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CLAWS Journal

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New Delhi

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The new strategic challenges to India require military transformation that is functional as well as innovative to meet the threats from China and Pakistan. India's military transformation initiatives should be based on integrating defence processes, smart use of existing systems, skilled manpower and smooth technology absorption. We cannot "burn the bridge behind us" by immediately throwing aside older organisations and weapon systems in favour of new organisations, new technologies and new platforms. Force modernisation is a necessity, and so is reconceptualisation of war, thus a careful analysis is required to discard legacy organisations and systems in such a manner that does not disrupt our warfighting capabilities. The Indian military has to take a decision whether to transform by adopting doctrinal push or technological pull.

A country with a strong military provides greater degree of security and stability vis-à-vis militarily weaker nation. A country with strong military allows a nation to deter and prevent wars as well as guarantee uninterrupted economic and social development. It has been proved beyond doubt that the instrument of force is a powerful tool of statecraft and therefore, development of military capabilities is a prime function of a state.

The CLAWS Journal Winter 2022 is focussed on strategic, conceptual and technological aspects of development of military capabilities. We need to examine security makeover and a road map for securing rise of India as a developed nation in near future. With assertive China on our northern borders, there is a need to visualise the context and contours of India's future wars. Nuclear deterrence remains relevant for India to maintain strategic stability especially against assertive China. At the same time Indian military should incorporate non-contact warfare as a strategy to fight multi-domain wars.

Protracted internal conflicts weaken a nation to face external security challenges and also hamper economic growth. Infinite national resources cannot be frittered away to deal with internal security challenges that have emerged due to socio-political faultlines. Internal security conflicts are complex and thus need for internal security doctrine for a calibrated response is a must.

In the current milieu, technology has become a tool of strategic competition. Strong research and development base is a pre-requisite for development of competitive military-industrial complex. To build technological excellence, research and development in dual-use technology is imperative for Atamnirbharta.

While we may be looking at issues from strategic point of view, but certain tactical excellence is required to secure critical infrastructure of strategic and economic significance. Russia-Ukraine War has highlighted that Special Forces will have to be trained to secure/shut down a critical plant/facility to prevent an accident that may have global or regional significance.

Credible military capabilities must be backed by an implementable doctrine to make adversaries believe that the cost of war will outweigh the perceived benefits. In the backdrop of the above, defining a doctrine is as important as developing military capabilities.

The government has set the ball rolling for military transformation by taking certain bold steps including creation of the Chief of Defence Staff post and the Department of Military Affairs. These initiatives are indeed path-breaking and now it is up to the military to carry forward integration, modernisation and right-sizing of the armed forces.

The main focus of this journal is to trigger debate and provide policy prescriptions to military professionals and policymakers on issues related to building military capabilities.

Brig **Narender Kumar**
Managing Editor

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Securing India's Rise: A Persuasive Case for an Indian National Security Makeover

Raj Shukla

"Yadi Shaastra (civilisational wisdom) ko bhuloge, toh apni Sanskriti kho doge, Par agar Shastra (instrument of force) ka tyaag karoge, toh Rashtra hi kho doge"

–Acharya Chanakya, on the Salience of the Instrument of Force in a Nation's Strategic Calculus

Abstract

An aspirational, resurgent, India, today, in many ways, is the geo-political toast of the world. In numerous metrics, it does seem to be well on its way to becoming a 'Vikasit Bharat' in the time frame of 2047-2050. If there is one eventuality, however, that could disfigure India's rise as a 'developed nation by 2047, it is a major national security reversal. In the eight years, the Government has laid a strong foundation for India's National Security Makeover. Given the accumulating strategic adversity around its peripheries, however, multiple transitions still need to be made. The article examines the challenges and opportunities that line India's National Security Path as also the transformation that we need to guardrail India's rise. In doing so, the article also discusses

Lt Gen **Raj Shukla,** PVSM, YSM, SM (Retd), a Former Army Commander Army Training Command & Member Union Public Service Commission.

the steps that the Indian Military and wider Defence need to take to transit from a framework focused narrowly on India's Defence to one that can also enable its Rise.

Backdrop

In many metrics of geopolitics, on several accounts, India does seem to be extremely well poised. As much a leader of the Global South, as of the G-20, it is indeed the geo-political toast of the world. If the objective is to make India a developed nation by 2047, Indian State must resolve to galvanise the economy further, empower the underprivileged, minimise social inequities, embrace emerging technologies, energise the private sector, business and commerce, give a fillip to the metrics of innovation, energy and enterprise as also enhance its regional and global competitiveness, so as to realise the vision of a 'Vikasit Bharat' (India's emergence as a developed nation). Were we to be even more ambitious, we could also become a 'Vishwaguru' of a unique kind—propelled by the attributes of 'economic primacy', 'technological lead', as also 'a net exporter of ideas and best practices'.

Such an aspirational surge/optimism is not without basis. For a couple of reasons. Recently, Stanford economist and Nobel laureate Michael Spence, declared that, **"India is the most outstanding (economic) performer now. It remains the most preferred investment decision".**[1] Chetan Ahya, Morgan Stanley's Chief Asia Economist, has predicted that the Indian economy will account for one-fifth of global growth over the next decade.[2] Our physical infra has improved greatly; our digital infra, courtesy instruments like the Unified Payments Interface (UPI), is now better than even the USA. When we so desire and resolve, we do pull off miracles. Developing the COVID vaccine in less than a year as also our great success in insulating Indian cities and the populace from the scourge of terror over the last eight years, are extremely creditable feat indeed. It is also worth recalling that

from the year 1 to 1820 in history, the two leading economies of the world and in many ways the two foremost civilisations, were China and India. So, a 200-year-old aberration could well be brought to an early end. It will be unwise, however, to presume a certain inevitability in this regard.

Sagacity would demand that we cast a long gaze over the challenges and opportunities that line India's National Security Path, and identify the guardrails that we need to secure India's rise.

It would also be innocent to believe, that such an aspirational path will not be lined with many dangers and numerous pitfalls. In fact, if there is one eventuality that could disfigure India's rise as a developed nation by 2047, it is a major national security reversal.

Sagacity would demand that we cast a long gaze over the challenges and opportunities that line India's National Security Path, and identify the guardrails that we need to secure India's rise.

There is a new realisation to create a strong foundation for India's National Security Makeover. The creation of the Chief of Defence Staff (CDS)/Department of Military Affairs (DMA), the new normal in our strategic outlook (as demonstrated by Balakote and Kailash), the meaningful steps taken to move 'Defence' out of the shadows of 'Foreign Policy' as also the very forward-looking reforms in capacity building—symbolised by 'Aatmanirbharta in Defence,' are game-changing initiatives indeed. While a great deal has been achieved, given the scale and complexity of the National Security Challenge, there are multiple transitions, still to be made. This article seeks to outline the possible contours of such a makeover; of making India so strong, so as to firmly deter any force that seeks to threaten our peace and prosperity. True power, it must be remembered, speaks softly. 'It has no reason to shout'.

Strategic Context

In evaluating the evolving strategic context, it may be useful to take note of the accumulating strategic adversity that is engulfing the Indian State: a strategic-military challenge, that is unfolding in terms of a giant pincer with three arms.

The **first arm of the pincer,** as demonstrated by recent events in Galwan and Yangtse/Tawang, lies obviously to the North and the East—along the Line of Actual Central (LAC), and beyond in the Western Theatre Command—where the coming together of China's geopolitical ambition, its economic zoom and military gallop to put it succinctly, is rather breathtaking. The brazen aggression in consequence and loss of influence in our immediate periphery are just two of the side effects. We have of course in response re-balanced majorly, we have signalled that there will be costs to pay for adventurism of any sort, we have narrowed China's response options, we are growing our technological prowess, we are doing what we must in terms of infrastructural development and our wider combat posture—but the challenge remains—the lag with China is growing in some ways.

Developments along our Western horizons, constitute the second arm of the pincer. The instabilities arising out of Afghanistan, with every possibility of a mega terror challenge coalescing again (the Tehrik-e-Taliban Afghanistan (TTA), Tehrik-e-Taliban Pakistan (TTP), Tehrik-e-Labbaik Pakistan (TLP), Lashkar-e-Taiba (LeT), Jaish-e-Mohammed (JeM), remnants of Al Qaeda and the Islamic State of Iraq and Syria (ISIS) coming together); Islamist triumphalism—we have disposed of both the Soviet Union and the USA—could drive Taliban's activities and ambitions in the future; the grim prospect of narco terror; the changing balance of power-America's significant pivot to the Indo-Pacific has led to the abandonment of critical geo-strategic space which is being filled by new alignments, viz, China—Pakistan—Turkey—Iran—Taliban; the rising spectre of Pan Turkism with Turkey determined to rewrite the

geopolitics of Eurasia. Chinese forays into Eurasia are significant: we too need to enhance our involvement with the European Union (EU) and North Atlantic Treaty Organisation (NATO)—a dedicated military office in the Indian mission to Brussels where both EU and NATO are located, maybe a good way to begin. Closer home, Pakistan's inability to climb out of its civil-military trap, its continued macro–economic instability as also its intimate military alliance with China are major causes of worry; the relentless influx of drones across the Punjab/Jammu and Kashmir (J&K) border—has wider strategic ramifications. All kinds of issues are disconcerting and need to be watched very carefully.

If this were not enough, we see a growing Chinese presence in the Indian Ocean Region (IOR): the veritable, third arm of the pincer. The People's Liberation Army Navy (PLAN), is already our maritime neighbour in the IOR, with a robust Eastern Maritime Flank (Hainan, Ream in Cambodia, Kyauk Phyu in Myanmar, bases in Thailand and Sri Lanka), an enlarging Western Maritime Flank (Gwadar, Djibouti, Abu Dhabi, as also bases in Namibia, Seychelles, Tanzania, even the Equatorial Guinea in the Atlantic), as also a staying power, which is becoming menacing with every passing day.

So, the Adversary Grand Strategy seems to be quite obvious: fix India to its terrestrial threats and concerns along the land borders in the North and the West and delay/enfeeble its long overdue turn to the seas; continue to capsule India's strategic thought and frame into a protective shell, shorn of a viable military reach beyond its borders. Now, unless there is a major re-imagination in our 'strategic outlook'—quickly and decisively and we act in multiple ways, the weight of the three pincers could envelop us in a kind of debilitating, strategic squeeze.

Pathways/Transitions

Given the realities of the strategic context, what are the pathways we must embrace, the transitions that we must make, to strengthen our

national security poise? What is the rejig we need in terms of our long-term strategic outlook? What more should we do in terms of diplomatic overtures, sharper external balancing, increasing the heft of our military diplomacy, growing our military capacities and adding techno-military muscle to our strategic partnerships? Why and how, must we shift our military gaze outwards so that the swathe of Indian power projects far enough to meet threats sufficiently afar, than our defensive crouch currently allows? What is the Indian Military's Data Strategy? What is the positive leveraging with regard to our considerable data exhaust? What are our overarching strategies with regard to emerging technologies: Artificial Intelligence (AI), robotics, quantum, advanced materials, Virtual Reality (VR)/Augmented Reality (AR), bio–tech, et al.?

How could we, through some creative statecraft, recalibrate our maritime geopolitics with our continental strategy? In what manner should our strategic policy course be correct?

- What are those pathways of hard and soft power that could usefully constrict and constraint China?
- How do we create such a strategic-military balance that China is not even tempted to alter the status quo?
- How could or how must, the Indian military and wider defence, become more dynamic?
- What should we do to re-structure the Indian military from one that is resolutely focused on India's defence to one that could also enable its rise?
- A discussion on the possible pathways/transitions that follow, may be useful.

Re-Imagination: Strategic Outlook. First and foremost, we need a major re-imagination of our beliefs and strategic outlook. Even as we do everything to fortify our posture along the Line of Control (LC)/LAC, with Pakistan/China we must concurrently take our ambitions far beyond.

The latter cannot wait for sequential addressal. Within the traditional domains we need to invest far more in the maritime domain specifically and in multi-domain proficiencies more generally, than we currently do. We need to engage and create capacities far more aggressively in the emerging domains: space, cyber, Electronic Warfare (EW), AI, quantum, robotics, et al., as also make some big moves in terms of creating capacities in digital combat. Only then will we be able to lay the edifice for multi-domain, integrated deterrence, so central to the operational prowess of modern militaries. The speed and momentum of change in National Security issues of this kind are hesitant and slow on two accounts. One, is because there is a view in some quarters, that capacities in emerging domains like Space, EW and AI are exotic, airy and do not have great relevance to real-world combat. Nothing could be further from the truth. All these emerging domains have significant, if not game-changing military payoffs as also intimate tactical impact; they are already affecting and will continue to change the course of company/squadron battles of the future. They will also impact our larger military poise in the Western, Northern and Eastern Theatres and must therefore be embraced with vigour. Without a Low Earth Orbit (LEO) configuration of satellites, for example, surveillance in tactically acceptable revisit times will not be available to local commanders. Without Position, Navigation, Timing (PNT) accuracies provided by satellite configurations, precision targeting will not be possible. Two, because of our strong obsession with turf and our entrapment in stand-alone silos of service tribalism. Unless we show the requisite wisdom and statesmanship to collapse these silos purposefully, we shall continue to lag in the strategic–military competition with our adversaries. We also need to move towards building power projection capacities in a phased manner—not to jackboot around the world, but to be able to militarily influence events at progressively increasing distances from the mainland, whence Indian interest so demands**.** The Indian State, it needs to be emphasised, is not expansionist; territorially

we are a status quo power. Such an outlook, however, is very distinct from building niche capacities to project power outwards, incrementally. A well-thought-through, informed, decision in this regard needs to be taken soon and resourced in terms of doctrinal orientation, technologies, combat platforms and inventories.

The China Challenge. China, of course, is the obvious seminal challenge before Indian statecraft. We need, however, to comprehend and internalise, its true import, urgency and gravity. For the first time in history, the world's two leading economies—China and India (Number 1 and Number 3 in PPP terms) are growing in close proximity without a physical barrier (the formidable Himalayas) or even a geographic buffer (Tibet). Our geostrategic trajectories are bound to clash– unless we take some smart, resolute, steps to ensure that such an intersection is peaceful. The prospects for such peace and prosperity were perhaps high as long as China was 'hiding and biding' and 'rising peacefully'. As it turns out, the peaceful rise was an elaborate ruse, a monumental exercise in orchestrated deception—China used the narrative and the time so gained, to stage an economic miracle, steal technologies and build/create robust capacities in defence and warfighting. Resultantly, China today is this economic behemoth, whose GDP exceeds that of Japan, Korea and India put together. By 2035, it is said, that while China will account for 24 per cent of global GDP, the USA will account for a mere 14 per cent.[3] The PLA has grown 44-fold (not merely in terms of bean count but in aggregate military capacities) over the last four decades. Its growth and evolution has been a personal project steered for a large part by Chairman Xi himself—some say, China's military modernisation is the most massive in the history of mankind. Xi's view of economic might and military power, which we may like to note is equally unique, "As important as economic prosperity is, it is military power that ultimately lies at the heart of state power". Now that China thinks or knows that it has arrived, it has abandoned 'hide and bide', and has consciously gone 'loud and proud'.[4]

Some Chinese ideologues are of the view, that the nation has mustered enough wealth; it is time now to turn that considerable wealth into power. An aphorism doing the rounds in Beijing, goes something like this, 'Mao gave us the revolution, Deng gave us wealth, Xi will restore Chine to its greatness'. If former Australian Prime Minister, Kevin Rudd is to be believed, Xi's China is marching to the tune of 'Left, Left, Right'.[5] Left on economic policy, left on ideology and right on nationalism—an ominous trio. The BRI—this ambitious, integrated enterprise of power and influence, undergirded by trade, commerce, a massive infrastructural push, diplomatic and military capacities, thus far, has been somewhat of a mixed bag. If it does live up to its conceived potential, however, it could create a Sino-Centric global order of considerable global influence. With ASEAN, alone, while American trade has grown three times (135 to 362 billion dollars) in the period 2000-2020, China's trade has grown 17 times (40 to 685 billion dollars) in the same period.[6] As the focal point of Cold War 2.0 shifts to Asia/the Indo-Pacific Theatre, increasingly, American hegemony seems to be making way for Chinese hegemony. The challenges before India, therefore, are indeed grim and stark. There is of course a possibility that Xi's abject mishandling of COVID could lead to further protests and sour the Chinese dream. Maybe, the famed Chinese economy has already peaked. China's authoritarianism at home, aggression abroad and inept governance may have taken much of the sheen off the 'Chinese model." Yet, it would be unwise to ignore the scale, and potency of the China challenge. The need of the hour is 'a more than government approach'—not only all the arms of government but the larger nation will have to come together in a comprehensive manner to counter the China challenge. We must sharpen our competitive skills in strategising, ideation, technology, R&D, industry, business and defence—for China is indeed a 'tough cookie'. While speculating on Chinese intent makes for some good debates, it will be far wiser, to watch very carefully, China's military capacities on the ground. It appears to the author of this

China perceives India to be ambitious, overconfident, yet military powerful neighbour, with whom it may eventually have to have a day of reckoning.

article that Chinese military capacities in the Western Theatre Command are just as formidable as they are in the Southern and Eastern Theatre Commands. China is indeed preparing for war. Viewing intent through the adversary lens may also be useful. In this regard, this view of Gary Klintworth, an Australian commentator on strategic affairs could be prescient, "China perceives India to be ambitious, overconfident, yet military powerful neighbour, with whom it may eventually have to have a day of reckoning. Yet, China consistently denies that New Delhi is a potential rival, driven by the shrewd calculation that acknowledging India as an adversary would elevate its importance undeservedly and thereby undermine China's efforts to position itself as the preeminent power in Asia in Asia".[7] In its quest to restore greatness, Xi's China could well gamble and cast an evil eye on India. We must create such smart and potent levers of deterrence, strategic–military balance and national power that China is not incentivised to alter the status quo. The right question to ask in the future should not be as to why 'China did this or that', but why did our deterrence fail? We must do all that we must now, to ensure that our deterrence is fail safe. That would be a higher metric to live by.

