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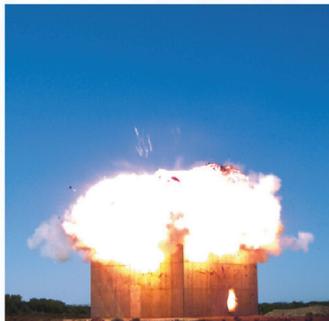
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Confronting Challenges with Action not just Empty Words



February 2022, Russia invades the Ukraine and gradually Europe awakes from its 'Holiday from History' that had defined its defence and security policies since the end of the Cold War. All of a sudden, there is talk of increasing defence spending, acquiring new equipment and repairing years of neglect. At the same time, defence equipment now flows to Ukraine, including war stocks, legacy systems and ammunition. Finally, politicians are starting to see the importance of actually thinking about and doing something about defence in the wake of a threat emerging that they cannot ignore.

It would be really nice at this point to write something along the following lines: And so it came to pass that NATO and members of the EU suddenly admitted that their defence capabilities had been allowed to wither for far too long and are determined to raise their defence spending significantly above the NATO 2% minimum with immediate effect. In parallel, defence procurement reforms aimed at bringing systems into service that fully met the stated operational requirements and were delivered on time and to cost came into force and immediately delivered results. Inspired by the new emphasis on defence and the obvious nature of the threat, Europeans clamoured to join their national military forces, leading European politicians to expand the size of national military forces after years of decline. Sadly, in far too many cases this is fantasy!

What is also concerning is that there are European leaders who seem have convinced themselves that Europe has a serious military capability and that they can posture and be bellicose when confronting the current international situation. Once again, we hear talk of a united European military capability and how it could transform Europe's security capabilities. As if by wishing that this will become a reality will make it a reality. Of course, the key word in all of this is reality; you can delude yourself with all sorts of dreams and wishes, but that is as nothing when compared to reality.

The reality of the situation is that it is a mixed picture as far as responding to the reality of threat situation that Europe faces. Some nations have responded by rapidly acquiring new capability, put into place procurement funding for further acquisitions and are also not ignoring the less glamorous, but critical areas such as the acquisition of ammunition stocks and spare parts. Others have spoken aloud of what they are going to do to increase defence capabilities, but scratch the surface and you find that there is nothing behind these words, it's all just talk and posturing.

Then you have to confront the fact that the defence industrial capabilities of Europe have been allowed to decline since the early 1990s. You could add to that the fact that industrial capabilities as a whole in Europe have declined as a result of globalisation, exporting both jobs and wealth. Then comes another issue that European politicians should really confront. Once again this is a question of wishes versus reality. You can talk at length about energy transition and 'Net Zero,' but then you have to consider the fact that a major side effect is a major increase in the cost of electricity. Add in over regulation and all of a sudden more industrial capability and more jobs are headed overseas and sovereign capability declines and often becomes unrecoverable.

Trying to rebuild industrial capability is not easy, particularly with there being a shortage of skilled workers. To put that into context, in the US the CEO of Ford Jim Farley said that the company had some 4,000 open mechanic positions, with a salary of USD120,000 and big company benefits but could not find workers to fill these positions. In France, the DGA, the French defence procurement authority, suggested that French companies could look to rehire recently retired workers to fill skills shortages and train new workers. Put simply, you cannot turn on a defence industrial capability overnight. Meaning that Europe has to start thinking about a serious and reality-based defence industrial policy right now.

David Saw

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Cover Photo: The Rheinmetall Skyranger air defence system on the Boxer platform. The Skyranger 35 variant on the Leopard 1 chassis is destined for Ukraine, while Germany has ordered the Skyranger 30 on the Boxer platform. Other Skyranger 30 customers include Austria, Denmark and most recently the Netherlands, all on different platforms. (Source: Rheinmetall)

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Letter from London

A Declining Capability

Francis Tusa

It is difficult to exaggerate the current sorry state of the British Army. In the 1990s, a Chief of the Air Staff moaned that the UK got more international kudos from deploying a single Warrior MICV battlegroup than the entire Royal Air Force. And the British Army was seen as a “reference army” for many allies in the 1990s and 2000s (especially France) – this is not the case now. So, what has happened?

Putting an exact date on the start, or the awareness of the decline is also difficult – and debatable. But the International Institute for Strategic Studies’ land warfare expert, Brigadier (Ret’d) Ben Barry’s recent – and very readable – book, *“The Rise and Fall of*

spending – with the Army budget reaching GBP 13.25 billion (EUR 15.3 billion) in 2024–25, larger than the defence budgets of many NATO countries – the Army is able to do less and less, and is operating ever-ageing equipment, while seeing serious problems in procuring new capabilities.

When operating in Iraq and Afghanistan, the Army generated up to four combat brigades per year, although this dropped back to two when there was only Afghanistan to cater for – but this capability has seemingly been lost. Those operations saw complete brigade formations exercised, not just the combat elements, but also the full Combat Support (artillery, engineers etc) and Combat Service Support (logistics, maintenance etc), as well as the headquarters. Since the withdrawal from Afghanistan, the UK has never exercised a full, NATO recognisable, brigade.

On the 2024 NATO Exercise Steadfast Defender, despite the Ministry of Defence lauding the thousands of troops that were deployed, it was carried out in packets, at most a battlegroup at one time, and some of those were composite, lacking their CS/CSS elements.

The British Army’s Enhanced Forward Presence battlegroup in Estonia has not seen a coherent force, based on a complete infantry battalion or an armoured regiment, but has seen individual companies/squadrons deployed – and this lack of doctrinal coherence has been noted by the hosts... Equally noticed in Estonia is that the decision to up the NATO battlegroups to brigades, has seen the UK say that it will do so, but by leaving the extra forces in the UK, with a promise to move them to Estonia when required. It is noted, locally, that Germany has started moving, and rotating, entire brigades to Lithuania, and is spending over EUR 800 million on infrastructure for this larger formation.



▲ [Ajax testing at Bovington at the Armoured Trials and Development Unit \(ATDU\) in October 2024. The continuing controversy surrounding this programme exposes the dysfunctional defence procurement system that Britain has to endure. \[Source: Crown copyright 2024\]](#)

the British Army, 1975-2025” sees the start of the decline coming in the late-2000s, and accelerating thereafter. Some might see this as strange, as the British Army was, in the early-2010s, active on two operations, Iraq and Afghanistan, so should have been accumulating vast amounts of valuable combat experience. So, how does this decline manifest itself? Despite rising defence

A regional source said, “*you have some very motivated troops, they are very keen to learn about operating in the region, but you equip them with last century’s weapons*”. Which brings one to equipment, and the far-from-satisfactory performance of the British Army...

Lack of Equipment

The last time that significant new equipment – and one is talking about armoured vehicles here, artillery, and the like – arrived into British Army service was the 1990s, when Challenger 2 was delivered, along with the AS90 155 mm self-propelled artillery system. Since then? A stream of programmes, but with no deliv-

AUTHOR

Francis Tusa provides a unique insight into the British and European defence scene. His newsletter Defence Analysis is absolutely “must read.”

eries. The upgrade for the Warrior MICV started in the mid-1990s, went through various competitive stages, and eventually saw a contract to Lockheed Martin in 2011, but was cancelled in 2021.

The Challenger Capability Sustainment Programme/Life Extension Programme started in 2005, again saw change after change to the requirement, some very quiet phases, and eventually became the Challenger 3 programme in 2021 – 15–16-years after things started. But initial operating capability (IOC) isn't until 2027–28 – and there still isn't a production contract to deliver vehicles.

To compound matters, despite there being a “not to exceed” battle weight for Challenger 3 of 76 t, current reports say that it has risen to over 80 tonnes, as the Army has changed the specifications, and has added tonnes of extra armour. At this weight, it won't be able to use the British Army's battlefield bridging, and will be unable to use a range of road bridges in Europe.

The Boxer 8x8 APC ought to be the bright, shining light of successful procurement for the British Army. But the procurement has already seen cuts in offtake, the rate of delivery was scaled at as low as 55 per year (there is a chance that for other armies, Boxer production could hit as high as 800+ in 2026–27), with the whole 650+ programme taking over a decade to deliver. And while not as bad as Ajax AFV, the Army has continued to demand engineering change requests from ARTEC, which drives up costs, risks, and time.

And finally, Ajax... By 2019–20, serious noise vibration problems had been identified with the vehicle family, serious enough that troops operating the vehicles were having to receive medical care, and some were discharged as medically unfit. The programme was halted, while investigations were set in motion to work out what was going on – and programme payments were halted. “Mitigations” were identified, and embodied – but not engineering solutions... And in late-2025, days after the Defence Procurement Minister announced that Ajax had passed its IOC, it was announced that on a series of exercises in 2024 and 2025, there had been further noise/vibration injuries reported. The 589-vehicle programme is currently on hold.

Since 2012, the Army has spent over GBP 15 billion/EUR 17.5 billion on AFVs, and has received 14 Archer 155 mm SP guns, an interim capability; about 30 Boxer 8x8s; 150 Ajax, only to renounce their acceptance; and no upgraded MBTs. It is difficult.

It is true that for Iraq/Afghanistan, there were what, in UK parlance, called “urgent operational requirements” (UORs), mainly mine-protected vehicles, but these were of highly mixed performance and satisfaction, and many of these were rapidly disposed of once those missions came to an end.

- ▶ **In late January, Rheinmetall announced that the Challenger 3 tank had completed its first crewed live firing as part of the ongoing trials programme, a significant achievement. The British Army is to receive 148 Challenger 3 tanks. [Source: Rheinmetall]**

What has caused this worrying decline in the capabilities of the British Army?

The first thing might be the influence of Afghanistan on the management and outlook of the Army. At the time, the focus was on “*The War*, not A War”. This meant that “*The War*” was Afghanistan, and the Army should focus on the capabilities, the equipment, the organisation that allowed it to fight in Helmand province.

But what this meant is that during that time, capabilities – armour, MICVs, 155 mm artillery, air defence – that were not seen as being of relevance to “*The War*” were completely de-prioritised, ignored, even. So, less and less depth maintenance, preventative maintenance on Challenger 2 and Warrior, the AS90 fleet allowed to wither and die due to a lack of support.

A lack of realism could also be seen also as a cause for the British Army's current malaise. Until quite recently, the upbeat talk was that the British Army was “a reference Army”, that is one to be emulated by other armies. But this talk was at its peak in the post-Afghanistan phase, when the worst of the decline was happening, accelerating, even. But no-one high in the chain of command seemed willing to tackle this false exuberance.

Constant changes to the perceived end state of British Army can also be seen as a key reason why things have been so dire. “Future Army” documents since 2015 have seen changes to the perceived ORBAT of the Army about every 2-3-years at most – there has been little or no stability. Concepts such as the (Ajax-equipped) Strike Brigades have arisen, then been radically changed, and have then partially faded away. A process of constant – and disruptive – change in how the British Army sees itself and its future have not been a help.

The current Chief of the General Staff, General Sir Roly Walker, was brought in to turn the British Army oil tanker around, away from the rocks where was headed. He has been trying – but it will be a very long time before success can be announced. At best, the British Army will reach its end state – two deployable, war-fighting divisions – by 2035. But many in Europe/NATO doubt that this will be achievable by that date. 



Letter from Prague

Czech Security Strategy and Eastern European Threats

Martin Smisek



The current Czech defence policy is outlined in the Security Strategy of the Czech Republic 2023.

Unlike previous strategies (the last one was approved in 2017), it is characterised by unprecedented directness, with Russia being explicitly identified as a fundamental threat to Czech security and an actor that deliberately works against political, economic, and social stability in Czechia. China

is also mentioned as the second threat, presented as challenging the international order with negative consequences for Euro-Atlantic security. The Strategy states that both Russia and China share a long-term interest in weakening the influence and unity of democratic countries.

The Strategy stresses that, following Russia's full-scale invasion of Ukraine in February 2022, the Czechia must be capable not only of resisting hostile actions in the cyber, information, economic, and intelligence domains, but also of preparing for the possibility of involvement in armed conflict. Membership in NATO and the EU is reaffirmed as the cornerstone of Czech security. Within NATO, strengthening the Eastern Flank remains a priority. In 2026, up to 2,000 Czech soldiers may be deployed in multinational battlegroups in Lithuania, Latvia, Poland and Slovakia, with the option of deployments in Estonia, Hungary, Romania and Bulgaria, depending on NATO's needs.

The Strategy emphasises that the key prerequisite for national defence is maintaining an all-arms military capable of combining heavy forces with advanced technologies, including emerging and disruptive systems. In line with NATO commitments, defence spending should reach at least 2% of GDP and remain above this level permanently. To this end, a minimum level of defence spending of 2% of GDP has been enshrined in law with

AUTHOR

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effect from 2024. Therefore, Prague has met the NATO financial benchmark for the first time in the last 19 years. As a result of such long-term underfunding, the overall condition of the Czech armed forces is in a poor state.

The gradual increase in defence spending is therefore completely insufficient to quickly remedy the unsatisfactory state of not only armaments, but also supplies and infrastructure. Moreover, the Public Procurement Act, unsuited for military acquisitions, has caused severe delays in arms purchases, despite a growing budget. In March 2025, the Czech government approved a gradual increase in defence spending between 2026 and 2030 to at least 3% of GDP. This commitment was further increased following the NATO Summit in The Hague in June 2025. As with the Baltic states and Poland, and as previously mentioned, Prague defines Russia as its main threat. However, unlike these countries, there is no sense of being a frontline state and therefore no urgency to rapidly increase military capabilities. Consequently, there was no massive rearmament or high level of defence spending and the country's support for Ukraine was more moral and organisational (the 'Czech Ammunition Initiative') than material or financial.

In Slovakia, Russia's aggression and the deteriorating regional security environment have also accelerated the country's military modernisation and increased defence spending. However, these changes remain gradual, and Slovakia has spent only a slightly larger share of GDP on defence than Czechia in recent years. Although Slovakia's own Security Strategy (2021) identifies Russia as the main security challenge, the current government formed after the 2023 elections has adopted a more conciliatory, even openly pro-Russian stance. Slovakia has thus aligned itself with Hungary, which has pursued a similar policy for more than a decade and remains the most pro-Russian country within the EU.

With the new Czech government appointed in December 2025, pro-Russian winds of change have also begun to blow in Prague. The administration includes Kremlin-friendly elements, whose nominee now serves as the Minister of Defence and who have called, among other things, for cancelling the purchase of F-35 Lightning II aircraft or terminating the Czech Ammunition Initiative. The first steps taken by the new government at the time of writing show that Czechia is positioning itself as an equal partner between Slovakia and Hungary in terms of its policy towards Russia. These changes were confirmed in January 2026 by Russian Foreign Minister Lavrov, who stated that "*healthy forces*" had awakened in Czechia. 

Letter from Warsaw

The Great Anxiety:

Central Europe Fears US Abandonment

Robert Czulda

The announcement of a new US National Security Strategy has triggered a wave of negative reactions across Europe. The strongest concerns though are voiced in Central and Eastern Europe, a region that in recent years has built both its political agency and its security primarily on the closest possible cooperation with the United States.

Some cautiously positive signals have come from the camp of Polish President Karol Nawrocki. He is associated with the mainstream right, for which close ties with Washington constitute one of the core pillars of its political programme. In mid-December, a Polish delegation led by General Andrzej Kowalski, Deputy Head of the Presidential National Security Bureau (BBN), travelled to the Pentagon. According to the official statement, the meetings resulted in “clarifications of certain aspects of the U.S. security doctrine, including the stationing of American forces in Europe”, and demonstrated that “the Americans are ready to deepen bilateral security cooperation”. American soldiers are already stationed in Poland under both permanent and rotational arrangements; at present, approximately 8,500 US troops and just over 1,000 military personnel from other countries are deployed in Poland.

These assurances, however, sit uneasily alongside the American peace initiative with Russia concerning Ukraine. Furthermore, these concerns are no longer limited to isolated voices. Even within right-wing and traditionally pro-American circles, criticism of US policy is becoming increasingly visible, accompanied by fears that President Trump’s current approach could have profoundly negative consequences for Central and Eastern Europe. This unease is magnified by the widespread awareness that neither France nor Germany is capable of providing military and political support comparable to that of the United States. The region understands that without Washington, the West cannot offer credible security guarantees and deterrence, and that without US military involvement, there can be no lasting peace or stability in this part of Europe.

The provisions of the US National Security Strategy might appear less alarming were it not for the broader context of US policy regarding Russia and Ukraine, which directly shapes security perceptions in Central and Eastern Europe. The Trump administration has failed to successfully conclude peace talks with Vladimir Putin, a result many analysts had predicted. The White House operated on flawed assumptions that Russia was genuinely interested in peace and prepared to compromise. This naïve belief (that the Kremlin can be engaged in sincere agreements that it will then honour) has characterised successive US administrations since the end of the Cold War. Each eventually discovered that Washington lacked any special leverage to compel Russia to pursue long-term, good-faith cooperation. From the perspective of Central and Eastern Europe,

shaped by historical experience and contemporary threats, the Trump administration appears unable, or unwilling, to grasp this fundamental reality of Russian foreign policy and the intentions of successive Kremlin elites.

Against this backdrop, voices from the region are issuing a warning that few in the West seem willing to hear: rewarded for aggression, Russia will not stop. Its ultimate objective is not Ukraine itself, but a radical reshaping of Europe’s geostrategic order. In other words, Moscow would seek to continue its aggressive policy, with Central and Eastern Europe the obvious next target.

Signs of this dynamic are already visible. As reported in the media, Russian Foreign Minister Lavrov has been escalating both demands and the price for peace. In the Kremlin’s vision, ending the war in Ukraine would require limiting NATO’s presence in Central Europe and halting Poland’s rearmament. These measures are Russia’s “security guarantees”. They closely echo those issued by Moscow in December 2021, which were rejected at the time.

Moreover, Lavrov reportedly informed Finnish Foreign Minister Elina Valtonen that Russia expected a “reset” of Finland’s NATO membership. This makes it clear that Russian demands for “security” apply not only to Ukraine, but to the entirety of Central and Eastern Europe, and even to Scandinavia. Far from seeking peace, Russia’s ambitions clearly extend well beyond Ukraine.

Faced with the prospect of US disengagement, the region may be forced to seek support elsewhere. Unfortunately, the only available alternative, though far weaker both politically and militarily, is the European Union, and in practice, France and Germany. These states are likely to push for deeper EU centralization, strengthening their own influence at the expense of smaller members, including those in Central and Eastern Europe, while simultaneously seeking a rapid accommodation with Russia.

Although this scenario may appear superficially attractive, it is deeply dangerous. The price Moscow would demand would be the renewed subordination of Central and Eastern Europe. Moreover, a more federalised EU under German leadership would not be pro-US at all.

Equally concerning are the potential consequences of lifting US economic sanctions on Russia. The White House may choose to make yet another goodwill gesture toward the Kremlin, increasing the temptation in Western Europe to “return to business as usual”. This would once again provide Russia with the resources needed for militarisation, the subordination of Central and Eastern Europe, and the blackmail of Western Europe, ultimately undermining the entire post-Cold War, Atlantic security architecture. 

Letter from Kyiv

The War Continues

Alex Horobets



In early 2026, the Russo-Ukrainian war entered a phase of protracted positional confrontation, in which both sides are attempting to combine military pressure with diplomatic manoeuvring. In the fourth year of full-scale war, hostilities are characterised by slow but exhausting advances by Russian forces on certain sections of the front, massive strikes on civilian infrastructure, and attempts to find a way out through peace negotiations under US auspices.

The front line remains consistently tense, with fighting intensity reaching 130–170 combat clashes per day. Ukraine's Defence Forces

must constantly defend over 1,000 km of frontline – an enormous physical strain – against an enemy with superior firepower, greater resources, and an apparently endless supply of expendable assault troops. The hottest spots remain Pokrovsk, Huliaipole, Kupiansk, Kostiantynivka, and Lyman. Russian troops continue gradual advances in Donetsk Oblast, however, the line of contact stabilised after the autumn-winter fighting of 2025, as weather conditions (snow and severe frosts) reduced operational manoeuvrability for both sides. Overall, the pace of the Russian advance has slowed significantly compared to autumn 2025, indicating the depletion of offensive potential due to enormous losses and logistical problems.

In the fourth year of the war, the Kremlin leadership decided to “freeze” Ukraine, taking advantage of an unusually cold winter. The main goal of these actions is to provoke a critical situation in the Ukrainian rear and force the Ukrainian leadership to the negotiating table on unfavourable terms. Since October 2025, Russia has systematically struck Ukraine's energy infrastructure with hundreds of drones, ballistic and cruise missiles, resulting in the destruction or damage of approximately 8.5 GW of power-generation capacity – substations, gas infrastructure in particular.

In January 2026, combined attacks have intensified significantly. The most severe blows to the energy sector took place on the nights of 9 and 20 January, leaving hundreds of thousands of households in Kyiv, Odesa, Kharkiv, Dnipro, and other regions without electricity and heating. Virtually all major thermal power plants (TPP), hydroelectric power plants (HPP), and a significant portion of distribution capacity were damaged, according to assessments. The Ukrainian government has stated that Russia planned to resort to an even more dangerous tactic – strikes on facilities and networks servicing nuclear power plants.

In parallel to January's strikes on energy facilities, particular attention was drawn to the Russian Oreshnik ballistic missile strike on Lviv Oblast on the night of 9 January. According to the Russian Ministry of Defence, the target was the Lviv State Aircraft Repair Plant. A discus-

sion arose among experts about the military utility of employing such a missile. However, the primary aim was most likely to create a propaganda effect and send a signal to the West regarding Russia's ability to strike deep-rear targets, including territories bordering the EU.

Peace negotiations in early 2026 remain in limbo. Following the announcement of the American peace plan consisting of 28 points and a subsequent 20-point document involving Ukraine, the United States, Russia, and Europe, Kyiv and Washington are now attempting to align the texts to be ready for signing. Volodymyr Zelenskyy asserts that talks between the Ukrainian and US teams have not reached an impasse and work on the documents continues. At the same time, Russia rejects compromises, insisting on recognition of all occupied territories as well as territories not even captured by Russian forces. Kyiv, in turn, does not consider territorial concessions and demands effective security guarantees for Ukraine. As of January 2026, a full ceasefire is not yet in sight. According to Kyrilo Budanov – former head of Ukraine's Main Directorate of Intelligence (GUR) and current head of the Presidential Office – the window for a realistic chance to reach an agreement to end the war may open in February 2026. This would be facilitated by the end of the difficult winter period for Ukrainian energy and the growing problems faced by Russia's economy.

Against this backdrop, Ukraine's military leadership remains committed to active operations. Commander-in-Chief of the Armed Forces Oleksandr Syrskyi stated that in 2026 Ukraine would conduct not only strategic defensive operations, but also offensive actions to retain the operational initiative. In his words, this will force the enemy to disperse its forces and resources. Meanwhile, Ukrainian Defence Minister Mykhailo Fedorov voiced an even more ambitious goal, stating that one of Ukraine's strategic aims in the war is to inflict up to 50,000 losses per month on Russia, making the war economically and demographically unsustainable for the Russian Federation. According to him, in December 2025 the figure of 35,000 verified (video-confirmed) “eliminated occupiers” was achieved. Most likely, reaching this target will be accompanied by a correspondingly significant increase in UAV production and asymmetric strikes on Russian rear areas.

Thus, the outlook for 2026 remains uncertain. On the one hand, Russia seeks to maintain the initiative on the front with plans to form at least 11 new divisions, mobilising over 400,000 people in the process. Indeed, it is already facing resource depletion and losses exceeding replenishment rates. On the other hand, Ukraine is preparing countermeasures, relying on Western aid and internal resource mobilisation, betting on technological advantage and societal resilience, despite the energy crisis. Should negotiations fail to achieve results by spring, an escalation in frontline combat may occur, even as efforts to pursue compromise continue. The war continues, and its outcome depends on which side reaches the limit of endurance first – Moscow or Kyiv.



Viewpoint from Vienna

Vienna in 2026

Matthew Lang

VIENNA: The European continent's security landscape continues to be unsettled at the beginning of 2026, shaped not only by the ongoing war in Ukraine but by broader shifts in positions on deterrence, Alliance cohesion and crisis management. With Europe forced to reassess its security architecture, Vienna offers a clear vantage point on these dynamics, where neutrality, diplomacy and internal security concerns increasingly overlap. Vienna remains a key hub for diplomacy, dialogue, and policy debate, with Austria's constitutional neutrality and EU cooperation continuing to shape the country's perspective. Around two-thirds of Austrians back enhanced coordination among EU member states on security and defence. These developments underline Vienna's evolving role: not as a conventional military power, but as a centre for strategic dialogue and crisis management.

Neutrality under scrutiny

Austria's constitutional neutrality, formally codified in 1955, remains a cornerstone of its national identity. Public opinion continues to strongly support neutrality, with around 75% in favour and only about 15% backing NATO membership. Yet Russia's full-scale war against Ukraine has stimulated debate over the suitability and appropriateness of neutrality in practice. Surveys reveal that just over half of Austrians believe neutrality would not protect the country from modern military threats.

Senior Austrian officials and retired military leaders increasingly argue that neutrality must be accompanied by credible defence capabilities. Defence spending in Austria has risen modestly (currently around 0.8–0.9% of GDP, with planned increases that could bring it slightly above 1%), but the country's armed forces continue to face serious gaps in readiness, air defence, and combat capability. However, EU-focused cooperation is increasing, providing a compromise between public support for neutrality and Brussels' pressure for greater collective security.

Still the spy capital of Central Europe

Austria's intelligence community has been shaken to its core with a high profile trial that began in January; ex-domestic intelligence officer Egisto Ott has been charged with supporting "a secret intelligence service of the Russian Federation to the detriment of the Republic of Austria" and abuse of office, accused also of collecting sensitive police and interior ministry data, handing this onto fugitive ex Wirecard executive, Austrian citizen, Jan Marsalek (believed to be in Russia since 2020). Prosecutors allege Ott's activity, which included unauthorised requests of European law enforcement databases and the transfer of encrypted devices, compromised Austrian national security and also exposed a network of refugees and officials to undue risk. The case illustrates

how Moscow's covert intelligence system has exploited Vienna's unique diplomatic community and highlights an urgent need for austere counterintelligence reform against the backdrop of great power politics.

In recent months, Austria's security environment has been upset by a number of weapons finds, exposing a deeper vulnerability beyond the spy scandals. In November 2025, Austria's domestic intelligence service uncovered a Hamas linked weapons cache in a rented Vienna storage unit – five handguns and magazines apparently for use in attacks on Israeli and Jewish targets across Europe. This launched an international counter terrorism effort, culminating in the arrest of one suspect in London. Elsewhere in Vienna, police seized an illegally stockpiled arsenal including dozens of firearms, ammunition and Nazi memorabilia during a December intervention, highlighting the threat of extremist hoarding. These seizures come amid broader domestic concerns over Austria's high number of private weapons and efforts in parliament to tighten gun laws after a lethal school shooting in Graz last summer.

Support for Ukraine

While Austria has joined European condemnation for Russia's aggression and supported EU sanctions, Vienna maintains a policy of no lethal military aid for Ukraine. Public opinion reflects this cautious approach: roughly half of Austrians favour continued EU assistance to Ukraine, though trust in Ukraine as a partner is limited, and support for direct military aid remains low. Austria's policy demonstrates a 'middle path' — to remain politically aligned with the West, but constrained by neutrality and domestic sentiment.

Since early 2022, Austria has backed Ukraine chiefly through humanitarian and financial assistance, providing more than €300 million in direct bi-lateral aid, with medical supplies and emergency vehicles for example, while refraining from any military assistance. In addition, Austria has also been a host country for displacement from the war, with roughly 80,000 Ukrainian refugees currently in Austria (nearly 40,000 of this number are in Vienna alone). While public support continues to broadly favour humanitarian and EU-level assistance, it remains cautious about deeper military or defence involvement. Official Austrian government data separates direct bilateral state assistance from broader EU contributions Austria participates in through the EU budget and Peace Facility). But the country is not immune to the war's spillover effects: intelligence authorities report hybrid threats, increased espionage activity, and extremist networks operating in Vienna, highlighting the city's dual role as both diplomatic hub and potential target.



At Sea ...

RN moves to recover SSN readiness

Dr Lee Willett

On 14 January, the UK Royal Navy (RN) released its Submarine Maintenance Recovery Plan (SMRP), a prioritised framework for cohering the UK's submarine enterprise to accelerate maintenance delivery.

The following week, while visiting the RN submarine base in Faslane, Scotland, General Sir Gwyn Jenkins – RN First Sea Lord since mid-2025 – said “Submarine maintenance throughput needs to drastically improve We are planning for productivity to improve dramatically over the next four years.”

“We want to put a radical engine for change in the middle of our enterprise, to recharge and refocus our priorities and get us ready for the warfighting footing we need,” Gen Jenkins added. This is illustrated at Faslane by a new, deployable (containerised) engineering workshop, enhancing capacity for maintenance outputs on operational submarines. Other facilities at Faslane and elsewhere are being developed to add further capacity.

Such facilities – designed to boost operational availability of the RN's fleet of 11 nuclear-powered submarines (four *Vanguard* class ballistic missile and seven *Astute* class fast-attack boats) – will have strategic impact for the RN, the UK, and also for NATO.

Getting submarines to sea to meet defence requirements has always been a primary RN priority. However, Gen Jenkins made *Astute* class availability – something that has ebbed and flowed for several years – a critical focus for his first 100 days in post.

Astute's maintenance challenges have been multi-layered, including: specific problems with specific boats; some reduced maintenance facility availability at Faslane; the COVID-19 pandemic significantly slowing maintenance throughput at the Devonport refit facility drydock; and the long-standing need to increase support infrastructure investment more broadly.

