ACT TECH RADAR

DEFENCE TECHNOLOGY TRENDS

China has transformed itself from a manufacturing follower into a leading innovation power, now ahead of the U.S. and other NATO countries in areas such as electric vehicles, batteries, telecommunications, and even military technologies, including advanced hypersonic missile capabilities. The country has also surpassed the U.S. in total R&D spending. This progress stems from a **coordinated national strategy that invests heavily across the entire innovation chain**, from basic research and talent development to large-scale industrial deployment. Innovation leadership today depends on an integrated system—research, talent development, and industrial scaling—and China is coherently executing across all three, while Western countries show a more fragmented approach. The U.S. retains strengths in science, private capital, and global talent, however, these advantages are eroded when innovation is decoupled from production, as **offshoring manufacturing also shifts engineering expertise**, supply-chain control and the ability to scale technologies. As a result, even if breakthroughs originate in the U.S., other countries can end up capturing the economic and strategic benefits by dominating production and deployment.

Looking at NATO, a staff officer from ACT argued on *War on the Rocks* that maintaining the alliance's technological edge requires more than investment in research, industrial scaling, and the fielding of new systems; it also demands a focus on **human creativity and adaptability** as core military capabilities. Evidence suggests that success in modern warfare depends less on the technologies themselves and more on the people who can experiment, learn quickly, and make decisions under uncertainty, making creativity a capability that must be deliberately cultivated and scaled.

Foreign Affairs | CSIS | War on the Rocks

NATO COUNTRIES AND PARTNERS

Palantir's Maven Smart System (MSS) is emerging as a cornerstone of U.S. military AI strategy. The Pentagon is formalising MSS as a program of record, signalling a major step toward making it a central AI-enabled platform for integrating data and decision-making across the military. This move secures long-term funding and accelerates adoption, positioning MSS as a **key component of the DOW's broader Combined Joint All-Domain Command and Control** (CJADC2) initiative. However, the transition raises significant questions about transparency, governance, and the system's evolving role, particularly whether it will remain a decision-support tool or expand into direct C2 functions such as targeting.

Defense Scoop

Claude Mythos represents a **major leap in cyber capabilities**, **enabling autonomous discovery and exploitation of software vulnerabilities** at a scale previously limited to technologically advanced nation-states. This collapses the barrier between state and non-state actors, creating "chaotic asymmetry" where even small groups can launch highly disruptive cyberattacks. Existing cybersecurity systems, built on slow patching and disclosure cycles, cannot keep pace with AI-driven attacks operating at machine speed. Without rapid government coordination and a shift to real-time defence mechanisms, current frameworks will fail to contain the threat as similar capabilities proliferate globally.

War on the Rocks

The US Army is accelerating its digital defences, recently hosting a **tabletop exercise with tech giants** (including Microsoft, Google, and OpenAI) to explore how **agentic AI** can defend against automated cyberattacks. This is critical as the new **"Mythos" AI model** has demonstrated an extraordinary capability for finding network vulnerabilities.

Axios | Bloomberg

Ukraine's response to Russia's invasion has accelerated a **bottom-up shift toward decentralised, technology-driven warfare** built on mass, low-cost unmanned systems across domains. Ukraine has developed an integrated **"drone wall"** and uncrewed systems now handle most frontline targeting while enabling mid-range (20–300 km) and deep strikes (over 1,000 km). These behind the front-line operations have helped halt a significant share of Russia's oil export capacity and extend reach beyond Ukraine, including maritime drone strikes against Russian naval assets in the Mediterranean. **At sea, unmanned systems have pushed back Russia's Black Sea Fleet**, forcing most of it back into port and leaving it unable to provide effective air defence from the sea. **On land, Ukraine is scaling robotic systems** to reduce manpower exposure. Kyiv plans to procure **25,000 unmanned ground vehicles by 2026** to shift logistics and evacuation tasks away from soldiers. Notably, over 22,000 unmanned missions, including **operations where positions were retaken using only drones and robots**, were carried out, illustrating the **growing maturity of coordinated robotic warfare**. Zelenskyy is now leveraging this drone expertise developed by Ukraine armed forces in the last years through "drone diplomacy," securing long-term defence partnerships and positioning Ukraine as a major exporter of counter-drone technology.

