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Dear Reader,

While putting this scan together, one thing became clear: the future isn't approaching — it's already here, rewriting the rules.

Old problems, new solutions. And unsurprisingly, most now come with a dose of AI. The unsettling part? We're talking nuclear weapons.

Exoskeletons are also making their way to the battlefield; not for heavy lifters or long endurance infiltration walks, but for drone operators. Back in 2015, when we tested early prototypes, who would've guessed?

And yes, drones are now using echolocation to navigate in the dark — just like bats.

As we said: the future has arrived. Not evenly distributed, not fully understood, but full of surprises.

We wish you an interesting read.

Foresightly Yours,

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1. Applications of AI and data

1.1	**Academics discuss the future of AI and nuclear weapons** During a July event at the University of Chicago, nuclear weapons experts met with Nobel laureates to discuss the future of nuclear weapons and how AI might be incorporated into nuclear command and control. (source) *Assessment:* The assembled experts agreed that incorporating AI into nuclear weapons command and control is inevitable. As Bob Latiff, a retired US Air Force major general and a member of the Bulletin of the Atomic Scientists' Science and Security Board, told *Wired,* "it's going to find its way into everything." However, exactly how AI is incorporated into nuclear weapons decision-making is unclear, with different applications being incorporated at different paces and to different scales. One application discussed during the event was large language models (LLMs) to detect patterns of foreign leader behaviour and decipher their intent during crises. For example, LLMs could be used to inform decision-makers what an adversary's leader will do based on all of their public speeches or writings. Certainly, this content could be useful. Still, there are also clearly challenges to using this type of information as the main driver of decision-making during a nuclear crisis, not the least of which is the disinclination of senior political and military leaders to give up control of such an important process to AI agents that have reached a conclusion through a "black box" process. Experts also highlighted the inherent constraint of using AI to inform or bound nuclear decision-making options. AI systems are bound by guardrails, training data, and programming. As the *Wired* article points out, "They cannot see outside themselves . . .Despite their much-hyped ability to learn and reason, they are trapped by the boundaries humans set." This is important because it limits the ability of AI systems to contextualise the information they collect or events they observe. One expert invoked the example of Staislav Petrov. Petrov was a Lieutenant Colonel of the Soviet Air Defence Forces who "saved the world" in September 1983 when he decided not to pass an alert from the Soviets' nuclear warning systems up the chain of command. Petrov's radar had indicated that the US had launched a five-missile nuclear strike against the Soviet Union. He used his judgment, training, and understanding of context to assess that if the United States were to launch a strike against the Soviet Union, it would be much larger than five missiles. Petrov guessed that the computers issuing the warning, which were new, were malfunctioning. As arms control expert Jeffrey Lewis told *NPR* in 2017, "[Petrov] just had this feeling in his gut that it wasn't right. It was five missiles. It didn't seem like enough. So even though by all of the protocols he had been trained to follow, he should absolutely have reported that up the chain of command and, you know, we should be talking about the great nuclear war of 1983 if any of us survived." Herb Lin, a professor at Stanford University, underscored the key lesson of the Petrov example and the importance of retaining human control of nuclear command and control by observing, "the point is that you have to go outside your training data to say: 'No, my training data is telling me something wrong. By definition, [AI] cannot do that."

1.2	**Researchers have developed a synthetic, AI-enabled echolocation system that allows drones to see in the dark** Researchers at the University of Michigan have developed a sensor system that blends AI and biology-inspired engineering. The system is inspired by bats and other animals that use echolocation to detect objects in low-to-no-light conditions. The sensor can help drones and other robots navigate and identify objects in challenging environments where many traditional sensors fail. (source and academic paper) *Assessment:* Bats send out high-frequency pulses and analyse the returning echoes to build detailed mental maps of their surroundings. This capability has long fascinated engineers and scientists, though none have been able to replicate the perceptual precision of nature's echolocation. By using simulated data, the research team was able to overcome the longstanding challenge of teaching machines to understand and classify real-world echoes without having to acquire or build exceptionally large training data sets. The team used sophisticated numerical simulations that created virtual echoes by modelling how ultrasonic waves scatter off objects of various shapes in a digital 3D environment. The echoes are then fed into an ensemble of convolutional neural networks, with each network tuned to detect one specific shape. In tests, the sensor was able to consistently distinguish shapes, even those—like spheres and cylinders—that produced almost identical echoes. The researchers also claim that the technology has shown resilience to object orientation, distance, and minor manufacturing imperfections, highlighting the potential for real-world deployment in environments in which darkness and other visual obstructions can degrade the performance of optical sensors or LIDAR systems. While these results are promising, challenges remain to be addressed before the systems can be effectively employed. Notably, the system struggled to classify objects with lower symmetry—such as cubes aligned directly toward the source—when their echoes closely resembled those of other shapes. Nonetheless, researchers are encouraged by their capacity to build a sophisticated system that advances trends toward the use of biomimicry to improve the performance of several types of systems. According to the researchers, "by aligning artificial perception models with principles observed in biological systems, this work contributes to narrowing the gap between engineered and biological perception." The US Army Research Office and the DEVCOM Ground Vehicle System Centre funded this research. Findings were published in the December 2025 volume of the *Journal of Sound and Vibration.*