UK media has reported previously that, on occasion, no *Astute* boats have been available for operations. This is a significant problem for the RN, the UK, and the NATO Alliance, as the RN's SSN capability brings strategic benefits at national and NATO levels.

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▲ **A UK Royal Navy Astute class SSN is pictured at sea in 2025. The RN is working to increase availability across the class. (Source: Crown copyright 2025)**

Arguably being the North Atlantic's foremost European NATO naval power, the RN fits Professor Eric Grove's definition (using UK university degree gradings) of an 'Upper Second-class' navy. With the United States and China possessing the global 'First-class' naval forces, navies like the RN sit in that second tier through operating aircraft carriers, amphibious forces, and SSNs.

This RN capability 'triad' provides significant deterrence and defence output for NATO. Moreover, set against a widely recognised increase in Russian submarine activity and capability – and with uncertainty persisting regarding US political-level commitment to NATO – the absence of a strategic-level capability like RN SSN presence would present a gap in national and NATO deterrence and defence coverage in the North Atlantic.

Moreover, Russia's growing capability – especially the fleet-wide Kalibr cruise missile fit – is expanding the area across which NATO submarines must provide warfighting output, needing to push Russian boats back across the Norwegian Sea from the Greenland-Iceland-UK Gap through the Bear Island Gap and into the Barents Sea, beyond striking range of key NATO targets.

There are other tasks for which the RN's *Astute* boats are acutely relevant, including securing Vanguard-class deterrent operations and countering threats to UK and NATO critical undersea infrastructure (CUI). The latter's strategic significance was underlined in January 2025, when UK defence secretary John Healey told Parliament that an *Astute* boat had surfaced close to the Russian surveillance ship *Yantar* to visibly demonstrate deterrence presence as the Russian vessel loitered close to UK CUI.

So, for NATO, SSN numbers matter. In the UK's latest Strategic Defence Review (SDR), published in June 2025, one of three core tasks assigned to the UK armed forces is supporting NATO's North Atlantic deterrence and defence.

Thus, returning *Astute* boats to sea is strategically vital for the RN, the UK, and NATO. Alongside the maintenance developments noted, there is evidence of growing operational availability. Boat six *Agamemnon* commissioned in September 2025. Moreover, in January, the *Daily Telegraph* reported that the RN was readying a boat to deploy to Perth, Australia for 2027 under the Standing Rotational Force (West) (SRF(W)) combined submarine operational deployment component of the Australia/UK/US AUKUS agreement.

Having one boat newly commissioned and another readying for SRF(W) indicates at least two hulls being available (from the six commissioned to date). The *Telegraph* added that another boat may return to sea soon. So, a sea change in *Astute* availability may be underway. 

EXOSENS: ADVANCING NIGHT VISION CAPABILITIES FOR MODERN ARMED FORCES

Given the centrality of night operations in modern military engagements, night vision technologies play a decisive role in operational effectiveness. Exosens is a leader in night vision, with a focus on innovation, industrial reliability, and operational relevance.

Supporting European Armed Forces with proven 4G technology

Photonis, key player within Exosens, is a long-established global leader in image intensifier technologies for night vision devices. This commitment is further exemplified by its active involvement in European defense programs and long-standing cooperation with armed forces and institutional partners.

OCCAR (Organization for Joint Armament Cooperation) awarded a contract to Theon International in 2024 for the supply of night vision goggles to the German Armed Forces, with Exosens selected as the supplier of image intensifier tubes. The program involves the delivery of approximately 200,000 16 mm image intensifier tubes for 100,000 night vision goggles, with deliveries scheduled between 2027 and 2029. This represents the most significant night vision contract ever awarded on a global scale. The agreement also includes additional systems for the Belgian Armed Forces, further strengthening European defense cooperation.

This program is based on years of operational deployment of Exosens technologies within European and NATO armed forces. As a leading innovator in the field of 16 mm image intensifier tubes, Photonis delivers performance benchmarks that are comparable to traditional 18 mm formats while significantly reducing weight. This contributes to enhanced soldier mobility, endurance, and operational efficiency.

Pushing the boundaries of Night Vision performance with the 5G

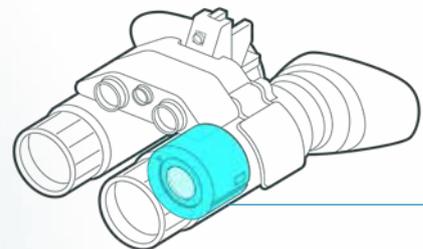
Exosens' strategy is rooted in continuous investment in research and development. This commitment is fully embodied by the recent launch of the 5G image intensifier tube by Photonis, officially unveiled at DSEI London in September 2025. The 5G was developed over five years and represents a significant technological advancement, with an estimated 30% improvement in overall performance compared to standard tubes currently on the market.



The 5G offers enhanced image quality with sharper, more contrasted images, significantly reduced noise in ultra-low-light conditions, and extended detection, recognition, and identification ranges. This product has been designed for large-scale deployment and meets the increasingly demanding requirements of modern armed forces operating across all night levels and environments.

The 5G is a sovereign, non-ITAR solution manufactured entirely in Europe, with production sites in France and the Netherlands. The product has been designed to equip soldiers' night vision goggles and to serve as a building block for future systems. This will reinforce Europe's operational autonomy and long-term night vision capabilities.

ONE SOLDIER, ONE GOGGLE



LEADER IN HIGH-PERFORMANCE NIGHT VISION INTENSIFIER TUBES

PROVEN PERFORMANCE IN THE MOST DEMANDING LOW-LIGHT CONDITIONS

SELECTED FOR MAJOR EUROPEAN ARMED FORCES PROGRAMS



The Turbulent Path of FCAS

Pierre Tran

One way to look at a European project for a new-generation fighter jet is through the lens of Europe's competing forms of capitalism, which have complicated efforts to build a new military capability at a time when Washington is pursuing an increasingly independent policy path. That planned fighter lies at the heart of an ambitious EUR 100 billion plan for a future combat air system (FCAS), backed by France, Germany, and Spain. Yet the programme has been hampered by clashes between key French and German

combat drones around the year 2029. Phase two includes two classes of remote carriers. The first comprises drones, or advanced collaborative combat aircraft (CCA). The second consists of light, low-cost drones designed as disposable weapons. The latter would be built by European missile maker MBDA and carried by the fighter. A project as ambitious as FCAS seeks to sustain the technology, engineering and work skills in Europe needed to design and build an advanced fighter. FCAS also envisages linking

the fighter to a combat cloud: a command and communication network connecting the fighter with other crewed and uncrewed aircraft in allied forces, as well as satellites, warships, and troops.

There is also the Tempest fighter being developed by the UK, Italy, and Japan in their global combat air programme (GCAP), with expectations that the aircraft should be patched into the FCAS network. What this particular fighter project clearly shows is that there is politics, and then there is economics. European allies recently rallied in response to the US demand for control of Greenland, demonstrating a political signal of European unity. Meanwhile, the new fighter was a political project aimed at strengthening Franco-German ties – and bolstering Europe –

announced in 2017 at a bilateral summit between French President Macron and then German Chancellor Merkel. The meeting was held at the Elysée president's office, the most political of statements.

Different forms of capitalism exist in Europe, and these differences may help explain the dispute keeping the French and German industrial partners apart. In Germany, there is capitalism based on strong ties between managers and elected labour leaders, with the two sitting together in the works council (Betriebsrat). There is also a search for consensus, which, once agreed, shapes the workplace. A powerful union with more than two million members, IG Metall sent a letter on 8 December 2025 to the German defence and finance ministers, informing about its refusal to working with French Dassault on the European fighter, *Reuters* reported. "Dassault has completely disqualified itself as a reliable partner within Europe in times of acute threat," IG Metall's letter stated, according to the *Reuters* report. "A line has been crossed. We no longer trust Dassault."

French employers' association for the metalworking industry (UIMM) has objected to the German union's letter, *Reuters* report-



▲ **A French Air Force Rafale of the 30e escadre de chasse takes to the air with an MBDA SCALP missile payload. The idea is that the future FCAS/SCAF will initially supplement and then replace the Rafale in French service. (Source: Armée de l'Air et de l'Espace)**

industrial partners over the business terms for designing and building a platform intended to fly the flag for Europe. French aircraft builder Dassault Aviation is the prime contractor for the fighter, with Airbus Defence and Space its German partner. The Airbus unit in Spain is the third major contractor on the fighter, with Indra the Spanish partner on the broader FCAS project. The fighter is intended as a European alternative to US-built fighters which dominate the world market, while also competing with Russia and China, both major players in the military arena. This assumes the industrial partners, Airbus D&S and Dassault, manage to agree on the underlying business.

At stake is the launch of FCAS phase two, whereby the partners build and fly a technology demonstrator of the new fighter and

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ed. “French industry companies cannot accept such a position aimed at excluding France’s industrial interests from this strategic project,” the association said. The aircraft company declined to comment, *Reuters* further reported.

“There is a strong German business culture for industry and work share,” said a French national who has worked closely with German colleagues in the European aerospace and arms industry. That insistence on work share could be seen with a separate assembly line in each of the four partner nations of the Tornado and Eurofighter Typhoon programmes, thereby driving up costs. The pursuit of work share can also be seen with Airbus DS insisting on one third of work on the new fighter for each of its German and Spanish units, giving the company two thirds of the work. Apart from the volume of work, Airbus DS engineers are keen to learn as much as possible on fighter technology, which Dassault has built up through its work on the Mirage and Rafale.

The Airbus unit has accepted Dassault as prime contractor, but seeks “interdependency”, a former Airbus DS senior executive, Jean-Brice Dumont, has previously said. Airbus DS sales accounted for 17% of the EUR 69 billion sales of Airbus in 2024, with the core airliner business bringing in 72% of revenue. Helicopter sales accounted for 11%. Airbus is a listed company, with a free float of 73.9% on the market. The company, which competes with US rival Boeing, is driven by stock market capitalism of the French CAC 40 share index to ‘wring every euro of profit’ from its business. That includes building a fighter. If the fighter project crashes and burns, there are media reports that Airbus might pursue the combat cloud as its military business target. Airbus describes this as: “The multi-domain combat cloud, based on its system-of-systems design, will be the strategic game-changer for future warfighting. The multi-domain combat cloud will enable manned and unmanned teaming assets to fight together in all domains under human control, making military operations more efficient and effective.”

Dassault objected to its allocated share of work, arguing that the company would receive only a one-third stake despite being the prime contractor. The French firm reportedly called for a 51% share, according to media reports. An equal division of work among the partners reflects the funding contributions from the three nations involved. Another Dassault objection is the tedious, often too lengthy meetings, as the three equal partners sat around the table discussing details rather than accept direction from the prime contractor.

For Dassault, there is the capitalism of a family-controlled company of medium size, with the family holding company, Groupe Industriel Marcel Dassault, holding 66.28% of the shares; there is 22.94% trading on the French stock market and 10.56% held by Airbus. Dassault Aviation also holds 0.22% of its own stock. A large family holding and small free float of shares allow the company to be effectively run as a family business. Dassault is therefore an exception to the rule of French state capitalism. This approach can be seen as particularly French, with the government holding a large stake in a company. Successive French governments have over time reduced state share holdings, or taken companies to the market with an initial public offering, or flotation.

The perceived importance of state stakes can be seen with US President Trump, calling for the administration to take up stakes in companies of strategic importance, such as Intel, a chip maker, and companies mining critical minerals.

Dassault said in January that it expected to report 2025 sales above EUR 7 billion, and an order book of 220 Rafale aircraft, unchanged from 2024; the company posted 2024 sales of EUR 6.2 billion. The company delivered 26 Rafale units last year, one unit more than predicted, and up from 21 shipped the previous year. That output is more than double the previous production rate of one fighter per month, the minimum amount needed to keep the production line open. Dassault is increasing the monthly build rate to three or four fighters in response to export sales. That hefty order book, a 2024 cash holding of EUR 8.4 billion, and the French Defence Ministry’s support for an interim



▲ **Eurofighter 30+74 aircraft of Luftwaffe Tactical Air Wing 74 in the special Castle Tiger livery at Neuburg an der Donau in July 2025. Eurofighter will eventually be replaced by FCAS, but questions still remain over cost, programme leadership and industrial workshare. (Image: Bundeswehr/Germaine Nassal)**

combat drone to operate alongside a planned updated Rafale F5 in the 2030s provide a comfortable medium-term outlook for the company.

The importance of the Rafale jet fighter could be seen at the 2024 Paris air show, with the fighter and the Neuron prototype of a combat drone on display, while the mock-up of the stealthy FCAS fighter was situated off to the side of the company pavilion. The FCAS phase 2 would be worth some EUR 5 billion, and would follow on from the closing of phase 1B at the end of 2025. Phase 1B was worth EUR 3.2 billion, and allowed the selection of the overall architecture by the air forces and contractors, and ran from 2023 to 2025. France would renew its fleet with the new fighter, which would fly alongside the Rafale before eventually replacing the twin-engine jet. At the same time, Germany and Spain would replace the Eurofighter Typhoon with the future aircraft. There is a clash of business convictions on the FCAS fighter, with considerable doubt as to whether the two leading contractors can work together on a project which puts Europe on the manufacturing map.

USN needs new 'boots on maritime ground', quickly

Dr Lee Willett

The United States Navy (USN) is well underway with the process of recapitalising its surface fleet force structure. Following announcements in late 2025, two new surface ship classes have emerged within this process – one each to meet the requirements for small and large surface combatants, respectively. However, these two new programmes and the procurement course changes they reflect are underscoring the need to deliver such recapitalisation more quickly, particularly when set against continuing shifts in global geostrategic tectonics and accelerating military threats.

The maritime domain and its connectors – sea lines of communication (SLOCs) on the surface, and critical undersea infrastructure (CUI) on the seabed – are subject to contest, confrontation, and conflict today, as great powers seek greater control over the domain.

With an uncharted journey towards a new world order perhaps being navigated today, naval surface forces will play a continuing, crucial role in accessing the maritime domain. Often called the 'workhorses' of any fleet, such surface forces – especially traditional 'escort' platforms like destroyers and frigates – play a vital part here, demonstrating interest in an area, generating presence there, and exercising sea denial or sea control if required. In the context of contest, confrontation, and conflict at sea, surface forces are effectively the maritime equivalent of 'boots on the ground'.

Even in a shifting geostrategic context, the USN will remain a global naval power and will retain a global maritime presence.

In the post-Cold War world, its CG47 Ticonderoga class cruisers and DDG51 *Arleigh Burke* class destroyers have provided the bulk of the USN's surface-based maritime mass. Two other major programmes – the DDG1000 *Zumwalt* class destroyers, and the twin Freedom and *Independence* class Littoral Combat Ships (LCSs) – were introduced as prospective new courses for transitioning towards new types of surface warship capability and effect: however, both were curtailed as costs increased and capabilities moved on.

Curtailing the LCS programme prompted the USN to seek another route for building small surface combatant (SSC) capability. This



▲ A US Coast Guard *Legend* class National Security Cutter (foreground) and a US Navy (USN) *Arleigh Burke* class destroyer sail in the Taiwan Strait in 2021. The USN's future surface force structure will include a core of *Arleigh Burkes*, small and large crewed combatants, and uncrewed vessels. (Source: US Navy)

led eventually to the selection of Italy's Fincantieri Marinette Marine to deliver the FFG62 *Constellation* class future frigate, using the Italian Navy's *Bergamini* class FREMM multi-mission frigate design.

The company received a build contract in April 2020; work began on the lead ship in August 2022, with its keel laid in April 2024.

The need for speed

However, in late 2025, the *Constellation* class programme was cancelled, bar the first two ships.

"We are reshaping how we build and field the fleet," US Secretary of the Navy (SecNav) John Phelan said, announcing the decision on social media. Working closely with industry to deliver warfighting advantage, the first step in this process would be "a strategic shift away from the *Constellation* class frigate programme", he added.

"A key factor in this decision is the need to grow the fleet faster, to meet tomorrow's threats," Phelan continued. The decision reflected requirements moving towards more rapidly constructing new ship classes, to deliver warfighting capability more urgently and in more numbers, SecNav emphasized.

Design and programme challenges had already seen the lead *Constellation* class ship's delivery schedule slip from 2026 to 2029.

This course change came at a significant time for the USN's surface fleet, given the need to underpin current readiness and operational output to counter mounting military threats while simultaneously building out the broader future force structure.

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For the foreseeable future, the *Arleigh Burke* destroyers will remain the core of the fleet, with the class's Flight IIA and Flight III ships to bring a combined force of over 80 platforms that will remain in service until at least the 2050s. However, around this core the USN is looking to layer lower-end and very high-end capabilities through developing the small and large surface combatant programmes.

With *Constellation* cancelled, the SSC capability is now set to be built by HII, using the company's design for its in-service Legend class National Security Cutters (NSCs).

Regarding the large surface combatants (LSCs), this is set to be provided by the *Trump* class battleships, announced by President Donald Trump in late December 2025.

This means the core surface ship force structure is set to be based around four primary pillars: the LSCs; the *Arleigh Burkes*; the SSCs; and a range of uncrewed surface vessels (USVs). Stated requirements for up to 25 *Trump*-class battleships/LSCs, 24 SSCs, and 80 or so *Arleigh Burkes* will give a crewed 'escort' surface ship inventory of around 140 vessels, with around 100 or so medium-size USVs bringing additional mass to augment this presence.

Yet uncrewed systems including USVs remain an emerging technology. So, the requirement remains in turn for delivering SSC and LSC, as the two new crewed platform pillars, as quickly as possible.

Delivering these two ship types illustrates several key challenges the navy is wrestling with.

First, speed is the need – but still is the challenge.

The LSCs, being developed instead of the planned DDG(X) programme, are aiming to bring significantly more capacity for technology and capability. With a planned displacement of at least 27,000 tonnes, the ships will have more than enough space to accommodate a full range of emerging effectors including rail guns, hypersonic missiles, and laser-based directed energy weapons. Yet despite the prospective capacity available in the hull, the challenges will include developing and constructing a new hull design of such scale; developing and integrating a range of still-emerging technologies; building a non-nuclear power-and-propulsion structure that can generate sufficient output to meet the requirements for both driving the ships and powering the new, energy-hungry weapons; producing sufficient crews; and controlling the costs of the different components of this complex programme.

The new SSC solution confronts some challenges, too. HII's NSC option was chosen because it is a proven design, with ships in US Coast Guard (USCG) service (the last arriving in April 2024), and with the design itself having been one of the candidates in the original SSC down-selection process. In this context, it was chosen to support delivery at speed and scale. Media reports indicate the first hull could be in the water by 2028.

However, what may be just as important as the programme's procurement speed is its capability scale. Displacing 3,200 tonnes compared to the 6,100-tonne *Constellation* class, it is not yet clear what capabilities the new hull may accommodate. For example, *Constellation* was an Aegis-capable, multi-role platform with a particular emphasis on anti-submarine warfare (ASW) capability, carrying high-end towed array and variable-depth sonars. ASW capability is increasingly in demand in both the Euro-Atlantic and Indo-Pacific theatres, with peer-level submarine threats from Russia and China.

Operational output

Assessing the threat issue, the USN's new surface force structure is to be accompanied by a new concept of operations, with different surface ships developed to provide adaptive, non-traditional, 'hedge' capacity against different missions, namely ASW, mine countermeasures, and integrated air and missile defence (IAMD).

The ASW and IAMD roles will fall to the escort vessels. With their extensive air-defence suites, the Flight IIA and Flight III *Arleigh Burkes* will cover the IAMD requirement, as well as the ASW threat. The US Department of War's 2026 National Defense Strategy highlighted Russia's undersea threat to the US homeland: the ASW threat is thus a time-urgent matter to address. Will the SSC capability continue to be part of the requirement for meeting this threat?

It is also worth noting that the changing world order is raising the question of whether there are still maritime areas where naval 'boots on the ground' will likely face only lower-end threat contexts. 'Non-traditional' actors such as the Houthi rebels in the Red Sea prove that non-state actors can bring emerging capabilities – uncrewed systems for example – and high-end capabilities like ballistic and cruise missiles to the naval fight. Other navies, including the UK Royal Navy (RN), are shifting away from dividing up surface forces across lower- and higher-end threats, 'up-gunning' all ships to reflect this new reality. Thus, the SSC solution may well need punchy outputs like its larger counterparts in the USN's surface fleet. 

- ▼ **Three uncrewed surface vessels (USVs) are pictured during a USN exercise in the Gulf in 2023. USVs will be a central component of the navy's future surface force structure. Pictured in the background is a Littoral Combat Ship. (Source: US Navy)**



Fentanyl: WMD, Distraction, or Both?

Dan Kaszeta

A recent declaration by President Trump stated that the synthetic opioid fentanyl is now to be considered a “weapon of mass destruction”. This declaration needs to be viewed in the context of the abduction of President Maduro of Venezuela and his wife for trial in the US on drug trafficking charges and a series of violent maritime actions against civilian vessels in the Caribbean Sea and Pacific Ocean, allegedly for trafficking in fentanyl and other substances.

ogy. First, does fentanyl count as a chemical weapon? It is worth recalling that chemical warfare and chemical munitions are banned by treaty law. Moreover, treaties, if they are to be at all effective, must define what it is they are restricting.

In force since 1997, the Chemical Weapons Convention (CWC) is the main body of law in such cases, as it lays down what chemical warfare agents are and what constitutes a chemical munition.

Nearly all chemical compounds in the world are toxic in some way or another, and much of the CWC focuses on action and intent. The operative bans are the use of chemicals to cause death by means of toxicity as part of acts of warfare. For example, chlorine is used in industry and sanitation and the CWC does not ban chlorine. Likewise, making or selling drugs for recreational use, even if deaths and injuries occur, does not meet the definition of warfare. Furthermore, the treaty applies to states, not criminal drug dealers. As bad as criminal drug gangs are, their business model is not based on murder, but primarily of greed.

Similarly, the term “Weapon(s) of Mass Destruction” (WMD) has, in fact, become debased through widely varied usage. One of the early uses of the term WMD referred to aerial bombing with conventional weapons following the bombing of Guernica in the Spanish Civil War. Throughout the Cold

War, the phrase was broadly used to refer to nuclear, biological and chemical (NBC), weapons, although individual uses varied. Where the definition becomes messy is in domestic US law. In 1994, US Congress passed a law (18 USC 2332(a)) defining “Weapon of Mass Destruction” so broadly as to include landmines, hand grenades, and every artillery piece ever invented, as well as traditional chemical and biological weapons. Any device designed to cause harm through poisoning or toxicity is therefore already designated a “WMD” under US law. Under existing law therefore, any use of fentanyl to cause harm would already qualify as a WMD. Singling out the



▲ **The United States Coast Guard now routinely seizes shipments of fentanyl. According to a report from the US Government Accountability Office (GAO) in 2024: “synthetic opioids—primarily fentanyl—accounted for 60% of all overdose deaths in the United States. That’s about 48,000 people.” (Source: US Coast Guard)**

Contemporary discourse can often take liberties with terminology, whether by accident or by intent. In order to reasonably discuss this issue, it is necessary to cut through some rhetoric to make sense of the actual issues. For any discussion to be coherent, it is first necessary to cut through some confusing terminology.

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molecule itself by executive decree probably only serves to increase the already significant paperwork burden on legitimate medical use.

Domestic drug abuse involves personal choices by private individuals; even if illegal, it does not reach the threshold of warfare, nor does it constitute terrorism. Trying to fold fentanyl into a *casus belli* with a sovereign state or to find grounds to engage in murder at sea is problematic to say the least. But is there some other underlying point worth examining? If we park the disruptive rhetoric to one side, we can examine the synthetic opioids from the perspective of their physical and biochemical characteristics.

Synthetic opioids do however, show some potential for use as chemical warfare agents. Of course, fentanyl does not meet all of the criteria for an ideal chemical warfare agent, but to date nothing does. High toxicity, rapid incapacitation, ease of production (at least by a nation state with a proper chemical industrial base), survival through various means of dissemination and the prospect of temporary contamination are all properties conducive to its use as a weapon. However, toxicity is by no means the only characteristic that makes a chemical compound useful as a warfare agent. It needs to be deployable over an area; things that are principally ingestion and injection hazards are broadly disregarded.

The properties of fentanyl itself have been exaggerated, particularly with regards to its ease of absorption into the human body; the risk has in fact, been exaggerated on social media. However, the various features that make fentanyl potentially dangerous can be enhanced. Other chemicals in the synthetic opioid family are potentially far more useful as weapons, and these are therefore of the most concern. Substances such as carfentanil, another member of the same broad family, are more toxic by weight than fentanyl and can be readily converted into a form that is deployable as an aerosol capable of causing widespread casualties through inhalation. When deployed this way, these synthetic opioids can cause rapid incapacitation, but the margin between an incapacitating dose and a lethal one is often very narrow.

This concern is not actually new. It is widely asserted by numerous legitimate authorities that carfentanil or some closely related synthetic opioid was used by Russian special forces in a terrorist-hostage situation in Moscow at the Dubrovka Theatre in October 2002, known as the Nord-Ost siege. Chechen extremists seized the theatre, taking as many as 900 hostages. Although the finer details of the incident are still shrouded in secrecy, it is evident that carfentanil and/or remifentanil in aerosol form was used to tranquilise both the terrorists and hostages. While the apparent intent was to rescue the hostages, over 120 civilians died from poisoning and many more were injured. Following the release of the chemical into the theatre, the emergency services were overwhelmed by the number of casualties among the hostages. The ensuing secrecy bred recrimination, conspiracy theories, and considerable human agony. The Moscow incident has driven much of the concern, as it demonstrates that, at least as of

2002, a nation-state was pursuing synthetic opioids as a weapon. More recently, there has been some concern that Iran has been researching “pharmaceutical-based agents” such as opioids for use as weapons.

It is important to note that the concept of synthetic opioids as terrorism and military threats is not new. A US military textbook published in 1997 discusses fentanyl as a potential incapacitating weapon. Serious concern over Iranian programmes dates back to



▲ **Existing technology for fentanyl detection is still of the desk-top variety.** According to the US GAO, between FY 2021 and FY 2024, US law enforcement captured 58,367 kg of fentanyl and 148,324 kg of fentanyl precursor chemicals. (Source: US Dept of Homeland Security)

2005 at least, according to US documents seen by this correspondent. There are also allegations that Iran collaborated with the Assad regime, leading to some incidents in the Syrian civil war in 2014 allegedly involving “anaesthetic agents”, which may have been some form of synthetic opioids.

As is often the case, it is difficult to verify facts in these cases, but the mere existence of such allegations has driven concern in non-proliferation circles. The Organisation for the Prohibition of Chemical Weapons (OPCW) takes the subject seriously; under the rubric of “central nervous system-acting chemicals”, it has been seriously discussing the issue for some years now.

In practical terms, one can follow the money. The US military is currently funding technologies for detection and identification. Existing military-chemical protection clothing and respirators are generally adequate, but soldiers need reliable detection systems to know when to use them. Older chemical warfare agent detection systems were not developed with aerosolised opioids in mind, although some of the technical approaches used in the past could be modified, just as some laboratory-based techniques could be adapted for field use. The fact that the US military is awarding contracts to the firm Kaleo for the procurement of large quantities of naloxone autoinjectors is a clear indication that it is at least taking the threat seriously. Political rhetoric and executive decrees however, are not really changing the underlying threats. 

Protecting Underwater Infrastructure: The Threat and Solutions

Conrad Waters

Recent incidents as far apart as the Baltic and the waters off Taiwan have highlighted the vulnerability of critical underwater infrastructure to malign actors. Whilst such threats have a long history, the increased significance of subsea assets to global economic activity underlines the importance of understanding these dangers and devising appropriate responses. On the positive side, there is now a strengthened awareness of the importance of this infrastructure and the nature of the risks it faces. However, developing appropriate solutions for these hazards remains a work in progress.

Whilst largely hidden from public gaze, a range of undersea assets increasingly form a crucial part of daily economic activity. This critical underwater infrastructure (CUI) spans a spectrum of assets laid across the seabed that are frequently divided into three main categories:

- **Subsea communications cables:** Successors to the telecommunications copper cables of yesteryear, today's network of submarine fibre-optic cables handles vast quantities of data, forming a vital global, regional and national communications network.
- **Underwater electricity cables:** Typically comprising insulated copper cables, these facilitate the interconnectivity of national and regional electricity grids and form crucial links with the offshore wind farms that have become a major part of the transition to green energy.
- **Oil and gas pipelines:** These networks of hollow pipes connect production fields to end markets, often over vast distances.

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Underwater CUI is installed, owned and operated by a diverse array of public and private entities. This can give rise to a degree of duplication and redundancy, particularly in the communications sphere, but also a lack of standardisation. The nature and location of the infrastructure involved often enhances its exposure to attack and disruption. In particular, it frequently lacks significant physical protection, whilst its extent and remoteness can make effective surveillance difficult. Conversely, concentration of infrastructure around key nodes, for example where cables and pipelines make landfall, provides opportunities for hostile actors to create disproportionate disruption. The financial costs of damage can be huge. For example, it has been estimated that the direct costs associated with the September 2022 Nord Stream pipeline explosions were considerably in excess of EUR 1 billion.