CEPA | CEPA | Atlantic Council |Atlantic Council | RAND | Defense News | Defense News | Defense News | Politico | Reuters | Bloomberg | Associated Press | New York Post | | Defense Express | The Sunday Times | Kyiv Post | The New York Times

The **U.S. DOW is accelerating development of coordinated, AI-driven drone swarms** with the Pentagon's **"Swarm Forge"**. Through demonstrations starting in June, **industry-developed swarms will be tested in realistic conditions, with the aim of delivering operational swarm packages within 90 days**. Concurrently, in the Middle East, Drones are already being leveraged at scale, with CENTCOM recently confirming the use of **hundreds of drones in "Operation Epic Fury,"** including reverse-engineered "LUCAS" kamikaze platforms similar to Iranian Shahed drones, to strike targets within Iran. Notably, the **SOUTHCOM Autonomous Warfare Command (SAWC)**, has also been established to coordinate and deploy UAVs across the Caribbean, Central America, and South America. The Command will integrate these technologies into missions ranging from deterrence and counter-cartel operations to disaster response.

Defense Scoop | Defense Scoop | - Inside Unmanned Systems

A **collaboration between Saildrone, Lockheed Martin, and Fincantieri has produced Spectre**, a 170-foot unmanned surface vessel designed for high-speed, long-range missions and optimized for ASW. The platform combines modular payloads, including missile launch systems and advanced sonar, near-endless endurance using wind-assisted technology. Positioned as a cost-effective alternative to traditional warships, Spectre **aims to extend naval reach by operating far ahead of manned fleets as a sensor and strike platform**.

TWZ

In the Baltic region, **NATO forces are actively adapting to drone-era warfare**; British and French troops in Estonia are conducting exercises like "Aces Spyglass" to **integrate electronic warfare and 3D-printed drone production**. The Royal Netherlands Navy has made the Shield AI-produced V-BAT unmanned aircraft system operational after Arctic shipboard trials, signaling a shift toward routine drone-based maritime surveillance across its fleet. The V-BAT proved it can reliably operate at sea, delivering long-endurance, real-time surveillance.

WSJ | Army Recognition

Lockheed Martin has been awarded a $1.356 billion contract modification to advance the Conventional Prompt Strike (CPS), aiming to transition the Mach 16+ system toward operational deployment on Zumwalt-class destroyers and later Virginia-class submarines. This reflects a broader push to embed hypersonic strike as a core element of future naval warfare amid growing competition with China and Russia, who have already fielded similar systems.

Defence Industry Europe

A CSIS report shows how the **U.S. is underinvesting in QIST** (Quantum Information Science and Technology), the field that uses quantum physics to process, transmit, and store information in fundamentally new ways, enabling technologies like **quantum computing, quantum communication, and quantum sensing**. It shows that private investment in AI reached $109.1 billion in 2024, over 100 times larger than investment in quantum, while China has committed about $15.3 billion compared to roughly $3.8 billion in U.S. public funding. The report highlights as possible solutions the **SBIR** (Small Business Innovation Research) and **STTR** (Small Business Technology Transfer) programmes which aim at **funding early-stage, high-risk research in small businesses and academic institutions, helping turn scientific breakthroughs into commercially viable products**. With more funding, they can stimulate innovation, build domestic supply chains, and accelerate the commercialisation of emerging technologies such as quantum.

CSIS

A recent Réalités Industrielles publication argues that **we are entering the "second quantum revolution", a shift from studying quantum phenomena to engineering them into usable technologies** such as quantum computing, sensing, and communications. This transition is strategically and militarily significant because it enables capabilities such as ultra-precise navigation without GPS, enhanced detection and surveillance, and secure comms, while future quantum computers could break existing encryption and transform simulation and logistic optimisation. As a result, quantum is framed as a dual-use technology with the potential to reshape the balance of power between states. The publication also includes a piece by ACT representatives explaining that **NATO is already preparing for this shift:** following its 2023 quantum strategy, the Alliance is testing post-quantum cryptography, quantum key distribution, and sensing technologies in operational scenarios, with initiatives such as the ACT-led Innovation Continuum. They highlight the need for "crypto-agile" systems able to adapt to evolving threats, and note that post-quantum cryptography is mature enough for early deployment, marking a first step toward quantum-resilient military infrastructures.

