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EDITORIAL

Ajit Kumar Thakur
Editor & Business Director

THE DECISIVE YEAR: INDIA'S 2026 CHALLENGE

The turbulent previous year posed challenges for India, yet with resilience and patience, it sailed through and retained its strategic space. The start of the new year continued with renewed vigour but caution. The India-European Union free trade agreement and the strategic defence partnership were boosters. The finalisation of the India-US trade deal brought much-needed respite to India's oscillating anxieties while bringing the partnership back on track.

Working on broader agendas and sorting out loose ends, both India and the US should now focus on advancing a partnership that shapes the balance of power in Asia and the world in the coming decades. Further, leveraging these convergences with the US, India's priority should be strengthening national capacities and widening its regional footprint with a proactive strategy. Additionally, India will have to keep a close watch on the emerging nuclear race between the US, China, and Russia, which is getting intense, as China recently conducted a nuclear test and plans more in the near term.

For India, 2026 is going to be an inflection year. To realise the 2047 vision of 'Aatmanirbhar' and 'Viksit Bharat', there is an urgent need to create a strong foundation in high-quality science education, as without impactful, citable research, the nation's innovation capacity, technological leadership, and economic competitiveness will lag behind. This, in turn, will adversely impact national security considering the changing dynamics of the global power game. Can an aspirational India afford to fall behind in research output and influence?

> "For India, 2026 is going to be an inflection year. To realise the 2047 vision of 'Aatmanirbhar' and 'Viksit Bharat', there is an urgent need to create a strong foundation in high-quality science education, as without impactful, citable research, the nation's innovation capacity, technological leadership, and economic competitiveness will lag behind"

In fact, the biggest barrier on India's national development path has been inadequate scientific progress combined with a lack of inner reflection, ethics, and a strong sense of responsibility. The chronic hesitation to include introspection and moral awareness while exploring the external world is alarming. Henceforth, blended with natural curiosity, observation, scientific evaluation, and analysis, the emphasis should be on implementing an inter- and multidisciplinary, skill-oriented education system. This system must be built on strong core subjects at the grassroots level with in-depth planning and preparation.

The first month of 2026 was eventful. The **77th Republic Day** celebrations showcased a rising India's defence prowess. Marking a significant shift, the successful **Wings India 2026** unveiled the nation's evolving aviation story—from being a mega-buyer of aircraft to building domestic capability across manufacturing, tech, and services.

Adding momentum, the 2026 defence budget, despite inevitable constraints, reflects continuity and caution. Moving forward after laying a foundation, it now requires complementarity through reform: creating non-lapsable modernisation funds, accelerated procurement pathways, realistic risk-sharing with industry, and protected R&D allocations. It's an opportune time for India to move decisively from resilience to indispensability and determine the credibility of its military power in the decade ahead.

With the maturing Indian drone ecosystem, there is an immense drone technology opportunity in 2026, estimated around 13–14 billion. It will reward startups and companies focusing more on IP ownership, reduced dependency on the global supply chain, and developing dual-use technology to serve commercial and strategic national interests. Moreover, the trend for exponential growth in 2026 will be focused on building realistic solutions and achieving indigenous hardware capability or secure autonomy.

The January-March edition is special for the team at *Raksha Anirveda*, as its release will mark another milestone—the successful completion of our eighth year in business, which constantly tested our persistent efforts, resilience, and patience. Reflecting on the journey so far, it is satisfactory. *Raksha Anirveda* is indebted to all well-wishers—those who believed in the idea of promoting the **India Story, India Way** early on, and those who initially observed and later extended their continuous support.

We hope this latest edition, with its wide-ranging coverage and engaging content, will meet the expectations of our esteemed readers, whose number has steadily grown over the years, both domestically and globally. Happy reading!

Jai Bharat!!

(Ajit Kumar Thakur)

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RESTORING ORDER IN AN ANARCHIC WORLD

Operation Sindoor was more than a retaliatory measure against Pakistani transgression; it was a deliberate act of Jus in Bello. Through its calibrated use of force, India sought not only to restore order but also to demonstrate strategic restraint. This disciplined, kinetic action was ultimately designed to ensure regional stability and prevent the conflict from spiralling out of control

PRANAY K SHOME

Both intellectuals and lay persons say that war is, without an iota of doubt, associated with violence. War, since times immemorial, has been fought for a multitude of reasons. Over the course of time, the underlying nature as well as the tools and mechanisms of warfare have undergone sea changes. Today, newer conceptions of warfare have emerged and with that the laws that govern such conduct. This conduct manifests itself in the tradition of Just War and its two foundational principles—*Jus Ad bellum* and *Jus in Bello*, while the former is concerned with principles of the right to go to war, the latter is concerned with the right conduct in war. In this context, it becomes essential to undertake an ethical analysis of Operation Sindoor—one of the most important military counterstrikes undertaken in recent times.

THE JUST WAR OF AQUINAS

Thomas Aquinas, one of the most revered religious personalities and philosophers in the theological and intellectual tradition of the West is an important figure in the Just War tradition. He is the author of the magnum opus text *Summa Theologica*. While Western statesmen, military officers and academics have invoked him to provide a theological-political interpretation of various conflicts, it becomes essential to invoke him in the Indian context.

For Aquinas, in this morally imperfect world, man is a mixture of opposites—he is capable of doing immense good as well as unimaginable acts of cruelty. In the context of the modern nation-state system, this imperfection manifests itself in the immoral activities of states. Pakistan represents one such immoral fiendish actor.

For Aquinas, war must be declared by a sovereign authority which is responsible for the welfare of the common masses. It must be pursued with a just intention aimed at securing peace and avenging injustice by punishing evil doers. Operation Sindoor was undertaken by the sovereign authority of the Indian state that is constitutionally bound to protect its population and its interests against all threats—internal and external. The precision strikes were, therefore, carried out for the purpose of avenging the grave injustice and pain inflicted on innocent civilians in the April 22, 2025 Pahalgam terror attack. Apart from this, the strikes were executed carefully in order to hit the infrastructure of terror groups and not civilian targets. This vindicates India's Jus in Bello requirements—the right manner of conducting war. India's actions demonstrate that she is committed to the protection of civilian lives while carrying out retributive actions that are aimed at exorcising morally evil entities like terror groups and their sponsors. Aquinas further argues that the objective of war is not to perpetuate the vicious cycle of violence and counter-violence but to ensure *Tranquillitas Ordinis*—to ensure the tranquillity of order. Through her military action, India sought to send a clear message to the world in general and the Pakistani civilian-military nexus in particular that while she doesn't seek war, India won't shy away from using punitive force to restore order.

KAUTILYAN DANDA NITI

Having established the Aquinian moral mandate for India's rightful intentions, it becomes essential to analyse India's execution via the strategic realist tradition of Kautilya. In the *Arthashastra*, Kautilya argues that the world is the realm of *Matsyanyaya*—a lawless, chaotic entity where the principle of "might is right"

operates. Hence, in order for the *Rashtra* or state to survive and thrive, it must cultivate strength. Contrary to conventional political theorists who view Kautilya as an "amoral realist", he was anything but that. For Kautilya, *Yogakshema* or the welfare of the masses must be the primary aim of the sovereign. If any external entity, according to Kautilya, seeks to disturb the peace of the *Janpada* or the people, it becomes the responsibility of the state to restore order and teach the perpetrator a stern lesson in order to enforce deterrence.

India, in accordance with the *upayas* of Kautilya sought to maintain camaraderie and amicable relations with Pakistan. India has tried *Sama* via diplomatic measures and numerous initiatives over the years to develop good relations with Pakistan, Dana or concessions through initiatives like the Indus Water Treaty to incentivise Pakistan to mend its notorious ways and reciprocate India's hand of friendship, but to no avail.

Therefore, left with no options India has chosen to apply the remaining two *upayas*— *Bheda and Danda*. The former has been used in steps like keeping the Indus Water Treaty (IWT) in abeyance, and carrying out an all out diplomatic offensive both via the Ministry of External Affairs (MEA) as well as Indian parliamentary delegations to send the message that misadventurism by Pakistan will carry devastating costs.

The aim of Danda is to make use of force in order to restore justice and ensure that unruly actors can stay within limits and mend their behaviour before a more punitive exercise of force is done; India chose to exercise the option of Danda following the exhaustion of the previous three upayas

The last *upaya Danda* represents the calibrated military action. The aim of *Danda* is to make use of force in order to restore justice and ensure that unruly actors can stay within limits and mend their behaviour before a more punitive exercise of force is done; India chose to exercise the option of Danda following the exhaustion of the previous three *upayas*. However, the idea of Danda in the evolving landscape of 21st century warfare has changed completely. Hence, India is invoking the *Shadgunya Niti* or six fold policy to continue the process of thwarting Pakistan's evil designs.

Among the policies, India is pursuing *Dvaidhibhava* or the strategy of dual policy involving *Samsraya* or alliance with like minded and not-so like minded actors to not only counter Pakistani designs in the neighbourhood of South Asia but to also make Pakistan realise that its transgressions will involve exaction of punitive costs.

Across civilisational and theological lines, both Thomas Aquinas and Kautilya recognise the fact that war must be fought for righteous reasons; it must be fought for the restoration of order and protection of innocent lives. Operation Sindoor, therefore, represents India's *Jus in Bello* action. India's calibrated use of force was ultimately aimed at ensuring order, demonstrating India's disciplined use of kinetic measures that sought to ensure stability and keep the conflict from spiraling out of control.

–The writer, a columnist, is a doctoral candidate in Political Science at Mahatma Gandhi Central University. He is also a Research Associate at Defence Research and Studies (dras.in). The views expressed are personal and do not necessarily reflect the views of Raksha Anirveda.

CAN 2026 PAVE THE PATH FOR INDIA'S SECURITY RESILIENCE?

Surakshit Bharat will not be delivered through slogans or marginal reforms. It will rest on control over technology, command over decision time, dominance in the information space, and clarity of strategic intent. The window for hesitation narrows sharply in 2026

LT GEN A B SHIVANE

A Year of Awakening: In 2025, India's security establishment confronted a stark reality: the strategic environment is no longer cyclical. It is continuously contested. The old pattern of provocation followed by pause has broken down. India now operates in a battlespace where cyber disruption, grey-zone pressure, proxy conflict, economic leverage, great-power realignment and domestic stress intersect without sequence or warning. Endurance, not sentiment, will ultimately determine the outcomes. 2026 will not judge India's intent; it will judge whether its institutions can move faster than pressure.

The cyber domain exposed how dated India's assumptions have become. More than one and a half million intrusions were logged within four days of Operation Sindoor. That volume alone marked a change in method. The GPS interference reported at seven airports in November 2025 was not meant to halt operations. It was meant to see how quickly movement, coordination, and public assurance could be unsettled. The issue is not cyber defence in isolation, but how long essential systems can function under pressure.

The deepfake operations targeting the senior military and national leaders, the synthetic narratives injected during Operation Sindoor overclaimed Rafale losses, and the communal-baiting misinformation that followed were not amateur experiments. They were deliberate probes designed to test how fast India fractures psychologically when the information space becomes contaminated at scale. No air defence grid or combat formation can compensate for erosion inside the mind of the state.

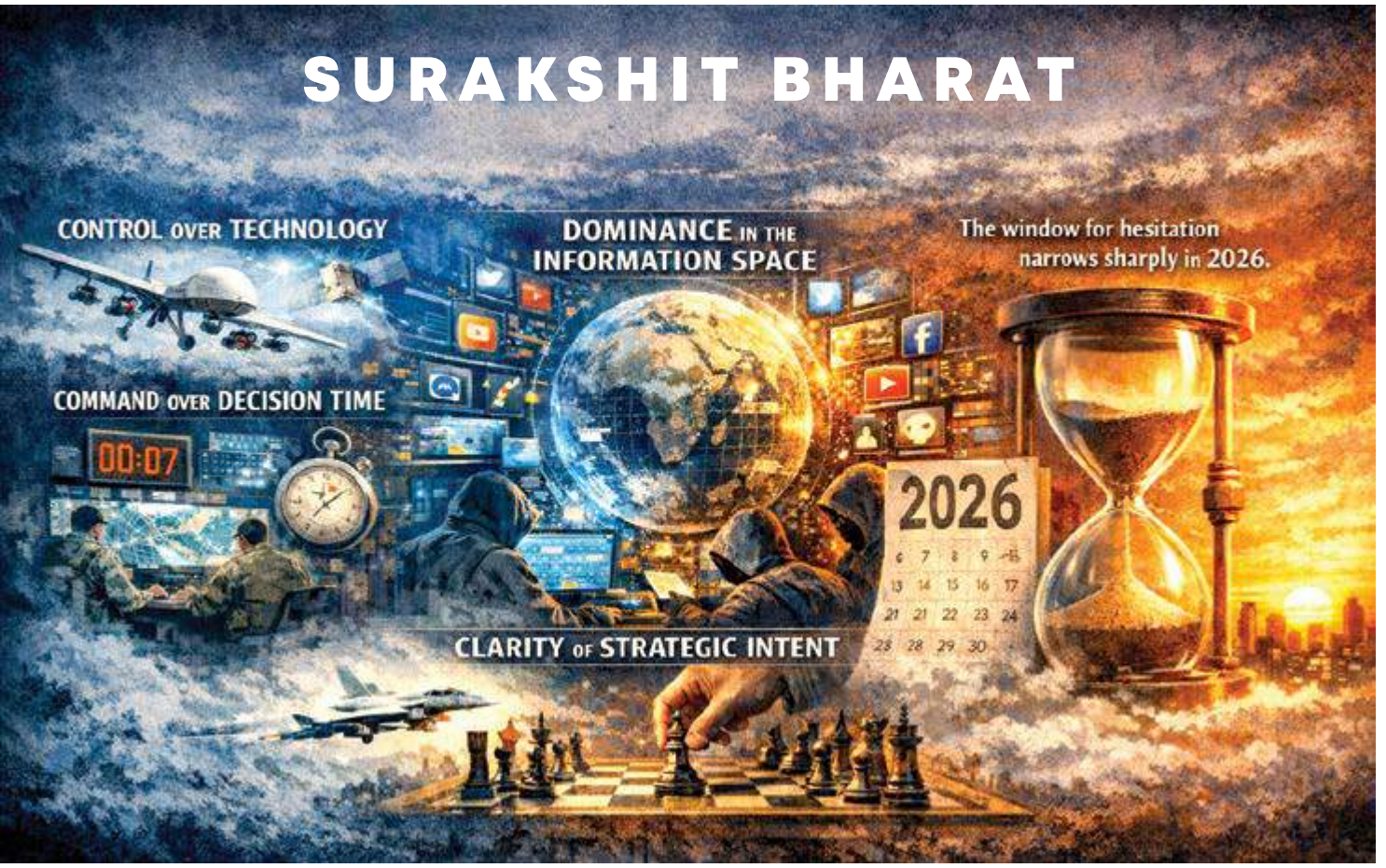
President Trump's planned visit to Beijing in April 2026 introduces a new variable. For India, reduced friction between Washington and Beijing is not comfort; it is pressure. It frees China to redistribute coercion, reopens space for Pakistan to repackage relevance, and reminds New Delhi that strategic centrality is perishable and must be continually earned

A THREAT LANDSCAPE THAT HAS OUTGROWN OLD PLAYBOOKS

2026 will demand a decisive shift from juggling crises to shaping the battlespace. Arming under crisis through emergency procurement will no longer hold good in compressed timeframes.

China will remain the major strategic pressure point and will periodically create friction through grey zone tactics to stretch India economically, militarily and psychologically. Cyber operations, information pressure, maritime posturing, and incremental land assertions are fused into a single method. This is not coercion by escalation but by exhaustion, and it cannot be met with a static defensive posture.

Across the West, Pakistan's state-sponsored terror continues to mutate. The 10/11 attack underlined two uncomfortable truths: proxy groups can exploit residual gaps in India's internal grid, and Pakistan's deep state still views deniability as a strategic weapon. Pakistan's economic weakness has not diluted its ability to outsource violence. Proxy networks remain central to its strategy, with deniability treated as a weapon rather than a shield. With expanding China–Pakistan military coordination, the risk of a two-front, or effectively a



single merged front, can no longer be treated as a contingency. China shapes the environment; Pakistan exploits the seams.

Internally, unresolved fault lines in border regions and the northeast persist, amplified by foreign interference and digital manipulation. Information warfare now penetrates deep into society, distorts perception, and risks unsettling command and governance chains. The rise of radicalisation and institutional subversion is the most corrosive threat of all. This is the ghost within which is quiet, persistent, and lethal if ignored.

GEOPOLITICAL TURBULENCE IMPACTING STRATEGIC SECURITY

The geopolitical churn and power play have impacted the Indian strategic security environment. The India–Russia relationship is now shaped by Moscow's Ukraine commitments and economic constraints. Russia wants strategic autonomy but is being pulled deeper into China's centre of gravity. India values the long arc of defence cooperation, but has to hedge against the shrinking space. Russia remains an important partner, but no longer a strategically insulated one. Defence dependence without strategic insulation is a liability, not legacy capital.

President Trump's planned visit to Beijing in April 2026 introduces a new variable. A managed thaw suits China by buying time for economic stabilisation and internal consolidation. For India, reduced friction between Washington and Beijing is not comfort; it is pressure. It frees China to redistribute coercion, reopens space for Pakistan to repackage relevance, and reminds New Delhi that strategic centrality is perishable and must be continually earned.

India does not remain insulated from these visits. A thaw in US-China relations alters the flavour of the subcontinental dynamics and India's centrality in the region. It frees China to redistribute pressure elsewhere. It reopens channels for Pakistan to project relevance to the US. And it forces India to tighten coordination with partners while avoiding the temptation to assume any alignment is permanent.

A MILITARY AT CROSSROADS: AIMING AND ARMING CHALLENGES

India's armed forces have shown grit along the LAC and resilience against terror networks. But grit cannot substitute for technological headroom, and resilience cannot replace autonomy over critical systems. India's defence ecosystem continues to be weighed down by legacy practices that limit its effectiveness. The procurement system remains slow, rule-bound, and out of step with operational urgency. GSQRs chase theoretical

perfection and arrive too late to matter. The outcome is predictable: imports by compulsion, dependence on foreign source codes, propulsion systems, sensors, and software, which are the true levers of modern combat power. The private sector remains stuck at low-risk assembly, while PSUs continue to rely on transfer-of-technology models that deliver hardware without intellectual control. Start-ups show ingenuity but struggle to scale because state commitment remains episodic. This gap between promise and permanence is structural, not accidental.

This troika of flawed procurement, shallow manufacturing depth, and limited R&D ownership is India's biggest barrier to military modernisation.

REWRITING THE SECURITY BLUEPRINT FOR 2026

The writings on the wall are clear. India needs institutional and urgent operational readiness for future warfare with a doctrinal construct which is proactive and pre-emptive. Some of the areas that need priority addressing are:-

First, India needs a National Security Strategy that is executable, not aspirational. Without a hard framework, capability development degenerates into disconnected projects. Strategic ambiguity no longer buys flexibility; it creates drift.

Second, Cyber and information warfare must be treated as weapons, not support functions. India needs a unified cyber command with offensive authority, integrated with civilian infrastructure protection. An information-space defence grid must detect, flag, and neutralise hostile narratives in real time and be treated as a core national security asset.

Military modernisation must pivot to mastery, not assembly. India cannot future-proof itself by importing platforms and slapping a 'Make in India' label on them. What matters is control over software, sensors, propulsion, and core algorithms

Third, procurement must be de-clogged. Open-ended timelines kill relevance. India's defence ecosystem is still influenced by legacy practices that no longer fit present conflict conditions. Procurement moves slowly, is driven by procedure, and rarely matches operational timelines, reducing preparedness when rapid response is required. Fourth, deterrence must shift from punishment to denial. India's posture remains predictable and ground-centric. Denial requires long-range precision, resilient C5ISR, genuine jointness, and an element of unpredictability that India's adversaries already exploit more comfortably.

Fifth, modernisation must pivot to mastery, not assembly. India cannot future-proof itself by importing platforms and slapping a "Make in India" label on them. What matters is control over software, sensors, propulsion, and core algorithms. That requires a layered defence ecosystem where large integrators anchor complex platforms, mid-tier firms deliver subsystems and components, and startups and academia drive high-risk innovation. Without this depth, India's defence industry remains ornamental, not strategic.

THE BIG CHOICE OF 2026

India stands at an inflexion point. It can continue adjusting old frameworks and hope crises remain manageable, or it can rewire its security architecture around speed, ownership, and denial. Surakshit Bharat will not be delivered through slogans or marginal reform. It will rest on control over technology, command over decision time, dominance in the information space, and clarity of strategic intent. The window for hesitation narrows sharply in 2026.

–The author, a PVSM, AVSM, VSM has had an illustrious career spanning nearly four decades. A distinguished Armoured Corps officer, he has served in various prestigious staff and command appointments including Commander Independent Armoured Brigade, ADG PP, GOC Armoured Division and GOC Strike 1. The officer retired as DG Mechanised Forces in December 2017 during which he was the architect to initiate process for reintroduction of Light Tank and Chairman on the study on C5ISR for Indian Army. Subsequently he was Consultant MoD/ OFB from 2018 to 2020. He is also a reputed defence analyst, a motivational speaker and prolific writer on matters of military, defence technology and national security. The views expressed are personal and do not necessarily carry the views of Raksha Anirveda.

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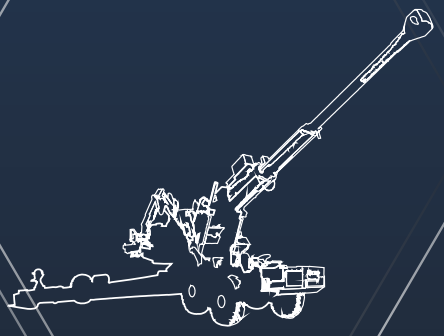

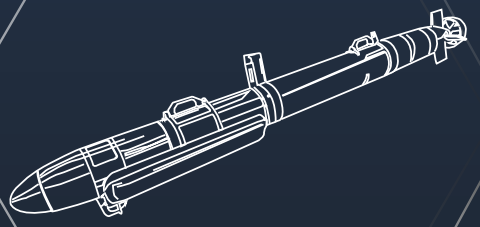

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SOMETHING TO CHEER ABOUT BUT NO CAUSE FOR COMPLACENCY

In the absence of an outcome-oriented budgeting, one can only speculate about what the enhanced allocations are meant for or what impact meagre enhancement will have on the organisations concerned. The defence budget for 2026-27 brings in some cheer yet cautions against complacency

AMIT COWSHISH

Going by numbers, defence budget estimates (BE) for the Financial Year 2026-27 (FY '27) are vastly more robust than the current year's budget. At ₹ 7.85 lakh crore, the proposed budget represents a year-on-year increase of 15.2 per cent, surpassing last year's hike of 9.5 per cent. Its share of 1.99 per cent in the estimated gross domestic product (GDP), and 14.67 per cent in the total central government expenditure (CGE), are among the highest since FY 2011-12. As in the previous years, the defence outlay is also the highest among all ministries and departments of the government.

Defence budget is comprised of four Demands for Grant: Ministry of Defence (Civil), Defence Services (Revenue), Capital Outlay on Defence Services, and Defence Pensions. Their share in the total defence budget stands at 3.64, 46.58, 27.95, and 21.84 per cent respectively. These Demands are not aptly structured. For example, the expenditure on ex-Servicemen Health Scheme (ECHS) for veterans is clubbed with the establishment expenditure of the Indian Army but J&K Light Infantry, which is a regular infantry regiment, is excluded from it.

Be that as it may, the grant most in focus is the Demand for Capital Outlay which, for the coming financial year, has been hiked by 21.84 per cent, from ₹1,80,000 crore to ₹ 2,19,3026 crore. This includes a notional 'modernisation' budget of ₹ 1,85,722 crore meant for acquisition of aircraft and aeroengines, heavy and medium vehicles, rolling stock, naval fleet. It also includes capital expenditure of naval dockyards, special projects, Joint Staff, and Rashtriya Rifles. The other-than-modernisation segment of the outlay includes capital expenditure on acquisition of land, civil works, research and development, National cadet Corps, investment in public enterprises, Director General of Quality Audit, ECHS, and assistance for prototype development under the 'Make' procedure.

The modernisation budget has been enhanced by 24.65 per cent which could partly be on account of the contractual payments that will become due during FY '27 against the increasing number of previously concluded contracts, but it also indicates the likelihood of some big-ticket contracts being awarded during the coming financial year, triggering the advance payments that are usually made on signing of the contracts.

A deeper dive into this tranche indicates that the focus of modernisation in the coming year would be on aerial platforms – fighter and transport aircraft, refuellers, helicopters, UAVs, and the like

A deeper dive into this tranche indicates that the focus of modernisation in the coming year would be on aerial platforms – fighter and transport aircraft, refuellers, helicopters, UAVs, and the like. The allocation for these platforms has jumped from ₹ 48,614 crore to ₹ 63,734 crore, and though the proposed allocation is less than the revised estimate (RE) of ₹ 72,780 crore for the current year, the priority accorded to strengthening air power is unmistakable.

Meanwhile, allocation for medium and heavy vehicles has gone up from ₹ 3,651 crore to ₹ 4,580 crore and for other equipment - mainly weaponry and other force multipliers - from ₹ 63,099 crore to ₹ 82,218 crore. The main beneficiary of this increase would arguably be the Indian Army. It is a matter of concern, though, that the allocation for the current year was reduced to ₹ 50,760 crore which indicates difficulty in utilising the allocated funds in full. Against this backdrop, it would be a challenge to utilise the allocation, which is

₹ 31,458 more, or almost 62 per cent, higher than the RE for the current year.

The paltry increase in the allocation for naval fleet, from ₹ 24,291 crore this year to ₹ 25,024 crore in BE '27 can only mean that either the Indian Navy's liabilities from the previously concluded contracts have come down drastically and consequently a substantial sum will be available to spend on new acquisitions, or alarmingly, the government does not expect many big-ticket contracts to be concluded this year. Considering the media reports that MoD was close to signing a deal with Germany's Thyssenkrupp Marine Systems for approximately $10 billion to acquire six submarines under Project 75(I), this would be surprising.

The revenue budget of the defence services was already too complex to be deciphered easily. This has now been bifurcated into establishment expenditure and 'other' expenditure comprising budget heads like stores, transportation, works, repairs and refit of naval vessels, all of which cater for expenditure on operations, procurement of ammunition and spares, and maintenance of equipment. Of these, 'stores' is the most significant budget head. There has been a modest increase in the allocation for stores from ₹ 62,902 during the current year to ₹ 65,784 crore in BE '27, which is less than RE of ₹ 66,188 crore for the current year.

In a significant development, probably in the wake of Operation Sindoor, a new revenue budget head was opened during the current year for payment of spectrum charges by the armed forces to telecom operators and satellite service providers. A sum of ₹ 66,069 crore has been provided under this budget head in the current year's RE and ₹ 67,514 crore in BE '27. It is too early to say, but in the years to come, this could push up the revenue expenditure of the armed forces, alongside the expenditure on procurement of stores.

No analysis of defence budget is complete without assessing its impact on at least three other organisations, no less in significance than the armed forces, but generally not as much in the public eye. One of these three is the Department of Research and Development which manages the Defence Research and Development Organisation (DRDO). Despite the government's efforts to rope in the private industry, DRDO continues to be the premier government agency for promotion of self-reliance through indigenous design and development. With its revenue allocation going down from ₹ 11,893 crore during the current year to ₹ 11,850 crore in BE '27 and a marginal increase of ₹ 2,326 crore in its capital outlay, it would be unreasonable to expect any quantum leap in the organisation's output. The other two important instrumentalities of the MoD are the Coast Guard Organisation (CGO) and the Border Roads Organisation (BRO). These organisations play an important role in regard to coastal security and infrastructure development along India's turbulent land and coastal borders. There has been a decline in CGO's capital outlay from the current year's allocation of ₹ 5,000 crore to ₹ 4,000 crore in BE '27 and in the revenue budget from ₹ 4,677 crore to 4,393 crore.

The BRO has escaped this treatment, but with its revenue budget going up only marginally from ₹ 1,345 crore to ₹ 1,537 crore, and capital outlay from ₹ 7,135 crore to 7,380 crore, it will be reasonable to expect business as usual in so far construction of roads, tunnels and bridges are concerned.

The exponential rise in defence pensions has been a matter of concern. The expenditure ballooned from ₹ 37,336 crore in 2010-11 to ₹ 1,57,654 crore in 2024-25. The Agniveer scheme, introduced by the government in 2022, entails no pension liability but it will take a long time to bend the expenditure curve. Meanwhile, the allocation has been increased by ₹ 10,543 crore to ₹ 1,71,338 crore in BE '27, but considering that it is only ₹ 2,152 crore more than the RE for the current year, and practically every year the allocation has been increased at the RE stage since 2010-11, barring on two occasions, the proposed allocation may turn out to be inadequate.

To conclude, in the absence of an outcome-oriented budgeting, one can only speculate about what the enhanced allocations are meant for or what impact meagre enhancement will have on the organisations concerned, as there is no system in place to make acquisitions and other plans public at the beginning of the financial year. Consequently, there is no way of knowing what the MoD sets out to achieve during a financial year and what is manages to achieve at the end of that year.

–The writer is Former Financial Advisor (Acquisition), Ministry of Defence. The views expressed are of the writer and do not necessarily reflect the views of Raksha Anirveda.

CALM AMIDST COMMOTION

Today global politics has become increasingly fractured—marked by trade wars, regional conflicts, and shifting alliances. India has chosen a path of calm strategic balance, engaging with all sides while remaining firmly anchored to national priorities

MAJ GEN G SHANKARNARAYANAN

From India's vantage point, the prevailing international order is deeply imbalanced and insufficiently representative of present-day power realities. While it is often described as a rules-based system, the formulation, interpretation, and enforcement of these "rules" remain dominated by a limited group of countries, many of which draw authority from historical privilege rather than contemporary relevance. As a result, regional power struggles are increasingly being internationalised, sustained through proxy alignments involving global power centres.

India views the emerging geopolitical contest—particularly between the US-EU combine on one side and Russia-China on the other—as symptomatic of this imbalance, where regional conflicts are amplified rather than resolved. From New Delhi's perspective, such polarisation narrows diplomatic space and undermines the autonomy of middle and emerging powers, compelling them to choose sides even when such choices run counter to their national interests.

As a multi-aligned rising power, India has consciously resisted this dynamic. Rather than aligning permanently with any single bloc, it has positioned itself as a bridge—capable of engaging rival camps without being absorbed by them. This approach allows India to advocate dialogue as the primary instrument for dispute resolution and to push for reforms in global governance that better reflect demographic, economic, and strategic realities.

India has also emerged as a consistent voice for the Global South, arguing that sustainable global stability cannot be achieved if developing nations remain marginalised in international decision-making. Issues such as technology access, development finance, climate responsibility, and fair trade practices are central to India's diplomatic agenda, not as abstract ideals but as practical necessities for global equilibrium.

Crucially, India seeks to pursue these objectives through diplomacy rather than coercion, and through institutional reform rather than institutional bypassing. This approach reflects a deliberate commitment to a rules-based international order, while simultaneously insisting that such rules must evolve to remain legitimate and effective.

THE TRUMPIAN ERA

The United States under the Trump administration marked a sharp departure from traditional alliance-driven American foreign policy, replacing it with a transactional, domestically oriented approach. Tariffs became a central instrument of statecraft, employed not merely to correct trade imbalances but to exert political and strategic pressure on partners and competitors alike. The driving

As economic nationalism, de-dollarisation, and regional conflicts reshape the global order, traditional power centres are losing their monopoly over influence

Despite tariff pressure and diplomatic provocation from the United States, India has responded with restraint, focusing on domestic resilience, diversified trade, and strategic autonomy. Continued energy cooperation with Russia underlines India's determination to safeguard national interest over external pressure

imperative was largely domestic—to demonstrate to the American electorate that the promise of Make America Great Again was being actively pursued.

At the same time, President Trump sought to project himself as a global peacemaker, particularly with respect to the Russia-Ukraine conflict. His administration promoted the economic isolation of Russia through sanctions and trade restrictions, viewing this as a necessary precondition for compelling Moscow into a ceasefire. Russia, however, interpreted these moves as strategic containment rather than conflict resolution.

From Moscow's perspective, the conflict was inseparable from NATO's eastward expansion and long-term security concerns, as well as the strategic necessity of maintaining access to warm-water ports in the Black Sea. Consequently, Russia remained resolute, showing little inclination to yield under economic pressure alone.

In West Asia, the situation was equally complex. Israel's sustained military campaign against Hamas and the broader Palestinian conflict escalated into a wider regional confrontation, drawing in Lebanon, Iran, Hezbollah, and the Houthis operating from Yemen and Syria. Despite repeated claims of diplomatic breakthroughs, tangible progress toward lasting stability remained elusive.

The European Union found itself navigating a particularly precarious position. While supporting Ukraine militarily and politically, Europe's motivations were shaped as much by existential anxiety as by normative commitment. The fear of Russian expansion, coupled with the risk of being drawn into a direct conflict, compelled European support—even as sanctions strained energy supplies and economic stability.

Compounding these pressures was uncertainty regarding sustained US commitment to NATO. Trump's national security doctrine, rooted firmly in "America First," signalled that allies would increasingly be expected to fend for themselves. As a result, NATO's institutional credibility—especially without unequivocal US backing—came under unprecedented scrutiny.

CHINESE GLOBAL IMPRINT

China's re-emergence as a major global power represents one of the most consequential shifts in the contemporary international system. Backed by the world's second-largest economy and a rapidly modernising military, Beijing has positioned itself as both a participant in and a challenger to the existing global order.

China pursues a carefully calibrated, multi-pronged strategy. It engages constructively with international institutions and agreements when they align with its interests—such as selective participation in multilateral financial institutions and climate frameworks.

Prime Minister Narendra Modi with Chinese President Xi Jingping

However, where existing norms constrain its strategic objectives, Beijing has shown a clear willingness to diverge from or reinterpret them.

In emerging domains where norms are still evolving—particularly internet governance, digital infrastructure, and technological standards—China has actively collaborated with other authoritarian states, most notably Russia, to shape frameworks that reflect their preferences. This deliberate norm-shaping effort has widened ideological and institutional divides with democratic countries, complicating collective responses to global challenges.

The risk inherent in this divergence is the emergence of parallel systems of global governance, which would significantly weaken multilateral cooperation. In the military sphere, China's expanding capabilities—particularly in the Indo-Pacific—pose challenges not only to US strategic primacy but also to regional stability, directly affecting India's security environment.

INDO-US RELATIONS

India entered 2025 with guarded optimism regarding the implications of a second Trump presidency. While trade frictions and immigration-related challenges were

PM Modi with US President Donald Trump

President Vladimir Putin's December 2025 visit to New Delhi reaffirmed the depth of India-Russia ties, spanning energy, defence, technology, and long-term economic cooperation. The summit demonstrated how durable partnerships are built on practical interdependence rather than ideological alignment

Modi with Russian President Vladimir Putin

anticipated, there was an expectation that differences could be managed within the broader strategic partnership.

Instead, the United States imposed substantial additional tariffs on Indian goods, explicitly linking them to India's continued purchase of Russian oil. This marked a significant escalation, transforming economic instruments into tools of overt geopolitical pressure.

Trump also publicly claimed credit for de-escalating the India-Pakistan crisis of May 2025—a claim that New Delhi categorically rejected as factually incorrect. More troubling from India's perspective was Washington's renewed diplomatic engagement with Pakistan, which introduced strategic ambiguity into the regional balance.

Further strain emerged through restrictions on H-1B visas, directly affecting Indian professionals and the long-standing people-to-people dimension of Indo-US ties. While the Indian government responded with restraint, these actions collectively eroded US credibility as a predictable and reliable strategic partner.

Ironically, India's long-term strategic value—its demographic dividend, expanding economy, military capability, and pivotal geography astride critical Indian Ocean sea lanes—had historically

motivated successive US administrations to cultivate closer ties as a hedge against China. The second Trump administration, however, appeared largely indifferent to this potential, prioritising short-term leverage over strategic continuity.

TARIFF IMPACT

The imposition of an additional 25 per cent ad valorem tariff, raising the cumulative burden on Indian exports to nearly 50 per cent, marked a decisive inflection point in bilateral economic relations. This move went far beyond routine trade adjustment, signalling a willingness to use economic pressure to influence India's strategic choices.

India's response was notable for its restraint. Rather than engaging in retaliatory tariffs or rhetorical escalation, New Delhi focused on strengthening domestic manufacturing, accelerating reforms aimed at self-reliance, and diversifying export markets. Continued energy imports from Russia served as a clear assertion of India's strategic autonomy, demonstrating that national interest would not be subordinated to external intimidation.

PRESIDENT VLADIMIR PUTIN'S VISIT

President Vladimir Putin's December 2025 visit to New Delhi carried significance well beyond symbolism. It functioned both as a reaffirmation of enduring ties and as a recalibration of the Indo-Russian partnership in response to a changing global environment.

The visit produced a comprehensive roadmap extending to 2030, encompassing cooperation across energy security, defence production, critical minerals, nuclear technology, connectivity, and alternative payment mechanisms. The emphasis on technology transfer and joint development—including advanced combat aircraft platforms—stood in stark contrast to conditional defence partnerships elsewhere.

Discussions on special currency arrangements and assured energy supplies reflected a shared intent to insulate bilateral cooperation from global financial volatility and sanctions pressure. For India, the visit demonstrated strategic balancing—maintaining a special relationship with Russia while sustaining multi-alignment. For Russia, it ensured continued engagement amid isolationary pressures.

India's evolving engagement with groupings such as the QUAD, alongside calibrated diplomatic engagement with China, reflects a strategy of regional balancing rather than confrontation. This approach allows India to shape its security environment while maintaining flexibility in a rapidly changing global landscape

CHINESE THAW AND QUAD DYNAMICS

China's military modernisation under the CCP's 15th Five-Year Plan (2026–2030) signals a sustained push toward technological self-reliance and industrial upgrading. However, territorial assertiveness—particularly following the 2020 Galwan clash—fundamentally altered India's threat perception.

India's subsequent engagement with the QUAD—comprising Australia, India, Japan, and the United States—reflects a strategy of zone balancing rather than direct confrontation. By shaping the regional environment collectively, India has sought to constrain coercive behaviour along the Line of Actual Control and in the maritime domain.

Simultaneously, economic pressures arising from US tariff policies encouraged limited diplomatic engagement with China, aimed at stabilising trade channels and accessing new markets. This dual approach reflects India's pragmatic blend of strategic caution and economic realism.

