innovative systems stems not from superior research laboratories but from tight coupling between frontline operations and production facilities, allowing battlefield lessons to inform design modifications in days or weeks rather than months or years [28; 31].

Establish a National Joint Experimental Unit with Specific Mandates:

1. Rapid Technology Assessment: Task the unit with continuously monitoring Ukrainian and other combat zones, identifying proven technologies and tactics, and assessing applicability to local requirements. When Ukrainian forces demonstrate effective counter-drone systems, FPV drone tactics, or EW techniques, the experimental unit should acquire examples, test them under local conditions, and provide recommendations within weeks [28; 35].

2. Adaptation and Integration: Foreign systems often require modification for local employment: different communications standards, environmental conditions (local winters differ from the Ukrainian climate), or integration with existing equipment. The experimental unit should conduct this adaptation, developing technical modifications, operating procedures, and training packages that allow rapid fielding to operational units [28].

3. Training Development: Converting equipment into capability requires trained operators and supporting doctrine. The experimental unit should develop training programs, produce instructional materials, and train initial cadres of operators who

can subsequently train wider forces. Ukrainian experience shows that FPV drone piloting can be taught to basic proficiency in 20–30 hours—but only if effective training programs exist [28].

4. Organizational Model: The experimental unit should include representatives from all combat arms—armor, infantry, artillery, engineers, signals, aviation—plus technical specialists in drones, EW, AI, and cyber. Size: approximately 30-60 personnel, supported by an assigned infantry unit for field testing and adaptation into the Armed Forces and authority to execute or request rapid procurement of small quantities of equipment for testing (fast-track acquisition outside normal procurement timelines) and direct access to senior military and civilian leadership to ensure recommendations receive prompt consideration [28].

5. Lithuania's Land Forces or TRADOC could host such a unit. The investment—perhaps around 10–20 € million annually for personnel, equipment, and operations—is modest compared to potential benefits: fielding combat-proven capabilities years faster than traditional acquisition timelines, avoiding expensive investments in systems that combat proves ineffective, and building institutional capacity for continuous adaptation [28; 31].

Conclusion

Carl von Clausewitz observed that "the aim of war should be to render the enemy powerless." [42] In the 21st century, that aim depends fundamentally on two factors: mass and adaptation. Mass—not merely of soldiers or tanks, but of sensors, drones, interceptors, and artillery shells—provides the capacity to sustain operations under attrition. Adaptation—the ability to observe enemy methods, develop countermeasures, and field new capabilities faster than adversaries can adapt—determines who controls the tempo of military (r)evolution [28; 39].

The five tendencies examined in this article—ubiquitous drones transforming reconnaissance and strike operations, layered air defense becoming essential for survival, electronic

warfare determining whether precision systems function, fusion of fires creating synergistic effects beyond individual weapons, and conditional maneuver requiring comprehensive enabling capabilities—collectively describe warfare's transformation into a domain where integration matters more than individual platform superiority, where adaptation speed determines survival, and where small, agile forces can impose disproportionate costs on larger but less adaptive adversaries.

The recommendations presented—building defense industrial capacity, completing and integrating the Baltic Defence Line with coalition air defense, acquiring long-range precision fires, developing AI-enabled decision superiority, and establishing experimental units for rapid adaptation—represent not aspirational goals but operational imperatives. Each recommendation addresses specific vulnerabilities revealed by Ukrainian and Israeli combat experience. Each is achievable within realistic timeframes (2–5 years) and budgets (representing 2.5–3.0 % GDP defense spending sustained over the period). Most importantly, each reinforces the others: precision fires become more effective when integrated with AI targeting; air defense proves more survivable when protected by counter-drone systems; maneuver becomes feasible when enabled by EW and engineer capabilities [28; 31; 38; 39].

The strategic logic is straightforward: properly implemented, these adaptations will make any Russian attack on the Baltic states operationally futile and strategically unaffordable. Not through conventional deterrence—the threat of unacceptable retaliation—but through denial: demonstrating that the Baltic region cannot be quickly overrun, that any invasion would face prepared defenses creating unsustainable attrition, and that NATO would have time to activate Article 5 and deploy reinforcements.

The fog of war remains. Nevertheless, we can choose whether it blinds us or whether we learn to see through it, turning uncertainty into advantage and adaptation into strength.

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