Réalités Industrielles

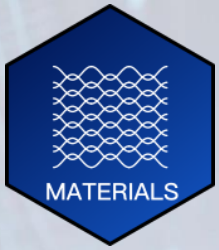
The U.S. Space Force aims to double its personnel and expand infrastructure by 2040, supporting a surge to roughly 30,000 government satellites as space becomes more contested. Its strategy focuses on strengthening core missions, missile warning, communications, navigation, and advancing new capabilities like space-based targeting. At the same time, U.S. policymakers are aligning around significantly increased funding, potentially reaching $71 billion by 2027, though progress is slowed by fragmentation between commercial and defence systems. To address this, the **Space Force is pivoting toward proliferated satellite constellations**, faster development cycles, and greater use of commercial technology. Recent operations, such as those involving Iran, underscore that space capabilities are now central to modern warfare, enabling communications, targeting, and missile warning at scale.

Breaking Defense | Space News | Air&Space Forces Magazine

The U.S. is accelerating development and deployment of directed energy weapons (DEW), reviving older laser systems while advancing new capabilities to counter drones and missiles. Recent

efforts include successful drone interceptions using reactivated experimental lasers and plans to **integrate laser weapons into unmanned platforms**. At the centre of this push is the **Joint Laser Weapon System (JLWS), part of the "Golden Dome for America"** initiative, which will build on programmes like HELIOS and IFPC-HEL. The U.S. Navy is leading early development with a focus on modular systems that can be deployed flexibly across different platforms. While laser weapons offer advantages such as speed-of-light engagement and low cost per shot, they continue to face significant technical challenges, including power demands, atmospheric interference, and the difficulty of intercepting fast, manoeuvring cruise missiles.

Defense News | Defense News | Defense News



- RAND research highlights how vast **polymetallic nodules on the Pacific seabed contain critical minerals that could allow the Western Countries to reduce their reliance on Chinese-controlled supply chains** and strengthen both economic and national security. However, large-scale seabed mining has never been successfully carried out due to major technical challenges. The U.S. is moving to accelerate exploration and development, including proposals to use remotely operated seabed systems. Yet extraction alone is insufficient, as processing these minerals into usable forms remains underdeveloped in the West. Without parallel investment in domestic processing and full supply chain capabilities, the risk is remaining dependent on China.

RAND

- The U.S. **DOW is rapidly increasing investment in Additive Manufacturing**, recognising that 3D printing enables faster and cheaper production, reduces supply chain risks, and strengthens military readiness. U.S. companies like **Divergent Technologies and Rocket Lab** exemplify this shift. The former is developing the first **3D-printed cruise missiles and other military and aviation components** with dramatically reduced production time and cost, and is now supplying major defence contractors such as Lockheed Martin and RTX. The latter is heavily integrating **additive manufacturing into its rocket engines**, enabling faster design iteration, lower costs, and scalable production. The visit by Pete Hegseth to both companies in January 2026 underscores the growing strategic importance of additive manufacturing in modernising U.S. defence production.

Elex Michelson (CNN) | Axios | America Makes | Voxel Matters

- **Waymaker Marine is using large-format 3D printing to produce small boats** as single-piece hulls, significantly reducing production time and enabling rapid design updates within days. This capability offers clear military value by allowing **fast adaptation to operational requirements**

without long manufacturing delays. The boats feature foam-filled interiors for buoyancy and survivability, modular components for quick repair, and flexible configurations for different mission profiles. They are built from advanced materials that are ballistic-resistant, radar-absorbent, recyclable, and stronger than traditional composites. Testing is underway as the company explores scaling to larger vessels.

National Defense

STRATEGIC COMPETITORS

- **China is expanding the use of AI across its military**, including upgrading naval systems and deploying **AI in drones, space, and cyber operations**. These efforts are part of a broader strategy to "intelligentise" warfare and improve speed, autonomy, and decision-making on the battlefield. AI is already being used in large-scale drone swarm testing, with a single operator reportedly controlling around 200 autonomous units. Additionally, Chinese firms with links to the People's Liberation Army are also using AI and open-source data to track and analyse U.S. military activity, including carrier movements and aircraft deployments. At the same time, **both China and Iran are leveraging AI for cognitive warfare**, using scalable, AI-generated content to shape perceptions, influence behaviour, and weaken adversaries. These efforts position **AI as both a battlefield and information-domain force multiplier** in modern conflict. Overall, while the U.S. maintains a strong overall lead, China may hold an edge in specific areas such as AI-enabled drone swarms and continues to expand its capabilities.