Asymmetric Balancing. While enhanced budgets help to grow combat capacities, monies alone, do not create cutting-edge militaries. Asymmetric Balancing of a stronger, better-resourced military, is well nigh possible through smart moves and wide-angled, comprehensive reform. We need to introspect and take some significant decisions in this regard. Why is it for example, that within similar budgetary differentials in defence, Beijing is causing far greater displacement anxiety in Pentagon, than we cause to Beijing? Were we to carry out many of the reforms in defence, which are currently in various stages of gridlock, with greater

speed and vigour, we would radiate far higher levels of deterrence, than we currently do. So, theaterisation, cross-pollination in the Ministry of Defence (MoD), creation of new talent pipelines, a more vigorous embrace of emerging technologies, placing of orders on start-ups and the private sector [as against mere grant of Acceptance of Necessity (AONs)/ Acceptance In Principle (AIPs)], must happen in accelerated time frames. Gatishakti (speed and scale) in defence reforms, is indeed the need of the hour. The proposed Theatre Commands, for example, must not merely be structural entities but digitised as well. Unless, the tangible benefits of AI and proficiencies in Edge Computing flow to the field, we will not be able to make the long-overdue transition to digital combat. Appointing a well-known, civilian, IT professional as Chief Data Officer in the MoD will also be very useful. The future lies in hybrid naval and air fleets of manned and unmanned systems—we need to re-structure accordingly. The current powers of the DGBR are of the order of Rs 150 crore per project which translates to a mere 15 km of road length. Why can we not delegate enhanced powers so as to enable the execution of greater road lengths at faster speeds to meet the obtaining infra challenge along the LAC? If the delegated powers of Director General Border Roads (DGBR) are enhanced to Rs 1000 crore, he will be able to deliver 100 km of road length in 2 years. Without such delegation, even if DGBR is allocated Rs 1000 crore, he shall be able to deliver 100 km of road length, but in 6 years (four additional years due to the to and fro of the process). So, even within current budgetary allocations for defence, if we undertake associated defence reforms, as discussed, we could deter China sufficiently. With additional budgets, we could of course take the fight more aggressively, to China.

Civil-Military Fusion. For far too long, India has grown up in these civil-military silos. Strategic advantage/productivity in the modern world, however, lies at the cusp of civil-military fusion. National Security today, is far too complex and sophisticated, for any single institution to

be able to grapple with its myriad challenges successfully. In the modern national security enterprise, all talents, attributes and capacities—civil or military, need to converge and come together. In India, the beginnings have been made. We need, however, to impart far greater speed and momentum to the enterprise of Civil-Military Fusion. Soldiers, civil servants, entrepreneurs, academia, the private sector, start-ups, dreamers, technologists and the scientific community all need to come together in the solemn enterprise of national security. National Security in India today, is in fact at a critical crossroad. It needs to transit from 'mediocrity' to 'talent' and from 'status quoism' to 'transformative change.' Civil-Military Fusion is just the right tool to propel the transition. A cross–pollinated MoD, civil talent recruited at industry-grade emoluments in the Defence Space Agency and the Defence Cyber Agency as also civilian faculty in military institutions of professional learning, maybe a good way to begin.

The Spirit of Innovation, and the Scourge of Bureaucratese, Process & Procedure. 'Aaatmanirbharta in Defence' and a host of parallel initiatives have unleashed the animal spirits of innovation, energy and enterprise through the defence eco-system in India. IDEX, thus far, has been a stellar success. Such spirits, however, are held back and are hostage to the scourge of process, procedure and bureaucratese. The sub-optimal utilisation of DRDO's Technology Development Fund (TDF) symbolises the malaise. General Financial Rules (GFR) and the Defence Procurement Procedure (DPP)-2020 are documents that allow a lot of discretion, as also provide considerable space for positive, affirmatory action. Alas, the officialdom that works the system, is extremely conservative and cautious in interpreting the existing rule framework for positive outcomes. In consequence, 'Aaatmanirbharta in Defence' has not quite realised its true potential. In fact, in the author's view, the political class today, is far more ambitious, risk-taking and far-sighted than the leadership in civil, technological, financial, administrative and military bureaucracies. A great

deal of introspection is called for. We need to do far more to galvanise initiatives already underway. There is also a strong case for financial transformation: the 'software bugs' in the domain of financial advice/enablement are far too many, for Indian Defence to become competitive internationally. The default setting in the processing of files/cases is still to see 'ghosts' rather than interpreting rules and regulations creatively and imaginatively to realise desired outcomes. There are few incentives in the financial system for initiative and risk-taking whereas modern military capacities especially those in techno–military innovation lie in risk-taking. The Competent Financial Authorities (CFAs) too, have failed to provide the necessary leadership whereby 'outcomes' trump 'processes.' We need to make urgent corrections, else, we shall miss a golden opportunity to take Indian defence to the next level in productivity, deliverance and preparedness.

The Tandem March of Defence & Diplomacy. Noted American diplomat, George Schultz, famously observed that 'negotiations are but a euphemism for capitulation unless the shadow of power is cast across the bargaining table'.[8] Wisely, therefore, the current government has shone the political torchlight for the defence to emerge out of the shadows of foreign policy. The creation of the CDS/DMA itself is a resolute step in this direction. It has restored the legitimate voice of the military in the larger strategic policy-making while calling upon the military and the CDS to conceptualise policy as also drive change through the National Security System. This also provides an opportunity for Defence to acquire an independent character in tandem with Foreign Policy. A good way to begin is perhaps by cross-populating the MoD/MEA with Indian Foreign Service (IFS)/Defence Services Officers at the Apex Level (Joint, Additional and Special Secretaries) to drive initiatives in various domains: in pushing defence exports and in helping Indian defence companies navigate the complexity of external markets. We also need to re-think our relationships and re-visit the metrics of

our strategic autonomy. Strategic dependence on Russia for equipment, logistics and spares of the order of 60-80 per cent, especially, when much of that equipment is not sophisticated, innovative enough for the modern battlefield is a cause of some concern. Apart from the need to diversify our military inventories, we will also have to consider the choices for Indian geopolitics as the Sino-Russian embrace deepens. With regard to our partnership with the USA, we should neither expect, nor do we need either American blood or American treasure. What we need however, is access to American technology to counter the Chinese techno-military juggernaut. Existing frameworks like the 2+2, the QUAD and the Defence Technology and Trade Initiative (DTTI) need to be energised to enable us to tap into American technological prowess and upgrade our own poise in critical and emerging technologies. Technological capacity so bestowed will help to greatly strengthen the Indian Military posture without raising temperatures, while yet causing great worry amidst Chinese strategic elites. It also needs to be emphasised that the defence eco-system, optimally leveraged can deliver not only international influence but also revenues. Look at Turkey—a middle power—yet one that has emerged as a 'drone superpower'; it is now using its new found position to take out threats at source, grow its strategic heft as also generate considerable revenue. The Turkish state along with the Bayrakhtar conglomerate is a dominant player in the drone market. MoD/MEA in concert, may consider mentoring two/three Defence Start-Ups/Private Defence Companies to deliver cutting-edge military capacities (and therefore influence) in a similar manner. Future Indian Military Theatre Commanders will also need to develop a quasi-diplomatic visage—the Western Theatre Commander, for example, should be looking not only at Pakistan but also at Afghanistan, Iran and Turkey through a military-diplomatic lens. Civilian foreign policy/technology advisors should be embedded in Theatre Commands to drive initiatives in this regard.

Roadmap

The afore-stated pathways/transitions could provide the conceptual frame for transformation. A more precise 'roadmap', that flows from the pathways discussed earlier, is discussed in succeeding paragraphs.

An Indian Instrument of Force, that is joint, optimised, calibrated, technologically enabled and ready will be the surest guarantor for peace and stability.

A Transformed Instrument of Force. An Indian Instrument of Force, that is joint, optimised, calibrated, technologically enabled and ready will be the surest guarantor for peace and stability, along the LC, LAC and in the Indo-Pacific. Each attribute is a one-word descriptor, albeit, a gigantic challenge that any military mind knows, will take decades of resolute capacity building to create. The Indian Military we all know, has been struggling with 'jointness' for well over three decades and is yet to attain any finality in its endeavour. Similarly, with 'readiness': in the build-up to the Ukraine Conflict, the Russian military was described by many analysts as this 21st Century Force, adept in IW, brilliant at leveraging the Gerasimov Doctrine, a master in 'winning without fighting.' When called upon to fight in Ukraine, however, it proved to be surprisingly 'Unready' and unravelled dramatically in consequence. The enormity of the challenge, for the Indian Military, the distance to be travelled to operationalise these attributes should be obvious.

Wide Spectrum Preparedness. The abiding lesson from the Ukraine conflict for militaries worldwide is to focus on wide-spectrum preparedness, arduous slogs in battle and long-haul industrial and logistics sustainment. Comprehensive techno-strategic competitiveness, grey zone proficiencies, competencies in traditional warfighting, industrial era prowess, digital combat and nuclear capacities are all equally salient. It is not a question of either/or—prioritisation does not seem to be an

option any longer; full-fledged embrace of all six domains is a strategic imperative. India needs to attune its statecraft accordingly.

Multi-Domain Integrated Deterrence. Another challenge for Indian statecraft is to create a robust framework of integrated deterrence, by converging capacities in multiple domains—diplomacy, strategic partnerships and warfighting. The skill with which we integrate capacities in the emerging domains (space, cyber, EW, etc.) with proficiencies in the traditional domains will define Indian deterrence of the future. We need to draw up a 'deterrence matrix,' composed of kinetic and non-kinetic instruments, sub-threshold and conventional capacities, an eco-system of long-range precision, diplomacy as also technological upgrades through strategic partnerships to enhance our deterrence signatures; and work resolutely thereafter to take the initiatives to their logical conclusion.

Techno-Strategic Competitiveness. The Indian military is a combat-hardened institution. It has a long tradition of valour and combat delivery. It needs to however buttress the same with technological sheen—significant steps have already been taken—they need to be buttressed further. Let us explore one metric, AI, which is slated to transform not only the way we think and live, but also how we fight. The Indian Military needs to first and foremost get its integrated data centres and pipelines going, in order that data resident in the three services is mobilised for combat effectiveness. We will, thereafter, need exquisite talent pipelines (civilian expertise drafted into the military for specific projects) to work on stacks like 'compute', 'data,' 'algorithms' and 'engineering.' Such initiatives will translate into game-changing military payoffs/differentials in the sensors grid, the fires grid, the command and control grid and the logistics grid. An, AI-Enabled Northern/Eastern Military Theatre will lead in the Observe, Orient, Decide and Act (OODA) loop vis-à-vis the PLA's Western Theatre Command (WTC), thus enhancing our combat effectiveness by an order of magnitude. Likewise, proficiencies in quantum will translate directly into military deliverables in stealth, high

bandwidth data exchange, target detection and identification, military codebreaking, computing, et al. The seminal role of chips and micro-electronics as demonstrated in the Ukraine conflict should drive us to significantly upgrade our prowess in the domain of chips and micro-electronics. It turns out that the formidable Russian military machine has come a relative cropper on account of a severe deficit in indigenous chips and allied micro-electronics. As many as 27 Russian military systems (from tactical radios to kill chains to high-end missiles) and 450 micro components used by the Russian military in the Ukraine conflict have been subjected to Western sanctions;[9] the resultant squeeze has led to declining levels of Russian combat effectiveness on the battlefield. The utility of sanctions, therefore, has been demonstrated beyond being a mere preventative tool—sanctions have emerged as a strategic asset in the toolkit of nations to neutralise adversary combat prowess. The lesson for the future is more than apparent—self-sufficiency in micro-electronics will undergird the strategic autonomy of nations. We in India, need, therefore, to work with renewed diligence and vigour to indigenise our capacities in micro-electronics and chips—and here, we have a long road to travel. So, we must do all that we can to grow our strategic-military poise through the embrace of emerging, disruptive, technologies: it is abundantly clear now that he who dominates the commanding heights of technology will be the strategic lead in the global pecking order. A lot of work needs to be done: from chips to space to AI to military autonomy—there are a plethora of technologies that need to be developed and converged. We need to pursue each of these techno-military projects with vision and passion to enhance our strategic–military competitiveness.

Grey Zone Proficiencies. Grey zone challenges which are currently manifest along the LAC, will also intensify in the air and maritime domains. Violations of airspace, establishment of arbitrary Air Defence Identification Zones (ADIZs), buzzing of Indian ships by PLA aircraft,

maritime coercion, etc, will manifest along our aerospace frontiers and in the IOR. We need to brace up. Do we need to upgrade our Coast Guard from merely an instrument of coastal security to a formidable entity of maritime coercion? We must also be wary of a PLA Deception Strategy that makes us believe that it is only the grey zone that matters, lull us into complacency and strike where we may be relatively unprepared—in all-out conflict.

Traditional Warfighting. The overriding lesson from Ukraine is that good old, traditional, warfighting is as salient as ever. Company/squadron battles, infantry slogs, the fundamentals of fire and manoeuvre, the blood and gore of combat are well and truly alive. In Ukraine, many paradigms regarding the 'character of war' have also been upended and some myths shattered, most notable amongst them being that all-out war is a thing of the past and that modern conflicts will be sharp and swift. Even as the Indian military pursues technological sophistry to include digitisation, it must not be at the cost of neglecting the fundamental tenets of combat—that is the central lesson from Ukraine. We will need to review our industrial capacities (manufacturing and surge) and military inventories for prolonged conflict, in terms of equipment, munitions and spares. We will need to upgrade existing combat platforms in terms of digital capacities: microelectronics, loiter, active protection systems, situational awareness, star link type terminals, jammers, creation of data pipelines, instruments to leverage big data, robotics and military autonomy as also by tapping into the significant advantages of combat simulation. Priority to digital capacities over legacy platforms must get reflected in our defence budgets of the future. We need to seriously revisit our industrial-era capacities/long-haul logistic sustainment. When Ukrainian stocks of artillery ammunition fell low after the first two months of intense warfighting, not a single NATO nation had the capacity to refil those stocks. Even the mighty USA is struggling to roll out High Mobility Artillery Rocket Systems (HIMARs) and Javelins in

sufficient numbers. That should drive home the gravity of the challenge of logistics sustainment and spur us into suitable action.

The Aerospace/Maritime Domains. The underwhelming performance of Russian airpower, despite overwhelming superiority in numbers across aircraft types, the absence of Suppression of Enemy Air Defence (SEAD) and Destruction of Enemy Air Defence (DEAD) and the broader inability of the Russian Air Force to establish air superiority, merits deeper investigation and analysis, especially since our own IAF operates a largely Russian origin fleet predicated on similar operational concepts. The Ukraine conflict has emphasised yet again that the battlespace has shifted quite dramatically from the 'close kinetic' to 'beyond visual range (BVR)'. It has also underlined the fact that the great democratisation of capacities in space, air and intelligence are severely challenging the ability of conventional air forces to operate with relative freedom, let alone dominant impunity as was the case in some of the campaigns of the recent past. The significant contribution of unmanned systems like the Bayraktar and Switchblades drones in impacting combat outcomes also needs to be acknowledged. In recognition of the role of Drones and Unmanned Combat Aerial Vehicles (UCAVs), the United States Indo-Pacific Command (US INDO-PACOM) is in the process of re-organising/re-structuring and embracing hybrid sea fleets (manned and unmanned). The US Air Force is taking similar steps to arrive at a hybrid force structure—a mixed array of manned and unmanned systems. We may consider revisiting the aerospace domain in the stated context and find solutions rooted in the dynamics of the Indian operational framework. Yet another factor that needs to be reflected upon is the inability of the Russian Air Force to carry out effective and sustained targeting from medium altitudes, due to the efficacy of ground-based, mobile AD systems. The inability of rotary wing platforms to penetrate enemy airspace due to interference by man-pads also demands a realistic assessment. In the maritime domain, we may like to consider creating a

robust Anti Access Area Denial (A2AD) network (radars and missiles) in the IOR that constrains/challenges the freedom of operation of the PLAN.

