DEFENCE TECHNOLOGY TRENDS

The Central Research Institute of the Armed Forces of Ukraine argued in a paper that emerging and disruptive technologies **(EDTs) are now central to achieving technological superiority** in modern warfare, particularly for Ukraine confronting a larger adversary. Future military advantage will depend less on mass alone and more on the ability to identify, adopt, integrate, and scale advanced technologies faster than adversaries. The authors frame **EDTs as the key enablers of asymmetric advantage, especially for states facing resource imbalances**. Rapid diffusion of new and easily accessible military tech threatens to erode the conventional military edge of even the most advanced powers, including the US, by allowing weaker actors to impose disproportionate costs and strike expensive assets. The paper's central argument is that these technologies should not be treated as separate innovation areas, but as mutually reinforcing capability drivers. For example, AI gains operational value when combined with big data, resilient communications, autonomous systems, space-based sensing, and advanced manufacturing. This convergence can shorten decision cycles, improve C4ISR, enhance survivability, strengthen logistics, and enable precision effects. A separate report extends this argument by showing that **military advantage increasingly depends** not only on drones or munitions themselves, but **on the AI-enabled software layer that selects targets, assigns effectors, and directs force**. Ukraine's Delta battlefield management system illustrates this shift: it integrates sensors, drones, intelligence feeds, and commanders into a real-time operational layer, demonstrating how software can become the organising system behind modern unmanned and autonomous warfare.

The Central Research Institute of the Armed Forces of Ukraine | Foreign Affairs | CSIS

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The DOW is increasingly focused on contested logistics, using AI, machine learning, and advanced autonomous technologies to protect supply chains from kinetic and cyberattacks. Officials emphasise that AI is helping generate higher-quality logistics and sustainment options, improve predictive analysis and accelerate commanders' decision loops. During the military confrontation with **Iran, US commanders reported that AI has allowed them to select targets at ten times the tempo of previous conflicts**. However, this automation has raised profound ethical concerns, exemplified by a Pentagon investigation into whether AI played a role in an accidental strike on an Iranian school that killed 165 children. Internally, the DOW's enterprise generative AI platform, **GenAI.mil, has seen user adoption surge from 80,000 to 1.5 million** in six months. The platform is being used for everything from drafting congressional reports to speeding up the creation of digital twins for weapon development.

National Defense Magazine | NewsMax | Defense Scoop | Wall Street Journal

Ukraine has become a proving ground for AI-enabled, networked warfare, where drones, satellite imagery, electronic warfare tools, AI navigation, and robotic systems are being integrated into real-time C2 networks. These emerging Next Generation C2 and "networked situational awareness" systems aim to give commanders a single, unified view of the battlefield by combining AI-filtered drone feeds, satellite-change detection, electronic warfare actions, and frontline sensor data. Ukrainian units are using these tools to monitor hundreds of miles of front line, identify movement or target shifts quickly, and support faster targeting decisions. The result is a **more transparent battlefield** in which activity can be detected, analysed, and acted upon in near real time.

Washington Post | Wall Street Journal | The Atlantic | Reuters

France is testing Arcadia, its AI-enabled battlefield command system, with NATO allies during the CWIX interoperability exercise in Poland from June 8–26. Developed with French firms including Mistral AI, Safran.AI, Thales, and Airbus, Arcadia is positioned as a **European alternative to Palantir's Maven Smart System**. French officials say the system addresses digital sovereignty concerns and is designed around NATO interoperability standards, open architecture, and decentralised data hubs rather than a centralised cloud.

Defense News

The war in Ukraine is being driven by a sophisticated three-tier drone strategy that combines battlefield disruption, operational strikes, and long-range attacks deep inside Russia. Ukraine is using short-, medium-, and long-range UAVs to hit targets as far as 1,100 miles into Russian territory, including oil refineries, military airfields, bridges, ports, supply routes, railways, and drone-production facilities. A growing focus of this campaign is a "**logistics lockdown**," with Ukrainian drones striking Russian fuel supplies and transport networks up to 100 miles behind the front. These attacks are intended to weaken Russia's ability to move troops, ammunition, and fuel while forcing Moscow to divert resources away from the battlefield to defend its rear areas.