ELITE SUPERCLUB 'C5'

India's refusal to yield under tariff pressure has coincided with reports of a proposed elite 'C5' grouping, bringing together the US, Russia, China, India, and Japan. This concept represents a significant departure from traditional forums such as the G7, prioritising population size, military capability, and economic weight over ideological alignment.

The proposed agenda—beginning with West Asian security and Israel-Saudi normalisation—underscores the ongoing reconfiguration of global power engagement, where flexibility and transactional diplomacy increasingly trump institutional orthodoxy.

BOTTOM LINE

India's equanimity in a fractured world order must not be mistaken for passivity or indecision. It represents a deliberate, self-assured strategy rooted in strategic autonomy, diplomatic engagement, and national interest.

As one of the world's fastest-growing major economies with expanding strategic influence, India is no longer merely navigating the global order—it is actively shaping it. Its emphasis on democracy, diplomacy, and dialogue reflects confidence, resilience, and a clear understanding of long-term interests.

In essence, India's equanimity is an instrument of power, enabling it to promote a more inclusive, balanced, and stable international system amid unprecedented global disruption.

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BREAK THE VICIOUS CYCLE

India must move beyond demonstrating force to systematically dismantling Pakistan's will to continually adapt and re-engage. It requires a sustained, multi-domain strategy that targets Pakistan's strategy to bleed India through covert, layered attacks

SRIJAN SHARMA

Last year's decisive Operation Sindoor redrew the strategic picture between India and Pakistan, setting a new normal and establishing a more credible level of deterrence by demonstrating an unequivocal ability to strike back. While this represents a significant and notable departure from earlier, more limited responses, India must remain acutely aware that Pakistan has not capitulated; instead, it has systematically recalibrated its approach, refusing to roll over through a sophisticated deceptive peace strategy and by continuously redeveloping its terror apparatus to adapt to new pressures.

The challenge for India is no longer just about demonstrating capability but about systematically dismantling Pakistan's will and capacity to perpetually recalibrate and re-engage in subversive warfare.

DECEPTIVE STRATEGY OF STRATEGIC PAUSE

Pakistan's strategy is built on a cold recognition of its limitations. It understands that its battlefield

endurance and conventional military strength are insufficient to deter an Indian offensive or to hold territory in a prolonged conflict. Therefore, its primary playbook involves engineering a "strategic pause" following periods of heightened tension. This pause allows Pakistan to shift from a vulnerable conventional posture to its preferred domain: sub-conventional warfare.

During this diplomatic interlude, Pakistan pursues a four-pronged deceptive peace strategy designed to regroup and rearm. First, it seeks to gather diplomatic support and sympathy on the global stage, casting itself as a victim seeking dialogue. Second, it works to repair material damages by securing financial aid and defence partnerships from allies. Third, it actively works to prevent regional isolation by re-engaging India in talks, thereby appearing reasonable. Fourth, and most critically, it uses this purchased time to shift back to sub-conventional methods—primarily orchestrating terror strikes—to retaliate against India and bleed it through a thousand cuts.

This strategy also relies on using Afghanistan to build strategic depth, providing safe havens and operational bases. As former Indian Air Force Chief Anil Chaudhary aptly described, this is a "Triple R" strategy: rearticulate its narrative, reorganise its terror assets, and relocate its operatives and leadership.

This deceptive dance is well-established. Pakistan retaliates through proxies and terror cells while its diplomats project a desire for peace, using talks as a tool to buy time and freeze the conflict at a manageable level of hostility. The fundamental aim remains to keep India destabilised through terrorism and to sustain the fundamentalist ideology that fuels it.

History is replete with examples where Pakistan's overtures at détente have been systematically sabotaged, either by its own deep state or by terror groups it nurtures. For instance, after the failed 2001 Agra Summit aimed at normalisation, terrorists attacked the Indian Parliament six months later, leading to Operation Parakram. A ceasefire in November 2003 was followed by a deadly attack on Jammu Railway Station just two months later.

In a stark example of this duality, in April 2005, India and Pakistan agreed to open the frontier in Kashmir and launch a cross-border bus service—a major confidence-building measure. Within five months of this opening, Lashkar-e-Taiba terrorists attempted to attack the Ram Janmabhoomi in Ayodhya, and Delhi was rocked by serial blasts.

SHIFT TO MORE COVERT STRIKES

In response to India's more robust post-Uri and post-Pulwama responses, particularly after the message sent by Operation Sindoor, Pakistan's deceptive strategy is undergoing a subtle but dangerous evolution. Its counter-responses are becoming less straightforward and overt, adopting a more covert, layered, and deniable approach. The recent Red Fort attack, for which no group claimed responsibility, is a telling indicator of this shift toward more clandestine tactics. This new form of subversive terrorism is a complex blend of direct and indirect actions. It includes sabotage, sophisticated infiltration, the use of front organisations, targeted kidnappings, and assassination attempts. Key to this is the redesign of its Karachi Project and a strategic pivot towards subversion targeting India's white-collar professionals and civil society to create internal discord.

These strategies are meticulously calibrated to inflict damage on India while remaining below the threshold that would trigger a full-scale conventional retaliation. This tactical shift is complemented by what analysts term the "madman approach" of Pakistan's current Army Chief, General Asim Munir, and other hardliners. This involves frequent, public warmongering, propaganda blitzes, and overt threats, which create a backdrop of persistent hostility without a clear diplomatic pathway—not even the deceptive one followed earlier. The objective is to maintain constant psychological pressure.

In essence, Pakistan has lowered the overt temperature of its immediate counterstrikes but has simultaneously signalled an unwavering resolve to strike back in more insidious ways. This thinking must be countered decisively. As author M.J. Akbar famously described Pakistan in his book Tinderbox, it is a "toxic jelly state"—unlike butter that melts or solidifies, it wobbles but remains in place, perpetually unstable yet persistently present.

Operation Sindoor may have had a shock-and-awe effect, but as history shows, Pakistan manages to recalibrate and re-emerge. Therefore, India's objective must evolve from merely showcasing

credible deterrence to actively and continuously breaking Pakistan's will and capacity to recalibrate.

FORGING A CREDIBLE MAXIMUM-PRESSURE STRATEGY

To achieve this, India must pursue a comprehensive, sustained maximum-pressure strategy that operates not just during overt conflict but relentlessly during peacetime. Past measures like threatening the Indus Water Treaty or intensifying sanctions scrutiny have shown limited efficacy in disrupting Pakistan's internal stability or its will to recalibrate. A more profound, multi-domain approach is required.

India must adopt a dynamic two-fold strategy operating across the overt and covert spectrum, encompassing diplomatic, economic, informational, and military tools. The first pillar is a pre-emptive strategy. This involves using overt or covert means to eliminate and disrupt imminent threats before they materialise. This could include targeted covert border strikes against terror launch pads, drone operations to neutralise leadership in transit, or cyber operations to disrupt imminent attack planning.

The goal is a sustained, multi-domain maximum-pressure campaign that systematically undermines Pakistan's will to recalibrate. This persistent pressure is key to achieving lasting deterrence and regional marginalisation of the threat

The second, and perhaps more crucial pillar, is a preventive strategy. This differs from pre-emption, as it targets non-imminent threats that could develop into major strategic advantages for Pakistan in the future. The goal here is to systematically target any Pakistani behaviour that aids its strategic recalibration. This is a broader campaign aimed at keeping Pakistan perpetually off-balance. Actions could include covert economic measures to short-circuit its financial stability, sophisticated diplomatic manoeuvring to isolate it in multilateral forums, clandestine diplomacy to exploit internal political fissures within Pakistan, and "preventive" intelligence operations to degrade its terror infrastructure during dormant phases. Overtly, this could also involve calibrated military demonstrations or strikes on high-value strategic assets inside Pakistan that contribute to its long-term recalibration capability, rather than just those posing an immediate threat.

The core idea is that disrupting Pakistan's will to recalibrate only works if India can sustain a multi-domain campaign of managed destabilisation through intertwined pre-emptive and preventive actions. The objective is to create a perpetual cost for recalibration, making the process so painful and disruptive that Pakistan's will to reorganise begins to erode.

A relevant analogy is the US maximum-pressure campaign against Iran, which was explicitly designed to target Tehran's will to advance its nuclear programme and strategic regional rise. Through targeted sanctions, cyber sabotage (like the Stuxnet virus), and diplomatic isolation, the US severely disrupted Iran's recalibration efforts, creating internal socio-economic fault lines.

India must pursue its own tailored version of such a strategy. The goal is to disrupt and destabilise Pakistan's recalibration engine so thoroughly that it opens a strategic window for India to finally push Pakistan to the margins of the regional order and, ultimately, achieve a state of complete and enduring deterrence.

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INVOKING SUTRAS AND CHAKRAS

The fourth Global AI Impact Summit is of critical importance for India, as it provides an opportunity to position itself as a leader from the Global South in the global AI governance landscape. Grounding its agenda within a framework that invokes Sutras and Chakras, the AI Impact Summit signals an intent to move the global AI debate from technological abstraction toward a language of coherence, alignment, and transformation

DR AJEY LELE

In recent times, Artificial Intelligence (AI) has emerged as an important component of India's science and foreign policy initiatives. There is a growing and thoughtful emphasis on integrating AI into India's bilateral arrangements with key international partners. Some important examples include India–Qatar AI Partnership (May 2025), decision to expand focus on AI during India and South Korea strategic ties meeting (August 2025), agreement reached towards enhancing cooperation in AI during the 11th India–Poland Foreign Office Consultations (December 2025) and some collaborations with agencies like Microsoft and few others.

This momentum was reinforced during the 18th Japan–India Foreign Ministers' Strategic Dialogue, held in New Delhi on January 16, 2026. During the dialogue, both the foreign ministers reaffirmed AI as a core pillar of the bilateral strategic partnership and agreed to advance cooperation through institutionalised mechanisms and concrete outcomes. India and Japan have significantly deepened their strategic partnership in AI, anchored in shared priorities of innovation, trust, and human-centric technology governance.

All these developments should be looked at the backdrop of the fourth AI Impact Summit which is being hosted at New Delhi from February 19-20, 2026. Japan has emphasised their commitment to contributing to the success of this February 2026 Summit.

India's AI policies have evolved against the framework of an expanding network of bilateral collaborations with a select group of partner states, reflecting a strategic effort to align domestic capability-building with international cooperation. Through such structured partnerships, India has sought to advance joint research, talent mobility, data governance, and the development of trustworthy and inclusive AI systems.

The fourth AI Impact Summit is of critical importance for India, as it provides an opportunity to position itself as a leader from the Global South in the global AI governance landscape. The summit can enable India to play a proactive role in shaping international AI norms, policies, and ethical frameworks. It is essential to ensure that AI technologies are deployed for inclusive development in key sectors such as health, education, climate action, and justice delivery. India must move beyond the conventional digital divide and actively prevent the emergence of an "AI divide" between developed nations and the Global South. Additionally, the summit should be leveraged to build AI-literate human capital, promote responsible and human-centric innovation, and strengthen institutional capacities. By showcasing its AI technological capabilities, India can attract global investments, deepen international cooperation, and reinforce its leadership in equitable and sustainable AI development.

Over the years, AI has shifted from a purely technical topic to one with implications for governance, national security and business. This had led governments, international agencies, industry groups and civil society to initiate debates, consultations, expert meetings and regulatory proposals. Global AI Safety Summits have been held since 2023. The first summit was held at Bletchley Park, United Kingdom (2023), followed by Seoul, South Korea (2024), and Paris, France (2025). India was the co-host for the Paris summit.

Early discussions on AI governance were catalysed by an "ethics boom" between 2016 and 2018, marking the beginning of sustained global engagement with AI policy issues that has now spanned nearly a decade. This surge was not coincidental, but was triggered by a series of high-profile global incidents that exposed the societal risks of algorithmic systems. These included documented cases of racial profiling and algorithmic bias, the first human fatality involving a self-driving vehicle, and the Cambridge Analytica scandal, which revealed the large-scale misuse of personal data without consent for algorithm-driven political micro-targeting. Collectively, these incidents underscored the urgent need for regulatory oversight, ethical safeguards, and accountability mechanisms in the development and deployment of AI technologies.

Prime Minister Narendra Modi with French President Emmanuel Macron

The summit can enable India to play a proactive role in shaping international AI norms, policies, and ethical frameworks. It is essential to ensure that AI technologies are deployed for inclusive development in key sectors such as health, education, climate action, and justice delivery

During May 2019, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) released the Beijing Consensus on Artificial Intelligence and Education, which called for the use of AI to augment human capabilities while safeguarding human rights and fundamental freedoms. In the same year, the Organisation for Economic Co-operation and Development (OECD) became the first intergovernmental body to secure an AI-specific multilateral agreement.

Bletchley Park, United Kingdom (UK), hosted the first global summit on Artificial Intelligence (AI) safety, held on November 12, 2023 with participation form many countries and private organisations associated with AI research, policy making and business. The second summit was held in South Korea on May 21-22, 2024. During the summit, 16 leading tech companies made new voluntary commitments to promote the responsible development

of advanced AI systems. From February 10-11, 2025, the third AI Action Summit was held in Paris. French President Emmanuel Macron and Indian Prime Minister Narendra Modi co-chaired this summit. During this summit Prime Minister Modi had argued that AI is rapidly reshaping humanity's future, transforming political, economic, security, and social systems in ways unmatched by earlier technologies and hence there is a need for a concerted global cooperation to develop trusted governance frameworks that mitigate risks while promoting innovation.

The forthcoming New Delhi Global AI Impact Summit grounds its agenda within a framework that invokes Sutras and Chakras, making it culturally rooted and globally resonant. "Sutra" means "thread" or "aphorism," referring to concise, memorable verses conveying deep spiritual knowledge. The word "chakra" (wheel) is about symbolising order and celestial bodies, with some references to energy points. The use of these specific terms is not merely rhetorical; it signals an intent to move the global AI debate from technological abstraction toward a language of coherence, alignment, and transformation.

Drawing inspiration from the seven energy centres of the human body in ancient Indian philosophical traditions, the Chakras symbolise different dimensions of life that must be harmonised to achieve holistic well-being. In the context of AI governance, these Chakras represent the critical areas required to shape AI as a global public good and to deliver tangible, outcome-oriented cooperation

India is focusing on the three Sutras namely People, Planet, and Progress; the idea is to frame AI as a force for inclusive human development, responsible innovation, and sustainable growth. Together, they emphasise people centred and trustworthy AI, alignment of technological progress with environmental stewardship, and the use of AI to advance impartial development through fair access to data and AI capabilities across sectors.

As articulated in India's vision, the three Sutras are to be operationalised through seven interconnected domains of focused multilateral collaboration, referred to as Chakras. Drawing inspiration from the seven energy centres of the human body in ancient Indian philosophical traditions, the Chakras symbolise different dimensions

What is crucial for India is to leverage the summit to persuade major AI stakeholders to converge around a mutually acceptable policy framework, one that promotes the ethical and responsible growth of AI, reflects the priorities of the Global South, and simultaneously supports innovation and industrial advancement

External Affairs Minister S. Jaishankar walks alongwith Japanese Foreign Minister Toshimitsu Motegi during the 18th India-Japan Strategic Dialogue, in New Delhi

of life that must be harmonised to achieve holistic well-being. In the context of AI governance, these Chakras represent the critical areas required to shape AI as a global public good and to deliver tangible, outcome-oriented cooperation. Each of the seven Chakras is supported by a dedicated working group tasked with examining key AI themes, generating policy-relevant insights, and, through multi-stakeholder engagement, identifying challenges, best practices, and actionable recommendations.

Seven Chakras involve Human Capital; Inclusion for Social Empowerment; Safe and Trusted AI; Resilience, Innovation and Efficiency; Science; Democratising AI Resources; and AI for Economic Growth and Social Good.

Since 2023, the AI summitry process has evolved from an initial emphasis on frontier-model safety at Bletchley, to institutionalising principles of safety, inclusion, and innovation in Seoul, and addressing socio-economic impacts in Paris. The upcoming AI Impact Summit in New Delhi is expected to advance the discourse from abstract principles to practical implementation, highlighting equitable development, "inclusion by design," and India's role in steering a more balanced and globally inclusive AI governance framework.

Overall, expectations from the New Delhi AI Summit must remain realistic. Given the inherent complexity of AI technologies and the uncertainty surrounding the trajectory of technological innovation, rapid or binding outcomes are unlikely. In the domain of norm-building, progress is expected to be incremental, largely voluntary, and non-binding for both states and private actors. What is crucial for India is to leverage the summit to persuade major AI stakeholders to converge around a mutually acceptable policy framework, one that promotes the ethical and responsible growth of AI, reflects the priorities of the Global South, and simultaneously supports innovation and industrial advancement.

–The writer is a Deputy Director General with MP-IDSA, New Delhi. The views expressed are of the writer and do not necessarily reflect the views of Raksha Anirveda.

TRUMP'S UNPRECEDENTED, ILLEGAL STRIKES AT VENEZUELA OPEN RISKY NEW CHAPTER

The modern nation-states face challenges today, because in the face of the US action in Venezuela, the global institutions are heading towards the stark reality of a crisis threatening their very existence. The US action has shown that a superpower can bend any rules

VINAY KUMAR

In the dark of night on January 3, as people in Venezuela slept after enjoying the New Year's celebration, the United States conducted a large-scale strike against Venezuela, bombing several points in the city of Caracas, which resulted in the capture of its president, Nicolas Maduro. The US special forces abducted President Maduro and his wife, Cilia Flores, in an audacious, dramatic raid and whisked them to New York to face drug-trafficking charges.

US President Donald Trump said he was putting Venezuela under temporary American control after the capture of President Maduro. "We will run the country until we can do a safe, proper and judicious transition," Trump said during a press conference at his Mar-a-Lago resort in Florida. "We can't take a chance that someone else takes over Venezuela who doesn't have the interests of Venezuelans in mind," he said.

Trump said as part of the takeover, major US oil companies would move into Venezuela, which has the world's largest oil reserves, and refurbish badly degraded oil infrastructure. It is well known that Maduro's regime was authoritarian and corrupt, leading to mismanagement, but that was not the reason why the US intervened.

Maduro's election was also a sham, as he is believed to have lost the last election in 2024. But Trump's abduction of Maduro can only be described as shocking, unprecedented and untenable in international law. Trump acknowledged that a key American goal was to regain control of Venezuelan oil, the largest known reserves in the world, as he said, "We're going to rebuild the oil infrastructure." He also admitted that it would require billions of dollars in investment by US oil companies to do so.

After capturing Venezuelan President Maduro, US President Trump said, "We will run the country until a safe, proper and judicious transition. We can't take a chance that someone else takes over Venezuela who doesn't have the interests of Venezuelans in mind"

The US operation and abduction of President Maduro sent shockwaves across the world. It also underlined the grim reality that the US will use all means at its disposal to reshape the Western Hemisphere. While its closest allies supported the US action, other nations maintained silence and many others, including China, Russia and Cuba, strongly condemned it. India expressed 'deep concern' over the US operation in Venezuela as New Delhi's direct stakes are limited. India is already facing 50% tariffs imposed by the Trump administration and a trade deal with the US hangs in the balance.

Many Latin American nations drew parallels with the intervention in Panama in 1989, resulting in regime change in which Manuel Noriega was overthrown. Venezuela's ideological allies, Cuba and Nicaragua, demanded Maduro's release and vowed to fight back. Brazil, Chile, Colombia, Mexico and Uruguay, with Spain from Europe, in a joint statement, rejected unilateral

intervention in Venezuela.

The US action tells the world that the so-called West-enforced rules-based order lies in tatters. Washington has brazenly crossed a red line as it has shown absolutely no respect to national sovereignty and national borders. It sends out the message that 'might is right' in international affairs.

The big question now is – what's next and where does Venezuela go from here? Indications are available that Trump appears inclined to strike a working equation with Maduro's Vice President Delcy Rodriguez and run Venezuela through her and existing elites in Caracas.

Trump has also set his sights on Venezuelan oil, and he has already said that US oil companies will refurbish Venezuela's energy infrastructure and start selling oil to third countries. However, strategic analysts believe that it is easier said than done. Though Venezuela has the largest proven oil reserves – about 18% of the world's total reserves – the oil is heavy and sour and not the kind that can be easily refined, but requires a complex process.

As a 'Trump Corollary' to the Monroe Doctrine was proclaimed part of the new National Security Strategy, the threat looms large in the background of further intervention. Perhaps, it is felt as real in Cuba, which had close relations with Maduro. Nearly 32 Cuban soldiers died in the US raid as they were supporting the President's security team. Cuba has relied on Venezuelan oil, now under a strict US embargo. Trump has indicated that Havana could face economic hardship and urged Cuba to "make a deal before it's too late."

In the aftermath of Maduro's capture, it is clear that the US action grossly violated the international law and principles contained in the United Nations Charter, regarding the respect for the territorial integrity of nations, their sovereignty and independence. Open and brazen US imperialism, through the use of force, the application of the Monroe Doctrine that proclaims

It is well known that Maduro's regime was authoritarian and corrupt, leading to mismanagement, but that was not the reason behind the US action. Trump says major US oil companies will move into Venezuela and refurbish badly degraded oil infrastructure

that "the Western Hemisphere, understood from Alaska to Patagonia, belongs to the United States interests."

The US intervention also aims to sever Latin America's ties with China, as the Maduro government was looking towards the East to secure investment and oil trade. A Chinese envoy was in Caracas just before Maduro was captured.

The message to Russia and China seems to be that they can keep up their attacks against Ukraine and Taiwan. And the US continues to treat the Americas as its own backyard, though the US interference in Latin America can lead to a messy situation.

There are also challenges to the modern nation-states because, in the face of the US action in Venezuela, the global institutions will face the stark reality of a crisis threatening their very existence. The US action has shown that a superpower can bend any rules.

The case of the United Nations remaining a mute spectator and its Security Council watching helplessly are stark reminder of this new era of statecraft propelled and supported by strong unilateral military actions. The global order today looks too fragile to be able to hold itself together. In 2026, the world is certainly looking at a chaotic situation and faces a grim reality of the global economy being affected if the crisis in oil-rich Venezuela persists for too long and leads to disruptions.

–The writer is a senior journalist and media consultant. The views expressed are of the writer and do not necessarily reflect the views of Raksha Anirveda.

TACKLING GLOBAL CHALLENGES BILATERALLY

The EU-India Security and Defence Partnership establishes a comprehensive framework aimed at restructuring EU and India's dialogue and cooperation on security and defence, and deliver results in areas such as maritime security, cybersecurity, and counterterrorism. The Security and Defence Partnership also marks the beginning of a new chapter in the strategic relationship between the EU and India

ASAD MIRZA

In less than a year, India has signed two FTAs with UK and EU. The expeditious Indian drive for these agreements shows its strategic recalibration, strengthening the case for diversifying economic partnerships and reducing exposure to an increasingly unpredictable US, in addition to forging a defence and strategic partnership.

On 27 January 2026, the European Union and India signed a Security and Defence Partnership on the margins of the India-EU Summit. The agreement was signed by High Representative and Vice President of the EU Kaja Kallas, and Dr S Jaishankar, External Affairs Minister of India.

The beginning of this new phase in the EU-India relationship signals a shared ambition to deepen economic integration while strengthening strategic and defence cooperation in an increasingly volatile global environment.

The India-EU Security and Defence Partnership covers maritime security, cyber and hybrid threats, counterterrorism, space and defence industrial cooperation. Negotiations were also launched on a Security of Information Agreement, paving the way for India's participation in EU security and defence initiatives.

The Security and Defence Partnership (SDP) responds to an increasingly challenging strategic environment and builds on long standing security and defence cooperation between India and the EU. It establishes a comprehensive framework that defines the EU and India's level of strategic ambition and will structure their cooperation on peace, security and defence.

"The EU and India maintain a long-standing strategic partnership. With today's signing of a new Security and Defence Partnership, we are entering a new phase of EU-India relations. It will expand our cooperation in areas such as maritime security, counterterrorism, and cyber-defence. The EU and India see the world changing in similar ways and are responding together. Security is now a core part of our relationship," EU's High Representative Kaja Kallas said after signing of the SDP.

The beginning of this new phase in the India-EU relationship signals a shared ambition to deepen economic integration while strengthening strategic and defence cooperation in an increasingly volatile global environment

EU-INDIA FTA AND SDP

In fact, the India-EU Free Trade Agreement (FTA) is less about economics or diplomacy and more about geopolitics. Its conclusion has been driven in large part by shifting geopolitical pressures from Washington and Beijing, which have forced both Brussels and New Delhi to reassess their strategic positioning.

For years, as negotiations stalled, India-EU relations drifted without a clear geostrategic anchor. That changed as global relations sharply shifted with the return of Donald Trump to the White House, coupled with China's growing assertiveness across critical supply chains. These developments compelled Brussels and New Delhi to rethink their exposure to these strategic risks.

Trump's renewed threats of tariffs, most recently over Greenland, forced the EU to confront the limits of its reliance on the US. Securing alternative markets

Prime Minister Narendra Modi (centre) with European Council President Antonio Costa (left) and European Commission President Ursula von der Leyen

The EU-India Security and Defence Partnership (SDP) responds to an increasingly challenging strategic environment and builds on long standing security and defence cooperation between India and the EU

is not only an economic calculation, but a geostrategic necessity. India, with its vast consumer market, youthful population and expanding manufacturing ambitions, stands out as a particularly attractive alternative.

India, is also exposed to the risks of Washington's increasingly transactional foreign policy. A long-time proponent of the rules-based international order, one that has underpinned its rapid economic growth, New Delhi found itself vulnerable under the revived "America First" agenda.

The pivotal moment came in June 2025, when Trump claimed credit for 'solving' the India–Pakistan military crisis and sought Nobel nominations. Pakistan complied; India refused. Endorsing Trump's narrative would have risked undermining Modi's domestic strong man image and India's insistence on bilateral crisis management. His refusal signalled a calculated assertion of strategic autonomy.

Washington's subsequent resort to economic pressures reinforced this reassessment. Successive rounds of tariffs, including measures targeting India's purchases of Russian oil for refining and re-export, culminated in duties of a combined 50%. In New Delhi, these moves were widely seen as punitive and hypocritical.

A DYNAMIC AND FORWARD-LOOKING FRAMEWORK

The India-EU Security and Defence Partnership comes at a time of heightened global instability and geopolitical tensions. It reflects the need for international partners to work closely together to address shared security challenges, including in non-traditional strategic domains like cyber, maritime and space.

The SDP reflects both sides' commitment to promoting a stable, rules-based international order with the UN at its core.

The SDP will also facilitate the negotiations on a Security of Information Agreement to enable the exchange of classified information, in line with the security interests of the EU and its member states, paving the way for India's participation in EU security and defence initiatives in line with EU Treaty-based frameworks.

India and EU further strengthened collaboration on emerging and critical technologies, innovation, and research, including by creating India-EU Innovation Hubs and launching an India-EU Startup Partnership. In addition, leaders renew the India-EU Agreement for Scientific and Technological Cooperation until 2030 and launch exploratory talks on the association of India to Horizon Europe, the EU's flagship research and innovation programme.

Additionally, to strengthen industry-level engagement, an India-EU Defence Industry Forum is being established to bring together companies from both sides and facilitate business collaboration. The forum will focus on identifying concrete areas of cooperation, with EU and Indian officials expected to participate as observers.

India already maintains substantial defence trade ties with several EU member states, including France,

Prime Minister Narendra Modi co-chairs the 16th India-EU Summit

Germany, Spain, and Italy, which are key suppliers of advanced weapon systems. Over the past two years, Indian defence exports to Europe have also risen sharply, driven largely by shipments of ammunition and explosives as European nations replenish depleted stockpiles.

Defence Minister Rajnath Singh is said to have coaxed European diplomats during the talks when he suggested India's defence industry can play a "meaningful role" in the EU's wider ReArm initiative, which mobilises €800bn in defence by 2030, especially since the bloc wants to rapidly diversify suppliers, de-risk dependencies and tap into India's growing manufacturing base.

Already, Indian aerospace firms such as Tata Advanced Systems already operate a local assembly line for the Airbus C-295 light transport aircraft in India. EU aerospace and defence companies could deepen their partnerships to source aerostructures and other fuselage components from Tata.

Currently, the Indian Armed Forces have come to trust French defence suppliers, compelled by the performance of Scorpene-class submarines and the predictable timelines and readiness of Rafale fighter jets. Further, enhanced information sharing between EU naval missions and the Indian Navy in the Western Indian Ocean is also being explored, with future joint maritime activities possible in regions of shared interest such as the Gulf of Guinea.

The newly concluded partnership is expected to further accelerate cooperation, with the EU aiming to leverage its strengths in defence research and development to reinforce India's industrial base while diversifying its own supply chains

SDP will facilitate India to participate in the EU's Security Action For Europe (SAFE) regulation, among other financial instruments. The SAFE regulation is a temporary loan scheme that the EU introduced in May 2025 to provide up to €150bn in loans to member states with the aim of helping to rapidly accelerate defence production, procurements, and industrial capacity.

Overall, the newly concluded partnership is expected to further accelerate cooperation, with the EU aiming to leverage its strengths in defence research and development to reinforce India's industrial base while diversifying its own supply chains. Indian manufacturing capabilities, in turn, are seen as a way for Europe to enhance its military preparedness.

The Security and Defence Partnership will be implemented through a dedicated annual India-EU Security and Defence Dialogue, supported by thematic exchanges and consultations on shared challenges and threats. The content of the Partnership will be reviewed as appropriate to assess progress, steer cooperation and effectively respond to global challenges.

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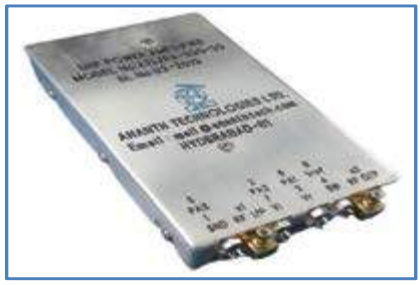

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INDIA'S STRATEGIC CALIBRATION IN WEST ASIA

The evolving defence landscape of West Asia presents both challenges and opportunities for India. The fluidity of the region's security architecture, provides India with an opening to leverage its growing defence capabilities, expanding industrial base, and reputation as a responsible actor. Well positioned to strengthen its defence diplomacy in West Asia, New Delhi's focus should be on consolidating partnerships, providing project stability, and contributing meaningfully to regional security

DR MANJARI SINGH

Defence and security have emerged as a consequential and increasingly visible domain of India's engagement with West Asia. Once confined largely to energy security, migrant mobility, and remittances, India's relations with the region have gradually expanded to include defence cooperation, military diplomacy, intelligence sharing, and strategic capacity building. This shift reflects both India's growing military confidence and the changing security landscape of West Asia, where traditional alliances are being recalibrated and new security arrangements are being explored. Against this backdrop, the reported evolution of a Strategic Mutual Defence Agreement (SMDA) between Saudi Arabia and Pakistan, with Türkiye reportedly exploring accession, has added a new layer of complexity to the region's defence architecture and presents both challenges and opportunities for India's defence diplomacy.

Over the past two decades, New Delhi has steadily institutionalised defence and security cooperation with several West Asian states. India has signed defence cooperation agreements or memoranda of understanding with Iran in 2002, Oman in 2008, the UAE in 2003 (expanded in 2016 and further elevated to strategic defence pact on January 19, 2026), Qatar in 2008, Saudi Arabia in 2014 (significantly advanced in August 2025), and Egypt in 2022. These frameworks cover a range of activities including joint military exercises, training and capacity building, defence industry collaboration, maritime security, counter terrorism cooperation, and regular strategic dialogues. While India's defence relationship with Israel remains among its most robust globally in terms of arms procurement, technology transfer, and operational cooperation, it is noteworthy that the relationship has evolved pragmatically without being formalised through a single overarching defence cooperation agreement, reflecting its unique strategic character.

India's defence footprint in West Asia has grown both qualitatively and quantitatively. Indian armed forces regularly conduct bilateral and multilateral exercises with regional partners. Exercises such as Desert Cyclone with the United Arab Emirates, Al Mohed Al Hindi with Saudi Arabia, Naseem Al Bahr with Oman, and maritime exercises with Qatar and Egypt have deepened

Indian Air Force joins multinational exercise Desert Flag-10 in UAE

India's defence footprint in West Asia has grown both qualitatively and quantitatively. Indian armed forces regularly conduct bilateral and multilateral exercises with regional partners. Exercises such as Desert Cyclone with the United Arab Emirates, Al Mohed Al Hindi with Saudi Arabia, Naseem Al Bahr with Oman, and maritime exercises with Qatar and Egypt have deepened operational familiarity

operational familiarity. Naval deployments across the Gulf of Aden, the Arabian Sea, and the Red Sea have enhanced India's role in the region. Indian military training institutions host officers from West Asian countries, while Indian defence personnel are increasingly exposed to desert warfare environments and maritime security operations relevant to the region.

The expansion of India's defence diplomacy has also coincided with the growing momentum of Aatmanirbhar Bharat and Make in India in defence manufacturing. India's defence exports crossed the ten thousand crore rupee mark in recent years, with West Asia emerging as a promising market for Indian platforms, systems, and components. Coastal surveillance radars, patrol vessels, artillery systems, unmanned aerial platforms, electronic warfare equipment, and ammunition are areas where Indian capabilities align with regional requirements. For West Asian states seeking to diversify defence procurement and reduce over dependence on traditional Western suppliers, India offers a credible alternative that combines affordability, reliability, and political predictability. Joint production and co development initiatives also hold potential as India seeks to integrate itself into global defence supply chains.

However, the evolving regional security environment necessitates careful strategic calibration. The Strategic Mutual Defence Agreement signed between Saudi Arabia and Pakistan in September 2025 represents a significant development. The agreement reportedly includes a collective defence clause stating that any aggression against one signatory would be considered an aggression against the other. Although the full text remains undisclosed, available information suggests that the pact encompasses wide ranging military cooperation including joint deterrence, intelligence sharing, defence industry collaboration, technology transfer, training, and potentially nuclear related coordination. Türkiye's reported interest in joining this framework would further internationalise the arrangement and elevate its strategic implications.

The Saudi Pakistan defence relationship has deep historical roots, dating back to the Treaty of Friendship in 1951 and the 1982 agreement that allowed Pakistani troops to be stationed in the Kingdom for training and support. Over decades, Pakistani military personnel have played advisory roles in Saudi Arabia, and bilateral cooperation has been driven by converging security perceptions, particularly following the Iranian Revolution. The current agreement appears to formalise and expand this long standing relationship

Indian Navy (IN) and Royal Navy of Oman (RNO) participating in bilatera exercise 'Naseem Al Bahr'

in a manner that reflects Saudi Arabia's desire to enhance defence autonomy and diversify security partnerships amid regional uncertainty.

For India, the emergence of such an arrangement raises legitimate strategic questions. Pakistan remains a declared adversary, and its inclusion in any collective defence framework involving key West Asian powers inevitably complicates India's strategic calculus. Türkiye's position adds another layer of complexity. Ankara's posture toward India has been constrained, particularly on issues related to Kashmir and broader ideological alignments. Despite Indian humanitarian outreach during Operation Dost following Türkiye's devastating earthquakes, political relations have not warmed substantially. This underscores the limits of goodwill diplomacy in altering entrenched strategic positions.

At the same time, internal divergences within West Asia indicate that the region is far from coalescing around a singular security axis. The Yemen conflict has exposed serious rifts between Saudi Arabia and the United Arab Emirates. Riyadh has publicly accused Abu Dhabi of undermining Saudi national security, an unusually direct expression of tension between two long time partners. Competing interests in southern Yemen, divergent approaches to proxy groups, and broader ambitions for regional influence have strained ties. Saudi strikes on UAE linked shipments in Yemen underscore the depth of these differences and highlight the fragmentation within the Gulf security landscape.

As Saudi Arabia deepens defence ties with Pakistan and potentially Türkiye, the UAE's emphasis on India underscores a preference for partnerships anchored in economic strength, political stability, and strategic predictability. India's secular polity, self-sustained economic model, and expanding global footprint offer a stark contrast to Pakistan's aid dependent economy and persistent political fragility

It is within this context that India's defence diplomacy acquires added relevance. Rather than being viewed as an outsider, India is increasingly perceived as a rational and stabilising actor capable of engaging across fault lines. High level visits in 2025 and early 2026, including the visit of the UAE President to India on January 19, 2026 with advancement of existing defence cooperation to strategic defence pact along with US $200 billion trade deal by 2032, reflect this perception. While the duration of the President's visit was brief, its symbolism was significant. It conveyed continuity, strategic reassurance, and a shared commitment to long term partnership amid regional flux.

There is a subtle strategic messaging embedded in this engagement. As Saudi Arabia deepens defence ties with Pakistan and potentially Türkiye, the UAE's emphasis on India underscores a preference for partnerships anchored in economic strength, political stability, and strategic predictability. India's secular polity, self-sustained economic model, and expanding global footprint offer a stark contrast to Pakistan's aid dependent economy and

Prime Minister Narendra Modi with UAE President Sheikh Mohamed bin Zayed Al Nahyan

persistent political fragility. For Abu Dhabi, closer alignment with India represents a rational hedge rather than an act of rivalry, aimed at balancing uncertainties and diversifying strategic options.

From India's perspective, this moment calls for a measured but proactive approach. Rather than reacting defensively to emerging alignments, New Delhi should deepen parallel defence engagement with trusted regional partners such as the UAE, Israel, Oman, and Egypt. Expanding defence industrial collaboration, increasing the frequency and complexity of joint exercises, enhancing maritime domain awareness cooperation, and institutionalising strategic dialogues can reinforce India's position as a credible security partner. Defence diplomacy should also be integrated with economic and technological cooperation, reflecting the interconnected nature of contemporary statecraft.

Importantly, India's approach must remain consistent with its broader strategic autonomy. New Delhi has successfully transitioned from the ideologically driven posture of the Non-Aligned Movement era to a pragmatic framework rooted in national interest. In West Asia, this has translated into the ability to maintain relations with competing actors while avoiding entanglement in zero sum rivalries. Defence diplomacy, when pursued as strategic statecraft rather than alliance politics, allows India to expand influence without compromising flexibility.