1.3	**AI to modernise logistics and sustainment** Both the South Korean and US Army are taking steps to integrate AI and other emerging technologies into their processes to create smart logistics and maintenance. (source and source) *Assessment:* South Korean company Willog, a supplier of Internet-of-Things and AI-powered supply chain intelligence solutions, announced on 13 August that it has signed a Memorandum of Understanding (MoU) with the Republic of Korea (ROK) Army Consolidated Supply Depot to support the Army's continued digital transformation. Under the agreement, Willog will provide IoT devices, which will monitor location as well as in-transit conditions such as temperature, humidity, and shock. Willog's AI platform will then analyse this data to deliver predictive insights that will help improve routes and provide insight into the status of military assets, improving overall logistics efficiency. Willog has a history of applying these solutions to high-risk commercial logistics environments, including precision instruments and pharmaceuticals. According to an official from the Army Consolidated Supply Depot, integrating advanced private sector technology is essential for building "a more efficient and sophisticated logistics system for our armed forces." The move is part of a broader effort to digitise the ROK Army's logistics. In 2024, the ROK Army's 1st Supply Group became the first unit in the ROK armed forces to receive a "Smart Logistics Centre" certification from the Ministry of Land, Infrastructure and Transport. The US Army is also seeking to incorporate AI more deeply into its vehicle repair activities. The Army is in the process of feeding hundreds of hours of video recordings into an LLM to improve maintenance on the Infantry Squad Vehicle (ISV) and hopes to eventually allow soldiers to use AI-powered smart glasses to fix vehicles. About 1,000 hours of video recordings of Army engineers and maintenance personnel repairing the ISV have been fed into the LLM as part of the Army's Smart Lookup feature. This will allow maintenance personnel to look up how to fix specific problems. The ambition is that the videos and related information will then be projected on lightweight smart glasses or HoloLens to help engineers diagnose or fix specific problems.

1.4	**Call for Papers on responsible defence innovation in the age of AI** The journal *Ethics and Information Technology* is publishing a special issue entitled "Responsible Defence Innovation in the Age of AI". The issue will examine a range of topics that provide insight into the tensions, uncertainties, and challenges facing defence and national security communities around the world as they seek to develop modern AI-enabled capabilities. (source) *Assessment:* *Springer Nature* issued a call for papers for the special issue earlier this summer. The main theme of the issue is to explore which conceptions of responsibility are used in defence innovation, and are these conceptions are changing amid the diffusion of emerging technologies—especially AI—and heightened interstate strategic competition. The call not only provides an opportunity for researchers and analysts, it also reflects the growing interest in and complexity of issues related to the responsible development of AI and other technologies in a highly competitive environment in which militaries throughout the world are under growing pressure to develop, adopt, and deploy AI solutions. A non-exhaustive list of questions the special issue will consider includes: • How should defence actors define and practice responsible innovation across different contexts • How do factors such as threat perception, strategic competition, bureaucratic politics, and epistemic uncertainty influence prevailing notions of responsibility in defence innovation? • What is the relationship between definitions of responsibility and innovation outcomes? Do strict ethical or regulatory regimes hinder, enable, or redirect the effective adoption and operationalisation of emerging technologies? • How have specific defence organisations or alliances institutionalised the notion of responsible innovation in their technology development, procurement, and deployment (e.g., in Ukraine, Gaza, or contested maritime zones) practices? • Can defence actors use emerging technologies to achieve positive results such as reducing civilian harm, improving the accuracy of targeting, and increasing compliance with international humanitarian law? • How do public-private partnerships, defence startups, or tech companies navigate ethical and strategic tensions when contributing to military innovation ecosystems? The issue will be edited by Michael Raska, Assistant Professor in the Military Transformations Programme at the S. Rajaratnam School of International Studies in Singapore; Michael Horowitz, Director of Perry World House and Richard Perry Professor at the University of Pennsylvania; and Tim Swijs, the Director of Research at The Hague Centre for Strategic Studies (HCSS). Papers should be between 5,000-8,000 words. Abstracts are due by 15 September. Full papers should be submitted by 15 January 2026.