Long Range Precision. The game-changing role of precision strike regimes/long-range fires in the Ukraine conflict also merits deeper analysis. Precisionary has been the dominant theme throughout the conflict. The game-changing role of the High Mobility Artillery Rockets (HIMARs), (critically during the Ukrainian counteroffensives in isolating forward deployed combat systems by targeting Russian reserve troop dispositions, headquarters, ammunition dumps, bridging systems and train-based logistics in depth) or even the precise targeting of critical Ukrainian infrastructure by the Russians has demonstrated the critical role of precision in modern combat. It does seem that increasingly precision fire systems will be the future. In India, our ordnance factories are these ammunition behemoths with little capacity/imagination to manufacture smart and precise munitions of the future—they need to transform comprehensively in thought, form, structure and delivery. In a somewhat similar manner, the critical role of long-range fires is also instructive. One of the key differentiators in the comparative targeting strategies of Russia and Ukraine is long-range precision. The momentum of Ukrainian frontline operations has often been stymied due to the Ukrainian inability to secure its depth areas through air and missile defences as also by way of response to Russian long-range strikes in kind (of Russian cities and infrastructure). The ability of High-Speed Anti-Radiation Missiles (HARM), integrated with aerial Ukrainian MiG-29 platforms to disable Russian radars has been most valuable; the role of the Javelin in neutralising Russian tanks with precision has also been seminal. The Indian military does need to think through the entire challenge of precision weaponry and upgrade its capacities in this regard. In the light of Chinese long-range strike capacities encapsulated by their Rocket Force, we will also need to re-visit the mechanics of our operational

posture/deployment along our Northern Borders—the need to fight distributed and dispersed to thwart the might of the PLA's Rocket Force is a challenge that we need to address. Do we have such a plan? What options does the Indian military have to offer to its political masters in terms of long-range retaliatory strikes? Critical posers that merit some quick thinking—a sophisticated ecosystem of precision and long-range strike, is the need of the hour.

Warfighting Advantage: Electro-Magnetic Spectrum. The battle in Ukraine has been between precisionary and EW—the latter emerging as the only degrader of the former. Additionally, the foundation of IW lies in the ability of modern militaries to dominate the EM Spectrum. In India's Thearerisation paradigm, perhaps the first stop should be a Theatre Command that encapsulates all modern capacities in warfighting "Space, EW, Cyber and Long Range Precision."

New Talent Pipelines. We have reached a stage in warfare whence private sector competencies/new talent pipelines are indispensable not only in capacity building, but also in warfighting. From skilled professionals that enabled intelligence fusion to Microsoft Cyber Threat Identification Teams to Musk's whizkids working Starlink terminals, the private sector contribution has been profound. The baby steps that we in the Indian defence ecosystem have taken in this regard, need to be expanded by a significant order of magnitude.

Nuclear Transitions. The conflict also tells us that nuclear capacities as the ultimate backstop and guarantor of national security, do matter**.** The fact that Russia boasts of the world's largest nuclear arsenal (5,977 warheads[10]) has been a significant factor in influencing US and NATO planning and decision-making. We in India need to think through the modern nuclear paradigm, carry out some careful risk balancing while re-examining some of our simplistic, dated, conclusions afresh, viz, that theatre/tactical nuclear weapons, do not matter, etc. The Chinese nuclear posture is growing in size, precision and sophistication—it has

The Chinese Nuclear System is predicated on ambiguity while the Indian system is based on transparency.

two distinct orientations in the form of a strategic nuclear force and a theatre (tactical) nuclear force—is targeting India, both, in terms of counter value and counter force dispositions, is precise and focussed. The Chinese FOBS (Fractional Orbital Bombardment System) has introduced the possibility of an additional hypersonic, nuclear vector through space. The Chinese Nuclear System is predicated on ambiguity while the Indian system is based on transparency; there are numerous indicators to suggest that the doctrine of nuclear ambiguity has several virtues. It may be wise, therefore, to re-visit the conceptual metrics of our nuclear posture as also the modernisation of our nuclear triad to arrive at the transitions that we need to make in order that our nuclear deterrence does not seem fragile in moments of grave crises.

An Enabling Narrative. India is the land of the 'Katha and the Kathakar': a well-thought-through narrative and a skilful narrator. The aspirational story of becoming a 'Vikasit Bharat' by 2047, provides us with both: a narrational edifice as also the outlines of a Grand Strategy. It signals to the wider world—friends, partners, competitors and adversaries alike—that this is an India that is purposeful, one that knows its mind and is determined to attain its place and promise in the world. It also signals to a wide range of Indian stakeholders: the bureaucracy, the military business, the strategic and scientific communities, academia, and our talents abroad, to contribute and work together to turn this dream into reality. We could layer the mega narratives with layered subsets: ones that signal, others that deceive, still others that outreach, etc. The Raisina Dialogue has been developed as an important forum for shaping foreign policy conversations. Should or could MoD and MEA come together and develop a platform that shapes regional and global strategic–military conversations? The latter may be useful to

radiate influence and enable a persuasive acceptance of India's strategic–military interests.

Summation

Securing India's rise is a huge challenge but not one that is unsurmountable. The aforestated National Security Makeover is a strategic imperative; it is as much about conceptual, attitudinal and doctrinal change as it is a challenge of surgical implementation. The precise contours/metrics of the makeover are of course open to wider debate—this article itself, could provide the intellectual springboard for such a debate. What is certain however is that we will need a major re-imagination in our strategic outlook, a fresh dose of energy and enthusiasm, as also speed and scale in innovation and implementation (the spirit of anusandhan and the force of gatishakti) for the proposed makeover to become a reality. If the Indian military, wider defence and the National Security Establishment can make this huge leap of faith, there is no reason why India cannot become a twenty-first-century Vishwaguru—a global leader, peace-loving and prosperous, but also influential, strong and secure.

- We must not ever forget these words of wisdom, 'If you have the power your values rule, if you don't, you submit'.

Notes

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Getting Serious about Thermonuclear Security: Need for New Tests, Augmented Capability and First use Doctrine & Posture

Bharat Karnad

Abstract

India has been an economic and military punching bag for China. This is India's fault because it has done less than nothing to counter the pummeling except occasionally reacting (as on the Galwan) and then only defensively. It is time India, a nuclear laggard, adopted the strategy conventionally weak nuclear weapons states (Pakistan against India, North Korea against the US) have successfully wielded against stronger adversaries by threatening nuclear first use, and by substantiating such threat by laying down short fuse, forward nuclear tripwires. For an India that has historically quailed before China, making this new more assertive stance credible will require significant measures—resumption of thermonuclear testing, emplacing a differentiated two-tiered doctrine that replaces the impractical

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"massive retaliation" strategy with flexible and proportional response notions pivoting on nuclear first use but only versus China while retaining the "retaliation only" concept for everyone else, and alighting on a tiered posture supported by the buildup of 'soft' strategic infrastructure (a separate strategic budget, specialist nuclear officer cadres in the three services, and a mechanism for oversight of nuclear weapons designing activity). It is a doable strategy the Indian government should not shy away from.

Introduction

India from the get-go did little right, nuclear military-wise, and has paid the price for it. Strung out between moral pretensions, ideals of a peaceful world, strategic myopia, and foreign pressure, Indian governments have not pursued a straightforward policy the nuclear visionary, Homi J. Bhabha, urged the 1962 War onwards—a series of open-ended underground tests of progressively higher yields culminating in a thermonuclear arsenal.[1] It was a practicable policy once the weapons threshold was attained in March 1964.[2] Instead, in the following decades, there were sporadic nuclear tests aimed at scoring political points or making short-term political capital, not securing a credible strategic deterrent. Bhabha's strategic vision, moreover, got directed by the Trombay leadership of the 1970s and 1980s into the small arsenal-minimum deterrence channel that conformed with government views.[3] It led to the testing "moratorium" in the wake of the 1998 Shakti series despite the government being informed of the thermonuclear/boosted fission device (S-1) "fizzling", and to the 2005 civil nuclear cooperation deal with the United States conditioned on India not testing again. More alarming still, the nuclear weapons programme was nearly terminated by Prime Minister Lal Bahadur Shastri in 1965 in return for joint US-UK security assurances.[4] And but for some inspired bureaucratic shuffling by an MEA official (M.A. Vellodi), the Bomb project would have been

axed by Prime Minister Morarji Desai, ten years later, on the altar of Gandhian values.[5] It would seem that Indian nuclear weapons face greater peril from the country's leadership than from external adversaries.

It is not clear why getting to the nuclear well but not drinking from it was thought to serve the national interest.

Whereas Pakistan had a clear idea why it wanted nuclear weapons—to prevent India from doing a Bangladesh in what remained of that country post-1971 War, there was no such clarity on the Indian side.[6] Nuclear weapons were considered a moral abomination and danger to world peace and, after the 1974 test, as variously an antidote for chemical and biological weapons and even for terrorism. Even a humiliating military defeat in 1962 did not result in the hard-earned capability being converted into nuclear weapons. It is not clear why getting to the nuclear well but not drinking from it was thought to serve the national interest. It set the precedent for dealing the same way with other advanced technologies as well. The multiple independently targetable re-entry vehicle (MIRV) technology, for instance, has been on the DRDO shelf since 2001-2002, but permission for prototype testing is still awaited.[7]

The country is in an extended strategic rut, but this is not recognised because of a sense of complacency—the Indian Establishment's besetting sin where national security is concerned. Three sets of corrective decisions need to be taken fast: to (1) resume open-ended nuclear tests to obtain a panoply of proven nuclear and high-yield thermonuclear weapons and, in parallel, rapid test-launches and induction into service of long-range MIRV-ed missiles; it will instantly endow the Indian strategic deterrent with clout, credibility and reach; (2) revise the "massive retaliation" doctrine with 'credible minimum deterrence' undertones into a two-tiered set of guidelines centred on nuclear First Use to tackle China, and retention of retaliation only principle for Pakistan, and configuring a deterrent posture accordingly; and (3) install the 'soft' but vital

infrastructure supportive of the strategic forces. This article briefly discusses why these decisions are necessary.

Resumed Thermonuclear Testing is Key

Commonsense is a precious commodity in short supply in the Indian milieu when it comes to nuclear weapons. Unless a new weapon technology is iteratively tested, and its performance proved in all conditions to the satisfaction of the end-user, it is not deemed a reliable battle-ready system. It is a metric the armed services use for conventional military hardware. So, it is curious the Indian military accepts the performance of the more consequential thermonuclear armaments on the say-so of the government/Defence Research & Development Organization (DRDO)/Bhabha Atomic Research Centre (BARC). This is, perhaps, because the uniformed brass does not want to make a fuss over something it knows little about. Naturally, the judgment of experts is trusted. Except, the experts, in this case, are the very BARC-DRDO scientists and technologists who design and produce these weapons, and have a vested interest in proclaiming these weapons first-rate and, in the past, have rendered advice the government wanted to hear. For example, regarding the 1998 thermonuclear test.

Despite K. Santhanam, Director, Field Testing, Pokhran, writing to the government immediately after the S-1 test on May 11, 1998, that the hydrogen bomb had "fizzled" and advising more tests, the Vajpayee regime declared it a roaring success and announced on May 28 a testing moratorium.[8] R. Chidambaram, then chairman of the atomic energy commission (AEC), and his BARC cohort did two things to provide scientific cover for furthering the government's political agenda of improving relations with the US but at the expense of the national interest. They claimed success for the hydrogen bomb on the basis of unconvincing seismic data, and despite nuclear veterans such as P.K. Iyengar and A.N. Prasad, former director, BARC, strongly

contesting such claims and offering technical assessments of the failure.[9] Chidambaram further asserted that India need never test again because between computer simulation and component testing the country would always have dependable thermonuclear weapons.[10] Chidambaram and his successor at AEC, Anil Kakodkar, have been charged with "dereliction" for "obscuring the failures of their thermonuclear device design", which Ashley J. Tellis suggests, getting the sequence wrong, "spurred Vajpayee's decision to end nuclear testing prematurely before the performance of India's highest yield warhead—which even at its maximum delivers just about 20 per cent of the explosive power of China's largest weapon—could be credibly demonstrated."[11] In any case, it enabled Vajpayee to forge the 'Next Steps in Strategic Partnership' with Washington, and his successor Manmohan Singh to sign the civil nuclear deal with the US conditioned on India not testing again.[12] The nuclear deal and Chidambaram's stance did lasting damage to the weapons programme.

Computer simulation can replace physical nuclear weapon tests only if a country has "exascale" computational capability (i.e., "one billion billion"—18 zeroes—operations per second) that only the US and China have. Place the fastest Indian supercomputer, Pratyush, with the Indian Institute of Tropical Meteorology capable of 20 petaflops (15 zeroes) capacity alongside, and the problem becomes evident.[13] Assuming optimistically that BARC has a 150 petaflop supercomputer (a level Pratyush expects to reach, finances permitting), it is still dwarfed by the US 'Summit' and the Chinese 'Sunway TaihuLight' exascale supercomputers. More daunting still, in October 2021 China claimed revolutionary technological breakthroughs with its 'Zuchongzhi 2.1' supercomputer featuring superconducting quantum computing and photonics quantum computing that is "10 million times faster" than 'Summit'![14]

Next, consider the scale of resources required. What China spends is unknown. But the US, for example, spends upwards of $5 billion annually on simulating thermonuclear explosions at its many weapons labs, and

India has to conduct open-ended tests to secure a modicum of such data, which will be infinitely more accurate than information derived from ICF and computer simulation.

has as many as 700 highly rated scientists and engineers at each of these locations. These simulations are driven, moreover, by real-time injection of data from actual miniature thermonuclear explosions produced at an inertial confinement fusion facility (ICF), where plutonium pellets are bombarded by high-intensity lasers to create fusion phenomena.[15] Because India lacks the financial, technological and skilled manpower resources to replicate such experimental and computational capability on scale, the resumption of underground thermonuclear tests is imperative. Vast explosion physics and material science data collected from actual weapon tests create a body of information about how temperature, pressure, density and other factors affect plutonium during a thermonuclear explosion and assist in designing better weapons. India has to conduct open-ended tests to secure a modicum of such data, which will be infinitely more accurate than information derived from ICF and computer simulation.

The US has carried out 1,032 nuclear tests and fired 1,132 devices/weapons prototypes with a total actual yield of 196,514 kilotons; USSR/Russia 727 tests, 981 devices fired yielded 296,837 KT; China 47 tests, 48 fired, produced 24,409 KT; North Korea six tests, six fired, yield of 197.8 KT; and Pakistan two tests, six fired yielded 51 KT. In the thermonuclear category, China has carried out nine tests, one 300 KT boosted fission shot in 1965 and eight megaton (MT) weapons tests in the 3 MT-4 MT range.[16] China's weapons programme, besides design and material help, also benefitted from Russian thermonuclear test data (as did the UK, French and Israeli fission and fusion weapons projects from American test data) and Pakistan and North Korea from Chinese test data transferred to them as part of the "rogue nuclear triad".[17] As sensitive information

sharing is ongoing within this triad, Islamabad and Pyongyang may not have to test again to enhance their strategic weapons profiles. With this triad in mind, any of the six nuclear tests, two of them thermonuclear, North Korea conducted in the last two decades offered reasonable cause to India to resume testing but New Delhi did not avail of it.

India is apparently satisfied with its three tests, with six devices fired yielding a total of 70 KT, including the failed thermonuclear.[18] According to Richard Garwin, one of the premier US thermonuclear weapons designers, some 2,000 things have to go right for a fusion device to explode to full yield. How are Indian counterparts to discern which and how many of the two thousand things went wrong with the S-1 device, without a host of new tests, leave alone design new and upgraded thermonuclear weapons based on flawed data from one fizzled test? He also added that "without nuclear tests of substantial yield, it is … impossible to have any confidence in a large-yield two-stage thermonuclear weapon".[19] Chidambaram's view, therefore, that a little tinkering with the basic design and some computer simulation is sufficient to validate Indian hydrogen bomb designs and upgrades, is absurd. Yet the government-BARC act as if Indian fusion weapons are the equal of thermonuclear armaments in other inventories.

In any case, if the Indian government had made up its mind not to test again, and knew it lacked ICF and the computational wherewithal, it should have at least extracted from the US its thermonuclear test data in return, the first time for the 1998 moratorium decision and, the second time, for the 2005 nuclear deal. This, incidentally, is what France did for ceasing nuclear testing after its last series of N-tests in 1996.[20] It makes one wonder why the Indian government rarely acts in the country's best interests.

To begin doing strategically correct and impactful things for a change, the Indian government should immediately order frequent test launches of MIRV-equipped long-range missiles on a speedy induction

schedule to provide targeting versatility and, more urgently, full-bore thermonuclear tests of yields in the 300 KT-low megaton range, and get the deep excavation work underway soonest to prepare L-shaped tunnels at depths around 2,000 metres.