New Delhi should deepen parallel defence engagement with trusted regional partners such as the UAE, Israel, Oman, and Egypt. Expanding defence industrial collaboration, increasing the frequency and complexity of joint exercises, enhancing maritime domain awareness cooperation, and institutionalising strategic dialogues can reinforce India's position as a credible security partner

On balance, the evolving defence landscape of West Asia presents both challenges and opportunities for India. The emergence of new defence pacts and shifting alignments underscores the fluidity of the region's security architecture. Yet it also reinforces the value of India's steady, interest driven engagement. By leveraging its growing defence capabilities, expanding industrial base, and reputation as a responsible actor, India is well positioned to strengthen its defence diplomacy in West Asia. Rather than being marginalised by emerging alignments, New Delhi can use this moment to consolidate partnerships, project stability, and contribute meaningfully to regional security in a manner aligned with its long term strategic objectives.

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INDIA'S OWN SHIELD: THE ARMOUR OF AUTONOMY

India's defence sector has shed its import-dependency to a large extent. Combining aggressive policy reforms, record-high capital investment, and a flourishing private ecosystem, Aatmanirbhar Bharat has transitioned from a slogan to a measurable, credible reality transforming the Indian defence ecosystem and strengthening its armour

DR MATHEW SIMON

For decades, India was defined by the paradox of being a top-tier global power with a bottom-tier reliance on foreign weaponry. However, the year 2025 has officially been declared the "Year of Reforms" by the Ministry of Defence (MoD), marking the definitive moment when India pivoted from a "buyer" to a "builder." This shift is not merely a change in procurement policy; it is the culmination of the Aatmanirbhar Bharat (Self-Reliant India) vision, supported by record-breaking production figures and structural overhauls that have rewritten the country's strategic destiny.

In the annals of India's military history, 2025 will be remembered as the year the nation finally decoupled its strategic security from the whims of global supply chains. For decades, India's defence posture was characterised by a "supermarket approach" — a patchwork of fragmented foreign platforms that created a logistical nightmare and a dependency trap.

The 2025 reforms have effectively shuttered this era, replacing the vulnerability of "just-in-case" imports with the resilience of "just-in-time" domestic manufacturing. By treating defence not merely as a procurement expenditure but as a primary engine for industrial growth, India has transformed its Aatmanirbharta mission from a rhetorical aspiration into a hardened, kinetic reality, signalling to the world that the "Sleeping Giant" of defence manufacturing has finally found its own voice — and its own teeth.

THE ARITHMETIC OF AUTONOMY: RECORD PRODUCTION AND BUDGETS

The most striking evidence of this transformation lies in the data. In 2025, India's annual defence production soared to an all-time high of ₹1.51 lakh crore (approximately $18 billion) for FY 2024-25. This represents a robust 18% growth over the previous year and a staggering 90% increase since FY 2019-20.

Behind these numbers is a deliberate budgetary strategy. For the 2025-26 fiscal year, the government allocated ₹6.81 lakh crore ($81 billion) to the MoD. Crucially, now the focus has

shifted toward modernisation.

A significant portion of the budget is now ring-fenced for domestic procurement. In 2025 alone, the Defence Acquisition Council (DAC) accorded "Acceptance of Necessity" (AoN) for proposals worth over ₹2.5 lakh crore, with nearly 92% of these contracts earmarked for the "Buy (Indian-IDDM)" category.

Of the 193 contracts signed in the latest cycle, 177 were awarded to domestic industry, injecting over ₹1.68 lakh crore directly into the Indian economy.

STRUCTURAL REFORMS: FROM BUREAUCRACY TO BUSINESS

The "Year of Reforms" in 2025 introduced the Defence Procurement Manual (DPM) 2025, which became effective on November 1. This manual is a landmark in "Ease of Doing Business," simplifying revenue procurement worth approximately ₹1 lakh crore. By standardising procedures across the Army, Navy, and Air Force, the DPM 2025 has slashed bureaucratic delays that previously sidelined domestic MSMEs.

Furthermore, the operational architecture of the Indian Armed Forces is undergoing its most significant change since independence: the transition to Integrated Theatre Commands.

In the annals of India's military history, 2025 will be remembered as the year the nation finally decoupled its strategic security from the whims of global supply chains. For decades, India's defence posture was characterised by a "supermarket approach" — a patchwork of fragmented foreign platforms that created a logistical nightmare and a dependency trap

By establishing commands in Jaipur (Western), Lucknow (Northern), and Coimbatore (Maritime), India is synchronising its tri-service resources to be more "joint" and "integrated" - a move that directly supports the domestic industry by creating unified equipment requirements.

THE RISE OF THE PRIVATE SECTOR AND STARTUPS

2025 has witnessed the breaking of the public-sector monopoly. While Defence Public Sector Undertakings (DPSUs) still account for 77% of production, the private sector's share has climbed to 23%. This growth is fuelled by:

1. Defence Industrial Corridors (DICs): The corridors in Uttar Pradesh and Tamil Nadu have attracted investments exceeding ₹9,145 crore, with over 289 MoUs signed to unlock potential opportunities worth ₹66,423 crore.
2. iDEX and ADITI: The Innovations for Defence Excellence (iDEX) initiative has engaged over 16,000 MSMEs and startups. For 2025-26, the government allocated ₹449.62 crore to iDEX and the ADITI scheme to foster "Acing Development of Innovative Technologies".
3. Positive Indigenisation Lists (PILs): By

2025, the government has placed over 5,000 items under an import embargo, forcing a "domestic-first" mindset for everything from simple components to complex weapon systems like the Nag Missile System Mk-II and Arnala-class anti-submarine ships.

"MAKE FOR THE WORLD": THE EXPORT SURGE

Perhaps the most "pontificating" achievement of Aatmanirbhar Bharat is India's emergence as a global defence exporter. In FY 2024-25, defence exports reached a record ₹23,622 crore ($2.8 billion), a 12% increase from the previous year and a massive 34-fold jump from a decade ago.

India now exports to over 100 countries. Key highlights include:

- Top Destinations: The United States (components and sub-systems), France, and Armenia (Pinaka rockets and Akash missiles).
- Key Platforms: Major exports now include the BRAHMOS supersonic cruise missile, Tejas LCA components, Dornier-228 aircraft, and Advanced Towed Artillery Gun Systems (ATAGS).
- The Private Edge: Remarkably, the private sector contributes nearly 64% of total exports, proving that Indian companies are now globally competitive in price and technology.

The operational architecture of the Indian Armed Forces is undergoing its most significant change since independence: the transition to Integrated Theatre Commands. By establishing commands in Jaipur (Western), Lucknow (Northern), and Coimbatore (Maritime), India is synchronising its tri-service resources to be more "joint" and "integrated" - a move that directly supports the domestic industry by creating unified equipment requirements

TECHNOLOGICAL FRONTIERS: OPERATION SINDOOR AND BEYOND

2025 was also the year India validated its indigenous tech in the battle field. Operation Sindoor served as a combat-validation milestone for home-grown drone warfare, layered air defence, and electronic warfare systems. The launch of Mission Sudarshan Chakra by Prime Minister Modi on Independence Day 2025 further emphasised this focus. This mission aims to build a "nationwide security shield" using AI-enabled systems, loitering munitions, and indigenous microprocessors like the DHRUV64. India

is no longer just manufacturing foreign designs; it is designing original solutions for modern, net-centric warfare.

LIMITATIONS AND CHALLENGES

While the 2025 reforms have fundamentally shifted the defence landscape, a critical analysis reveals that Aatmanirbharta remains a journey of high-tech hurdles rather than a completed destination. The primary limitation lies in the persistent "Technology Gap" in core propulsion and material sciences. Despite the success of the Tejas and various missile programmes, India still lacks an indigenous aero-engine (the Kaveri project remains a cautionary tale), forcing a continued reliance on GE's F414 engines for the LCA Mk-II.

Furthermore, while the domestic share of production has reached 75% for modernisation, this often translates to the local assembly of systems that still depend on imported high-end semiconductors, precision electronics, and specialised alloys. This "assembly-centric" indigenisation risk creates a facade of self-reliance that could be vulnerable during prolonged supply chain disruptions or "sanction-heavy" geopolitical shifts.

Structural and bureaucratic challenges also persist as a friction point against rapid innovation. The "Legacy Procurement Mindset" often prioritises the established, risk-averse Defence Public Sector Undertakings (DPSUs) over agile private startups, despite the private sector now contributing 21-23% of production. Private players frequently cite a "lack of a level playing field," where long gestation periods and unpredictable order pipelines make heavy R&D investment a financial gamble.

Additionally, the DRDO's share of the budget — standing at roughly 3.94% — is widely viewed by experts as insufficient for the "quantum leap" required in directed energy weapons, hypersonic, and stealth technology. To truly transcend these barriers, the next phase of reforms must move beyond "Make in India" (manufacturing) to "Design in India" (Intellectual Property), ensuring that the sovereignty of the software and the core hardware, i.e. the "brain" is as Indian as the steel that encases it.

However, the year 2025 stands as the moment India's defence sector finally shed its "import-dependent" skin. Through a combination of aggressive policy reforms, record-high capital investment, and a flourishing private ecosystem, Aatmanirbhar Bharat has transitioned from a slogan to a measurable, credible reality. India is now not just securing its own borders with "Made in India" steel, but is increasingly providing the world with the tools of modern security.

–The writer is an Assistant Professor, at ICFAI University, Jaipur. The views expressed are personal and do not necessarily reflect the views of Raksha Anirveda.

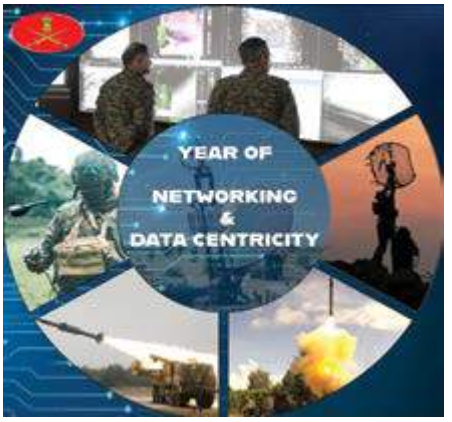
NETWORKING AND DATA CENTRICITY IN INDIAN ARMY

The character of modern land warfare is undergoing a fundamental transformation driven by advances in networking, artificial intelligence, unmanned systems, and data-centric command architectures. With Indian Army's focus on "Networking and Data Centricity" in 2026, the article examines the doctrinal, technological, and institutional shifts underpinning this transition. It analyses the Army's evolving approach to unmanned and autonomous systems, AI-enabled decision support, predictive maintenance, logistics modernisation, and human–machine teaming

LT COL NARENDRA TRIPATHI

Modern warfare has progressively shifted from an attrition-based contest of platforms to a competition defined by information superiority, speed of decision-making, and system resilience. The Indian Army's selection of "Year of Networking and Data Centricity" as the theme for Army Day 2026 reflects a conscious recognition of this shift. Contemporary conflict environments, characterised by persistent surveillance, multi-domain operations, and compressed decision cycles, demand forces that can sense, analyse, decide, and act faster than their adversaries.

This article examines how the Indian Army is operationalising this vision through integrated digital architectures, unmanned systems, AI-enabled sustainment, and indigenous innovation. Rather than focusing on individual technologies in isolation, the analysis emphasises system-level integration as the decisive factor in future combat effectiveness.



2026 in year of Networking and data centricity, Pic courtesy: ADGPI Instagram handle

ARMY DAY 2026 AS A MANIFESTATION OF TRANSFORMATION

Army Day observances have progressively evolved into platforms that showcase the Indian Army's advancing operational capabilities, moving beyond ceremonial tradition to reflect tangible transformation. The 2026 celebrations clearly underscored this evolution, seamlessly integrating legacy military ethos with cutting-edge technologies, offering the nation a compelling demonstration of combat capability augmented by deep-tech applications.

The Shaurya Sandhya event, highlighted by a synchronised aerial display of nearly a thousand drones, demonstrated the maturity of autonomous coordination and network-enabled control architectures. Beyond its visual impact, the display served as a powerful indicator of doctrinal direction, illustrating how large-scale unmanned systems, when intelligently networked and centrally orchestrated, can fundamentally reshape paradigms for reconnaissance, deception, and precision strike.

In parallel, the operational enactment of Operation Sindoor reinforced the Army's enduring emphasis on adaptability and the integrated employment of combat power. It reaffirmed a core principle of modernisation, that technology acts as a force multiplier for the soldier, enhancing human judgment and battlefield effectiveness rather than supplanting the central role of the warrior.

AGILE FORMATIONS AND THE EVOLUTION OF TACTICAL UNITS

The participation of specialised Bhairav Battalion contingents during the celebrations marked an important

milestone. These units symbolise the Indian Army's shift towards highly mobile, mission-oriented combat groupings capable of rapid deployment and independent action.

Such formations rely heavily on secure communications, real-time situational awareness, and decentralised decision-making. Networking and data fusion enable these units to operate effectively despite dispersion, ensuring coherence without rigid command structures. This represents a move away from linear, hierarchical control towards distributed command architectures supported by digital systems.

FIREPOWER IN A NETWORKED BATTLESPACE

Conventional firepower, armour, artillery, and rocket forces remain central to land warfare. However, its effectiveness increasingly depends on integration with ISR assets, targeting networks, and command systems. Modern artillery and armour platforms function not as isolated weapons, but as nodes within a broader combat ecosystem. This integration enables rapid sensor-to-shooter loops, enhanced target discrimination, and coordinated fires across domains. Consequently, combat effectiveness is determined less by individual platform capability and more by network reliability and data fidelity.

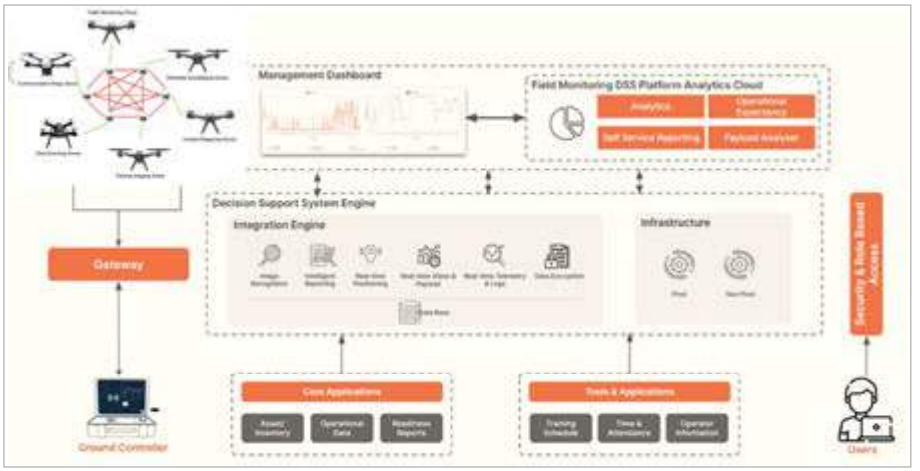
Shaurya Sandhya Drone show at Jaipur on Army Day, Pic Courtesy: Prokerala/IANS

UNMANNED AERIAL SYSTEMS: FROM ASSETS TO ECOSYSTEMS

Unmanned Aerial Systems (UAS) have transitioned from niche ISR tools to multi-role operational enablers. The Indian Army's expanding drone inventory supports surveillance, logistics, targeting, training evaluation, and force protection. However, global conflict experience underscores a critical lesson: numerical superiority in drones does not guarantee battlefield advantage. Operational effectiveness emerges from integration. Diverse drone types, tethered, untethered, swarm-enabled, must feed synchronised data into unified command-and-control systems. Fragmentation caused by OEM-specific control stations limits situational awareness and slows decision-making. The requirement, therefore, is not merely for more drones but for networked drone operations supported by AI-assisted data fusion.

In parallel with drone proliferation, the Army has invested in training units

Equipped with state-of-the-art equipment, Bhaiarav Battalion, Pic Courtesy: Times of India



Integrated Decision Support system using Drone Network, Pic Courtesy: Axl Drone, Kerala

to manage basic unmanned operations organically, while also strengthening counter-UAS capabilities. As drone density increases, effective detection, identification, and neutralisation become indispensable elements of battlefield survivability.

ARTIFICIAL INTELLIGENCE AS AN OPERATIONAL ENABLER

Artificial Intelligence has tangible military utility when applied to practical problems such as sensor fusion, target recognition, predictive maintenance, and counter-UAS operations. Its value lies in compressing the cognitive burden on commanders and staff by filtering information and highlighting actionable insights. The next major inflection point lies in Generative AI (GenAI) deployed as a secure, sovereign decision-support capability. When implemented on-premise, GenAI systems can function as intelligent staff assistants, processing natural-language queries and synthesising insights from operational databases, technical manuals, SOPs, and historical records.

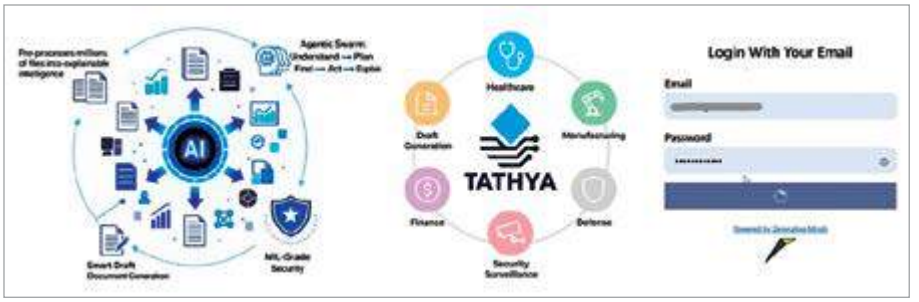
A relevant example is TATHYA, developed by Zenerative Minds, which exemplifies a mil-grade GenAI platform designed for knowledge management and decision support. Built on an agentic swarm AI architecture, TATHYA preprocesses large volumes of data into explainable intelligence, enabling planning support while preserving data sovereignty. Its design philosophy demonstrates how GenAI can augment human judgment without compromising security or command authority.

MUMT USING ROBOTICS

Robotics adoption within the Indian Army has followed a pragmatic, mission-driven trajectory. Applications such as explosive ordnance disposal robots, surveillance platforms, and autonomous sensors prioritise immediate operational value and risk reduction. The emerging paradigm of man unmanned teaming recognises complementary strengths. Machines excel in endurance, speed, and pattern recognition; humans retain judgment, ethics, and command responsibility. The goal is synergy rather than substitution. Within this framework, legged robotic systems, including robotic dogs, offer potential advantages in reconnaissance, perimeter security, and operations in complex terrain. Strategic advantage, however, lies not in limited imports but in indigenous development, enabling terrain-specific adaptation and long-term sustainment.

MAINTENANCE PHILOSOPHY AND SUSTAINMENT TRANSFORMATION

Operational readiness depends fundamentally on sustainment. The Indian Army's maintenance philosophy has evolved into a structured system guided by six pillars: skilled manpower, tools, infrastructure, spares, timely repairs, and major interventions. Maintenance infrastructure has advanced from basic



Gen AI system Tathya designed for Mil grade on-prem deployment, Pic Courtesy: Zenerative Minds, Hyderabad

facilities to integrated static and mobile repair ecosystems. Digital initiatives such as the Workshop Automated System Program (WASP) have enhanced transparency, enabling real-time tracking of job cards, spares, and equipment status. Inventory management has similarly transitioned toward data-driven provisioning, leveraging analytical techniques for demand forecasting and reliability assessment. Layered maintenance responsibilities ensure faults are addressed at appropriate echelons, minimising downtime across dispersed deployments.

AI-ENABLED PREDICTIVE MAINTENANCE

AI enables a shift from reactive to predictive maintenance, improving equipment availability and reducing lifecycle costs. This requires a secure, mission-aware data architecture aligned with operational constraints. On-premise data lakes at unit and upto command levels store structured and unstructured operational data. IoT-based sensors embedded in critical platforms log performance parameters, with data processed locally at the edge and transmitted securely when feasible. A multi-tiered architecture supports immediate diagnostics at the tactical level, trend analysis at intermediate echelons, and advanced predictive analytics at central hubs. Federated learning allows AI models to be trained locally without transferring sensitive data, preserving confidentiality and sovereignty.

A PHASED ROADMAP FOR DEFENCE TECH ADOPTION

A credible roadmap for the adoption of Artificial Intelligence in defence must be phased, resilient, and operationally grounded. The initial phase should prioritise comprehensive digitisation and sensorisation of legacy and contemporary platforms, establishing a reliable data foundation. This must be followed by carefully controlled pilot deployments in secure, air-gapped environments, enabling validation of AI use cases without compromising operational security. Proven applications can subsequently be scaled across Services under the oversight of a centralised Defence Maintenance and AI Integration Hub, operating on hardened, on-premise infrastructure.

Briefing on Indigenous Quadruped Robotics (Robo Dogs) to Chief of Army Staff, General Upendra Dwivedi and Defence Minister, Pic Courtesy: Xterrarobotics /IIT Kanpur

Equally critical to this roadmap is the establishment of high-quality training and experimentation infrastructure for AI, unmanned systems, and robotics. Dedicated AI and robotics laboratories, simulation centres, and drone test ranges should be created as structured learning ecosystems where personnel can acquire hands-on proficiency, experiment with emerging technologies, and understand their operational implications. These facilities would serve as technology incubation and assimilation environments, enabling troops, technicians, and commanders to internalise new concepts in a controlled and purpose-built setting before field deployment.

The final phase envisages full-spectrum integration of Artificial Intelligence across sustainment and operational domains, including AR-enabled maintenance, autonomous diagnostics, and predictive logistics, with systems engineered to function reliably in contested, degraded, and denied environments while retaining robust human-in-the-loop mechanisms to preserve command authority, accountability, and operational judgement. Central to the success of this transformation is the manner in which deep technologies are imparted to the force, with the most effective training achieved through the involvement of seasoned subject matter experts from the defence ecosystem, particularly military veterans with strong academic foundations from institutions such as IIsT, IIsM and IISc, and proven experience across military operations and the defence industry, who uniquely combine operational insight, industrial execution, and academic rigour, thereby creating an optimal environment for the structured assimilation and responsible adoption of AI, robotics, and unmanned systems within the Armed Forces.

TOWARDS INTELLIGENT SUSTAINMENT & NETWORKED COMBAT POWER

The Indian Army's emphasis on networking and data centricity reflects a strategic understanding that future conflicts will be won by forces that integrate sensors, shooters, sustainment systems, and commanders into coherent digital ecosystems. Artificial intelligence, unmanned systems, and predictive logistics are not adjuncts but core enablers of combat power. Over the next decade, AI-driven sustainment, human–machine teaming, and sovereign digital architectures will redefine readiness and resilience. With balanced policy support, indigenous innovation, and doctrinal clarity, the Indian Army is well positioned to transition from platform-centric strength to an intelligent, integrated warfare capability.

–The writer is a veteran of the Indian Army (EME) and now a Founder/ Consultant in various deep-tech startups, leading innovation defence technologies in Gen AI, Drones and Robotics. His firm has won the Samvaad AI iDEX project for Indian Navy. The information presented is sourced from open domains. The views expressed are of the writer and do not necessarily reflect that of Raksha Anirveda

SHIPBUILDING PROWESS MATTERS

Building on its strength in defence shipbuilding excellence and burgeoning policy support, India can narrow down the existing disparity between its shipbuilding ecosystem and the well-oiled global machines of China and South Korea. With strategic investments translating into sustained infrastructure upgrades, technology adoption, export competitiveness, sustained focus, significant capital flows, maritime infrastructure modernisation, skilled work force, quality standards and international collaboration, India can emerge as a strong global contender in both commercial and defence shipbuilding

CDR SUMIT GHOSH

China has cemented its position as the world's top shipbuilding nation as it secured orders for 3,454 out of a total of 5,735 vessels in the current global orderbook, about 62.42% or a total of 175.4 Mn GRT. China, Japan and South Korea dominate with combined orders of over 90% of the world's orderbook. South Korea ranks second with an orderbook share of 21.39% or 687 ships, while Japan is placed third with a share of 8.83% or 651 units. The Asian nations' dominance in shipbuilding is supported by the rise in clean fuel-powered ships.

To meet maritime aspirations of power, reach and dominance, India must achieve excellence in the shipbuilding industry, which is the cornerstone of global trade, national defence, and comprehensive maritime capability. Over the past decade, Asian shipbuilding giants China and South Korea have consolidated their dominance in terms of output, technology, efficiency and global market share, while India, despite strategic intent and policy boosts, continues to lag in several key performance parameters.

GLOBAL POSITIONING & MARKET SHARE

China has become the global leader in shipbuilding output, accounting for more than 56.5% (average) of global merchant shipping by gross tonnage. dwarfing other countries combined. As per industry data, in 2024 alone, the Chinese shipyards delivered an estimated 38.7 Mn GRT equating to roughly 56.5% of global volume, and secured more than half of global orders. South Korea consistently ranks second, with approximately 20 Mn GRT output in the same period, whilst possessing a strong niche in high-value vessels. In fact, China, South Korea, and Japan are leaving a small portion for all other countries of the world, including India. Korean shipyards HD Hyundai and Samsung Heavy Industries, along with Hanwha Ocean, collectively secured billions of dollars' worth of contracts in 2024 alone (e.g., HD Hyundai securing orders for 112 vessels valued $ 12.3 bn).

The Indian shipbuilding industry, which is the key pillar of our global trade, national defence, and the overall national maritime capability, has to be highly technologically advanced and capable of high efficiency, output and impact. Today, India's overall shipbuilding output remains very small relative to China and Korea. Its commercial shipbuilding market has been valued at just $1.3 billion in 2025, representing less than 1% of the global market. In terms of global market share, India's presence is minuscule and estimated at 0.06% in overall shipbuilding. This stark difference underscores the scale gap between Indian shipyards and global leaders. India's total shipyard capacity stands at around 0.072 million gross tonnes (GT) compared to individual Chinese yards exceeding about 10 Mn GT and Koreans delivering from 7 to 9 Mn GT.

PRODUCTION CAPACITY & OUTPUT TRENDS

China's shipbuilding machine produces an enormous volume annually. In 2024, China's output reached approximately 48 million deadweight tonnage (DWT), with its order-book increasing nearly 50% year-on-year to over 208 million DWT, strengthening its dominant position. Beyond volume, China has diversified its portfolio in recent years to include green vessels, LNG carriers, cruise ships, and other advanced commercial ship types, signalling a move beyond simple bulk export volume towards higher-value segments. South Korea's shipyards, while smaller in aggregate volume than China's, have excelled in specific high-value categories such as LNG and LPG carriers, VLCCs, and advanced military support vessels. South Korea also secured a rather high and disproportionate share of LNG carrier orders globally, often exceeding 90% of such contracts in certain years.

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Indian shipyards are primarily structured around defence, naval support, and smaller commercial vessels rather than mass commercial tonnage. Public sector yards such as Mazagon Dock and Cochin Shipyard build complex platforms, including destroyers, frigates, submarines and Carriers, demonstrating capabilities in high-technology defence shipbuilding. However, in pure commercial output,

Indian yards, limited by dock size, technology access, and order volumes, represent only a fraction of the global tonnage production.

TECHNOLOGY AND PRODUCTIVITY

A defining attribute of Chinese and Korean success has been technology integration, automation, and productive scale. Chinese shipyards benefit from lower labour costs (~50% lower than Korea/Japan) and government subsidies that reduce financing costs and operational risk. Korean yards, meanwhile, maintain high productivity through advanced modular construction techniques, robust design ecosystems, and skilled marine engineering workforces. These factors contribute to greater labour productivity and shorter build cycles. While precise productivity statistics vary, historical comparisons suggest labour productivity in East Asian yards can be more than 10x that of Indian shipbuilding operations. Indian shipyards grapple with legacy infrastructure and historically segmented supply chains. Lower degrees of automation, reliance on imported components, and higher financing costs (often ~9-10% interest) reduce overall efficiency and increase construction lead times. Collaborative agreements, such as technical cooperation between Cochin Shipyard and Korean shipbuilder HD Korea Shipbuilding & Offshore Engineering, are intended to accelerate knowledge transfer and improve technological competencies.

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FINANCIAL & COMMERCIAL METRICS

Korean shipyards maintain robust revenue streams from both commercial and defence contracts, underpinned by a diverse global client base. For instance, the combined contract value booked by Korean yards in 2024 reached tens of billions of dollars across hundreds of vessels. Chinese yards also accumulated vast order backlogs, exceeding 90 million CGT, suggesting sustained demand and future production security. Indian shipyards, while showing revenue growth in defence and diversified markets, operated on a smaller scale financially. Our yards have historically lacked large order backlogs for commercial vessels, relying instead on strategic defence contracts. However, recent shifts like the French CMA CGM placing a first order for vessels to be built in India indicate emerging commercial confidence.

DEFENCE SHIPBUILDING AND STRATEGIC IMPACT

While commercial shipbuilding dominates global statistics, defence shipbuilding is of particular interest in a defence-focused magazine context. Reports indicate Chinese shipyards can produce more tonnage in a year than entire industries in other major nations have produced across decades, contributing to both commercial fleets and naval power expansion. South Korean yards also build high-value naval platforms and military support vessels, and their defence shipbuilding primarily complements a robust commercial base. India's shipyards, such as Mazagon Dock, Kolkata and Hindustan Shipyard, have delivered multiple submarines, destroyers, and offshore patrol vessels. These achievements underline a maturation of indigenous defence shipbuilding capability, which is considered crucial to India's maritime security strategy.

To compete globally, the Indian shipbuilding industry must focus on:

a. **Advanced Tech:** Use modern design tools & software (CAD/CAM systems and digital modelling), automated welding, cutting, and assembly to boost precision and reduce costs. Integrate eco-friendly shipbuilding solutions (e.g., energy-efficient hull designs, LNG/alternative fuel systems. Strengthening research in high-end naval architecture, materials science (composites, advanced steels), and digital shipbuilding.
b. **Modernisation of Infrastructures:** Upgrading Facilities: Modern dry docks, slipways, fabrication units, and material handling systems. Development of integrated shipbuilding and logistic clusters. Improved supply chain of integration.
c. **Skilled Workforce Development:** Training and Certification in Industry-focused welding, ship design, quality control, and marine engineering. Collaboration with technical institutes and foreign shipbuilders for skill transfers and retention strategies.
d. **Policy and Regulatory Support:** Stable and predictable policies, financial Incentives e.g. subsidies, tax breaks, and low-cost financing to improve cash flow for shipyards. Duty exemptions on imported inputs for export orders. Ease of Doing Business: Simplified approvals and faster clearances for projects.
e. **Financing & Cost Competitiveness:** Easy access to capital: Improved funding mechanisms from banks and financial institutions. Reducing operating and financing costs through economies of scale. Insurance and guarantee mechanisms.
f. **Quality, Standards & Certification:** Compliance with global class societies (e.g., ABS, DNV-GL, Lloyd's Register). Stringent Quality Control: Quality Assurance systems & ISO certifications. Warranty support, spares, and retrofit services to build global client trust.
g. **Strategic Focus on Niche Segments:** Specialised Vessels: Offshore service vessels, dredgers, tugs, coast guard ships. Warships and submarines with domestic content. Small & Medium Commercial Vessels (ferries, bulk carriers, container feeders).Ships with lesser emissions and alternative fuel systems.
h. **Supply Chain and Indigenous Content:** Strengthening suppliers of marine engines, electrical systems, and automation controls. Reducing delays and costs in transporting parts and raw materials.
i. **Global Partnerships and Collaboration:** Tie-ups with established global shipbuilders for technology transfer, building hulls or components for foreign companies. Collaboration in design, engineering, and after-sales.
j. **Digital Transformation:** Shipbuilding ERP systems, virtual testing and simulation to cut development time. Data Analytics & IoT.
k. **Reduced Red tapeism, time-**bound actions and planning.

Indian shipyards grapple with legacy infrastructure and segmented supply chains. Lower degrees of automation, reliance on imported components, and higher financing costs reduce overall efficiency and increase construction lead times. Collaborative agreements, such as technical cooperation between Cochin Shipyard and Korean shipbuilder HD Korea Shipbuilding & Offshore Engineering, are intended to accelerate knowledge transfer and improve technological competencies

SUMMING UP

A clear disparity exists between India's shipbuilding ecosystem and the well-oiled global machines of China and South Korea. While China's dominance in volume and South Korea's high-value specialisation dominate global shipbuilding, India's strengths lie in defence shipbuilding excellence and burgeoning policy support. If India's recent strategic investments translate into sustained infrastructure upgrades, technology adoption, and export competitiveness, it could begin to narrow structural gaps. Yet, catching up with the sheer scale and integration of Chinese and Korean shipyards will require sustained focus, significant capital flows, and international collaboration.

To compete on the global stage, the Indian shipbuilding sector needs to modernise its maritime infrastructure, adopt advanced technologies, strengthen policy frameworks and financing support mechanisms, build a skilled workforce, focus on quality & standards and form global collaborations. With coordinated action in these areas, India can emerge as a strong global contender in both commercial and defence shipbuilding.

–The writer is a former Indian Navy Submarine Officer He is a specialist in missiles, underwater weapons, sensors, anti-submarine warfare and also a deep sea diver. He writes regularly on strategy, tactics, warfare and modern military technologies. He is an active member of national strategic think tanks like USI, the Chakra Foundation and STRIVE. The views expressed in the paper are personal. He can be reached at sumit12in@gmail.com.

BETWEEN WASHINGTON

India's presidency of BRICS comes amid escalating geopolitical fractures, economic uncertainties, and a push for a multipolar world order. New Delhi must navigate external pressures—especially from a protectionist United States—while managing internal divergences among member states

NEERAJ SINGH MANHAS

India assumed the rotating presidency of the BRICS grouping on January 1, 2026, stepping into a pivotal role at a time when the world is grappling with escalating geopolitical tensions, economic uncertainties, and a resurgent push for multipolarity. The BRICS alliance comprises Brazil, Russia, India, China, and South Africa. The alliance was expanded in 2024 to include Egypt, Ethiopia, Iran, the United Arab Emirates, and Saudi Arabia. It now represents over 45 per cent of the global population and approximately 35 per cent of the world's GDP, surpassing the G7 in purchasing power parity terms according to recent IMF estimates. This economic heft underscores why India's leadership is crucial: it offers New Delhi a platform to amplify the voices of the Global South, foster sustainable development, and challenge entrenched Western dominance in international institutions.

Prime Minister Narendra Modi's vision to redefine BRICS as "Building Resilience and Innovation for Cooperation and Sustainability" signals a pragmatic, people-centric approach, emphasising humanity-first solutions to shared crises like pandemics, climate change, and economic inequality. This presidency is not just a diplomatic milestone for India; it is essential for reshaping global governance in a way that prioritises equity over exploitation.

The importance of India's BRICS presidency lies in its potential to consolidate the bloc's role as a counterweight to unipolar influences, particularly at a juncture when multilateralism is under severe strain. With the expanded BRICS+ now accounting for nearly 30 per cent of global land area and controlling over 40 per cent of the world's oil production—thanks to new members like Saudi Arabia and the UAE—the grouping has evolved from a mere economic forum into a geopolitical force advocating for reforms in bodies like the United Nations, World Bank, and International Monetary Fund. Data from the New Development Bank (NDB), established by BRICS in 2014, highlights its growing impact:

India's presidency is not just a diplomatic milestone for India; it is essential for reshaping global governance in a way that prioritises equity over exploitation

AND THE WORLD

by 2025, the NDB had approved loans worth over $35 billion for infrastructure and sustainable projects, with India being the largest borrower at around $10 billion for initiatives in renewable energy and urban development.

For India, holding the presidency in 2026 allows it to build on its successful 2023 G20 chairmanship, where it championed African Union inclusion and digital public infrastructure (DPI). Analysts project that under India's stewardship, BRICS could advance DPI adoption across member states, potentially benefiting 3.5 billion people by enhancing access to services like telemedicine and education technology. This is vital for India, whose economy grew at 7.8 per cent in 2025 per World Bank figures, as it seeks to leverage BRICS to secure supply chain stability amid global disruptions, including the ongoing Russia-Ukraine conflict and Middle East tensions. Without India's balanced leadership, the bloc risks fragmentation, diluting its ability to advocate for debt relief for low-income countries—where Global South nations owe $9 trillion in external debt, as per UN estimates—thus making this presidency a linchpin for collective progress.

Yet, the path forward is fraught with challenges, particularly in managing relations with a tariff-wielding United States under President Donald Trump and navigating internal divergences among BRICS members. The way forward for India's BRICS tenure is shadowed by formidable challenges, chief among them being the intensifying friction with the US. President Trump's administration has ramped up protectionist measures, imposing 100 per cent tariffs on select imports from BRICS nations accused of undermining the US dollar, a policy that could shave off 1-2 per cent from India's GDP growth if escalated, according to a 2025 Brookings Institution report. Trump's warnings, issued just before the 2025 Rio de Janeiro BRICS Summit, targeted de-dollarisation efforts, labelling them an "anti-Western agenda." This puts India in a delicate position: while BRICS has explored local currency settlements to reduce reliance on the dollar—which dominates 88 per cent of global transactions per SWIFT data—New Delhi has distanced itself from

aggressive de-dollarisation rhetoric to preserve its strategic partnership with Washington.

US Commerce Secretary Howard Lutnick's remarks in 2025, criticising India's purchase of Russian military equipment, exemplify the ripple effects: India's trade with the US reached $120 billion in 2025, but tariffs could disrupt this, forcing India to balance its Quad alliances with BRICS commitments. Moreover, US actions in Venezuela, including reported interventions in early 2026, test BRICS' unity on multilateralism; with Russia and China backing Caracas, India must navigate this without alienating Western partners.

The Venezuelan crisis, where oil production has plummeted 80 per cent since 2013 due to sanctions, highlights BRICS' potential role in advocating for non-interference, but divergent views—India's preference for dialogue over confrontation—could strain consensus. India's presidency thus becomes a litmus test for maintaining BRICS as a pro-Global South platform without provoking a full-blown trade war.

Internal challenges within BRICS further complicate India's agenda, as the bloc's expansion has amplified ideological and economic divergences. China, the economic powerhouse with a GDP of $18 trillion in 2025 (IMF data), pushes for rapid de-dollarisation and infrastructure dominance through initiatives like the Belt and Road. It has invested $1 trillion globally but drawn criticism for debt traps in countries like Ethiopia. India, wary of China's border aggressions—evidenced by the 2020 Galwan clash and ongoing Ladakh standoffs—must steer clear of Beijing's overreach while fostering cooperation. Data shows Indo-China trade hit $135 billion in 2025, but India's $100 billion deficit underscores the imbalance.

While BRICS has explored local currency settlements, New Delhi has avoided aggressive anti-dollar talk to preserve its strategic partnership with Washington

Russia, facing Western sanctions post-Ukraine invasion, relies on BRICS for energy exports; its oil sales to India surged 300 per cent since 2022, reaching 2.5 million barrels per day in 2025 per OPEC figures, yet this exposes India to secondary US sanctions. South Africa and Brazil advocate for climate justice, with the former's G20 presidency in 2025 securing $8.5 billion in just-transition funding, but new members like Iran bring complications—its nuclear ambitions and regional conflicts could dilute focus.