2. Robotics and Autonomous Systems

2.1	**Colombia joins the drone age: Colombian military turns to domestic providers to meet asymmetric drone threat** Colombian state-run company CIAC, is producing domestically built drones for the Colombian military as it seeks to meet a growing drone threat from guerrilla forces and drug organisations across the country. (source) *Assessment:* Drones have become a prominent feature of the intensifying conflict between Colombian armed forces and drug traffickers, though most of the use of drones has been by drug traffickers and guerrillas. These forces have used drones to monitor their drug crops and cocaine laboratories, target rival smugglers, and ambush police and army troops—the Colombian Army claims that government forces have been attacked about 200 times in the last two years with explosive-laden drones, including 17 attacks in one day. The trafficker's makeshift and inexpensive weapons—the drones are purchased for $2,000 or less online and then outfitted with handmade explosives—have challenged the air defence of Colombian forces. Attempts to use small arms fire to defend against drones have not been effective, given the speed and manoeuvrability of even commercial drones. Meanwhile, more expensive multi-layer systems can be difficult to procure and are not necessarily economical for dealing with attacks of individual or small numbers of $2,000 drones. The criminal gang drones have also caused collateral damage to non-combatants and local infrastructure, increasing the urgency of finding a way to better manage the drone threat. Until the recent effort to develop domestically built drones, the Colombian military had not attempted to deploy drones at scale. Laura Bonilla, deputy director of the Peace and Reconciliation Foundation in Bogota, argues that this is due to "too much bureaucracy . . . It's really difficult for the armed forces to reach the same capacity" because "the criminals don't need any permits" to buy and fly their drones. While the move to acquire and deploy domestically built drones is generally well-received, the jump to scaling domestic production is not necessarily simple. Currently, the Colombian government is producing about eight of the latest models of its drone per month. This number should increase over time, but, as *NPR* noted, "cash-rich drug traffickers can buy dozens of drones with a few clicks on a computer", highlighting the asymmetry felt by many of the most advanced militaries in the world as they seek to address non-state groups and asymmetric drone threats.

Figure 1: An image of the CIAC drone being developed and deployed to fight in Colombia's intensifying "drone war." Source: Drone News and DJI Rumors

2.2	**It's not just stealth, it's *double stealth:* Indian companies test innovative stealthy material** Two Indian tech companies have partnered to create India's first "dual stealth drone", designed to minimise detection by both radar and infrared (IR) detection. The material incorporates a next-generation nanotechnology-based coating. (source and source) *Assessment:* As the detection-deception competition heats up, militaries are increasingly deploying novel technologies to improve detection of adversary assets across a broader range of the electromagnetic spectrum. Veera Dynamics has developed a material called Radar Absorption and Multispectral Adaptive (RAMA) that seeks to reduce the detectability of military assets to both radar and in IR light. RAMA uses nanotechnology to fuse carbon-based compounds that absorb radar waves and convert them into heat. This heat dissipates at approximately 1.5 degrees Celsius per second. By matching the surrounding temperature, RAMA helps vehicles minimise both radar cross-section and heat signatures. RAMA can be applied as a coating or as a wrap-around military assets and has achieved a 97% cut in IR signature and a 90% reduction in detection by radar. The company has partnered with Binford Research Labs to integrate the technology into drones recently evaluated by the Indian Army and built for GPS-denied and jammed environments. Sidhanth Jain, founder of Binford, added that the drones "can carry out covert, high-risk missions in contested zones" and "significantly compress the adversary's detect-to-engage window to near-zero."