Washington Post | Economist | Bloomberg | CBS | The New York Times | Reuters | Atlantic Council

Airbus Helicopters and Quantum Systems are exploring whether **H145M military helicopters can carry interceptors to detect and defeat hostile swarms of drones**, addressing growing threats during low-altitude operations, takeoff, and landing. At the same time, Airbus is unveiling **new uncrewed platforms** including the U145 autonomous helicopter, U760 Ravenstorm fighter wingman, U740 Valkyrie collaborative combat aircraft, U680 Bird of Prey drone interceptor, and U950 Eurodrone surveillance platform. These systems are designed for missions ranging from air combat and electronic warfare to cargo transport, reconnaissance, and mass-drone defence.

Interesting Engineering | Interesting Engineering

A U.S. Navy autonomous drone boat reportedly completed a first-of-its-kind rescue near the Strait of Hormuz, helping recover the crew of a crashed Apache helicopter off Oman. The 24-foot Saronic Corsair located the crew after roughly two hours in the water, moved them to a safer position, and enabled a rescue helicopter to hoist them out. The mission highlights the growing real-world use of AI-enabled unmanned vessels for rescue, surveillance, and maritime operations. More generally, reflecting the growing role of autonomous systems, **legislative efforts are undergoing in the US Senate to authorize the creation of a four-star Robotic and Autonomous Systems Command**, following what has already been done by Ukraine and Russia with the establishment of dedicated uncrewed system forces.

New York Post | Axios | BBC | Interesting Engineering | Air & Space Forces Magazine

At Eurosatory 2026 **Rheinmetall** showcased its **Containerised Missile Launcher, a modular system that turns standard logistics containers into rapid-launch bases** for FV-014 loitering munitions. The FV-014 combines reconnaissance, long-range operation, and precision strike capability while keeping a human operator in control of lethal engagement decisions. Rheinmetall presents the system as mass-producible, networked, and central to future European battlefield reconnaissance-and-strike operations.

Interesting Engineering

US companies Saronic and Castelion are partnering to **combine Saronic's Marauder autonomous surface vessel** with **Castelion's Blackbeard hypersonic strike system**, in what they describe as the first effort to launch a hypersonic vehicle from an unmanned surface vessel. The companies plan to conduct an at-sea demonstration in **2027**, showing how an uncrewed ship could serve as a mobile launch platform for long-range precision strikes. The partnership is meant to give commanders more launch options across large maritime areas while reducing risk to sailors. It also fits a broader Navy push toward distributed, unmanned systems that can carry advanced payloads and complicate adversary targeting. Marauder is still in testing, but Saronic is expanding production capacity and the Navy is evaluating the vessel through its MUSV marketplace initiative.

Interesting Engineering

France is advancing the **ASN4G hypersonic nuclear cruise missile** as the future core of its airborne nuclear deterrent, with service entry expected around **2035**. The missile being developed by **MBDA** is intended to preserve France's ability to penetrate increasingly advanced air defence systems. After studying both stealth-focused and hypersonic concepts, France selected the hypersonic approach because extreme speed and manoeuvrability can reduce warning time, complicate radar tracking, and make interception far harder. Although details remain classified, the ASN4G will be integrated with the future **Rafale F5** and used by both France's land-based and carrier-based nuclear aviation forces.

Interesting Engineering

Q-CTRL, the global leader in quantum infrastructure software, argued that **quantum computing could begin delivering military operational advantages as early as 2027**. The company highlights use cases including convoy routing, strategic airlift, resilient defence manufacturing, and missile defence/counter-drone operations. These applications could help commanders optimise scarce assets, shorten decision cycles, and improve responsiveness in contested environments. The article frames quantum optimisation as a potential tool for managing increasingly complex, data-intensive military operations. However, the projected benefits remain dependent on continued progress in quantum hardware and software, and real-world integration.