▲ **US Navy SEALs conduct diving training in waters off Key Largo in Florida in February 2025. Critical underwater infrastructure is being targeted by an increasingly wide range of threats, of which diving operations are just one example. (Source: US Navy)**

A history of risk

Attacks on underwater infrastructure are by no means new. The outbreak of the First World War saw both Imperial Germany and the British Empire initiate measures to disrupt and disable their opponents' undersea telegraphic cables, although it was Britain's command of the seas that proved decisive. The effective destruction of much of the German network hindered

its ability to communicate beyond the European continent and left these communications inherently vulnerable to interception. This was an important element in the British decryption of the infamous Zimmermann telegram that hastened the United States' entry into the war. Later, interception of Soviet submarine cables by NATO during the Cold War yielded valuable intelligence information.

Although hostile attacks on CUI therefore have a long history, it is important to note that such disruption is by no means the most significant threat. A recent RAND Corporation study has estimated that around 40% of known disruption to this infrastructure is related to fishing and a further 15% to

case fell outside of its jurisdiction under United Nations Convention on the Law of the Sea (UNCLOS) principles.

Although such low level, grey zone attacks by state-sponsored actors have the potential to cause considerable harm, they are by no means representative of the full extent of the threat CUI currently faces. For example, rapid developments in the availability and cost of relevant technology such as uncrewed underwater vehicles (UUVs) holds out the prospect that terrorists or criminals could also target CUI for their own purposes. At the other end of the scale, it is conceivable that CUI could be the subject of a more widescale assault as part of the precursor to a more conventional military conflict. The activities



- ▲ **A US Navy Mk 18 Mod 1 uncrewed underwater vehicle (USV) pictured during Exercise Valiant Shield 22 in the Pacific. The widespread adoption of uncrewed and autonomous assets poses increased threats to CUI but also provides new options for their protection. (Source: US Navy)**

natural hazards such as storms. Despite this, a series of recent incidents have highlighted the potential for more malevolent intervention. These include the cutting of two subsea cables linking Taiwan's Matsu Islands to Formosa in February 2023 in events that were linked to the nearby presence of Chinese vessels. In Europe, the Baltic region has seen a series of disruptions since the outbreak of the Russo-Ukrainian war. Notably, a spate of incidents towards the end of 2024 saw the severance of the BCS East-West Interlink and C-Lion1 subsea communications cables, as well as the Estlink 2 underwater power cable. Whilst it has been speculated that these events were the result of hybrid warfare sponsored by Russian intelligence agencies, no definitive evidence of hostile intent has entered the public domain.

All these incidents are illustrative of the particular vulnerability of CUI to the increasingly prevalent trend towards 'grey zone' or hybrid warfare. In this sphere, the cutting of a cable by the 'accidental' dragging of a merchant vessel's anchor or a breach in a pipeline due to an unknown cause can be cloaked under the veil of plausible deniability. The resulting damage and disruption can be disproportionate to the effort involved and the direct consequences limited. It is also arguable that international maritime law has failed to keep pace with this evolving environment, with the scope for taking preventative action outside of a country's territorial waters seemingly uncertain. In November 2025, the Helsinki District Court ruled that criminal charges against some of the crew of the vessel involved in the Estlink 2 incident could not be pursued as the

of the Russian Navy's Project 22010 oceanographic research vessel RFS Yantar in mapping subsea communications cables in both European waters and beyond, doubtless providing the information needed for such an attack, have been widely reported. In December 2025, British First Sea Lord General Sir Gwyn Jenkins highlighted broader Russian investment in its Main Directorate of Deep-Sea Research (GUGI) – including deep sea submersibles – in an interview with the *Financial Times* in the context of a growing risk to the United Kingdom's critical seabed cables and pipelines. As is the case for deniable hybrid actions, the legal scope to challenge these surveillance activities when they are conducted outside of territorial waters is limited.

A collaborative response

The vulnerability of CUI to hostile action has, of course, not gone unnoticed. This has resulted in the rapid expansion in national and cross-border activity to deter and respond to the threat, particularly by European nations facing what are arguably the most intensive risks. Whilst European Union activity has largely been at the policy level, NATO created a strategic Critical Underwater Infrastructure Coordination Cell at its Brussels headquarters in February 2023 and followed this by standing up a more operationally-focused Maritime Centre for Security of Critical Undersea Infrastructure in May 2024. The latter is based at NATO Allied Maritime Command (MARCOM) in Northwood near London. It is described by the Alliance as a "...networking and knowledge centre concentrating on CUI" to

assist “Commander MARCOM in making decisions, deploying forces and coordinating action”.

Another important part of the jigsaw of partnerships strengthening the protection of CUI is the UK-led Joint Expeditionary Force (JEF), which is also headquartered at Northwood. Comprising ten NATO members in the Nordic, Baltic and North Sea regions, this essentially provides a pool of high-readiness assets to deter malevolent actors and permit a rapid response to any incidents, complementing NATO’s activities. The JEF has been taking an increasing interest in safeguarding CUI, undertaking exercises in 2023 and 2024 aimed at improving its capacity to counter the more threatening environment. The 2024 activities, known as JEF Response Option activity NOR-DIC WARDEN, involved a month-long series of activities by ships and aircraft drawn from JEF participants encompassing CUI from the North Atlantic through to the Baltic.

Beyond Europe, the protection of CUI appears to remain more of a national endeavour despite the regionally interconnected nature of many of the assets involved. There is, however, a growing understanding that the vulnerabilities demonstrated, particularly, by events in Europe have broader relevance. For example, the Association of Southeast Asian Nations’ *ASEAN Digital Masterplan 2025* takes embryonic steps to improve the resilience of the region’s submarine cables and provide transnational access for cable repair. The Quadrilateral Security Dialogue (Quad) between Australia, India, Japan and the United States also announced its own programme for CUI protection, the Quad Partnership for Cable Connectivity and Resilience, at its May 2023 summit. Whether this initiative will endure the increasingly transactional focus of the second Trump presidency must remain a matter of conjecture.

Developing practical capabilities

It is clear from the above analysis that, at least in Europe, a strategy for the requisite collaborative approach to combating the threat to CUI is already well underway. For this response to be effective, however, this strategic dimension needs to be accompanied by the acquisition of appropriate materiel to identify and respond to the danger.

A fundamental capability requirement is improving the surveillance of infrastructure which, as previously noted, is extensive in nature and frequently located in remote and hostile environments. A range of solutions have been implemented, or are under development, to alleviate these challenges. These include the use of satellite imagery to track the activity of potential hostile surface vessels, the use of autonomous USVs to undertake remote surveillance of the seabed and the use of fixed-point sensors to detect anomalies. The pace of technological development is rapid. For example, in November 2024, Thales announced an agreement with another French company, FEBUS Optics, to utilise the latter’s distributed fibre optic sensing (DFOS) technologies to enhance the functionality of its existing BlueGuard sonar system. DFOS can be used to monitor the water space around the entire length of a piece of CUI, detecting acoustic signals generated close to the infrastructure being monitored.

Another important example of technological development is the down-scaling of sonar technologies to integrate with the new generation of uncrewed platforms. In December 2025, SEA, part of the British Cohort group, revealed it had been awarded a multi-million-pound contract to supply 22 of its KraitArray undersea sensing systems to Liquid Robotics, a Boeing Company, for integration into the company’s Wave Glider



▲ The Russian Navy’s Project 22010 oceanographic research vessel RFS Yantar is widely seen as being used by Russia’s Main Directorate of Deep-Sea Research (GUGI) to map out CUI for potential future attack. This photograph was taken in the English Channel during 2018. (Crown Copyright 2018)



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▲ SEA's KraitArray thin-line towed array sonar is representative of a number of recently-developed technologies that can enhance the effectiveness of uncrewed assets in monitoring CUI. (Cohort Plc)

uncrewed surface vessel (USV). Described by the company as delivering high-end, passive acoustic detection performance in a compact, modular form, KraitArray – and similar compact sonars – offer the prospect of significantly improving the ability of uncrewed platforms to provide enhanced intelligence and maritime domain awareness in support of CUI protection.

The development of improved monitoring capabilities is being accompanied by the acquisition of specialised surveillance ships to deploy and support the array of new equipment. An early example is the British Royal Fleet Auxiliary service's multi-role ocean surveillance ship RFA Proteus, a former commercial offshore support vessel brought into naval service in 2023. Whilst the detailed concept of operations underpinning her purchase is shrouded in secrecy, her ability to deploy a range of underwater vehicles provides the United Kingdom with significant deep-sea deterrence and response capabilities. A number of other European countries have announced plans to operate similar vessels, most recently the Danish Ministry of Defence's purchase of the commissioning service operation vessel Norwind Helm at the end of 2025. All-in-all, the arrival of these vessels significantly enhances the potential of European navies to respond to the threat posed to CUI.

An integrated response

Despite this progress, much still remains to be done, particularly in developing appropriate operational concepts. Given the vast, distributed nature of the infrastructure involved, it would seem that an integrated approach is necessary, combining the capacity of traditional assets such as crewed ships, submarines and aircraft with newer technologies, such as uncrewed vehicles and artificial intelligence (AI).

A good example of the likely direction of travel is the British Royal Navy's Project CABOT, which aims to provide a persistent anti-submarine warfare (ASW) surveillance capability in the North Atlantic. Whilst focused on the broader spectrum of threats posed by Russian submarine and other sub-sea activity, the defence of CUI forms an important part of its scope. It is intended to be delivered in two phases:

- **Atlantic Net:** Envisaged to be an interim capability delivered by industry, this will use uncrewed vehicles operated by commercial partners to provide AI-assessed acoustic data for further Royal Navy analysis. It will be a relatively low-cost phase that will enhance undersea surveillance whilst allowing crewed assets to be focused on other missions.
- **Atlantic Bastion:** A more comprehensive solution using an armed forces-operated model will encompass an integrated network of crewed and uncrewed surface vessels, submarines and aircraft to provide an enhanced capability. These assets will include traditional platforms such as the Type 26 ASW frigates and P-8A Poseidon maritime patrol aircraft, as well as uncrewed vehicles such as a proposed Type 92 ASW USV sloop and Type 93 'Chariot' UUV.

Although developed as a national, British capability, it seems likely that the project will be expanded to encompass other regional allies. For example, growing strategic cooperation with Norway – illustrated by its acquisition of Type 26 frigates and the December 2025 signature of the Lunna House Agreement – looks set to see it emerge as a crucial player in the Atlantic Bastion concept.

Currently at the start of its implementation, Project CABOT is very much a work in progress that is likely to yield important



▲ A number of navies are introducing specialised surveillance ships to improve their ability to monitor and protect CUI. This is the British RFA Proteus, which entered service in 2023. (Crown Copyright 2023)

lessons for the protection of CUI in other parts of Europe and beyond. It is, however, important not to view it as a universal panacea to the threat posed to CUI worldwide. The attractiveness of seabed infrastructure to hostile actors suggests it will prove impossible to deter or prevent all future attacks. This makes both resilience and the ability to conduct rapid repairs other important parts of the defensive armoury.

Indeed, some commentators have suggested that the ready availability of specialised repair shipping might be a significant constraint in responding to any concerted attack on CUI. In September 2025, the UK Parliament’s Joint Committee on National Security Strategy recommended the acquisition of a genuinely sovereign British cable repair ship by 2030 in a report on the resilience of subsea telecommunications tables. More broadly, it will be important to ensure effective information sharing and cooperation with often private sector owners of critical assets, as well as to take care that their builders and operators remain aligned with national interests. Notably, the United States has been proactive in taking steps to prevent China’s HMN Technologies from gaining a dominant position in subsea cable laying, largely over espionage fears.

Conclusion

It is evident from this short overview that the world is entering a new phase in the long history of threats to CUI. Moreover, these threats are both increasing and multi-faceted. Encouragingly, the nature of the danger and the importance of combatting it appear to be well-recognised. Particularly in Europe, co-ordinated international action is being taken to mitigate and combat the danger. This is being accompanied by the development of improved technologies and new operational

concepts that hold out the prospect of significant progress in the areas of surveillance and threat detection. However, the challenge is immense, relying on an integrated response that extends beyond operational command and control as far as the commercial and legal domains. Much work remains to be done.





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Infantry Tactical Insights from Ukraine: The Role of Infantry in Modern High-Intensity Warfare

Alex Horobets

Russia's full-scale invasion of Ukraine in February 2022 was the largest armed conflict in Europe since World War II. It has changed – and is still changing – how we understand modern ground warfare. Classical NATO doctrines, developed during

At the same time, in modern warfare – which is often a confrontation of drones and technologies – infantry remains the basis of ground combat, since no technical system is yet capable of independently capturing and holding territory. It is infantry units



▲ **DevDroid Ground robotic systems handle the toughest tasks – logistics, evacuation, reconnaissance in the armed forces of Ukraine. (Source: Ministry of Defence of Ukraine)**

the Cold War before being skilled and tested in Middle Eastern conflicts, were based on the expectation of air superiority and fast-moving armoured forces. The war in Ukraine has shown that strong air defences and the widespread use of drones by both sides have made deep offensive operations difficult, resulting in a mostly static front line, except in areas where one side gains a temporary advantage.

that carry out the key tasks: assaulting and defending positions, clearing populated areas, and controlling territory. This can be described as ensuring the state's real presence on the ground. Without the involvement of infantry, no ground operation can be considered complete. Thus, infantry – previously viewed by many as a supporting branch of the armed forces in the era of high-precision weapons – has once again become the central element in intense combat, albeit in a more technologically advanced form.

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The Evolution of Ukrainian Armed Forces Infantry in the War Against Russia, 2022–2025

From 2022 to 2026, the infantry of Ukraine's Defence Forces underwent a rapid and profound transformation to adapt to a war of attrition against an adversary with superiority in artillery, aviation and manpower, while relying on limited resources and



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▲ **Use of Leleka UAVs by the 14th Mechanised Brigade during nighttime operations. (Source: General Staff of the Armed Forces of Ukraine)**

the accelerated introduction of new technologies, primarily unmanned aerial vehicles (UAVs). The transformation was so radical that, according to assessments by Ukrainian military personnel themselves, a soldier who joined the army in 2022 and, for some reason, had a break from the war would have to undergo complete retraining by 2026 – both in terms of coordination with units and in the use of new systems such as drones, ground robotic platforms, and robotic observation posts.

During the initial stage of the full-scale invasion, Ukrainian infantry operated mainly according to traditional doctrines of territorial defence and combined-arms warfare. This involved urban combat in small units, holding populated areas, and organising defences in deeply layered positions. The lack of air superiority – due to limited aircraft and air defence capabilities – along with restricted counter-battery options, forced the infantry to adopt a decentralised command structure: platoons and squads often

the clearing and consolidation of captured positions. Assault units could number 10 to 40 soldiers. However, it is important to understand that such a number of fighters did not advance in a single dense line. Moreover, Ukrainian tactics at this time evolved towards greater dispersion. A single group often split into several subgroups – those entering trenches or buildings directly, a fire support group suppressing enemy positions, and a reserve group ready to organise defence or repel a possible counterattack while the first subgroup regrouped or evacuated the wounded.

The situation began to change dramatically in 2023. The widespread use of first-person view (FPV) drones by both sides caused catastrophic losses of armoured vehicles, often even during the advance to start positions. In addition, the number of continuously operating reconnaissance UAVs increased significantly. The reconnaissance network began functioning in real time, sharply reducing the time between detecting a target and striking it. As a

result, in many operations, a sizeable percentage of tanks and infantry fighting vehicles (IFVs) were destroyed by the enemy before even entering direct contact, making classic mechanised assaults extremely costly and risky. Assault group sizes shrank dramatically, down to 8–14 soldiers. Combat formations consequently took the form of a “cloud” of small groups. For example, a platoon could be spread over an area previously occupied by a company or

◀ **French-made VAB armoured personnel carriers in service with the 155th Mechanised Brigade. (Source: Ministry of Defence of Ukraine)**



even a battalion. This made high-precision strikes economically inefficient – for instance, against a group of three fighters.

A new phenomenon emerged: the so-called “drone wall,” a near-continuous engagement zone, with FPV drones equipped with delivery systems, and precision-guided artillery, extending 10 to 25 km deep. As a result, large-scale offensive operations gave way to local “nibbling” of positions, infiltration, and the accumulation of small groups in shallow enemy rear areas or in the grey zone. This minimised losses, though it also slowed the pace of advances. A challenge for the Ukrainian Armed Forces is that the Russian army actively uses similar tactics.

In 2024–2025, the primary source of a unit’s firepower was no longer small arms, grenade launchers, or anti-tank missile systems, but FPV drones, cargo drones, and ground robotic platforms. By 2025, an assault group could be comprised of between 5–9 infantry soldiers (carrying ammunition, assault troops, and engineers), 4–6 operators of various types of drones, and 1–3 operators of ground robotic platforms. The role of ordinary infantry changed dramatically. They began identifying and further scouting enemy positions, covering drone operators, marking and confirming targets, finishing off the enemy after drone strikes, and quickly consolidating captured positions. Unlike traditional artillery fire, drones eliminate specific enemy silhouettes and firing positions. Infantry only advances once the enemy’s fire systems are disrupted by precision strikes.

At the same time, so-called robotic strongpoints appeared as a technological response by the Ukrainian forces to manpower

shortages and the high tempo of Russian offensives in certain areas. Unlike traditional strongpoints, where soldiers must be directly at the machine gun, in robotic strongpoints the firing positions are placed 50–500 m forward, while operators remain in protected locations controlling the fight via terminals. Thanks to these systems, positions could be held for 30 days or more, primarily by ground robots equipped with machine guns, thermal imaging cameras, and motion sensors. By early 2026, this concept was gradually moving from experimental testing to serial deployment, with the logical next step being “swarm” control, where one operator manages not a single turret but a network of firing positions. Ukrainian examples of such systems include Burya 2.0, Wolly and ShaBlia.

In addition to robotic platforms at command posts, cargo drones and unmanned ground vehicles (UGVs) began to be widely used in areas where roads were blocked by enemy fire. These systems deliver food, water, and ammunition to positions, allowing strongpoints to remain combat-capable. According to Ukrainian military sources, by 2025 around 90% of all supplies to the front line near Pokrovsk were delivered by UGVs.

As of early 2026, classical armoured assaults without the prior creation of a “drone corridor” are no longer used. The modern offensive scheme now looks as follows: deep drone-based attrition at a depth of 10–40 km, a simultaneous strike by a large number of FPV drones against identified targets, followed by infiltration and consolidation by small units in selected areas. It is clear that unmanned systems have radically changed the nature of combat for Ukrainian infantry. Russian forces are also actively employing fibre-optic drones, coordinated FPV swarm

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attacks, and ground-based unmanned platforms. However, Ukraine has outpaced its opponent in the speed of technological adoption and in integrating drones down to the lowest tactical level – squads and assault groups. This gap is now one of the reasons for the asymmetric effectiveness of Ukrainian infantry under conditions of limited manpower and material resources, as drones have effectively become the “eyes” and “artillery” directly available to the individual infantryman. At the same time, while Ukraine is ahead in the issue of technology integration, Russia is attempting to offset this by leveraging its superior resources to rapidly replicate and mass-produce systems that Ukraine was the first to test in real combat conditions.

A painful problem at present is Russian fibre-optic-guided FPV drones with ranges of 20–60 km, which can bypass electronic warfare. To counter them, the Ukrainian Armed Forces are forced to employ a set of methods, such as camouflage and frequent positional changes, the construction of underground shelters with multiple exits, and the hunting of enemy UAV operators. Because of these challenges, the assessment of the usefulness of particular types of fortifications has also changed. If at the beginning of the full-scale war large strongpoints were built, now instead of large fortifications, smaller groups of trenches are constructed – the so-called “foxholes” – which minimise the effects of the enemy’s use of strike drones.



As a result, by early 2026, Ukraine’s defence has turned into a hybrid model, in which the main defensive nodes with infantry, mortars, and artillery hold key points, while all remaining space is controlled by drones. However, this system is highly dependent on maintaining a high density of drones and on rapid response to any infiltration. A decrease in drone density can lead to local breakthroughs and an expansion of grey zones.

Ukrainian Experience for NATO Forces

The experience of Ukrainian infantry in modern full-scale combat operations against the Russian army offers a number of important lessons for NATO armed forces. First, the use of traditional mechanised

infantry tactics cannot withstand modern UAV-dominated combat without both the total dominance in the drone domain and prior creation of a “drone corridor”. Second, victory in a war of attrition, among other elements, depends on such critical factors as the mass production of inexpensive strike UAVs, the speed of introducing new counter-drone technologies, and the training of infantry soldiers as universal operators of drone systems.

NATO’s armed forces don’t have much time to undergo such a transformation. A dangerous mistake would be to preserve outdated approaches, hoping that classical warfare will become relevant again (with the use of large amounts of armoured vehicles and precision-guided weapons). Faced with the reality of the 2020s, such a war is virtually impossible without absolute dominance in the air and especially in the drone domain. Ukrainian experience shows that in modern warfare, victory belongs not to the side with more tanks, but to the one whose infantry adapts more quickly to technological changes and is more effectively integrated into a unified digital battlespace.



▲ Training of soldiers from the 92nd Assault Brigade in skills necessary on the frontline. (Source: Ukrainian Ground Forces)

As the Armed Forces of Ukraine are forced to counter various types of UAVs used by Russian forces and infiltration tactics by small infantry groups, adaptation of the front’s defensive line has come to play a major role, becoming a key element of territorial control under constant aerial surveillance. What exists now is no longer a continuous line of trenches, but rather a system of separate strongpoints, grey zones and specially prepared areas designed to destroy the enemy with drones. Between major defensive nodes there are often gaps – up to 1–3 km wide – not covered by a permanent infantry presence, but primarily by drones. If a small-sized Russian unit does manage to infiltrate such zones, efforts are made to detect and eliminate it as quickly as possible, before it has time to consolidate.

At the hottest axes of the Russian offensive, it is precisely the density of the “wall of drones” that remains the main factor slowing the advance of small enemy groups. This tactic has turned into a constant on-station presence of UAVs and the rapid rotation of operators. However, this same tactic contains its own vulnerability – both a shortage of drones and of skilled operators, which plays into Russia’s hands.

The Emerging Role of UGVs

Alexey Tarasov

Driven by the realities of modern warfare, unmanned ground vehicles (UGVs) are evolving rapidly, reflecting their increasing operational importance on the battlefield. More importantly, combat employment prompts innovations in both tactics and technology, which in turn expands the range of combat and support roles for UGVs, with many new roles having emerged in recent years.

The Russo-Ukrainian conflict serves as a catalyst for innovation not only among the belligerents but also among numerous third-party states observing and analysing the conflict. Consequently, the experience of ground warfare in Ukraine often translates into transformative changes in tactics, technology, and doctrine worldwide.

One area that has seen the most extensive development is unmanned ground systems. Over recent years, both Russia and Ukraine have invested heavily in UGV technology, resulting – by early 2026 – in a surge in deployed systems and an expansion of

their combat and support roles. In March 2025, Ukrainian news outlets, citing a Ministry of Defence official, reported that the Ukrainian military planned to deliver over 15,000 UGVs by the end of 2025. This represents 7.5 times the estimated 2,000 UGVs produced in 2024 (a 650% increase). While the Russian Ministry of Defence and military industry officials do not disclose precise figures, Russia appears to be following a similar trajectory, with more systems entering low-rate serial production, experimental combat employment, and field-testing.

Ukraine and Russia exemplify a broader global trend toward autonomous ground systems. The military UGV market is expected to grow from USD 3.07 billion in 2024 to USD 6.35 billion by 2032, at a Compound Annual Growth Rate (CAGR) of 8.6%. Arguably, the most significant consequence of this wider adoption and combat use is the emergence of new applications for autonomous systems, alongside the validation of older concepts.

◀ **A multipurpose Impuls-KPTM UGV in mine laying configuration. (Source: Alexey Tarasov)**

Existing and emerging

Before examining specific cases in detail, it is necessary to note that changes in contemporary warfare have brought to the fore several key challenges and debates surrounding the development and employment of unmanned ground systems. Unlike the air and maritime domains, the land domain has proven to be, and remains, the most challenging environment for robotic systems, with ground combat representing the most complex operating conditions. Despite recent advancements, many of these difficulties remain unresolved and have been further intensified by evolving battlefield dynamics.

At the same time, the emerging threat environment and operational realities on the ground

have reshaped the understanding of which platforms are in demand, altered key technical and performance requirements, and redefined the roles assigned to UGVs. Consequently, several pre-2022 concepts have been deprioritised, while others have emerged or expanded in direct response to battlefield necessity. Both the pre-2022 applications and newly emerging roles of UGVs are discussed below.



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▲ **A group of engineering UGVs simulating an assault on a fortified line. A bulldozer and several bridge-laying UGVs are visible. (Source: Ministry of Defence of the Russian Federation)**

Armed platforms

Prior to 2022, armed UGVs were envisioned as one of the core components of future warfare, with a strong emphasis placed on large and medium-sized platforms. Today, although these platforms remain under development and continue to undergo trials in many countries, there is no evidence of their deployment – let alone large-scale employment – in contemporary conflicts, whether in Gaza, the Thai–Cambodian border clashes, Ukraine, or other small- or large-scale wars. Instead, as indicated by the experience of the Russo-Ukrainian conflict, interest in smaller and cheaper multipurpose UGVs has grown over the past two years.

The armed variants typically consist of wheeled or tracked platforms with a combat weight below 1 tonne, armed with a 7.62 mm (and more rarely 12.7 mm) machine gun or grenade launcher, and equipped with onboard electronic warfare (EW) systems. These systems can be employed in an overwatch role, for perimeter defence, ambush operations, or as stationary fire points. A critical and as yet unresolved limitation remains their dependence on human oversight for operation, as well as direct human involvement in maintenance and ammunition resupply. At present, the use of UGVs for direct fire support or indirect fire missions remains limited and largely experimental.

Logistic support

In contrast to armed UGVs, demand for autonomous logistics platforms has expanded significantly in response to the challenges of sustainment and resupply in the contemporary battlespace. Based on publicly available data, light unmanned logistics vehicles – weighing below 1 tonne – now constitute the majority of UGV fleets fielded by the Russian and Ukrainian armed forces, which currently represent the largest operators of unmanned ground systems worldwide.

- ▶ **U.S. Marines and Navy Sailors with 4th Marine Regiment, 3d Marine Division rehearse experimental casualty evacuation drills using Rheinmetall Mission Master Silent Partners on Camp Schwab, Okinawa, Japan in August 2025. (Source: U.S. Marine Corps)**

Despite the apparent increase in the number of deployed logistic UGVs, their contribution to the entirety of logistic operations remains marginal. For example, according to statements by Russian Minister of Defence Andrey Belousov: “In 2025, all-terrain vehicles, as well as aerial and ground robotic systems, began to be used extensively and delivered over 12,000 tonnes of various cargo, whereas in the previous year their employment had been sporadic.” In 2026, this figure is expected to increase by at least twofold. This number can be compared to the

general volume of cargo transported by the Russian logistic system for the groupings engaged in the zone of the Russo-Ukrainian conflict, which amounted to 8 million tonnes in 2024. This gives UGVs an input of approximately 0.2% of the overall volume.

Limitations in mobility, platform size, and payload capacity of light platforms, however, remain the primary constraints on the use of unmanned logistics systems in high-intensity conflict, particularly for supporting large-scale operations or the sustainment of heavy equipment.



CASEVAC

The growing demand for CASEVAC unmanned ground vehicles is driven by several factors, including the proliferation of reconnaissance and strike assets at the tactical level. Indeed, the “transparency” of the modern battlespace – combined with the dispersion of troops – has made the CASEVAC mission increasingly difficult for traditional means, such as motor transport or armoured vehicles.

Typically, CASEVAC capability is integrated into logistics platforms, which are frequently employed in a dual role. As the experience of the Russo-Ukrainian conflict shows, light

First, as described above, the modern ground battlespace remains increasingly challenging for the deployment of autonomous systems. Second, from a tactical perspective, the mission of a one-way explosive UGV can often be accomplished by alternative means, including high-precision munitions and aerial drones.

There are documented instances in which kamikaze drones in various forms – ranging from small UGVs to robotised armoured fighting vehicles (AFVs) – have been deployed both in Ukraine and Gaza. However, their employment remains sporadic and is often dependent on a combination of operational factors and favourable conditions. In most documented

cases, one-way explosive UGVs have been employed for the demolition of obstacles, field fortifications, or minefields.

Reconnaissance and ISR

In doctrinal terms, most UGVs possess an inherent reconnaissance function, as they are equipped with sensors and secure data links capable of supporting command-and-control (C2) processes. However, recent operational experience has driven the emergence of purpose-built reconnaissance UGVs and modular intelligence, surveillance, and reconnaissance (ISR) payloads, constituting a distinct and rapidly expanding subclass of unmanned ground systems optimised for ISR tasks. The models that have emerged since 2020–2022 include, for example, THeMIS OB-SERVE, Rheinmetall’s Mission Master

UGVs equipped with modular ISR payloads, Kalashnikov’s Marker, and Guardium/Guardium-LS by G-NIUS, among others.

These light platforms offer superior concealment due to their small size, electric propulsion, and reduced acoustic and thermal signatures, and are therefore well suited for roles such as forward observation, acoustic detection and localisation, and target designation. Typical payloads include day- and night-capable electro-optical/infrared (EO/IR) sensors, acoustic sensors, radars, and laser rangefinders. Combined with a modular architecture, this allows payload configurations to be tailored to specific missions, terrain, or operational theatres. Recent developments also indicate an increasing emphasis on AI/ML-enabled data processing and autonomy.

Notably, despite the growing reliance on aerial ISTAR assets, unmanned ground systems offer several unique advantages, including the ability to conduct reconnaissance and observation with a lower probability of detection, to maintain persistent observation over extended periods (including in low-power modes), and to access areas or terrain inaccessible to aerial reconnaissance assets. There are, however, limiting factors, with the cost of the sensor suite being among the most significant. In some cases, the cost of the ISR payload may exceed that of the platform itself, which constrains wider adoption.