Figure 2: A stealth drone concept tied to Veera Dynamics and Binford Labs' RAMA coating. Source: Indian Defence Research Wing

2.3	**Real world RoboCop: Russian troops surrender to drones and uncrewed ground vehicles (UGVs) in Ukraine** A video released on 9 July showed two Russian troops surrendering to a combination of drones and uncrewed ground vehicles (UGVs) after repeated attacks on entrenched Russian positions. (source) *Assessment*: Ukraine's 3rd Separate Assault Brigade revealed on 9 July that "for the first time in history: Russian soldiers surrendered to the 3rd Assault Brigade's ground drones." The operation took place in Kharkiv Oblast in northeast Ukraine. A video included with *Kyiv Independent* reporting showed multiple first-person view (FPV) drones and UGV systems striking Russian forces attempting to conceal themselves in bunkers. It then shows FPV drone footage of an individual Russian soldier with his head out of his bunker, pointing to a white sign with Cyrillic writing on it. The sign apparently indicated the soldier's intent to surrender. Subsequent video shows two Russian soldiers being led out of the combat zone by a UGV and ultimately surrendering to Ukrainian forces. The video also includes extensive commentary (in Ukrainian) from three Ukrainian soldiers involved in the operation. The operation adds another data point indicating the growing importance of drones in modern combat and the iteratively evolving and adaptive nature of military tactics and operations. It also reflects the consequences of being detected on the battlefield in Ukraine—if a soldier can be detected that soldier is likely only seconds away from being struck. The decision to surrender to robots in this lethal environment may well be replicated in the future

Figure 3: An image of a Russian soldier surrendering to a Ukrainian FPV drone. Source: Ukrainian Armed Forces vis Kyiv Independent

2.4	**Dogs of war: Roketsan presents robotic dog armed with missiles** During the 17th International Defence Industry Fair in Istanbul in late July, Türkiye's Rokestan unveiled KOZ, a robotic dog whose development illustrates the convergence of artificial intelligence, robotics, and precision strike munitions. (source) *Assessment:* KOZ is a four-legged ground system capable of both autonomous and remote-controlled operations. The system integrates four METE mini rockets equipped with laser guidance for precision strikes. It has an operational endurance of 2.5 hours and is designed for reconnaissance, assault, and special operations in contested areas. KOZ represents a significant increase in combat capability for military "robotic dog" systems, which previously have been equipped with mainly small arms. The METE missile payload is already fielded on drones and naval platforms and offers increased range, lethality, and precision. It also provides tactical flexibility, allowing ground robots to be used in more missions and meeting the growing demand for uncrewed systems to operate in contested environments that are deemed too risky for the deployment of humans.

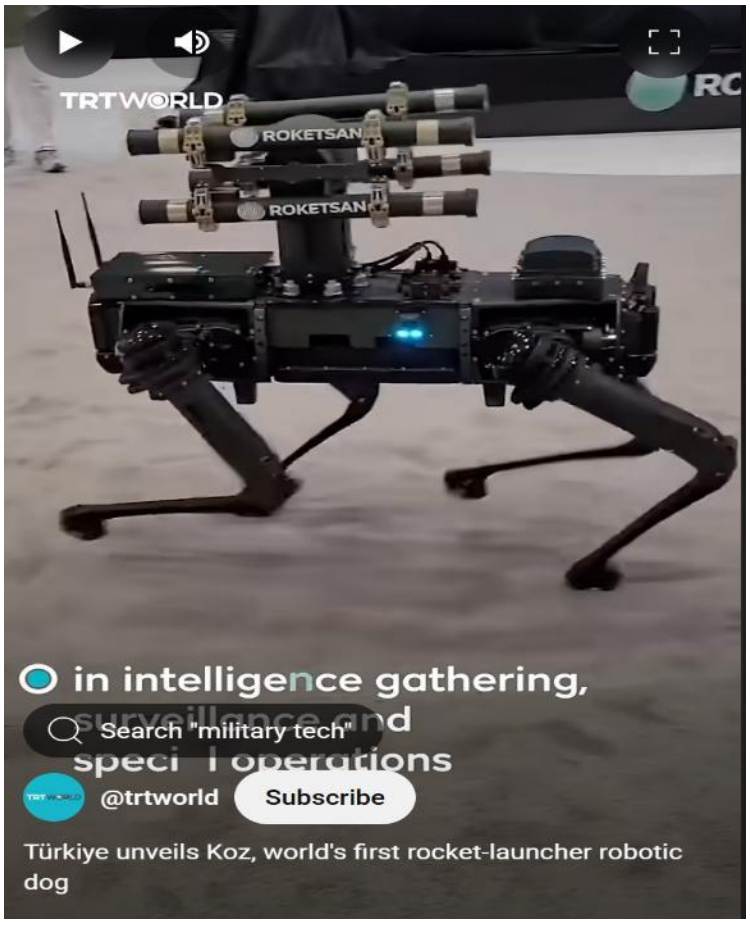

Figure 4: A screenshot of the KOZ robotic system manoeuvring around the IDEF exhibition in Türkiye in late July. Source: TRT