The US was never in a position to prevent India from testing and weaponising had it been determined to do so, but it offered an excuse for Indian leaders to escape making difficult decisions. Jawaharlal Nehru in the early 1960s declined to proceed with weaponisation, and in 1974 Indira Gandhi got cold feet after just one test. Had either of them proceeded with nuclear weaponisation Washington could have done little about it. In the emerging international "correlation of forces", the US is unlikely to impose sanctions for restarting nuclear testing because it needs India more than India needs the US, and would prefer a proven Indian thermonuclear arsenal discomfiting the PLA at southern Asia end of the Indo-Pacific.[21]

A Two-tiered Nuclear Doctrine and Posture

The Indian establishment's ambiguous attitude to nuclear weapons is reflected in the stock view of all and sundry that "nuclear weapons are for deterrence, not warfighting". It undergirds the disturbing belief that possessing dread-inspiring bombs is good enough as symbols that their quality and quantity don't matter, i.e., a 20 KT Indian bomb has the same psychological and deterrent effect as a Chinese standard-issue 3.3 MT warhead. This is the pixilated take on nuclear weapons and deterrence the Indian government has internalized and reflects a minimalisation of nuclear weapons by political consensus. It eventuated in Prime Minister Vajpayee's definition in Parliament on May 28, 1998, the two basic parameters of Indian nuclear doctrine and strategy—No First Use (NFU) and minimum deterrence.

A military doctrine is a guideline for action, not a straitjacket to squeeze strategy and operations into. The draft-nuclear doctrine

produced by the First National Security Advisory Board (NSAB) in end-1998 encompassed Vajpayee's parameters but, under the elastic rubric of "credible minimum nuclear deterrence"—credible relative to which adversary, minimum compared to what enemy force, provisioned for strategic forces to grow and improve qualitatively. Inherent in NFU is the retaliation only principle, which the draft finessed to say "rapid punitive response". It then passed into the hands of the National Security Adviser (NSA), Brajesh Mishra, a generalist civil servant of a type Dr Santhanam dismissed as "a babe in the woods on nuclear matters."[22]

Amateurism surfaced in several aspects. Unprecedented for any country's nuclear doctrine, the draft document was made public supposedly to generate debate. It led, as some NSAB members had warned, to foreign public and official pressure (mainly from the US and Western Europe) to define the size and quality of the "minimum deterrent" India proposed to have. It is not known what assurances were conveyed to these countries. But the slow-paced growth of the Indian nuclear arsenal in the new millennium is, perhaps, a consequence. India could have produced 175-200 additional weapons/warheads by now using its stock of separated reactor-grade plutonium to obtain an arsenal the size of China's.[23] In any case, as of mid-2022, India had 160 weapons/warheads—the smallest nuclear weapons stock of any state, lagging behind Pakistan's stockpile (of 165 weapons/warheads), and China's (with 350 weapons/warheads expected to grow to 1,000-weapons by 2030).[24] Ignoring the draft doctrine, the government in 2003 formalised a "massive retaliation" strategy, and stepped into an existential muddle.[25]

Obviously, this strategy won't work at any level against China—a comprehensively superior thermonuclear weapons-armed adversary. Mercifully, no Indian official has claimed otherwise. The infirmities in the massive retaliation strategy against Pakistan are many, and best illustrated by outlining certain contingent scenarios. The threat of the

"massiveness" of response is supposed to so unnerve Islamabad as to dissuade it from initiating nuclear First Use.[26] The scenario is for the Pakistani nuclearised 60 mm Nasr rocket to hit the lead armoured units of an aggressing Indian formation that has broken through the forward defences, penetrated into Pakistani territory, and is poised for a "break out", providing the Pakistan army with plausible cause for going nuclear. Needing to make good on its threat, India will have to decide how massive its "massive retaliation" has to be? Clearly, destroying several Pakistani tanks in return won't do, but an enemy defensive formation? Or, by way of jumping a step in the escalation ladder and pursuing the Russian "escalate to de-escalate"-strategy, attacking Pakistan's II Strike Corps headquarters in Multan with a bigger tacnuke?[27] The problem with escalation inherent in the intended Indian practice of massive retaliation is that it will deplete the weapons stockpile faster than Pakistanis can fire their weapons singly or in salvo, because the logic of such a response requires more weapons to be expended in retaliation to achieve a greater level of destruction than is suffered by India from Pakistani first strike and follow-on attacks. Soon enough in this action-larger reaction sequence, Indian weapons will be exhausted even as Pakistan retains a residual force. In short, minimum deterrence is not compatible with "massive retaliation" strategy.

There's another aspect to consider. Should Pakistan breach the nuclear taboo, the nature of subsequent action could be taken out of New Delhi's hands by forces of nature. The winds in the winter campaign season blow west to east and could turn a Pakistani tactical nuclear strike inside Pakistan into a strategic war. How? Clouds bearing the resulting radioactivity could be carried by the prevailing winds into India where populations in border towns and cities would be contaminated by radioactive rain, compelling the Indian government to skip the tactical response option and hit Pakistani cities.[28] Any way massive retaliation is gamed it leads to unedifying outcomes—why it was jettisoned by both

US and USSR early in the nuclear age.[29] It makes sense for India to revert to a flexible and proportional retaliation nuclear strategy implied in the "punitive response" notion featured in the NSAB draft doctrine. It provides a longer fuse, more political-military off-ramps for de-escalation, and dovetails with a small-sized nuclear force.[30]

Actually, Pakistan is not a serious threat and does not merit nuclear attention for two reasons. One, because the exchange ratio in a nuclear war so lopsidedly favours India—two Indian metro cities for the extinction of Pakistan as a social organism, in the Spenglerian sense, the Pakistan Army will do nothing to facilitate such a *denouement.*[31] And secondly, total war is inconceivable because India-Pakistan conflicts have historically been encounters of manoeuvre restricted in time, space and intensity and with little collateral damage. Nuclear sabre-rattling apart, shared culture, history, ethnicity, language, religion and social norms are, apparently, powerful inhibitors of wars of annihilation.[32]

China, on the other hand, is a different proposition and demands a more aggressive approach. Its policy driver is its vision of its centrality in the world with policies geared to subduing neighbouring states/regions into acknowledging this. Disrupting Beijing's "tianxia" geopolitical design and policies and blunting the Chinese People's Liberation Army's military edge should, therefore, be the chief purpose of Indian policy.[33] Except, the chasm between China's nuclear and conventional militaries and India's is real and widening. India has no choice other than to opt for an asymmetric strategy successfully adopted by weak nuclear weapons against conventionally stronger foes—Pakistan against India, North Korea against the US, and Russia trapped in a losing war in NATO-assisted Ukraine. These countries have laid down short-fuse forward tripwires and threatened nuclear first use.

In theory, India has a triadic deterrent. The air vector is the weakest because, absent a genuine strategic bomber, medium-range strike aircraft (Su-30 MKIs) are tasked with this role. However, the chances of mission

success are bleak owing to the circuitous routing over the sea of this aircraft and of aerial tankers for mid-course refuelling, and complicated tactical routing over densely air-defenced mainland China. Leasing six of the advanced 'White Swan' variants of the Tu-160 Blackjack strategic bomber from Russia is an obvious solution.[34] The sea vector has a different problem as the Arihant-class SSBNs are to be deployed in a protected "bastion" with a restricted patrolling area in the Bay of Bengal.[35] But their protection will consume a large fraction of the navy's submarine and surface combatant fleets, thereby reducing the availability of ships and submarines for other duties, such as sea presence. In this respect, the SSBNs so disposed will become as much an operational liability in crisis as aircraft carriers requiring equally extensive protection.[36]

The principle of not dividing a military force, mandates consolidating the nuclear fighting assets against China and involves, for a start, unilaterally moving nuclearised short-range ballistic missiles (SRBMs) Prithvi and medium range (700 km) Agni-1 ballistic missiles (MRBMs) from the Pakistan border to the LAC in Ladakh and Arunachal Pradesh, and grouping them with, say, nuclearised Prahar/Nirbhay-type area weapons. (Longer-range Agni-5 Prime missiles from hinterland launch points can hit targets in Pakistan as well as in China.) This collection of weapons forming the second tier of a forward deterrent posture on the LAC will balance the Chinese SRBM/MRBM forces in Tibet, the largest such concentration outside the Fujian coast opposite Taiwan. These missiles can be converted to canisterisation on LAC sites for ready use in launch-on-launch (LOL) and launch-on-warning (LOW) modes.[37] China should be publicly warned, moreover, that firing any missile southwards from the Tibetan Plateau would lead to LOL/LOW action because there's no technology to distinguish nuclear from conventional warheads on incoming missiles, and prudence dictates that the worst be assumed. Atomic demolition munitions (ADMs)—simple, compact, low-yield fission devices that can be easily designed and produced in

bulk for placement in mountain sides of passes the PLA will likely pass through, would constitute the tripwire and first tier. When triggered, the ADMs will bring down mountains on Chinese forces that have penetrated Indian territory. The reason ADMs are ultra-credible weapons is because of their usability in that (1) they are activated only by enemy action, (2) there is no venting of radioactivity because the toppled mountains of earth/dirt will effectively absorb and entomb the gamma rays, and (3) they fit India's passive-reactive-defensive military outlook and ideology vis-à-vis China.[38] Optics-wise, moreover, the biggest virtue of this first nuclear use (FNU) policy is that ADMs will act as a guillotine with the rope-tug releasing the falling blade handed to the Chinese theatre commander. The only thing about the revised doctrine that should be made public is this new wrinkle—first nuclear use solely against China. It will end the era of silk-glove handling of China and may even earn for India a smidgeon of respect from Beijing.

Filling the Soft Strategic Infrastructure Void

By their very nature, nuclear armaments are hard, high-end, but minus the soft supportive infrastructure their political and military value gets diminished. In the years since India became a declared nuclear weapons state in 1998, the government has not addressed three critical voids facing the country's strategic forces. The first is the absence of an Indian version of the JASON Committee in the US. Reputed scientists including stalwart weapons designers are appointed as its members with a brief to check and professionally evaluate the scientific and technical viability of new nuclear weapons designs conceived by the weapons laboratories, recommend solutions for glitches they may discover, and even suggest novel design improvements to increase performance. India desperately needs such a committee in light of the experience with R Chidambaram, who stifled the weapons programme, is accused by BARC insiders of letting the experimental ICF at the Centre for Advance Technology,

Indore, go to ruin, and for opposing the renewal of testing.[39] Though essential, the BARC leadership is unsympathetic to having such oversight because they believe it questions their competence.[40] This is where the government, for the sake of national interest, will have to over-rule the nuclear establishment and constitute a JASON Committee-type mechanism to curb the excesses of another Chidambaram.

The second void in fact refers to a budgetary innovation. It is time there was a separate budgetary stream for nuclear forces and infrastructure (including the development of military bases in friendly island-nations and countries on the South China Sea and the Indian Ocean littoral).[41] A systemic solution was attempted during the Vajpayee government. It tried to implement a 1999 plan by Defence Research & Development Laboratory that mooted a "separate strategic weapons directorate" to indigenously design and develop long-range, long endurance, weapons systems to ensure "strategic security" for the country. Such consolidation of the existing design, development, testing and production agencies under one roof would also have resulted in a singular funding stream. But despite Prime Minister Vajpayee and Defence Minister Jaswant Singh's support, this plan died because of bureaucratic politics.[42] Too often programmes relating to strategic systems and infrastructure—nuclear weapons development and acquisition, MIRV, nuclear powered ballistic and cruise missile-firing submarines, N-powered attack submarines, intercontinental range and intermediate-range ballistic and cruise missiles, lease of Tu-160s, hardening of nuclear command, control, communications (NC3) net, excavation of L-tunnels for tests, and of mountain tunnel complexes for long-range missile storage and launch sites, etc., are side-lined because they compete with conventional military priorities. The defence budget should rise to the 3 per cent of GDP level recommended by the 15th Finance Commission and the Parliamentary Standing Committee on Defence. A third of this enlarged defence allocation—0.75-1 per cent of GDP, should be sequestered for

the proposed Strategic Forces budget. Otherwise, the country's meagre nuclear arsenal will continue languishing in the basement to carry on without political direction, until faced with Chinese nuclear coercion by when it will be too late.

The third element is the missing specialist nuclear officer cadre in the three armed services. "Without a specialist cadre that is fully versed and immersed in all aspects of nuclear deterrence—from designs of nuclear weapons and missiles to conceiving and designing command and control networks, from nuances in deterrence theory to practical problems of mobility, and from nuclear forensics to technology for secure command links", I wrote in August 2012, "the country will be stuck with what we have: a Strategic Forces Command with military officers on its rolls who are professionals in conventional warfare but rank amateurs in the nuclear field. They have to perforce learn on the job, only for such learning to go waste once their three-year term ends, and they are posted elsewhere."[43] With the navy running SSBNs, it is the first military service to appreciate the benefits of a dedicated band of specialist nuclear officers. But its efforts have run into the problem of reconciling too few nuclear platforms and too small an officer cadres generally to carve up a separate nuclear stream. The army feels no need to have one because it is not concerned with what the artillery units are asked to fire as long as they control the missile launch units, and the air force has no strategic bomber fleet to make such an officer branch worth its while. The consequences of the missing military nuclear specialists are two-fold. The knowledge of nuclear issues within the SFC being shallow, the commander and his team cannot write up the QSRs for anything relating to nuclear armaments and strategic forces and infrastructure, and have to be satisfied with whatever DRDO-BARC dish out. And such advice as they are now and then called on by the government to give is usually ignored, leaving it to the equally clueless generalists clogging up the system of stove-piped decision-making to come up with what passes for strategic counsel in government.

Typically, strategic nuclear capacity, capability and infrastructure deficiencies take 25-30 years to make up.

Typically, strategic nuclear capacity, capability and infrastructure deficiencies take 25-30 years to make up. The Indian government and military cannot afford to stick to their habitual tardiness in implementing the corrective measures. Smaller, weaker, nuclear weapon states with, survival-wise, smaller margins of error (Pakistan, North Korea, Israel) are naturally more serious and proactive where their nuclear security is concerned. Large and powerful countries (US, Russia, China) are not any less driven because they compete with each other for primacy in the strategic realm. India, uniquely, is the only big state which manifests a stunning level of nuclear complacency and incompetence.[44] Sandwiched between two purposeful nuclear adversaries, for the Indian government to continue to do nothing to alleviate the situation would be to do something definitely wrong.

Notes

1. Why thermonuclear weapons? Because, according to Richard Garwin, who first engineered the theoretical 'Teller-Ulam' configuration into a thermonuclear weapon, for a fission weapon to produce 200 kiloton yield would require 60 kg of plutonium or U-235, which amount of fissile material would suffice for 10 thermonuclear weapons in the megaton class, each weighing less than 1,000 lbs. See Bharat Karnad, *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy*, Second edition (New Delhi: Macmillan India, 2005, 2002), p. 628.
2. Ibid., pp. 180-195.
3. That influential leadership was formed by the duo of Raja Ramanna and P.K. Iyengar. Ibid, pp. 318-323.
4. Ibid., pp. 254-256.
5. Ibid., pp. 332-338.
6. Feroz Hassan Khan, *Eating Grass: The Making of the Pakistani Bomb* (New Delhi, etc: Foundation Books, 2014 reprint), pp. 68-94.
7. Karnad, *India's Nuclear Policy* (Westport, CN & London: Praeger Security International), pp. 80-82.

8. Karnad, *Nuclear Weapons and Indian Security*, pp. 400-420; Karnad, *India's Nuclear Policy*, pp. 65-71; P.K. Iyengar, A.N. Prasad, A. Gopalakrishnan, Bharat Karnad, *Strategic Sell-out: Indian-US Nuclear Deal* (New Delhi: Pentagon Press, 2009).
9. S.K. Sikka, G.J. Nair, Falguni Roy, Anil Kakodkar, "The Recent Indian nuclear tests—A seismic review", *Current Science*, Vol 79, Issue 9, November 2000, https://www.researchgate.net/publication/237222667_The_recent_Indian_nuclear_tests_-_A_seismic_overview. Iyengar's view based on various indices, such as large traces of the thermonuclear fuel—lithium deuteride, evidenced in the rock morphology in Pokhran, was that there was "partial thermonuclear burn", not full combustion, and that's a fry cry from a workable weapon. See Karnad, *Nuclear Weapons and Indian Security*, pp. 412-413.
10. Karnad, *Nuclear Weapons and Indian Security*, pp. 415-419.
11. See his *Striking Asymmetries: Nuclear Transitions in Southern Asia*, [Washington, DC: Carnegie Endowment for International Peace, 2022], pp. 200-201. As special adviser to US ambassador Robert Blackwill, Tellis helped shepherd the 2005 Indian-US nuclear deal at both the Washington and New Delhi ends.
12. It is revealing that Tellis describes the moratorium on testing as a self-imposed "constraint" derived from "the political failures of the BJP leadership". Ibid.
13. Abhijit Ahaskar "India's supercomputing capabilities fall behind its peers", *Mint*, July 6, 2022.
14. "Chinese researchers achieve quantum advantage in two mainstream routes", *Global Times*, October 26, 2021, https://www.globaltimes.cn/page/202110/1237312.shtml
15. Eric Betz, "Testing Nuclear Weapons is More Important Than Ever", *Discover*, March 20, 2019, https://www.discovermagazine.com/technology/testing-nuclear-weapons-is-more-important-than-ever
16. *List of nuclear weapons tests*, https://en.wikipedia.org/wiki/List_of_nuclear_weapons_tests
17. Bharat Karnad, "Countering the Rogue Nuclear Triad of China, Pakistan and North Korea", *The Wire*, July 25, 2016, https://thewire.in/world/countering-the-rogue-nuclear-triad-of-china-pakistan-north-korea
18. Refer n. 16.
19. Karnad, *Nuclear Weapons and Indian Security*, pp. 627-628.
20. R. Jeffrey Smith, "France, US secretly enter pact to share nuclear weapons data", *Washington Post*, June 17, 1996, https://www.washingtonpost.com/archive/politics/1996/06/17/france-us-secretly-enter-pact-to-share-nuclear-weapons-data/cf9d04f3-aabe-4b77-b793-95163527da8e/
21. "We want to be India's defence partner of choice for India: US Official", *The Hindu*, November 3, 2022. Also refer Ashley Tellis' statement to an Indian daily, see "Idea Exchange: India may be compelled to test again and when it does, it's in the US interest to avoid penalising it", *Indian Express*, October 31, 2022.
22. Santhanam said this specifically about Manmohan Singh's NSA, M.K. Narayanan, a policeman, but it applies to most generalist diplomats/civil servants/policemen who have so far been appointed

NSA. See "NSA a babe in the woods on nuclear matters: Santhanam", PTI, *The Hindu*, September 25, 2009.