▲ Light UGV equipped with electronic warfare systems providing protection for a self-propelled howitzer in August 2025. (Source: Ministry of Defence of the Russian Federation)

unmanned platforms that deliver supplies to forward positions and return with casualties (typically on stretchers, open beds, or sledges) represent an extremely common – and often predominant – use case.

The modern threat environment, however, is prompting the development of medium-sized dual-role or even standalone CASEVAC platforms, such as the Russian *Nerekhta* or *Marker* UGVs. The reasons for experimentation in this direction include the extreme vulnerability of light UGVs to enemy fire, their inability to accommodate a medic or stabilisation equipment due to limited size, and their susceptibility to enemy interference or jamming. It is therefore possible that, in the near future, priority will be given to larger, better-protected, and optionally manned platforms, in which a medic could assume manual control in the event that the platform loses connectivity or autonomous functionality.

One-way explosive UGVs

The origins of one-way explosive UGVs, also known as ‘kamikaze drones’, can be traced back to both the First and Second World Wars. While technological developments have enabled the revisiting of this concept in the 21st century, the widespread employment of such vehicles remains limited by two main factors.

Sapper and engineering support

Over the past decade, engineering UGVs have been regarded as an essential capability by most advanced militaries. In recent years, however, engineering UGVs have undergone particularly extensive development, and by 2026 an entire and rapidly expanding UGV sub-class has emerged.

Beyond established functions such as Explosive Ordnance Disposal (EOD) and mine clearance in rear areas, a growing number of engineering UGVs have been developed for direct combat engineering support. These systems, which largely fall within the light UGV category, provide capabilities including mine laying, obstacle breaching (including the placement of explosive charges), bridge and gap-crossing support, barrier emplacement

A light unmanned platform equipped with onboard EW systems was shown accompanying a 2S19 Msta-S self-propelled howitzer. According to the footage, the UGV is capable of speeds of up to 15 km/h across rough terrain and requires an operator for remote control. Employment of this system enables a reduction in the thermal and acoustic signatures of the SPH while its engine is shut down. At the same time, the UGV's EW suite provides protection for both the howitzer and the accompanying anti-drone infantry detachment.

This, however, appears to represent an isolated and likely experimental case. Nevertheless, wider future use of unmanned EW system carriers is probable. During 2024–2025, multiple instances of UGVs equipped with onboard EW systems for self-defence were documented.



▲ Rheinmetall's Mission Master CXT (centre) armed with twin Dillon Aero M134D miniguns. (Source: Rheinmetall)

(such as barbed wire), smoke deployment, and related tasks. In addition, some variants are specifically configured for engineering and route reconnaissance.

Electronic warfare (EW) system carrier

Electronic warfare (EW) suite-carrying UGVs represent a relatively new capability that has emerged in response to the growing threat posed by aerial reconnaissance and strike UAVs. In principle, ground-based unmanned EW carriers offer a broad range of potential applications, from accompanying infantry under an EW "umbrella" to securing perimeters, patrolling logistics routes, and protecting high-value assets such as air-defence systems, tube and rocket artillery, radars, and command posts.

In footage released by the Russian Ministry of Defence in August 2025, one such employment concept was demonstrated.

Air Defence System Carrier

The demand for short-range and ultra-short-range air defence (SHORAD/U-SHORAD) solutions has steadily increased over the past five years, driven largely by operational lessons from conflicts such as Nagorno-Karabakh, the Russo-Ukrainian War, and various low-intensity engagements in the Middle East. The primary driver has been the need to counter reconnaissance and strike UAVs, both on the battlefield and in rear areas. This has spurred the emergence of new systems, as well as upgrades across the spectrum of existing capabilities.

A number of UGV-mounted SHORAD/U-SHORAD systems, specifically tailored to counter emerging aerial threats such as drones and loitering munitions, have been introduced. These include for example Milrem's TheMIS with Stinger Vehicle Universal Launcher (SVULL), Rheinmetall's Mission Master CXT fitted

with the Oerlikon Skyranger, or a Mission Master CXT equipped with twin Dillon Aero M134D miniguns, a radar, an electro-optical sensor suite, and an AI-based target detection and tracking system, according to the manufacturer. Meanwhile, Ukraine's 28th Mechanized Brigade has tested (and demonstrated) an unmanned ground system armed with a 9K38 Igla MANPADS.

While developments in this area are ongoing, demand for U-SHORAD solutions is expected to continue growing in the near term, with more unmanned platforms entering field tests and operational deployment. Potentially, two operational subclasses may emerge: one designed for frontline deployment—including U-SHORAD for small infantry units—and another comprising larger platforms intended to secure rear areas, infrastructure, and static assets.

In conclusion

The recent evolution of ground warfare has reshaped the roles previously envisioned for UGVs, emphasising capabilities that address immediate battlefield needs while deprioritising others. The most dynamically developing roles are:

- Logistics and resupply (high-volume, routine delivery under threat);
- Engineering and obstacle/breach support (route clearance, mine neutralization, fortification);

- Systems carriers for EW and ISR (forward observation, jamming, counter-UAS protection).

SHORAD/U-SHORAD applications on UGVs remain largely experimental or in early testing, with limited operational scale to date. Current development focuses on small platforms (typically under 1 tonne), which are mostly remotely controlled, require human oversight, and offer better concealment and deployability.

While numerically more UGVs are entering service and the spectrum of their roles has expanded, wider adoption remains constrained by tactical and technical factors, including protection, payload capacity, endurance, the need for human oversight, and mobility on severely degraded terrain. These limitations are expected to be addressed by larger unmanned platforms (up to 10 tonnes) currently in advanced development or limited testing.

In doctrinal terms, the path forward is a tiered UGV ecosystem: small, attritable, human-supervised systems for lower tactical levels, progressively complemented by larger, more capable and protected platforms to support higher-end roles in high-threat environments as maturity increases. This lessons-driven progression – rooted in ongoing high-intensity conflict – will shape the next phase of unmanned ground operations.



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Infantry-Portable Anti-Drone Options

Sidney E. Dean

Recent and ongoing conflicts highlight the rapidly growing threat posed by unmanned aerial vehicles (UAVs) to dismounted infantry. A variety of kinetic and non-kinetic countermeasures are being deployed in response. Various factors impact the infantry-based counter-drone mission. On the one hand, the UAVs most frequently deployed against dismounted personnel are generally small and light, and not particularly robust or shielded, making them comparatively vulnerable to kinetic or electromagnetic disruption. On the other hand, their small size and generally low-altitude approach provide them with a minimal visual and acoustic signature and considerable agility; this tends to delay detection and minimise a defender's reaction time. Early detection and classification thus become the infantry's first line of defence. A layered defensive capability is also essential for engaging drones at varying range.

Detection and Electronic Countermeasures

Lightweight detection systems are frequently integrated with electronic warfare (EW) countermeasures in order to enable an immediate response before the drones close with the infantry unit. Some detectors are carried in backpacks and set up in the field, while others are small enough to be worn on the soldier's body, enabling true on-the-go surveillance.

Danish company MyDefence Soldier Kit currently stands out as one of the most advanced wearable systems. It consists of two main elements – the Wingman detector (coupled with a wideband XF antenna) and the Pitbull jammer. The circa 2.5 kg system is worn on the plate carrier or vest without restricting movement.

The detector employs passive radio frequency (RF) sensing, enabling constant monitoring without further operator attention. While the baseline internal antenna monitors only a few frequency bands and permits 90° horizontal and vertical surveillance, the attachment of the wideband antenna expands omni-directional 360° coverage to the complete 200 MHz–6 GHz spectrum. Wingman alerts the wearer of a detection, and automatically relays sensor data to the kit's jammer, enabling the fastest response when threats are detected. The Pitbull can be set to either manual

- ▶ **The MyDefence Soldier Kit drone detection and countermeasure suite including the Pitbull jammer and Wingman detector (with attached wideband XF antenna) worn side-by-side. [Source: MyDefence]**

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mode, permitting the wearer to activate countermeasures, or to automatic mode. Interdiction can target GPS signals as well as RF frequencies to disable both autonomous and remote-controlled drones.

Additionally, the Soldier Kit can integrate an optional ATAK plugin with an embedded RF spectrum analyser. Sensor data can be shared in real time with other units, enhancing blue-force situational awareness and supporting coordinated operations.

In June 2025, the US Army announced the award of a USD 26 million contract to MyDefence to supply 485 mobile counter-UAV (C-UAV) kits. The contract is the largest in the Danish firm's history. The hardware is expected to be distributed to US Army Transformation-in-Contact units in Europe (where it has already been tested) and elsewhere for operational evaluation, which could lead to larger procurement orders if the systems are deemed highly effective.





◀ **The DroneBuster Block 4 paired with DZYNE's DTI system. Handheld RF weapons are easy to use by soldiers trained on handguns and rifles. (Source: DZYNE)**

When a contact is detected, the visual sensors slew toward the coordinates for confirmation. AI-assisted analysis of sensor data classifies the target and performs 3D tracking (range, direction, altitude). Results are transmitted to end users and countermeasure systems in real time. While Osprey cUAS is still at the TRL 4/5 stage, the firm plans TRL-5 pilot deployments and partner integrations in Q1-Q2 of 2026.

Hand-Held RF Weapons

In addition to body-worn or tripod-mounted RF Jammers, numerous hand-held EW solutions are also in use. While microwave and laser systems remain too power hungry and bulky for dedicated infantry applications, roughly rifle-sized RF weapons are fully portable and easily wielded. They can be brought to bear quickly and are intuitive for trained infantry to operate, with some weapons requiring only five minutes of instruction.

The DroneBuster RF weapon marketed by DZYNE detects and disrupts drones across the 400 MHz–6 GHz spectrum. The 55 cm long, 2.65 kg device is equipped with a pistol grip and can be fired with one hand. Picatinny rails permit attaching various accessories including a selection of optical sights and a laser rangefinder. Unlike many handheld electromagnetic weapons, the DroneBuster's capabilities are not restricted to RF jamming. According to the manufacturer, it is the only US-produced handheld counter-small-USV with optional PNT (Position, Navigation, and Timing) Attack (GNSS spoofing) ability. This allows the DroneBuster operator to feed the drone false GPS coordinates, mislead its navigation system, and cause it to drift, land, or lose autonomous guidance. This is especially useful when confronting autonomous drones on pre-programmed waypoint missions.

More than 2,500 units have been deployed in 50 countries worldwide to date, with a large portion being used by the US Army. The latest iteration, the DroneBuster Block 4, was introduced in 2025 as a 'next-generation' countermeasure featuring enhanced transmission power, wideband coverage, support for jamming all modern GNSS satellite constellations, and is effective against both single drones and swarms. The Block 4 is also available in a

At AFCEA 2025, Elbit presented the newest iteration of the ReDrone C-UAV system. Unlike the earlier variants of ReDrone, the new Man-portable Detection and Jamming System configuration is only slightly larger and heavier than a hand-held radio. It is specifically designed to be carried by a single soldier and operated automatically while on the march. It is available in two options. The Portable Drone Detection System (PDS) device is a pure detection system scanning the 400 MHz to 6000 MHz with 360° coverage. The Portable Drone Detection and Jamming Unified System (PDJS) combines the PDS with a radio-frequency jammer effective along the system's full detection spectrum. The system scans continuously and alerts the wearer when RF signals are detected. The jammer can be set for manual or automatic operation, and can form a protective electromagnetic bubble of up to 1,000 m diameter over the entire infantry unit. Prolonged jamming is possible on the march, at the cost of battery life. Batteries can be easily replaced in the field. The obvious drawback of this system is that it cannot defend against fibre-optic guided drones.

Not all detection systems monitor the radiofrequency spectrum. The Osprey cUAS system developed by Oregon-based Osprey cUAS Inc. combines EO/IR, acoustic and SWIR (short-wave infrared) sensors. It can detect all types of UAV including fibre-optic guided units. The compact system weighs less than 4 kg and is designed for deployment at the squad level. It is not a wearable system, and must be set up on a tripod or other support to operate. Setup can be accomplished by a single soldier within five minutes.

While the firm does not provide specifics, it states that the device can seamlessly integrate and exchange sensor data with ATAK and C2 networks as well as with active countermeasure systems. Specifically, the system monitors for acoustic contacts across a 360° omnidirectional spectrum.

▶ **A German soldier fires the G27 sharpshooter rifle with the Smartshooter SMASH X4 fire control device. (Source: German Armed Forces)**



dedicated DroneBuster 4-EU variant designed to add jamming for the European short-range device band. Both variants can seamlessly integrate with the firm's proprietary Detect, Track, Identify (DTI) device which can be handheld or worn on the soldier's vest. The DTI provides omnidirectional wideband detection at up to 7 km distance. Tracking and target identification data is presented on the LCD display or through optional interface with a TAK (Tactical Assault Kit) device.

The Australian firm DroneShield produces a range of globally marketed C-UAV systems including the DroneGun Mk4 and the longer-range variant DroneGun Tactical. The DroneGun Mk4, released in 2023, is described as an ultra-portable handheld countermeasure. The 3.37 kg weapon is equipped with a pistol grip and fired with one hand. The weapon activates within three seconds, and comes with a safety switch to prevent accidental discharge. The integrated battery supports one hour of aggregate operational time per charge, although batteries can also be exchanged quickly in the field. The weapon disrupts control, video feed, and navigation signals, as well as satellite navigation signals. Top and bottom Picatinny rails facilitate customisation with additional elements. While DroneShield does not publish operational range, the Mk4 is generally believed to be effective out to 500–1,000 m.

The firm's DroneGun Tactical is generally attributed with double the range of the Mk4. The larger, bulkier Tactical weighs 7.3 kg, due largely to the more powerful batteries (including the carrying case, the full system weighs 20 kg, versus 12 kg for the cased Mk4). Aggregate operating time is two hours per battery charge.

Fire Control Systems for Assault Rifles

While standard assault rifles and sights are not well suited for acquiring, tracking and engaging fast and agile small UAVs, special automated tracking and fire control devices can now significantly improve the infantry's odds of downing drones with their service rifles. The SMASH family of AI-assisted fire control systems (FCS) is currently the global leader in this field (the designation is not an acronym but the contraction of Israeli manufacturer's name, SMARt SHooter). The devices, which are mounted on the weapon's Picatinny rail, incorporate a red-dot reflex sight, digital stabilisation, onboard computer and image processor. They provide automatic target acquisition and tracking. The FCS performs a real-time calculation of the optimal release time for the bullet, and prevent the rifle from firing until the FCS's reticle is truly aligned for a hit ('lock and launch' trigger interlock). The system is designed to intercept micro-

and mini-drones with a single precision shot during daylight or nighttime operations. According to SmartShooter, minimal training is required.

The SMASH 2000L ('Light'), marketed since 2021, improves on the original SMASH 2000 fire control system (FCS). Optimised for dismounted infantry, it weighs circa 740 g, or 20–30% less than the earlier variant (depending on configuration); is reduced in size for easier handling; and has improved battery efficiency (72 hours or 3,600 assisted shots). According to SmartShooter, the targeting algorithms enable soldiers to track and hit even very small, high-speed UAVs at distances up to 250 m.

The SMASH 4X, developed for sharpshooters and designated marksmen (including dedicated C-UAV shooters), takes the capabilities matrix a step further. It has an improved electro-optical sensor suite and integrates 4x optical magnification to achieve better long-range target recognition and enhanced tracking for Group 1 and 2 UAVs at greater distances. It also features a more powerful onboard processor and can be equipped with optional networking and data sharing features as well as a laser range finder. The 4X, which was introduced in 2022, uses the same battery configuration as the 2000L. While SmartShooter does not provide weight figures, the enhanced elements are likely to increase the 4X to circa 1–1.2 kg.

Combat Shotguns

Shotguns have proven an effective tool against UAVs at close range. In practice they are most useful against drones which have evaded first-line defences. While standard combat shotguns and shells can be used, specialised firearms and munitions provide a greater chance of intercept.

Benelli Defense introduced the M4 A.I. Drone Guardian 18.5" shotgun during the Enforce Tac expo in March 2025. Derived from the Benelli M4 shotgun, the semiautomatic 12-gauge counter-UAV weapon is chambered for 3" magnum shells. For once, the acronym A.I. does not stand for artificial intelligence but for advanced impact. This refers to patented improvements made to the barrel, including a larger and longer cone which in turn improves effective range, velocity and destructive impact. Benelli cites an optimal engagement range out to 50 m, and a borderline capability out to 100 m. The weapon comes with a Picatinny rail and features a 355 Ghost Ring rear sight with diopter with adjustable windage and elevation and protective side lugs. A 26" barrel and a Steiner red-dot MPS are available.



▲ The Benelli M4 A.I. Drone Guardian shotgun (top) and the Fabarms STF/12. (Originals: Benelli Defense and Fabarms/Composite: S.E. Dean)



▲ **Screenshot from the 6 August 2025 intercept of a UAV by a Claymore-armed SkyRaider quadcopter, taken by the Skyraider's camera seconds before target destruction. (Source: US Army)**

The preferred munition is the Norma AD-LER (anti-drone long effective range) which packs 350 2.7 mm diameter tungsten buckshot and achieves up to 100 m effective range. According to test data cited by Benelli, up to 25 pellets struck mini-UAV sized targets at 75 m distance, considerably more than the three pellets often considered sufficient to disable a small drone.

Fabarm's STF/12 Compact XL Range 22" is another shotgun designed specifically for CUAV roles. The Italian-made 12-gauge, 3-inch chamber (12/76) pump-gun features the Tribore HP 22" XL barrel that tapers from 18.7 mm to 18.4 mm. This configuration helps achieve higher muzzle velocity, tighter patterns, and greater effective range. Like the Benelli M4, the STF/12 can accommodate tungsten carbide anti drone loads such as Norma's AD-LER. Fabarm cites destruction of drone-sized clay targets at ranges up to 100 m during testing.

In addition to destructive rounds, shotguns can also fire specialized munitions to capture and force down the UAV. A prime example is the ALS12SKY-MI5, also referred to as SkyNet, manufactured by Amtec Less Lethal Systems (ALS). Once fired, the 12-gauge round deploys five fibre tethers, each of which is topped by a Zuerillium alloy anchor. Centrifugal force draws these weights out uniformly so that the fibre tethers form a 1.5-metre-wide capture net. On impact, the net enfolds the drone, incapacitating the propellers and forcing it down. The Mi-5 shell can be fired from pump or semi-automatic shotguns with a 3" chamber and a barrel length of 18" or greater, utilising a cylinder, improved cylinder, or rifled choke.

Ground-Launched Rucksack-Portable Interceptors

Recent developments enable dismounted infantry to launch airborne interceptors against enemy drones. In August 2025, paratroopers from the US Army's 173rd Airborne Brigade's innovation team achieved the US military's first documented drone-on-drone intercept using an armed UAV. The test, conducted at Fort Rucker, Alabama, employed a SkyRaider quadcopter developed by Aeryon Defense USA (a FLIR Systems subsidiary). A Claymore mine was attached to the bottom of the quadcopter, which was launched to intercept a fixed wing intruder drone. Both UAVs were remote controlled and engaged in what Army observers called a 'dogfight' until the interceptor achieved an optimal position and the operator detonated the payload. The target was destroyed while the interceptor was retrieved intact. While the concept remains, for the moment, in the evaluation stage, the successful use of the 80 cm wide, 4.5 kg light UAV opens significant new options for squad-level infantry counter-drone operations. "With the right kit, paratroopers will be able to utilize a low-cost system with pre-existing munitions to execute a wide variety of mission tasks – and have the power to protect their unit from an endemic threat," said team leader 1st Lt. Francesco La Torre.

German startup E-Wolf & Warg Drones presented its Drone Hammer C-UAV Missile at the May 2025 AFCEA Expo. Drone Hammer is a miniaturised, ground-launched solid fuel rocket specifically optimised for dismounted infantry to use in the counter drone role. While the 50- cm-long weapon can be prepared and launched by a single operator, targeting requires laser illumination of the target drone by an external source – in this case optimally by a second infantry soldier. Drone Hammer has a stated range in excess of 600 m, and approaches its target at 500 km/h. As it nears the drone, the warhead detonates a CO₂ canister, releasing submunitions which form a 10-m diameter cloud, ensuring target destruction. According to E-Wolf & Warg Drones, the Drone Hammer is currently at TRL 5. A new company, Skylance, is being formed to pursue the dedicated development programme through operational maturity. The firm estimates a unit price of EUR 2,500.

Project Flytrap

The Drone-Counterdrone arms race will continue and intensify. Increasing integration of AI into sensors, EW countermeasures, fire-control systems (FCS) and interceptors will enhance the accuracy and speed of detection and neutralisation. Another lesson that continues to be reinforced is that no single system can address the full spectrum of small UAV threats. This was proven again during Project Flytrap, a bilateral US-UK evaluation of infantry-suitable counter-drone systems conducted in four stages or 'iterations' between June and August 2025 in Germany and Poland.

The exercises validated a layered, multi sensor, multi-effector construct built around rapid adaptation and close soldier-engineer collaboration. The exercise consistently blended RF detection, jamming, smart optics, kinetic shooters, and drone on drone capabilities. Leaders from V Corps emphasised that the programme's value lies not only in technology assessment but in accelerating transformation across NATO's forward deployed land forces. Project Flytrap represents a pragmatic, soldier centred pathway toward layered C-UAV integration, blending technological innovation with incremental doctrinal change to meet the demands of the contemporary battlefield. Iteration 5.0 will build on lessons learned to date. It is scheduled for March–April 2026.



Europe's Drone Wall – Ready, EDDI, Go!

Thomas Withington

The European Union's 'Drone Wall' initiative aims to protect the continent's Eastern Flank against Russian drone attacks. Its implementation is following an aggressive schedule. On 9 September 2025, NATO combat aircraft took their first ever kinetic action against a Russian military threat. Between 22.30 Zulu/Z on 9 September 2025 and 05.65Z the following morning, NATO jets shot down four of an estimated 23 unmanned aerial vehicles (UAVs). The Russian government admitted to launching the aircraft but said they were not directed against Polish targets. The Russian UAVs, reports stated, were engaged by *Koninklijke Luchtmacht* (Royal Netherlands Air Force) Lockheed Martin F-35A Lightning-II and *Siły Powietrzne* (Polish Air Force) General Dynamics/Lockheed Martin F-16C/D jets. Other NATO assets which supported the effort to down these UAVs included an *Aeronautica Militare* (Italian Air Force) Gulfstream G550 airborne early warning and control aircraft, and a NATO Airbus A330-200 tanker. Fortunately, the UAVs did not cause any casualties, although some light structural damage to buildings in southern and eastern Poland, where most of them fell did occur.

The incident in Poland was not an isolated case; Russian UAVs had already violated the airspace of European NATO members earlier in 2025. For example, the Romanian government announced on 17 January 2025 that several Russian UAVs had entered the country's airspace. Later, on 20 August, a Russian Geran-2 UAV crashed near Osiny, a village in eastern Poland. Prior to the 9/10 September 2025 incident, Poland had experienced two violations of its airspace by Russian UAVs on 4 September and 8 September respectively. Reports noted that throughout the rest of the year, Russian UAV violations of Estonia, Moldova and Türkiye also occurred. Moreover, incidents of unauthorised UAV flights in the vicinity of Copenhagen International Airport, Volkel airbase and Eindhoven airport, both in the southern Netherlands, also took place. Towards the end of the year, French authorities reported that the *Marine Nationale* (French Navy) base at l'Île Longue in Brittany on the French Atlantic coast was overflown by five UAVs which were neutralised. The base is home to the Navy's *Le Triomphant* class nuclear-powered ballistic missile submarines.

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▲ **The heads of government of Bulgaria, Estonia, Finland, Latvia, Lithuania, Poland, Romania and Sweden met in Helsinki in December 2025 for a summit to discuss closer security cooperation. Finland and Poland announced they would jointly lead the Eastern Flank Watch initiative at the event. (Source: Government of Finland)**

Motivations and responses

Some of the Russian UAV flights over the borders of Estonia, Moldova, Poland and Romania, all either NATO or Allied nations, are likely to be deliberate acts by the Kremlin aimed at causing local disruption. The flights may also be performed to test the reactions and capabilities of local air defences. Moldova, Poland and Romania may also experience UAV violations as fallout from the ongoing war in Ukraine, though lackadaisical flight planning might occasionally cause Russian UAVs to veer off course. Likewise, technical problems and/or jamming could cause these aircraft to lose their way. The reasons for the UAV flights over the airports and military bases in Denmark, France and the Netherlands are more mysterious. There is a credible risk that such incidents could be mounted by Russian secret agents, or local Russian sympathisers, to cause economic disruption, particularly by forcing an airport to suspend flights during UAV activity. The illicit flights may also be used to gather intelligence on military facilities.

Russia's actions have not gone unanswered. Alongside NATO's engagement of the UAVs violating Polish airspace in September 2025, the Alliance has activated Operation Eastern Sentry. The Polish government made a declaration of Article Four of the North Atlantic Treaty, the Alliance's constitution, on 10 September 2025. Article Four specifies that a member can call for consultations within the Alliance if "the territorial integrity, political independence or security" of a member country is threatened. Operation Eastern Entry was subsequently launched on 12 September 2025. According to the Alliance, it involves combat aircraft, ground-based air defence assets and anti-air warfare vessels provided by Denmark, France, Germany, Italy, the United Kingdom and Spain. Eastern Sentry will enhance the air defences of Estonia, Lithuania, Latvia, Poland, the Czech Republic, Slovakia, Hungary, Romania and Bulgaria. Supporting NATO's efforts are two European Union (EU) initiatives. These efforts take the form of the European Drone Defence Initiative (EDDI), also known as the European Drone Wall and Eastern Flank Watch.

Viable response

As a primer on the EDDI and Eastern Flank Watch makes clear, interception of errant UAVs has been hitherto performed by expensive platforms such as the F-35A and F-16C/D aircraft discussed above. Publicly available figures estimate the per-hour flying costs of an F-35 variant to be between USD 33,000 and USD 42,000. A Raytheon AIM-120 series active radar homing air-to-air missile can cost circa USD 1 million per round, according to publicly available

data. One of the Polish F-16s was reported to have fired such a missile at a Russian UAV during the September 2025 incursions. It is clear therefore that responding to massed UAV violations across the eastern borders of Europe's EU and NATO members could exact a significant financial cost. Exacerbating the cost burden of defending NATO and EU airspace against Russian UAVs is almost certainly among Moscow's motivations. As the EU primer notes: "(d)eploying fighter jets and expensive air-to-air missiles to counter drones is operationally possible, but fiscally unsustainable".

The establishment of the Eastern Flank Watch was proposed by Ursula von der Leyen, the President of the European Commission, the EU's executive branch, in her 2025 State of the Union address. According to the EU, the Eastern Flank Watch will be a network of complementary and interlocking physical, air and maritime defences that will be deployed across the same nations as Operation Eastern Sentry, with the addition of Sweden and Norway. As a European Parliament briefing paper on the Eastern Flank Watch makes clear, this will "reinforce the EU's eastern borders against hybrid, cyber, maritime and conventional threats from Russia and Belarus through the integration of air defence, electronic warfare, surveillance and maritime security systems". The EU expects Eastern Flank Watch to work closely "with NATO's integrated command and control structures and operations, such as Baltic Air Policing and Operation Eastern Sentry". Eastern Flank Watch is expected to start implementation in 2026, the European Parliament's paper states and its "full functionality" is expected by the end of 2028. In



- ▶ Although written in Ukrainian, this map clearly shows the flight path of the Russian UAVs which entered Polish airspace on the night of 9th/10th September. The Russian government denied that Poland was deliberately targeted. Several of the UAVs were downed by local NATO forces. (Source: Ukraine War Monitor)

December 2025, the governments of Finland and Poland announced they would jointly lead Eastern Flank Watch.

Eastern Flank Watch is one of four EU Defence Readiness Roadmap 2030 flagship projects alongside the EDDI, the European Air Shield and the European Space Shield. The Roadmap has a relatively straightforward remit, which is to ensure “a sufficiently strong European defence posture to credibly deter its adversaries and respond to any aggression”, in its own words. The European Commission and the EU’s High Representative for Foreign Affairs and Security Policy, Kaja Kallas, were tasked in June 2025 to draft the Roadmap. The drafting was the result of a decision to this end by the EU heads of state and government, and European Council; the latter decides the general political direction and policy priorities of the EU. European Union timelines call for initiatives such as the EDDI to be ready and operational by 2030. The European Air Shield will provide overarching air and missile defence to the EU’s membership and will be fully interoperable with NATO’s Air Command and Control System (ACCS). ACCS is a continent-wide Integrated Air Defence System (IADS) designed to protect the airspace and air approaches of NATO’s European membership. The EU’s Space Shield will establish “and protect a comprehensive European system of space capabilities that serve defence purposes, building on the EU space systems and existing national capabilities”, EU documents continue.

Implementing EDDI

The European Parliament’s briefing paper states that the European Drone Defence Initiative will develop a “cutting-edge interoperable system for countering and deploying drones”. At the heart of these efforts will be a multi-layered network of UAV sensors capable of detecting, identifying and tracking such aircraft. Once confirmed as hostile, the UAVs will be neutralised. The paper does not specify which effectors would be employed to this end, though kinetic capabilities are likely to feature. The latter could be short/medium-range air defence systems including anti-aircraft artillery, or surface-to-air missiles. Kinetic effectors will be complemented

by electronic attack: for example, jamming can interdict a UAV’s radio link with its pilot on the ground and stop the aircraft’s reception of position, navigation and timing signals from a global navigation satellite system constellation. Non-kinetic effectors could include directed energy weapons (DEW) using lasers or microwave radiation. It may even be possible to employ electronic attack systems able to enter a UAV’s control software, which could be compromised with malicious code allowing air defenders to take over the UAV and land it safely. It remains unclear however, from existing information in the public domain whether existing and/or new counter-UAV (CUAV) effectors will be used by the EDDI members to perform the CUAV mission. The same question is also relevant regarding sensor provision.