3. Connectivity

3.1	**UK Parliament Office of Science and Technology (POST) publishes primer on electronic warfare (EW)** On 10 July, the UK POST released a useful document describing the importance of the electromagnetic spectrum for military operations across domains, types of EW, and descriptions of several nations' current capabilities, including those of the United Kingdom. POST is the UK Parliament's in-house source of independent, balanced analysis on science and technology issues. (source) *Assessment:* The document begins with a description of EW and the electromagnetic spectrum. It also describes the several types of EW activities, such as electromagnetic attack/offensive EW, electromagnetic defence/defensive EW, and electromagnetic surveillance/electromagnetic support. The paper includes descriptions of how EW intersects with the air, land, sea, space, and cyber domains, as well as a general evaluation of the capabilities of the United States, Russia, and China. The second half of the paper provides a more detailed discussion of the UK's EW capabilities, research and development investments, and challenges and opportunities. Identified challenges and opportunities associated with developing, deploying, and defending against EW capabilities include: • Coordination between the UK's various armed forces, which has become a focus of the 2025 Strategic Defence Review recommendation to establish a new CyberEM Command by the end of 2025 • A wider UK skills gap and challenges for the UK defence sector in recruiting and retaining workers with science, technology, engineering, and mathematics skills • Lack of data gathered by users in the operational environment, which can be a barrier to research in EW by some academic and industry stakeholders • Lack of sovereign EW capabilities across the UK and Europe, forcing a reliance on the United States for procurement of EW technologies

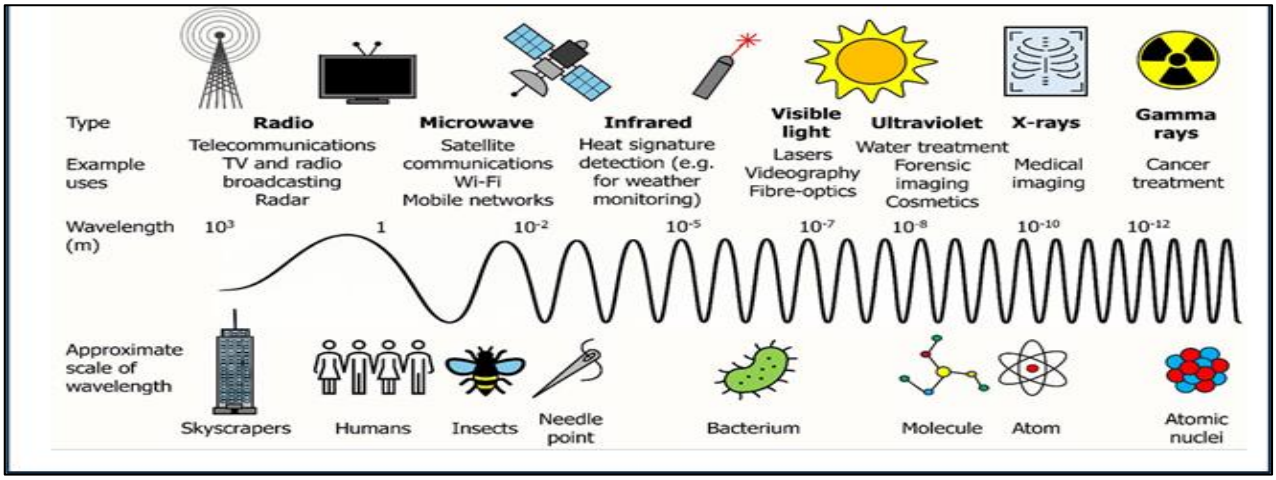

Figure 5: A figure from the UK Parliament Post depicting the types of radiation in the electromagnetic spectrum. Source: UK Parliament POST

4. Human Protection and Performance

4.1	**China's Kestrel Defence reveals new exoskeleton for drone operators** The Chinese defence company released photos of a soldier wearing an exoskeleton system that includes mechanical leg supports, a modular backpack, a head-mounted display, and drone-launch systems. The equipment reflects the ongoing efforts by militaries around the world to develop emerging technologies to support operators engaged in activities and missions that reflect the changing nature of conflict, such as drone operators. (source) *Assessment:* The equipment is designed to reduce fatigue during long-term missions for drone operators, artillery units, and reconnaissance teams, all of which are required to crouch or kneel for extended periods. The lower-body frame includes reinforced knee braces and mechanical linkages along the thighs and calves, allowing soldiers to move across rugged terrain and carry heavier loads with less effort. The system also includes a compact system for launching drones. A central spine-like structure that likely carries the power system and onboard electronics is attached to the back of the exoskeleton. The system is currently in the prototype phase. Additional details about the system's specifications and capabilities have not been revealed. However, the photos released do reflect a growing trend toward the integration of advanced robotics, wearable systems, and AI-enabled systems to improve human performance and protection.