23. The reasons and the logic for an Indian thermonuclear force of some 470 weapons/warheads is detailed in Karnad, *Nuclear Weapons and Indian Security*, pp. 614-646. A 2015 ISIS study estimated India's then stock of separated reactor grade plutonium at 2.9 metric tons—good enough for as many as 125 weapons/warheads. This stock of plutonium has grown since then. See Elizabeth Whitfield, "Fuzzy math on Indian nuclear weapons", *The Bulletin of Atomic Scientists*, April 19, 2016, https://thebulletin.org/2016/04/fuzzy-math-on-indian-nuclear-weapons/
24. *Status of World Nuclear Forces*, Federation of American Scientists, https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/; Peter Martin and Anthony Capaccio, "China's Nuclear Arsenal Is Growing Faster Than Expected, Pentagon Says", *Bloomberg*, November 3, 2021, https://www.bloomberg.com/news/articles/2021-11-03/pentagon-sees-china-nuclear-arsenal-growing-faster-than-expected#xj4y7vzkg
25. "Cabinet Committee on Security reviews progress in operationalizing India's nuclear doctrine", Prime Minister's Office, January 4, 2003, https://archive.pib.gov.in/archive/releases98/lyr2003/rjan2003/04012003/r040120033.html
26. Shyam Saran, ex-Foreign Secretary and then Convenor of NSAB, was reported as saying this: "India will not be the first to use nuclear weapons, but if it is attacked with such weapons, it would engage in nuclear retaliation which will be massive and designed to inflict unacceptable damage on its adversary." See Indrani Bagchi. "Even a midget nuke strike will lead to massive retaliation, India warns Pak", *Times of India*, April 30, 2013. For a response, see Bharat Karnad, "India's nuclear amateurism", *New Indian Express*, 28 June 2013.
27. For a case arguing why tactical nuclear warfare between India and Pakistan is impracticable, unrealistic and extremely unlikely, see Bharat Karnad, "Scaring-up Scenarios: An Introduction" in Gurmeet Kanwal & Monika Chansoria, eds., *Pakistan's Tactical Nuclear Weapons: Conflict Redux* (New Delhi: CLAWS and KW Publishers, 2014). On the "escalate to de-escalate" strategy, see Joshua Bell, "Escalate to De-escalate: Russia's Nuclear Deterrence Strategy", *Global Security Review*, March 7, 2022, https://globalsecurityreview.com/nuclear-de-escalation-russias-deterrence-strategy/
28. Bharat Karnad, *Staggering Forward: Narendra Modi and India's Global Ambition* (Gurugram: Penguin-Viking, 2018), pp. 326-330.
29. For the text of the 1998 NSAB draft nuclear doctrine, https://www.armscontrol.org/act/1999-07/indias-draft-nuclear-doctrine
30. Karnad, *Staggering Forward*, pp. 333-334.
31. Husain Haqqani, *Pakistan: Between Mosque and Military* (Washington, DC: Carnegie Endowment for International Peace, 2005), pp. 199-260.
32. Bharat Karnad, "Key to Peace in South Asia: Fostering 'Social' Links between the Armies of India and Pakistan", *The Round Table: The Commonwealth Journal of International Affairs*, April 1996.
33. Karnad, *Staggering Forward*, pp. 154-220.

34. Karnad, *Why India is Not a Great Power (Yet)*, pp. 335-336; Karnad, *Staggering Forward*, pp. 364-365.
35. Admiral Arun Prakash, "Why the Arihant missile test was critical for India", *Hindustan Times*, October 18, 2022.
36. On large aircraft carriers as operational liability, see Karnad, *Why India is Not a Great Power (Yet)*, pp. 373-376.
37. Tellis claims the Agni missiles are canisterised only to keep nuclear warheads stable in an airconditioned container, and are not ready for instant use. See his *Striking Asymmetries*, pp. 127-129.
38. Karnad, *Staggering Forward*, pp. 344-349.
39. Bharat Karnad, "Incomprehensible position on N-testing", *Security Wise* (Blog), February 7, 2017, https://bharatkarnad.com/2017/02/07/incomprehensible-position-on-n-testing/
40. Karnad, *Nuclear Weapons and Indian Security*, pp. 328, 417.
41. On the urgent need to build up the North and South Agalega island base in Mauritius, the Gan island base in Maldives, Trincomalee in Sri Lanka and Na Thrang in Vietnam, see Karnad, *Why India is Not a Great Power (Yet)*, pp. 346-351.
42. Bharat Karnad, *India's Nuclear Policy* (Westport, CN, & London: Praeger Security International, 2008), pp. 79-80.
43. Bharat Karnad, "Dedicated nuclear cadre", *Security Wise* (Blog), August 16, 2012, https://bharatkarnad.com/2012/08/16/dedicated-nuclear-cadre/
44. Such complacency is labelled "the remarkable persistence of strategic conservatism" by Tellis. See *Striking Asymmetries*, pp. 69-74.

Visualising the Context and Contours of India's Future Wars

DS Hooda

> "Think, too, of the great part that is played by the unpredictable in war: think of it now, before you are actually committed to war. The longer a war lasts, the more things tend to depend on accidents. Neither you nor we can see into them: we have to abide their outcome in the dark. And when people are entering upon a war they do things the wrong way round. Action comes first, and it is only when they have already suffered that they begin to think."
>
> —Thucydides, *The Peloponnesian War*

Introduction

There is a great deal of study and discussion about the character of future wars. Such a study is absolutely essential so that we are not caught in the trap of fighting the last war and finding ourselves on the losing side. However, it is also recognised that predicting future conflicts is not the easiest of tasks. Perhaps we can heed the words of Michael Howard, the eminent military historian, who said, that, "the purpose of

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future gazing in war is not to get it right but to avoid getting it terribly wrong".

In assessing the future, we must analyse ongoing conflicts as these provide the best possible lessons in a live environment that cannot be replicated in wargames and exercises. However, we must also be mindful that wars occur in specific political, geographic, and strategic settings. What happens in one context may not be directly applicable in another. When the US was engaged in wars in Iraq and Afghanistan, it was predicted that the future of warfare would be insurgencies and countering terrorism. Wars between states were considered unlikely, with the greatest danger of such a war primarily in the Middle East and South Asia.[1] The traditional thinking in the Indian military leadership was that conventional wars would be "short and swift."[2]

The Russia-Ukraine war in Europe has upended much of this thinking. Conventional wars between large, well-equipped militaries are no longer considered improbable. The US 2022 National Defense Strategy talks about developing "new operational concepts and enhanced future warfighting capabilities against potential PRC aggression."[3] The war in Ukraine has also brought in observations about this being "the final war of 20th-century militaries," with tanks, fighter jets, and warships "being pushed into obsolescence, giving way to new tools of conflict."[4] Others argue that it is premature to declare that the era of large military platforms is over.

"Hybrid Warfare" is another term that is increasingly being used, although many strategists have argued that the combination of conventional and unconventional strategies is as old as war itself. However, the success of the Russian strategy in the invasion of Crimea in 2014 rekindled interest in the study of hybrid wars. Between insurgencies and all-out wars lies the "Grey Zone" conflict that seeks to achieve victory while remaining below the threshold of a conventional war. This is likely to be the preferred instrument of both strong and weak powers,

Emerging technologies have always shaped warfare and driven innovation in tactics, influenced doctrines, and led to a change in warfighting strategies.

as deterring such conflicts is infinitely more complicated.

Emerging technologies have always shaped warfare and driven innovation in tactics, influenced doctrines, and led to a change in warfighting strategies. Artificial Intelligence (AI), autonomous weapons, cyber resilience, unmanned systems, information dominance, hypersonics, and quantum computing have the potential to change the character of wars. However, technology alone is not a 'silver bullet' as evidenced by the US's inability to achieve victories in its campaigns in Vietnam and Afghanistan.

In this uncertain milieu, what will India's future wars look like? As stated earlier, wars occur in a specific geopolitical context, against specific adversaries, and with specific political objectives. Therefore, it would be appropriate to look at these aspects as these would determine how India will likely fight its wars.

Geopolitical Factors

Geopolitical tensions are on the rise. In South Asia, India-China relations are at their lowest point in the last three decades, and India-Pakistan relations have never been worse since the 2008 Mumbai terror attack. On the Line of Control (LOC) between India and Pakistan in Jammu and Kashmir, firing across the border by both armies was routine, but 2019 saw India using air power to strike terrorist camps in Pakistan. Pakistan Air Force responded the next day, hitting targets across the LOC and capturing an Indian pilot. Escalation was narrowly avoided as both countries claimed victory, but this crisis showed that restraints on the use of military force had loosened.[5]

In May 2020, the PLA moved large forces across the Line of Actual Control (LAC) in Ladakh, in some cases intruding into areas that India

considered on its side of the LAC. Clashes in June led to the death of 20 Indian soldiers, the first fatal casualties in an India-China clash since 1975. The situation has not yet been completely resolved three and a half years later. Meanwhile, both armies have moved in additional troops, strengthened defences, improved infrastructure, and view each other with suspicion. Even if the current crisis is defused, the breakdown of Confidence Building Measures and the lack of trust means tensions will persist along the LAC.

The US-China great power rivalry has also intensified and will increasingly play out in the Indo-Pacific. The US Indo-Pacific strategy clearly identifies China as the main adversary, stating, "The PRC's coercion and aggression span the globe, but it is most acute in the Indo-Pacific. From the economic coercion of Australia to the conflict along the Line of Actual Control with India to the growing pressure on Taiwan and bullying of neighbors in the East and South China Seas, our allies and partners in the region bear much of the cost of the PRC's harmful behavior." In this strategy, the US proposes to "steadily advance our Major Defense Partnership with India and support its role as a net security provider."[6]

Many Chinese strategic scholars see the deepening of India-US ties as an attempt to contain the rise of China.[7] India professes 'strategic autonomy' and is unlikely to be drawn into a military alliance with the US, but suspicions in China about India's future intentions will remain. China is dismissive of India's aspirations to become a major power and could initiate a sharp border conflict as a warning to both India and the US.

India's Military Adversaries

India's future wars will likely be with Pakistan and China, two adversaries with whom it has previously fought and with whom the likelihood of complete normalcy remains elusive. Pakistan has a professional, well-

trained military with adequate experience from its deployments along the LOC and in counterterrorism operations. While it cannot match India's conventional superiority, it feels it can hold its own in a limited conflict.

The Pakistan Army views its struggle with India in existential terms. In the words of C. Christine Fair, "For Pakistan's men on horseback, not winning, even repeatedly, is not the same thing as losing. But simply giving up and accepting the status quo and India's supremacy, is, by definition, defeat."[8] This simply means that Pakistan is unlikely to give up its calibrated strategy of using terror groups to stir up violence in Jammu and Kashmir.

The People's Liberation Army (PLA) is slowly transforming into a formidable military force. The PLA Navy (PLAN) is the largest in the world, with a battle force of approximately 355 platforms. It is estimated that the PLA Air Force (PLAAF) will become a majority fourth-generation force within the next several years. In addition, PLAAF has one of the world's largest forces of advanced surface-to-air missile systems. The *Director of National Intelligence Annual Threat Assessment 2021* assesses that "China presents a prolific and effective cyber-espionage threat, possesses substantial cyber-attack capabilities, and presents a growing influence threat."[9]

The PLA Rocket Force (PLARF) has seen an unprecedented expansion between 2017 and 2019, growing from 29 missile brigades to 40.[10] China has also reportedly tested a hypersonic glide vehicle that flew through low-orbit space and circled the globe before striking within two dozen miles of its target.[11] China's Military-Civil Fusion strategy has deepened the interaction between China's military and civil research and commercial sectors, enabling the rapid induction of technology into the PLA.

Despite these impressive achievements, the PLA will still face serious geographical constraints in a conflict with India. The Himalayan watershed, across which operations would be conducted, is a formidable

obstacle. Logistics, terrain, and a strong Indian Army deployment would limit quick success. In the maritime domain, India has a dominant position in the Northern Indian Ocean. For the PLAN to operate in the Indian Ocean, it will have to overcome its weaknesses in Maritime Domain Awareness, tactical air cover, communication infrastructure, and strategic anti-submarine warfare.[12]

Political Objectives

Political objectives will ultimately determine the military objective and the amount of force required to achieve it. In visualising India's future wars, the starting point should therefore be to look at India's political objectives.

The most likely scenario for an India-Pakistan war is one in which India initiates a military conflict in retaliation for a major terror attack. The Indian government's objective would be to demonstrate its resolve and deter Pakistan from supporting terrorist activities. The limited force would be applied in the first instance, with a readiness to escalate if Pakistan responds militarily.

In an India-China war, which in most cases would be initiated by China, the Chinese leadership would not wish to engage in a war that would require a significant shift in forces from its primary focus on Taiwan and the South and East China Sea toward Tibet. A short, pedagogic war would be preferable. India's political objective would be to impose punishing costs that would limit China's military success and deter it from having expansive war aims.

While the political aim would be to achieve success without engaging in a costly all-out war, there is great unpredictability in the outcome. Factors like notions of victory and defeat, the stance of the leadership, nationalistic fervour, and public sentiment could lead to uncontrolled escalation. The Indian military must be prepared for this contingency.

Nuclear Overhang

Any potential conflict in South Asia would be waged between nuclear-armed countries. The nuclear factor will play out differently in wars with Pakistan and China, but it will have one common impact—restraint on the use of military force.

An India-China conflict will mostly play out along the contested land border. This is mainly unpopulated, barren terrain that needs to be defended on the grounds of territorial sovereignty but has limited strategic value. As long as the war remains controlled and geographically confined, nuclear weapons will not come into play. However, the nuclear factor cannot be completely ignored if there is an all-out war, vital national interests are threatened, large population centres are targeted, key trade routes are blocked, etc.

India's conventional military superiority has led Pakistan to adopt a strategy of 'Full Spectrum Deterrence' that envisages the possession of "full spectrum of nuclear weapons in all three categories—strategic, operational and tactical, with full range coverage of the large Indian land mass and its outlying territories."[13] In an address at the Centre for International Strategic Studies in February 2020, Lt Gen Khalid Kidwai, Advisor, National Command Authority of Pakistan, stated that "Pakistan has ensured seamless integration between nuclear strategy and conventional military strategy, in order to achieve the desired outcomes in the realms of peacetime deterrence, pre-war deterrence, as also in intra-war deterrence."[14]

Many scholars in India dismiss Pakistan's nuclear threats as a mere bluff and believe that space exists below the nuclear threshold for a conventional conflict. However, the scale and scope of this conflict have to be considered. Even if the military is prepared to conduct large-scale combat operations against Pakistan, the Indian government would perhaps prefer to start with limited action, as has been witnessed in the past.

Role of Technology

The PLA has made impressive gains in adopting military technology and is pursuing several advanced military capabilities with disruptive potentials, such as autonomous systems, hypersonic weapons, electromagnetic railguns, directed energy weapons, and counter-space capabilities.[15] At the 20th National Congress of the Chinese Communist Party (CCP) on October 16, Xi Jinping stated that China would adhere to the integrated development of the PLA through mechanisation, informatisation, and intelligentisation.

Intelligentisation refers to the adoption of AI, and papers published in China show that PLA is seeking to use AI in four main areas. These are the autonomy of unmanned weapons, including swarm drones; processing large amounts of information through machine learning; speeding up military decision-making; and using AI in cognitive warfare.[16]

Influencing human cognition requires detailed personal data that enables the targeting of prominent individuals or specific groups of people. The extensive penetration of Chinese technology companies in India has given them access to a vast amount of personal data that would be available to the Chinese government.[17] It would be realistic to assume that China would use this data to launch sophisticated information campaigns during future conflicts.

Non-kinetic elements of warfare like electronic warfare, information warfare, and cyber warfare have gained enormous importance due to technological advances. While non-kinetic warfare cannot win battles by itself, it can reduce the requirement of costly physical engagements as the primary measure of gaining victory. This would also tie in with the political objectives of winning with the least kinetic effort.

It must also be admitted here that the Indian military has been lagging in adopting military technology in the forces. Some steps have now been taken, but deeper reforms and doctrinal changes are required to hasten the pace of technology induction.