Sensors and effectors will need to be networked using multiple, redundant, secure communications. EU documents do not specify what communications architectures will network the EDDI but it is likely that this could include conventional military very/ultra-high Frequency (V/UHF: 30 MHz to 3 GHz) radio. V/UHF links could be reinforced with satellite communications (SATCOM) across dedicated, sovereign military/government constellations and/or using leased, secure SATCOM bandwidth. Alongside SATCOM, dedicated fibre-optic networks could be employed. National telecommunications networks may also carry secure and encrypted internet-protocol traffic around the EDDI components. Fortunately, much of this military networking is likely to already be in place via NATO-wide initiatives such as ACCS.

The fourth piece of the EDDI jigsaw will be the command and control (C2) architectures to battle manage the detection, engagement and assessment of hostile drone encounters. For example, when, where and how will the Recognised Air Picture (RAP) regarding UAV threats be developed to support the EDDI? Will participating nations develop the RAP at the tactical level using their own CUAV systems. Would this RAP then be sent upwards to higher echelons to create a ‘Super RAP’ covering all, or part of the EDDI’s zone of responsibility? Will this Super RAP be developed at the national IADS Control and Reporting Centres populating the IADS of the

- ▼ **A Dassault Rafale of the *Armée de l’Air et de l’Espace*. In late September 2025, as a part of Operation Eastern Sentry to protect the eastern flank of NATO; Denmark, France, Germany, Italy, Spain and the UK all contributed forces. The French contribution comprised of three Rafale aircraft. (Source: NATO)**





▲ **The US Army is deploying counter-UAV systems to Europe to help strengthen the protection of the continent's airspace against uncrewed aerial vehicle incursions. The future EDDI system could share threat and C2 data with such assets and vice versa. (Source: NATO)**

EDDI member nations? Another important question relates to the C2 arrangements for the European Drone Defence Initiative: If hostile UAVs are detected and positively identified, how will the interception of these threats be managed? Which nation/s will be responsible to this end?

European Commission spokesperson Thomas Regnier told *ESD* that the EDDI was conceived as a “multi-layered, technologically advanced system with interoperable counter-drone capabilities for detection, tracking and neutralisation”. Concerning the connectivity issue, Mr. Regnier stressed that the initiative “should be fully interoperable and connected among member states providing European situational awareness and (the) ability to act together and secure critical infrastructure together with NATO”. The spokesperson seems to imply that the EDDI would have a high degree of synergy with NATO capabilities. Might integration with the ACCS then be a possibility. Likewise, capabilities such as Poland's Northrop Grumman Integrated Battle Command System (IBCS) may have a key role to play within the EDDI architecture. According to the company, the IBCS supports Poland's Raytheon MIM-104F medium-range/high-altitude surface-to-air missile batteries.

SAFE bet

From a financial perspective, Mr. Regnier stressed that the EU's Security Action for Europe (SAFE) programme will have an important role to play. According to the EU's own literature, the SAFE initiative provides a fund of USD 175 billion in long maturity, competitively priced loans. The loans can help finance large scale and urgent defence acquisitions. SAFE forms part of the EU's 2030 readiness plans and is the first stage of a wider plan to eventually support up to USD 934 billion of defence spending by EU members. This spending will be essential to support the 2030 goals. SAFE will be used to support common procurements of defence capabilities across the EU to benefit at least one member state. Ukraine or European Economic Area/European Free Trade Association can also

apply for SAFE funding. Furthermore, SAFE is temporarily supporting procurements by individual EU member states, with the latter mechanism intended to assist the timely satisfaction of urgent capability requirements. The use of the SAFE vehicle implies that EDDI members will make CUAV capabilities they either possess, or are procuring to meet national requirements, available to the wider European Drone Defence Initiative. Additional capability requirements not covered by these procurements may then be satisfied through the procurement of common capabilities via SAFE.

Clearly there are still unanswered questions regarding several elements of EDDI, not least concerning sensors, effectors, networking and C2. It is entirely possible that more information may come to light to this end over the coming year and beyond. As the European Parliament's briefing paper makes clear, an initial operational capability for the EDDI is expected by the end of 2026. With the system expected to be fully functional by the end of 2027, national members of the European Drone Defence Initiative are currently drafting their plans concerning EDDI implementation. As for the unanswered questions, “we will know more once we take a look at the national plans Member States submit,” Mr. Regnier concluded.



▲ **NATO Secretary General Mark Rutte gives a statement following the violation of Poland's airspace by Russian uninhabited aerial vehicles in September 2025. (Source: NATO)**



Collaborative Combat Aircraft

What's not to like?

Dr Trevor Nash

Collaborative Combat Aircraft (CCA) are increasingly touted as the next major development in the delivery of air power. With a major programme ongoing in the US and many other nations working towards melding CCA with current and future manned platforms, this feature considers the implications of integrating the concept from both technological and doctrinal perspectives.

age of hyperbole being generated in many quarters as to the 'game changing' capabilities of CCA as the USAF 'leans into a new chapter of aerial warfare' to provide 'vital force multiplying effects' that offer a 'step-change in the annals of aviation'.

The aim of this feature is to de-couple the marketing hype generated by the aerospace industry and the military from the practical application in the use of CCA alongside next-generation combat aircraft.



A CCA platform may be defined as an uncrewed aircraft designed to be either controlled by another aircraft or to potentially fly autonomously in conjunction with, or separate from, other aircraft. In many ways, the CCA concept is not new and is exemplified by Project Mistel during the Second World War when the German Luftwaffe used a single-seat fighter mounted on top of a twin-engine bomber packed with explosives. Known as a 'composite aircraft', the mothership fighter jettisoned the bomber near the target and then via an RF link, flew it to impact the target.

The modern CCA began to evolve over a decade ago when it was frequently referred to as the 'loyal wingman' concept, which saw the platform 'tethered' to a manned aircraft through a datalink. According to the Mitchell Institute for Aerospace Studies, based in Arlington, Virginia, "Tethered operations...provide dedicated formation support, improve formation outcomes, and enhance individual formation effects [while] untethered operations have the

potential to present greater complexity to an adversary, enhance mission resilience, and provide greater operational flexibility."

Here Tomorrow...

Today, the most significant programme is, unsurprisingly, taking place in the United States and is associated with the USAF's Next Generation Air Dominance (NGAD) programme. This contract was awarded to Boeing in March 2025 for the development of the NGAD platform, currently referred to in many quarters as the F-47. According to the USAF, "the NGAD Platform will bring lethal, next-generation technologies to ensure air superiority for the Joint Force in any conflict". The new aircraft is expected to make its first flight in 2028 and eventually be fully integrated with CCA platforms.

▲ **The RAAF MQ-28A Ghost Bat CCA has been designed by Boeing Australia and in late-2025 fired an AIM-120 AMRAAM to destroy a Phoenix jet-powered target controlled from an E-7A Wedgetail during trials in Australia. (Source: Boeing Australia)**

Defined by the US Air Force Research Laboratory (AFRL) as providing a 'critical shift' in the way the US Air Force (USAF) will project future air power, the emerging potential of CCA concept will certainly provide a nuanced alteration to the application of air power. The real question is will that change be evolutionary or revolutionary? There is certainly no short-

AUTHOR

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▲ **The Kratos XQ-58A Valkyrie has been flying since 2019 and highlights the maturity of many CCA programmes. Teamed with Airbus, the XQ-58A is being offered to the German Luftwaffe. (Source: Kratos)**

The CCA element of this programme partially has its roots in the AFRL Skyborg project that resulted in the USAF awarding CCA development contracts to five contractors in 2024. Later that year, two companies were awarded Increment 1 Mission Design Series contracts to develop prototype platforms, General Atomics with its YFQ-42A and Anduril fielding its YFQ-44A. In December 2025, the USAF added Northrop Grumman's YFQ-48A Talon CCA. Trials are currently being carried out at Nellis AFB in Nevada. With such a major contract in the offing, other players such as Boeing, Kratos and Lockheed Martin are also developing their own CCA to meet what has been claimed to be a 1,000 platform USAF requirement according to Frank Kendall, Secretary of the Air Force. These companies, along with possible competition from overseas, could be swept up in an Increment 2 award, a 'concept refinement phase', expected early in FY26.

As with manned aircraft, CCA can have different roles that can vary from close air support (CAS) through counter-air, to intelligence, surveillance, target Acquisition, and reconnaissance (ISTAR) and suppression of enemy air defences (SEAD). For CCA, this translates to platforms varying from the exquisite to the expendable and as such the USAF's selection will encompass a variety of platforms.

Referring to the USAF approach to CCA as being in 'state of flux' is perhaps incorrect but the US DoW has to keep a number of balls in the air at the same time. In itself, CCA procurement is part of an 'accelerated development schedule'. Add to that the desire of President Trump to double the DoW budget and Secretary of War Hegseth's focus on Portfolio Acquisition to speed up the procurement process, combined with the recent restructuring of R&D into a 'unified innovation ecosystem', and it becomes clear that the NGAD/CCA procurement environment sands are constantly shifting.

Before looking at some of CCA's proposed advantages, it is worth reiterating the major doctrinal drivers that underpin the delivery of air power and these will provide a framework to assess the potential future benefits of CCA. The USAF describes the tenets of air power in Air Force Doctrine Publication (AFDP) 1 as providing overall mission command; flexibility and versatili-

ty; the creation of synergistic effects; persistence; concentration; balance and the ability to integrate cohesive, prioritised operations. These aspects are also reflected in the UK's Joint Doctrine Publication (JDP) 0-30 which underscores the ability of air power to provide agility – generated by a mix of responsiveness, adaptability, flexibility and resilience – ubiquity and concentration in both time and space.

Although it is clear that CCA can assist in the delivery of air power, the real drivers forging their adoption are more prosaic. Conventional military aircraft are expensive to develop, to procure and to maintain and so over recent years the USAF's combat fleet has significantly diminished. Additionally, and although having been partly addressed through programmes such as Pilot Training Next (PTN), the USAF is still suffering from a pilot shortage: human assets that CCAs simply do not require. Other cost savings identified by the US Congressional Research Service in its November 2025 CCA report highlight the overall lower cost of a CCA compared to a crewed aircraft, and that CCA training could be undertaken virtually, "so the airframes themselves would fly less, potentially leading to lower maintenance and sustainment costs".

With modern 5th generation manned combat aircraft having a unit cost anywhere between USD 60 to USD 100 million what will be the bill for a CCA? Secretary of the Air Force Kendall estimates that individual CCA platforms would cost between USD 25 and USD 30 million, though this figure depends largely on mission-specific configuration, which is the key driver to CCA pricing; According to Steve Fendley, the President of Unmanned Systems at Kratos, CCA could come in at USD 10 million or less, again depending on their role.

The adoption of CCA as part of the NGAD programme is not a zero-sum game of course. Could the lower-cost potential cost of CCA lead to a reduction in manned aircraft? One indicator that manned platforms are under the microscope was provided in December 2025 when a report by Department of Defense [sic] Office of the Inspector General disclosed that the F-35 Lightning II 'aircraft readiness rate' for FY24 was 50%. The initial procure-



▲ **In late November 2025, Türkiye's Baykar aerospace company's Kizilelma CCA fired a Gökdoğan BVR air-to-air missile to destroy an aerial target. (Source: Baykar)**

ment and sustainment costs of modern manned combat aircraft indicate that fewer can be procured for a given defence budget. This shortfall reinforces the call for the increased use of CCA, especially when only 50% of manned platforms are available.

As in most major procurements for similar platforms, individual US forces pursue separate paths despite the benefits of joint procurements. For the US Navy (USN), it has its own low-key approach to CCA. In late 2025, two BQM-177A modified subsonic aerial targets were flown autonomously by a virtual F/A-18. According to NAVAIR: "...the virtual F/A-18 acted as the mission lead, directing the BQM-177As to defend designated Combat Air Patrol locations. When the simulated adversary aircraft attempted to move into those areas and threaten US forces, the autonomously controlled BQM-177As responded according to their mission tasking." These trials follow USN development contracts awarded to Anduril, Boeing, General Atomics and Northrop Grumman.

European Initiatives

In Europe, Airbus began early development of what was to be known as its 'Wingman' concept in 2018 using a variant of its Do-DT25 target drone launched and controlled by an Airbus A400. As part of the company's Future Combat Air System (FCAS) programme, conducted in conjunction with France and Spain, further trials were carried out in Finland featuring combat aircraft, a helicopter and five UAVs, all linked through the company's Compact Airborne Data Link (CANDL).

When 'Wingman' was first unveiled at ILA Berlin in June 2024, Michael Schoellhorn, CEO at Airbus Defence and Space said that the German Air Force expressed a "clear need for an unmanned aircraft flying with and supporting missions of its manned fighter jets".

FCAS was expected to become operational in 2040 "to maximise the effects and multiply the power of its fighter fleet..." but at the moment the programme seems to be mired in a political stand-off between Germany and France over whether the Eurofighter GmbH or Dassault will take the lead in the project to provide the two countries next-generation combat aircraft. According to Reuters, the development of a joint solution is 'very unlikely' due to disagreements over platform design and workshare.

Another development in the fast-moving world of CCA concerns Airbus Defence and Space teaming with Kratos as part of the latter's bid for the expected Luftwaffe programme where the company is offering its XQ-58A Valkyrie platform. The XQ-58A has been deployed to Eglin AFB in Florida and controlled by USAF F-16 and F-15 aircraft during trials conducted by AFRL and the Air Force Test Center.

The other project of interest features the governments of the UK, Italy and Japan and their industrial bulwarks, BAE Systems, Leonardo and Japan Aircraft Industrial Enhancement Co (JAIEC) in the Global Combat Air Programme (GCAP). Planned to enter service in 2035, the three nation Joint Venture, known as Edgewing, is currently working on the Combat Air Flying Demonstrator (CAFD) that BAE Systems describes as a "crucial part of the work to develop manufacturing processes and de-risk the next generation combat aircraft delivered through GCAP".

With the potential demise of the Franco-German FCAS project, it is highly likely that GCAP could benefit with the addition of Germany to the programme. Other potential partners could include Spain, Saudi Arabia, Sweden and Canada. Meanwhile, FCAS partner France continues to develop its nEUROn unmanned combat air system (UCAS) as a CCA operating in conjunction with the Rafale F5.

One other interesting development concerning European nations occurred in late 2025 when the Netherlands announced it was joining the USAF's CCA programme. The Dutch Government's recent Defence *Strategy for Industry and Innovation* paper highlights unmanned systems as a strategic national priority.

◀ **Edgewing, formed by BAE Systems, Leonardo and JAIEC, are working jointly in the Global Combat Air Programme (GCAP) programme. (Source: BAE Systems)**



Here Today...

If the recent demonstration of a Boeing MQ-28A Ghost Bat launching an AIM-120 AMRAAM to destroy a Phoenix jet-powered target drone is anything to go by, CCA are here today. The recent tests were conducted at the Woomera range complex in Australia as part of *Trial Kareela* 25-4 by the Royal Australian Air Force (RAAF) in conjunction with Boeing and the USAF and saw the MQ-28 controlled by a RAAF E-7A Wedgetail. An RAAF F/A-18F Super Hornet also took part in the test firing, although its exact role has not been confirmed apart from flying in formation with the MQ-28 and tracking the target.

According to the Australian Department of Defence, "*Trial Kareela* 25-4 was a demonstration of a CCA employing an air-to-air weapon against an aerial target in an operationally relevant scenario." The statement continued that, "this landmark demonstration proves that the MQ-28A is a world-leading CCA capability and underlines the MQ-28A's growing potential to deliver an operational capability for the Royal Australian Air Force".



▲ **The Boeing MQ-25 Stingray is an autonomous carrier-borne aerial refuelling platform that can also undertake ISR. It can carry 15,000 lb fuel out to 500 NM. (Source: Boeing)**

With a further seven MQ-28 CCA on order (six Block 2 and one Block 3 variants with the latter featuring an internal weapons bay), the aircraft has been designed by Boeing's Australian division and emphasises Boeing's strong experience in the field. The company has been involved in unmanned aircraft "since the 1950s" according to Jerad Hayes, Boeing's VP and Chief Engineer at the company's Phantom Works. "These loyal wingmen can communicate with each other to share real-time data, coordinate manoeuvres and execute complex missions with unprecedented precision. The result is a more cohesive and effective fighting force capable of responding to dynamic battlefield conditions."

Türkiye is also pursuing CCA through Baykar. In late November 2025, its Kizilelma CCA fired a Gökdoğan BVR air-to-air missile at an aerial target over the Sinop ranges. According to the company: "This test marked the first time in aviation history that an

unmanned fighter jet successfully destroyed a jet-engine-powered aerial target using a BVR air-to-air missile."

Although not strictly a CCA, mention should be made of the Boeing MQ-25 Stingray that is to be used by the USN as a carrier-borne AAR platform. Powered by a Rolls Royce AE 3007N turbofan engine, Boeing was awarded an Engineering & Manufacturing Development (EMD) contract for the platform in 2018 and in subsequent tests the MQ-25 has conducted AAR trials to refuel an F/A-18, E-2D and F-35.

Conclusion

CCA are here to stay. Perhaps they will not be the game changer that the current 'CCA evangelists' proclaim, but they do offer a significantly lower-cost platform than current manned aircraft and in itself, this provides a massive benefit. These cost savings are also redeemed as far as training is concerned in that the majority of this training can be undertaken in the virtual environment and this therefore negates the requirement for actually flying the CCA to carry out live training.

At the other end of this cost-benefit equation is a challenge: do such systems herald the demise of the manned combat aircraft and what are the implications of such an outcome? Will the removal of the human in the loop present ethical kill/no kill issues or lower the decisional bar for armed conflict?

The other concern surrounding CCA relates to security, specifically the datalinks and 'autonomous software' that informs them of their mission. As the military adopts increasingly sophisticated platforms and information systems that are reliant on the instantaneous transmission of data, any security breach or disruption could be catastrophic; look at the chaos generated when banks or large corporations are hacked in peacetime?

In essence, the emergence of CCA is evolutionary and not revolutionary, but the changes brought about by their adoption will be significant.



Poland Progresses Counter-UAS Initiatives

Robert Czulda



▲ **A battery of the Pilica anti-aircraft missile-and-gun system prepares to open fire at the Central Air Force Training Range in Ustka during the Autumn Fire-25 exercise. (Polish Armed Forces)**

Poland's East Shield programme is a large-scale initiative aimed at securing NATO's and the EU's Eastern Flank. One of its planned components focuses on protection against various types of drones. In late January 2026, several binding decisions were finally made.

At the outset, it is worth briefly recalling the rationale and core assumptions behind the system that Poland, responsible for protecting the external border of both NATO and the European Union, has decided to construct along its eastern frontier. This border is shared with Russia (232 km in total, including a 22 km maritime section) and Belarus (418 km of land border). To counter illegal migration, Poland has already installed a 5.5-metre-high steel fence. At the

same time, the country is preparing to defend itself against a far more conventional threat: a potential Russian invasion.

The drone threat has already materialised. In September 2025, approximately 20 'objects' entered Polish airspace and were identified by Polish authorities as Russian drones. Although these aerial vehicles were unarmed, the incident resulted in damage to a civilian building and temporary closure of a number of airports. In cooperation with NATO allies, airborne early warning aircraft and combat jets were activated in response.

Responding to the growing threat environment, Poland has begun work on what is still not a fully defined structure known as the East Shield (Tarcza Wschód in Polish) project. The official designation of this government initiative is the National Deterrence and Defence Programme, adopted in June 2024. The programme is expected to comprise a multi-layered system including detection, warning, and tracking capabilities; forward operating bases; logistical hubs; and infrastructure dedicated to counter-drone operations.

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A key component of the project is the so-called Tactical Base Access System (TSDB, Taktyczny System Dostępu Bazowego). This system is intended to include: (1) a network of base stations and masts deployed along the border and at operational centres; (2) base stations functioning as access points for secure military communications; (3) IMINT, SIGINT, and acoustic sensors (the ECHO system), complemented by electronic warfare capabilities; and (4) operational centres for data analysis, supported by artificial intelligence (AI), integrated with reconnaissance assets and automated strike-system programming. Ultimately, the East Shield barrier is planned to consist of anti-tank obstacles (including dragon's teeth and trenches), reconnaissance and early-warning systems, including counter-drone measures, and a network of bunkers.

These elements are to be integrated with NATO initiatives (Eastern Sentry) and EU efforts (Eastern Flank Watch). All solutions, including counter-drone defences, are intended to be interoperable with systems fielded by Poland's partners, such as the Baltic Defence Line, as well as with Poland's national air and missile defence systems, including WISŁA (medium-range air and missile defence) and NAREW (short-range air defence). Counter-drone capabilities are expected to be introduced first in military units deployed in northern and eastern Poland.

The East Shield is scheduled for completion by 2028, after which Poland plans to focus on its further development and modernisation, as well as on the introduction of additional capabilities, including counter-drone systems, within units deployed deeper inside the country. Drone-defence capabil-

ities are to be acquired under the codename SAN, elements of which were partially outlined in December 2025. SAN is intended to form an additional layer of airspace defence alongside existing systems, including NAREW and WISŁA, and is expected to deliver both kinetic and non-kinetic counter-drone capabilities.

With regards to drones and counter-drone systems, these capabilities are among the key priorities of the Polish Armed Forces Development Programme for 2025–2039, a classified document signed by Minister of National Defence Władysław Kosiniak-Kamysz in December 2025. In order to accelerate procurement, the Polish government announced in October 2025 its decision to simplify procedures for the acquisition of drones and counter-drone systems. This move is part of the current approach, which envisages the procurement of counter-drone systems for the armed forces under an urgent operational requirement, thereby bypassing standard public procurement regulations.

Following an assessment of operational requirements and threat perceptions, the East Shield framework gave rise to the KINMA programme (Kinetyczno-Niekinytyczny Moduł Antydronowy or kinetic and non-kinetic anti-drone module), envisioned as a modular counter-UAS system. KINMA was intended initially to support the Pilica+ VSHORAD air-defence system and, at a later stage, other units of the Polish Armed Forces. (Pilica+ is the designation for a missile-and-artillery air-defence system equipped with CAMM missiles). Importantly, KINMA was designed to retain an independent operational capability.



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In its original configuration, KINMA was to be equipped with a laser effector, as well as additional kinetic and non-kinetic effectors, including microwave systems, programmable ammunition, autocannons, and missiles. However, financial constraints led to the suspension of the project, and its future remains uncertain. According to information reported in the Polish press, the KINMA programme was never launched at full scale due to the absence of secure funding.

In late January 2026, the Polish government finally signed the agreement. The main contractors will be the Polish defence group PGZ and Norway's Kongsberg. Another key partner is the Polish company APS (Advanced Protection Systems), alongside several others, including PIT Radwar, ZM Tarnów, and Huta Stalowa Wola (HSW).

APS will deliver the SanView C2 command-and-control (C2) system, which will also be used for fire control. The SAN system will employ two Polish-made radars (FieldCTRL Ultra and FieldCTRL Follow), as well as battery-level radars supplied by Weibel. In addition, this layer will be equipped with passive electronic intelligence sensors capable of detecting drone communication systems, as well as electro optical sensors.

SAN will be armed with laser guided APKWS missiles deployed in land-based batteries; these missiles are also planned to be integrated with Polish F 16 fighter aircraft. Two types of cannons will also be procured. Polish-made SA 35 guns, derived from naval artillery used on Kormoran II minehunters and *Miecznik* class vessels, will employ both sub calibre ammunition and programmable air burst rounds. These guns can engage targets at altitudes of up to 3.5 km and at ranges of approximately 3-5.5 km.

In addition, SAN will field 30 mm cannons, also capable of firing programmable ammunition, already known from the Rosomak IFV with the ZSSW turret and the Borsuk IFV. These guns will be integrated with combat modules supplied by Kongsberg and are capable of engaging targets at distances exceeding 2 km.

ZM Tarnów will supply WLKM 12.7 mm machine guns with a rate of fire of up to 3,600 rounds per minute. These weapons have an effective range of up to 1.5 km against aerial targets and up to 2 km against ground targets. As part of its counter drone shield, Poland also plans to procure interceptor ("hunter") drones based on the MEROPS system.

A total of 18 SAN batteries are to be acquired. Sixteen will be assigned to four air defence brigades and regiments of the Polish Land Forces, while two will become part of the Pilica+ air defence system, which is responsible for protecting WISŁA medium range air defence batteries.

Each SAN firing platoon will be equipped with a 35 mm gun, a 30 mm gun, machineguns, an APKWS launcher, a command vehicle, loitering munitions, radar stations, a vehicle equipped with electronic warfare systems, and an ammunition vehicle. Four platoons will form one battery (three firing platoons and one support platoon) with each firing platoon possessing full independent capabilities for detecting, tracking, identifying, and engaging aerial targets.

Up to 700 vehicles are to be procured under the programme. The SAN system will be partially funded through the EU's SAFE (Security Action for Europe) initiative with the total value estimated at EUR 3.6 billion – approximately 60% of the sys-

- ▼ **Poland is developing its own indigenous radar systems. The Bystra radar is designed for target detection and designation in short-range air defence systems used to protect tactical combat formations against fixed-wing combat aircraft, helicopters, missiles, unmanned aerial vehicles (UAVs), and mortar rounds. (Source: Ministry of National Defence)**



tem's components are to be supplied by PGZ S.A. companies. Deliveries are planned for 2026–2028, with the largest volume expected in 2027.

As of now, Poland effectively lacks meaningful, operational counter-drone capabilities. In this context, the non-kinetic SkyCtrl system is frequently cited. The system was ordered in 2022 and entered service one year later. It is also being used in Ukraine, including in the form of lightweight, portable SKYctrl S jammers. However, the original procurement was limited in scale, and the systems provide only restricted, point-defence coverage for selected facilities. SkyCtrl is capable of detecting and jamming unmanned aerial vehicles, but it already requires urgent modernisation. While, this issue remains unresolved, some sources point to financial constraints as the primary obstacle, though the Polish military maintains that the delay is driven by “reservations” regarding the system's performance.

Poland may opt to procure more advanced solutions offered by its domestic defence industry. Polish company APS, producer of the SkyCtrl system – together with British firm MSI Defence Systems – has developed an integrated counter-drone solution combining APS sensors and jamming systems with a 30 mm Bushmaster II autocannon using programmable ammunition (the SKYctrl SKID variant). APS is also cooperating with Estonia's Frankenburg Technologies on systems integration. The Polish side aims to combine Estonian missile solutions with domestic effectors, including guns of various calibres, interceptor drones, and laser effectors.

In November 2025, Poland announced the deployment of MEROPS (Multispectral Extended Range Optical Sight) counter-drone systems along NATO's Eastern Flank. MEROPS is capable of detecting UAVs, tracking and identifying them, and transmitting targeting data to other ground and air units responsible for neutralisation, as well as engaging targets directly. The systems transferred to Poland originated from US Army reserve stocks. Polish soldiers subsequently began training on the system, which is also in service in Denmark and Romania. MEROPS is regarded as an interim solution that Poland intends to employ on the Eastern Flank until the domestic defence industry develops a sovereign system.

In December 2025, Poland's Armament Agency signed a contract with the Turkish company Aselsan for the delivery of the

KORAL-NG mobile radar electronic warfare system, which is to be deployed on the Eastern Flank. According to the manufacturer, KORAL-NG is capable of detecting and jamming radar systems at ranges exceeding 200 km, while simultaneously tracking and disrupting multiple targets. The system will be integrated into the Polish Armed Forces' existing automated reconnaissance and jamming architecture, known as Kaktus (Zautomatyzowany System Rozpoznawczo-Zakłócający). While few details were disclosed, it was revealed that the deal with Türkiye is being treated as the initial phase of a much larger contract for a comprehensive counter-drone defence system under the aforementioned SAN programme, which is currently under development.



▲ **ZM Tarnów will supply one of the system's kinetic effectors: a remotely controlled 12.7 mm multi-barrel heavy machine gun (WLKM). It can be integrated with an optronic (electro-optical) head and the Legwan tactical vehicle. (Source: ZM Tarnów)**

Poland also plans to deploy four unmanned aerostats known as Barbara, designed for the detection of drones and cruise missiles. The systems were ordered in 2024 at a cost of approximately EUR 820 million, with deliveries scheduled for 2026. The primary sensor aboard the surveillance aerostats will be a long-range radar, with a detection range exceeding 300 km. Additional payloads may include communications equipment and electronic intelligence (ELINT) systems.

Beyond aerostats, Poland intends to build situational awareness on the Eastern Flank through satellite data, electro-optical reconnaissance sensors operated by the Border Guard, and the recently acquired Passive Location System (PET/PCL). By 2035, a total of 63 system sets are planned for acquisition, with the first deliveries expected in 2028. The system enables continuous monitoring of airspace, including the localisation and tracking of aerial objects, while remaining completely passive and emitting no signals.



Long range, manoeuvrable, precise, and deadly: Latest smart 155 mm munition developments in the US and beyond

Tim Guest

Smart rounds with longer ranges and increased hit probabilities than standard, dumb, 155 mm artillery munitions, change the possibilities for fire missions on the battlefield. They also offer commanders powerful tools for increasingly effective deeper fires against high-value target sets. Smart, precision-strike artillery munitions have been around for decades – the Vietnam-era

Copperhead from the 1970s and the APGM programme munitions of the 1980s serve as two cases in point. Indeed, old stocks of Copperhead mean that it is still found in the inventories and potentially in use with at least six nations. It has also been supplied to Ukraine, where Ukrainian artillery have reportedly praised the round's continued precision and effectiveness.