Figure 6: Images of Kestrel Defence's new exosuit that appeared on Chinese social media. Source: Interesting Engineering

4.2	**Squid Games: Researchers develop new camouflage coating from squid protein** Researchers from the University of California Irvine (UCI) published a study detailing how they have created a biomimetic infrared camouflage coating inspired by Loliginidae, also known as pencil squids. (source and academic paper) *Assessment:* The core component of the team's innovation is reflectin, a structural protein essential in a squid's ability to change colour and reflect light. According to the paper, the research team was able to produce reflectin in common bacteria and used it to make thin, optically active films that mimic the skin of a squid. The key advantage of this material is its ability to dynamically change its coloration and reflectance, given the appropriate chemical stimuli. This allows the material to disappear and reappear when visualised with an infrared camera. Militaries use infrared equipment for night vision, navigation, surveillance, and targeting. The ability to dynamically avoid detection—especially in the near-infrared region of the electromagnetic spectrum ranging from 700-1,2000 nanometres—would constitute a novel development for soldiers and equipment. According to UCI researchers, this region of the electromagnetic spectrum is not usually accessible to biologically derived reflective materials. Project research lead Alon Gorodetsky asserted that the team's goal is to "create fabrics that can dynamically alter their texture and colour to adapt to their environments. Basically, we're seeking to make shape-shifting clothing—the stuff of science fiction—a reality." The development reinforces the trend referenced above toward biomimicry and taking inspiration from nature to improve military capabilities. In addition, the development underscores—along with the story below—how emerging technologies are contributing to the intensifying battlefield competition between detection and deception.

4.3	**Point/Counterpoint: A new metasurface could help revolutionise night vision** Researchers at the Massachusetts Institute of Technology (MIT), the University of Wisconsin-Madison, Rensselaer Polytechnic Institute, and Seoul National University revealed a process that creates extremely thin layers of special crystal material that can help transform night vision systems by reducing their size and increasing their fidelity. (source) *Assessment:* Night vision technology has taken significant steps forward over the last decade, including integrating AI as well as thermal sensing with optical imaging and increasing durability and endurance. However, key emerging technologies currently under development hold the potential to transform night vision systems, dramatically improving performance and, crucially, reducing the size of night vision systems. One such technology area is metasurface research and development. Metasurfaces are artificially engineered, ultra-thin optical surfaces composed of an array of subwavelength-scale structures that can manipulate electromagnetic waves in ways not possible with conventional materials. This allows them to behave in ways that natural materials cannot and can do so while significantly reducing the size and complexity of night vision systems. An MIT-led research team published a study earlier this year in *Nature* that describes a new metasurface developed through a process called “atomic lift-off” or ALO. This process allows for the production of an ultrathin electronic film, less than 1/100th of the width of a human hair, that senses heat and other signals about 100 times better than older materials such as lithium tantalate. The material can also help night vision systems sense wavelengths from across the entire infrared spectrum rather than focus on near-infrared light, as current-generation image intensification night-vision systems do. Crucially, the special material (called PMN-PT) allows sensors to work at room temperature, eliminating the need for sensors to be cooled by bulky, power-hungry cooling systems. This could pave the way for a dramatically reduced size and weight of night vision systems, relieving neck, eye, and back strain on operators who have to wear heavy systems for multiple hours while on the move. The research was sponsored by the US Air Force and the Department of Energy.