The existing geopolitical tensions, while not pointing to an imminent war, are creating an environment where the use of military force cannot be ruled out.

Visualising India's Future Wars

It is not always easy to predict the future, but from the analysis carried out in this paper, some trends can be discerned. The existing geopolitical tensions, while not pointing to an imminent war, are creating an environment where the use of military force cannot be ruled out. If a conflict does break out, its broad characteristics are defined below.

Graduated Escalation

- In a war with Pakistan or China, the initial use of military force is likely to be limited in line with the political objectives, as already discussed. If China initiates a conflict along the LAC, this force could still be considerable in number, employing a range of non-kinetic measures- electronic, cyber, and informational. However, it is likely to be geographically limited to the LAC due to the PLAN's current inability to operate effectively in the Indian Ocean. In the case of Pakistan, the conflict would probably start with a limited conventional strike by India in response to a major terror attack and Pakistan's counter-strike.
- India's response, in either case, would be a graduated escalation to deter or coerce the adversary from further action. The level of force and the means employed particularly the use of naval power would depend on the situation. At each level of escalation, a psychological impact is sought to be created to force the opponent to back down.
- An essential element of this strategy would be the ability to communicate our intent and demands to the adversary clearly. This helps in establishing the conditions for de-escalation and the cost of

further escalation. This communication strategy is primarily executed at the political/diplomatic level.

- There is always the danger of the escalation spinning out of control and leading to an uncontrolled, large-scale conflict. The military must be prepared for this contingency. However, from an overall perspective, the strategy adopted for a graduated escalation would be very different from the current thinking about a "cold start" or "proactive" doctrine that envisages the complete application of military power from the start of the conflict.
- The thought that wars are likely to be limited and controlled should not lull us into complacency, where we go slow on building a strong military capability. In any conflict, how the adversaries view India's military power will be essential in controlling escalation.

System Warfare

- The PLA's theory of victory in modern warfare recognises the importance of system destruction warfare. Under this theory, warfare is no longer centred on the annihilation of enemy forces on the battlefield but on disrupting, paralysing, or destroying the operational capability of the enemy's operational systems.[18]
- In a war, the PLA would target command and control, reconnaissance, intelligence, firepower, and logistics networks, and degrade the flow of information. The aim is to create a psychological paralysis where decision-making and transmission of orders become difficult. The means used would be both kinetic and non-kinetic.
- The PLA's views on system warfare may still be developing and have not yet reached maturity, but it indicates their strategic thought process. The Indian military must also start studying this aspect and prepare for system warfare by both hardening its systems and developing offensive capabilities.

Information Warfare

- An essential element of future wars will be an attempt to gain dominance in the information space. Electronic warfare and cyber-attacks will be employed to paralyse information networks. This would be combined with attacks on critical infrastructure that impact the financial, transportation, and power sectors.
- An important part of the information campaign will be the targeting of both specific individuals and the civil population at large. The availability of vast amounts of individual data, combined with advanced sensors and AI-enabled systems, has led to what is being called the 'individualisation of war.'[19] New tech-enabled systems can now more easily target individual leaders, key functionaries, and even their family members, creating psychological pressure.
- Deception, fake news, disinformation, and deep fakes will be employed to spread panic and confusion among the public and undermine trust in the government. In turn, this could create pressure on the political and military leadership to make decisions meant to satiate public sentiment rather than to achieve long-term strategic goals.

Well-Defined Military Objectives

- In any future conflict, it is essential to have clearly defined military objectives that will further the political objectives that have been laid down. These military objectives could be defined in terms of territory to be captured or defended, destruction of the adversary's military capability, deterrent effects to be achieved, etc. Based on the progress of the battle or escalation levels, military objectives would need to be suitably modified.
- The military objectives will decide the strategy to be adopted. This strategy has to be a joint tri-service effort at land, sea, and air, which also incorporates other elements of military power—informational,

cyber, and space. This will require changing our current structures and processes in which individual services make operational plans with little inter-service coordination.

Conclusion

In attempting to visualise the type of war India could be fighting in the future, it is essential to understand the geopolitical setting in which conflicts could break out, the capability of the adversaries and the likely political objectives for which the war will be waged. Keeping all aspects in view, it is likely that India's future war will be one of graduated escalation in which advanced technology and information dominance will play a key role.

This paper could be criticised on two grounds. One, is that it does not consider the possibility of an all-out war from the start of the conflict. Two, it has not fleshed out in greater detail how future warfighting would be conducted. These are matters that can be further deliberated by military planners based on political objectives, the context in which wars would be fought and the contours of such a war.

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Non-Contact Warfare: A Strategy for Future

Vivek Verma

Abstract

Examining events after World War II shows that the emerging technological environment is shaping the future. The shift in operational doctrine from 'massing of forces' to 'massing of effects' with a quantum reduction in physical contact between adversarial forces has been scripted. Future conflict trends are likely to be diffused, diverse and disruptive. Expanding security-arena from traditional to non-traditional domains necessitates a nuanced doctrinal approach. The escalation levers are looking at non-military and military means of contestation.

No Peace Prophecy

War is the product of its age. World War II witnessed various strategies the Allied and Axis powers adopted. Germany relied on 'blitzkrieg' to exploit the enemy's weak spot through speed and surprise. The Soviets used amassing of forces for their deep battle manoeuvres, while the US and the western allies relied on disproportionate use of force. The nuclear bomb ended the deadly World War II but opened the world to a new form of war. In 1945 George Orwell coined the term 'Cold War' and

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predicted that nuclear arms might end large-scale wars, but the world will witness a "peace that is no peace."[1] Tracing and tracking doctrinal development as a precursor to technological development shows a new paradigm where technological development is tripping doctrinal and strategic formulations in the new age.

Cold War Foundations—War Under Nuclear Overhang

The end of World War II saw the world bracing with economic distress and decolonisation. Neo-colonisation themes by the US and the USSR revolved around the economic revival of the impoverished, newly independent, decolonised nation. The Americans 'Marshall Plan' and the Soviets 'Molotov Plan' used economic gratification to operationalise political warfare. These competing powers aimed at creating surrogate and client states. The Bretton Woods monetary system, through the World Bank and the International Monetary Fund (IMF) creation, set the stage for the containment strategy. Dominance through developmental economics gave rise to competition, rivalry, and conflict while dividing the world along ideological grounds. Economic gratification was enmeshed with the intelligence operation for regime control. Revolutionising military space through technology was given greater importance than the economic space. 1949 nuclear explosion by the Soviets changed the perception of the western powers regarding the cost of nuclear misadventure.

The 1950 Korean War was the first war that tested the nuclear deterrence dilemma. The 'Truman Doctrine' of restraint paved the way for limited war under a nuclear overhang. Though the conflict ended with a stalemate, it intensified the space and the nuclear arms race. The need to communicate and engage at longer ranges overseas spurred space and under-sea communication explosions, thus laying the foundation for intercontinental ballistic missile (ICBM) technology. The competition was keenly matched with the Soviet Sputnik 1 launch on October 4,

1957, and American Explorer 1 launch on March 31, 1958, followed by manned space missions in 1961-62.

Soviet's downing of the US U-2 spy plane during the same period gave birth to satellite killer programmes in both countries. The Soviet engineers drew blueprints of satellite killers based on the threat from spy satellites, while the Americans developed the Satellite Interceptor or SAINT project.[2] As part of risk mitigation, the US developed and deployed the long-range surveillance drone, 'Lightning Bugs,' which could be launched from the wings of a Lockheed DC-130 Hercules aeroplane and controlled by onboard Airborne Remote Control Officers.[3]

The 1962 Cuban missile crisis raised the risk of deterrence by denial or punishment.[4] It also unveiled a dissuasion strategy while dealing with peer rivals. It also triggered the need for networking the geographically displaced nuclear assets within the US. The ARPANET, a pioneering network for sharing digital resources among geographically separated computers, was conceptualised. By 1968 the first routers were made, leading to the internet's birth in 1969. During this period, the ICBM technology also matured, leading to a spurt in treaties related to Outer Space (1967), Seabed Arms Control (1971), Anti-Ballistic Missile, and Strategic Arms Limitation Treaty (SALT) (1972). All the treaties as part of lawfare were meant to create an exclusive club for resource control besides denying access to the other technologically inferior countries.

The 1970s witnessed the US misadventures in Vietnam and the Soviets in Afghanistan. The strategists were compelled to give a denovo look to the warfighting through the prism of Revolution in Military Affairs (RMA). Marshal Nikolai Ogarkov, the Chief of the General Staff of the Soviet Union, introduced the term "reconnaissance-strike complex". It was premised on the developing precision, non-nuclear destruction systems with increased strike efficacy closer to nuclear weapons.[5] Andrew Marshall, who headed the US Office of Net Assessment, concurred with the idea and believed that these capabilities

could revolutionise how wars will be waged.[6] The need to work through the shadows of nuclear catastrophe laid the foundations for generational warfare in the form of small wars and fourth-generation warfare[7] with non-state actors as anonymous agents. In contrast, the fifth-generation warfare looked at targeting people and the political will through the world's disaffected.[8]

By the mid-1970s, state-funded science and technology research with government and military patronage gave roots to the civil enterprise. By 1975 start-up IT companies mushroomed. Programmers like Bill Gates and Paul Allen founded Microsoft, and Steve Jobs and Steve Wozniak founded Apple Computer Company. They aimed to provide "a computer on every desktop and in every home". The next decade saw the emergence of the information age. The space race pandemonium and the ability to mount surveillance to remain ahead in the strategic awareness game transformed information and communications technologies (ICT), leading to the unveiling of the Strategic Defence Initiative (SDI), commonly called the 'Star Wars' programme. The US Defence Advanced Research Projects Agency (DARPA) revolutionised digital network systems. Global Positioning System (GPS) added to intelligence and precision warfare. However, it gave the civil world an idea to adapt and monetise military technology for civil use. The dual use also set the pace for civil-military collaboration and heightened the arms race.

The Pentagon report, 'Soviet Military Power 1985', flagged excessive Soviet military expenditure of almost 15-17 per cent of the Gross National Product despite the strain on the Soviet economy due to the 1981 oil glut. It prompted the Office of Net Assessment (ONA) under Andrew Marshal to forecast the collapse of the Soviet Union. The 1989 Berlin Wall collapse set the Soviet implosion into motion. Political scientists championed the role of geo-economics in shaping the world order. For the first time, the non-contact alternate means of warfare led to the capitulation of a superpower. Though the 'end state' was defined

by economics, the 'means' was triggered by technological innovation, and the world witnessed more of it in the post-Cold War era.

Post-Cold War Future Manifestation

Weaponising Protests. The ideological drawdown in Moscow created waves in Chinese Tiananmen Square in April 1989. The defiant "Tank Man" image atop the Chinese Peoples' Liberation Army (PLA) tank that went viral on June 5, 1989 signified the suppression and oppression committed by the Communist Party of China (CPC) and the PLA. The protests kept China on the verge of social disobedience for seven weeks. The unarmed struggle in Tiananmen gave fodder for future discourse to social scientists like Gene Sharp, who, in his book 'There Are Realistic Alternatives', lists 198 methods to generate pressure on the politico-military combine. The advent of mobile phones and the internet in 1991 created a networked society. Gene Sharp's strategy of leveraging the people to paralyse the governance structure was effectively used during the 2010 Arab Spring revolution in North Africa and West Asia and the Colour Revolution in post-Soviet Eurasia. Disinformation became a tool to create the necessary divide, discord and disruption.

Repurposing Technologies. 9/11 compelled Washington to review its policy on terrorism. For the first time, the non-state actor, Al Qaeda, led by Osama bin Laden, used Taliban-ruled Afghanistan as a proxy for sponsoring their activities. 9/11, for the first time, pitted the organisational strength of the armed non-state actors in dealing with networked and hierarchically controlled armed forces. The traditional weapons were replaced with modified aeroplanes. Shaping public opinion became essential for both sides to garner local support in countering terrorism or fuelling the insurgency. Osama's brief television appearances boosted his fighters' morale and influenced Muslims worldwide. The surveillance platforms like unmanned drones were converted to combat platforms like Predators.[9] The asymmetric warfare methods of reduced

The seventh-generation war will be about automated warfare with augmented reality guided by quantum communications and artificial intelligence.

risk at combat and new media tools inspired other terrorist organisations like the Islamic State of Syria and Levant (ISIL). They used viral social media messaging to capitulate the Iraqi forces equipped with American weapons in the battle of Mosul in 2014. Technology drove both terrorists and armies alike to devise new tactics.

Situational Awareness—Interpreting and Interrupting Patterns. 2003 Gulf War 2 demonstrated the swiftness of ground operations under absolute air supremacy. It gave rise to the 'Time-Sensitive Targeting' concept based on situational awareness and precision-guided munitions (PGM).[10] CIA intelligence operatives were engaged in direct action, including sabotage operations inside Iraq, before the main offensive. Russia effectively employed the lessons from this war in the 2014 Crimean conflict. Green Berets influenced the referendum for Crimean secession from Ukraine. At the same time, the electronic eclipse over Ukraine ensured a lack of situational awareness as no UAVs could take off, and smart bombs turned into duds.

Future Generations of Warfare. Russian military analyst Maj Gen Vladimir Slipchenko, in the aftermath of Desert Storm in 1991, spoke of "no-contact warfare" as the optimal form for sixth-generation warfare.[11] According to him, new technologies like electronics, information and communications will be used to defeat the opponent's armed forces within their territory by subverting or changing the adversary's political system.[12] He made a compelling case for C4ISR with a blurring distinction between combatants and non-combatants.[13] Given the technology development landscape, the seventh-generation war will be about automated warfare with augmented reality guided by quantum communications and artificial intelligence (AI). The Deep Learning

algorithm is likely to define eighth-generation warfare as attempts will be made to breach the cognitive frontiers. It will aim at incapacitating responses and actions of the leaders, systems and the population.

The post-Cold War era has proved that the international system will remain anarchic, and war is always possible within nuclear overhang. Small wars, proxy wars, and the new non-contact warfare filled the space between stable peace and nuclear wars in the continuum of conflict. These wars questioned the global systems and employed the tools of their time to contest the opponents. It raises a pertinent question concerning the nature of war. It also focuses on how technologies and new actors like armed non-state actors and civil security firms will alter the character or methods of warfighting. The 'massing of force' gives way to the 'massing of effects,' which opens up new domains to conflict. The expanding security domains from traditional to non-traditional will affect the engineering of chaos and conflict. The essential question of attaining victory or winning along the escalation ladder will determine the quantum of the force application.

The Future Conflict Trends

The threats, aspirations, and balance of power have remained the key ingredients to fuel competitions, rivalries, and conflicts. Technology is at the centre stage of driving the policies or strategies for the contest. The future battlefield environment appears to be diffused, diverse, and disruptive amidst deterrence disappearance.

- **Diffuse.** The accessibility to war instruments is no longer the exclusive preserve of the state. The need to prosecute hybrid, non-contact and unconventional wars has led the state to distribute weapons to non-state and sub-state entities (terrorist groups, criminal networks, insurgent forces, mercenaries, and private corporations). Hence, the distinctions between combatants and non-combatants are getting blurred. Houthi rebels from Yemen have shown their ability

to puncture the air defence umbrella of Saudis and UAE. The recent Taliban takeover of Kabul showed how a militia could defeat the Army of the state, the Afghan National Army.

- **Diverse.** The urge to influence operations and reduce combat risk has given rise to non-contact warfare. Escalation levers created by the state in the sub-conventional and non-traditional domains are increasingly used as leverages. The means of conflict now vary across a wider spectrum—ranging from 'non-military' to military capabilities. Economic coercion, cyber-attacks, and information operations as non-lethal means are deployed at the lower end of the conflict spectrum, while advanced precision and long-rage conventional weapons and weapons of mass destruction (WMD) are being developed as a measure of dissuasion and deterrence at the higher end. The diverse contest methods across multiple domains can be seen in the current Russo-Ukraine conflict, where businesses and commodities can be weaponised, and alliances can be fractured.
- **Disruptive.** There is an increasing emphasis by states and terrorist groups on disrupting critical infrastructure, societal cohesion, and government functions rather than defeating enemy forces on the battlefield through traditional military means. The disruption spectrum can range from deception, denial, and distortion to destruction. The civil-military fusion being practised by the leading powers adds ambiguity and increases the threat of incognito operations.
- **Deterrence Disappearance.** The investment by nations in strategic intelligence capacity to see underground and underwater has the potential to make triad assets visible to adversaries. Such an eventuality will undermine the second-strike nuclear capabilities and is likely to trigger a review of nuclear doctrine from 'No First Use' to pre-emption. Any such change will adversely affect strategic stability. The deterrence in the non-nuclear arena calls for a large investment to build non-nuclear deterrence capabilities in biomaterials, nuclear-

electronic attacks or cyber-physical attacks, which can plunge society and governance into chaos.

Cyberspace and outer space will gain prominence, and sovereignty overlays are set to expand from the physical to the virtual realm.