With nearly 65 countries applying for membership, as noted by Indian experts, India must manage expansion carefully; unchecked growth risks paralysing decision-making in a consensus-driven group. The proposed BRICS+ unit—a payment instrument backed 40 per cent by gold and 60 per cent by member currencies—aims to facilitate $500 billion in intra-BRICS trade (up from $300 billion in 2020), but India's cautious stance prioritises stability over revolution. These frictions demand deft diplomacy from New Delhi

to consolidate gains, such as advancing an investment guarantee mechanism for climate and poverty alleviation, projected to mobilise $100 billion annually for emerging economies.

Despite these hurdles, India's presidency is indispensable for advancing a multipolar world order that benefits the marginalised. The bloc's emphasis on sustainable development aligns with India's domestic goals: with renewable energy capacity at 180 GW in 2025, India aims to lead BRICS in climate-resilient infrastructure, potentially reducing carbon emissions by 2.5-3 billion tons cumulatively by 2030, per IPCC-aligned models. Food and fuel security, debt relief, and AI cooperation will be central, addressing challenges where 800 million people in BRICS nations face hunger, according to FAO data. For India, this role enhances its global stature, attracting FDI inflows of $85 billion in 2025 while positioning it as a bridge between East and West.

By hosting the 2026 BRICS Summit, likely in New Delhi, India can showcase its "Humanity First" framework, integrating South-South cooperation to tackle inequities. This is especially critical amid Trump's G20 presidency in 2025, which sidelined Global South issues; BRICS under India can fill that void, ensuring voices from Africa and Asia shape reforms. The presidency's success hinges on consensus-building: if India navigates US pressures and internal rifts, BRICS could emerge stronger, proving that multipolarity is not chaos but collaborative resilience.

Inside BRICS, differences are growing. China pushes for fast de-dollarisation, while India remains wary of Beijing's ambitions, demanding deft diplomacy to hold the group together

Thus, India's 2026 BRICS presidency arrives at a crossroads for global cooperation, where opportunities for reform collide with threats of division. By prioritising resilience and innovation, New Delhi can harness the bloc's collective strength—evidenced by its 28 per cent share of global manufacturing and 50 per cent of agricultural output—to forge a fairer world order. The challenges with the US, marked by tariff threats impacting $200 billion in BRICS exports, and intra-group tensions demand strategic finesse, but the rewards are immense: empowering the Global South, where 80 per cent of humanity resides, to address existential threats like climate change, which could displace 1.2 billion by 2050 per World Bank projections.

India's leadership is imperative for sustaining multilateralism in an era of uncertainty, ensuring BRICS evolves from an acronym into a beacon of equitable progress.

–The writer is a Special Advisor for South Asia at the Parley Policy Initiative, Republic of Korea. He regularly provides commentary on India-China border issues, water security, and transboundary river challenges in South Asia. You can follow his updates on X at @The_China_Chap. The views expressed are personal and do not necessarily reflect the views of Raksha Anirveda.

NAVIGATING UNCERTAINTY: BUILDING RESILIENCE

The lessons from 2025 reinforced a core principle for Schiebel: operational relevance tied up with resilience. In 2026, Schiebel's business strategy will focus on three interlinked pillars: operational maturity, supply-chain resilience and scalable growth while being India's reliable partner

JAJATI MOHANTY

As this January-March 2026 issue goes to print, the experiences of 2025 are still fresh — and highly instructive. The past year was not simply a period of execution and delivery; it was a year that tested resilience, adaptability and long-term thinking across the global defence and aerospace industry. For Schiebel, 2025 sharpened our understanding of what it truly means to operate in an environment shaped by geopolitical uncertainty, supply-chain fragility and evolving operational demands. Those lessons now directly inform how we are positioning ourselves for 2026, both in India and across our global markets.

From an Indian perspective, these reflections carry particular significance. India's defence ecosystem continues to mature at pace, driven by operational necessity, policy clarity and a clear national commitment to self-reliance. At the same time, global supply chains have become increasingly constrained and politicised. Technology, once viewed primarily as an enabler, is now frequently used as leverage in strategic competition between major powers. In this environment, defence capability can no longer be separated from questions of access, assurance and industrial resilience.

Looking back, 2025 reinforced a core principle for Schiebel: operational relevance cannot exist without resilience. Defence and security organisations worldwide are no longer evaluating platforms solely on performance metrics. They are asking more fundamental questions about availability, lifecycle support and long-term continuity — especially in times of crisis. These considerations have become central to procurement thinking globally, particularly in the maritime domain, where sustained presence and readiness are critical.

Throughout 2025, Schiebel focused on consolidating and advancing the strengths of the CAMCOPTER® family. The CAMCOPTER S-100 continued to demonstrate why it remains a reference system for shipborne VTOL unmanned

aviation, proven in demanding maritime environments around the world. In parallel, the CAMCOPTER S-300 progressed as a next-generation capability designed to deliver greater endurance, higher payload capacity and persistent wide-area maritime coverage. Together, these platforms reflect our long-held belief that maritime unmanned aviation must balance agility with persistence - immediate responsiveness with long-duration presence.

India has been central to this journey. Over the course of 2025, discussions with Indian maritime stakeholders - including the Indian Navy and other organisations responsible for maritime security and safety - continued to underline the operational relevance of rotary-wing unmanned systems in one of the world's most complex maritime theatres. Blue-water operations in the Indian Ocean Region coexist with dense coastal traffic, humanitarian responsibilities and law-enforcement missions. In such an environment, unmanned helicopters are increasingly recognised as essential enablers of maritime awareness and operational planning.

Throughout 2025, Schiebel focused on consolidating and advancing the strengths of the CAMCOPTER® family. The CAMCOPTER S-100 continued to demonstrate why it remains a reference system for shipborne VTOL unmanned aviation, proven in demanding maritime environments around the world

One of the most notable shifts during 2025 was the evolution of dialogue with stakeholders. Conversations moved decisively beyond the question of what a platform can do, to how reliably it can be sustained, upgraded and supported over decades. This shift mirrors a broader global trend. Supply-chain disruptions - driven by geopolitical tensions, export controls and industrial bottlenecks - have exposed vulnerabilities in defence programmes that rely on narrowly sourced components or rigid support models.

For India, these challenges intersect directly with the national objective of Aatmanirbhar Bharat. Strategic autonomy in defence is not achieved through manufacturing alone; it requires control across the full lifecycle of a system - from sustainment and upgrades to skills, training and long-term availability. The experience of 2025 made it clear that self-reliance must be systemic rather than symbolic.

In this context, the role of Schiebel India has continued to evolve. Our focus has been on strengthening local competence, building technical depth and aligning global technology roadmaps with Indian operational priorities. The objective is clear: to ensure that unmanned systems intended for Indian maritime use can be supported, adapted and sustained within the country over the long term. This approach is essential if India's maritime forces are to retain freedom of action in an increasingly contested global environment.

As we look ahead through 2026, the strategic context is unlikely to become simpler. Global competition remains intense, and supply chains for advanced technologies will continue to be influenced by political, economic and security considerations. For operators, this reality reinforces the need for platforms that offer not just capability, but confidence - confidence that systems will remain available and supportable regardless of external disruptions.

Schiebel's business strategy for 2026 is built around this understanding. Globally, our focus is on three interlinked pillars: operational maturity, supply-chain resilience and scalable growth. Operational maturity means continuing to refine systems that are already proven, ensuring they remain adaptable to new sensors, evolving missions and changing threat environments. It is a

deliberate choice to prioritise reliability and evolutionary development over short-term novelty.

Supply-chain resilience has become a strategic imperative rather than a supporting function. In 2026, this translates into diversifying sourcing, strengthening trusted partnerships and reducing single points of dependency. For users and decision-makers, the benefit is tangible: greater assurance that unmanned fleets can remain operational when they are most needed, even in times of global disruption.

Scalable growth forms the third pillar - and here, India occupies a particularly important position. India is not only a key market, but also a strategic anchor in the Indo-Pacific. Demand for maritime surveillance, unmanned aviation and persistent ISR will continue to grow, driven by legitimate security, safety and humanitarian requirements. Schiebel India is well positioned to contribute to this trajectory by aligning global experience with Indian needs, while also ensuring that insights from Indian maritime operations inform developments elsewhere in the world.

The role of Schiebel India has continued to evolve. The focus has been on strengthening local competence, building technical depth and aligning global technology roadmaps with Indian operational priorities

In a volatile world, consistency matters. Trust is earned through performance over time. Resilience is not an abstract concept, but a capability in its own right. And partnerships endure when they are built on long-term commitment rather than short-term advantage.

Schiebel enters 2026 with a clear objective: to remain a reliable, forward-looking partner for India and for customers worldwide, delivering unmanned aviation solutions that are not only technologically advanced, but industrially and strategically dependable. In an era where access and assurance matter as much as innovation, that distinction will define success.

–The writer is CEO, Schiebel India. The views expressed are of the writer and do not necessarily reflect the views of Raksha Anirveda.

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HIGH VALUE COMBAT AIR PATROLS: SAFEGUARDING INDIA'S EYES IN THE SKY

The S-400's shootdown of a PAF ELINT platform has exposed the vulnerability of unescorted high-value airborne assets. For the Indian Air Force, the lesson is clear: institutionalising High Value Combat Air Patrols is no longer optional — it is the doctrinal linchpin for preserving air dominance in a multi-domain, peer-contested battlespace

RAKESH KRISHNAN SIMHA

In the increasingly contested airspace of the Indian Subcontinent, the Indian Air Force operates in a theatre defined by persistent threats from nuclear-armed adversaries, advanced missile systems and evolving aerial reconnaissance capabilities. The incident on May 14, 2025, during Operation Sindoor — in which an Indian S-400 Triumph surface-to-air missile system successfully neutralised a Pakistan Air Force Electronic Intelligence (ELINT) aircraft — serves as a stark reminder of the fragility of high-value airborne assets (HVAAs).

In this backdrop, it is a doctrinal necessity for the IAF to institutionalise High Value Combat Air Patrols (HVCAPs), also known as High Value Airborne Asset Combat Air Patrols, as a core element of its air defence and offensive operations. Drawing on military doctrine, historical precedents and lessons from the 2025 conflict, it is clear that HVCAPs are essential for enhancing the survivability and operational efficacy of assets such as Airborne Warning and Control Systems (AWACS), aerial refuellers, and Intelligence, Surveillance and Reconnaissance (ISR) platforms.

MAYDAY FOR THE PAF

The dawn of May 14, 2025, marked a pivotal moment in aerial warfare over the Indian Subcontinent. Amid escalating tensions following India's precision strikes on PAF forward bases in response to cross-border incursions, an Indian S-400 battery stationed near the Line of Control (LoC) detected and engaged a PAF Saab 2000 Erieye ELINT variant loitering at medium altitude in Pakistani airspace. The system's 91N6E Big Bird acquisition radar, with its multi-frequency scanning capabilities, locked onto the non-stealthy platform at an estimated range of 300 kilometres, culminating in a direct hit by a 40N6E extended-range missile. The downing of this ELINT aircraft — not merely a reconnaissance tool but a critical node in Pakistan's integrated air defence network — disrupted PAF command-and-control (C2) loops, forcing a temporary withdrawal of their airborne surveillance envelope and contributing to India's tactical dominance in the ensuing 72-hour engagement.

This event, while a triumph for India's ground-based air defences, underscores a reciprocal vulnerability: the IAF's own HVAAs, including its three Phalcon AWACS platforms and IL-78MKI refuellers, operate in increasingly contested environments where adversaries like the PAF and People's Liberation Army Air Force (PLAAF) deploy long-range SAMs, electronic warfare assets, and beyond-visual-range (BVR) missiles. The 2025 conflict revealed that even brief lapses in asset protection can cascade into operational paralysis, as evidenced by Pakistan's near-loss of situational awareness after the ELINT shootdown.

In this context, HVCAPs emerge as an indispensable doctrinal evolution. Defined

as dedicated fighter patrols escorting HVAAs during their "time on station" to provide early warning, interception, and suppression of enemy air defences (SEAD), HVCAPs bridge the gap between passive defences and proactive force multiplication. Therefore, integrating HVCAPs into IAF operations is not merely tactical prudence but a strategic imperative for maintaining air superiority in a peer-competitive environment.

THE STRATEGIC VALUE OF HIGH-VALUE AIRBORNE ASSETS

HVAAs form the neural backbone of modern air campaigns, enabling network-centric warfare through persistent surveillance, C2 and force projection. AWACS platforms, such as India's Israel Aerospace Industries (IAI) Phalcon systems mounted on IL-76 airframes, furnish 360-degree radar coverage up to 400 km, fusing data from ground sensors, fighters and satellites to create a real-time battlespace picture. ELINT and ISR aircraft, exemplified by the PAF's ill-fated Saab 2000, collect signals intelligence (SIGINT) to map enemy radar emissions, while aerial refuellers extend the endurance of strike packages, transforming limited sorties into sustained operations.

In the Indo-Pakistani theatre, these assets are force multipliers of unparalleled significance. During the 2019 Balakot crisis, IAF Mirage 2000s relied on AWACS-derived targeting data to evade PAF intercepts, demonstrating how HVAAs amplify offensive reach against fortified borders. Similarly, in the 2025 skirmishes, the PLAAF's KJ-500 AWACS analogs provided China with observational insights into Indian tactics, highlighting the dual-use potential of such platforms in proxy engagements. Quantitatively, studies indicate that air forces employing AWACS achieve up to 30% greater sortie generation rates and 40% improved kill ratios in BVR engagements, underscoring their role in shifting the locus of decision advantage from ground-based systems to airborne nodes.

Yet, this value is inherently double-edged: HVAAs are high-signature, low-manoeuvrability targets, often operating in predictable orbits to maintain coverage, rendering them prime candidates for attrition warfare.

Defined as dedicated fighter patrols escorting HVAAs to provide early warning, interception, and suppression of enemy air defences, HVCAPs bridge the gap between passive defences and proactive force multiplication. Therefore, integrating HVCAPs into IAF operations is a strategic imperative for maintaining air superiority in a peer-competitive environment

The Phalcon AWACS (Airborne Warning and Control System)

VULNERABILITIES IN MODERN AIR WARFARE

Contemporary airspaces are saturated with threats that exploit HVAAs' weaknesses. Long-range SAMs like the Russian-built S-400, with engagement envelopes exceeding 400 km and low-altitude performance against cruise-missile analogs, pose existential risks to loitering platforms. The PAF's integration of Chinese HQ-9 systems, coupled with JF-17 Block III fighters armed with PL-15 BVR missiles (range: over 200 km), exemplifies this evolution, as seen in their attempted ELINT ingress during the 2025 conflict.

Electronic vulnerabilities compound kinematic threats. ELINT aircraft, by design, emit minimal signatures but rely on data-links vulnerable to jamming; the PAF platform's downfall was partly due to its failure to counter S-400's frequency-hopping radars. Broader lessons from the conflict reveal systemic gaps: Pakistan's overreliance on networked assets without robust escorts led to a 25% degradation in response times post-shootdown, mirroring historical precedents like the 1991 Gulf War, where coalition AWACS escorts neutralised Iraqi SAM ambushes.

For the IAF, these risks are amplified by dual-front contingencies. China's J-20 stealth fighters and YJ-12 anti-ship missiles

Representational Image: Pakistan's 70 million AWACS Aircraft Destroyed

IAF's IL-78 refueling Jaguars in flight

threaten eastern HVAAs, while PAF drones and ballistic missiles contest the West. The 2025 engagements exposed India's network-centric strategy's Achilles' heel: overdependence on AWACS without layered protection, resulting in two near-misses on IAF IL-78s. Absent proactive measures, such assets risk becoming high-value targets rather than enablers.

THE ROLE OF HVCAP IN ASSET PROTECTION

HVCAP doctrine, rooted in US and NATO airpower principles, deploys fighter elements — typically 2-4 aircraft — in concentric orbits around HVAAs to execute three interlocking functions: surveillance augmentation, threat interception and electronic warfare support. Unlike general combat air patrols (CAPs), which prioritise area denial, HVCAPs are asset-centric, with fighters maintaining line-of-sight to the protected platform while scanning for low-observable intruders via infrared search-and-track (IRST) and radar warning receivers (RWR).

Empirical evidence affirms HVCAP efficacy. In NATO exercises, HAVCAP-configured F-35 escorts extended AWACS on-station time by 50% against simulated S-400 threats, leveraging data fusion to preempt launches. For the IAF, integrating HVCAPs with indigenous assets like the Tejas Mk1A — equipped with Uttam AESA radars — would synergise with S-400 batteries, creating a "kill web" where airborne patrols cue ground fires. This

Indian Air Force's Mirage 2000 aircraft

HVCAP doctrine, rooted in US and NATO airpower principles, deploys fighter elements — typically 2-4 aircraft — in concentric orbits around HVAAs to execute three interlocking functions: surveillance augmentation, threat interception and electronic warfare support

layered approach mitigates single-point failures, as demonstrated in the 2025 conflict, where unescorted PAF ELINTs succumbed to isolated SAM volleys.

CASE STUDY: THE S-400 ENGAGEMENT AND ITS REVELATIONS

The May 14 interception exemplifies HVAAs' peril without escorts. The PAF ELINT, tasked with mapping Indian SAM emissions, orbited at 25,000 feet, 180 km from the Line of Control, its synthetic aperture radar (SAR) and SIGINT pods betraying its position via incidental emissions. Lacking an HVCAP screen — diverted to cover JF-17 strikes — the platform evaded initial IAF Rafale patrols but entered the S-400's no-escape zone undetected until terminal guidance. Post-incident analyses reveal that a single PAF F-16 escort could have jammed the missile's active radar homing (ARH) seeker, potentially aborting the engagement.

This mirrors IAF vulnerabilities. The lesson is thus unequivocal: in an era of hypersonic threats and AI-driven targeting, unescorted HVAAs invite preemption.

IMPLICATIONS FOR IAF DOCTRINE

The IAF's 2022 Basic Doctrine emphasises integrated air operations but under-specifies HVAA protection, relying on ad hoc CAPs amid squadron shortages (31 vs 42 authorised). The 2025 conflict accelerated doctrinal shifts, with post-action reviews

The S-400's downing of the PAF ELINT aircraft in 2025 is an impressive and unprecedented feat, but it's a pyrrhic victory if it does not catalyse doctrinal innovation. In an epoch where aerial dominance hinges on information superiority, India's slowness in adopting HVCAPs risks ceding the initiative to adversaries schooled in attrition

S-400 Anti Missile System

China's HQ-9 Missile System

advocating HVCAP standardisation to counter China's 200-plus AWACS fleet and Pakistan's Erieye expansions. Integration with the Integrated Air Command and Control System (IACCS) would enable dynamic tasking, fusing HVCAP feeds with S-400 data for predictive analytics.

RECOMMENDATIONS FOR IMPLEMENTATION

To operationalise HVCAPs, the IAF should:

Procure Dedicated Escorts: Allocate 20% of Rafale and Tejas fleets for HVAA duties, prioritising IRST-equipped variants for stealth detection.

Training Overhaul: Establish an HVCAP syllabus at the Tactics and Air Combat Development Establishment (TACDE), simulating S-400/J-20 threats via Red Flag exercises.

Technological Augmentation: Invest in next-gen electronic warfare pods (such as DARE's indigenous jammers) and drone swarms for forward screening, reducing manned risks.

Joint Doctrine Refinement: Harmonise with Army and Navy assets under the Chief of Defence Staff framework, ensuring tri-service HVCAP rotations.

Budgetary constraints — exacerbated by MRCA delays — necessitate phased rollout, starting with western theatre priorities.

To conclude, the S-400's downing of the PAF ELINT aircraft in 2025 is an impressive and unprecedented feat, but it's a pyrrhic victory if it does not catalyse doctrinal innovation. HVCAPs represent a proven, cost-effective paradigm for safeguarding the IAF's HVAAs, transforming potential liabilities into resilient enablers of airpower. In an epoch where aerial dominance hinges on information superiority, India's slowness in adopting HVCAPs risks ceding the initiative to adversaries schooled in attrition.

By institutionalising this capability, the IAF can not only deter aggression but also project power credibly across the Himalayas and Arabian Sea, ensuring strategic stability in contested airspace. As General Dwight D Eisenhower observed, "If I didn't have air supremacy, I wouldn't go anywhere" — a remark that underlines a core doctrinal truth: control and protection of the air domain, including the survivability of critical enablers that make air supremacy possible, are prerequisites for effective military operations. In the modern context, HVCAPs serve precisely this function by safeguarding AWACS, ISR platforms and aerial refuellers that underpin air superiority.

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FRACTURING WORLD ORDER: TIME FOR EUROPE TO TALK TO RUSSIA

The choice before Europe is clear: continue on the path of subordination to a declining hegemon, or chart an independent course that recognises Russia as a legitimate partner in continental security. Europe and Russia must establish direct channels of dialogue and negotiate a security architecture that acknowledges the legitimate interests of both parties

MAJ GEN DEEPAK MEHRA

The contemporary international system stands at a critical juncture. What was heralded as the 'end of the Cold War' following the collapse of the Soviet Union has instead produced nearly three decades of unprecedented military interventions, regime change operations and escalating geopolitical tensions. From the Middle East to Eastern Europe, from Venezuela to Ukraine, and from the freezing Nordic climes to the thick Jungles of Africa, the world has witnessed the convulsions of a unipolar order desperately trying to conserve itself against the inexorable forces of multipolarity. The fundamental principle of 'the balance of power', that historically sustained peace amongst the great powers, has been systematically subordinated to the logic of hegemonic preservation. Unitary US actions, ranging from interventions in Iraq, Iran, Libya, Venezuela and Ukraine; to the warnings directed at Cuba, Colombia, Mexico, India, and even Greenland; alongside the weaponisation of tariffs and the marginalisation of the United Nations, have become a norm. Such actions can only be described as the naked ambitions of a superpower attempting to retain control of a world that is slipping from its grasp.

This article argues that Europe, which possessed both the historical opportunity and material capacity in 1991 to construct an independent security architecture inclusive of Russia, instead chose dependence on Washington and exclusion of Moscow — a choice that has produced the current catastrophe in Ukraine and threatens further destabilisation of the World. The path to sustainable peace requires Europe to abandon its subordinate

Ukrainian President Volodymyr Zelenskyy, former German Chancellor Angela Merkel, French President

role within the American-led order and engage directly with Russia on questions of continental security. Kenneth Waltz, in 'The Theory of International Politics', argues that the anarchic structure of the international system, characterised by the absence of a central authority, compels states to rely on self-help mechanisms. The distribution of capabilities among states determines the system's structure and incentivises balancing behaviour to maintain equilibrium (Waltz, 1979). The restoration of this balance offers the only realistic path to lasting peace.

THE BALANCE OF POWER: FROM WESTPHALIA TO BIPOLARITY

To understand our current predicament, we must first comprehend the historical function of the balance of power in international relations. The modern state system, established with the Peace of Westphalia in 1648, was built explicitly on the principle that no single European power should achieve the degree of dominance that characterised the Holy Roman Empire or Spanish hegemonies of preceding centuries. As Waltz argues in his foundational work on structural realism, the balance of power is not merely a strategy that states consciously pursue; rather, it emerges as the natural outcome of the security imperative confronting all sovereign actors in an anarchic system (Waltz, 1979). When one power grows too dominant, others band together to contain it, restoring equilibrium through what Waltz calls 'balancing' behaviour.

Courtesy image: abcnews.go.com

Emmanuel Macron and Russian President Putin

When the Soviet Union collapsed, Europe stood at a historical juncture. The European Union had the opportunity to become the harbinger of a new security architecture that could encompass all of Europe and Russia. This was an opportunity for Europe to develop as an independent security actor capable of managing its own affairs without American mediation

For over two centuries following Westphalia, this mechanism operated effectively. The nineteenth century witnessed a multipolar arrangement with Britain, France, Germany, Austria-Hungary, and Russia constituting the great powers whose relative capabilities determined the shape of international politics. This system, despite its imperfections and periodic wars, prevented any single power from achieving continental mastery.

The Second World War fundamentally altered this distribution. The catastrophic defeat of Germany and the exhaustion of Britain and France produced a bifurcated system dominated by two superpowers: the United States and the Soviet Union. This bipolar structure, while dangerous in its potential for direct great-power conflict, proved remarkably stable precisely because the balance of nuclear terror created mutual assurance of destruction. As John Mearsheimer notes in his offensive realist framework, great powers naturally seek to maximise their relative power and achieve regional hegemony whenever possible, yet the balance of power operates as a restraint on hegemonic ambition (Mearsheimer, 2001). Neither superpower could achieve the kind of regional hegemony that might have tempted aggressive expansion; the costs of attempting hegemony within the other's sphere were prohibitive.

AMERICAN ASCENDANCY: THE MARSHALL PLAN AND WESTERN SUBORDINATION

The roots of American dominance, however, could be traced back to strategic decisions made in the immediate aftermath of World War II. The Monroe Doctrine, originally proclaimed in 1823, took on renewed force as American military and economic power expanded throughout the twentieth century, eventually creating a Western Hemisphere under unmistakable US strategic hegemony. But it was the Marshall Plan, announced in 1948, that truly consolidated American dominance over Western Europe. By offering massive economic assistance to a shattered European continent on the condition of acceptance of American strategic leadership, the United States created a dependent alliance system in which Western European states had little choice but to accept their subordinate role within an American-led order.

NATO, established in 1949, institutionalised this hierarchy, placing European military capabilities under American command and ensuring that European security would forever depend on American commitment. As Richard Sakwa observes, this created what scholars term 'liberal hegemony' — a system in which the dominant power maintains control not through explicit military occupation, but through institutional frameworks, alliance dependencies, and the internalisation of American values

and preferences by subordinate states (Sakwa, 2020). Western Europe could not defend itself against the Soviet Union without American nuclear protection, and American nuclear protection came only at the price of accepting American leadership. The Cold War at least provided a rationale for this asymmetrical arrangement: the Soviet threat was real, and the cost of containment was perhaps worth the loss of European autonomy. The Soviet Union's collapse removed that rationale entirely. The United States suddenly found itself unshackled from the burden of maintaining an elaborate alliance system against a great-power rival.

THE UNIPOLAR MOMENT: 1991 AND THE EROSION OF BALANCE

The collapse of Soviet communism and the dissolution of the USSR in 1991 produced a radically novel situation in world politics. For the first time in the modern state system, a single power possessed the capacity to act without meaningful constraint from other major states. American military capabilities, economic dominance, technological superiority, and cultural soft power combined to create what Charles Krauthammer termed the 'unipolar moment' — a period in which the United States stood alone as the world's sole superpower.

As Henry Kissinger has argued, the fundamental law of international politics is that great powers seek to prevent the emergence of other great powers capable of challenging their dominance (Kissinger, 2014). Once freed from the Soviet constraint, American policymakers faced a choice: they could adjust American military and strategic posture downward in recognition of reduced threats and acknowledge that other powers — particularly in Europe — might establish independent security arrangements, or they could attempt to preserve and perpetuate the unipolar moment, maintaining the infrastructure of global hegemony and using it to shape world order according to American preferences. The choice made by successive American administrations,

President Donald Trump, centre, Finland's President Alexander Stubb, Ukrainian President Volodymyr Zelenskyy, NATO Secretary General Mark Rutte, center right, Germany's Chancellor Friedrich Merz, Italy's PM Giorgia Meloni, France's President Emmanuel Macron and British PM Keir Starmer

bipartisan in nature, was unmistakable: preserve hegemony. The 1992 Pentagon's Defence Planning Guidance explicitly stated the goal of preventing the emergence of any great power that could challenge American dominance. NATO, rather than being diminished or dissolved with its original purpose gone, was instead expanded eastward, pushing American military presence deeper into the former Soviet sphere and closer to Russian borders.

What is crucial to understand is that this expansion into Eastern Europe and the former Soviet space was not driven by the consent or security needs of the states being incorporated into NATO. Rather, it reflected American determination to extend the sphere of the post-Cold War liberal order into regions that, by any objective standard of international relations, constituted Russia's traditional sphere of influence. As Kissinger himself cautioned regarding Ukraine, the strategic wisdom of pushing NATO into Ukraine was fundamentally flawed because it violated the basic principle of realist diplomacy: every great power must be allowed a sphere of legitimate influence in which it will resist external pressures that threaten its security (Kissinger, 2014).

THE SOLE SUPERPOWER AS GLOBAL POLICEMAN

The unipolar system created conditions in which American dominance could be leveraged without meaningful opposition. The period since 1991 has witnessed an extraordinary proliferation of the American military with more than 600 bases and multiple interventions across the globe — far more than during the Cold War, when the balance of power imposed restraint. The catalogue of direct American military actions in the unipolar era is extensive and sobering. The 1991 Gulf War in the Middle East was followed by Somalia, Haiti, Yugoslavia, and the catastrophic invasion and occupation of Iraq in 2003 and the

Courtesy image: times.co.sz

emergence of ISIS. The 2001 invasion of Afghanistan evolved into a twenty-year occupation and Taliban restoration. It was followed by the intervention in Libya on the false pretext in 2011. Beyond the direct military interventions, the American security state invested heavily in the infrastructure of regime change and political destabilisation. US organisations funded opposition movements and civil society organisations from Ukraine to Venezuela to Hong Kong and supported 'colour revolutions' designed to topple governments deemed hostile to American preferences. Ukraine's Euromaidan movement of 2013-2014, which descended into civil war and ultimately Russian intervention, occurred in the context of explicit American and EU encouragement of Ukrainian elites to reject the Yanukovych government's attempts at balancing between Russia and the West. The driving logic behind these interventions is clear: the sole superpower sees its role as global policeman, responsible for maintaining and expanding the liberal international order that American power had constructed.

EUROPE'S ABDICATION: THE LOST OPPORTUNITY OF 1991

At the moment when the Soviet Union collapsed, Europe stood at a historical juncture. The European Union, having successfully integrated Western European economies and gradually reduced the likelihood of intra-European conflict through institutional frameworks and economic interdependence, had the opportunity to become the harbinger of a new security architecture that could encompass all of Europe and Russia. This was, perhaps, an opportunity for Europe to develop as an independent security actor capable of managing its own affairs without American mediation.

Instead, Europe chose subordination. Western European elites, moved by the cacophony of newly independent Eastern European countries and scarred by memories of the Cold War, remained convinced that American military presence and leadership were necessary for continental stability. The promise made to Russia during the end of the Cold War — that NATO would not expand into the former Warsaw Pact space — was abandoned within a few years. This was not a strategic necessity. Russia in 1991 was militarily devastated, economically collapsing, and soliciting Western investment and support. The Russian threat that would justify NATO expansion did not exist in the 1990s; it was created by the policies of American hegemonic assertions that convinced European elites that Russian integration into the Western order was not possible. The result was the creation of a system in which European elites came to see the world through American eyes. They choose to define their interests in terms compatible with American hegemonic preservation and to regard Russia as a threat that justified continued American presence and leadership

THE NAKED DANCE OF AMERICAN AMBITION: CONTEMPORARY MANIFESTATIONS

The rise of China as an economic powerhouse, India's demographic and economic ascent, the resurgence of Russia despite Western sanctions, and the increasing assertion of the Global South in international affairs signal the end of the unipolar moment and the emergence of multipolarity. What the world witnesses today is the increasingly frantic attempts of a declining hegemon to maintain its dominance through ever more aggressive assertions of power. The contemporary American posture reveals the naked ambitions of a superpower attempting to retain control of a world that is slipping from its hands. As Mearsheimer notes in his analysis of great power politics, 'the tragedy of great power politics' emerges when a declining hegemon refuses to accept the redistribution of power and instead doubles down on maintaining its dominance through increasingly costly and destabilising interventions (Mearsheimer, 2022). In its one-track ambition to remain the most powerful nation, the United States is treating its friends and foes alike with equal disregard for their interests and sovereignty. International laws, institutions, and treaties that have stood the test of time have all been consigned to this lust for power.

THE CASE FOR EUROPEAN-RUSSIAN DIALOGUE

The fundamental problem with the current world order is that it is unsustainable. The unipolar system has produced chronic instability, endless military interventions, and the erosion of international law. As American relative power declines, the hegemonic structure cannot be maintained, and Europe finds itself at the cusp of critical choices. It can continue to hitch its security to a declining hegemon, engaging in ever more costly military buildups and technological competition while American strategic stability continues to deteriorate. Or else, it can pursue genuine independence and try to restore the fundamental principle of international relations that has historically maintained peace — the balance of power.

The restoration of balance requires dialogue and the creation of legitimate channels for the non-belligerent adjustments of great-power interests. Kissinger, in his writings on international order, has consistently emphasised that sustainable peace requires every major power to have channels through which it can pursue its interests and achieve

Courtesy image: aa.com.tr

Ukrainian President Volodymyr Zelenskyy meets with Finnish President Alexander Stubb, British Prime Minister Keir Starmer, Italian Prime Minister Giorgia Meloni, European Commission President Ursula von der Leyen, and NATO Secretary General Mark Rutte ahead of talks with US President Donald Trump

recognition of its legitimate needs. He goes on to argue that security involves not just defeating rivals or compelling them to accept terms, but incorporating them into a structure that makes peaceful relations possible (Kissinger, 2014). Europe and Russia, cojoined by centuries of shared history and culture, share a continent and inescapable geographic proximity. They cannot escape each other, and continued attempts to exclude Russia from the European security architecture would be strategically futile and counterproductive.

It is time for Western countries to speak out. Rather than depending on the United States to bring peace to Europe, a strategy that has failed, they would do well to open direct channels of communication with Russia. For centuries, European powers maintained peace through regular diplomatic consultation and the recognition of mutual legitimacy. The Helsinki Accords of 1975, which established the Conference on Security and Cooperation in Europe as a forum for dialogue between rival blocs during the Cold War, provide a precedent for how dialogue can proceed even amid deep disagreement.

THE WAY FORWARD

What might be the path forward for Europe-Russia? First, it should begin with acknowledgment of a fundamental principle: that Russia, as a great power and a European state, has legitimate security interests that cannot be disregarded without creating instability. Second, Europe should use its economic and diplomatic resources to facilitate dialogue on the basis of recognising Russia's legitimate place in Eurasian security architecture. The principle of 'indivisible security' — which holds that no state's security should come at the expense of others' security — offers a framework more sophisticated than the current NATO expansion logic. Third, Europe should develop genuine military and diplomatic independence from American hegemony. This does not require hostility to the United States, but it does require the development of autonomous European capabilities and decision-making structures. A Europe that is strategically independent can negotiate with Russia as a peer, rather than as an American client.

As the Global South rises, China and India assert themselves, and American power continues its relative decline, the imperative for European strategic autonomy becomes more urgent

The choice before Europe is clear: continue on the current path of subordination to a declining hegemon, with all the instability and military escalation that implies, or chart an independent course that recognises Russia as a legitimate partner in continental security. It may be prudent that Europe and Russia, having shared the same continent for centuries, establish direct channels of dialogue and negotiate a security architecture that acknowledges the legitimate interests of both parties. As the Global South rises, China and India assert themselves, and American power continues its relative decline, the imperative for European strategic autonomy becomes more urgent. History will judge which path Europe chooses, but the stakes could not be higher as the restoration of balance in this fragmented world, and the preservation of peace depend upon it.

–The writer, Kirti Chakra, AVSM, VSM, is an Indian Army veteran. He has also served as the Indian Military Attaché in Moscow. He is the Founding Director and CEO of ThorSec Global. An accomplished scholar, he specialises in Geopolitics with a focus on Russian Studies and is currently pursuing his PhD. The views expressed are of the writer and do not necessarily reflect that of Raksha Anirveda.

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BUDGET ANALYSIS:
STANDING COMMITTEE ON DEFENCE NEEDS TO CHANGE TACK

India needs seminal budgetary reforms to arrest downward slide in the allocation for defence to strengthen India's military capabilities, especially in view of the contemporary developments in its immediate neighbourhood and the wider geopolitical unpredictability. Placed in a vantage position, SCoD must prioritise harmonising budgetary allocations with planned outcomes in order to make its examination of the annual outlays more meaningful

AMIT COWSHISH

Former Financial Advisor (Acquisition), Ministry of Defence

Since its constitution in April 1993 to exercise legislative oversight of the Ministry of Defence (MoD), parliament's Standing Committee on Defence (SCoD) has examined and reported on such diverse issues as stress management in the armed forces, construction of border roads, welfare measures for the war widows, and defence public sector undertakings, but the annual defence outlays are one area it has anatomised and reported on with unfailing regularity. This exercise will be undertaken again next month shortly after Finance Minister Nirmala Sitharaman presents the union budget for 2026-27.

The committee's reports on defence budget are a virtual mine of information and statistics, but the analysis and recommendations of the committee are rather staid, based as these are on a desultory assessment of the hike in outlay, its relation to the central government expenditure (CGE) and gross domestic product (GDP) in percentage terms, ratio of revenue expenditure to capital outlay, budgetary support for military modernisation, underutilisation of allotted funds, and the like. This has had little impact on the trajectory of the defence budget or its utilisation.

The defence outlay grew by a compound annual growth rate (CAGR) of 13.18% between 2004-05 and 2013-14, but this rate declined to 8.26% between 2014-15 and 2024-25. The corresponding CAGR of the capital outlay, which funds modernisation of the armed forces and consequently remains in focus all the time, declined from 9.99% to 6.16%. Meanwhile, the share of defence expenditure in the CGE fell from 13.59% in 2011-12 to 9.55% in 2024-25, and its share in the GDP fell from 1.96% to 1.39% during the same period.

On several occasions in the past SCoD had commented on underutilisation of capital outlay and exhorted the MoD to make sure that the funds are fully utilised. And yet, funds were continuously underutilised between 2011-12 to 2015-16 and then again from 2022-23 onwards. The underutilisation ranged from ₹1,296 crore in 2011-12 to ₹ 14,602 in 2014-15. Even last year (2024-25), there was underutilisation to the tune of ₹ 12,232 crore.

These facts are too palpable to be glossed over by the committee, but its response to this stark reality has generally been by way of generic instructions to MoD, such as to seek more funds from MoF for expediting modernisation of the armed forces, ensure full utilisation of allotted funds by reforming the procurement procedures, and maintain a balance between revenue and capital expenditure. These are common sense precepts which MoD's civil and military bureaucracy is expected to follow anyway even without any external prodding.