5. Platforms and Weapons Systems

5.1	**Start-up demonstrates new capability and manufacturing model** In May, US-based Tiberius Aerospace debuted a 155mm artillery ramjet-powered artillery shell with extended range and heightened precision. In addition to the potentially impressive new capabilities, the company is pursuing a new manufacturing model that will purportedly reduce costs and increase agility for buyers. (source, product information page) *Assessment:* The shell, known as Sceptre, is a guided ramjet liquid-fuelled munition that is launched from a 155mm howitzer-class artillery with a range of 140-160 kilometres—nearly triple the range of standard rounds—and a maximum velocity of Mach 3.5. The company claims that Sceptre remains precise even in GPS-denied environments. The combination of extended range—essential in outgunning adversary artillery—speed, and precision, has led to the system being described as "category-defying", underscoring how the incorporation of novel technologies is leading to the blurring of categories between distinct types of military capabilities. As *Business Insider* points out, the shell is more comparable in its specifications and performance to an extended range Guided Missile Launch Rocket System (GMLRS), even though it is fired from a howitzer rather than a missile launcher. In addition to its novel capabilities, Tiberius' manufacturing model is another source of the company's innovation. The company plans to license the design to governments, which will pay $5 million to gain manufacturing rights and then $2.5 million a year to receive regular software updates. Government clients can then produce the munition in-country, supporting their own supply chain and industrial base. This is an intriguing model that can challenge aspects of traditional defence procurement models. However, it is unlikely to supplant traditional models, especially for large programs and programs of record, as countries begin to prioritize scaling production to deliver large stockpiles over agility, incremental buys, and just-in-time flexibility. Moreover, elements of the production of munitions favour longer, centralized production runs due to safety and reliability concerns. Paul Hough, a UK-based expert in defence procurement, told *Business Insider,* "I hope the Tiberius model works. But at this point, it appears to be a novel potential addition rather than a fundamental change to the established supply chain."

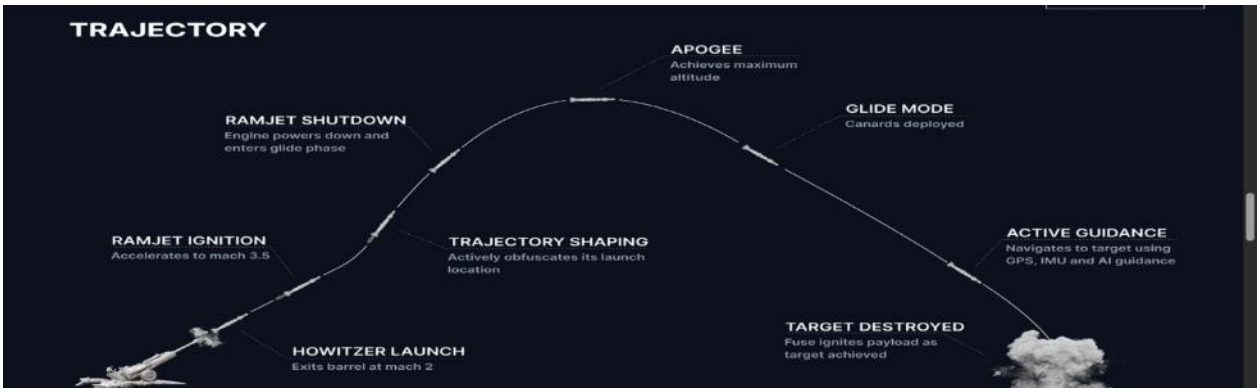

Figure 7: A screenshot of the stages of Sceptre's trajectory taken from Tiberius' production description page for Sceptre. Source: Tiberius

5.2	**Blinded by the light (again): Germany accuses China of using a laser to blind pilots in the Middle East** The German Foreign Office reported that a Chinese military vessel operating in the Red Sea used a laser to blind the pilots of a German military surveillance aircraft. The aircraft was operating in the area as part of the EU mission Aspides to help defend civilian vessels against attacks from Yemen's Houthi rebels. (source, source, source) *Assessment:* The German Foreign Ministry said that on 2 July that a People's Liberation Army Navy (PLAN) ship shone a laser at the surveillance plane "without reason or prior contact." They added that the Chinese frigate in question—which was not named—"had been encountered several times in the area before." Powerful high-energy lasers can burn targets, while less powerful ones can dazzle optical devices or harm the vision of individual operators. EU foreign policy spokesperson Anouar El Anouni called the incident "dangerous and unacceptable" and that it "put personnel at risk and compromised the aircraft's mission." Indeed, the attack caused the crew to abort the mission, though the aircraft landed safely at a base in Djibouti with the crew in good health. A Chinese government spokesperson denied the accusation and told a press conference on 9 July that the frigate in question was in the Gulf of Aden at the time rather than the Red Sea. Moreover, the Chinese government announced that the German government's account was "totally inconsistent with the facts known by the Chinese side." This is not the first time China has been accused of using lasers to distract or interfere with foreign pilots of military aircraft. In 2018, the US accused Chinese military personnel of using a laser against several US military aircraft operating out of the US military base in Djibouti, which is only miles away from the Chinese military base in the same country. In 2022, Australia also claimed a PLA warship fired a laser at a Poseidon-8 maritime patrol craft operating north of Australia. High-energy lasers are mainly seen as one of a range of lower-cost tools to deal with the threat of lower-cost systems such as drones and cruise missiles. However, this incident also reflects their utility in what are frequently called grey zone operations—aggressive actions, frequently difficult to attribute, designed to test and push literal and figurative boundaries and/or harass potential adversaries while still staying below the threshold of conventional armed conflict.