As of early 2026, there are several ongoing and new precision-guided and enhanced long-range 155 mm artillery ammunition programmes underway in the US and Europe; these are intended to accelerate the delivery of cost-effective advanced munitions, delivering improved ranges beyond 70–100 km. They also possess manoeuvring capabilities, assuring first-round accuracy, as well as technological capabilities to function in GPS-denied, EW-saturated environments. In order for new rounds to operate in contested environments, manufacturers and programme departments are focusing more on inertial navigation, laser, or IR-based sensors, rather than GPS-based seekers.

Wide-ranging developments

In Europe, one development is the Vulcano 155 mm Guided Long Range/GLR round from Leonardo and Diehl Defence. A sub-calibre round, that uses GPS and inertial guidance, as well as, in some versions, either a semi-active laser/SAL seeker, or an infrared/IR seeker for high-precision, terminal guidance. It can reach ranges out to 70 km when fired from an L52 barrel, or 55 km from an L39-calibre gun. Accuracy, defined by circular error probability (CEP), using GPS/inertial guidance is said to be $CEP \leq 5$ m, while using

IR or SAL for terminal homing achieves $CEP \leq 3$ m, for both static and moving targets.

Germany's Rheinmetall, meanwhile, is expanding its whole industrial capacity for producing both conventional and smart 155 mm artillery ammunition to meet surging demand brought on by the war in Ukraine and the wider, ongoing threat from Russia towards its other European neighbours. With a reported

▲ **The Boeing-Nammo team set a record with their Ramjet 155 round at the US Army Yuma Proving Ground in October 2023 for the longest indirect fire test of a ramjet-powered artillery projectile. [Photo: US Army]**

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per-annum production target of 1.5 million shells by 2027, it has new production lines in Germany and Lithuania, operational, or planned, over the next 18 months, including lines devoted to manufacture of its sensor-fuzed SMArt 155 top-attack round. Re-starting production of this smart munition (which was originally developed by Diehl in 1989), was approved by the Bundestag in late 2022 in support of its supply to, and use by, Ukraine.



Another system, this time from Boeing and Nammo, is said to have set a record in October 2023, for the longest indirect fire test of a ramjet-propelled 155 mm projectile at the US Army Yuma Proving Ground, with their air-breathing, solid-fuel Ramjet 155 round. This ramjet-powered projectile was part of the then Extended Range Cannon Artillery/ERCA, which was subsequently cancelled the following May and replaced by the Self-Propelled Howitzer Modernisation – SPH-M – programme.

Nevertheless, the Boeing-Nammo round – its development also part of the army's then XM1155 Extended Range Artillery Projectile/ERAP programme – proved its ramjet range capabilities from a 58-cal tube, having previously also been proven from a 39-cal gun in Norway. Precision guidance modifications followed with the integration of a Joint Direct Attack Munition (JDAM) mission computer on the Ramjet 155, to demonstrate its first-round-hit capabilities against both static and moving targets. Morten Brandtzæg, Nammo's CEO, said at the time of the Yuma test firing, that the round was a 'real collaborative achievement' by the two companies and delivered on-the-range and precision requirements the US Army desired. He added, "We believe the major development hurdles have now been cleared and production is viable within a relatively short timeframe." While the range achieved at Yuma was not disclosed at the time, reports suggest the Ramjet 155 will be able to hit targets 150 km away.

Two or more

Indeed, it is understood that the US Army is evaluating at least two primary, distinct, high-speed, sub-calibre, long-range 155 mm, precision-guided munitions for its advanced long-range precision fires munition project, formerly the XM1155-SC. Along with the aforementioned Ramjet 155, the Scorpio-XR from BAE Systems, is another contender, with a guided, manoeuvrable, discarding-sabot, long-range projectile. Both these competing systems are part of the wider Enhanced Range Advanced Munitions (ERAMS) initiative, which is aimed at developing projectiles capable of engaging static and moving targets at ranges beyond 100 km+, or, as mentioned above regarding Ramjet 155, 150 km+ when using ramjet propulsion.

For its part, BAE's Scorpio-XR projectile, also underwent Yuma firing tests last year – in mid-October – conducted successfully according to a company statement and in collaboration with

▲ **Increased manoeuvrability enables the LRMP to fly shaped trajectories to engage obstructed, static and moving targets. It can operate in GPS-denied environments, achieving extended ranges and precision-strike capabilities using deployable aerodynamic control surfaces and onboard guidance. (Source: General Atomics)**

the US Army Combat Capabilities Development Command Armaments Centre (DEVCOM AC). The tests demonstrated the compatibility and NATO interoperability of the round with an array of 155 mm, 52-cal, Joint-Ballistics-MoU howitzers. Multiple rounds were fired and the company said each 'was guided to, and impacted, the target'.

Jason Casciotti, programme director for Combat Systems Development at BAE Systems, said at the time, that the successful demonstration of the Scorpio-XR's compatibility was a major achievement for the programme, with the milestone illustrating BAE's effective working relationship with the army in pursuing guided-projectile technology. Further integration of advanced sensors into the round is set to deliver the army's desired accuracies at ranges at least twice those achieved by existing, standard munitions – so, likely, 70 km+ – with some reports suggesting the projectile's range capabilities might exceed 100 km+. The round is expected to be able to perform optimally even in GPS-denied/contested environments, with improved, first-round-hit capabilities through advanced, precision guidance.

As BAE's contender to deliver the army's advanced long-range precision fires munition, previously XM1155-SC, Scorpio-XR has been proven in other test firings from both 39-cal and 58-cal guns, including as part of BAE'S Hypervelocity Projectile (HVP) range of munitions. As said, it is designed to operate in contested environments, and its high manoeuvrability and short time-of-flight, enhance its abilities to defeat both static and moving targets. More than 100 HVP/Scorpio-XR test firings have taken place in order to advance and evaluate the precision-guided capabilities and technologies of the round.

LRMP shapes up

One of the most recent developments in the field of smart 155 mm rounds comes from General Atomics Electromagnetic Systems (GA-EMS) in the US. In mid-October 2025, the company announced it had conducted successful Yuma-Proving-Ground tests that August, from an M777 howitzer of its Long-Range Manoeuvring Projectile (LRMP) for the US Army. Multiple

LRMP rounds using M231 powder charges were said to have been fired, demonstrating sabot separation, de-spin stabilisation, wing deployment, and controlled descent. The company calls its LRMP a next-generation munition, which can operate even in GPS-denied environments, achieving its extended range and precision-strike capabilities using deployable aerodynamic control surfaces and onboard guidance, which enable it to actively manoeuvre in flight to engage targets at long range. Scott Forney, president of GA-EMS, said at the time of the Yuma tests, “As the US faces rising threats from near-peer adversaries and increasingly-contested environments, affordable, mass-produced artillery [ammunition. ed] is critical. LRMP meets that need while proving its ability to perform in extreme conditions and reshape long-range firepower.”

Just prior to the Yuma tests, GA-EMS showcased a 1:2 scale LRMP model at the Space and Missile Defence Symposium in August 2025, with GA-EMS’s Scott Forney saying at the time, “Our LRMP aligns with dynamic defence requirements for improved long-range precision strikes and minimises operational uncertainty by integrating into existing artillery systems. The next phase of full-system testing will validate the projectile’s performance across complex scenarios and ensure seamless integration with missile defence frameworks.”

The company claims LRMP can achieve ranges two to three times further than current rounds from today’s platforms with shaped trajectories and inflight manoeuvrability enabling it to change course, or even switch targets, whether static, or moving, non-line-of-sight targets. The projectile is designed and engineered in shape and with control surfaces to produce greater lift, less drag, thereby enabling its exceptionally long-glide ranges to be achieved without the need for auxiliary, rocket-assisted, or ramjet propulsion. The round is also compatible with mainstream legacy and current 155 mm towed and SP howitzers.

Picatinny’s part

It is worth mentioning that, among the many departments involved in the development and delivery of precision-guided munitions (PGMs) for the US Army, Picatinny Arsenal appears repeatedly as a key institutional player. At various stages of these efforts, programme offices and officers based at Picatinny have played central roles. The Arsenal was at the heart of the Army’s earlier APGM programme in the 1980s, mentioned above. Today, it continues to drive efforts to develop a 155 mm artillery round

with greater range, precision-enabling manoeuvrability, and increased lethality; this work includes programmes such as the XM1155 Extended Range Artillery Munitions Suite. Picatinny is also home to major organisations such as the Fires Center of Excellence and the Project Manager for Combat Ammunition Systems (PM CAS). These departments are where the army sets out what it wants and needs from a smart 155 mm round, defining the strategic scope of various programmes, as well as specific parameters for desired capabilities, such as accuracy, lethality, and range, as well as performance under different environmental conditions and extremes. Extending the range of these smart rounds, too, is a key factor in order to assure the protection and safety of artillery crews firing them, allowing them to engage the enemy further from the front, without being within range of counter-battery fire themselves. The PM CAS equips the US Army and USMC, amongst other US Forces and allies, with various mature munitions, including precision ammunition products across various categories and calibres, but including 155 mm artillery PGMs, such as, (though not exclusively), Excalibur and Precision Guidance Kits (PGKs).

Excalibur update

In this regard, a quick M982 Excalibur update is required, including reports from July 2025 of an impending Indian Army procurement of the RTX/BAE Systems Bofors round, due to expenditure of stocks during clashes with Pakistan in Operation Sindoor. Confirmation followed in November, that the US Defence Security Cooperation Agency had approved a USD 93 million package, of which USD 47 million was 216 M982A1 Excalibur variants, for its M777 towed guns, legacy towed, as well as SP K9 Vajra-Ts. In Ukraine, GPS-guided variants of Excalibur have been relatively effective from towed M777s and AHS Krab SP guns, although Russian EW assets causing degraded GPS signals have, according to reports, diminished the effectiveness of the projectile, on occasions. That said, Ukrainian artillery have still reported its overall effectiveness as a positive one.

According to RTX at this time, over 1,400 Excalibur rounds have been fired in combat so far by both US and allied forces, its accuracy reducing collateral damage through increased first-round-hit probability. Its CEP is said to be under 2 m and this precision-strike capability reduces the need for more rounds to be dropped on target to neutralise it, thereby reducing the logistical burden and associated risks of transporting and delivering unnecessary quantities of standard rounds to a gun position. The company claims analysis shows the effects of one Excalibur

on target would require ten standard dumb rounds to achieve the same.

Ranges achievable using the PGM for a 39-cal tube are up to 40 km, 52-cal tube to 50 km, and a 58-cal tube out to 70 km. The multiple variants of the round, suited to different missions, are compatible with several of the latest 155 mm

◀ **Over 1,400 Excalibur rounds have been fired in combat by both US and allied forces.** (Source: RTX)





▲ **Sceptre, liquid-fuelled, ramjet-propelled, 155 mm, extended-range, PGM concept. (Source: Tiberius Aerospace)**

systems, with which it has undergone compatibility trials. These include: the M777, M109 series, M198, Archer, PzH2000, as well as AS90, K9, Denel G6, and Caesar 6×6s, with the round's proven compatibility also meeting US ERCA requirements. Current procurement negotiations are said, by RTX, to be underway with a number of new customers, (reportedly Denmark and Norway), while current users beyond the US, include: Australia, Canada, India, Jordan, the Netherlands, Spain, and Sweden.

As for its specific, land-based artillery variants suited to different fire missions and target sets, the upgraded Excalibur 1B round incorporates enhanced shaped trajectory software enabling targets in hard-to-reach locations to be engaged during the terminal phase of attack. US Forces are now equipped with this version of the projectile. The test-fired, hit-to-kill/HTK armour-piercing variant has a discarding sabot with an armour-defeating, kinetic-energy penetrator and is able to autonomously locate static and moving targets under any conditions using its all-weather seeker, even if firing coordinates are inaccurate. A laser-guided version of the round, the Excalibur S, has a digital SAL seeker for use against moving targets and under GPS-denied conditions.

As mentioned, another precision-guided solution under the purview at Picatinny, is the aforementioned M1156 PGK, from Northrop Grumman. Previously, only GPS-guided, this has now been modernised to ensure it remains effective even in GPS-denied scenarios. Replacing the fuze and attaching to standard 155 mm rounds, PGKs have been able to reduce a dumb artillery round's CEP from 100 m–300 m, down to a PGK-improved CEP of 10 m–30 m.

The new extended-range PGK, the PGK-ER, through the use of tech such as inertial guidance, can now maintain its performance even in GPS-degraded environments. The company says it is also compatible with higher muzzle velocities encountered when fired from new 58-cal cannons, as well as legacy 39-cal platforms. Notable, that back in March 2025, the company's NOC business unit signed a USD 40.5-million deal with the US Army's Contracting Command, to supply an undisclosed number of PGKs to the US Army by 21 May 2028, with the work to be conducted at the company's Plymouth, MN, facility. According

to reports, this is just one of a number of contracts for PGKs driven by current geopolitics and allied/NATO nations bolstering and enhancing 155 mm artillery munition stockpiles.

New kid on the block

A brief mention in closing to newcomer on the defence-industry block, Tiberius Aerospace, which has recently, just three years since its founding in 2022, been awarded a UK MoD contract to develop its liquid-fuelled, ramjet-propelled, 155 mm, extended-range, PGM concept, named Sceptre. Sceptre was introduced in May 2025 and the contract expects Tiberius to bring the round to trial stage. The Sceptre round (TRBM 155HG), has a ballistic trajectory and will be able to reach velocities of Mach 3.5, as well as beyond-jamming-range altitudes over 65,000 feet, to achieve payload-dependent, extended ranges out to 150 km. Compatible with NATO artillery platforms, Sceptre is designed to deliver a CEP of less than 3.5 m and be able to function in GPS-denied environments.

These performance stats are based on computational modelling. Interestingly, the proposed liquid fuelling of the projectile will take place on the gun position, after a proposed just-in-time delivery helping reduce logistics burden and storage/transit safety issues; multi-fuels are: diesel, JP-4, or JP-8, whichever is available. Apparently, fuel is to be stored in a fuel bladder within a pressurised tank, before being electronically injected using a fuel micro-controller regulating flow into each round, prior to a fire mission. This all sounds tortuous, immediately begging the question, *how will gun crews take to such a series of preparation tasks before the round is ready to load and fire, particularly under the dire pressures, stresses, and urgency of a sudden fire mission?* In an age of shoot-and-scoot tactics to avoid counter-battery casualties, a round that requires more than the usual support paraphernalia before it's ready, might not turn out to be such a popular proposition with the gunners who will be required to use it. And what happens to the fuel bladder when a gun has to bug out? Time and real-world trials may prove this author wrong, but presented with the current details, this fuelling approach sounds like an impractical burden to place on gun crews, who need a PGM round to be as ready-to-go as possible when it first arrives on the gun position. 

FAcT – Canada’s New Approach to Aircrew Training

Dr Trevor Nash

The Royal Canadian Air Force (RCAF) aims to revolutionise its aircrew training process with its Future Aircrew Training (FAcT) programme. Provided by SkyAlyne, a partnership between KF Aerospace and CAE (formerly Canadian Aviation Electronics), FAcT is scheduled to start operations in 2029. However, not all is plain sailing, as Canada is yet to confirm the main tranche of CF-35A Lightning IIs to replace the CF-18 Hornet which has led to disruption.



▲ **Two Grob CT-102B Astra II basic trainer aircraft are already in Canada with a further 21 set for delivery in the coming year. (Source: SkyAlyne)**

During the Cold War, Western nations tended to undertake aircrew training in-house by employing military instructors and using government-owned resources to provide that training. Following the fall of the Berlin Wall in 1990 and the West’s clamour to turn ‘swords into plough shares’, nations began to consider moving away from the established training paradigm of government-owned resources and government-delivered training – the so-called government-owned, government-operated (GO-GO) model – to a system whereby industry played a larger role in training delivery.

Over time, this GO-GO model has become increasingly less attractive as the ‘peace dividend’ resulted in the reduction of national military aircraft inventories and therefore the cost justification for large training infrastructures diminished; in short, the number of aircrew to be trained has sharply reduced. Today, the world’s air forces generally adopt one of two models. The first sees the government retain ownership

of the training resources with the training, maintenance and support provided by one or more commercial contractors. This is referred to as the GO-CO model. The other option is for the government to hand over total responsibility to the contractor to provide resources and training delivery, the CO-CO model.

In reality, such approaches rarely provide such a clear delineation between the GO and CO elements. For example, the UK’s Military Flight Training System (MFTS) saw the UK government stipulate the Hawk T2 as the advanced jet trainer element of the programme, thereby removing any preference that the contractor, Ascent Flight Training, might have had for a different airframe.

Other indicators pointing to the popularity of outsourced flight training solutions can be seen in the NATO Flight Training Europe (NFTE) initiative. It has always been a long-term aim of NATO to maximise the flight training assets of its members and use those resources to benefit all of its European affiliates. According to NATO, with the “latest expansion of the number of training campuses to fourteen locations, NFTE is now facilitating training in seven Allied countries” with 17 nations having signed up to the programme. Before looking at the RCAF FAcT programme in detail, it is worth highlighting an issue that has always caused difficulties for commercially driven contractor-provided training. All successful

training delivery is dependent on a stabilised training pipeline. In the UK for example, the MFTS programme has suffered seriously from government-driven changes to manning levels and the types and numbers of aircraft in service. Assuming it takes two years for a pilot to transition the training pipeline, the early retirement of a platform or the adoption of a new one could mean a surplus or deficit of aircrew or worse still, aircrew trained for non-existent platforms altogether.

Canadian approaches

Canada has a rich and proud history when it comes to aircrew training. During the Second World War, Canada formed the core of the British Commonwealth Air Training Plan (BCATP). Moreover, President Roosevelt referred to Canada as the ‘aerodrome of democracy’ and during that conflict Canada graduated nearly 138,000 aircrew. During the First World War, some 3,100 pilots were trained in Canada and as with the second global conflict, great use was made of civilian schools and personnel.

Over more recent years, Canada has used commercial resources to bolster its flight training capabilities and this included drawing on the expertise of companies such as Bombardier,



- ▲ **The Airbus CT-153 Juno is already widely used as a training helicopter worldwide. Nineteen Juno helicopters will be operated from Portage la Prairie. (Source: Airbus Helicopters)**

KF Aerospace and CAE. To address a new era, 2018 saw the Canadian Department of National Defence (DND) host a FAcT industry engagement symposium in Ottawa to outline the scope of its requirements for a new aircrew training process. The DND's aspirations were directed towards a long-term coordinated aircrew training programme that encompassed all pilot training for fast-jet, multi-engine and rotary-wing pilots, as well as for Air Combat Systems Officers (ACSO) and Airborne Electronic Sensor Operators (AESOp). With its roots in the RCAF Future Pilot Training System (FPTS), FAcT was initially designed to provide the RCAF with a holistic and sovereign training capability, the concept for which first emerged in 2011.

With FAcT not due to achieve FOC until spring 2029, it is worth considering the way training was conducted at the time of DND's first industry engagement in 2018 and the major element of this system that remains relevant today.

Pilot training comes under the command of 15 Wing based at CFB Moose Jaw in Saskatchewan. The current system sees initial fixed-wing, multi-engine and rotary-wing training conducted at 3 Canadian Forces Flying Training School (CFFTS) at Portage la Prairie (Southport), Manitoba. This training is provided by the Allied Wings consortium led by KF Aerospace and comprises Bluedrop Training & Simulation, Canadian Base Operators and Canadian Helicopters to fulfil the requirements of the DND's Contracted Flying Training and Support (CFTS) programme.

- ▶ **The Canadian Government is yet to place the order for the second tranche of CF-35A Lightning II aircraft, which means the CF-18 Hornet must soldier on for years to come. These RCAF CF-18s formed part of NATO's Baltic Air Policing Force. (Source: DND RCAF)**

Allied Wings has 12 Grob 120A and seven King Air C90B aircraft owned by KF Aerospace alongside ten Bell 206 and nine Bell 412 aircraft owned by DND. Those destined for a career flying the RCAF's CF-18 Hornets would leave Southport after completing their Phase I training on the Grob 120A prior to joining 2 CFFTS at Moose Jaw where they would carry out Phase II and III training on the CT-156 Harvard II, a variant of the Beechcraft T-6. Remaining at Moose Jaw, fast-jet pilots would transition to the CT-155 Hawk before undertaking Fighter Lead In-Training (FLIT) at Cold Lake, Alberta, again on the CT-155 with 4 Wing's 419 Sqn.

This CT156 and CT-155 training was established under the NATO Flying Training in Canada (NFTC) programme in a contract awarded to Bombardier in 1998 with CAE taking over the programme in 2015. During its lifetime, NFTC had trained pilots from 17 NATO and Allied nations but in early 2024, the CT-155 Hawk was retired early – supposedly due to airframe fatigue although some industry insiders argue that the real reason was that the RCAF felt the NFTC Hawk was not suitable as a training platform for pilots to fly the 5th generation CF-35A.

When the FAcT programme was initially mooted, it was expected that the Hawk would be available until at least 2028. With the Hawk's premature retirement, FLIT no longer forms part of FAcT; this was not the only challenge faced by the RCAF.

RCAF issues

As described earlier, for a training pipeline to operate efficiently, it requires both a defined strategic vision and a stable equipment plan. When FAcT was launched in 2018, the RCAF was facing a number of issues.

After successfully passing the Aircrew Selection Centre at CFB Trenton, Ontario, potential pilots would attend the Royal Military College at Kingston, Ontario before beginning flying training at 3 CFFTS. With the unveiling of FAcT in 2018, 3 CFFTS was working at maximum capacity.

One challenge faced by the CFTS/NFTC model was a lack of instructors, particularly in the Operational Training Units (OTU) tasked with transitioning pilots to their operational aircraft. The RCAF simply did not have enough OTU instructor pilots, nor instructors to conduct Phase II and III training on the CT-156. The latter issue was addressed by retaining some of the best student pilots at Moose Jaw as flight instructors, referred to as 'creaming off'.



This instructor shortage was as a direct result of an overall pilot shortage in the RCAF at the time. In 2018, the RCAF was short of 275 pilots and so the need to create a new, more efficient and more capable training pipeline was paramount.

Perhaps the greatest factor affecting the creation of FACt was the DND’s indecision over the CF-18’s replacement, as this would directly shape the FLIT syllabus following FACt and potentially influence elements of Phase II and III training that prepare pilots for Phase IV. The Canadian ‘on-again, off-again’ approach towards the procurement of the CF-35A Lightning II has seen 16 aircraft ordered with a remaining 62 not yet contracted. Saab is offering its JAS-39 Gripen with the option for assembly in Canada, but the RCAF remains firmly committed to the CF-35A, planning to acquire the remaining 62 aircraft.

In addressing the early Hawk retirement, CAE is providing Bridge FLIT (BFLIT) prior to the adoption of the Future FLIT (FFLIT) programme, the final element of the RCAF’s training jigsaw. According to the RCAF, “BFLIT is a temporary mitigation measure to maintain fighter force pilot training requirements, while bridging to the eventual introduction of the FFLIT capability. BFLIT also preserves some of the existing RCAF FLIT training structure to facilitate the transition to FFLIT, including personnel and fighter instructor experience.”

BFLIT has seen RCAF pilots trained at the Euro-NATO Joint Jet Pilot Training (ENJJPT) facilities at Sheppard AFB, Texas and in Finland, as well as at the International Flight Training School (IFTS) in Decimomannu, Sardinia. In February 2025, the Canadian Government identified CAE as its strategic partner to work with the RCAF to develop and refine the FFLIT programme, which will prepare and train pilots for the transition to the CF-35A – if that platform is ever procured in the numbers initially planned.

The major irony here is that the RCAF did not consider the CT-155 Hawk a suitable airframe to train pilots for the 5th generation CF-35A, but RCAF pilots are now training on Hawks in Finland and on the even older T-38 with ENJJPT in the US.

Enter FACt

The FACt contract was signed in May 2024 and is valued at CAD \$11.2 billion (USD 8.06 billion); its duration is foreseen for 25 years and is planned to commence in spring 2029. During the run up to the contract award, BAE Systems, Airbus Defence and Space, Babcock Canada, Leonardo Canada and Lockheed Martin Canada were all announced as ‘qualified suppliers’. SkyAlyne’s sole competition was provided by a joint bid by Babcock Canada and Leonardo Canada after the other companies

withdrew between 2019 and 2020 with SkyAlyne selected as preferred bidder in July 2023.

As could be expected, SkyAlyne has expanded the initial Joint Venture with CAE to include companies to provide specialist skills. Bluedrop, CBO and Canadian Helicopters are part of the team brought from Allied Wings alongside Serco (ATC, air navigation and support services); CGI (computing and cybersecurity); Textron (engineering support and GBTS components); PAL Aerospace (support for ACSO and AESOp training); Red Space (computing) and SRS (management support).

“Once the FACt program reaches full operational capability, we are expected to deliver 90-120 pilots, 24-32 ACSOs and 24-32 AESOps each year,” Harrison Reuss, SkyAlyne’s Head of Communications, Collaboration and Stakeholder Relations told ES&D. “The precise annual throughput of graduates is aligned with the RCAF to support their demand.

“The instructors for FACt will be a combination of civilian and RCAF personnel,” he added. “RCAF leadership will ensure adherence to military standards throughout training, regardless of whether the instruction is provided by a military or civilian instructor.”

FACt also features a new training fleet comprising:

Number	Type	Base
19	Airbus H-135 (CT-153 Juno)	Portage la Prairie
19	Pilatus PC-21 (CT-157 Siskin II)	Moose Jaw
23	Grob 120TP (CT-102B Astra II)	Moose Jaw
7	Beech King Air 260 (CT-145E Expeditor II)	Portage la Prairie
3	De Haviland Dash 8-400 (CT-142Q Citadel)	Winnipeg

The first two Grob 120TP aircraft were delivered to SkyAlyne in September 2025 following the production test flight at Grob’s Tussenhausen-Mattsies factory in Germany. The Grobs are DND owned and will provide Basic Flying Training (Phase I) for all fast-jet, multi-engine and rotary-wing candidates. The latter will move straight on to the H-135 from the Grob. With its turboprop engine, the Grob 120TP offers a significant improvement in performance over the current Grob 120 piston engine aircraft that support CFTS.

Operating alongside the Grobs at Moose Jaw will be a fleet of 19 PC-21s. Currently in manufacture at the Pilatus factory in Stans,

◀ **Pilatus is currently building 19 CT-157 Siskin II (PC-21) aircraft to be used for Phase II and III training at Moose Jaw. The first delivery to Canada is expected later in 2026. (Source: Pilatus)**





▲ **The cockpit of the CT-145E Expeditor II (Beechcraft King Air 260); seven aircraft are on order and will be used for advanced multi-engine flying training. (Source: SkyAlyne)**

Switzerland, deliveries will begin in the second half of 2026. These aircraft will be used for Advanced Flying Training for both fast-jet and multi-engine pilots.

As far as rotary-wing training is concerned, SkyAlyne selected the ubiquitous Airbus H-135 that is operated by 12 military customers worldwide, many in the training role. The latter includes Australia, the UK and Germany. The aircraft are being 'finished' at the Airbus Canada facility at Fort Erie in Ontario and will start delivery in mid-2026 to Portage la Prairie.

Multi-engine training will use the Beechcraft King Air 260. Also based at Portage la Prairie, deliveries are set to begin in the first half of 2028. The King Air 260 replaces the King Air 90B, which has been serving as the multi-engine trainer within the existing RCAF training programme since 2005. Textron Aviation is also contracted to deliver components for a full flight simulator and flight training devices set to be manufactured by CAE.

Compared to CFTS and NFTC, FACt will see increased use of GBTS "including full flight simulators, cockpit trainers, and personalized virtual reality devices. This helps students gain experience by being exposed to a wider variety of training scenarios, including supporting more personalised training, while also lowering overall operational costs", explained Reuss.

The final element of the FACt programme is the training of AESOp and ACSO personnel through the purchase of three Dash 8-400s. This training is currently undertaken by 17 Wing at CFB

Winnipeg and provided by 402 Sqn using the Dash 8-100 (CT-142), nicknamed 'Gonzo' for its distinctive blue nose housing its radar. This aircraft has been in use by the RCAF for more than 30 years but will now be replaced by the Dash 8-400s being acquired by SkyAlyne. These aircraft feature higher performance, updated avionics and larger cabins to facilitate new and improved airborne simulation training systems.

Conclusion

Despite the current issues surrounding the RCAF's future fighter, there is little doubt that FACt will provide Canada with a more streamlined and efficient aircrew training system than hitherto the case. Much of this is due to a new and more capable training fleet and the adoption of an integrated GBTS system.

On the other side of the coin, FACt highlights that despite the expertise brought to the negotiating table by industry, the time taken by governments to negotiate and finalise their requirements can seriously compromise what is initially seen as a sound concept. Add to this the experience of those in the military whose knowledge is limited to their own air force training doctrine and operations, and the efficient and effective procurement of training solutions becomes further compromised.

Despite these issues, given the expertise of SkyAlyne's partner companies, FACt is likely to provide a springboard for that company's future global training service aspirations in the years ahead.



Ballistic Protection for Infantry

Tim Guest

Having an endoskeleton may have several outstanding advantages for humans over creatures with exoskeletons. However, being vulnerable to external physical forces that can cause damage to soft tissues and bones, isn't one of them.