To be fair, sometimes the committee does transcend such generalities and makes specific recommendations, but most of them have turned out to be impractical. For example, ignoring the protestations of the Ministry of Finance (MoF), SCoD 'strongly recommended' in its 16th report on the Demands for Grant for the FY 2007-08 that MoD should ask MoF to provide 'a minimum 3% of GDP for Defence Services every year in order to ensure a fixed amount to carry out their modernisation, Capital acquisition and R&D Programme and fulfil the need based requirements of the Defence Forces'. In the event, this feat was never achieved and,

as a matter of fact, the percentage has consistently remained below 2% at least since 2011-12.

Likewise, for a long time, SCoD kept rooting for creation of a non-lapsable 'Defence Capital Fund Account' for modernisation of the armed forces. In its 32nd report of August 2016, the committee called it 'an imperative need for enhancement and heightened operational preparedness of our Defence Forces' and argued that 'even if certain financial rules and regulations have to be amended for creation of a ' Non-lapsable Defence Capital Fund Account' to meet the requirements of our Defence forces, it can and should be done in the interest of the nation'. This recommendation too was contrary to the reservations expressed earlier by MoF and MoD itself. Though subsequently the government did take some initial steps to set up the fund, the move seems to have fizzled out, not least because MoD has not been able to utilise in full even the allocated funds in the last three years.

These are but a few examples of SCoD's unproductive efforts specifically in relation to its 'examination' of the annual defence outlays. It's time SCoD tried a different and pragmatic approach to examining MoD's Detailed Demands for Grant which at the present juncture, are four in numbers Ministry of Defence (Civil), Defence Services (Revenue), Capital Outlay on Defence Services, and Defence Pensions. Some of these demands are not appropriately structured. For example, the Demand for capital outlay on defence services includes the outlay for Ex-servicemen Health Scheme, National Cadet Corps, Research and Development, etc., but excludes Border Roads, Coast Guard, and JAK LI which is an infantry regiment of the Indian Army. This distorts the overall picture of defence budget. It will be a good starting point for SCoD to 'examine' the need for setting right this anomaly.

The larger point, however, is that it is futile to be fixated on numbers and percentages, draw innocuous conclusions from specious statistical analyses, and proffer the same advice, sometimes with change of phrase, year after year, or recommend measures which lack rationale. Consisting of members from both houses of the parliament, SCoD is placed in a vantage position to bring about seminal budgetary reforms.

It's time SCoD tried a different and pragmatic approach to examining MoD's Detailed Demands for Grant which at the present juncture, are four in numbers: Ministry of Defence (Civil), Defence Services (Revenue), Capital Outlay on Defence Services, and Defence Pensions. Some of these demands are not appropriately structured

What forms the core of these reforms is the need to arrest downward slide in the allocation for defence, especially in view of the contemporary developments in India's immediate neighbourhood and the wider geopolitical unpredictability, which impart a sense of unprecedented urgency to strengthening India's military capabilities. This is possible only by institutionalising financially viable defence planning.

SCoD has dealt with the issue of defence planning sporadically in the past but it always stops short of enquiring what ails defence planning in that why defence planning hasn't taken roots in India the way it has in other leading countries of the world. There are questions like whether enunciation of a national security strategy is a sine qua non for defence planning and whether we have the right organisational structures and professionally qualified personnel for planning. These are the fundamental issues that SCoD must first address to harmonise budgetary allocations with planned outcomes which, in turn, would make its examination of the annual outlays more meaningful.

Space constraint doesn't permit a detailed elaboration of the areas in which SCoD could make a more meaningful and long-lasting contribution with its erudite analysis of the budget outlays, their utilisation, and most importantly, the outcomes. It would be presumptuous to suggest how SCoD should go about this task, but the change in its approach must be based not only on a dispassionate self-assessment of its current approach and efficacy of its observations and recommendations, but also on the inputs from a cross section of experts, institutions and think tanks.

STRENGTHENING THE INDIAN ARMY'S COMBAT EDGE

Demonstrating a clear shift from capability creation to execution at scale, SMPP's multi-domain engagements in 2025 align closely with the Indian Army's evolving requirements and long-term force planning revolving around indigenous capability, operational resilience, and preparedness on the road to India 2035

RA EDITORIAL DESK

As India moves through the first quarter of the year, the focus within the national security community shifts from commemoration to strategic assessment. The Indian Army today confronts a battlespace defined by heightened geopolitical volatility, compressed decision cycles, and increasingly technology-driven warfare. From high-altitude deployments and contested borders to precision artillery and unmanned systems, preparedness is no longer measured by numbers alone, but by survivability, scalability, and assured access to critical capabilities.

This transition has placed renewed emphasis on indigenous defence manufacturing—not merely as a policy objective, but as an operational imperative. Over the past year, India's private defence industry has demonstrated a clear shift from capability creation to execution at scale. Among the companies reflecting this maturation is SMPP, whose multi-domain engagements in 2025 align closely with the Indian Army's evolving requirements and long-term force planning towards India 2035.

SOLDIER SURVIVABILITY AS A COMBAT MULTIPLIER

Personal protection systems remain central to endurance, morale, and battlefield effectiveness. Modern conflict has reinforced an enduring reality: soldier survivability lies at the heart of combat effectiveness. Whether in counter-insurgency environments, high-altitude standoffs, or conventional engagements, advanced personal protection directly impacts operational endurance and morale.

In 2025, SMPP secured a significant breakthrough under the Indian Army's Emergency Procurement framework, winning orders exceeding ₹300 crore for 27,700 bulletproof jackets and 11,700 advanced ballistic helmets

In 2025, SMPP secured a significant breakthrough under the Indian Army's Emergency Procurement framework, winning orders exceeding ₹300 crore for 27,700 bulletproof jackets and 11,700 advanced ballistic helmets. Designed, developed, and manufactured in India, these systems integrate advanced materials engineering with configurations validated under Indian field conditions.

Emergency Procurement is reserved for systems that meet urgent operational needs with minimal induction risk. SMPP's selection reflects confidence in its indigenous design capability, stringent quality assurance processes, and ability to deliver at scale within compressed timelines.

"Modern battlefields demand that protection systems evolve as rapidly as threats," said Dr S C Kansal, Chairman & Managing Director, SMPP. "Our focus has been on delivering

lighter, stronger, and mission-adaptable protection solutions that enhance soldier survivability without compromising mobility."

ARTILLERY AMMUNITION AND THE QUESTION OF SUSTAINED FIREPOWER

Assured availability and domestic scale define readiness in prolonged conflict. While platforms often dominate attention, military planners recognise that wars are sustained—and often decided—by ammunition. For the Indian Army, artillery remains central to deterrence and battlefield dominance, particularly along contested frontiers.

A decisive shift occurred in 2025 when SMPP became the only private Indian defence manufacturer to successfully clear all user trials and DGQA evaluations for the Bi-Modular Charge System (BMCS) and 155mm artillery ammunition, including Boat Tail and Base Bleed variants. This milestone marked a significant expansion of private-sector participation in a strategically sensitive domain.

SMPP will soon be operationalising a state-of-the-art ammunition manufacturing facility, and executing its first export order. The company has an ammunition order book of approximately ₹2,000 crore.

"For the Army, ammunition assurance is inseparable from combat readiness," Maj Gen Anil Oberoi (Retd) noted. "A diversified domestic manufacturing base provides resilience, scalability, and confidence during both peacetime planning and crisis response."

SMPP has made a remarkable debut in the field of drones, specially designed for military applications. Following the successful completion of recent trials, SMPP—along with its consortium partners—has signed contracts worth over ₹1,000 crore with the Indian Armed Forces for a range of specialised drones

PRECISION FIREPOWER AND SELECTIVE GLOBAL COLLABORATION

Combining advanced technology with indigenous manufacturing depth. Looking towards India 2035, artillery

effectiveness will increasingly be defined by accuracy, responsiveness, and networked targeting rather than sheer volume.

Recognising this shift, SMPP entered into a Teaming Agreement with the Franco- German company KNDS (formerly KMW and Nexter Defense Systems) to introduce the KATANA family of next-generation 155mm precision-guided artillery ammunition to India.

Offering extended range, GNSS-IMU guidance, and reduced collateral damage, KATANA aligns with contemporary precision warfare doctrines.

"Selective partnerships that combine global expertise with indigenous production are essential for long-term operational sovereignty," said Ashish Kansal. "The objective is not import substitution, but capability absorption and sustainment."

SMPP MAKES A STELLAR ENTRY INTO THE FIELD OF MILITARY DRONES

From force multipliers to embedded battlefield essentials. Recent global conflicts have underscored that unmanned systems are no longer niche capabilities. Surveillance drones, loitering munitions, and autonomous platforms are now integral to modern military operations.

SMPP has made a remarkable debut in the field of drones, specially designed for military applications. Following the successful completion of recent trials, SMPP—along with its consortium partners—has signed contracts worth over ₹1,000 crore with the Indian Armed Forces for a range of specialised drones.

These advanced systems include both surveillance and attack drones equipped with high-altitude flying capabilities, as well as anti-jamming and anti-spoofing technologies. Capable of carrying payloads of up to 20 kgs, these drones can execute precision strikes at speeds reaching 500 km/h, with an operational range extending from 10 km to 180 km.

SMPP was awarded a five-year contract by HAL to provide armour solutions for 160 LCH platforms. The programme underscores the importance of aerospace-grade precision engineering, weight optimisation, and lifecycle reliability

ENHANCING AERIAL PLATFORM SURVIVABILITY

Protecting aircrew in increasingly contested operating environments. Rotary-wing platforms increasingly operate within dense threat envelopes, making survivability enhancements a critical enabler of mission success. The Light Combat Helicopter (LCH), optimised for high-altitude warfare, is central to the Army and Air Force's offensive and reconnaissance roles.

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FROM PROCUREMENT TO ENDURING CAPABILITY PARTNERSHIPS

Why industrial alignment will define combat readiness by 2035? What distinguishes SMPP's recent trajectory is strategic coherence. Soldier protection, ammunition, precision firepower, unmanned systems, and platform survivability are interconnected elements of the Indian Army's modern combat architecture.

As India advances towards 2035, military effectiveness will increasingly depend on enduring capability partnerships rather than episodic procurement. Indigenous industry is no longer operating at the periphery of national security—it is becoming central to it.

The Indian Army's future combat edge will be defined as much by industrial resilience and responsiveness as by doctrine and manpower. The past year has demonstrated that this convergence between operational vision and indigenous capability is not aspirational—it is already underway.

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TRAINING FOR MULTI-DOMAIN WARFARE: THE INDIAN IMPERATIVE

Warfare has irreversibly shifted to multi-domain operations, with non-kinetic vectors increasingly shaping and complementing kinetic action. This evolution demands a fundamental transformation in military training. For the Indian Armed Forces, training needs to move beyond domain-centric models and align directly with operational realities, preparing commanders and soldiers comprehensively for all foreseeable facets of modern conflict

COL AMIT BAVEJA

Military preparedness pivots on the quality of training that precedes combat. While weapons, platforms and doctrines continue to evolve, it is training that ultimately shapes how soldiers and commanders respond under pressure. As the character of warfare changes, it becomes imperative to transform the manner in which Armed Forces prepare for conflict. Traditionally, Armies tend to train for the previous war; this approach now demands a fundamental shift.

Contemporary conflict bears little resemblance to the linear battlefields of earlier eras. Operations today unfold across multiple, overlapping domains, including land, air, maritime, cyber, electromagnetic, space and the information environment. This often happens concurrently and with minimal warning. Non-kinetic vectors increasingly complement and in many cases, precede kinetic actions, shaping the battlespace even before the first shot is fired. This convergence has compressed decision cycles, heightened battlefield transparency and significantly narrowed the margin for error.

For India, characterised by its huge size and diverse terrain, a complex security environment and a wide spectrum of threats, the challenge is unambiguous: training must prepare forces for contested, multi-domain battlefields rather than conventional, idealised or compartmentalised scenarios.

THE CHANGING CHARACTER OF THE BATTLEFIELD

Persistent Surveillance and Compressed Decision-Making. The modern battlefield is defined by near-constant observation and unprecedented transparency. Unmanned aerial systems, satellites, ground sensors and open-source intelligence have significantly eroded the ability to conceal intent, movement and force build up. Areas once considered relatively secure including command posts, logistics nodes and rear echelons are now the prime targets for detection and precision targeting. This persistent visibility compresses decision timelines and imposes a heightened cognitive load on commanders at all levels. Training must therefore condition leaders and soldiers to operate under continuous observation, ambiguity and pressure.

Manned–Unmanned Integration and Precision Warfare. Unmanned systems have transitioned from supporting roles to becoming central actors in military operations. Their employment reduces physical risk to personnel and, by extension, lowers the political threshold for their use, altering escalation dynamics and expanding the scope for calibrated force application. Drones, loitering munitions and autonomous surveillance platforms increasingly shape the battlespace well before traditional force-on-force contact. When integrated with precision-guided munitions and reliable intelligence, they enable rapid, high-impact actions with effects that can extend well beyond the tactical level. This evolution places a premium on tempo, coordination and sound judgement. These qualities need to be deliberately cultivated through training.

Convergence of Kinetic and Non-Kinetic Effects. Modern conflict is characterised by the seamless integration of kinetic force with cyber operations, electronic warfare, space-based effects and information campaigns. More often than not, communications are disrupted, sensors degraded and narratives contested even as manoeuvre forces advance, significantly amplifying the ambiguity on the battlefield and within command posts. Training that isolates these effects or treats them as episodic disruptions risks preparing forces for an incomplete and sanitised version of war. Forces must be trained to fight through them rather than around them.

The challenge for India, characterised by its huge size and diverse terrain, a complex security environment and a wide spectrum of threats, is unambiguous: training must prepare forces for contested, multi-domain battlefields rather than conventional, idealised or compartmentalised scenarios

LIMITATIONS OF CONVENTIONAL TRAINING APPROACHES

Predictability and Control. Conventional training methodologies remain indispensable for building discipline, procedural competence and unit cohesion. However, they often operate within predictable and tightly controlled frameworks. Enemy actions are known, escalation is managed and outcomes are broadly anticipated.

Multi-domain warfare, by contrast, is marked by uncertainty, surprise and rapid adversary adaptation. Friction, ambiguity and imperfect information are defining features of modern conflict. Training that insulates commanders from these realities risks producing competence in routine conditions, but fragility under pressure. Effective preparation must therefore expose leaders to uncertainty rather than shield them from it.

Siloed Training Structures. A significant limitation of existing training paradigms lies in their fragmentation across multiple dimensions.

a. First, individual and collective training are often conducted in parallel rather than as a continuum. Skills acquired at the individual level are seldom integrated seamlessly into collective training, resulting in gaps when units operate under realistic conditions.
b. Second, there remains a persistent disconnect between live (field firing &

exercises), virtual (simulated training) and constructive training (wargaming). The absence of integration between these modes limits the ability to translate conceptual understanding into tactical and operational execution.

c. Third, training lacks adequate progression across regimental centres, field units, Category 'A' establishments and other training nodes. This discontinuity inhibits cumulative skill development and weakens institutional learning.

Training excellence within individual arms and services does not automatically translate into effectiveness across domains. Platform-centric and arm-specific training, when pursued in isolation, restrict exposure to the complexity of joint and combined operations. In multi-domain conflict, actions in one domain inevitably influence outcomes in others. Training architectures must therefore reflect this interdependence rather than reinforce silos.

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Under-representation of Non-Kinetic Stressors. Non-kinetic elements, including electronic warfare, cyber disruption and information operations are frequently introduced as discrete training events rather than as persistent operational conditions. As a result, commanders may understand these threats conceptually, yet remain insufficiently conditioned to operate amid sustained degradation, uncertainty and cognitive overload. Modern battlefields demand the ability to fight through disruption rather than wait for restoration. Training that does not replicate this reality risks leaving forces operationally unprepared despite technical awareness.

BRINGING REALISM BACK INTO TRAINING

Red Teaming as a Way of Thinking. Red Teaming must move beyond being

a periodic exercise to becoming an embedded training philosophy. A credible Red Team challenges assumptions, adapts dynamically and exploits vulnerabilities across domains. In the Indian context, Red Teams must be grounded in real adversary doctrines, capabilities, and behavioural patterns, compelling commanders to think like their opponents and adapt under pressure. AI powered Red Teams can inject realism beyond conventional means.

The Live-Virtual-Constructive Continuum. No single training medium can adequately replicate the demands of modern warfare. Realism emerges from the intelligent integration of live, virtual and constructive training, each reinforcing the other.

- Live training builds physical robustness, confidence, and trust
- Virtual training enables immersion, repetition, and experimentation without risk
- Constructive simulation allows leaders to grapple with scale, tempo, and complexity

When integrated, these elements create a training environment that mirrors the cognitive and operational challenges of combat.

Creating a Training-Operations Continuum. Training environments must increasingly reflect operational realities including terrain, threat behaviour, electromagnetic conditions and decision pressures. The closer training resembles combat, the smaller the cognitive transition required when forces deploy.

REIMAGINING TRAINING ARCHITECTURE IN THE INDIAN CONTEXT

Integrated Architecture from Institutions to Networked Ecosystems. Future training systems must evolve from a collection of isolated institutions into networked training ecosystems. Units, formations & training establishments need to be connected through secure and resilient digital infrastructure, enabling collective training despite geographical dispersion. An integrated architecture would allow training to move beyond episodic events toward continuous, progressive preparation. It facilitates distributed collective training, enables rapid dissemination of lessons from operations and exercises and ensures that learning is retained institutionally rather than remaining localised. For a force operating across diverse terrains and threat environments, this adaptability is essential.

Jointness through Experience. Jointness cannot be achieved through policy directives or doctrinal articulation alone. It must be experienced and internalised through training, where personnel from different services operate within shared scenarios, confront common challenges and develop mutual understanding. Integrated simulation-based training environments, particularly those that support collective, multi-echelon participation and offer a practical means to achieve this. By enabling forces to plan, execute and assess operations together, such environments help build familiarity, trust and operational coherence long before forces deploy in real-world situations.

Training excellence within individual arms and services does not automatically translate into effectiveness across domains. Platform-centric and arm-specific training, when pursued in isolation, restricts exposure to the complexity of joint and combined operations. In multi-domain conflict, actions in one domain inevitably influence outcomes in others

TECHNOLOGY AS AN ENABLER OF WARFIGHTING EFFECTIVENESS

Technology should not be viewed merely as a training aid. When applied judiciously, it becomes a transformative enabler of better judgement, sharper decision-making and deeper professional understanding. Advanced simulations and objective analytics shift training emphasis from task completion to decision-making under stress, allowing leaders to examine not just outcomes, but the reasoning that produced them. Used wisely, training technology can significantly strengthen the organisational capabilities.

SUMMING UP

Multi-domain warfare has emerged as a defining feature of the contemporary security environment. For India, preparing for this reality requires a fundamental shift in how training is conceived, structured and delivered. By embedding realism through institutionalised Red Teaming: integrating live, virtual and constructive training; strengthening the training–operations continuum and reimagining the training architecture, the Indian Armed Forces can ensure that preparation keeps pace with the evolving character of war. Such an approach aligns training more closely with operational demands and reduces the gap between rehearsal and execution.

Ultimately, effective training is measured not by activity or intensity alone, but by its ability to prepare forces for the conditions under which they will be required to fight. In war, outcomes are decisive and preparation must reflect that reality.

–The writer is a military veteran and capability architect. His work focuses on solving defence challenges at the intersection of technology, policy, strategy and execution. The views expressed are personal and do not necessarily reflect the views of Raksha Anirveda.

INDIA'S QUANTUM SECURITY IMPERATIVE 2026

For India, the clock is ticking not in qubits, but in harvested encrypted data awaiting decryption. India must prioritise Quantum Security over Quantum Computing while recognising that in quantum technology, security isn't a subset of computing; it's the foundation of digital sovereignty

SUDIPTAA PAUL CHOUDHURY

As the United Nations declared 2025 the International Year of Quantum Science and Technology, India faces a critical choice: chase the mirage of quantum computing supremacy or secure the nation's digital infrastructure today. Whilst headlines celebrate qubit milestones, a more urgent reality lurks: Adversaries are harvesting encrypted data now to decrypt later when quantum computers mature.

Union Communications Minister Jyotiraditya Scindia's declaration that "quantum computing is not just another step forward but a giant leap" must be balanced with an uncomfortable truth: India's quantum security deficit poses a greater existential threat than its quantum computing gap.

QUANTUM SECURITY vs QUANTUM COMPUTING: THE CRITICAL DISTINCTION

The global conversation conflates two fundamentally different challenges. Quantum computing - building machines with 50-1,000 qubits- represents an aspirational technology race where India trails significantly. Quantum security, on the other hand, protecting today's critical infrastructure from tomorrow's quantum threats, is an immediate national security crisis where India can and must lead.

Consider the mathematics: Shor's algorithm, running on a sufficiently powerful quantum computer, can break RSA and Elliptic Curve Cryptography (ECC) that protect 90% of internet communications. Every UPI transaction, Aadhaar authentication, defence communication, and classified file transmitted today using current encryption could be retroactively decrypted within years. This "harvest now, decrypt later" threat means adversaries are already capturing India's encrypted data from defence networks to BFSI systems, betting that quantum computers will unlock these secrets by 2026-2028. Earlier it was estimated that Quantum computers will arrive between 2026 to 2030, but given the last year's significant development in Quantum Computing, the scenario is changing fast with maturity of product launches.

As cybersecurity expert Robert Burns warned, "A practical quantum computer could not only render traditional online activities insecure; it could break most of the security underpinning the internet". For India, this isn't theoretical. Ajai Chowdhry, NQM Chairman, grimly noted, "During the Galwan incident, China brought down India's electrical grid at the border without using quantum technology. Imagine the threats once quantum computing reaches full potential".

THE ZERO TRUST IMPERATIVE: NEVER TRUST, ALWAYS VERIFY

Quantum threats demand architectural transformation beyond encryption upgrades. Zero Trust Architecture (ZTA)—the principle of "never trust, always verify"—becomes non-negotiable. ZTA assumes every user, device, and application is a potential threat, requiring continuous authentication through:

- **Least Privilege Access:** Grant only necessary rights, containing breaches
- **Continuous Verification:** Real-time behaviour analysis, not static trust
- **Micro-Segmentation:** Network compartments preventing lateral movement
- **Quantum-Safe Protocols:** Hybrid PQC+QKD encryption layers

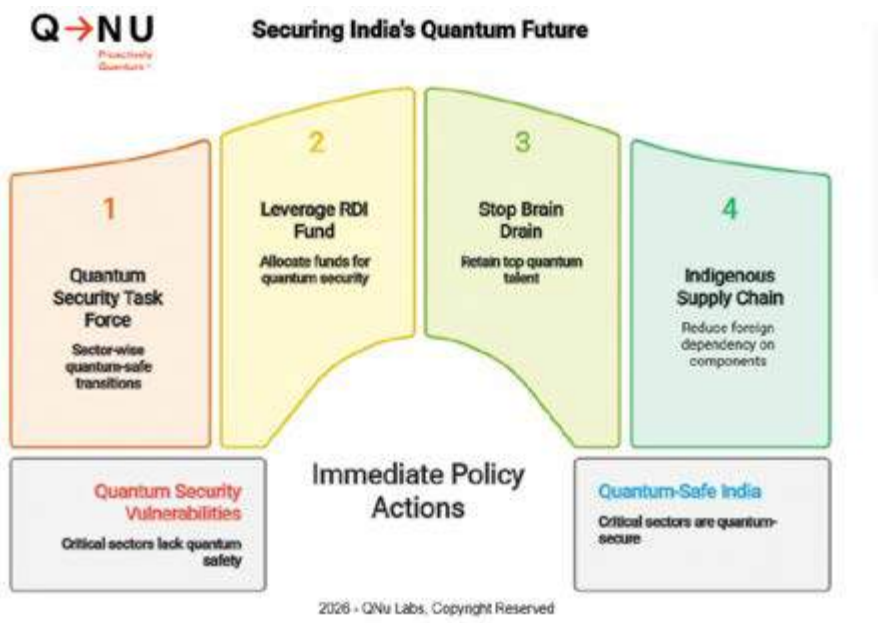
Cisco's research shows 73% of US organisations believe quantum threats are imminent, yet 81% admit inadequate preparation. India cannot afford such complacency.

INDIA'S QUANTUM SECURITY REALITY: QNU LABS LEADS THE CHARGE

Whilst India's 7-qubit quantum computer struggles for relevance, QNu Labs, a Bengaluru-based startup incubated at IIT Madras, demonstrates that India can lead in what matters most: quantum security deployment.

MAJOR DEPLOYMENTS ACHIEVED

- **500+ Kilometre QKD Network (2025):** QNu demonstrated India's first extensive Quantum Key Distribution network over existing optical fibre infrastructure under the National Quantum Mission, announced at ESTIC 2025 by Dr Jitendra Singh. Engineered by Southern Command Signals across Rajasthan's Corps network with trusted nodes, this represents operational quantum-secure communications—not laboratory demonstrations.
- **India's Critical Sector Deployment (2024):** Delivered 25 Armos QKD systems, marking India's largest quantum security implementation. These protect naval communications against current and future threats.
- **Army Networks (2022-2024):** Winner of iDEX Open Challenge 2.0, QNu deployed 150-km QKD systems with trusted nodes for the Indian Army. Secured wireless networks at MCEME and MCTE using Quantum-secure VPN solutions combining QRNG with NIST-approved Post-Quantum Cryptography.
- **QShield Platform (April 2025):** Launched on World Quantum Day, QShield is the world's first unified quantum-safe cryptography management platform across cloud, on-premises, and hybrid environments. It integrates QKD, Quantum Random Number Generators (QRNG), and Post-Quantum Cryptography into enterprise-grade SaaS.
- **Global Reach:** QNu's Armos QKD systems deployed to Middle Eastern clients, many PSUs, payment providers, global banks, large telco



giants, and showcased at India Mobile Congress 2025 with Quantum Safe networks demonstrated at DST, BSNL and TEC booths.

- A total of 30+ deployments have been made across the globe, with growth continuing to be strong.
- **National Quantum Mission Support:** As one of eight startups funded under NQM, QNu received investment from NQM. QNu's products are available on the Government e-Marketplace (GeM) for nationwide procurement and have been tested, validated, and certified by various national and global bodies – TEC, TUV, VAPT, and more.

THE POLICY IMPERATIVE: FROM AMBITION TO EXECUTION

Prof Abhay Karandikar's celebration of NQM progress must translate into quantum security mandates, not just quantum computing aspirations.

IMMEDIATE POLICY ACTIONS REQUIRED:

QUANTUM SECURITY TASK FORCE UNDER NQM

NQM/DST led Quantum Security Task Force should produce sector-wise quantum-safe transitions:

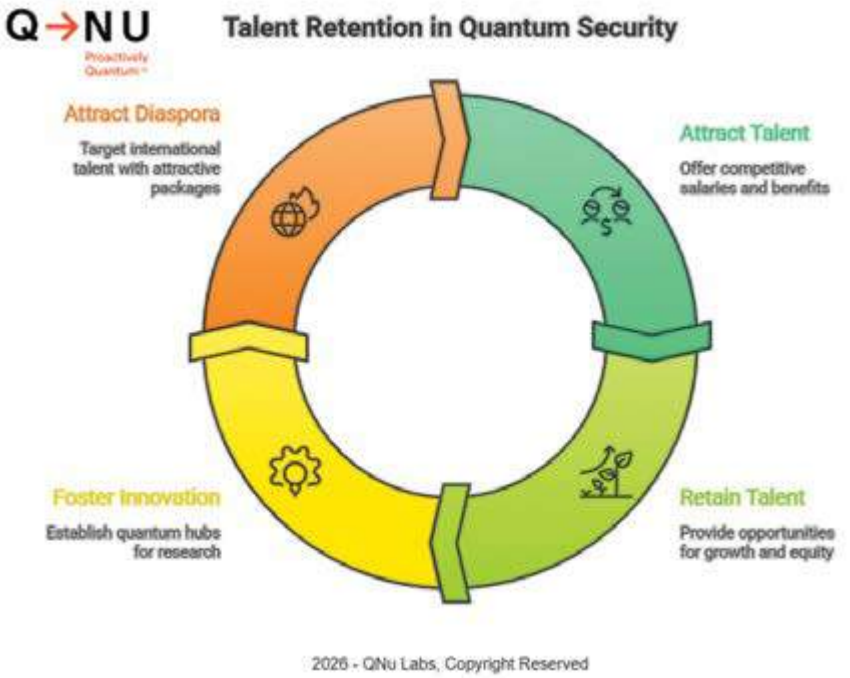
- **BFSI:** RBI's 2024 directive urging banks to inventory cryptographic protocols needs enforcement deadlines, not suggestions
- **Telecommunications:** TEC's QKD and Quantum-safe Cryptographic Systems standards must become licensing requirements by 2027
- **Defence & Government:** Accelerate QNu-style deployments across all critical networks
- **Critical Infrastructure:** Power grids, railways, airports to quantum-secure by 2026 (phase 1) and complete by 2027-2028.

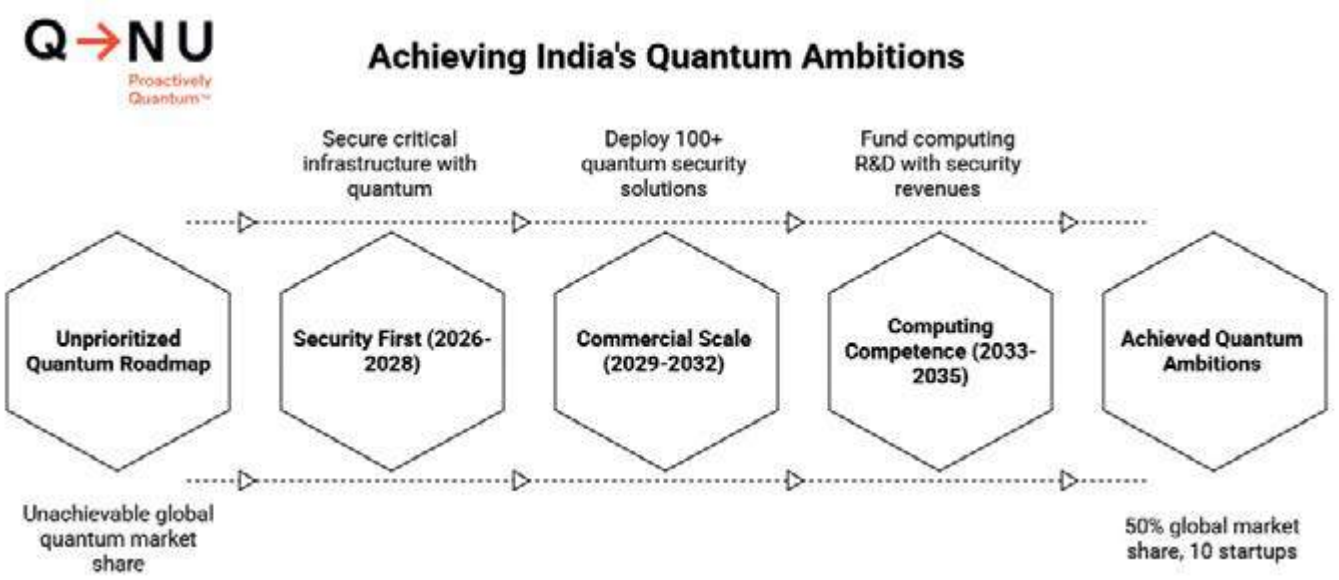
LEVERAGE THE ₹1 LAKH CRORE RDI FUND

Prime Minister Modi's ₹1 lakh crore Research, Development and Innovation Scheme launched at ESTIC 2025 explicitly prioritises quantum technologies. Dr Jitendra Singh emphasised RDI addresses the "persistent gap between laboratory research and commercialisation".

Allocate ₹10,000-15,000 crore specifically for quantum security infrastructure:

- **₹5,000 crore:** National quantum-safe network buildout
- **₹3,000 crore:** Indigenous component manufacturing (SPDs, encryptors, QRNGs)
- **₹2,000 crore:** Startup ecosystem (target 50 quantum security companies)
- **₹2,000 crore:** Talent retention programmes





STOP THE BRAIN DRAIN

India ranks second globally in quantum-related graduates after the European Union yet top talent migrates to US, EU, and China's better-funded programmes. Quantum Scientists in India command ₹14-17 lakh entry salaries- competitive domestically but nowhere near international offers.

SOLUTIONS

- **Fast-track Promotion:** TRL 7+ quantum security products qualify for Government procurement premium pricing
- **Equity Participation:** RDI Fund recipients must offer employee stock options
- **Quantum Hubs:** Establish five regional quantum security centres (Bengaluru, Pune, Hyderabad, Delhi, Kolkata) with world-class facilities
- **Global Reverse Migration:** Target diaspora quantum scientists with ₹50 lakh-₹1 crore packages plus research funding

INDIGENOUS SUPPLY CHAIN DEVELOPMENT

QNu and startups struggle with foreign dependency on photonic components, FPGAs, single photon detectors—all dominated by Chinese suppliers. The ₹720 crore quantum fabrication facilities must prioritise security hardware over computing chips.

THE 2035 VISION: QUANTUM SECURITY LEADER

India's December 2025 quantum roadmap targets 50% of global quantum software markets and 10 globally competitive startups by 2035. This is achievable—but only if we prioritise differently.

REVISED PRIORITIES

- **Security First (2026-2028):** Quantum-secure all critical infrastructure
- **Commercial Scale (2029-2032):** 100+ quantum security deployments globally
- **Computing Competence (2033-2035):** Leverage security revenues to fund computing R&D

Chowdhry's warning resonates, "India must prioritise quantum security to safeguard critical infrastructure, financial systems, and national security". His pragmatism offers the path: "We will create our own quantum computers. For the period we don't have a quantum computer, we'll buy a few quantum computers to do research on."

THE HONEST CALCULUS

As Minister Scindia urged India to "step into the quantum age with boldness, brilliance, and a clear sense of purpose" that purpose must be crystal clear: secure India's digital sovereignty today, not chase quantum computing supremacy tomorrow.

The question isn't whether India can build a 1,000-qubit computer by 2031. The question is whether India's banks, defence networks, and critical infrastructure will remain secure when China or the US achieves quantum supremacy. QNu Labs proves India has the technology. The ₹1 lakh crore RDI Fund provides the capital. The National Quantum Mission offers the framework. What's missing is the courage to prioritise protection over aspiration—to recognise that in quantum technology, security isn't a subset of computing; it's the foundation of digital sovereignty.

As Chowdhry wisely noted, "Don't ask what quantum earns next year. Ask what India loses if we don't build it now". For India, the clock is ticking not in qubits, but in harvested encrypted data awaiting decryption.

–The writer is Chief Marketing Officer at QNu Labs, India's pioneering quantum cybersecurity company incubated at IIT Madras. An IIM-Calcutta alumnus with 22+ years of global marketing leadership, she has led quantum security thought leadership initiatives positioning India's "Made in India, Made for the World" quantum capabilities across defence, government, and enterprise sectors globally.

BITING THE SILVER BULLET:
DRILLS THAT BUILD SHOOTING SKILLS

Continuing the series - Biting the Silver Bullet, the writer in this article focuses on firearm safety and the drills that build shooting skills

SANJAY SONI

When it comes to training with your handgun, you really have two options available to build your skills - Dry Fire Drills and Live Fire Drills. Before we go further, I would like to reiterate the aspect of Safety!

SAFETY FIRST: FOUR RULES OF FIREARM SAFETY

Whether you're at home or at a gun range, safety should always be your number one priority. Whenever your gun isn't in use, keep it unloaded and safely stored away in a protective gun case or a gun safe.

Always follow the Four Rules

1. Keep your gun pointed in a safe direction
2. Always treat your gun as if it were loaded
3. Keep your finger off the trigger until you're ready to shoot
4. Be sure of your target and what lies beyond it

DRY FIRE DRILLS AND LIVE FIRE DRILLS

Both are valuable, and both will allow you to build your handgun proficiency and attain the accuracy you are striving for.

Dry Fire Drills: Dry Practice Makes Perfect!

Although live drills are important, dry fire drills are the single best thing you can do to improve your handgun accuracy. Dry fire drills can be done anywhere at any time and cost nothing. If you keep up with your dry fire practice, you should start to see improvement in your accuracy with each visit to the gun range.

Dry fire exercises are those that are done with your handgun with no ammunition. You can practice your draw stroke, sight alignment and trigger squeeze all without firing a shot. The benefit to dry fire practice is that you don't have to go to the range. You can practice in your garage, basement, or office.

Why Dry Firing?

The main point of dry fire practice is to develop muscle memory so you consistently produce an awesome trigger pull and don't flinch when it's time for real

shooting. And if you've developed some bad habits along the way, it does a great job of rewiring you back over time.

At least for me, I find that after a week or two of dry firing a few minutes a day, I become "one" with my trigger and grip.

Becoming "One" with Trigger and Grip

My grip just feels right, and I can sense all the little nuances in the trigger pull. And when I focus on the front sight and pull the trigger, the front sight stays super steady. It takes a lot of practice to reach that point. Remember, it's a diminishing skill that needs to be kept up to date too. Even after just a few days of not practicing, I can feel some differences the next time I dry fire or shoot.

Keep in mind that you are still handling a gun and as such, you should always treat that gun as if it were loaded. For all dry fire exercises, unload your handgun and all the magazines you will be using for your training session. Then, remove all the live ammo from the room you are training in.

As a final reminder that your dry fire practice session is beginning, say to yourself, out loud, "dry fire practice beginning, gun is unloaded." When you finish your session and reload your magazines and your gun, again, say to yourself out loud, "dry fire practice is over, gun is loaded and hot." This is just an extra level of precaution that reminds you that the gun is no longer safe for dry fire exercises.

Live Fire Drills

Live fire exercises are those done with real ammo, on the range, sending rounds to the chosen target. Now you get a chance to see how your dry fire practice is paying off. The real goal is to manipulate the handgun with live fire in the exact same manner as you did in your dry fire practice. Your draw, presentation, and trigger squeeze should all be the same. Except now you have all that commotion at the end of your arms; muzzle blast, recoil, ejecting brass, etc.

If you are executing all the fundamentals correctly, you should see improvement in your accuracy on every trip to the range.

Five Rules to Remember

We've taken a look at the challenge of mastering our handgun, as well as handgun shooting fundamentals and the types of training we can do to begin building solid accuracy into our shooting. Before we dive into the specific drills to improve your accuracy, let's review the basic safety rules. These rules are necessary if you want to be effective in your training. Before we start the Drills I would like to again remind you of the basics of handgun shooting which need to be in place for an accurate shot.