Non-Contact Warfare as a Strategy for Future

The strategy development has moved to technology-induced warfare. "Influence Warfare" riding on the internet of things (IoT) backbone aided by the convergence of smartphone platforms is likely to see a change with quantum technologies and AI development. The future of situational awareness and decision-support systems will be transformed by edge computing. Cyberspace and outer space will gain prominence, and sovereignty overlays are set to expand from the physical to the virtual realm. Countries like China have already devised a strategy to invest in new-age technologies. The narrowing of the technological divide has prompted the US to announce its National Security Strategy in 2017, which declares China and Russia as strategic competitors. The document also emphasises the ability of the Pentagon to increase the strategic space for conflict while compressing the window for strategic-operational-tactical reactions.

As the scope of conflict widens from traditional to non-traditional security domains, the core competency of the armed forces will need metamorphosis. Non-Contact warfare is gaining prominence. In non-contact warfare, "the states seek to employ all elements of national power, and the non-state groups attempt to leverage their influence across multiple domains".[14] The target remains "adversary's population, sovereignty, governance structures and economy". It plans to employ both non-military or military non-kinetic and kinetic means. The aim is to intimidate, paralyse or denude politico-military response capabilities and enable winning without fighting or fighting with minimum use of physical contact of own forces. Non-contact warfare can be non-lethal or

lethal and addresses adversaries' sensitivities and vulnerabilities in non-military and military domains. The intent is to keep the response measured and calibrated along the desired escalation matrix to remain ahead in the game of domination. Winning along each ladder of escalation is essential to extract favourable outcomes.

Lessons for India

The shift in operational doctrine from 'massing of forces' to 'massing of effects' with a quantum reduction in physical contact between adversarial forces has been scripted. The pace of technological reforms in stealth, stand-off precision targeting, networked ISR, and autonomous systems have compelled major powers like the US, Russia and China to initiate defence reforms. The overlapping of traditional battlespace of land, seas, air and outer space with the non-battlespace like technological space (cyber and electromagnetic space), social spaces (politics, economics and culture) and cognitive space of the human mind[15] have ensured that virtually every space is being contested with battlefield significance.

Non-Contact warfare riding on technology is set to guide the future strategy. India must investigate the future operational environment and realign its security and technological needs and doctrines. Key areas that need to be addressed are:

- Strategic Security and Defence Review must be undertaken at the earliest by the Defence Planning Committee (DPC) to analyse and evaluate the national defence and security priorities, foreign policy engagement imperatives, intelligence coordination, scientific development priorities enmeshed with academic and industrial incubation centres and assign lead agencies to new sovereign requirements.
- Internal Security remains at the core of security threats to any nation. Hence, it is imperative to institute an agile governance

model through civil service, police and judicial reforms. Strengthen societal protection and oversight mechanism to deal with disasters and disturbances.

- It is important to prioritise preparation for war. The Cabinet Committee approved only three of the last 13 defence five-year plans.[16] Linking capability development with budgetary provisioning is the only way to strengthen the indigenous defence industrial and technological base. Screening of pervasive technologies in critical infrastructures is essential.
- An approach to guard global interests should be based on strategic partnership and the ability to institute a robust and dynamic legal mechanism that proactively anticipates and adapt to technological and macro-cultural changes, which are much harder to predict.
- Aligning structures and business rules in consonance with national security is important. The nature of non-contact warfare demands inter-ministerial, inter-agency coordination and better civil-military integration to allow a plug-and-play inter-operable system driven by processes rather than personalities.

As India progresses, security challenges are bound to increase. Navigating the anarchic international world order will require a stable internal security framework. Non-contact warfare is testing the boundaries of structures and strategy. Adaptation to change is imperative. The words of Alvin and Heidi Toffler remain relevant, "if war was ever too important to be left to generals, it is now too important to be left to the ignorant- whether they wear the uniform or not." India will need to look at the doctrinal approach to security as we have entered the 'era of accelerated human progress (2017 to 2035)' and be prepared to face the challenge as we step into the 'era of contested equality (2035 to 2050)'.

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India Must End Protracted Conflicts to Create a Stable Environment for Development

Prakash Singh

Abstract

India has been suffering from protracted internal armed conflicts in different theatres for the last nearly fifty years. Indigenous and Transnational terrorism, pose a formidable challenge to the country's security. The separatist movement in Jammu & Kashmir, aided and abetted by Pakistan, has forced India to deploy huge security forces in the state. The northeast has been having multiple insurgencies. Assam, Nagaland, Manipur, Mizoram and Tripura have all been affected by insurgencies at different periods of time. Nagaland continues to fester. The Maoist movement, which had engulfed large areas of central India, has since been contained to an extent, but it continues to be a major threat. Security forces have generally established their dominance, but the socio-economic dimensions of the problem still remain unresolved and needs to be addressed more comprehensively. The protracted conflicts are essentially due to flaws or lacunae in our doctrinal approach, strategic vision and tactical handling of the challenges. The country must have an internal security doctrine and the security architecture must be completely revamped.

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The protracted conflicts largely emanate from unresolved social, political and economic grievances of the people.

Introduction

Kautilya wrote in the *Arthashastra* that a state could be at risk from four different kinds of threats—internal, external, externally-aided internal and internally-aided external. The internal security scenario of the country has a mix of all the shades of threats visualised by Kautilya.

The major challenges on the internal security front which have bedevilled the Indian State for a long are the threat from indigenous and transnational terrorism, the separatist movement in J&K aided and abetted by Pakistan; insurgent movements in the north-east; and Left-Wing Extremism (LWE) in the resource-rich Central India. The worrying fact is that protracted conflicts progressively become routine and the focus slowly shifts to the management of conflict rather than the resolution of the conflict. This aspect of national security requires urgent attention since it has serious economic, social, political and security implications.

Protracted Conflicts

The protracted conflicts largely emanate from unresolved social, political and economic grievances of the people. Such conflicts, if not addressed properly and in good time, have a high probability of relapse. The fault lines become platforms for adversaries to interfere and give impetus to the conflict. Insurgencies in the north-east and cross-border terrorism in J&K have been exploited by inimical forces. Allowing such conflicts to simmer for a prolonged period has a heavy cost on the state and civil society. The onus for the resolution of internal security conflicts rests with the government of the day. If the conflicts fester for a longer period, they become that much more complex and difficult to resolve.

Terrorism a National Security Challenge

Indigenous and Transnational terrorism pose a formidable challenge to the security and stability of the country. The terrorists are opposed to the very idea of India and they want to destroy India politically, economically and culturally. According to *Global Terrorism Index, 2022*,[1] India is among the countries which have a "high impact" of terrorism. According to the US State Department Report, India witnessed 679 terror attacks during the year 2020 as compared to 655 in 2019. The largest number of these attacks were in J&K which recorded 257 or 37 per cent of all the terror attacks in the country.[2]

Al-Qaeda is committed to raising the "flag of jihad" in the sub-continent and bringing back Islamic rule in the region. According to a Committee of the UN Security Council, Al Qaeda in Indian Subcontinent (AQIS) operates under Taliban protection from Kandahar, Helmand and Nimruz provinces.[3]

The emergence of ISIS (Islamic State of Iraq and Syria) in the Middle East and its concept of Caliphate gave a new dimension to the terrorist threat. The Islamic State vowed to expand the organisation's war against India, citing apocalyptic religious prophecies which talk of a global war. The death of Baghdadi on October 26, 2019, and the subsequent elimination of his successor, Abu Ibrahim al-Hashemi al-Qureshi, on February 3, 2022, caused a setback to ISIS.[4] However, according to Iran's Foreign Minister, Javad Zarif, the Islamic State is shifting its base from Syria and Iraq to Afghanistan and that geographical proximity would mean continued, if not a greater threat to countries in the region including India.[5] The Home Ministry has been maintaining that the Islamic State has a very limited impact in India, but there are disturbing reports of Indian Muslims being increasingly attracted to its ideology. Kerala and Tamil Nadu have emerged as safe havens for Islamist terrorists operating from South India.

Pakistan is the greatest nursery of terrorists in the world. The US President recently described Pakistan as "one of the most dangerous nations in the world", one that has "nuclear weapons without any cohesion".[6] The Lashkar-e-Toiba (LeT), Jaish-e-Mohammad (JeM) and Hizbul Mujahideen are the major terrorist outfits operating from Pakistan and launching attacks on India. The former Prime Minister of Pakistan, Imran Khan, himself admitted, while speaking in Washington on July 24, 2019, that there were 30,000-40,000 terrorists on its soil who had fought in Afghanistan and Kashmir.[7]

The indigenous terrorist outfits which have been perpetrating incidents at regular intervals are the Indian Mujahideen and the Popular Front of India (PFI). The former has lately been dormant. The Government of India recently banned the PFI and its associates, affiliates, or fronts as "unlawful association". The PFI had come to adverse notice for engineering communal tension, organising violent protests, and radicalising youth to join global terror organisations like Islamic State to "establish the rule of Islam in India by 2047".[8]

There is, presently, a well-organised attempt to revive terrorism in Punjab. The state witnessed a series of targeted murders, including that of RSS workers, in 2016 and 2017. An investigation by the National Investigation Agency (NIA) revealed that there was a transnational network of conspirators affiliated with the Khalistan Liberation Force (KLF) and backed by Pakistan's ISI with linkages running through Dubai, France, UK, Italy and Pakistan. Radical Sikh diaspora in Europe, North America and Canada have formed 'World Sikh Organization' and 'Sikhs for Justice' to revive the demand for Khalistan. There have been several reports in the recent past of arms dropping with drones in Punjab to be used by pro-Khalistan elements within the country. In a sinister development, the Khalistani groups have started using criminals and gangsters to promote their political objective. The ISI is also learnt

to have floated a new platform, Lashkar-e-Khalsa, to train and provide logistics to these criminal elements.[9]

According to the South Asia Terrorism portal,[10] there are a total of 173 terrorist/extremist/insurgent outfits in the country: out of these 79 are proscribed, 76 are active and another 18 are engaged in peace talks with the Government of India.

Jammu and Kashmir Inexorable Conflict

The government of India's policy in J&K has been to secure the borders from cross-border terrorism and to contain militancy; redress genuine grievances of the people within the legal framework; ensure economic development of the area; and integrate the state with the rest of India.

Ever since the advent of militancy in the state in 1990, a total of 14,091 civilians and 5,356 security forces personnel have lost their lives till 2020 in the incidents of violence. The relevant figures of 2016 to 2020 are as follows:[11]

The Trends of Terrorist Violence in J&K since during 2016-2020, as per Ministry of Home Affairs, Annual Report 2020-21

Year	Incidents	SFs killed	Civilians killed	Terrorists killed
2016	322	82	15	150
2017	342	80	40	213
2018	614	91	39	257
2019	594	80	39	157
2020	244	62	37	221

It would be seen that incidents of terrorist violence touched a peak in 2018. It was the bloodiest year insofar as the number of terrorist incidents and the casualties of both security forces and the terrorists were the highest in the last five years.

According to P. Stobdan, Pakistan has been conscious, since 2016, trying to "indigenise the movement".[12] The killing of Hizbul Mujahideen Commander, Burhan Wani, by the security forces on July 8, 2016, led to prolonged agitation by separatists in the Valley. The popular upsurge was fully exploited by Pakistan. On September 18, 2016, JeM terrorists attacked an Indian army post in Uri along the LoC, killing 19 soldiers. The Indian army responded by carrying out a surgical strike inside Pakistan-Occupied Kashmir (POK) in the early hours of September 29, 2016, inflicting heavy casualties and damage to the terror launch pads in the region. A German political scientist, Hein Kiessling, has stated in his book *The ISI of Pakistan* that Pakistan's ISI will continue its proxy war against India regardless of any change in its leadership and that Kashmir will remain "an area of activity *sui generis*".[13]

On February 14, 2019, in a devastating terrorist attack, 40 CRPF personnel were killed in a vehicle-borne improvised explosive device (VBIED) attack by militants in the Lethpora area on Srinagar-Jammu national highway in Pulwama district. The Jaish-e-Mohammad claimed responsibility for the attack. This was the highest fatality suffered by security forces in the State ever since the beginning of terrorism in 1988. The incident caused deep resentment across the country. The Government of India responded aggressively and, on February 26, 2019, the Indian Air Force fighter jets hit a major JeM training camp in Khyber Pakhtunkhwa province deep inside Pakistan territory. The Ministry of External Affairs described it as a "non-military pre-emptive strike" to prevent the terrorist outfit from planning another attack. The MEA claimed that the camp headed by Maulana Yousuf Azhar, brother-in-law of Masood Azhar, was decimated. A large number of terrorists are believed to have been eliminated.

In a bold initiative, The Government of India abrogated Article 370 of the Constitution on August 5, 2019, thereby effectively ending the special status of Jammu and Kashmir. The state was further bifurcated

to create two separate union territories—Jammu and Kashmir with a legislature and Ladakh without a legislature.

According to a statement by the State Police on August 5, 2022, over 500 terrorists have been killed in J&K following the abrogation of Article 370 in 2019 while the number of security forces personnel and civilians killed in terrorist incidents has come down from 481 to 284 (SF 174 and civilians 110) in the last three years.[14] According to another statement by the Army on April 4, 2022, as many as 172 terrorists including 79 foreigners are currently active in J&K.[15]

North-East Simmering Conflicts

North-east has been convulsed with separatist and secessionist movements of different hues. The nature of protracted conflict in the north-eastern states makes it difficult to determine when the multiple conflicts will be over. The states and the people are stuck in a conflict trap and ironically successive governments have not found a solution to the unending separatist and secessionist movements. Though the incidents of violence have decreased over the years enduring peace is still eluding the people of north-east. The profile of violence in the region as a whole during the last five years has been as follows.[16]

The Profile of Violence in NER as a whole during 2016-2020, as per Ministry of Home Affairs, Annual Report 2020-21

Years	Incidents	Extremist arrested	Extremist killed	Arms recovered/ surrendered	SFs killed	Civilians killed	Extremist surrendered
2016	484	1202	87	698	17	48	267
2017	308	995	57	432	12	37	130
2018	252	804	34	478	14	23	161
2019	223	936	12	379	4	21	158
2020	162	646	21	739	5	2	2644

There has been a gradual improvement in the security situation. The number of incidents as also casualties amongst the civilians and the security forces have all come down.

Nagaland has been the epicentre of armed insurrection in north-eastern India. There is a suspension of operations in the state since 1997. A framework agreement was signed on August 3, 2015, to pave the way for a final settlement. There have been prolonged discussions between the Government of India and the various Naga groups, but the intransigence of the National Socialist Council of Nagaland (Isak-Muivah), which has been insisting on a separate flag and constitution for the state, has delayed the final settlement. In 2020, there was a 45 per cent decline in the total number of violent incidents in the state as compared to the figures for 2019.

As per South Asia Terrorism Portal, there are approximately 42 insurgent groups in Manipur. Twenty-five of them are inactive, five of them are in negotiations with the government and the rest continue to operate in the Valley and the Hill districts. In 2020, there was a 23 per cent decrease in insurgency-related incidents in the state.

In Tripura, the activities of the National Liberation Front of Tripura (NLFT) and All Tripura Tiger Force (ATTF), the two main rebel outfits, have been contained.

In Assam, the sharpness of ULFA has been blunted, thanks to Bangladesh's cooperation. Leaders of the insurgent outfit have shown a willingness to negotiate with the Government of India and abandoned their insistence on recognition of 'sovereignty' as a pre-condition for talks. Paresh Baruah, commander of the armed wing of ULFA is, however, opposed to any talks with the Government of India until the "core issues" of sovereignty and independence of Assam are discussed. In 2020, insurgency-related incidents declined by 12 per cent in the state.

A number of Islamist extremist groups are also active in Assam. These include the Muslim United Tiger Force of Assam (MTFA) and the Muslim United Liberation Tigers of Assam (MULTA).

Left-Wing Extremism

Left-wing extremism (LWE) was once described as the biggest internal security threat to the country. The salient features of the movement today are its spread over a large geographical area; potential for violence; expansion in the northeast; and nexus with other extremist groups.

Geographical Spread: The movement which started from a small village in 1967 has spread over a vast swathe of the country over the last 50 years. According to a statement made by the Minister of State for Home on July 26, 2022, the number of LWE-affected districts has come down from 70 in 2014 to 46 in 2021. The Minister also said that the incidents of Naxal violence have also significantly dropped from 1091 in 2014 to 509 incidents in 2021.[17]

Potential for Violence: The CPI (Maoist) is the most potent among the various LWE outfits in the country and was responsible for 86 per cent of the total violent incidents and 96 per cent of the resultant deaths during 2020.[18] There has, however, been considerable depletion in the strength of the Maoist outfits during the last few years.

Expansion in North-East: The Maoists are spreading their tentacles in the north-east and there are reports of their trying to forge links with the insurgent outfits active in the region. Himanta Biswa Sarma, Chief Minister of Assam, recently said that this is the "third wave" and that there had been similar attempts in 2008 and 2013-14 also.[19] Maoists' foray into the sensitive north-eastern states is fraught with serious strategic implications.

Nexus: The Maoists' nexus with the other extremist organizations has added to the complexity of the problem. They have some kind of *entente cordiale* with the NSCN (IM). Some batches of Naxals received

arms training from the ULFA. The Communist Party of India (Maoist) has also fraternal relations with the Communist Party of Nepal. The ISI has been trying to reach out to the Maoists.