That's why infantry soldiers need body armour to provide them with some of the protective advantages of an exoskeleton, as long as that armour meets the right ballistic protection standards, and exploits latest ergonomic designs and advanced material technologies, to do the job properly.

Keeping up with standards

Amongst NATO member nations, a variety of hard and soft body-armour products, solutions, and systems, made from a range of materials, such as Kevlar and other composites, as well as modular ceramic and other kinds of plates, are in use or under development. These are either as standalone items, or, in several cases, as elements of wider future soldier systems (FSSs). But while materials used and equipment may vary, common to all are some of the NATO and international ballistic and personal armour standards they meet on their way to being adopted. And by meeting these key NATO STANAGs, (standardisation

agreements), Alliance members and other allies are assured that respective protective kit and body armour meets a consistent level of performance and high quality, if, per chance, they find themselves having to use each other's equipment. Let's take a look at just a handful of these standards.

Probably the key standard against which body armour is tested in NATO, is STANAG 2920. This is the *Ballistic Test Method for Personal Armour Materials and Combat Clothing*, which assesses an item's resistance to fragmentation and emphasises the V50 testing method, which determines the velocity at which a material – say Kevlar or a ceramic plate – has a 50% chance of stopping a projectile, namely its V50 ballistic limit. It is used mainly to measure the resistance of the protective material against fragment simulating projectiles (FSPs), which are specialised, non-axisymmetric, test projectiles, meeting MIL-P-46593A/STANAG 2920, and used in development to certify



▲ **More than 300,000 advanced, modular protective Mobast vest systems were delivered by Mehler Protection to the Bundeswehr by July 2025. (Source: Mehler Systems)**

This article looks at some of the key standards applied to body armour and protective ballistic systems and gear across NATO, including latest iterations and developments to which industry adheres if products are to meet the demanding operational requirements for individual protection on today's battlefields. And with a plethora of companies active in this defence industry segment, indeed, too many to mention here, the article also looks at a handful of manufacturers and some of their latest body armour products and developments.

ballistic shields, body armour, and other personal protective gear against the effects of artillery and mortar-round shrapnel. This is a critically important standard considering fragmentation injuries against infantry are far more likely than being hit by a bullet. That said, newer AEP-2920 classifications for complete body armour systems now replace parts of STANAG 2920 and address 'procedures for the evaluation and classification of personal armour' – hard, soft, and helmets – but this time against not just fragmentation threats, but small arms fire, i.e., bullets, too.

At the same time, while STANAG 2920/AEP-2920 is established as the official NATO standard for the development and testing of body armour, the European VPAM standard, set by Germany's *Vereinigung der Prüfstellen für angriffshemmende Materialien und Konstruktionen*, (Association of Test Laboratories for Attack-Resistant Materials and Constructs), applies strict European rules for the certification of a wider range of end-product armour systems using uniform testing protocols for ballistic and blast-resistant materials, applying not only for body armour, including helmets, but armoured vehicles, also. For soft body armour, VPAM levels of protection range from 1 to 5, and for hard armour from

In addition, to test both new and worn or conditioned armour, (to reassure as to its continuing battlefield effectiveness and reliability), a fresh set of uniform testing velocities have been set, removing previous low-velocity parameters for worn equipment that was contained in the previous .06 version. (As an aside, the testing of conditioned body armour, where new equipment has been subjected to extremes of heat, humidity, and other environmental factors to mimic operational wear-and-tear conditions, before being subjected to tests like the NIJ's new test velocities, is conducted to ensure the materials comprising the body armour do not degrade under such extremes and remain effective.)

New NIJ Ballistic Protection Levels (NIJ 0101.07)

New Level	Former Level	Protection Description
HG1	Level II	9mm FMJ, .357 Mag JSP
HG2	Level IIIA	9mm FMJ (higher velocity), .44 Mag JHP
RF1	Level III	7.62x51 mm M80, 7.62x39 mm MSC, 5.56mm M193
RF2	New Level	All RF1 threats, plus 5.56 mm M855 (Green Tip)
RF3	Level IV	.30-06 Springfield M2 Armour Piercing (AP)

levels 6 to 14. Also worth mentioning here, as it aligns closely with the VPAM standard for ballistics tests – and not surprisingly also a standards' regime set in Germany – is the *Technische Richtlinie (TR) Ballistische Schutzwesten*. Used to categorise levels of ballistic protection for German Polizei and Bundeswehr body armour, it categorises equipment into five levels, L to 4, of ballistic protection, though with further sub-levels/categories of protection against knife/bladed and bayonet attack.

NIJ still holds sway

While there are other test regimes and protocols applied by various agencies to measure the effectiveness of body armour and ballistic protection systems for police forces and different security teams, perhaps some of the most widely and internationally recognised and used sets of standards by militaries and security services around the world are those of the National Institute of Justice, or NIJ, in the US. Its NIJ 0101.06 has been in play since 2008, though is to be replaced by the latest infantry and law enforcement ballistic standards contained in the new NIJ Standard 0101.07, *Ballistic Resistance of Body Armour*, which was released end November, 2023, along with sister document, NIJ Standard 0123.00, *Specification for NIJ Ballistic Protection Levels and Associated Test Threats*. With a rapidly-changing battlefield and latest weaponry developments over recent years, the new .07 standard is intended to address modern threats, such as higher-velocity rifle and sniper rounds, including through the introduction of more descriptive protection-level terminology. Indeed, its new naming convention is according to the NIJ, one of the main changes within NIJ 0101.07, with Roman numerals II, IIIA, III, IV replaced with 'HG' for handgun and 'RF' for rifle. Other key changes include updated threats, such as 7.62x39mm Mild Steel Core (MSC) and 5.56 mm M855 (Green Tip) small arms' rounds, not found in the old standard.

There are also stricter testing protocols featured in the new standard, such as requiring 45-degree-angle shots, intended to simulate real-world impacts; specialised tests for female-specific body armour are also included and required by NIJ 0101.07.

Having been adhered to since 2008, the transition from old to new NIJ standard takes time for all stakeholders to get onboard, so body armour that has been developed, manufactured and tested to the older 0101.06 standard will, according to the NIJ, still be recognised until the end of 2027, at least, if not beyond that timeframe.

That said, in the case of US Forces, the army sometimes follows its own ballistic protection and body armour specifications alongside NIJ standards, or instead of them, the latter being the case with Enhanced Small Arms Protective Insert (ESAPI) and X-Threat Small Arms Protective Insert (XSAPI) standards, which are even more stringent than NIJ requirements. These relate to the army's ceramic-composite, hard-armour plates, which are intended to defeat specific high-velocity rifle and armour-piercing threats. The ESAPI standard, for instance, sets a protection level for inserts, which exceeds the NIJ .06 Level III and is closer to Level IV, in that it protects against multiple hits from armour-piercing rounds that a basic small arms protective insert cannot stop.

In the case of the XSAPI standard, the army has established this as its highest level of effectiveness and reliability for personal body armour, offering protection levels exceeding ESAPI standards to meet threats, which are referred to as X-Threats, in some quarters. Indeed, the standard and plates that result, from companies such as Custom Armor Group in North Carolina in the US, have been specifically designed to stop NATO M993 armour-piercing, tungsten-carbide, 7.62x51 mm rounds. As a result, XSAPIs turn out typically thicker and heavier than ESAPIs, with boron or silicon carbides often used to add rigidity and, in some cases, adding high-performance polyethylene or other ceramic in order to withstand impacts from even higher velocity rounds.

Let's now take a look at a handful of European companies, which manufacture body armour to meet the exacting standards mentioned above.

Made in Europe

Numerous European companies are heavily involved in manufacturing and latest body armour and ballistic protection requirements for militaries across Europe, NATO member countries, and beyond; this includes the necessary replacement of stocks sent by many of them to Ukraine over the past four years, as well as supplying elements of various nations' FSS programmes. Advanced materials and lightweight ergonomic systems, that provide the wearer with optimum ballistic protection, including enhanced multi-hit capabilities, but without impeding his/her normal movements as much as possible, are the order of the day.

In Germany, Mehler Protection, with a long history, provides the Bundeswehr with its body armour and personal protection requirements, most recently notable, its Mobast systems for infantry, more of which later; and compatriot, MKU, makes systems with improved agility and optimum protection, like the Kavro TAC-II vests for elite European SOF.

Meanwhile, in Norway, the NFM Group produces ergonomic, hard and soft armour systems, with ballistic protection said to be holistically integrated into tactical load-bearing garments, not simply an add-on; in France, Integris Composites makes personal lightweight armour using advanced materials.

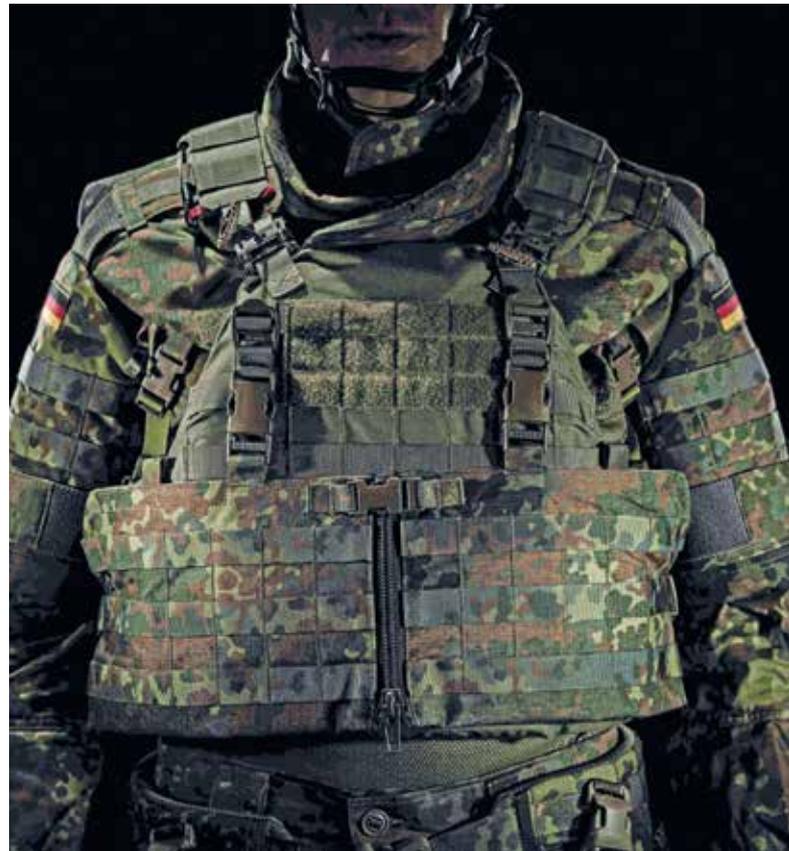
Made in Germany

Over 1 million ballistic vests from Mehler Protection's production lines have been supplied worldwide to law enforcement agencies, military, and SOF. The company conducts the widest range of testing on its systems, working in tandem with an independent German ballistic testing authority, to make sure they comply with stringent standards outlined above, with over 1,600 performed annually and involving more than 15,000 test shots as part of the overall process.

The company's hard ballistic plates meet NIJ, VPAM, and other ballistic standards, against high-velocity rifle fire, and suit stand-alone use or can also be combined with soft ballistic armour systems. Moulded protection can also be extended to other parts of the body beyond the core, including upper arms, thighs, and ribs exposed laterally.

At the end of 2024, the company announced that it had handed over the 200,000th Mobast, modular ballistic protection and carrying equipment for the Bundeswehr's Mobast Programme, and was on target, at the time, to equip the armed forces with over 300,000 of the advanced, modular protective vest systems by the end of 2025. Indeed, the full complement of systems, which provide scalable, high-level protection against various threats, including ballistic and fragmentation hazards, were delivered to the Bundeswehr's Federal Office for Bundeswehr Equipment, Information Technology and In-Service Support, or BAAINBw, in July 2025. CEO of Mehler Systems Group, Dr. Mario Amschlinger, said at end 2024, "At a time of global uncertainty and geopolitical challenges, we have successfully established a robust and reliable supply chain. This ensures that we can deliver on time, even under difficult conditions."

The modular Mobast system itself combines soft and hard ballistic protection to cover key areas of the body, including neck, shoul-



▲ **Skjold body armour comes in X-series, R-series, and E-series formats, differentiating between plate weight and performance ratio. (Source: NFM)**

ders, upper arms, abdomen and thighs, including ballistic underwear to protect against fragmentation shrapnel, but can also be adapted quickly for different threats and operational requirements, offering various levels of protection against stabbing and handgun fire, to fragmentation and artillery/mortar shrapnel, and high-velocity rifle fire. 1900

Nordic noir

In Norway, NFM's Skjold body armour system delivers lightweight, modular ballistic protection by combining soft ballistic panels with the company's hard Hexa plates in a scalable architecture. Protection levels can be tailored to the operational threat, optimising effectiveness by avoiding unnecessary weight. Unveiled in 2024, Skjold is offered in three lines X-series, R-series and E-series — differentiated by plate weight and performance ratios. The X-series, positioned as NFM's premier line, delivers the highest protection and mobility, with a high performance-to-weight ratio suited to SOF and other elite units.

NFM has applied its FREC-2 pressing technology to the development and manufacture of the Skjold body armour system, enabling lower-weight armour with improved ballistic performance. The process uses isostatic pressure, applying ultra-high compression of more than 1,000 bar during plate production. NFM also operates an in-house ballistic test laboratory, allowing rapid validation against multiple standards and supporting shorter manufacturing timelines.

The hard ballistic plates used in the Skjold system feature ceramic cores encased in high-performance fibreglass and thermoplastic fibre-reinforced plastic with a polyethylene terephthalate (PET)

matrix composite. This construction helps control impact crack propagation and improves multi-hit performance. While most armour standards define a fair hit as 50–75 mm from the plate edge, NFM states that Skjold plates provide effective protection to within 13 mm of the edge.

Body armour French style

French firm Integris Composites produces a range of soft and hard body armour for US and European military customers, using modern manufacturing techniques and advanced materials. Its hard armour plates incorporate alumina, silicon carbide and boron carbide ceramics, along with high-performance polyethylene, to deliver high-level ballistic protection. These plates are tested to meet NIJ 0101.06 Levels IIIA to IV and VPAM levels 6 to 12, with trials conducted both in-house and by independent laboratories, including TNO in the Netherlands, Mellrichstadt in Germany, AITEX in Spain and BNE in France.

Integris has actually operated its own dedicated 30 m shooting test range for more than 20 years, for rigorous ballistic testing, where testing across a broad range of calibres can be conducted, from small to medium calibres, including .22 LR, 9 mm, 14.5 mm armour-piercing rounds, as well as simulated artillery/mortar shell fragments. The company says the range meets NIJ and MIL-STD velocity-detection, drag-calculation, and operation-methodology requirements.

Exoskeleton footnote

Having started with an endoskeletal mention, seems fitting to end with a few words on an Exoskeletal innovation, in this case the Exom up-armoured exoskeleton from aforementioned Mehler Systems. In the company's words, it's been designed to 'revolutionise the paradigm of weight management and ballistic protection' and is a collaborative effort between Mehler Protection, Mawashi Science & Technology, and the elite GIGN police tactical unit of the French National Gendarmerie.

The passive Exom system requires no external power source, making it suitable for extended missions without the need to carry batteries or charging equipment. It is designed to support the body when operating with heavy ballistic protection and other loads, without adding significant weight. From the shoulders down, the system redistributes up to 70% of the carried load, reducing strain on muscles, joints, ligaments and tendons. Its titanium structure provides inherent ballistic protection, with an option for full-body ballistic coverage qualified to the VPAM 8 standard.

It seems we clever humans can, like insects, also benefit from some of the advantages of having an exoskeleton... but, luckily, without having to moult somewhere quietly on the battlefield!



Marketing Report: EVPÚ Defence

GLADIUS:

WEAPON STATIONS FOR TODAY'S PLATFORMS

Modern army procurement increasingly focuses on weapon stations that can be integrated into existing vehicle fleets without structural changes, major requalification, or disruption to established logistics. In this context, the GLADIUS family of weapon stations from EVPÚ Defence reflects current operational and technical expectations for remotely operated systems and offers vehicle manufacturers a flexible solution for integration across multiple platforms.

The GLADIUS family includes four basic variants, each supporting one or more weapon systems: 7.62 mm and 12.7 mm machine guns, a 40 mm grenade launcher, or a 30 mm autocannon. This range allows platform designers to select the appropriate GLADIUS variant for integration on light wheeled armoured vehicles, tracked platforms, naval vessels, and fixed defensive positions.

A common design philosophy across the GLADIUS family enables straightforward mechanical and electronic integration, with systems delivered either with their own control software or prepared for connection to existing vehicle control architecture and BMS. This supports procurement requirements for minimal vehicle modification and continued use of standard service weapons and ammunition.

From an operational perspective, GLADIUS systems provide stabilized fire on the move and sensor suites capable of 24/7 operation in all weather conditions. Variants for 12.7 mm and larger calibres employ a fully detached line of sight, enabling independent sight movement which contributes to precise engagement.

When paired with a separate commander sight, the system supports hunter-killer operation, enhancing target acquisition and situational awareness. The GLADIUS weapon stations can also be complemented by EVPÚ Defence's laser and radar warning system, enabling integrated vehicle self-protection.

The Czech Army previously acquired GLADIUS 12.7 mm weapon stations and, more recently, a modified version of the same calibre was selected for the Czech CV90 programme. The modular architecture of GLADIUS further allows future adaptation, including weapon changes, sensor upgrades, and software modification. For combat vehicle producers, this combination of compatibility, performance, and growth potential makes GLADIUS a very practical candidate for integration into current and future platforms.



[EVPÚ Defence]

Russian Defence Exports: Growth Trends in 2025 (Part I)

Yury Laskin

Despite sanctions imposed by the US, the EU, and their allies since the start of the war in Ukraine, and despite the demands of equipping its own forces, Russia significantly expanded defence exports in 2025. The facts and figures of this trend were disclosed by President Putin himself during the recent meeting of the Commission on Military-Technical Cooperation held on 30 January 2026.

Moreover, Putin stated that Russian defence exports are planned to grow significantly in 2026, stating that “further efficient use of available financial and other mechanisms and instruments of support is crucial, because defence export volumes in accordance with the plan for 2026, which we will finally consider and approve today, must grow significantly.” He added that “Additional support measures are to be introduced within the framework of the new Federal Project for development of military-technical cooperation with foreign countries for the period of 2026–2028.”

Coming to the figures, Putin disclosed financial results from 2025, noting that: “Our export contracts were consistently performed. Russian defence products were supplied to more than 30 countries worldwide, and currency revenues totalled more than USD 15 billion.” He added that “The result provides extra funds for defence sector plant upgrades, the production capacity expansion and for research and development.”

The size of Russia’s backlog of signed arms contracts was disclosed by Russia’s First Deputy Prime Minister Denis Manturov at a meeting with President Putin on 12 January 2026. Manturov stated that “Before 2022, the maximum backlog size was USD 55 billion. Today, it’s a record USD 70 billion.” According to the First Deputy Prime Minister, this growth trend is set to continue, as “combat-tested equipment is self-promoting”. He also noted that Russian electronic warfare systems and unmanned aerial vehicles were of particular interest to foreign customers.

Rosoboronexport, the Russian defence sales organisation, was the central player in these export contracts. According to its Director General, Alexander Mikheev, the company’s order backlog exceeds USD 60 billion. Interviewed ahead of the World Defense Show in Riyadh, Mikheev mentioned that in 2025, Rosoboronexport had signed contracts worth over USD 14 billion with a number of deals each exceeding USD 1 billion.

Under state law, all new international defence export contracts are concluded exclusively through Rosoboronexport. This policy allows the federal government to maintain effective oversight and prevents competition among domestic manufacturers. However, several companies are licenced to



▲ **The Sukhoi Su-57E is the export designation for Russia’s fifth-generation fighter aircraft, Russia is prepared to offer export customers both local production and technology transfer for this aircraft. It is suggested that the Su-57E has already gained its first export customer. (Source: UAC - United Aircraft Corporation)**

According to President Putin, the country built up a solid portfolio of new defence export orders in 2025, at a time when the national system of military-technical cooperation demonstrated efficiency and high resiliency. “It is critical that fundamental groundwork was completed, making it possible to noticeably expand the range and the geography of supplies of our defence products and thereby strengthen the positions of Russia as a reliable partner, developer and producer of advanced weapon systems, tested and tried in real combat warfare,” the Russian leader stated.

provide spares and support services on previously concluded contracts for better and faster after-sales support to foreign customers.

Speaking on 30 January, Vladimir Putin noted that “special attention should be paid to spreading military-technical cooperation and partnership. More than 340 such projects are already being implemented or are in the development stage with 14 countries.” According to Mr. Putin, joint work in this area will improve the characteristics of existing weapons and equipment, as well as develop new promising models, including those in demand on the global market.

► **Pantsir-SMDE air defence system module version with two types of missiles, the module can support up to 12 of the standard 57E6EB and up to 48 anti-drone TKB-1055E missiles. In this image the load is six 57E6EB and 24 TKB-1055E. Pantsir was developed and is produced at the Shipunov Design Bureau, High-Precision Weapons Holding subsidiary. (Source: LAGUK-Media)**

Needless to say, such an open attitude to the most advanced technology transfers and establishing production facilities abroad plays a decisive role in the Russian defence export promotion. Alexander Mikheev stated that “We are focusing on technology transfers – the most in-demand format of cooperation in the world today. We are talking about successfully implemented projects and discuss promising ones.” He also noted that “Today, Russia is the only country that offers not only the supply of fifth-generation fighters, but also the localisation of Su-57E production on the territory of a foreign customer. This includes technology transfer and enables partners to develop their own next-generation aircraft.” This statement was made during the Dubai International Air Show held in the UAE last November.

Show Business

Since 2022, Russia has been banned from participating in the major international air and defence exhibitions, including Le Bourget, Farnborough, Singapore and Eurosatory. Instead, Moscow has increased its presence at the platforms offered within the BRICS countries and their allies. Just after the Su-57E live demonstration at Zhuhai in November 2024 Vadim Badeha, CEO of United Aircraft Corporation (UAC), the jet fighter manufacturer, announced that “the queue has been formed” for this 5th generation aircraft.

On 10 February 2025, Rosoboronexport’s head announced the Su-57E’s first international customer. Speaking at the Aero India exhibition in Bengaluru, Alexander Mikheev said the aircraft would enter service with the customer in 2025. Russian officials have not named the country. Soon afterwards, Indian officials began talking about the country’s return to the fifth-generation combat aircraft joint programme with Russia.

Recently, on 6 February, Mikheev confirmed further export Su-57 deliveries this year, adding that his expectations were to sign new contracts for this aircraft.

The Sukhoi Su-57E fifth-generation fighter made its Middle East debut at Dubai-2025 with its flight demonstration programme creating a strong impression. The Su-57E was shown at the static display along with its latest weapons package: the advanced RVV-MD2 and RVV-BD short- and long-range air-to-air missiles, Kh-38MLE, Kh-69 and Grom-E1 air-to-surface missiles and the Kh-58UShKE air-to-radar missiles, integrated into the fifth-generation fighter’s weapons suite, are designed



for internal carriage. Surprisingly the Su-57E new-generation 177S turbojet thrust-vectoring engine was also on an open display by the side of the fighter. The Russian exhibition, and the Su-57E in particular, attracted the personal attention of UAE President Sheikh Mohamed bin Zayed Al Nahayan.

The UAE has been a long-term customer of the Russian defence industry. During the Air Show, Sergey Chemezov, Rostec Corporation’s CEO confirmed that the development of the Pantsir air defence system was initially funded in the 1990s by the UAE. Not surprisingly, the system manufacture - the Tula-based Shipunov KBP Design Bureau, Rostec subsidiary through the High-Precision Weapons holding, displayed the weapon latest version – the Pantsir-SMD-E surface-to-air missile (SAM) system, intended to destroy all types of air targets, including UAVs. Its modular design employs the combined use of two types of missiles: up to 48 TKB-1055 short-range SAMs or up to 12 57E6 SAMs on each combat module, either a combination of both.

Russian aircraft and helicopters also took part in the flying programme at Dubai, where the upgraded Yak-130M combat trainer made its international debut, featuring updated avionics and a new weapons suite. The Yak-130M fully complies with the requirements of a light combat aircraft for performing fighter and ground attack missions. It is fitted with state-of-the-art avionics, including an airborne radar, a targeting pod, and the President-S130 self-protection electronic warfare (EW)

system. Furthermore, the aircraft's range of guided air weapons has been expanded and includes RVV-MD short-range air-to-air missiles and the KAB-250LG-E and K08BE guided bombs for engaging ground and surface targets.

The IL-76MD-90A(E) military transport aircraft, which carried the majority of the Russian exhibition's equipment to Dubai, was also at the static display with an open ramp. The plane is capable of performing a wide range of missions; this includes transportation of equipment, cargo, and personnel of airborne units and combat vehicles, evacuation, firefighting, and disaster relief. The aircraft boasts improved transport capabilities and can carry a payload of up to 60 tonnes over a range of 4,000 km or 52 tonnes over a range of 5,000 km. The IL-76MD-90A(E) is equipped with a state-of-the-art multi-channel EO system to accurately locate airdrop zones. Optionally, it can be fitted with the President-S self-protection EW system, firefighting and casualty evacuation equipment.

The Ka-52 recon/attack helicopter also took part in the Dubai flying programme. The coaxial rotor system of the helicopter enables it to perform unique manoeuvres: a quick turn towards the target, high-speed lateral movement and a steep dive. Along with



- ▲ **The Yak-130M advanced jet trainer/light attack aircraft is fitted with state-of-the-art avionics, including an airborne radar, a targeting pod, and the President-S130 self-protection electronic warfare (EW) system. Air weapons include RVV-MD short-range air-to-air missiles and the KAB-250LG-E and K08BE guided bombs. (Source: LAGUK-Media)**

the Ka-52, advanced air weapons that can be integrated into helicopter suite were also at the show; the Kh-MD multipurpose homing missile for engaging ground and surface targets, as well as the Kh-38MLE guided missile for destroying surface targets in the coastal zone and armoured ground targets. The 305E lightweight multipurpose guided missile, which has proven highly effective in real combat conditions, was also demonstrated. Russia also displayed the Orlan-10E, Orlan-30 and Skat-350M reconnaissance UAV systems as well the world most deadly loitering munition Lancet-E produced by the ZALA company.

From the Russian perspective, it is clear that Western countries, and the US in particular, have been opposing Russian defence exports in order to prevent the spread of Russian

influence and to block Russia receiving funds from defence sales in order to boost its economy. Central to this is CAATSA (Countering America's Adversaries through Sanctions Act), the US legal framework intended to impose costs on certain defence transactions involving Russia. Those countries who buy Russian-made hardware, such as combat aircraft, may be sanctioned by the US. That is why neither Russia nor the buyers of the Russian weapons want to advertise any deals. There is considerable evidence that Moscow's defence exports retain traction despite isolation efforts, sustaining influence through platforms that can reconfigure regional balances while tightening the link between procurement decisions and strategic alignment.

Key Customer – China

Rosoboronexport is planning to showcase the latest Russian defence industry products – aircraft and air defence systems – at this November's international aerospace exhibition – Airshow China 2026 – the company's press service recently reported. It was also revealed that Alexander Mikheev met with Russia's Ambassador to China Igor Morgulov during a working visit to the People's Republic of China. Mikheev noted

that "We have witnessed a major evolution in bilateral military-technical cooperation, with a wide range of matters being addressed. As our cooperation developed, trust and a broad partnership between specialised organisations and defence enterprises in Russia and China grew and strengthened, business and friendly ties between Russian and Chinese specialists were formed, mutual respect was established, and everyone's understanding of the mutual benefits of military-technical cooperation between Russia and China deepened. The role of the Russian Embassy in China, its leadership, and staff is of paramount importance in this process."

According to Mikheev, Rosoboronexport marked its 25th anniversary last year and that since its inception, it has been "inextricably linked to the development of military-technical cooperation with China" and the "strengthening of ties" between the two countries. Airshow China in Zhuhai was the first exhibition at which the Russian company participated. It was also at this exhibition in 2024 that the newest Russian fifth-generation fighter, the Su-57E, was presented internationally for the first time. Mikheev added that "The word 'for the first time' characterises Russia-China military-technical relations. China became the first export customer of Russia's S-400 Triumph latest long-and medium-range surface-to-air missile system, Su-35 fighters, and many other high-tech weapons."

Key Customer – India

President Putin and Indian Prime Minister Modi welcomed the results of the 22nd meeting of the Intergovernmental Commission on Military and Military Technical Cooperation (IRIGC-M&MTC) held in New Delhi on 4 December 2025. “Responding to India’s quest for self-sufficiency, the partnership is reorienting presently to joint research and development, co-development and joint production of advanced defence technology and systems. Both sides expressed their satisfaction with regular defence and military contacts, including the meeting of Defence Ministers in New Delhi in April 2023 on the sidelines of the Shanghai Co-operation Organisation (SCO) Defence Ministers’ meeting and joint exercises of the armed forces of the two countries. Both confirmed their commitment to “maintaining the momentum of joint military cooperation activities and to expand military delegation exchanges”, the official statement concluded.

Vladimir Putin described the military-technical cooperation between Moscow and New Delhi as “very trusting”. Much work has been done to develop ties between Moscow and New Delhi over the past years. “As our countries develop, and our economies develop, opportunities for our cooperation have expanded,” the Russian head of state added, as he referred to new spheres of cooperation opening up in the hi-tech field.