Quantum Insider | Q-CTRL

President Trump signed **two executive orders** aimed at securing US leadership in **quantum technologies**. The orders direct federal agencies to accelerate the creation of a **scientifically relevant quantum computer by 2028** and mandate a government-wide migration to **post-quantum cryptographic standards** by 2031 to defend against future quantum-powered cyberattacks. The Pentagon has been specifically tasked with fielding **three new types of quantum sensors** by fall 2028 for use in navigation and secure communications.

Bloomberg | Next Gov | Breaking Defense

The US commercial and national security **space sectors suffered a major setback after Blue Origin's New Glenn launchpad explosion** practically destroyed its only Cape Canaveral launch facility. The incident could delay NASA's lunar base ambitions and Amazon's satellite broadband constellation by up to a year, while further reinforcing SpaceX's launch-market dominance. However, the US Space Force and National Reconnaissance Office remain committed to Blue Origin to preserve a multi-provider space ecosystem. At the same time, the **Space Force is shifting battlefield surveillance from aircraft to orbit**, awarding SpaceX a $4.16 billion AMTI satellite contract and supporting it with a $2.29 billion Space Data Network backbone. These systems aim to **track aircraft, cruise missiles, and hypersonic threats from low Earth orbit** through a resilient mesh communications architecture. Looking further ahead, **US Space Command's new focus on offensive cislunar operations** signals a major policy shift toward space control beyond geosynchronous orbit

Reuters | Space News | Breaking Defense

Ukraine has achieved a significant **technological advantage** on the battlefield by integrating commercial satellite intelligence directly into the "sensor-to-shooter" cycle. The collaboration with firms like Vantor has reportedly shortened the time to locate and strike Russian assets by **90%**, allowing for precise midrange strikes on logistics hubs and air defences.

Wall Street Journal

Thales says its **UK-made RapidDestroyer radio-frequency directed-energy weapon (DEW)** successfully disabled 80 drones during April trials. The system is **designed to counter drone swarms** by using powerful radio waves to disrupt drones' internal electronics. Meanwhile, the **U.S. Naval Research Laboratory** has also demonstrated a laser system that can both **beam power wirelessly** and **counter aerial threats**, showing how directed-energy platforms could support multiple battlefield roles. The test used a trailer-mounted laser to transmit power across an airfield before quickly switching to engage a simulated drone threat, highlighting potential benefits for expeditionary forces by reducing reliance on fuel convoys, generators, and cables. NRL is now working with Marines, Soldiers, and Sailors to gather operational feedback.

Interesting Engineering | Interesting Engineering

Hawaii-based **Voltage Vessels** has submitted a **six-metre 3D-printed military boat concept** to the Pentagon, highlighting how vessels could be produced closer to the point of need. The design uses advanced, reinforced recycled materials intended to improve durability while supporting more flexible production. The approach could offer operational advantages for naval forces by reducing logistics burdens and enabling faster replacement or scaling of small craft. If proven viable, additive manufacturing could become a critical tool for military operations, supporting forward logistics through rapid, distributed production in contested or remote environments.

Tom's Hardware

Joseph Jewell, the Pentagon's assistant defence secretary for science and technology said **Marines in the Pacific experimented with using 3D printers** and other tools to produce shaped charges from local materials, including plastic water bottles, crushed volcanic rock, coconut husks, and coffee grounds. Jewell said all the charges detonated, with volcanic rock proving most effective. He argued that **3D printing could reduce the time needed to produce useful capability at the point of use by about 99%**. In a related push, the **U.S. Army** is also **evaluating Continuous Fiber 3D manufacturing, to produce** stronger, lighter, and more consistent **missile components** such as nose cones, fins, leading edges, and bulkheads

Defense One | Interesting Engineering

Advanced ceramics are becoming increasingly important because future aerospace and defence systems, including hypersonic vehicles, rocket propulsion, turbine engines, and space assets, must **survive extreme heat, pressure, and mechanical stress**. AeroVironment's new $20 million contract with the Air Force Research Laboratory is meant to accelerate research into ceramic and ceramic matrix composite materials that are lighter, more durable, and better suited for these harsh

environments. The work will use advanced manufacturing methods such as 3D printing, sensor integration, new fabrication techniques, and predictive modelling to improve how these materials are designed, tested, and monitored in real time. More broadly, the programme reflects the **U.S. military's push to invest in next-generation materials** science as a foundation for faster, more efficient, and more resilient air and space systems.