5.3	**Speaking of lasers: Australian firm secures world's first export order for 100kW laser** Electro Optic Systems Holdings Limited (EOS) announced in early August that it secured a €71.4 million order from a European NATO member for a new 100kW high-energy laser weapon system designed to counter drones. (press release, source) *Assessment:* The contract includes the production and delivery of the system, spare parts, training, and documentation. It will be fulfilled from 2025 to 2028 by EOS's facility in Singapore. A 100kW laser is significantly more powerful than most counter-drone laser weapons, which generally range from 10 to 50kW. The increase in power allows forces to defeat high-speed and highly manoeuvrable drones. The system will be deployed on a truck and integrated into a multi-layered air defence network. It incorporates algorithms for threat detection, target acquisition, and beam locking. The company said the design specifically addresses the challenge of defending against drone swarms at a cost that allows sustained operations. Dr. Andreas Schwer, EOS chief executive officer, announced that the sale "is the world's first export order for a 100-kilowatt class laser defence system. The laser hits the target at the speed of light, unlike a bullet, which can take a second or two to get there. The system is very accurate and has a very low cost-per-shot—less than 10 cents per shot. The high-power level of this system means it can shoot down more drones faster... up to 20 drones per minute."

Figure 8: An image of the EOS 100kW laser mounted on a vehicle for testing. Source: EOS Press Release

5.4	**The momentum of KAAN: Turkish 5th generation fighter program had an active summer** KAAN is Türkiye's first-ever domestically developed combat aircraft and is expected to enter service in 2028. During the reporting period, Turkish Aerospace Industries (TAI) secured its first export deal for the KAAN, while there was additional reporting indicating continued progress in the development program. (source, source, source, source) *Assessment:* Türkiye signed an "implementation contract" with Indonesia for the sale of 48 KAAN aircraft on 26 July during the International Defence Industry Fair in Istanbul. Reporting about the deal initially emerged in June at the Paris Air Show, though contract details were not finalized until late July. The value of the deal has not been confirmed. The deal with Indonesia is interesting at multiple levels. First, it further indicates Indonesia's intent to improve its defence industry. Over a 10-year delivery timeline, KAAN fighters will be assembled and integrated in Türkiye while new production and maintenance facilities are established in Indonesia to enhance technology sharing and the development of Indonesia's defence industrial base. Such technology-sharing deals are becoming more common for large expenditures from countries that increasingly want to reduce dependence on foreign suppliers. Second, it offers a big lift for Türkiye's defence industry and for the KAAN program, providing a platform for additional sales in an increasingly crowded—perhaps even saturated—international fighter jet market. While Indonesia is the first export customer for the aircraft, Mehmet Demiroglu, general manager at TAI, told *Breaking Defense* that a second deal as big as Indonesia is expected "if not this year, early next year." The KAAN program began in 2016. It became an even bigger priority for the Turkish military and defence industrial base in 2019 after Türkiye was removed from the American-led F-35 program due to Türkiye's procurement of Russian S-400 air defence systems. This decision—and the loss of the 100 F-35s Ankara had planned to buy—meant that Türkiye had no access to fifth-generation fighters. The importance and progress of the program were seen in two announcements during the reporting period. First, the Turkish government announced that it has procured the sixth prototype of the KAAN. This move will allow the government to further evaluate the platform's intended performance through stress tests, avionics checks, high-speed taxi runs, and runway manoeuvres. Second, TAI acknowledged in June that it has already started working on a new TF3500 turbofan engine with the aim of using this engine in the KAAN by 2032. Currently, the KAAN is powered by General Electric's F110 turbofan. However, the Turkish government seeks to develop a local alternative to reduce reliance on foreign suppliers and vulnerability to key defence programs being slowed by decisions such as the one that removed Türkiye from the F-35 program. TAI confirmed that a conceptual design of the engine is almost done and that it will go to initial prototyping, potentially by the end of the year, with early testing planning in 2026.


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