Fast and accurate handgun shooting demands a stable shooting stance. A proper handgun shooting stance will set you up for success in other areas, such as sight alignment, trigger control, and recoil management. The most popular handgun stances include the Isosceles, the Weaver, and the Chapman. There is no "best" stance. All three have their advantages and disadvantages

1. Keep Your Grip High and Tight

How you hold the handgun is key to controlling recoil and can even slightly make up for a sloppy trigger pull. Unfortunately, the grip is also one of the things that shooters tend to get wrong.

When holding a handgun, your grip should be high and tight, meaning there should be no spaces between your flesh and the gun when you grip it. Having spaces in between your hand and the gun means that there is room for the gun to move when it recoils. The web of your hand should go as high as possible without interfering with the slide, and your non-dominant hand should come forward to fill the empty space on the grip panel.

2. Get Your Stance Right

Fast and accurate handgun shooting demands a stable shooting stance. A proper handgun shooting stance will set you up for success in other areas, such as sight alignment, trigger control, and recoil management. The most popular handgun stances include the Isosceles, the Weaver, and the Chapman. There is no "best" stance. All three have their advantages and disadvantages. Experiment with different stances and choose one that you feel most comfortable with.

3. Use the Front Sight

One of the biggest mistakes that beginner shooters tend to make is looking directly at their target as opposed to their front sight. If you're shooting for pure accuracy, you need to line up the front and rear sights. The front sight should be in clear focus, while the rear sights are somewhat fuzzy.

Don't pull the trigger until you see that your sights are aligned. Doing otherwise will only instill bad shooting habits that will be hard to break.

4. Work on Recoil Anticipation

Recoil anticipation screws up a lot of hand gunners. This is one of the reasons why dry firing—shooting without live ammo—is so important because it helps build muscle memory that can help you overcome recoil anticipation. If you find yourself flinching in anticipation of the recoil, try to pull the trigger as if you were just dry firing it and let the gun do its thing.

Dry firing is perfectly safe for the most part (the exception being rimfire guns) and can significantly improve your handgun accuracy. Keep in mind that the four rules of gun safety still apply to dry firing. So when you're finished dry firing your pistol, be sure to immediately return it to the pistol case. People have dry firing accidents when they get distracted, load their firearm and return to "dry firing," only to experience a loud bang. A handgun case can help prevent unnecessary accidents.

5. Learn Proper Trigger Squeeze/Press

Despite trigger pull being one of the most important aspects of handgun shooting, it's often easily neglected by beginners and experienced shooters alike. If you have your sights lined up and your shot is still veering off the left or the right, an improper trigger pull is probably to blame.

Most handgun instructors advise using the center of the pad on your fingertip and the first knuckle joint to press the trigger. However, this may differ for everyone based on your hand and finger size.

Let us now look at the various Live Drills that will help you in becoming a better shot!

Drill 1: Dot Slack Torture Drill

As mentioned earlier, trigger control is the key to accurate handgun shooting and this exercise serves to examine your trigger squeeze.

Take a piece of paper and draw 10 dots with a Sharpie about the size of a pencil eraser. Now, tape your paper to the wall or on a target stand. Stand so that when you press your gun out toward the target, your muzzle is about one inch from the target.

Begin Drill 1

As with all dry-fire exercises, be sure your firearm is unloaded. Remove all live ammo from your training area and be sure you have a safe backstop. Cycle your action so the gun is cocked and ready to fire. Press the gun out one-handed with your strong arm and align your sights with one of the dots on your target.

Now, begin to work the take-up (or slack) out of your trigger and bring it right to the point before it fires. This drill is taught at the Sig Academy and, according to Mike Green, about 70% of our shooting habits reside in the trigger slack. This means that if the front sight is moving AT ALL during the slack take-up, we are building in micro movements that cause us to manipulate the trigger from an inaccurate front sight position.

Look for any movement in the front sight as you take up the slack. Work through all 10 dots from the same placement of your feet and shoulders. This forces you to angle your handgun in different positions.

End Drill 1

With bigger dots, you can do this same drill as a live fire exercise. Use a bigger piece of paper or the back of a target, place the target 3 yards away and concentrate on minimal sight movement as you take up the slack and press through to send the shot.

Drill 2: Dot Reset Torture Drill

As in the previous drill, we will use the same page with ten dots on it. However, now we will press through the slack and "fire" our shot.

Begin Drill 2

With the trigger pinned back against the frame, rack the slide to the rear to cock the firearm.

Now, extend your gun out, line up the sights on a dot and slowly release the trigger. But only release the trigger as far as the reset. You should be able to hear and feel the trigger reset for the next shot.

End Drill 2

This exercise allows you to see what's happening after the shot and as you work the trigger in reverse. Any front sight movement in this portion of our shooting sequence means we will be slower getting back on target and making follow up shots.

When we master trigger take up and reset, then we allow ourselves to start from true accuracy, instead of having to make up for it as we manipulate the trigger.

Drill 3: Balance the Brass (or Coin)

To continue honing our trigger squeeze, we can move to another dry-fire exercise that will reveal our ability to squeeze and reset smoothly and without movement.

Begin Drill 3

With your gun unloaded and a safe backstop, rack your slide to cock the gun, then build your grip and press out to the target. Once the gun is fully extended and you have the sights aligned on your target, have your shooting partner balance an empty cartridge case or coin on your front sight. Now, begin your trigger squeeze all the way through 'firing' the shot. Were you able to properly squeeze off the shot without the case or coin falling off?

End Drill 3

You can also reverse this process and rack your slide while the trigger is pinned to the rear and then practice your trigger release to reset while keeping the case balanced on the front sight.

Drill 4: One Ragged Hole

As the name suggests, the goal of this live-fire drill is to have every shot go through one hole. Caylen Wojcik, the owner of Kalinski Consulting and Training, has his students begin at three yards with a one-inch dot to aim at.

Begin Drill 4

- Prep your gun
- Draw from your holster
- Press out to the target
- Align your sights
- Slowly squeeze the trigger and send your shot. Try to fire your shot within 10 seconds of getting the gun on target.
- Reholster, and repeat until your magazine is empty.

Recoil anticipation screws up a lot of hand gunners. This is one of the reasons why dry firing—shooting without live ammo—is so important because it helps build muscle memory that can help you overcome recoil anticipation

End Drill 4

You can then shoot from five yards with a two-inch dot, then seven yards with a three-inch dot.

This is a slow, deliberate drill designed to make you concentrate on aiming at the exact same spot, every time and executing a perfect trigger squeeze, sending every shot through the same hole.

Drill 5: The Loved One

This drill can be followed after the One Ragged Hole drill. Here we use two full-size silhouette targets. However, we're going to fasten one of the targets partially over the other target to simulate an assailant holding a loved one hostage.

Start off with a good portion of the assailant target exposed to the side of your loved one. Take a marker and write the name of your loved one on the front target to induce some stress into the situation.

Begin Drill 5

- Start at the three-yard line with the gun at low-ready or in the holster.
- Set your timer for five seconds.
- At the start buzzer fire two rounds into the assailant target.

End Drill 5

As your scores begin to increase you can reduce the size of the assailant target that is visible, increase the range or reduce the time interval or all three. I also found this graphic to be immensely helpful in diagnosing my shooting errors.

Have a target, shoot a couple shots at it, and see where they land in relation to the chart.

I usually start off pretty strong and as I get more comfortable I forget some of my lessons, such as remembering to squeeze. That's when I start telling myself to "squeeze" every shot again. It's one thing to be dry firing and shoot perfectly, but another once real recoil is entered into the equation. *We shall continue the drills in the next article.*

The writer is the Managing Director of Hughes Precision Manufacturing Pvt Ltd, India's first small calibre manufacturer in the private sector. An MBA from the Indian Institute of Management – Bangalore, he has been involved with the ammunition industry in India and abroad for the more than a decade.

IG DEFENCE: BUILT IN BHARAT BUT READY FOR THE WORLD

IG Defence's transformation from a drone manufacturing company to an entity offering the full-spectrum defence technology company, building integrated battlefield systems, demonstrates its commitment to move forward as per the demands of the growing defence ecosystem in the country. In a wide-ranging chat with Editor, Raksha Anirveda, Ajit Thakur, IG Defence's Senior VP (R&D), Major General RC Padhi, focussed on company's growth and its underlying philosophy, i.e. Built in Bharat, Built for Bharat, Ready for the World

IG Defence, which started as IG Drones initially, represents the transition of the Indian defence ecosystem, from being a single focussed to a multi-focussed entity. It also represents a natural evolution of the company's capabilities and responsibility. In the beginning, unmanned aerial systems were IG Drones's main focus, but modern warfare today is no longer confined to a single domain. Conflicts are now multi-domain, network-centric and driven by autonomy, intelligence, and electronic dominance. Thus, the transition to IG Defence embodies the company's intent to move beyond being perceived as only a drone manufacturer and to position itself as a full-spectrum defence technology company building integrated battlefield systems.

IG Defence works closely with the Armed Forces, especially during high-intensity operations like Operation Sindoor, which made it clear to Gen Padhi, that the army's future requirements extend far beyond aerial platforms. They involve land and maritime autonomy, secure communications, AI-enabled command systems, electronic warfare resilience, and counter-drone technologies. Thus, IG Defence was structured to address this wider battlespace and to contribute meaningfully to India's sovereign defence ecosystem under the spirit of Make in India and Aatmanirbhar Bharat.

For IG Defence, Aatmanirbhar Bharat, is about far more than domestic manufacturing. It is about owning the complete technology stack—design, software, data, upgrades, and mission logic—so that India retains strategic control over its defence capabilities. IG Defence, focuses on building end-to-end indigenous systems, from airframes and avionics to secure datalinks, AI stacks, ground control stations and training simulators, all within India.

Every product is designed around the demands of the Indian terrain, Indian threat scenarios, and Indian force structures. Whether it is high-altitude ISR platforms, swarm-enabled tactical drones or counter-UAS systems, IG Defence's objective is to deliver sovereign solutions that the Armed Forces can modify, upgrade, and deploy without foreign dependencies or operational constraints. This approach directly strengthens Make in India while ensuring long-term operational freedom for India's forces.

IG Defence considers three major segments emerging as major growth drivers, in the near future. The first is counter-UAS and layered air defence, because the proliferation of low-cost drones has fundamentally altered battlefield threats. The second is AI-enabled command, control, and decision-support systems, which are becoming essential to manage sensory overload, compress decision cycles and enable integrated theatre operations. The third is autonomous and semi-autonomous land and maritime platforms, especially for logistics, ISR and perimeter security roles,

its VP (R&D) Maj Gen RC Padhi said.

As modern forces will depend less on isolated platforms and more on connected ecosystems that can sense, decide, and act across domains. IG Defence, therefore, focuses on interoperability—building systems that integrate seamlessly across air, land, sea, and cyber environments and provide commanders with actionable intelligence rather than disconnected data streams.

Operational deployment is the most rigorous test of any defence system. During Operation Sindoor, IG Defence's FPV and tactical platforms were used for ISR, terrain mapping and precision strike missions. Thus, IG Defence gained valuable insights into endurance under stress conditions, electromagnetic interference behaviour, operator workload, and the importance of rapid mission reconfiguration. These experiences reinforced the need for ruggedisation, encrypted low-latency communications, modular payloads and systems that can be repaired and redeployed quickly in the field, said Maj Gen Padhi.

In parallel, IG Defence moved forward with the induction of the IG T-Shul Pulse, its indigenous handheld anti-drone jammer, which has already secured orders from both the Indian Army and Navy. Designed and manufactured in India under Make in India and Aatmanirbhar Bharat, it provides frontline troops with a rapid-response capability against hostile UAVs. It combines mobility, multi-band jamming, and battlefield ruggedness, and will play a key role in protecting bases, convoys, and high-value assets against emerging asymmetric threats.

Based on real-time operating stress, IG Defence learned that systems must function reliably in degraded environments GPS denial, spectrum congestion, dust, heat, vibration, and the chaos of active operations. Based on this, it strengthened its system's navigation redundancy, hardened datalinks against jamming, improved thermal sealing and reinforced mechanical durability across platforms. It also redesigned operator interfaces to reduce cognitive load and shorten decision time in high-stress scenarios, Maj Gen Padhi said.

Equally significant was the shift towards faster, field-driven design cycles. Instead of long development silos, user feedback from deployed units now feeds directly into the company's weekly product iterations. This ensures that its systems evolve in step with operational realities rather than laboratory assumptions.

For IG Defence, Aatmanirbhar Bharat, is about far more than domestic manufacturing. It is about owning the complete technology stack—design, software, data, upgrades, and mission logic—so that India retains strategic control over its defence capabilities

IG Defence also observed that the main challenges included complex terrain, communication shadow zones, electronic interference, and rapidly changing threat patterns. In several scenarios, continuous datalinks could not be guaranteed, which tested both autonomy and onboard processing capabilities. So, the company focussed on making its systems adaptable through autonomous fail-safes, terrain-aware flight logic, multi-band communications and onboard decision support that reduced dependence on constant operator control.

This experience reaffirmed a critical principle for the company: survivability today depends as much on software architecture as on hardware. The ability to adapt dynamically, recover gracefully and continue operating in contested environments is now central to how IG Defence designs its every new platform, Maj Gen Padhi said.

Casting a futuristic stance, Gen Padhi says that simulators are absolutely foundational for future drone warfare. Next-generation conflicts will involve swarms, electronic warfare, GPS denial, and extremely high operational tempo. Training all of this in live environments is neither safe nor economical. High-fidelity simulators allow forces to practise complex missions, failures, and counter-drone tactics without operational risk. Thus, IG Defence's indigenous simulator replicates GPS-denied zones, EW conditions, urban and mountainous terrain and coordinated swarm behaviour. It enables pilots and commanders to train decision-making, mission planning, and contingency management in realistic conditions. Over time, such tools will become as essential to drone forces as live-fire ranges are to conventional units.

AI is already embedded across multiple layers of IG Defence's systems, including

navigation assistance, object detection, terrain mapping, predictive maintenance, and mission optimisation. Today, AI supports operators by reducing workload and improving situational awareness. The roadmap has now moved toward collaborative autonomy, where multiple platforms share intelligence, re-task dynamically and assist commanders with actionable insights rather than raw data. In the future, we foresee semi-autonomous swarm operations, distributed sensing networks, autonomous logistics and AI-driven command support systems that significantly compress decision cycles. These capabilities will allow forces to operate faster, more resiliently and with far greater precision in contested environments, says Gen Padhi.

"Collaboration is central to our innovation model. We work closely with DRDO laboratories, iDEX start-ups, academic institutions, and deep-tech partners to accelerate development and avoid duplication. These partnerships allow us to integrate advanced materials, secure communications, sensor innovation, and cutting-edge AI research into deployable systems more efficiently." Gen Padhi further said.

IG Defence plans to prioritise its ISR platforms, counter-UAS systems, simulators, and integrated command solutions for export platforms. Built under Make in India and Aatmanirbhar Bharat, these systems offer a compelling combination of cost-effectiveness, adaptability and operational credibility tailored to regional security requirements.

"Equally important is our continuous engagement with operational units. Feedback from soldiers, pilots and commanders directly shapes product design, ensuring that innovation remains grounded in battlefield relevance and aligned with real-world doctrine and deployment needs," Maj Gen Padhi said.

"Yes, export readiness is an important part of our long-term strategy. While India remains our primary focus, scale and sustainability require participation in global markets. Friendly foreign nations across Southeast Asia, Africa, the Middle East and Latin America are actively seeking affordable, combat-proven and non-restrictive defence technologies".

By 2030, IG Defence aims to be recognised as a core pillar of India's sovereign defence technology ecosystem. Its goal is to have delivered indigenous autonomous systems, credible counter-drone shields, AI-enabled command platforms, and world-class training solutions that materially strengthen India's national security

"The involvement of senior military leadership has been transformational for our R&D priorities. Their operational experience ensures that our technology roadmap remains threat-aligned, doctrine-compatible, and deployment-ready. Inputs from experienced officers have influenced system ergonomics, maintenance design, training frameworks, and long-term capability planning.

This fusion of battlefield experience with engineering talent allows us to avoid purely theoretical development. Instead, every major programme is shaped by how systems will actually be deployed, sustained, and fought with in real operational environments." Gen Padhi said while commenting on the need for interaction between defence manufacturers and battle commanders.

Foreseeing the most concerning threats, which may include low-cost swarm saturation attacks, AI-enabled autonomous weapons, grey-zone ISR proliferation and hybrid electronic-cyber-kinetic warfare. Future adversaries will increasingly target networks, data pipelines, and decision cycles rather than only physical platforms. To prepare for this emerging scenario, IG Defence is investing in swarm defence, cyber-resilient architectures, adaptive AI and integrated multi-sensor counter-UAS ecosystems. The objective is not just to defend platforms, but to protect the entire operational system that supports modern combat.

While designing new products, the company also ensures that all major systems are designed keeping in mind the tri-service interoperability. Thus, its platforms support shared situational awareness, common command interfaces, and cross-domain data fusion so that Army, Navy, and Air Force units can operate on a unified picture. This approach directly supports India's vision of integrated theatre commands.

Technologies such as unified command dashboards, AI-driven mission planning tools and multi-domain sensor fusion will become key enablers of joint operations. Thus, IG Defence focuses on building systems that naturally integrate rather than forcing connectivity after deployment.

By 2030, IG Defence aims to be recognised as a core pillar of India's sovereign defence technology ecosystem. Its goal is to have delivered indigenous autonomous systems, credible counter-drone shields, AI-enabled command platforms, and world-class training solutions that materially strengthen India's national security.

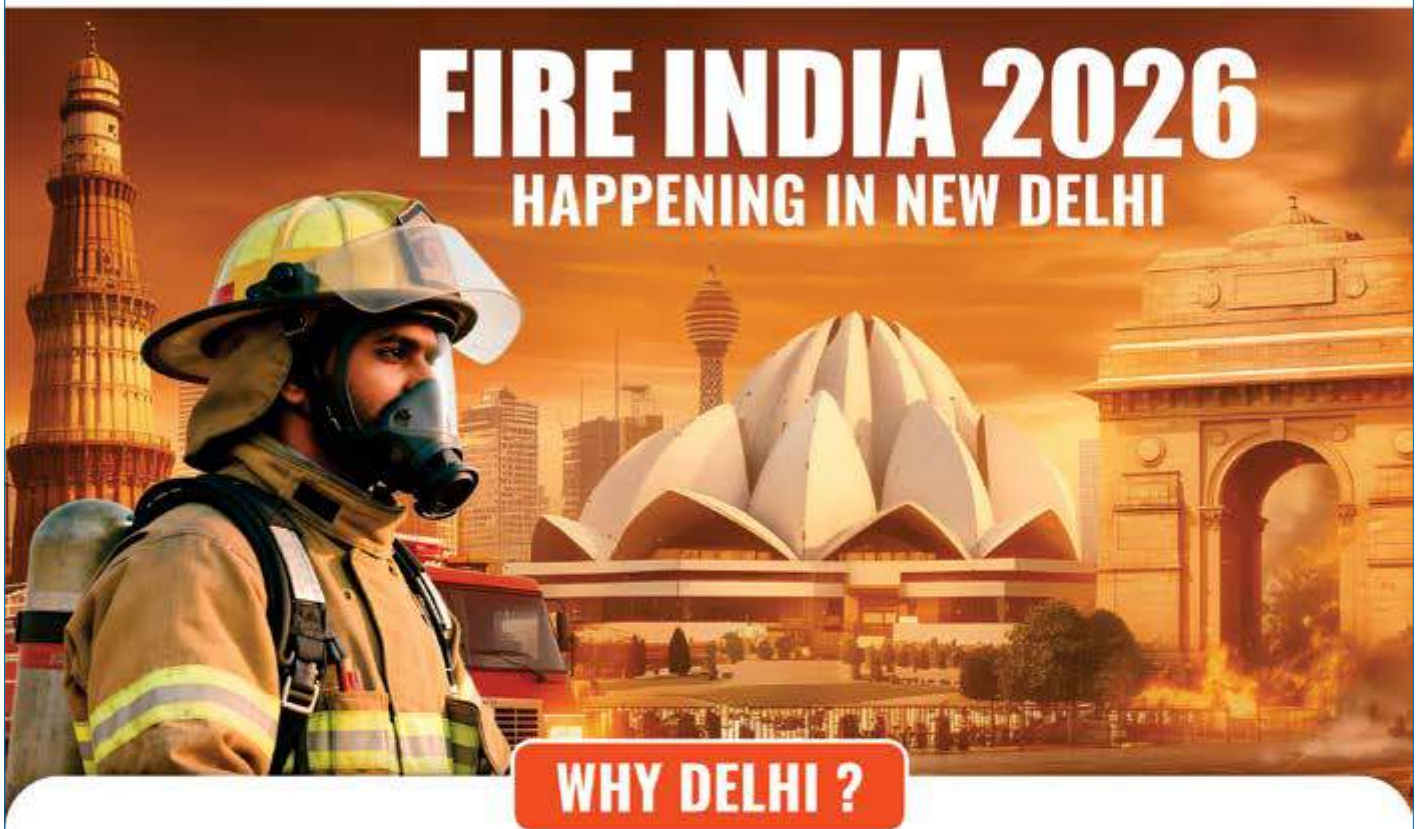
Internationally, IG Defence aspires to be seen as a trusted defence partner from India—offering affordable, adaptable, and combat-relevant technologies built under Make in India and Aatmanirbhar Bharat, and known for innovation, integrity, and operational credibility.

INTERNATIONAL FIRE INDIA 2026 EXHIBITION & CONFERENCE

28th 29th 30th SEPTEMBER 2026

Yashobhoomi, India International Convention & Expo Centre, Dwarka

DELHI



FIRE INDIA 2026

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POLICY TO PRACTICE: POSITIVE TRAJECTORY, YET FAR FROM A TRANSFORMATIVE IMPACT

Whether 2025 was truly a 'year of reforms' that delivered desired results, or whether it remained an aspirational rhetoric. The answer is more nuanced. The real question is whether reforms are being implemented persistently, adapted to ground realities, and given the time required to mature. On that measure, the trajectory is positive. Honesty demands acknowledgement of where reforms have fallen short of transformative impact

DR R SHIVARAMAN

Big Bang Boom signs a 200 crore contract for Anti- Drone Defence System with Indian Air Force & Indian Army. These contracts were awarded to BBBS in the presence of Defence Minister Rajnath Singh

Around the same time as President Trump was sworn-in in January 2025, our company achieved a milestone that would have been unimaginable just seven years ago. Big Band Boom Solutions became India's first iDEX startup to export and deliver defence systems to a friendly country. This was not merely a commercial achievement; it validated a fundamental shift in India's defence ecosystem. As someone who has navigated this transformation from the trenches rather than the policy corridors, I offer this assessment not as an observer, but as a practitioner who has experienced both the promise and the friction of reform.

The question we must examine honestly is whether 2025 truly represented a "year of reforms" that delivered meaningful change, or whether it remained largely aspirational rhetoric. The answer, I have found, is more nuanced than either celebration or cynicism would suggest.

THE FOUNDATION: REFORMS THAT HAVE TAKEN ROOT

When we founded our company in 2018, the defence technology landscape was starkly different. Defence Public Sector Undertakings dominated not only production but also innovation, foreign OEMs controlled high-value contracts, and the defence startup ecosystem was virtually non-existent. The phrase Aatmanirbhar Bharat had not yet entered the national vocabulary, and the idea that a Chennai-based deep-tech startup could secure developmental contracts across all three services would have seemed improbable.

Seven years later, the transformation is tangible. The Innovations for Defence Excellence programme, launched in 2018, has matured from an experimental initiative into a robust pipeline connecting innovators with military end-users. Our own journey, securing ten developmental partnerships with the Ministry of Defence, converting three into procurement contracts worth over $40 million, and raising $30 million in venture capital, would not have been possible without this structural reform.

The iDEX framework addressed a long-standing challenge in defence innovation: the gap between prototype development and procurement. By providing grant funding, facilitating access to military

Big Bang Boom Solutions Co-founder Dr Shivaraman shows his company's anti-drone defence systems to Prime Minister Narendra Modi

testing facilities, and creating clear pathways from innovation to adoption, iDEX reduced risk on both sides. Startups could invest in defence technology without wagering their survival on uncertain outcomes, while the armed forces could evaluate solutions without committing to procurement upfront.

The impact extends beyond individual companies. According to Ministry of Defence data, iDEX has funded over 300 startups and MSMEs, with approximately 75 solutions transitioning from development to trials or procurement. More importantly, it has altered institutional culture. Officers who once viewed startups with scepticism now actively seek innovative solutions, recognising that agility and cost-effectiveness matter alongside proven track records.

The phased introduction of the negative import list from 2020 onwards has been another consequential reform. By restricting imports of 411 defence items and encouraging indigenous alternatives, it created genuine market opportunities for Indian manufacturers. Our work on electronic warfare systems and AI-enabled platforms benefited directly from this shift, allowing us to compete not as a compliance requirement, but on technical and economic merit.

"Our own journey, securing ten developmental partnerships with the MoD, converting three into procurement contracts worth over $40 million, and raising $30 million in venture capital, would not have been possible without this structural reform" says Co-Founder and CTO of Big Bang Boom Solutions

Defence exports, once peripheral to national strategy, have emerged as both a priority and a measure of industrial maturity. India's defence exports crossed $2.6 billion in FY 2023–24, up from $686 million in FY 2018–19. Our January 2025 export delivery demonstrated that Indian defence technology can compete globally not only on cost, but on capability. Streamlined export authorisation processes and government-facilitated buyer engagement were critical enablers.

The liberalisation of Foreign Direct Investment in defence, permitting up to 74% under the automatic route and 100% through government approval, has begun attracting serious capital. Our $30 million fundraiser, delivering 15 times returns to early investors, helped convince venture capital that defence technology is not only strategically vital, but commercially viable. This is catalysing an ecosystem where talent, capital, and entrepreneurship are converging on national security challenges.

THE FRICTION POINTS: WHERE PROGRESS LAGS PROMISE

Honesty demands acknowledgement of where reforms have fallen short of

transformative impact. The gap between policy intent and implementation reality remains significant in several areas.

Procurement timelines, despite reform efforts, remain stubbornly long. While iDEX has accelerated development cycles, the transition from successful trials to large-scale procurement continues to navigate multiple approval layers, technical evaluations, and financial vetting processes. What should take 18 to 24 months often stretches to 36 to 48 months, creating cash flow pressures for startups and MSMEs that lack large balance sheets. The Defence Procurement Procedure 2020 introduced welcome simplifications, but execution remains inconsistent across services and categories.

The offset policy, designed to build indigenous capability through technology transfer, has delivered mixed outcomes. While some foreign OEMs have established meaningful partnerships in India, others have met obligations through low-value activities that do little to enhance domestic capability. Transfer of critical design knowledge, manufacturing processes, and core subsystems remains limited in many high-value programmes.

Despite policy support, MSMEs and startups continue to face structural disadvantages when competing with DPSUs and large private players. Evaluation criteria often emphasise prior experience, installed capacity, and turnover, parameters that favour incumbents. Although the "Make-I" category under DPP 2020 seeks to address this imbalance, awareness and adoption remain limited. Access to testing infrastructure, qualification facilities, and domain expertise also remains a challenge for smaller firms.

Procurement timelines remain long. While iDEX has accelerated development cycles, the transition from successful trials to large-scale procurement continues to navigate multiple approval layers, technical evaluations, and financial vetting processes. What should take 18 to 24 months often stretches to 36 to 48 months

Defence industrial corridors in Uttar Pradesh and Tamil Nadu have made progress in infrastructure development, but the manufacturing ecosystems envisioned are still nascent. Land allocation and utilities are improving, yet anchor investments that create supplier networks and skilled labour pools have been slower to emerge. This reflects not policy failure, but the reality that industrial ecosystems require patient capital, stable policy, and market certainty over extended periods.

Export growth, while encouraging, remains concentrated in a narrow range of products and markets. Even with a capable product and a willing buyer, navigating export clearances, end-user certification, and logistics support requires persistence and active facilitation. Scaling from isolated successes to sustained international competitiveness will require continued diplomatic engagement and competitive financing mechanisms.

2025: A YEAR OF CONSOLIDATION, NOT REVOLUTION

Was 2025 truly a "year of reforms" in defence? A more accurate characterisation is that it was a year of consolidation, when reforms introduced over the previous five to seven years began delivering visible, scalable outcomes.

Our January 2025 export achievement was the cumulative result of multiple reforms: iDEX funding that reduced R&D risk, negative import lists that created demand for indigenous solutions, export facilitation that enabled foreign engagement, and certification frameworks that built buyer confidence. No single 2025 initiative enabled this outcome; rather, sustained policy direction compounded over time.

This underscores a critical lesson. In defence, a sector defined by long development cycles and high operational stakes, meaningful change does not result from headline announcements. It emerges through incremental improvements, patient capital, and sustained government-industry collaboration.

The evolution of the iDEX programme illustrates this trajectory. The 2025 cohorts exhibit higher proposal quality, clearer articulation of military requirements, and faster execution than those of 2018–19. This improvement reflects accumulated learning

Big Bang Boom Solutions Pvt Ltd, secured funding for a $5 million joint R&D and commercialization project with Foresight Autonomous Holdings Ltd under the India–Israel Industrial R&D and Technological Innovation Fund (I4F)

rather than isolated policy intervention.

Similarly, the growth of defence exports reflects years of groundwork in diplomacy, quality enhancement, and credibility building. Each successful delivery, whether our system to an FFC or BrahMos missiles to the Philippines, strengthens confidence and opens subsequent opportunities.

THE ROAD AHEAD: REALISTIC OPTIMISM

As we look towards 2026 and beyond, the appropriate stance is one of realistic optimism. The policy foundation is sound. Frameworks such as iDEX, negative import lists, FDI liberalisation, and export promotion are directionally correct and beginning to deliver results. Evidence lies in ecosystem indicators: venture capital entering defence, engineering talent choosing defence careers, and military formations actively seeking innovation.

However, continued attention is essential. Procurement simplification must translate from policy to consistent practice. Technology transfer obligations require stricter enforcement. Testing and qualification infrastructure must expand to meet growing demand. Above all, defence innovation requires patient, risk-tolerant capital willing to support five to seven-year development cycles.

Defence industrial corridors need anchor investments to create gravitational pull for suppliers and a skilled workforce. This may necessitate proactive government coordination, risk-sharing mechanisms, or direct investment in foundational projects.

For MSMEs and startups, success depends not only on policy support but on execution capability. Many promising firms fail due to weak project management, inadequate quality systems, or the inability to scale. Incubators, industry bodies, and government programmes must focus as much on organisational maturity as on technical innovation.

PROGRESS OVER PERFECTION

As someone who has built a profitable defence technology company from scratch in seven years, I can state unequivocally that the reform journey has been real and consequential. Securing contracts across all three services, raising significant venture capital, delivering strong investor returns, and exporting Indian defence systems would have been impossible in the pre-2018 ecosystem.

Big Bang Boom Solutions takes stage at the India - Kenya Mini Defence Expo, with a live demonstration of our anti drone systems by Dr R Shivaraman

Yet triumphalism would be misplaced. Reform is working incrementally and unevenly. Transforming India from an import-dependent defence consumer into an innovation-driven, export-competitive power will take decades of sustained effort.

The offset policy has delivered mixed outcomes. Some foreign OEMs have established partnerships in India, but others have met obligations through low-value activities that do little to enhance domestic capability. Transfer of critical design knowledge, manufacturing processes, and core subsystems remains limited in many high-value programmes

The real question is not whether 2025 was a "year of reforms," but whether reforms are being implemented persistently, adapted to ground realities, and given the time required to mature. On that measure, the trajectory is positive.

The Prime Minister's vision of "Make in India, Make for the World" is no longer aspirational. It is becoming an operational reality. Our January 2025 export delivery demonstrated that. Converting this momentum into a dominant paradigm will require policy stability, execution excellence, and an ecosystem-wide commitment to quality and innovation.

The foundation has been laid. The task ahead is to build upon it with patience, pragmatism, and an uncompromising pursuit of excellence. That is how defence reforms move from policy intent to strategic capability.

–The is the Co-Founder and CTO of Big Bang Boom Solutions, India's first profitable deep-tech defence contractor and the first iDEX startup to export defence systems to a friendly foreign country. The views expressed are of the writer and do not necessarily reflect the views of Raksha Anirveda

FRANCE'S PRIDE: M88 JET ENGINES

The original M88 engine remains operational and widely used. Its upgraded successor, M88 T-REX is actively being developed – with risk – reduction work already started and qualification planned to match Rafale F5s service entry in the early 2030s

SRI KRISHNA

The M88 is a French built fighter jet engine and is one of the most important military aero engines and the heart of the power plant system in the Rafale fighter aircraft. France is the only country in Europe capable of building fighter jet engines with such precision, thanks to the DGA or what is called the General Directorate for Armament.

The DGA is responsible for defence procurement, research and armament development. It operates under the French Ministry of the Armed Forces. A typical test flight of M88 takes place in Istres, in the south of France, where a Rafale fighter jet slices through the sky, almost silently at first. Then the sound arrives — a dense, metallic roar that makes coffee in nearby cups tremble. On the tarmac, a handful of engineers in orange vests barely look up. For them, this sound is not noise. It's a signature. The proof that somewhere inside the fuselage, a piece of French know-how is working with absurd, almost stubborn precision.

Few people know that in Europe, only France can design and qualify such engines from A to Z. Behind this very discreet superiority, there's a name that almost no one outside the defence world can identify on the first try. As has been described by analysts and others who have visited a DGA test centre and it doesn't resemble as such as it isn't a classic office with laptops and slides. It smells like kerosene and hot metal. Screens display numbers you don't see in everyday life — 1,800°C, 50,000 rpm, pressure ratios that sound straight out of science fiction. The people here don't build planes. They forge trust in something you never see, but that pilots literally bet their lives on.

While Airbus and Rafale well known globally, almost nobody has heard of the DGA, the French defence procurement agency quietly orchestrating all that tech in the shadows. That's the paradox: France holds one of Europe's rare sovereign skills — designing fighter jet engines with surgical precision — and it lives almost entirely off-radar. M88 is a French after burning turbofan engine built by Safran aircraft engines which was formerly Snecma. It was specifically designed to power the Dassault Rafale fighter jet, a twin-engine multirole combat aircraft used by the French Air Force and Navy, as well as exports to several nations including India. The engine first entered service in early 2000s and has since accumulated over a million flight hours in operational use.

France has spent decades insisting on "strategic autonomy" while others outsourced, pooled, or simply gave up certain skills. Building a fighter jet engine means mastering metallurgy, aerodynamics, software, acoustics, cooling, digital simulation — and tying all of it together inside one coherent process

To understand specifics of the M88 engine, it is essential to follow the trail to Villaroche, near Paris, where Safran Aircraft Engines lives and breathes. This is where the M88 is built, the compact turbojet that powers the Rafale. Next door, the DGA doesn't just "oversee a programme". It validates every tolerance, every blade profile, every microscopic defect that might appear after thousands of hours at full afterburner. Inside the test bunkers, M88s are chained to heavy mounts. They're tortured with extreme temperatures, simulated sandstorms, sudden throttle changes. Sensors record everything. When a turbine blade vibrates a little too much, the data goes back to Safran's offices. The engine is tweaked. The DGA checks again. This back-and-forth is what no other European country controls fully on its own. The whole chain, from concept to certification, sits on French soil.

This doesn't happen by accident. France has spent decades insisting on "strategic autonomy" while others outsourced, pooled, or simply gave up certain skills. Building a fighter jet engine means mastering metallurgy,

aerodynamics, software, acoustics, cooling, digital simulation — and tying all of it together inside one coherent process. The DGA acts as orchestra conductor. It funds research labs, supports young engineers, sets requirements the industry initially thinks are impossible, then helps them get there. That's why France can sit at the table with the US or the UK on equal footing when it comes to propulsion. And that's why no other EU country can just "decide" to do the same next year.

The DGA's secret recipe: testing, doubt, and obsessive precision.

Inside the DGA Propulsion test halls, there's a ritual that could almost pass for a strange craftsmanship tradition. Before a major test, the rooms are purged, every cable checked, every sensor recalibrated. On paper it's all written down in procedures. In real life, you see something else: small gestures, habits, shared looks that say "we know how this can go wrong". The standard M88 engine delivers about 75 KN of thrust with after burner which is enough to sustain supersonic flight.

It is designed to be lighter and more fuel efficient than earlier engines while offering performance across a large number of missions. M88 is a power plant for aircraft like Dassault Rafale where two M88 engines give the fighter its speed, agility and performance in both air-to-air and ground attack roles.

Safran is developing an upgraded version called M88 T-REX, which will provide roughly 20 per cent more thrust and it is intended for future Rafale standards like F5 variant. In short, M88 is a French built fighter jet engine. Its one of France's most important military aero-engines and the heart of the power plant system for the Rafale fighter.

The original M88 engine remains operational and widely used. Its upgraded successor, M88 T-REX is actively being developed – with risk – reduction work already started and qualification planned to match Rafale F5s service entry in the early 2030s. This marks a significant modernisation of France's propulsion capability. M88 is one of France's most important military

aero-engines and is the heart of the power plant in the Rafale fighter.

Some of the salient features of the M88 engines include its after burning turbofan configuration with a twin spool low-bypass turbofan with an afterburner for supersonic performance. It has a high thrust with compact size. It is designed for a high thrust to weight ratio to support fighter agility and payload capability and has excellent fuel efficiency.

The machine features single crystal high-pressure turbine blades with ceramic coatings to withstand high temperatures. Other advanced manufacturing techniques include powder metallurgy compressor for strength and weight reduction.

M88 stands out for its compact, high performance afterburning turbo fan design, advanced materials and digital central systems, evolution modular maintainability and its path like M88 T-REX enabling future growth in thrust and capability. The programme for the M88 arose from a need for a suitable propulsion system for air-superiority and ground-attack missions. In 1983, Dassault Aviation planned to produce a technology demonstrator for the Avion de Combat eXpérimental (ACX), which was expected to fly in 1986. Although the M88 was intended to be fitted to the definitive aircraft, it was not expected to be ready in time, and the ACX was therefore initially powered by the General Electric F404.

Due to the broad application of the new engine (as the aircraft was to replace a considerable number of the French fleet), it was necessary for the engine to have a high thrust-to-weight ratio, low fuel consumption in all flight regimes, and a long engine life.