Interesting Engineering

STRATEGIC COMPETITORS

- A **Chinese** research team says it has developed an **AI algorithm,** HG-STR, **that could let drone swarms autonomously track and attack targets even when communications are jammed and visibility is poor**. The system reportedly uses a dynamic battlefield "graph" to understand relationships between drones, terrain, threats, jamming sources, and targets rather than treating everything as isolated data points. Researchers claim the system achieved a 100 percent kill rate in simulation. If effective, the technology could allow drone swarms to keep operating after losing communications or direct visual contact by inferring likely enemy positions from prior observations and environmental context.

Interesting Engineering

- **Russia** is reportedly deploying a **new generation of jet-powered strike drones with longer range, larger warheads, and improved survivability** to counter Ukraine's growing interceptor-drone capabilities. Moscow aims to make these systems a much larger part of its air campaign, with Ukrainian officials warning they could account for up to 50 percent of Russian drone attacks. This reflects Russia's broader strategy of scaling domestic drone production to overwhelm Ukrainian air

defences, strike cities and infrastructure, weaken the wartime economy, and pressure civilian morale. Russia is rapidly adapting its drone tactics and technologies, including networked drones and mobile-network control, to regain momentum in the air war. At the same time, Kaja Kallas, the EU's top diplomat, has warned that Chinese support to Russia, including drone-related and EW training, is acting as a decisive enabler of Moscow's war effort.

Atlantic Council | South China Morning Post | The Times

- **China controls an estimated 80–90 percent of the global drone market and dominates the critical minerals, batteries, sensors, motors, electronics, and components needed to manufacture drones.** This gives Beijing significant leverage over Western defence supply chains, because export controls or a Taiwan-related disruption could severely constrain U.S. and European drone production. A CEPA report argues that the United States and Europe are moving to decouple from China, but overcoming China's cost advantages and vertically integrated supply chains will require years of sustained investment, predictable procurement, and industrial planning.

CEPA

- Germany's military space commander, Major General Michael Traut, has warned that **Russia may be developing technology to place a nuclear warhead in orbit**. Such a weapon could potentially disable satellites across vast areas, rendering parts of space unusable for decades. In response, Germany is expanding its military space capabilities, including the development of jammers, lasers, and a sovereign satellite communications network.

Politico

- **Strategic competitors are accelerating investment in quantum technologies,** with China prioritising quantum networking, quantum communications, computing, and sensing. **China is investing heavily in large-scale quantum key distribution** (QKD) infrastructure and satellite-based demonstrations. QKD is a secure-communications method that can reveal eavesdropping. Russia and China are also reportedly collecting encrypted Western data today, anticipating that future quantum computers may allow them to decrypt sensitive information. This represents a major

threat because quantum computing may eventually break widely used encryption protecting government secrets, military communications, financial systems, and critical digital infrastructure. Beyond cryptography quantum breakthroughs would also enable materials discovery, defence modelling, logistic optimization, ultra-precise navigation without GPS, making early deployment of post-quantum cryptography and crypto-agile systems essential for future military resilience.

CNAS | Foreign Affairs

A Chinese firm has unveiled a **man-portable "Lijian" anti-drone laser designed to disable drones by burning or overheating critical components**. Its main innovation is portability, with related systems reportedly weighing 25–30 kg, though the smaller version likely has reduced range and power. Its battlefield value remains uncertain because lasers depend on clear line of sight, good weather, sustained tracking, and may struggle against fast drones or swarms

Interesting Engineering

Chinese exports of gallium remain highly constrained despite the U.S.-China trade truce, leaving U.S. industry exposed to shortages in a strategically important material. Gallium is critical for gallium nitride semiconductors used in advanced radar, electronic warfare, communications systems, missile defence, data centres, electric vehicles, and power electronics. China produces around **99 percent of global primary gallium**, meaning its export controls give Beijing a powerful tool to pressure U.S. defence and high-tech supply chains.

CSIS

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