Russia actively cooperates with India in the defence field and shares technologies with it, President Putin said in an interview with India Today ahead of his official visit to New Delhi last December. “We are not simply selling technology – we are sharing it and that is a very rare thing to see in the sphere of military-technical cooperation”, the Russian head of state added. “India stands out as one of our reliable and privileged partners in this area. We have a broad portfolio indeed, including naval construction, rocket and missile engineering, and aircraft engineering,” he concluded.

Putin also noted that “It is a different level, a different quality of relations that we have with India, and we value this. We see how India values this relationship too,” he said.

Moscow and New Delhi have agreed to promote the joint production of components for Russian military equipment in India through technology transfer and the establishment of joint ventures, according to a joint statement following talks between President Putin and Prime Minister Modi. “Both sides agreed to encourage joint manufacturing in India of spare parts, components and other products for maintenance of Russian origin arms and defence equipment under the Make-in-

India programme through transfer of technology and setting up of joint ventures for meeting the needs of the Indian Armed Forces as well as subsequent export to mutually friendly third countries,” the document said.

India seeks to possess the latest combat systems, including fifth-generation aircraft, Russian Federal Service for Military-Technical Cooperation (FSMTC) Director Dmitry Shugaev told Russian TV. “The main areas of collaboration until 2030 could be cooperation in combat aviation – expanding the



▲ **INS Tushil is the 7th Talwar-class stealth frigate based on the Russian Project 11356 design. Built at Yantar shipyard in Kaliningrad, she commissioned into the Indian Navy (IN) on December 9, 2024 and reached Kanwar naval base in India on February 14, 2025. His sister ship Tamal was commissioned into IN on July 1st, 2025. (Source: Rosoboronexport)**

licenced production of the Su-30MKI fighter aircraft and their modernisation, as well as the joint development of a fifth-generation fighter,” he said. In addition, Russia and India, as part of their long-term partnership through 2030, may develop military-technical cooperation on modern air defence systems, unmanned aircraft, and joint production of modern air-launched weapons. This includes collaboration in ground systems, specifically the modernisation of previously supplied equipment, joint development of an advanced tank and combat vehicle, as well as naval technology, such as technical assistance in ship construction and maintenance, the FSMTC Director said. Shugaev added: “Despite all the difficulties of the current international political situation, our military-technical relations are developing steadily and according to plan. Not a single project implemented in this sphere has been cut, and several more have yielded positive results in 2025.”

According to him, Russia has completed the construction of two Project 11356 naval vessels and delivered them to India, while licensed production of Su-30MKI fighter jets, aircraft engines, and T-90S tanks continues in India. “Russia and India are currently implementing dozens of large-scale projects in the military-technical sphere,” the Russian official emphasised. “India, after the effective use of the S-400 Triumph missile system, wants to purchase more such weapons and Moscow is considering this possibility, Shugaev added ahead of the Russia-India summit. “Such prospects are being considered. We are working together with our Indian colleagues in this direction,” he concluded.



“No War, No Real Peace”: Have the Western Balkans slipped into permanent crisis management?

Lincoln Gardner

Despite no immediate risk of a return to large-scale conflict, two unresolved and potentially volatile issues continue to weigh heavily on the Western Balkans region: the Kosovo–Serbia normalisation process and internal political fragmentation in Bosnia and Herzegovina; both continue to generate persistent risks to regional stability.

Both of these domains are characterised not by major escalation, but by a deepening sense of institutional erosion and deep-rooted political deadlock. The dominant security paradigm has shifted however, from conflict resolution to conflict and crisis management. NATO, the EU, and key partners have succeeded in keeping the lid on renewed violence in both settings, but they have collectively failed to generate sustainable political outcomes for long-lasting domestic legitimacy. The result is a fragile balance that continues to depend heavily on an international presence in both Bosnia and Herzegovina (BiH) and Kosovo, deterrence, and crisis management rather than durable political settlement. Without a recalibration of policy tools and increased political will, both files will remain frozen throughout 2026 and beyond, with growing long term costs for regional stability, EU credibility, and NATO’s southern flank.

Kosovo–Serbia Dialogue: Going nowhere fast

As of early 2026, the EU facilitated Kosovo–Serbia Dialogue, under the auspices of the EU Special Representative (EUSR) Peter Sørensen, a seasoned Danish diplomat with years of experience in the region, remains active – at least formally – but substantively re-

mains in the doldrums. The normalisation frameworks established in Brussels and reinforced through the so-called Ohrid Roadmap exist on paper but lack any sort of traction on the ground. Engagement persists almost exclusively at the technical level, where working groups meet in Brussels or through virtual channels, yet without meaningful progress toward normalisation or the thorny issue of mutual recognition. This ongoing interaction serves primarily to prevent crises and tension on the ground from erupting into open violence, in order to allow both sides to show cooperation to their international partners and backers, and to accommodate domestic political agendas that prefer delay over compromise. These functions amount to containment, not conflict resolution.

Kosovo continues to seek international consolidation of statehood through increased recognition, and incorporation into Euro Atlantic institutions. Serbia, by contrast, seeks to preserve ambiguity regarding Kosovo’s status, delay, thwart or reverse any recognition, and maintain leverage over Kosovo Serb communities in Kosovo, primarily in the northern municipalities. This strategic asymmetry makes any compromise politically costly for both sides. In Kosovo, successive fragile governments and disputed mandates make coalition partners wary of compromise, which is often portrayed as a threat to sovereignty. In Serbia, Kosovo remains a core identity issue, and any perceived concession is easily framed as a betrayal by nationalist forces. As a result, domestic necessities always outweigh long term strategic resolution.

In northern Kosovo, the security situation has stabilised compared to flashpoints in recent years, but this stability is externally enforced rather than secured locally. NATO’s KFOR mission remains the primary deterrent to violence, and continues to maintain a

▼ Domestically produced Miloš 2 multi-purpose combat vehicle in service with the Serbian Armed Forces (Source: MoD Republic of Serbia)



significant operational footprint. Serbian parallel structures continue to retain influence in local governance and the provision of essential civic services, while Pristina-based institutions struggle to exert any form of legitimacy among local Serbs. In short, what we see on the ground resembles containment as opposed to consent, which for NATO creates an enduring operational burden – maintaining calm (and order amidst occasional flare-ups) without a clear political prospect for sustainable resolution.

Over the past year, the effectiveness and real impact of EU mediation has diminished, partly due to enlargement fatigue among key EU member states, the changing (some say ambiguous) accession timelines for both Serbia and Kosovo, and the perceived uneven application of conditionality (a common refrain throughout the region) – all of which have led to weakened leverage from Brussels and EU institutions. Incentives such as potential EU membership continue to be distant and an uncertain eventuality for both. While the United States continues to support stability and has offered diplomatic encouragement for the EU-led dialogue process, Washington has carefully avoided direct ownership of the political process. As a result, the narrative is one of a “return to dialogue” even as the process remains basically stalled.

The outlook for 2026 suggests continued dialogue without implementation, though a late January 2026 meeting convened by the EUSR on missing persons stemming from the conflict was constructive. Breakthroughs toward mutual recognition are unlikely in the absence of political incentives, while NATO deterrence remains the principal mechanism for preventing escalation. However, this deterrence comes at a cost: it requires sustained troop deployments, operational readiness, and political will from Alliance capitals when strategic priorities are diversified across NATO’s global commitments.

Fragmentation in Bosnia and Herzegovina

Bosnia and Herzegovina’s key challenge in 2026 will not be the resumption of inter ethnic violence or any form of armed rebellion, but more a deliberate strategy of institutional undermining by political actors – primarily within one of the two entities, the Serb-majority Republika Srpska (RS). The RS leadership will continue to challenge and reject the authority of state level institutions in Sarajevo, reject the transfer of competencies to the entity level, and resist decisions from the Constitutional Court and the internationally-led Office of the High Representative (OHR). This disruptive approach deliberately avoids formal secession, which would trigger a robust international response, in favour of steady de facto disengagement. The Bosnian Serb leadership’s strategic objective appears to be maximum autonomy combined with minimal accountability.

Despite the absence of armed conflict, BiH’s stability and functionality remain fragile. The continued presence of EUFOR Althea’s (the EU-led military mission responsible for maintaining stability in BiH) acts as an important stabilising factor, despite its small size



▲ **The M-18D Oganj is a modernised 128 mm multiple launch rocket system, originally fielded in the 1970s, new rockets achieve a range of 40 km, with a low CEP 50 km range rocket also available. The ALAS missile system can also be utilised by the Oganj. (Source: MoD Republic of Serbia)**

of only 1,500 troops. But the lack of violence should not be seen as stability. The country continues to experience state decay under international supervision, alongside chronic legislative deadlock and ethnic vetoes that undermine legislative reform. While defence and intelligence structures exist, they lack strategic direction and any cohesive political backing from Sarajevo.

International governance bodies, such as the OHR and EU, continue to provide reform frameworks, but both suffer from declining legitimacy and weak enforcement mechanisms. Nevertheless, BiH’s EU accession process remains the country’s primary strategic anchor, yet conditionality has lost much of its coercive power. NATO’s role, while stabilising, is not able to address constitutional dysfunction directly. While the international community in BiH since the end of the conflict in 1995 may have succeeded in preventing outright collapse, it has not created functioning governance.

More acutely than in any other regional context, the strategic implications for BiH are profound. The State’s limited functionality weakens regional security cooperation, allows persistent institutional disruption, and opens the country to external influence. Over time, this dynamic has eroded confidence in the perceived panacea of eventual Euro Atlantic integration.

Regional re armament

An additional risk in the Kosovo-Serbia and BiH dossiers is the gradual process of re armament across the Western Balkans. While this does not yet constitute a serious arms race, it does represent a dynamic in which states build capability partly because they predict that disputes will remain unresolved for the foreseeable future.

Competitive militarisation in the Western Balkans is not merely rhetorical, it is demonstrated by arms deals, procurement contracts, and defence industry developments that are boosting and even reshaping capabilities the region. Serbia sits at the epicentre of this dynamic with its defence modernisation programme is by far the most obvious; Belgrade is allocating significant funds to new weapons, upgraded platforms, and expanded domestic production capacities. In 2024–2025 alone, Serbia committed nearly EUR 740 million to new arms purchases, including modern armoured combat vehicles such as Miloš II 4x4 multi purpose armoured combat vehicles, additional Nora 8x8 self propelled gun howitzers, and upgrades to their indigenous Lazar III and M80AB1

infantry fighting vehicles. These investments reflect a broad portfolio of domestic and imported systems designed to enhance mobility, fire-power, and defensive. Its sustained programme of military modernisation, combined with reports on covert arms exports through third countries (to Ukraine for example), reinforces perceptions that Belgrade's defence posture is increasingly shaped by industrial rather than strategic considerations.

For Kosovo, Serbia's expanding military profile reinforces incentives to accelerate domestic security sector development and seek external guarantees rather than political compromise. In BiH, particularly in the context of RS's institutional defiance, Serbia's posture forms a permissive strategic backdrop that emboldens obstruction. This dynamic unfolds alongside broader regional trends. NATO member countries in the Western Balkans, namely Albania, Croatia, Montenegro and Slovenia, have been increasing defence spending, boosting capabilities, and deepening interoperability with Alliance forces. Kosovo has announced plans to expand domestic defence capacity within the constraints of its constitutional framework. None of these steps are destabilising in isolation; collectively, however, they create strategic density in a region where political disputes remain unresolved and confidence building mechanisms are weak.

Meanwhile, BiH's defence industry is quietly booming, taking advantage of insecurity on the European continent with demand for ammunition at record levels. In the first two months of 2025 alone, military exports reached EUR 46.6 million, double the value recorded over the same period in 2024, according to the BiH Indirect Taxation Authority – the customs administration equivalent. This increase is important not because BiH produces high-end weapons systems (it does not), but because its factories specialise in producing the essentials for war: ammunition, grenades, rockets, mines, and related components that are relatively cheap, rapidly consumable, and increasingly sought after. Exports are flowing, including to Czechia, the USA, Saudi Arabia, and also Serbia.

Serbia has also bolstered its domestic defence industrial base. At the 12th International Armament and Military Equipment Exhibition – Partner 2025, Belgrade signed multiple investment and procurement contracts with national defence firms such as Prva Iskra namenska, Zastava oružje/TERVO, Teleoptik žiroskopi, and JUMKO, aiming to expand production capacity and integrate state of the art military systems into the Serbian Armed Forces. These agreements not only supply the military but also support long term industrial development, allowing Serbia to increase its export capabilities.

Serbia's high profile purchase of 12 new Dassault Rafale fighter jets from France, valued at approximately €2.7 billion, is one of the region's largest single defence deals. The acquisition – scheduled for delivery through 2029 – marks a strategic move away from traditional reliance on Soviet-era/Russian hardware toward advanced Western manufactured combat aircraft; this illustrates Belgrade's balancing act between EU accession, traditional political and defence ties with Russia, and a self declared policy of military neutrality.



▲ **A NATO press release in January noted that: “Croatia began policing its own airspace on Jan. 1, 2026, employing recently procured Rafale multirole fighters, as part of NATO’s Integrated Air and Missile Defence (IAMD) framework.” Croatia received 12 Rafale F3 aircraft from France in 2024. (Source: Croatian Air Force)**

Interestingly, Serbia has decided to reintroduce mandatory military service for young men, ending a 14-year suspension as Belgrade moves to strengthen force readiness amid heightened regional tensions. President Aleksandar Vučić announced that the service period was still being finalised but was likely to last around 75 days.

NATO member Croatia's own procurement path, while aligned with its Alliance and EU commitments, has likewise been significant. Zagreb has invested heavily in modernising its air and ground capabilities, completing a EUR 1 billion upgrade of its air force – also with 12 (used) French Rafale F3-R fighter jets – and taking delivery of additional aircraft, marking the largest such investment in the Croatian air force since independence. Croatia has also acquired US made Bradley armoured fighting vehicles and Black Hawk helicopters and is establishing a EUR 125 million anti drone defence network with advanced detection, jamming, and interception systems – reflecting lessons being drawn from Ukraine and modern battlefield priorities around unmanned threats and integrated air defence. Beyond hardware, like Serbia, Croatia has also restored compulsory military service to enhance force readiness and create a broader trained reserve, reversing trends from the previous two decades.

Another regional NATO member, Montenegro, has committed to meeting Alliance defence spending benchmarks. In May 2024, the government approved the use of reserve budget funds to acquire two OPV 60M patrol vessels, from Kership, France, reflecting a strategic focus on maritime security and coastline defence. The first vessel will be received in the spring this year, with the second due in autumn 2027. The contract, worth EUR 120 million, underscores Podgorica's intention to maintain credible naval capabilities consistent with Alliance obligations.

These procurement patterns reflect a multi layered regional dynamic. Serbia's mix of imported advanced systems and expanding domestic production enhances its baseline capabilities and industrial footprint. Immediate neighbour Croatia's alignment with NATO standards and technology creates interoperable capacity and reinforces Zagreb's Alliance commitments. Montenegro's small-scale but focused investments, though smaller in scale, are consistent with alliance obligations and niche capability development. Across the region, defence spending is continuing to rise and interoperability initiatives – such as the 2025 trilateral defence declaration between Croatia, Albania, and Kosovo – reflect growing cooperation, without closer regional integration.

Recent arms deals and procurement efforts in Albania, Serbia, Croatia, and Montenegro underscore a regional shift toward capability accumulation. These developments interact with broader strategic narratives of Alliance integration, deterrence posturing, and open competition – all against a backdrop of unresolved disputes and international mediation fatigue. The strengthening of military capability increases the costs of political stagnation and raises the stakes for future diplomatic engagement.

Looking ahead

Despite their different contexts, the fractious Kosovo–Serbia relationship and Bosnia’s internal fragmentation share common patterns. Both are characterised by political processes more often than not in a state of deadlock, with a dangerous reliance on external deterrence rather than internal consent (the “culture of dependency”). Stability in both locations is being substituted for strategy, and

the gradual build up of military capability provides a new layer of complexity to an already troubled strategic environment.

While the Western Balkans may not be on the brink open conflict in 2026, parts of the region remain at risk of drifting even further from resolution of key outstanding issues: the Kosovo–Serbia dialogue, Bosnia’s internal fragmentation and paralysis, and emerging militarisation (a sub-regional arms race) show a regional security model built on containment, deterrence, and delay. While this model prevents immediate violence, it cannot deliver long term stability. The central challenge is no longer about preventing conflict but preventing the permanent dysfunction of states in an environment where militarisation and political stalemate may end up becoming the default option. Without decisive policy recalibration, the accumulation of arms and reliance on external guarantees will continue to make eventual political resolution increasingly difficult. 

Exhibition Update

Between Civil Applications and Security Needs: Defence at XPONENTIAL Europe

robotics, sensor technologies, artificial intelligence and cybersecurity are already used to protect critical infrastructure, support disaster response and enhance maritime security, while also being relevant in defence contexts. XPONENTIAL Europe deliberately highlights this dual-use perspective and frames defence as a responsible approach to technologies that contribute to Europe’s resilience and security. This understanding shapes both the exhibition and the supporting program.



Autonomous systems and robotics are no longer emerging technologies — they are already shaping security-relevant applications across Europe. From 24–26 March in Düsseldorf, Germany, XPONENTIAL Europe brings together decision-makers from industry, research, public authorities and user communities to address these developments. As Europe’s leading trade fair for uncrewed and autonomous technologies, the event reflects the full range of applications, from civil use cases to security- and defence-related fields, with defence playing an increasingly strategic role.

Dual-Use Technologies as a Connecting Element

Many of the technologies presented operate at the interface between civil and security domains. Autonomous systems,

Practical Insights and Expert Exchange

A key feature is the Innovation Theatre in Hall 1. On 25 March 2026, it will serve as a meeting point for the German Armed Forces (Bundeswehr) as a new strategic partner. Short keynotes, project presentations and moderated discussions offer direct insight into technological developments and their practical application, with a strong focus on exchange between users, developers, industry, start-ups and research institutions.

In-depth Perspectives in the Conference Programme

The official conference program is complemented by the Defence Theatre, which offers in-depth discussions on security and defence-related topics.

With a conference ticket, participants can join sessions featuring high-level speakers from industry, the military, politics, science and regulatory bodies. Topics include autonomous systems in defence, European cooperation, regulatory frameworks and the protection of critical infrastructure.

Shaping Responsible Innovation

XPONENTIAL Europe provides a platform where innovation, security and responsibility converge. It offers valuable orientation in a rapidly evolving technological landscape.

Ticketshop: xponential-europe.com/2130

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France Resolves Truck Requirements

Pierre Tran

Arqus, a French builder of military trucks and light armoured vehicles, and its Belgian parent company John Cockerill Defense, welcomed in the new year by announcing a contract to supply 7,000 military trucks to the French army, with the help of their German partner, Daimler Trucks. This long-awaited deal could be seen as highlighting the benefits of cross-border consolidation in the land weapons sector. The French contract for the PL6T truck project was reported by financial daily *Les Echos* to be worth some EUR 2 billion over seven years, with an option for a further 3,000 trucks. Arqus will adapt the Daimler chassis to French military standards, which includes an armoured cabin for some 20% of the fleet, a source close to the deal said. For the French PL6T contract, Arqus and Daimler Trucks will deliver a six-tonne, six-wheel-drive truck, with the brand name Zetros by Arqus. Versions of the truck will include flat bed, troop and equipment transports, cranes, and recovery vehicles, the source added.

The truck deal could be seen as the prize for John Cockerill's acquisition of Arqus in 2024 from Volvo, the Swedish truck manufacturer. John Cockerill has said it expected to pay some EUR 300 million for Arqus, with the final price depending on performance over the next 18 to 24 months. John Cockerill Defense is best known for its turret systems that have been exported globally.

A sharpened appetite among shareholders and bank lenders for arms companies stems from the war in Ukraine; European nations are pressured to re-arm after enjoying the so-called peace dividend in the wake of the fall of the Berlin Wall. US President Trump has called on Allies to spend more on defence, while European leaders doubt they can rely on America should a military helping hand be needed. A chilly investor sentiment against arms companies, arising from corporate social responsibility, has eased after Russian President Putin's hostile bid with extreme prejudice on Ukraine. Corporate deals in the pipeline include an initial public offering of KNDS, a Franco-German joint venture in tanks, armoured vehicles, and artillery. Last December, KNDS France appointed Nicolas Groult as chief executive, taking over from Nicolas Chamussy. There is also a planned KNDS acquisition of Texelis Defence, a French company which supplies mobility packages, composed of engine, gearbox, axles, tyres, and suspensions. The French competition authorities gave the green light to this acquisition in December 2025 and it is expected to be completed at the end of the first quarter or early second quarter this year.

Then there is the private, family-owned French company Lohr, which has denied that it is in exclusive acquisition talks with the Belgian company, Dumarey, as reported by the website *La Tribune* last October. Lohr is the parent company of Soframe, a supplier of military vehicles. Lohr, which did not rule out seeking a partner, lost its bid in the PL6T truck competition. Other bidders were reported to be Scania and MAN. However, there was positive news for Lohr, since the DGA selected Soframe to supply the French Army with



▲ **Arqus won the French Army's PL6T truck contract. Basic vehicles are manufactured at Daimler Truck production sites in Wörth am Rhein, Germany, and Molsheim (Alsace). Arqus will militarise the vehicles at their French facilities, as well as providing support and maintenance services. (Source: Arqus)**

Heavy Recovery Vehicles (ELD) in a framework contract that calls for the supply of 20 ELDs in 2027, with five to be delivered before the end of the first semester. The contract also covers the potential acquisition of as many as 80 ELD vehicles. Lohr noted that the ELD vehicles were similar to the Protected Recovery Vehicles (PRV) that they have delivered to the Belgian Army.

Other developments

The market appetite for weapons manufacturers could be seen with the January flotation of a Czech arms firm, Czechoslovak Group (CSG), which saw its share price rise some 30% on the first day on the Amsterdam stock exchange. That signalled market value above EUR 30 billion for CSG, based on the sale of 15.2% of the company's shares. That flotation meant the personal stake held by the founder of CSG, Michael Strnad, 33, was worth just under EUR 3 billion.

Germany's Rheinmetall has long been regarded as a European defence-industry star performer, with its shares surging on the DAX. The stock opened at EUR 1,551.50 on 1 January 2026, up from EUR 614 on 1 January 2025 on the Frankfurt exchange. In January, Chief Executive Armin Papperger said the company expected to secure EUR 80 billion in orders in 2026, Reuters reported, compared with EUR 16.5 billion in orders in 2024 and an order book of EUR 30.7 billion.



Expanded Portchester facility enlarges HII's UK and European footprint

Dr Lee Willett

Huntington Ingalls Industries (HII) expansion of its Portchester, UK facility – announced on 12 January – demonstrates the company's footprint for supporting UK and European navies' requirements. Senior officials from HII – the largest US crewed naval shipbuilder, and a leading international provider of uncrewed capabilities – stated that the enhanced facility will primarily enable the company's ability to deliver and support uncrewed system programmes, but added that the facility has capacity to support all of HII's technology, mission, and business areas.

In a media briefing, HII highlighted two features of its uncrewed system portfolio – one enduring, one emerging. The enduring system is its REMUS uncrewed underwater vehicle (UUV), available in REMUS 100, 300, 600, and 620 variants and in service with more than 30 countries, including 14 NATO members. The emerging system is its ROMULUS uncrewed surface vessel (USV) family, of which different variants are in testing (an intelligence, surveillance, and reconnaissance [ISR] version, for example) and in build (the ROMULUS 190, a 190-foot version set for launch, sea trials, and delivery in 2026 as the family's lead prototype).

Statement of intent

In a press statement unveiling Portchester's improved capacity, HII said "The enlarged facility significantly enhances and strengthens the company's presence in the UK, and increases capacity and support for the UK Royal Navy (RN) and European partners that operate the REMUS line of UUVs The facility also prepares the region for the deployment and sustainment of HII's ROMULUS family of USVs, a modular, artificial intelligence (AI)-enabled line powered by HII's Odyssey Autonomous Control System (ACS)."

"We have effectively doubled the available floor space. This new facility will increase the square footage by 6,500 square feet," Nick Green, HII's senior international business development manager, based in Portchester told the media briefing.

HII received building access in early January and, following the media launch and a ribbon-cutting ceremony, operations have begun in the expanded production space, under a phased plan leading to full utilisation by Quarter 3 2026.

"That is the intent," said Green: in that timeframe, "HII would envisage having everything in there we need, so we can hit the ground running with 620 and ROMULUS support."



▲ **HII's ROMULUS USV (the 190 variant is pictured) and REMUS UUV families are two of the primary uncrewed capabilities the company aims to produce and support for the UK and Europe, from its expanded Portchester facility. (Source: HII)**

Portchester's enhanced capacity enables the company's aim of delivering a range of activities there. Green said these included supporting the REMUS product line across the company's UK and European customer base, including with the RN (whose main base is nearby, at Portsmouth); conducting basic-level assembly, and having a flexible support infrastructure, for REMUS 620; providing service and support for two of the company's UUV launch-and-recovery (L&R) systems – the autonomous torpedo-launched system (TTL&R), and the surface platform-based Sea Launcher autonomous L&R system; and supporting development and integration of ROMULUS and its onboard Odyssey ACS.

While the facility offers significant support functions, conducting build work there is central to HII's thinking. Such thinking includes the UK as a specific customer.

"There is intent to do a level of production in the UK where possible and where we can," said Green. "The intent is to try and put more emphasis onto what we can do within the UK, as we believe UK content for UK contracts is increasingly important and a big part of what we can offer as a mature UUV and USV supplier."

"It's not a coincidence this facility is expanding in the Portsmouth area, as the RN has been and continues to be a key customer of HII whom we've been supporting with REMUS UUVs for the last 25 years," Green added.

▼ **HII's autonomous Sea Launcher surface vessel UUV launch-and-recovery system deploys a REMUS. The 13 January test of the combination reflects HII's focus on developing autonomous capability quickly for front-line operators. (Source: HII)**



"Our intent is definitely to find ways to do production here in the UK to support our UK customers We opened up the initial facility here in 2007 to support those units," Duane Fotheringham, HII's president for unmanned systems, told the briefing.

ROMULUS and REMUS

The RN operates REMUS 100, 300, and 600 vehicles. In its most recent order, in 2024, three more REMUS 100s and five more REMUS 300s were added. In 2025, HII received an integrated logistics support contract for the RN's REMUS fleet. "This new facility will enhance the ability to carry out duties of that contract," said Green.

Alongside the UK, the aim is to support a range of other European customers at and from the facility, including Belgium, Estonia, Lithuania, the Netherlands, Norway, and Sweden, amongst others, Green explained. "All the REMUS users have the ability to send their systems to the UK for repair and maintenance," he said.

"We have 750 vehicles worldwide A significant number are across Europe, so we'll be supporting that industrial base," Fotheringham added, noting that Portchester's utility as a support 'hub' was evidenced by NATO's REMUS user group being set to meet at the facility.

Portchester also provides a 'hub' for collaborating with industrial partners. For example, HII is working with Babcock UK on the REMUS TTL&R programme, with HII bringing REMUS 620 and the autonomous TTL&R system to integrate with Babcock's submarine Weapon Handling and Launch System (WHLS), to prepare HII's TTL&R technology to meet any needs from the RN and other WHLS customers. HII and Babcock are also collaborating on the latter's Autonomous and Remote Maritime Operational Response (ARMOR) Force architecture, designed to enable crewed

platforms to conduct command and control of disaggregated uncrewed platforms and systems.

"We will use this facility to support the TTL&R work we've already announced with Babcock through that partnership, and the ARMOR partnership," said Fotheringham.

Portchester also provides a starting point for supporting ROMULUS vehicles in Europe, Fotheringham continued.

"The facility will be a key part of the development for ROMULUS, and the ability to do 'drop-on' autonomy to any vessel of opportunity [with Odyssey]," Green added. Aiming to support the requirement to deliver capability to the front-line faster, Odyssey's 'drop on' autonomy is designed to enable an operator to take even a basic-level boat and turn it into a fully autonomous vessel, Green explained.

ROMULUS – especially the larger variants like ROMULUS 190 – provide increased capacity for capabilities to support multi-domain operations (MDO), which are at the core of current NATO maritime thinking. ROMULUS 190 can carry up to four 40-ft ISO containers, allowing modular embarkation of podular capabilities for tasks encompassing ISR, counter-uncrewed air system (CUAS), mine countermeasures (MCM), and strike operations. ROMULUS's ability to deploy UUVs to support some of these tasks will be enabled by the addition of the Sea Launcher autonomous L&R capability, which HII tested successfully from a surface ship on 13 January.

For a platform like ROMULUS, Portchester offers a 'hub' in which the USV and its systems can be tested and demonstrated to the RN and other European navies, including when integrated with Odyssey, Green said. "It's a very large, flexible, open space, which allows us to bring in vessels internally."

Expanding capability

Expanding the Portchester facility reflects and enables navies' increasing investment and development in new capabilities, including uncrewed systems.

"A lot of what we're doing is driven by the current geopolitical climate, with both the US and allied militaries investing a lot more in defence We see increases across the board," said Fotheringham. "This facility and this expansion in the UK is in part to support those efforts." Here, Fotheringham highlighted increased US funding for uncrewed systems and greater European naval focus on using uncrewed systems for tasks like MCM.

"The UK expansion is very much in line with the importance HII is placing on our global partnerships across the HII enterprise," Fotheringham continued, highlighting for example the Australia/UK/US AUKUS programme and its uncrewed systems focus.

"What we're seeing more now as well is, while in the past customers would ask for quantities of ones and twos, now we're up into the 10s and 15s," Green added. "So, the demand is there, [and] the requirements are there as the technology is improving." 



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