Defense News | The Washington Times | Washington Post | Defense News

- **Russia is integrating AI as part of a broader, state-driven ecosystem that links civilian innovation, military needs, infrastructure, and workforce development into a unified system**. Rather than competing in cutting-edge AI research, it focuses on adapting existing open-source and

foreign models into practical applications such as computer vision, navigation, and targeting for UAVs. This **"good enough" AI approach** avoids high costs and long timelines, while still delivering operational impact. So far in Russia AI has been embedded in specific, mission-critical functions across systems rather than pursued as full end-to-end autonomy, enabling faster deployment and scalability. Increasingly, this ecosystem is being centralised under state control, ensuring that AI development aligns directly with national security and wartime priorities.

CSIS - The Defense Post

- CSIS finds that **Russia's drone ecosystem is evolving rapidly through a model that prioritises scale, speed, and adaptability over technological perfection**. The report also highlights that **in Russia innovation is becoming bottom-up first, state-scaled later**: small teams and civilian engineers experiment rapidly in real conditions, and the state only funds and mass-produces designs that prove effective, reducing inefficiencies and accelerating deployment. As a result, drones are becoming more modular, AI-enabled, and integrated into coordinated kill chains, significantly enhancing operational effectiveness despite technological constraints. This "**People's military-industrial complex" is now shifting from a decentralised volunteer effort to a more state-directed system**, with many grassroots initiatives absorbed by scaled government production.

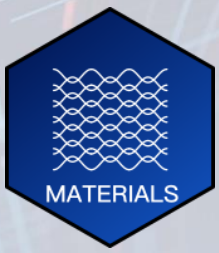
CSIS | War on the Rocks

- A CSIS report highlights that a small subset of **Chinese GEO satellites** is exhibiting manoeuvre patterns consistent with **emerging counterspace and on-orbit operational capabilities**. These behaviours suggest growing Chinese capacity for inspection, interference, and sustainment of space assets in contested environments. While most Chinese GEO satellites remain stationary, a small number conduct frequent and unusual manoeuvres that deviate from traditional space operations and may support military objectives. Patterns identified include close approaches, coordinated movements, and continuous drifting, which are consistent with capabilities like surveillance, targeting, space situational awareness, and potential interference with adversary satellites.

CSIS

Space has emerged as a critical enabler in the Iran war. US intelligence confirms that **Russia is providing satellite intelligence** to Tehran, which likely assists in targeting and monitoring naval movements in the Strait of Hormuz. This collaboration highlights a growing challenge for NATO in maintaining space superiority and protecting its own orbital assets from adversary interference

NYT



Advanced additive manufacturing (AM), also known as 3D printing, **is enabling non-state actors to manufacture firearms and even ammunition locally**, creating resilient, decentralised supply chains. What began as crude, unreliable prototypes has evolved into increasingly durable, repairable weapons, supported by global open-source communities that rapidly iterate and share improved designs. This shift reduces reliance on smuggling networks and external sponsors, allowing insurgent groups to sustain and regenerate combat capability even under sanctions or battlefield losses. At the same time, **ammunition, once a key constraint, is gradually becoming more accessible** through improvised production methods, further strengthening self-sufficiency.

War On The Rocks | Threat beat

China's dominance of critical mineral processing creates a major security vulnerability by giving it outsized control over supply chains essential to advanced defence technologies. A key example is Gallium, **China controls roughly 99% of primary gallium, a key input for gallium nitride semiconductors used in radar and electronic warfare**, and has demonstrated its leverage through export controls and bans targeting the U.S. The situation with gallium mirrors earlier strategic missteps, where the U.S. pioneered key technologies like silicon chips but lost manufacturing leadership through offshoring.

Foreign Affairs | War on the Rocks

Originator: HQSACT Innovation Branch, S&T Section

Version: April 2026

Contact: snt@act.nato.int | pietro.maccabelli@nato.int