When the SNECMA M88 engine main concepts and choices were settled at the end of the 1970s, both SNECMA and French Ministry of Defence concluded that a high overall pressure ratio and high Turbine Entry Temperature (TET) were needed. The layout was to be a twin spool, low bypass turbofan engine using new powder metal compressor blisks, a clean burning annular combustor and a key new technology, air cooled, ceramic coated, single crystal turbine blades made from a new AM1 alloy (N-18 alloy in the final production engines). The turbine performance was further enhanced with the use of active blade tip clearance control. Full authority digital engine controls and monitoring were used throughout.

–The writer is a senior journalist and media consultant. The views expressed are of the writer and do not necessarily reflect that of Raksha Anirveda

POWERING THE DEPTHS

Bharat V Shah, an IIT Bombay alumnus and founder of Polyphase Motors, transformed a small Vadodara-based unit into a critical pillar of India's naval defence. Through two decades of relentless innovation, his team designed and manufactured 360 specialised motors for the Arihant-class nuclear submarines, consistently outperforming global competitors. In a firsthand account to _Raksha Anirveda,_ he explores the challenges of mastering stealth technology and the pride of achieving strategic autonomy through indigenous engineering

I started my professional journey after earning my B.Tech. in Electrical Engineering from IIT Bombay and serving in the Siemens Motor Design Department for a brief period. This was where I acquired the essential knowledge of design practices for different applications of motors in a variety of fields while always ensuring they conformed to international standards.

In 1975, I established my own electric motor manufacturing unit in Vadodara which I named "Polyphase Motors." In the beginning, my focus was on manufacturing special-duty motors for a variety of industrial uses. However, the real and ultimate challenge came when I began developing special-purpose motors for Indian Navy warships and nuclear submarines. This long-term endeavour became the crowning glory of my career, as many of these motors were ultimately proven to be superior to imported Russian technologies.

During my years in the industry, I was honoured to be appointed President of the All India Electric Motors Manufacturers' Association and to subsequently represent the motor industry at the CII National Council. I also served as a team member of the BIS and BEE committees for motors. Because motors deliver mechanical energy to all equipment they drive, they are truly the prime movers of any complex system. Although the terms "Aatmanirbhar Bharat" and "Viksit Bharat" are modern slogans, I feel immensely happy and proud that I was driven by that very implied spirit while developing motors for nuclear submarines from 1993 to 2016.

THE DAWN OF NAVAL COLLABORATION

My company's association with the Indian Navy started in 1984, when we began developing many sizes and models of shock-grade motors. In 1993, we successfully commenced our continuous collaboration and follow-up with the Defence Machinery Development Establishment (DMDE). Initially, we engaged in many technical discussions without ever knowing the specific project or the sensitive locations involved.

By 2017, we had developed fourteen models, totalling 360 motors for the highly advanced Arihant-class submarines. This work became the crowning glory of my career, as many of these motors were proven to be superior to imported Russian models

Then, quite suddenly around the year 2000, our unit was visited by Director Rear Admiral R S Randhawa and Additional Director Commodore D Prabhakar. What followed were extensive technical discussions covering international standards and a broad spectrum of designs and manufacturing processes across various sectors including machine tools, textile machinery, and high-stakes navy projects.

The Admiral and his team frequently toured our shop floor to witness the actual motors being built and to personally verify critical parameters, testing facilities, and our meticulous record-keeping. During one of these visits, Rear Admiral Randhawa personally witnessed our "Flange Perpendicularity Test" performed right on the floor. When I asked him why such senior officers would spend their time visiting an MSME unit, the Admiral explained that they wanted to know firsthand whether any unit in India truly could manufacture motors for a project with specifications that were far more stringent than standard Navy requirements. He concluded the

Director Rear Admiral R S Randhawa and Additional Director Commodore D Prabhakar at Polyphase Motors unit

DG (ATVP), V Adm D Prabhakar with Bharat V. Shah, at Polyphase Motors Stall in International Naval Exhibition, in Visakhapatnam

Motor Drive		ATU	
Output		1.1 kW TE (No Fan)	
Source		Polyphase Motors	Russia
Project		S3SX	Imported Sample
Mat. of Construction		MS	Aluminium
Frame size		90 L	100 L
Volt	V	380	380
Weight	kg	20.2 actual	24.2 actual
Efficiency	%	79.40 Tested	72.2 Declared
Power Factor	-	0.815 Tested	0.72 Declared
No Load Current	A	1.55 Tested	2.44 Tested
Current on Load (ATU)	A	2.3 Tested	(3.2 Declared)

visit by confidently assuring me, "You will get enquiries."

OUTPERFORMING GLOBAL STANDARDS

By 2006, after we had supplied more than 100 motors, we finally learned from the main contractor that the project we were contributing to was for **Nuclear Submarines**. By 2017, we had developed fourteen distinct models, totalling 360 motors for the highly advanced Arihant-class vessels.

It was remarkable to see that our Polyphase motors were significantly more compact than the Russian models; for example, in the Auxiliary Tank Units (ATUs), we developed motors that were physically smaller yet significantly superior in their test results. While the imported Russian motors utilised aluminium construction for heat conductivity, we engineered our versions using mild steel enclosures to satisfy specific defence requirements. In the confined world of a submarine, the size and weight of every component is extremely critical, and our design provided a vital advantage.

Copper Die-Cast Rotor Motors

We continued to innovate by developing Copper Die-Cast Rotor (CDCR) motors, which perform significantly better than traditional aluminium rotors due to their much higher efficiency. Polyphase Motors was among the first four motor manufacturers in the country to successfully develop this technology. While large motors often use fabricated copper rotors, the die-cast variety is much more complex and difficult to produce at scale. Nevertheless, we successfully supplied the first-ever CDCR motor of a small size (Frame 100 L) to the Navy and DMDE.

PRECISION AND STEALTH TECHNOLOGY

Steering Gear Motors: Our steering gear motors also underwent exceptionally rigorous testing. Under rare, non-specified overloading conditions, our motors survived because we had deliberately over-designed them for extreme durability. When the Commodore inquired about their performance limits, I confirmed that they were perfectly suited for

22 KW, 3000 RPM motors for Nuclear Submarine

The success of our projects was made possible by the tremendous trust, confidence, and support from top defence and DRDO officers. It proves that if properly assessed, evaluated, and encouraged, MSME units can contribute substantially to the defence, security, and progress of the nation

three minutes of extreme operation, which far exceeded the expected one-minute requirement. The Commodore subsequently took a commitment that if we ever received a repeat order, we would comply with the same design, raw materials grade, and manufacturing standards. This reliability led to repeat orders for steering gear motors for two more nuclear submarines.

Stealth Technology: The final frontier for us was mastering Stealth Technology. Our 22 KW, 3000 RPM blower motors had earlier been supplied with a specified noise level of 80 dBA to the DMDE. Through my own research, I learned about "Stealth Technology for Submarines" and realised that because only Sonar works under water, silence is the ultimate defence. I discovered that Low Output (LO) limits were 70 dBA and for Very Low Output (VLO), the limits were a mere 60 dBA. Using unconventional design methods and procedures, we successfully converted our design into the 60 dBA range. Our design was passed to our licensee in Aurangabad, and DMDE certified the sample as the first three-phase VLO motor manufactured in India. We later learned from DMDE that they had floated enquiries to major manufacturers in America and Europe for such a demanding sound level, but they had all declined the challenge.

A LEGACY OF STRATEGIC AUTONOMY

The success of these complex motors and results were only possible for us because there was tremendous trust, confidence, and support from our top defence and DRDO officers. Although it was a top-secret project at the time, the results were achieved because everyone involved possessed tremendous willpower and enthusiasm. This journey proves that if properly assessed, evaluated, encouraged, given trust and opportunity, small businesses can contribute substantially to the defence, security, and progress of the nation. I offer my humble salute to the defence and DRDO officers who believed in our capability.

Jai Hind. Bharat Mata ki Jai.

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CATALYSING MULTI-DOMAIN COMBAT TRAINING

The fast changing character of warfare has led to re-examine training philosophies and adopt simulation-led ecosystems that are continuous, scalable and analytically rigorous. At the centre stage of this transformation is Live–Virtual–Constructive Integration which offers a pathway to realistic, joint and continuous preparedness

SHANTANU GUPTA

The character of warfare is undergoing a phenomenal shift. Military operations today are no longer confined to single platforms or domains, but are executed across land, air, maritime, cyber, space and the information environment, more often than not simultaneously and at machine speed. In such a context, preparedness is determined not only by what a force operates, but by how effectively it trains to think, decide, and act as an integrated system. From an industry perspective, this reality places training, and the associated enabling technologies, at the centre of defence capability development.

TRAINING MUST REFLECT THE REALITY OF MODERN CONFLICT

Traditional live training remains indispensable, but it faces inherent constraints. Large-scale exercises are resource-intensive, episodic, geographically bounded and often unable to replicate the full cognitive complexity of modern operations. The ambiguity, information overload and compressed decision cycles that define real conflict are difficult to reproduce consistently through live means alone. This has led advanced militaries worldwide to re-examine training philosophies and adopt simulation-led ecosystems that are continuous, scalable and analytically rigorous. The objective is no longer limited to platform proficiency; it is about developing decision superiority, jointness and adaptability across the Armed Forces.

LVC integration powers joint mission planning and rehearsals, multi-domain experimentation, and large-scale decision training—without the cost, risk or disruption associated with full live deployments

LIVE – VIRTUAL - CONSTRUCTIVE INTEGRATION AS A CORE PHILOSOPHY

At the centre of this transformation is Live – Virtual - Constructive (LVC) integration, a

Indigenous training systems increasingly handle sensitive operational data, doctrinal logic and decision patterns. Ownership of design, data and intellectual property is therefore critical, not only for security, but also for adaptability and long-term sustainability

training philosophy that connects different modes of simulation into a single, coherent ecosystem. Live training involves real troops operating real equipment in physical environments.

Virtual training places real operators inside simulated platforms and environments, allowing them to practise missions, procedures and decision-making virtually, without deploying actual assets.

Constructive simulation, also known as Wargaming, which traditionally used maps and sand models, have now evolved into software based system to model combat unit, equipment and logistics at scale, enabling commanders and staffs to validate and practice doctrines as well as operational plans.

Incidentally, these are siloed and take place independently. When integrated, these domains create a single synthetic battlespace where actions and decisions interact across levels of command.

An LVC ecosystem allows a live unit in the field, virtual crews in simulators, and AI-powered constructive forces to operate together in real time, on common operational scenarios. Tactical actions influence operational outcomes, while strategic decisions cascade down to affect frontline engagements. This mirrors the interconnected nature of modern warfare far more accurately than isolated training systems. LVC integration powers joint mission planning and rehearsals, multi-domain experimentation, and large-scale decision training—without the cost, risk or disruption associated with full live deployments.

SIMULATION AS AN END-TO-END DEFENCE CAPABILITY

Progressive defence forces increasingly view simulation not as a standalone product, but as a capability embedded across the defence lifecycle. Simulation supports concept development and experimentation, enabling doctrines and force structures to be tested before induction. It underpins training and skill progression, allowing continuous learning rather than event-based instruction. It facilitates platform induction and upgrades, reducing learning curves and operational risk. It enables mission rehearsal and validation, and generates data-driven performance insights that inform both training outcomes and operational planning.

The convergence of artificial intelligence, digital twins, immersive interfaces and advanced analytics has significantly expanded the scope of simulation. Modern systems can adapt scenarios dynamically, model intelligent adversary behaviour and capture objective performance data. Within an LVC framework, these capabilities converge to create a continuous learning loop, linking individual proficiency with collective readiness in one domain, as well as rehearsing various arms/ branches in the other domain.

WHY INDIGENOUS CAPABILITY MATTERS

The strategic importance of indigenous simulation capability cannot be overstated. Synonymous with technological sovereignty, it elevates Aatmanirbharta and adds on to strategic capabilities.

Indigenous training systems increasingly handle sensitive operational data, doctrinal logic and decision patterns. Ownership of design, data and intellectual property is therefore critical, not only for security, but also for adaptability and long-term sustainability.

India's Aatmanirbhar Bharat vision recognises this imperative. Indigenous capability is not about isolation; it is about strategic autonomy, resilience and global competitiveness. It requires sustained investment, risk appetite and a willingness to build deep technology stacks rather than assemble solutions. At Tecknotrove, this philosophy has been our DNA ever since inception. With 100% indigenous design and development and full intellectual property ownership, the company has invested consistently in building simulation technologies across Defence, Aviation, Mining, Construction, Driving and Logistics sectors. Our focus has been on modular architectures, open systems and LVC-ready designs that can evolve with changing doctrines and technologies.

The fact that our solutions are today exported to over 30 countries underscores that indigenous capability, when built with quality and vision, is globally competitive.

From Tecknotrove's perspective, our vision has been unambiguous: to invest early in indigenous capability, to own critical design and intellectual property, and to build training systems that convert precision in preparation into operational excellence

INVESTING FOR THE FUTURE

Building advanced simulation ecosystems is not a short-term endeavour. It demands long-term investment in R&D, talent, and infrastructure, as well as close collaboration with users to understand operational realities. As warfare continues to evolve, training systems must remain flexible, interoperable and data-centric. Indigenous industry has a critical role to play in ensuring that defence forces are not only equipped for today's challenges, but prepared for tomorrow's uncertainties.

CONCLUSION

The effectiveness of future armed forces will be shaped as much by training ecosystems as by platforms. Integrated Live–Virtual–Constructive simulation offers a pathway to realistic, joint and continuous preparedness.

From Tecknotrove's perspective, our vision has been unambiguous: to invest early in indigenous capability, to own critical design and intellectual property, and to build training systems that convert precision in preparation into operational excellence.

Precise today. Perfect tomorrow.

–The writer is Founder and Director of Tecknotrove Systems India Pvt Ltd. The views expressed are of the writer and do not necessarily reflect that of Raksha Anirveda

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INDIA – ISRAEL DEFENCE RELATIONSHIP ON UPWARD TRAJECTORY

India and Israel plan to co-develop several advanced defence systems in 2026 through joint ventures under the 'Make in India' initiative. These projects involve technology transfer, local production, and integration into Indian supply chains. These steps build on the last year's MoUs for R&D in AI and cybersecurity

ARIE EGOZI

The strong defence relationship between India and Israel is expected to continue flourishing in 2026; this is the common understanding of all Israeli parties involved. The bilateral partnership is strengthening rapidly through recent Memoranda of Understanding (MoUs) and specific deals, with a clear trajectory towards co-production, technology transfer, and joint innovation this year. Key drivers include shared counter-terrorism goals and India's 'Make in India' push, positioning Israel as a top supplier of advanced systems. Projections for 2026 showcase scaling up deliveries, R&D in AI/cybersecurity, and multi-billion-dollar procurements.

Director General of the Israel Ministry of Defence, Major General (Res) Amir Baram told Raksha Anirveda that 2025 has been a pivotal year in defence relations between Israel and India. "The strategic MOU we signed represents not merely an agreement between governments, but rather a deepening partnership built on shared values and profound mutual trust. The Israeli defence industries have achieved remarkable success in the Indian market, from joint ventures to technology transfer, demonstrating how Israeli innovation addresses India's security needs," he said.

The November 2025 MoU, signed during the Joint Working Group meeting in Tel Aviv, expands cooperation in strategic dialogues, military training, defence-industrial partnerships, R&D, AI, and cybersecurity. Indian Defence Secretary Rajesh Kumar Singh met Israeli firms, including Elbit Systems, Rafael, and IAI, aligning with India's Mission Sudarshan Chakra for air/missile defence. This builds on prior ties, including Barak-8 missiles and UAVs, with India viewing Israel as the 'first-rate strategic partner'. Discussions also included Arbel upgrades and potential MR-SAM expansions with local production. These talks align with funds for joint R&D and a shift from imports to industrial partnerships.

Israel Weapon Industries (IWI) will deliver the first batch of 40,000 light machine guns (LMGs) to Indian forces in early 2026, following trials in 2024, with the potential for a faster rollout over the next five years. A deal for 170,000 next-gen Close Quarters Battle (CQB) carbines nears finalisation, with IWI supplying 40% through Adani Group's PLR Systems joint venture. India may approve $3.7 billion worth of deals for IAI missiles/rockets, including the MR-SAM air defence, to be manufactured locally.

According to Israeli defence sources, cooperation targets AI-enabled systems, cybersecurity, missile defence, and counter-terrorism training, with joint production emphasising India's manufacturing scale and Israel's tech edge. The bilateral Work Plan (2024-2026) supports the 'Make in India' initiative via local ventures such as PLR Systems and Bharat Forge. Future efforts include Arbel defence upgrade systems for precision fire, pending approval.

Defence Secretary Rajesh Kumar Singh meets

Israeli sources said that the strong partnership is moving towards a 'long-term strategic framework' involving the co-development of platforms, expanded exports (potentially tens of thousands of rupees annually), and interoperability through joint exercises. Challenges like India's multi-partner balancing (e.g., Russia) persist, but momentum favours elevated tech-industry ties and measurable output in 2026. This aligns with rising Indian arms imports from Israel in recent years.

MAJOR CO-DEVELOPMENT PROJECTS

India and Israel plan to co-develop several advanced defence systems in 2026 through joint ventures, focusing on AI-enabled weapons, electric mobility platforms, and precision fire systems under the 'Make in India' initiative. These projects involve technology transfer, local production, and integration into Indian supply chains. Confirmed efforts build on 2025 MoUs for R&D in AI, cybersecurity, and co-production.

According to available data, major co-development projects include:

All-Terrain Electric Mission Module (ATEMM): Belrise Industries and Plasan Sasa from Israel signed a three-year pact in December 2025 to co-produce this self-propelled electric robotic platform, enhancing battlefield mobility, payload, and survivability. It converts 4x4 vehicles to 6x6 configurations and supports autonomous operations.

Israel Weapon Industries (IWI) is in talks for co-production via PLR Systems (IWI-Adani Group JV) to integrate an AI-based system in the Israeli ARBEL rifle using algorithms for precise target alignment and strikes into Indian lines.

Director General, Ministry of Defence, Israel Major General (Res) Amir Baram, in New Delhi

Close Quarters Battle (CQB) Carbines: PLR Systems to supply 40% (approx. 68,000 units) of 170,000 next-gen carbines, with Bharat Forge handling 60%, involving joint manufacturing finalised by early 2026.

Israeli sources added that Israeli combat-proven technology will be part of projects targeting the needs of the Indian armed forces for counter-terrorism and border security, with deliveries starting early. Success hinges on approvals and trials, which boost India's self-reliance through technology transfer and exports. Future expansions may include space-based and autonomous systems.

Indian partners such as PLR Systems, Belrise Industries, and Bharat Forge will manufacture co-developed Israel-India defence systems in 2026, focusing on local production under 'Make in India'. These firms leverage joint ventures for technology transfer and assembly of advanced platforms.

Tata Advanced Systems Limited (TASL) will focus on completing key defence infrastructure and indigenous systems integration in 2026, without direct involvement in Israel-India co-development projects based on current partnerships.

DOMESTIC PRODUCTION OF RAMPAGE MISSILE

India is considering producing the Israeli Rampage missile domestically as part of its 'Make in India' initiative, a move aimed at improving its long-range strike capabilities and reducing its dependence on defence imports. The Indian military first acquired the missile in 2020 following clashes in the Galwan Valley with China, and it has since become a pillar of New Delhi's long-range strike capabilities. In Indian military service, the weapon is known as the High Speed Low Drag – Mark 2. It was developed for long-range, high-speed strike missions, allowing aircraft to attack targets deep inside enemy territory without entering the range of advanced air defence systems. According to Indian reports on Operation Sindoor, Su-30 MKI fighter jets successfully launched Rampage missiles with high

accuracy, which increased their operational value on the battlefield.

Developed by Israel Aerospace Industries (IAI) and Elbit Systems in response to a clear operational need of the future battlefield, the Rampage warhead, rocket and advanced navigation suit allow execution of the assault mission of high-quality, well-protected targets with utmost precision. The Rampage features optimal penetration capability into protected areas. Its focal precision prevents collateral damage at a very low mission cost compared to existing solutions. The Rampage can operate in any weather conditions, as well as day and night. It offers simplified operation, with no need for a 'man in the loop' and can be carried on a broad range of aircraft, manufactured by Western or Eastern countries. The total weight of the missile is 570 kg, and it is 4.7 metres long. The Rampage gains high velocity after launch, and that makes its detection very difficult.

IAI's President and CEO, Boaz Levy, told Raksha Anirveda that India is a key strategic partner for IAI. "Our long-standing, close cooperation reflects a shared commitment to technological excellence, security, and sustainable

industrial collaboration. Our strong local presence in India aligns with Prime Minister Modi's Make in India initiative, enabling us to strengthen local capabilities while developing joint solutions designed to serve India and partners around the world, further deepening the strategic partnership between our two countries," he said.

Bezhalel (Butzi) Machlis, President and CEO of Elbit Systems, told Raksha Anirveda, "Our relationship with India is built on a long-standing partnership and close industrial and technological cooperation with local industry and customers, in strong alignment with the 'Make in India' policy. Together with our Indian partners, we jointly develop and manufacture advanced solutions locally, contributing to India's security while supporting local employment, technology sharing, and the co-development of critical know-how and technologies, for India and for export."

"As this collaboration continues to evolve, it creates value for both sides by combining global experience with local strong capabilities and allowing Indian-developed solutions to address a broader set of requirements. We remain committed to strengthening India's defence capabilities and to advancing this partnership over the long term," he concluded.

TALKS ON AIR LORA AND ICE BREAKER

Additionally, India is in advanced negotiations with Israel on the local production of the two ALBMs – the Air

Lora made by Israel Aerospace Industries (IAI) and the Ice Breaker made by Rafael. The local production is as per the Indian 'Make in India' policy.

Air Lora is the air-launched version of the Lora ground-launched ballistic missiles and is designed to destroy high-value targets from very long standoff ranges. With a robust warhead of various types, Air Lora enables Air Forces to strike enemy targets from far distances outside the reach of the enemy Air Missile Defence (AMD). It features high survivability with advanced immune INS/GNSS navigation and strong anti-jamming capabilities, allowing for 24/7 operation in extreme weather conditions and highly contested battlefields. The Air Lora can be simply integrated into fighter and bomber aircraft as a Stand-Alone Configuration or through the Avionics System, easy to train, with simple fire-and-forget and autonomous operation.

Last year, the Indian Ministry of Defence was holding talks to sign a contract for the local production of the Rafael Ice Breaker. The negotiations have recently accelerated, with some Indian companies taking part as candidates for the local production of the missile. According to Rafael, the Ice Breaker is an aerial force multiplier designed to overcome modern warfare arena challenges through Rafael's legacy of high-end precision-guided solutions. The company says that Ice Breaker is resilient to electronic countermeasures and is fully operational in GNSS-denied arenas. Rafael said in an official announcement that the Ice Breaker provides surgical, pinpoint precision strike capabilities from standoff ranges up to 300 km, and the cruise missile features an advanced IIR (Imaging Infra-Red) seeker, ideal for stationary or moving land and maritime target engagement in advanced Anti Access/Area Denial (A2/AD) arenas.

According to the official release, Ice Breaker is compatible with various aerial platforms, including jet fighters, light aircraft and helicopters, and is fully operational across all weather conditions. The missile's datalink supports real-time man-in-the-loop decision-making and tactical updates, with midflight abort and Battle Damage Assessment (BDA) capabilities. The missile was developed, employing Rafael's unique, combat-proven artificial intelligence technology, including deep learning and big data-based scene matching, which enables Automatic Target Acquisition (ATA) and Automatic Target Recognition (ATR). Rafael says that the missile flies at high subsonic speeds and has a multi-directional, synchronised full sphere attack capability, based on predefined attack plans, according to waypoints, azimuth, impact angle and aim point selection. This ensures a high probability of mission success. The Ice Breaker is 4 metres long and weighs 770 lbs, including a 250 lb penetration, blast and fragmentation warhead.

"The strategic MOU we signed represents not merely an agreement between governments, but rather a deepening partnership built on shared values and profound mutual trust," says Director General of the Israel Ministry of Defence, Major General (Res) Amir Baram

Yoav Tourgeman, president and CEO of Rafael, told Raksha Anirveda that the company reaffirms its long-standing commitment to supporting the Indian Armed Forces through the delivery of advanced, combat-proven systems and multi-domain technologies.

"Our partnership with India, built over decades, is closely aligned with the principles of Aatmanirbhar Bharat and Make in India, with a clear focus on local production, technology transfer, and sustained capability development. Working in close cooperation with our Indian partners, we support the strengthening of indigenous defence capabilities and the expansion of local industrial participation, while ensuring that Rafael's most advanced and operationally proven solutions are effectively integrated within India's defence ecosystem. This collaboration reflects a shared commitment to technological excellence, operational readiness, and long-term national security."

An MoU and full technology transfer rights have been secured, meaning India will gain access to the full manufacturing 'recipe' for both systems, including design, seeker integration, guidance technologies, and system architecture. Key Indian firms such as Bharat Electronics Limited (BEL) and Hindustan Aeronautics Limited (HAL) are expected to play central roles in integrated manufacturing, with ongoing interfaces for digital integration and missile assembly. The final approval by India's Cabinet Committee on Security is anticipated by mid-2026, after completion of financial, export compliance, and supply chain arrangements. The move comes against the backdrop of accelerating missile modernisation pressures from China's layered air defence deployments and Pakistan's GPS jamming practices, recently observed during Operation Sindoor.

All indications point to another busy year in the defence relations between Israel and India. Director General of the Israel Ministry of Defence, Major General (Res.) Amir Baram said, "Our support for Israeli Defence Tech industries at leading exhibitions such as Aero India and BTS in Bengaluru advances partnerships that strengthen the defence capabilities of both nations. This collaboration exemplifies the potential of combining Israeli technology with India's strategic vision, while jointly addressing the complex security challenges of our time."

–The writer is an Israel-based freelance journalist. The views expressed are of the writer and do not necessarily reflect that of Raksha Anirveda.

CO-CREATING SMART, RESILIENT AIRPORTS FOR INDIA'S GROWTH

India's aviation ambitions demand airports that are not just bigger, but smarter and more resilient. Through collaborative, digital-first approaches, SITA is helping the country build facilities that can handle today's growth while preparing for tomorrow's challenges

SUMESH PATEL

Air travel in India is more frequent than ever, and airports are having to adapt quickly. With more people moving through terminals each day, even small delays can turn into long queues if systems don't keep up. Passengers expect journeys that move smoothly, while airport teams continue to run daily operations as major upgrades takes place. In this environment, operational efficiency and seamless collaboration are no longer optional—they are essential. SITA is helping airports and airlines tackle these challenges by creating a connected, digital ecosystem where every stakeholder can work together in real time.

Across 61 airports in India and more than 1,000 globally, SITA's solutions combine AI, biometrics, and integrated management tools to simplify passenger processing and airport operations. From check-in kiosks and baggage drops to airside coordination, these systems allow airports, airlines, Air Navigation Service Providers (ANSPs), regulators, and technology partners to share data instantly. The result is smoother passenger journeys, fewer bottlenecks, and better-informed operational decisions.

The impact goes beyond day-to-day efficiency. By enabling predictive and collaborative operations, these digital platforms help airports scale safely and adapt to fluctuating passenger volumes. For staff, this means clearer workflows and less firefighting. For passengers, it translates to shorter queues, faster

SITA is helping airports and airlines tackle these challenges by creating a connected, digital ecosystem where every stakeholder can work together in real time

FACT SHEET

A. Global Reach

- Employs more than 5,100 people worldwide, Serves over 2,200 customers worldwide
- Technology is used at more than 1,000 airports, 19,600 aircraft, and 70+ governments
- Handles nearly half of all global air transport data exchange
- Supports over 5,000 biometric touchpoints around the world
- Provides real-time operational insights and consistent passenger experiences for airports and governments

B. SITA in India

- Running one of India's largest aviation technology programmes
- Cloud-based passenger and baggage solutions being rolled out at up to 50 AAI airports
- Expected to cover more than 3,500 touchpoints
- Supports 61 airports with check-in, self-service, and baggage management platforms
- Helps 65+ airlines comply with Government of India API rules
- Employs over 1,135 staff across India
- Operates a 24/7 Global Command Centre in Delhi
- Manufactures equipment locally under the Make in India initiative

C. India Aviation Snapshot

- India is the world's third-largest aviation market
- Served 411 million air travellers recently
- 174 million were origin–destination passengers
- Aviation contributes USD 53 billion to India's GDP
- Digital transformation is critical to pace with this growth

D. Biometric and Digital Identity

- 17 airports currently using DigiYatra
- 10 more airports planned to join
- Supports travel based on biometrics
- Long-term goals include:
  - Single check-in and walk-through journey
  - Trusted digital identities
  - Automated border processing
  - Real-time baggage tracking
  - Connected onward travel

processing, and a more reliable travel experience.

India's aviation ambitions demand airports that are not just bigger, but smarter and more resilient. Through collaborative, digital-first approaches, SITA is helping the country build facilities that can handle today's growth while preparing for tomorrow's challenges.

–The writer is President - Asia Pacific, SITA Aero. He is responsible for developing and driving the strategic direction of SITA in the region. A global leader in the air transport industry with decades of experience working with airports and airlines across the world, he has guided teams in the design and implementation of major IT initiatives to meet the exacting needs of Asia Pacific's leading airlines and airports. The views expressed are of the writer and do not necessarily reflect that of Raksha Anirveda

WINGS INDIA 2026: AVIATION'S NEW ARCHITECTURE

Wings India 2026 marked a significant shift in the nation's aviation story. Moving beyond its role as a mega-buyer of aircraft, India is now focused on building domestic capability across manufacturing, tech, and services

PRABHA GUPTA

For decades, the global aviation narrative regarding India was mostly defined by its massive airplane orders. We were the big buyers from companies like Boeing and Airbus, but not deeply involved in the high-tech manufacturing and operational core of the industry.

As the curtains fell on Wings India 2026, Asia's biggest civil aviation event, the message was unmistakable: India has transitioned from being primarily an aircraft buyer to an emerging global aviation leader with ambitions that span manufacturing, services, automation, infrastructure and ecosystem building.

Held at the historic Begumpet Airport in Hyderabad, the four-day mega show drew industry heavyweights, government leaders, international exhibitors and tens of thousands of visitors. It highlighted not only India's robust market growth but also a renewed policy emphasis on sustainability, technology-driven operations, regional connectivity and cross-border partnerships.

A DEFINING SHIFT

Wings India 2026 underscored a fundamental shift in India's aviation narrative. For decades, the Indian market was characterised by strong passenger demand but limited domestic production and heavy reliance on foreign aircraft manufacturers. This edition of Wings India, however, underlined a deeper ambition: India aims to build capability, not just capacity.

Industry leaders pointed to substantial commercial aircraft orders and strategic partnerships as evidence of this shift. Civil Aviation Minister Jyotiraditya Scindia talked about a record 670 orders and commitments worth over $90 billion placed by Indian airlines at the event. Airbus projects that India's commercial fleet could nearly triple by 2035, growing from roughly 850 aircraft today to more than 2,250, a testament to accelerating demand for both domestic and international travel.

But the picture is much more inclusive now. Beyond the big purchases, the focus is now on developing a full aviation ecosystem within the country. There's a strong push to develop local maintenance, repair, and overhaul (MRO) facilities, aircraft leasing, and even domestic assembly of components and helicopters. The goal is to capture more of the industry's value chain within India.

This evolution reflects a clear recognition that India is not just a consumer of aviation technology, but an active participant in shaping the global aerospace ecosystem.

TRANSFORMING AIRPORT OPERATIONS

Conversations at the event made clear that the future of aviation is not only about bigger fleets, but also about smoother, smarter airports. In an interview during the event, SGK Kishore, Executive Director and Chief Innovation Officer at GMR Airports, articulated how airport operations are on the brink of a structural shift.

Kishore explained that many tasks traditionally performed inside terminals such as boarding pass issuance, baggage check-in and security screening are expected to move outside or even ahead of the airport arrival point.

This transition is already taking shape at Hyderabad's Rajiv Gandhi International Airport (RGIA), where cityside check-in facilities allow passengers to complete key

processes before entering the terminal. Over time, such pre-terminal processing could reduce waiting times, lower stress and enhance passenger comfort.

Central to this transformation has been the Airport Operations Control Centre (APOC), a digital framework introduced at RGIA in late 2024. Rather than relying on siloed data systems, APOC consolidates information from airlines, security agencies, ground handlers and airport operators into a single data platform. This unified approach means all stakeholders operate from a shared real-time view, enabling coordinated responses to congestion, delays, security alerts and other disruptions.

Importantly, Kishore highlighted the next frontier: predictive operations. Instead of reacting to delays or bottlenecks, integrated systems will begin anticipating them, signifying a move from reactive to proactive airport management.

ARROBOT'S PRACTICAL AUTOMATION DEBUT

Arrobot, the deep-technology and autonomous systems arm of Raghu Vamsi Aerospace Group, showcased

autonomous ground handling systems designed to operate on airport aprons and directly support aircraft turnaround.

Unlike abstract future-tech concepts, these systems are designed for real-world deployment scalable, safety-oriented, and compatible with existing airside workflows. The display included autonomous electric tugs capable of moving aircraft and helicopters without a human driver, along with autonomous refuelers and baggage loaders. These vehicles aim to improve airside efficiency, safety and turnaround times, addressing one of the most persistent bottlenecks in airport operations.

The Arrobot platforms demonstrated an important point: automation in aviation is not hypothetical, it's operationally relevant today. By integrating propulsion, mission logic and platform engineering, these systems point toward a future where repetitive, precision-dependent tasks shift toward autonomous platforms, freeing up human operators for supervision, exception handling and higher-order decisions. Arrobot's CEO, Raghu Vamsi, stated the systems are "designed for immediate deployment," targeting improved efficiency, safety, and faster aircraft turnaround times.

This is in step with global trends: autonomous ground handling pilots are being tested at major airports like Zurich, where digital simulation and autonomous tugs are being trialled to optimise logistics and improve safety metrics.

HUMAN CAPITAL AND DIGITAL INTEGRATION

With automation and digital platforms rising, the sector's growth story is no longer just about physical infrastructure, it's about skills, integration and human-machine synergy.

Airbus, OEMs and airport operators used the Wings India platform to showcase pilot simulators, digital training interfaces, and engagement sessions designed to build a workforce ready for tomorrow's aviation challenges. The need is for specialists in AI, data analytics, robotics, and air traffic coordination and management.

Industry leaders stressed that education and workforce development must keep pace with technological deployment including advanced systems to prevent skill gaps from becoming a growth constraint.

PUBLIC ENGAGEMENT AND OPERATIONAL REALITIES

With tens of thousands of visitors attending Wings India 2026, aviation clearly resonates with the Indian public whether as a symbol of national progress, an economic engine, or a field of career opportunities.

However, the event also underscored real-world constraints. Traffic and crowd management challenges around the venue reminded attendees that technological ambition must align with logistical readiness.

As airports grow more complex - blending digital platforms, autonomous hardware and real-time predictive systems coordination between authorities, operators and city administrators becomes increasingly important.

CHALLENGES AND FUTURE OUTLOOK

Global economic uncertainties, supply chain constraints in aerospace components, and the evolving dynamics of international trade could test the pace of India's ambitions. Skilled labour shortages, regulatory harmonisation with international standards, and climate-aligned aviation fuels and technologies are additional hurdles that industry stakeholders acknowledged as potential constraints.

Yet, the overall narrative emerging from Wings India 2026 is one of strategic confidence and accelerated momentum. Passenger numbers are growing, airline fleets are expanding, and investments both local and foreign are flowing into infrastructure and capability development. The event's scale and substance reflected not only India's achievements to date but also its readiness to compete and collaborate on a global aviation stage.

The Arrobot platforms integrate propulsion, mission logic and platform engineering. Arrobot's CEO, Raghu Vamsi, stated the systems are "designed for immediate deployment," targeting improved efficiency, safety, and faster aircraft turnaround times

Wings India 2026 was more than an exhibition; it was a microcosm of India's civil aviation evolution. It showcased an industry poised for expansion, backed by policy support, technological innovation, global partnerships, and a vibrant domestic market. From state honours for ecosystem development to high-level dialogues on manufacturing and connectivity, the event laid out a blueprint for India's aviation transformation one that promises economic growth, technological leadership and broader access to the skies, combining policy support, homegrown innovation, and global partnerships.

Wings India 2026 was a snapshot of an industry in transition. It marked a moment where India's aviation narrative visibly shifted from aspiration to action.

–The author is a senior journalist and Editor-in-Chief of https://newshashtag.com/. The views expressed are personal and do not necessarily reflect the views of Raksha Anirveda.

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Analysing Defence ToT Using Mathematical Modelling

***Nuances of Transfer of Technology in Defence Domain and Its Mathematical Modelling*, is perhaps the first book of its kind explaining the linkage between mathematics and ToT and how India can increase its technological base using the model**

ASAD MIRZA

Transfer of Technology (ToT) is a cornerstone of India's strategy to achieve self-reliance in defence manufacturing under the Aatmanirbhar Bharat vision. It enables Indian industries and research institutions to access advanced foreign technologies, accelerating the development of indigenous defence systems while reducing dependency on imports.

Penned by Dr Lakshman Singh and Gaurav Yadav, 'Nuances of Transfer of Technology in Defence Domain' introduces the reader about various dynamics that come into play while transferring the technology between nations, especially in the defence sector.

The authors, both of whom had a long stint with the Avionics Division of the Hindustan Aeronautics Ltd. at Korwa, Amethi, UP from 2009 to 2015 possess shared interest in technology innovation, R&D, national security, and augmenting self-reliance in defence production.

The authors have in-depth analysed not just the technical but the economic aspects of ToT, besides outlining the need for India to embrace technology transfer and how it can help achieve parity with nations that are averse to India's growth trajectory.

Using the qualitative approach in mapping tech transfer for 'Make in India' and how to propel this mission further, so that India can increase both its capability and capacity in the defence production, the authors also showcase a mathematical model for technology absorption and technology transfer while mapping the values supply chain and extend the ToT usage in the MRO sector, besides mapping the tech transfer and basics of defence corridor's successful impact. This innovation helps reader in understanding how the mathematical aspects of the ToT, aid in establishing the economics of the project and determining the timelines for its successful execution.

Book: *Nuances of Transfer of Technology in Defence Domain and Its Mathematical Modelling*
Authors: Dr Lakshman Singh and Gaurav Yadav
PP: 261, ISBN-13: 978-81-7062-383-0
Publishers: Lancers Publishers, New Delhi

The book with 16 chapters provides a comprehensive overview of technology transfer, blending technical details with geopolitical insights. With its thorough analysis of defence technology integration and its long-term impact, the book becomes a must read for policy makers, defence professionals, researchers and everyone interested in understanding India's evolving defence landscape. The testimonials and expert review by senior policymakers and defence professionals speak volumes about this book.

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Air Marshal S Shrinivas takes over as AOC- in-C Training Command, IAF

Air Marshal Seethepalli Shrinivas took over as Air Officer Commanding-in-Chief (AOC-in-C), Training Command, Indian Air Force on January 01, 2026. After assumption of his new appointment, the Air Marshal paid homage to bravehearts by laying a wreath at the Training Command War Memorial.

An alumnus of National Defence Academy, Air Marshal Shrinivas was commissioned in the fighter stream of IAF on June 13, 1987. He is a 'Category A' Qualified Flying Instructor with over 4200 hours of flying experience on MiG-21, Iskra, Kiran, PC-7 Mk Il, HPT-32 and Microlite amongst other aircraft. He is also qualified as a 2nd pilot on Chetak / Cheetah helicopter and a categorised Operations Officer on the Pechora missile system. He has held a number of command appointments in his career. He has been the Commandant of the Air Force Academy, Air Officer Commanding (AOC) of a frontline fighter base on the Western border, and a premier flying training base, AOC Advance HQ Western Air Command (Jaipur), Commanding officer of the prestigious Flying Instructors School, Commandant of the Institute of Aerospace Safety and CO of Basic Flying Training School. His staff and other appointments include Assistant Chief of the Air Staff (Personnel Officers), Chief Instructor (Flying) at Air Force Academy, Ops Staff at HQ Central Air Command and Directing Staff at College of Air Warfare. Prior to his current assignment, he was the Senior Air Staff Officer at HQ SWAC. The Air Marshal is a graduate of National Defence College, College of Defence Management and Defence Services Staff College.

Matthieu Louvot Appointed Airbus Helicopters CEO

Amsterdam, the Netherlands. Airbus SE (stock exchange symbol: AIR) has appointed Matthieu Louvot Chief Executive Officer (CEO) of Airbus Helicopters, effective 1 April 2026. He will report to Airbus CEO Guillaume Faury and be part of the Company's Executive Committee. Matthieu Louvot, currently Executive Vice-President Strategy for Airbus, will succeed Bruno Even, who has decided to leave the Company to pursue his next personal and professional objectives.

A graduate of the Ecole Polytechnique and Ecole Nationale d'Administration, Matthieu Louvot started his career in the French administration, including as advisor for industry at the French Presidency. He joined Airbus Helicopters in 2010 where he held a number of management positions including Executive Vice President Customer Support & Services and Executive Vice President Programmes.

Air Marshal Inderpal Singh Walia Takes Over as AOC-in-Chief Eastern Air Command

Air Marshal Inderpal Singh Walia assumed the appointment of Air Officer Commanding-in-Chief, Eastern Air Command, IAF on February 01, 2026. He is an alumnus of the National Defence Academy and was commissioned in the Fighter stream of the Indian Air Force on June 11, 1988. The Air Officer is qualified on all variants of the MiG-21, MiG-23, MiG-27, Jaguar and Su-30 MKI. He has over 3200 hrs of accident/ incident-free flying. In a career spanning over three decades, the Air Officer has tenanted various Command and Staff appointments. He has commanded a MiG-27 Squadron, the Tactics and Air Combat Development Establishment (TACDE) and was Air Officer Commanding of a frontline base. He is a Fighter Strike Leader, an Instrument Rating Instructor & Examiner (IRIE), has undergone the Advance Command & Staff Course in the UK and the National Defence College in Bangladesh. He has served as the Defence Attaché at the Embassy of Japan and South Korea. He tenanted the appointment of Air Commodore, Directorate of Air Staff Inspection (DASI), the Assistant Chief of Air Staff (Training) at Air HQ and Air Defence Commander, HQ WAC. Prior to taking over as AOC-in-C, EAC, he was Senior Air Staff Officer at HQ EAC. In recognition of his distinguished service, he was awarded Vayu Sena Medal (VM) in 2008 and Ati Vishisht Seva Medal (AVSM) in 2018.

Nivedita Dubey takes charge as Member-HR, AAI

Nivedita Dubey's appointment was indeed historic in aviation history as she became the first woman officer to be inducted into the Airport Authority of India (AAI) Board, an achievement which was hailed across the country.

She began her professional journey with AAI in 1995 as a management trainee. Over the years, she has served in several challenging roles. What was notable and came to the notice of aviation experts was her performance as airport manager at Indira Gandhi International Airport. Her work in one of the most prestigious airports - Indira Gandhi International Airport (IGIA) - was widely appreciated. Her expertise in human resource management proved to be a key asset to the organisation, and as regional executive director of the eastern region, she played a crucial role in turning loss-making airports into profitable ones.

As Member (Human Resources), Dubey will now shoulder key responsibilities in policy-making and administration within the country's aviation sector, setting an inspiring example for women and youth across India. Dubey has assumed charge as Member (Human Resources) of the Airports Authority of India (AAI) with effect from January 30.

As Member (Human Resources), Dubey will be responsible for formulating, coordinating, and implementing AAI's personnel and industrial relations policies, along with overseeing commercial management functions. She is expected to play a pivotal leadership role in supporting sustained organisational growth and strengthening AAI's human capital framework.Dubey brings with her over three decades of rich and diverse experience across core Airport Operations, Human Resource Management, and Airport Economic Regulation.

GE Aerospace Appoints Shilpa Gupta as Chief Technology Officer, India

GE Aerospace has appointed Shilpa Gupta as the new Chief Technology Officer for GE Aerospace in India and the Site Leader for the John F. Welch Technology Centre (JFWTC) in Bengaluru. In this role, Shilpa will lead the company's engineering, research, and digital technology teams at Bengaluru to accelerate innovation, scale advanced technologies, and strengthen regional impact to advance GE Aerospace's purpose of inventing the future of flight, lifting people up, and bringing them home safely. Shilpa joins GE Aerospace from GE Vernova, where she led the Gas Power engineering team in India across Bengaluru, Hyderabad, and Noida, and served as JFWTC Site Leader for GE Vernova. Shilpa succeeds Alok Nanda, who has taken a global role as General Manager of Services Engineering at GE Aerospace, focusing on enhancing customer outcomes, driving operational efficiency, and positioning the company for next-generation growth.

Aniruddho Chakraborty appointed as Embraer's Communications Head - India

Continuing to expand its presence in India following the opening of its central hub in New Delhi, last year, Embraer has appointed Aniruddho Chakraborty as head of communications for India. In this role, he will oversee communications across the company's commercial aviation, defence, executive aviation, and support and services businesses. The company has been building local capacity as part of its plans to engage more closely with India's aerospace and defence ecosystem. Embraer has been operating in India for over two decades, with its aircraft serving the Indian Air Force, government agencies, business jet operators and regional airline Star Air. Nearly 50 Embraer aircraft across multiple platforms are currently in operation in the country.

Aniruddho Chakraborty joins Embraer from RTX, where he served as head of external communications in India for Collins Aerospace, Pratt & Whitney and Raytheon. His career spans 17 years across corporate communications roles at organisations including Boeing, Ericsson, Tata Teleservices and Comic Con India. He holds a master's degree in advertising and public relations from the Indian Institute of Mass Communication, New Delhi, and a bachelor's degree in commerce from Shri Ram College of Commerce, Delhi University.

AMCA Race: L&T, Tata and Bharat Forge Shortlisted

The Advanced Multirole Combat Aircraft (AMCA) programme is expected to have a final winner within the next three months as three private sector companies have been shortlisted to develop and manufacture next generation fighter jets.

After a scrutiny of technical bids by seven Indian entities, three companies - Tata Advanced Systems Limited, Larsen & Toubro and Bharat Forge - have been shortlisted, according to sources. The remaining four companies including state-owned Hindustan Aeronautics Limited (HAL) are out of the race.

The shortlisting was based on technical expertise, manufacturing capabilities, order book and financial strength as all leading Indian manufacturers had submitted bids for the mega contract. The bidders were required to prove that they have the technical capability to absorb the AMCA design and possess adequate experience in development, engineering, manufacturing, equipping and testing, among other things. One of the clauses also discouraged companies with a large outstanding order book.

The selection of the final winner is expected to take place within three months, after the shortlisted companies submit detailed commercial proposals for manufacturing prototypes of the next generation jets. As per plans, the winner of the competition will work with the Aeronautical Development Agency (ADA) to produce five prototypes of AMCA.

With an indicative budget of ₹15,000 crore for the prototype stage allocated by the ministry, the final order however is expected to be in several multiples of that, once the aircraft is proven and ordered by the Air Force.

Arguably, AMCA is India's biggest ever military research and development programme. The new, fifth generation fighter jet is slated to become India's mainstay aerial platform from the mid-2030s. After the development, the expected first batch order will be of 120 fighter jets, with deliveries expected to start by 2035. Subsequently, with the development of more advanced variants, the number is expected to go up significantly in the coming years.

Adani Defence and Leonardo Forge Strategic Partnership

Adani Defence & Aerospace, the flagship defence and aerospace arm of Adani Enterprises Ltd and a frontrunner in India's defence sector, February 3 announced the signing of a Memorandum of Understanding (MoU) with Leonardo, the global leader in defence, aerospace and security. This landmark partnership will establish a fully integrated helicopter manufacturing ecosystem in India, addressing surging military demands and propelling the nation toward self-reliance in helicopter production.

Targeting the Indian Armed Forces' requirements, particularly for Leonardo advanced AW169M and AW109 TrekkerM helicopters, the collaboration will deliver phased indigenisation, robust maintenance, repair, and overhaul (MRO) capabilities, and comprehensive pilot training. By fusing Leonardo's world-class helicopter design and engineering prowess with Adani Defence's end-to-end defence and aerospace expertise, the initiative advances the Aatmanirbhar Bharat vision, strengthens national defence readiness, with the potential to be extended to civil aviation applications and international supply chain integration. This ecosystem promises transformative economic impact: thousands of high skill jobs in engineering, manufacturing, logistics, and sustainment service while cementing india as a competitive hub for helicopter production. This strategic partnership redefines India's aerospace landscape, strengthening defence autonomy and position the country as a trusted global hub for helicopter manufacturing and sustainment.

Key Milestone: NMIA Crosses One Lakh Passenger Footfall within 19 Days of Opening

Navi Mumbai International Airport (NMIA) has marked a key operational milestone by crossing one lakh passengers within the first 19 days of commercial operations, reflecting strong passenger traction and a steady ramp-up in travel demand from the region. As of January 12, 2026, NMIA handled a total of 1,09,917 passengers, comprising 55,934 arriving and 53,983 departing passengers. The airport recorded its busiest day on January 10, 2026, with 7,345 passengers handled in a day.

During this period, NMIA managed 734 Air Traffic Movements (ATMs),

including 32 General Aviation ATMs, demonstrating growing utilisation across both scheduled and general aviation operations. A total of 40,260 arriving bags and 38,774 departing bags were processed demonstrating efficient baggage handling aimed at passenger comfort. On the cargo front, NMIA handled 22.21 tonnes of cargo, underlining the airport's integrated approach to passenger and cargo operations from the outset. In terms of connectivity, Delhi, Goa, and Bengaluru emerged as the top sectors. With modern infrastructure, streamlined processes, and a focus on operational efficiency, NMIA continues to scale up services in a calibrated manner while maintaining high standards of safety, service quality, and passenger experience.

Garuda and BEL Sign MoU

With the signing of a Memorandum of Understanding (MoU), Garuda Aerospace and Bharat Electronics Limited (BEL) intend to jointly address upcoming opportunities for the supply of Unmanned Aerial Systems (UAS) to Indian Defence Forces, Central Police Organisations (CPOs), and specialised security groups.

The MoU was signed between Agnishwar Jayaprakash, Founder and Director, Garuda Aerospace Ltd, and Prahalad, General Manager – Marketing, Bharat Electronics Limited, in New Delhi on January 13, 2026.

The MoU establishes a framework for cooperation wherein BEL will act as the Team Leader and Lead Bidder, while Garuda Aerospace will serve as the Technology and Teaming Partner. The collaboration aims to leverage BEL's extensive experience in defence electronics, system integration, and programme execution, together with Garuda Aerospace's capabilities in advanced drone design, manufacturing, and deployment.

The partnership reflects a shared intent to develop and deliver indigenous, mission-critical unmanned solutions aligned with the evolving operational requirements of India's defence and internal security ecosystem, while supporting the national objective of self-reliance in defence manufacturing under the Aatmanirbhar Bharat initiative.

To take this collaboration forward, the parties will enter into a separate Teaming Agreement at a subsequent stage. This agreement will define the binding terms of engagement, including scope of work and work-share distribution, based on end-customer requirements and applicable procurement processes.

GRSE Inaugurates Next-Generation VR Lab

Reinforcing its commitment to Aatmanirbhar Bharat and indigenous shipbuilding, Garden Reach Shipbuilders and Engineers (GRSE) Ltd., took a significant leap in digital ship design and construction by inaugurating its Next Generation Virtual Reality (NGVR) Lab on January 15, 2026, at the Main Works Unit, Kolkata. The state-of-the-art facility marks a major step towards enhancing self-reliant, technology-driven warship design and production capabilities in the country. GRSE already had a VR Lab since 2018, and with technological advances being made in the field of ship design and digital shipbuilding, GRSE made the move to upgrade the existing facility into a next generation VR Lab. This is part of the shipyard's continuing effort to remain future-ready and build modern, state-of-the-art platforms as per the requirements of Indian Navy, Indian Coastguard and friendly foreign countries. The new facility enables immersive, true 1:1 scale visualisation of ship designs, allowing stakeholders to experience compartments, systems, and workflows with unmatched clarity, transforming traditional design review into an intelligent, data-driven process.

Big Bang Boom Expands its Pan-India Footprint

Big Bang Boom Solutions Pvt. Ltd. (BBBS), a leading Indian Deep Tech Defence company, January 19 announced the commissioning of its new 20,000-sq-ft state-of-the-art R&D centre in Chennai and the opening of two new Capability and Service Centres in Pune and Delhi. With six iDEX contracts and the prestigious i4F Indo-Israel grant to its credit, the company has demonstrated a strong track record of innovation, indigenisation and capability development. Building on this momentum, the launch of the R&D Centre and Capability and Service Centres underscores BBBS's rapid growth and expanding footprint in the defence sector. The expanded R&D Centre will have 6 dedicated labs, including a massive 4,000-sq-ft Electronics Warfare Centre to cater to defence innovation in today's fast-changing world. Further, over next 6 months, BBBS also plans to increase the headcount at the R&D centre by 40 specialised researchers from fields of AI, Electronic Warfare and Nanotechnology. This will enable the company to cater to new projects, as well as its national and international orders with greater agility and efficiency. Having recently completed its first large order, BBBS has the distinction of being an indigenous startup that has not only delivered a large-scale defence contract but has done so ahead of schedule.

Jamshedpur Hosts Jharkhand's First MSME Conclave on Defence Production

The industrial area of Adityapur in Jharkhand, known for auto parts manufacturing will be developed to cater to the requirements of the defence sector, said Union minister Sanjay Seth on January 16. Inaugurating a two-day state-level MSME conclave on defence production, MoS for Defence, Sanjay Seth said that Adityapur has enough potential to become the industrial hub of the country. "India is exporting defence materials to over 90 countries across the globe.The objective of such conclaves is to make India self-reliant in the defence sector and provide opportunities to the MSMEs to contribute to the sector," he said. Talking to a leading media agency later, Seth said such a conclave was taking place for the first time in the state.

He said, "Prime Minister Narendra Modi and Defence Minister Rajnath Singh have been stressing the need for indigenisation of the defence sector, and the role of MSMEs is very important in it. Around 1,500 MSMEs are operating in Jamshedpur and Adityapur.

They even export their products to the US."

"The conclave was a step towards developing Jamshedpur-Adityapur, Ranchi and Bokaro industrial areas as a corridor for defence manufacturing. The initiative would get impetus if the Jharkhand government came forward," he added. According to Adityapur Small Association (ASIA) president Inder Agarwal, the area would soon also be known for defence equipment manufacturing, along with auto parts. The MSME conclave was organised by Bharat Chamber of Commerce in association with the Department of Defence Production.

Saildrone to Equip its USVs with Lockheed Martin's Strike Missiles

Saildrone will equip its unmanned surface vessels with strike missiles made by Lockheed Martin, the drone company announced. The collaboration comes in response to a call by global navies for more armed naval drones, according to Saildrone.

The 20-metre Saildrone Surveyor vessel will boast the Joint Air-to-Ground Missile (JAGM) launcher manufactured by the US defence giant. Larger Saildrone USVs are also under consideration to carry Lockheed Martin weaponry, such as the Mk 70 Vertical Launching System, a containerised missile launcher, per a company press release.

The new partnership will entail enhanced naval capabilities, including the use of artificial intelligence, which is part of Lockheed Martin's $50 million investment in Saildrone. Many global navies have envisioned a manned-unmanned hybrid fleet for their future requirements, including the United States. Former US Chief of Naval Operations Adm. Michael Gilday said the service's ambition is to build up to 500 vessels, including 350 crewed ships and 150 large uncrewed surface vessels. Last year's reconciliation bill known as the 'One Big Beautiful Bill Act,' passed by Congress, included investments of over $3 billion for the procurement of surface vessels: $1.5 billion for the expansion of small USV production and $2.1 billion for the development and procurement of medium ones.

Bharat Forge Secures Contracts for Indigenous Unmanned Systems

Bharat Forge Limited Aerospace Division has achieved a significant milestone in India's defence modernisation journey by securing contracts worth approximately ₹300 crores under the ongoing Emergency Procurement – VI (EP-VI) framework.

These contracts are for the Indian Army and also for end use at Indian Navy, cover a range of indigenous unmanned systems, including Intelligence, Surveillance, and Reconnaissance (ISR) platforms and loitering munitions. The contracted platforms namely Omega One, Omega Nine, Bayonet, and Cleaver, are developed for India to meet urgent operational requirements across diverse terrains and mission profiles. During the prestigious Army Day Parade held in Jaipur on January 15, the Omega One was displayed onboard an upgraded BMP-2 infantry fighting vehicle, marking a momentous highlight and validation of BFL's capabilities in front of India's defence leadership. These inductions underscore Bharat Forge Limited's relentless focus on delivering indigenous solutions aligned with the national vision of Aatmanirbhar Bharat. The programmes leverage a surge in domestic production capacity to ensure rapid delivery timelines while upholding quality, reliability, and scalability.

EDGE, Barzan to Establish Strategic JV in Qatar

EDGE Group and Qatar's Barzan Holdings have agreed to establish a joint venture focused on the collaborative development of advanced defence technologies, reinforcing long-term industrial cooperation between the UAE and Qatar. The agreement was formalised at a signing ceremony held at DIMDEX 2026, Doha. The joint venture is intended to support the co-development of technologies aligned with evolving national security requirements, while reinforcing sustainable industrial capability in the UAE and Qatar. It brings together complementary strengths across expertise, operational insight, and industrial capacity, enabling a more integrated approach to development and delivery.

EDGE and Allison Transmission Sign Dealership Agreement

EDGE entity TRUST, a leading military combat supplier, has signed an authorised dealership agreement with Allison Transmission, a global leader in fully automatic transmissions for commercial and defence applications. The partnership reflects TRUST's continued expansion of its capabilities, reinforcing its role in delivering reliable, high-performance solutions that enhance operational readiness. As an authorised Allison Direct Dealer, TRUST will provide sales, service, support, and genuine parts for Allison Transmission systems, strengthening local and regional access to proven drivetrain solutions across land mobility platforms.

Rafael's EuroTrophy Signs Contract with KNDS

Israeli company Rafael announced the signing of a multi-nation contract between EuroTrophy GmbH and KNDS Deutschland to supply Trophy® Active Protection Systems (APS) for the Leopard 2 A8 programmes of Lithuania, the Netherlands, Czech Republic, and Croatia.

Valued at approximately Euro (€) 330 million, the contract includes the delivery of Trophy® APS systems, spare parts, training packages, and comprehensive logistical support to ensure long-term availability and through-life sustainment. Trophy® is integrated as part of the Leopard

2 A8's standard configuration, enabling interoperability and commonality across the participating NATO forces.

Developed by Rafael, Trophy® is the world's only combat-proven active protection system, designed to detect, track, and neutralise modern anti-tank threats in real time. Beyond hard-kill protection, Trophy® delivers critical situational awareness to armoured crews, directly supporting survivability, mission continuity, and operational effectiveness in dense and complex threat environments.

Trophy® has been integrated on leading Western armoured platforms, including the Leopard 2, M1 Abrams, and Merkava main battle tanks, and has also been selected for integration on additional next-generation platforms such as the K2 Black Panther.

Mexico Joins LM's C-130J Super Hercules Fleet

The Fuerza Aérea Mexicana (FAM) recently announced the acquisition of their first Lockheed Martin C-130J-30 Super Hercules tactical airlifter, making Mexico the first country in Latin America to operate the C-130J.

The FAM's acquisition of the Super Hercules was the first of two international C-130J contract awards to close out in 2025, with the second new international customer yet to be disclosed. In choosing the C-130J-30 Super Hercules, the most advanced Hercules ever built, Mexico joins 24 other nations and a global fleet of more than 560 C-130Js operating today. A longtime Hercules operator, the FAM is recapitalising its legacy fleet with the modern C-130J-30 Super Hercules — a decision rooted in five decades of proven C-130 operational performance and existing interoperability between nations. FAM crews will operate the C-130J-30 Super Hercules — the stretch version of the C-130J that adds 15 feet of cargo space — marking a new modern era of tactical airlift capability for Mexico and Latin America. With increased power, range, fuel efficiency and space, the C-130J-30 provides the FAM with proven and known capabilities ready to support any tactical mission requirements while leveraging Mexico's decades of C-130 flying, maintenance and logistics experience.

Paras Defence to Enter Advanced Semiconductor Packaging for Defence Applications

Paras Defence and Space Technologies Ltd. January 20 announced a strategic expansion into semiconductors with the launch of new subsidiary, Paras Semiconductor Pvt. Ltd., marking an important milestone in the company's growth journey across advanced and critical technologies.

Paras Defence would also be setting up exclusive advanced heterogeneous and 3D packaging OSAT facility focused on Semiconductor Devices for Optical and Optronic Systems for Defence and Security High-Performance Computing (HPC), networking and data center applications. Paras aims to make it a domestic hub for chiplet integration and advanced system-in-package (SiP) technologies.

The new subsidiary will focus on advanced semiconductor packaging and assembly, a segment that has emerged as a critical link between chip fabrication and end-use systems. The segment is a crucial part of the manufacturing process as it breaks away from traditional large, monolithic chips to enable highly customised, powerful and energy-efficient systems.

While India has made strong progress in semiconductor design and policy support for fabrication, advanced packaging capabilities remain limited domestically, particularly for high-reliability applications such as Defence. Paras Semiconductor aims to address this gap by building domestic capability in packaging, testing and qualification for strategic electronics. The initiative is envisioned as a long-term platform to build advanced packaging capability at scale, aligned with national priorities for defence, strategic electronics and secure computing.

It is also expected to contribute to skill development and creation in the sector, enabling eco system across semiconductor manufacturing, testing and allied engineering domains.

Globally, the semiconductor industry is undergoing a structural shift. This includes packaging multiple chips together into a single system to deliver higher performance, lower power consumption and improved reliability for complex defence and computing applications. Performance improvements are driven not only by chip design but also by how multiple chips are packaged and integrated together. Hence, as the semiconductor industry transitions from transistor scaling to system-level integration through chiplets, hybrid bonding, 2.5D/3D heterogeneous integration (3DHI), wafer- and panel-level fan-out, fine-pitch copper pillar/micro-bump, Co-Packaged Optics (CPO) integration and high-end test/qualification INDIA must establish domestic capabilities in advanced packaging to complement its globally renowned semiconductor design strength.

Advanced packaging has become central to applications such as high-performance computing, secure communications, radar systems and electronic warfare. The global advanced packaging market is witnessing strong growth driven by rising demand for computing power, data processing and secure electronics, even as supply remains concentrated in a few geographies.

For defence platforms, such capabilities are critical to ensure assured availability, long product lifecycles and control over sensitive technologies. This imbalance between demand and supply has gained sharper focus in the current geopolitical environment.

HAL-TATA Elxsi Collaboration Forge Ahead with CATS Warrior

The CATS Warrior, a pivotal unmanned combat aerial vehicle (UCAV) under Hindustan Aeronautics Limited's (HAL) Combat Air Teaming System (CATS), represents a leap in loyal wingman technology, announced TATA Elxsi on its official web portal. This platform pairs seamlessly with the Tejas mothership, executing high-risk tasks like strike missions, surveillance, reconnaissance, electronic warfare, decoy roles, and swarm operations. Its low-observable design and Autonomous Take-off and Landing (ATOL) features minimise risks to manned pilots in contested airspace.

TATA Elxsi collaborated closely with HAL, delivering expertise in airframe assembly, fuel storage, and landing gear for the full-scale demonstrator. This partnership fused TATA Elxsi's aerospace engineering prowess with HAL's aviation heritage, achieving a demonstrator in just 14 weeks—a timeline that surpassed expectations and set benchmarks for future indigenous defence projects under Make in India. The project faced a formidable challenge: completing design, engineering, fabrication, and validation within 14 weeks. Precision was paramount, with requirements for dimensional accuracy, structural symmetry, adherence to weight targets, and a fully leakproof fuel system. Complex air duct fabrication added layers of difficulty, demanding innovative solutions under relentless pressure.

Indian Defence Tech Funding Touches $711 Million Cumulative Capital

The Indian Defence Tech with a total funding touched $711 million cumulative capital with a sharp step-up in median cheque sizes, indicating a shift from exploratory venture deployment to infrastructure-style conviction. The capital concentration intensified, with the top five companies absorbing 53% of all funding and a single $100 million Series B round alone representing over 40% of 2025 inflows, reflecting investor pre-selection of future defence platform anchors rather than broad-based portfolio construction. Funding reached $247 million in 2025, marking the ecosystem's highest annual capital inflow, driven by a single $100 million+ funding round raised by Raphe mPhibr. Non-combat systems accounted for the majority of investment inflow, accounting for 78% of total capital, underscoring investor preference for dual-use, procurement-visible infrastructure layers, over long-gestation combat platforms. Geographically, Bengaluru ($216M), Noida ($168M), and Chennai ($88M) emerged as the top-funded cities, together accounting for over 66% of total funding in the ecosystem. Tracxn which released its report on India's defence technology ecosystem, outlined a transition from fragmented innovation toward an execution-driven capability infrastructure.

Embraer and Adani Defence Announce Strategic Partnership

Embraer - a global leader in aerospace, and Adani Defence & Aerospace, a leading player in India's aerospace and defence and the flagship company of Adani Enterprises Ltd, have signed a Memorandum of Understanding (MoU) to develop an integrated regional transport aircraft ecosystem in India. The companies aim to collaborate on opportunities in aircraft manufacturing, supply chain, aftermarket services, and pilot training. The collaborative industrial partnership will aim to establish an assembly line, followed by a phased increase in indigenization to advance India's Regional Transport Aircraft (RTA) program, in alignment with the Aatmanirbhar Bharat initiative and the UDAN regional connectivity vision.

This potential partnership will leverage Embraer's deep engineering and aircraft manufacturing expertise alongside Adani's aviation value-chain footprint, which includes airport infrastructure, aerospace manufacturing, MRO services, and pilot training. The proposed ecosystem is geared towards supporting domestic demand while generating significant direct and indirect employment across engineering, manufacturing, logistics, and support services.

Shield AI Selected by Indian Army

Shield AI, the deep-tech company building state-of-the-art autonomy software products and defence aircraft, January 28 announced that India has selected Shield AI to supply V-BATs to the Indian Army. Under the programme, the Indian Army will receive V-BATs and licenses for Shield AI's Hivemind autonomy software, which will be integrated into the V-BAT platform.

In addition to the procurement of V-BAT aircraft, the deal includes the licensing of Shield AI's Hivemind autonomy software development kit (SDK). Hivemind enables defence systems to sense, decide, and act, allowing autonomous platforms to adapt to dynamic environments, avoid threats, and complete missions without human intervention. The SDK enables the sovereign development, deployment, and evaluation of mission autonomy across platforms and will also be available to select Shield AI partners in India to develop autonomous solutions tailored for India, in India.

D-Propulse Successfully Tests Rotating Detonation Engine

India's burgeoning defence start-up ecosystem has notched up a significant milestone with D-Propulse successfully testing its rotating detonation engine (RDE).

Co-founded by propulsion expert Sourav Jha and eminent scientist Dr V Ramanujachari, the venture boasts mentorship from Dr V K Saraswat, former DRDO chief and NITI Aayog member. This breakthrough underscores India's push towards indigenous hypersonic and advanced propulsion technologies.

Rotating detonation engines represent a paradigm shift in aerospace propulsion. Unlike conventional engines that rely on deflagration—subsonic combustion—RDEs harness continuous detonation waves travelling supersonically around an annular combustor. This process yields higher thermodynamic efficiency, potentially slashing fuel consumption by up to 25 per cent while delivering compact, high-thrust outputs ideal for missiles, ramjets, and even space launch vehicles. D-Propulse's recent test featured a 5 kN combustor, with footage revealing stable detonation waves sustaining high-pressure combustion. The trial validates the startup's design prowess in managing the extreme instabilities inherent to RDE operation, such as wave mode transitions and thermal management. Such success positions D-Propulse at the forefront of India's efforts to master detonation-based propulsion, critical for next-generation hypersonic cruise missiles and air-breathing scramjets.

Sourav Jha, a seasoned aerospace engineer with prior stints at leading firms, brings hands-on expertise in solid and liquid propulsion systems. Dr V Ramanujachari, renowned for his contributions to ISRO's liquid engines and Agni missile stages, lends unparalleled credibility. Dr V K Saraswat's guidance, drawing from his oversight of hypersonic technology at DRDO, ensures alignment with national strategic goals like the Hypersonic Technology Demonstrator Vehicle (HSTDV) programme.

BISAG-N and QNu Labs Sign MoU

The Bhaskaracharya National Institute for Space Applications and Geo-informatics (BISAG-N), under the Ministry of Electronics and Information Technology (MeitY), signed a Memorandum of Understanding (MoU) with QNu Labs Pvt. Ltd. to collaborate in the area of quantum-resilient cybersecurity solutions.

The MoU was signed in the presence of Jitin Prasada, Union Minister of State for Commerce & Industry and Electronics & Information Technology, S. Krishnan, Secretary, Ministry of Electronics and Information Technology, senior officials from MeitY, and leadership teams from BISAG-N and QNu Labs.

As advancements in quantum computing continue globally, the need to prepare digital infrastructure against future cybersecurity risks has gained strategic importance. This collaboration aims to strengthen India's preparedness by advancing indigenous, quantum-safe cybersecurity capabilities, aligned with national priorities. Under this partnership, BISAG-N's indigenous cryptographic software capabilities, including "Vedic Kavach," will be integrated with quantum hardware and secure infrastructure platforms provided by QNu Labs. BISAG-N has developed Vedic Kavach and has undertaken one of the early government-led implementations in India covering quantum-resilient web servers and an indigenous secure web browser, integrated with Quantum Random Number Generation (QRNG).

The MoU establishes a structured framework for technology transfer, integration, and deployment, enabling the development of hardware-backed, quantum-resilient cybersecurity solutions for use across government systems, defence networks, critical infrastructure, and public sector platforms, in accordance with applicable policies.

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AAI and Apogee Aerospace Forge Strategic Collaboration

Amphibian Aerospace Industries (AAI), a subsidiary of Amphibian Aircraft Holdings (AAH), and Apogee Aerospace Pvt Ltd February 5 announced a strategic collaboration to establish amphibious aviation as a strategically important capability for India, anchored by the Albatross 2.0 amphibious aircraft platform.

Albatross 2.0 is the world's first and only FAA or EASA certified Transport Category amphibious aircraft above 19 seats (up to 28 seats) in the Registered Passenger Transport (RPT) sector.

Under the collaboration, Apogee Aerospace has been designated as AAI's exclusive Authorised Representative Partner for the Indian Subcontinent in the restricted category covering defence and government requirements. The partnership extends across maintenance, repair and overhaul, training and capability development, simulation, end-to-end systems integration for the militarisation of the aircraft, and the establishment of aircraft tail-section manufacturing in india to support the global supply chain.

AAI and Apogee will jointly promote and operationalise the Albatross 2.0 across defence. government, and strategic civil applications in India. The platform's ability to operate seamlessly from land, water, snow and ice, as well as open-sea conditions with wave heights of up to six to eight feet, positions it uniquely for India's diverse operational environments.

With a standing cabin height of 188 centimetres, a dedicated luggage compartment, a fully functional washroom, and an equipped galley, Albatross 2.0 is designed as a true transport-category amphibian rather than a niche seaplane solution. This makes the aircraft highly relevant for India's vast coastline, island territories, riverine geography, humanitarian response requirements, and joint military operations, while also aligning with national initiatives such as the Sagarmala Programme, coastal economic development, and enhanced maritime domain awareness.

Amphibious aviation is also a natural enabler of the Prime Minister's long-term vision for strategic island development, including projects in the Great Andaman and Nicobar Islands The Albatross 2.0 supports connectivity, logistics, surveillance, humanitarian assistance, and rapid response across India's eastern and western seaboards, offering infrastructure independent reach in both peacetime and crisis scenarios.

As part of the strategic collaboration, Apogee Aerospace has placed an order for 15 Albatross 2.0 aircraft, representing an approximate programme value of ₹3,500 crore. Apogee will also invest up to ₹500 crore to establish tail-section manufacturing, maintenance and overhaul facilities, training and simulation infrastructure, and advanced systems integration capabilities in India. These system integration facilities will support the development and delivery of Indigenised military variants of the Albatross platform for the Indian Armed Forces. In addition, Apogee Aerospace has invested $7 Million dollars (₹65 crore) into Amphibian Aircraft Holdings, reinforcing long-term strategic alignment and shared execution commitment between the two organisations.

Amphibian Aerospace Industries is poised to be world's 1 of only 8 FAA or EASA certified Transport Category aircraft manufacturers in the Registered Passenger Transport (RPT) sector, alongside Boeing, Airbus, Embraer, ATR, Cessna, Viking De Havilland, and Mitsubishi Heavy Industries.

The initiative is further reinforced by recent Union Budget announcements, where recent policy signals highlighted the government's intent to support seaplane and amphibious aircraft manufacturing, maintenance and overhaul, and ecosystem development as part of India's broader aerospace and manufacturing growth strategy.

Through this collaboration, Amphibian Aerospace Industries and Apogee Aerospace aim to position India as a global hub for amphibious aircraft manufacturing, sustainment, training, and exports, while delivering a strategically vital, future-ready aerospace capability aligned with India's long-term operational, industrial, and export ambitions.

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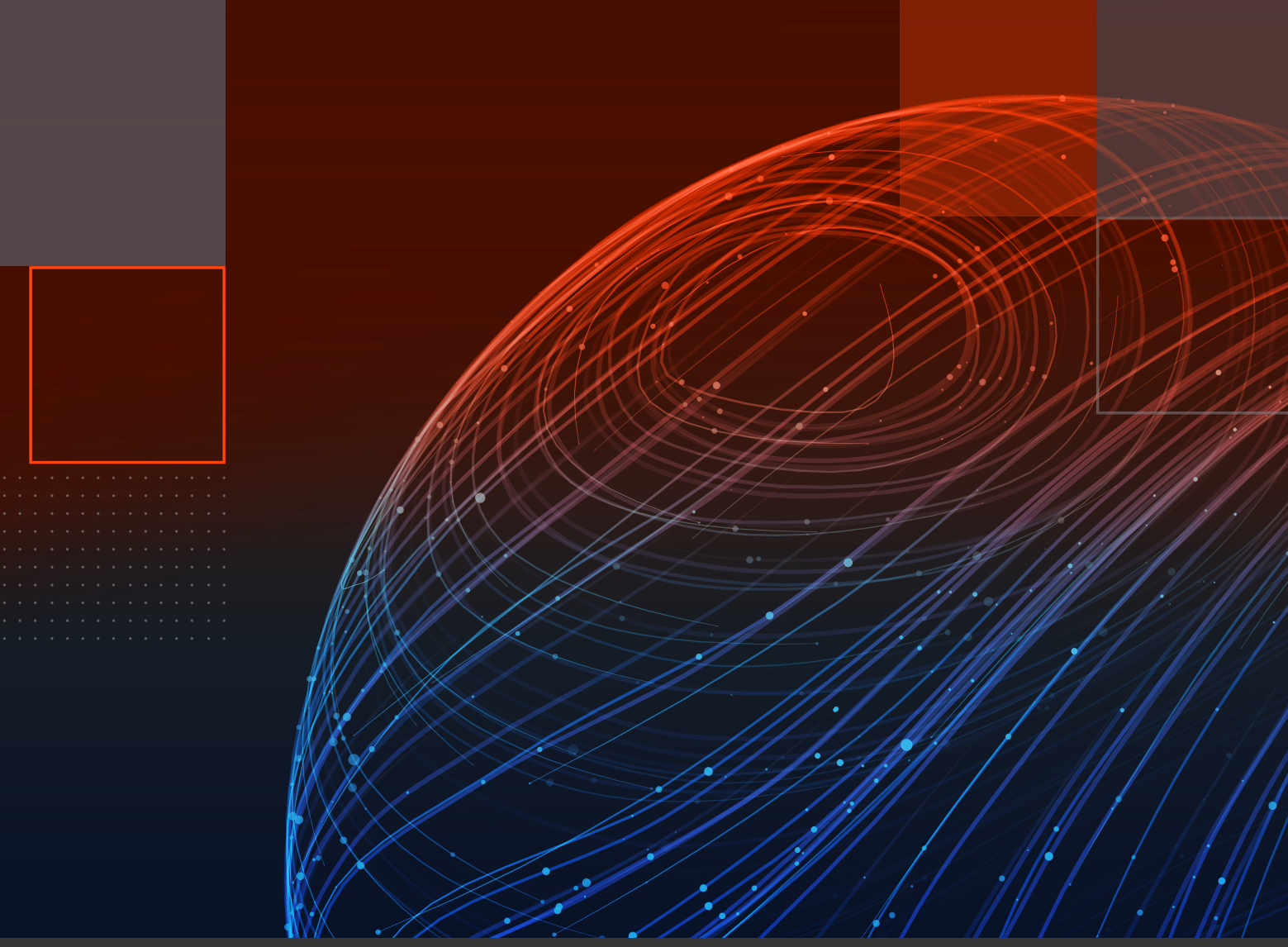

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