The level of Maoist violence in the affected states during the five-year period 2016-2020 has been as follows:[20]

State-wise Extent of LWE Violence during 2016-2020, as per Ministry of Home Affairs, Annual Report 2020-21

State	2016		2017		2018		2019		2020	
	Incident	Death	Incident	Death	Incident	Death	Incident	Death	Incident	Death
Andhra Pradesh	17	6	26	7	12	3	18	5	12	4
Bihar	129	28	99	22	59	15	62	17	26	8
Chhattisgarh	395	107	373	130	392	153	263	77	315	111
Jharkhand	323	85	251	56	205	43	200	54	199	39
Madhya Pradesh	12	2	3	1	4	0	5	2	16	2
Maharashtra	73	23	69	16	75	12	66	34	30	8
Odisha	86	27	81	29	75	12	45	11	50	9
Telangana	7	0	5	2	11	2	8	2	15	2
Others	6	0	1	0	0	0	3	0	2	0
Total	**1048**	**278**	**908**	**263**	**833**	**240**	**670**	**202**	**665**	**183**

In 2020, Chhattisgarh with 315 incidents and 111 deaths was the worst affected state followed by Jharkhand (199 incidents and 39 deaths), Odisha (50 incidents and 9 deaths), Maharashtra (30 incidents and 8 deaths) and Bihar (26 incidents and 8 deaths).

The Government of India has adopted an integrated and holistic approach to deal with the problem. There is a 'National Policy and Action Plan' with a multi-pronged strategy that seeks to strengthen security, accelerate development and ensure the rights and entitlements of local communities. In a press release on September 21, 2022, Union

Home Minister, Amit Shah, claimed that the security forces have achieved "unprecedented success" in the year 2022 against the LWE in *Operation Octopus, Operation Double Bull and Operation Chakrabandha* in the states of Chhattisgarh, Jharkhand and Bihar.[21]

The socio-economic dimensions of the problem nevertheless cause concern. There are disturbing reports of economic inequality in the country. According to the *World Inequality Report 2022,* India is among the most unequal countries in the world, with rising poverty and an affluent elite. The report highlights that the top 10 per cent and top 1 per cent in India hold 57 per cent and 22 per cent of the total national income respectively while the bottom 50 per cent share has gone down to 13 per cent.[22] In Human Development Index, India ranks 132 out of 191 countries and territories.[23] These statistics are not flattering.

Protracted Conflicts Need to be Contained

It is distressing that the north-east has been in a state of turmoil for the last more than 60 years; the Maoist rebellion has been haunting us for the last more than 50 years, and Jammu and Kashmir has been witnessing unrest for the last more than 30 years. Obviously, there have been serious flaws in our efforts to tackle these problems and, as a consequence, they continue to fester.

The country has been paying a heavy price for these continuing internal security problems. According to an estimate for the period 2010-14, the Maoist targeted the railways in 119 incidents, telephone exchanges/towers in 153 incidents, school buildings in 82 incidents, forest roads/culverts in 613 incidents, panchayat bhavans in 57 incidents, power plants in 4 incidents and mines in 17 incidents.[24] During the Jat Reservation Agitation in Haryana (February 2016), on a conservative estimate, property worth Rs 20,000 crore was devastated; it is estimated that 1,196 shops were set ablaze, 371 vehicles were damaged or set on fire, 30 schools and colleges were burnt, 75 houses were set on fire, 53

The country should have an internal security doctrine that should lay down the principles that would govern the tackling of problems in any region.

hotels/marriage places were devastated, 23 petrol pumps were attacked and 53 religious institutions were vandalised.[25] According to an international think tank, Institute for Economics and Peace, violence cost the country 7 per cent of its GDP in 2020.[26]

It is absolutely necessary that the protracted conflicts which have been bleeding the Indian state for the last 50 years or more are contained, if not resolved. The country needs a stable environment for a faster rate of economic growth. It is a sombre thought that due to the aforesaid continuing internal security problems, which have substantially sapped our economic strength, India would probably have been a superpower today.

What needs to be done?

To start with, the country should have an internal security doctrine that should lay down the principles that would govern the tackling of problems in any region. Unfortunately, we have not cared to define these principles and codify our internal security doctrine. The result is that every party in power views these problems from its own political lens and adopts strategies as per its own perception. It is high time that the doctrine is clearly defined. We also need to take corrective measures in our handling of the major challenges to internal security.

Unfortunately, we have to date no anti-terror policy. There is no clarity about how is it to be combated, what training and equipment the police forces need at the state level and what kind of coordination must be ensured between the Central Armed Police Forces, the State Police formations and the central and the state intelligence. The handling of the Kandahar incident, in which an Indian Airlines Airbus (IC 814) was hijacked to Afghanistan at the end of 1999, was a disaster and showed

the flaws in our anti-terrorist operations. The terror attack on Mumbai on November 26, 2008, also showed the chinks in our armour. It is also unfortunate that there has been no consistency in the legal framework to combat terrorism. Initially, we had the Terrorist & Disruptive Activities Act (TADA) which was later modified to the Prevention of Terrorism Act (POTA) and subsequently to the Unlawful Activities (Prevention) Act (UAPA). It is also a pity that the National Counter-Terrorism Centre (NCTC), which was proposed in the wake of the terrorist attack in Mumbai, has yet to be set up.

In Jammu and Kashmir, the region's status as a full-fledged state should be restored. The abrogation of Article 370 was fine, but lowering the status of J&K to a Union Territory caused unnecessary humiliation to the people of the state. The political process in the state needs to be revived and a popular government installed. There should be a well-coordinated effort to bring about all-round development of the state. The common man should feel that integration with India has brought economic prosperity.

In north-east the term of suspension of operations in Nagaland should be strictly enforced. The rebel Nagas continue to indulge in extortions, collection of taxes, forcible recruitment and other unlawful activities. It should also be made clear to the NSCN (IM) that the Government of India would not agree to dilute the authority of the Union Government in any manner which would impinge on the territorial integrity of the neighbouring states, and that their demand for a separate flag or constitution could not be considered. The government must also ensure accountability in the utilisation of development funds, a major chunk of which is either siphoned off by the rebels or pocketed by the corrupt establishment.

In tackling Maoist insurgency, it must be impressed upon the state governments that their police should be at the forefront of anti-Maoist operations; the Central Armed Police Forces can play only a supporting

role. The genuine grievances of tribal, particularly those relating to the Forest Rights Act, must be addressed. The door for peace talks should also be kept open. There should be a whole of government approach to win over the hearts and minds of the people.

Summing Up

The protracted internal security conflicts must be contained and, in due course, resolved. To tackle these effectively and ensure a faster rate of economic growth, we must have a comprehensive Internal Security Doctrine so that officers in the field are clear about the objectives and the methods to be adopted to achieve those. The legal framework would also need to be strengthened. These measures must however be accompanied by radical reforms in the police so as to strengthen the law enforcement machinery at the grassroots level. The capabilities of the state police need substantial augmentation and modernisation in terms of manpower, infrastructure and other resources. The Central Armed Police Forces must develop more teeth. The intelligence organisations would need to improve their penetration by human intelligence and incorporation of technology. There are no shortcuts to tackling the challenges. We shall have to comprehensively revamp the entire internal security architecture. A grievance redressal system and transparency in the delivery of governance in conflict-affected regions would be an essential tool to create capacity for enduring peace.

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Research and Military-Industrial Complex: A Springboard for Capability Development

Michael Padgett

Abstract

Collaborative efforts are required to develop future technologies for securing a nation. To develop military technologies a nation is required to create a system where all stakeholders can jointly work together to find solutions for meeting national security challenges. It is a good idea to invest and incentivise the efforts of universities and industry to develop future defence technologies. The role of government research and development organisations is paramount to coordinate the research and development of usable technology for military services. The military-industrial complex can only become a springboard for capability development if there is strong indigenous R&D.

Introduction

To develop the full research capability of a nation, the optimal method is to gain benefit from a nation's three pillars of research: Government research laboratories, universities and industry researchers. Each of the

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three pillars has an interest in one or more of the levels of research, from basic research to full-scale development of products. Users of defence products, such as the members of the military services, are responsible for identifying gaps in capabilities and defining requirements for industry or universities to pursue new research that can solve or reduce the gaps in capabilities. The military may not be fully aware of future trends in technology, thus a closer interaction is required with the scientific community of the country to find solutions to the complex security problems. All these issues will be reviewed in this paper.

Key Policy Challenges for Research and Development

A good starting point may be to ask some key questions: how can a nation maximize its technological advancement, especially in the military element of power? Can industry alone propel a nation's Research and Development (R&D) of Science and Technology (S&T)? How can a government' motivate the maximum possible S&T effort from the industry, universities and their own research laboratories? These questions form the basis for the analysis of several subtopics that lead to answers to the questions. Some of the subtopics that require clear understanding are: What areas of S&T is the industry motivated to dedicate their R&D resources? What areas of S&T should remain the domain of governmental research institutions? What areas of S&T might best be obtained from international partners? These key policy guidelines can be laid down by the government in consultation with the military. However, it is also important to assess the levels of excellence or expertise acquired by the universities, industry and government research laboratories in the development of new-generation systems for military use. The classified projects may need governmental oversight to ensure that confidential R&D project details are not leaked to unauthorised entities.

Scientific research in a nation arises from three sources: government R&D laboratories, universities, and R&D assets within the industrial complex.

Approach to Building Strong R&D for Capability Development

The terms R&D and S&T are closely related and not clearly defined. Based on the application of the terms from historical experience within the US defence research establishment, the relationship between the terms is that research explores the disciplines of science. Science results in the discovery of new technologies. Potentially useful material solutions might result from some new technologies, and those solutions might result in useful applications for societies and defence establishments. Once science reveals useful technologies, the practical application of those technologies can be developed until the end users find it not compatible with the national security objectives.

Scientific research in a nation arises from three sources: government R&D laboratories, universities, and R&D assets within the industrial complex. To maximise a nation's R&D and S&T, universities, industry and government laboratories must be motivated either by funding research or some guarantee for the acquisition of products for military use so that industry or universities are motivated to make investments in research and development. In both these models there is a high possibility of failure and to keep universities and private players motivated, the government should compensate or incentivise their efforts.

The government laboratories should be the vanguard for laying down the technical parameters for R&D and should seek seed money funding for S&T capabilities useful to the defence establishments of a nation. The defence establishment scientists and engineers have a huge responsibility, to find answers to the following questions: what S&T is emerging from or could emerge from government laboratories, universities, and industry that would benefit the military services? Close

coordination with the military services (end users) is crucial, with a view to filling gaps in military capabilities.

Military services may not be aware of the future trends in S&T and their applications. The defence research establishments should leverage the creative capabilities of scientists within the defence research establishments, universities, and industry in consultation with the military to identify the technologies required for building capabilities. Knowledge of the areas of research by other countries with advanced S&T can help initiate and expand the trend lines of S&T best pursued by other nations that could be tailored to the specific needs of a nation.

The glue binding all national S&T potential for defence applications is the government research laboratories that could act as a guide and central coordination agency for the development of specific technology required by the military. For example, defence research might be dedicated to (1) robust communications and surveillance capabilities; (2) lethal weapon technologies; (3) specialised land-based vehicles, tanks and trucks (4) maritime surface and subsurface warships and submarines, (5) aviation assets; (6) missiles and radars; (7) soldier systems; (8) medical; (9) information technology (IT) cyber and artificial intelligence (AI); (10) autonomous systems. The former list is not at all-inclusive but is an example to highlight what can be done by the government defence research laboratories and industry in collaboration with each other.

Since universities faculty and students often look for funding sources for their research, thus seed money from the government or industry defence research establishments is required to motivate university research fellows to pursue research in areas identified as the most critical for enhancing military capabilities. University faculty and research fellows can help identify a multitude of possible solutions to fill military capability gaps as identified either by the military or the defence research establishments.

Universities are best suited for the first stage of R&D, which is called basic research by the US defence research establishment. The most

promising university theories can be tested and evaluated by defence research establishments with increased levels of funding to determine which theories are most promising for useful applications. Once theoretical research reveals the most useful applications, more funds from defence research establishments should be sought. Next, the defence research establishments should identify industries with core competence to develop technology with the potential for future military application. The transition from the first stage of research (basic research), to the second (applied), is an area where all three national assets may work in concert: the defence research establishment, universities, and industry. The first two stages are best categorised as research stages and the focus is on research and development.

The third, and last stage is the development of the applications determined to be most promising from the first two R&D stages, basic and applied. Once a technology is proven to have a greater application for the military service, the industry must receive more funds to develop the most useful, critical technologies identified in the first two stages of R&D. The defence research establishments should allocate more funds toward industries that are willing to dedicate their own internal R&D assets for the development of desired technologies for military application. If technology has application in more than one defence sector, securing R&D funding becomes much easier.

For the above-mentioned specific lines of research identified previously, numbers 1, 8, and 9 are likely to be most attractive for the industry to dedicate their internal R&D assets due to potential commercial applications. Numbers 2-7 and 10 may have to be primarily developed by the government R&D establishments and laboratories, and to a lesser degree by the industry's internal R&D assets. Considering the criticality of funding levels for R&D, both within the defence establishments and industry, the next section will address what the R&D funding levels are to create world-class R&D establishments. While allocating funds for R&D,

India must keep in view how much budget is being allocated for R&D by China a potential adversary.

R&D and S&T Require High Investment for High Dividends

It is important to understand that the level of investment in R&D done by a nation as compared to its adversary will determine the development of military technology. China is the main adversary of India, hence, India's investment in R&D must be proportionate to what China is spending on R&D and S&T; therefore, this article provides the most recent R&D expenditure data from three countries: the US, India, and China. The R&D data reported by China is likely to be understated as many intelligence sources believe China does not report its actual defence and R&D expenditures.

The narrative now shifts to a comparison of R&D expenditure levels for the three countries: In most cases, the R&D expenditure data is often either not clearly reported by countries or is reported differently by those organisations that track national defence R&D expenditures; therefore, the following is not an exact comparison over the same periods. Data was found for more years for the US and China than India, but the calculation of trends for each country is possible with the data shown below:

India (in billions of dollars*)	**China** (in billions of dollars)	**U.S.** (in billions of dollars)
		2022: $122.9
		2021: $114
		2020: $100
	2019: $24.24	2019: $95
2018: $1.816	2018: $21.54	2018: $88
2017: $1.613	2017: $19.51	2017: $70
2016: $1.629	2016: $18.51	2016: $63
2015: $1.625	2015: $15.81	2015: $63
	2014: $16.8	2014: $63
	2013: $16.33	2013: $70
	2012: $15.24	2012: $78
	2011: $13.38	2011: $79
	2010: $11.45	2010: $80

**Sources for the above data are Statista, SIPRI, and the Congressional Research Services.

To maximise a country's defence capability, a convergence should exist between researchers within the defence establishments, universities, and industry.

Some additional data of interest is that China's total defence spending is $240 billion in 2019, which was approximately 1.7 per cent of their GDP. China often conceals exact allocation for R&D and defence budget, hence the figures mentioned above may be lower than the actual figures. India's defence spending is 2.1 per cent of GDP, and defence spending has been growing from 2010 to 2020 at 9 per cent. The total budget spent on defence in 2022 indicates, the US is number one ($750 billion), China number 2 ($237 billion), Saudi Arabia number 3 ($67.6 billion), India number 4 ($61 billion), and Russia at number 8 ($48 billion). The data shown above indicates, if the budget allocation for R&D by India is going to be the same in terms of percentage, in that case, building matching capabilities with China is a far cry. Therefore, India needs to take a hard look at the budget allocation for defence R&D if it is aspiring to make the military-industrial complex a springboard for capability development.

Indigenous Research Efforts must be Complemented by other Stakeholders and International Partners

To maximise a country's defence capability, a convergence should exist between researchers within the defence establishments, universities, and industry. The efforts of the three pillars of R&D and S&T must complement each other instead of reinventing wheels in isolation. As stated before, universities are often interested in government-funded research, including areas that benefit the defence sector. The areas of communication, medicine, AI, and IT are attractive to university researchers, especially for basic research and early stages of applied

research. Defence establishments researchers often have to perform the basic research for lethal technologies, warships, military aviation assets, specialised military vehicles, missiles and radars, and advanced soldier systems. But there are some cross-over sub-technologies where university faculty and researchers can help out in these defence-specific areas as well. The key is to develop a system where defence research scientists can determine and evaluate areas of research by universities to find alternative solutions and future technologies for use by the military. To assume military services are in the best position to determine what alternative solutions can solve current capability gaps is a huge mistake; often defence scientists, universities and industry research scientists will probably be in a better position to identify future technologies that can be used for military purposes.

Bringing together the best minds is essential because collective thinking can find better solutions to fill capability gaps. Therefore, there is a need to create an organisation where the military, government research scientists, university research fellows and industry R&D must have formal and informal interaction to determine what technology is required to fill the capability gaps and future security requirements.

Once the application of a technology is identified, the industry with core competence specific to that technology should be added to the consultation group where the best minds exchange views. Once technology blueprints are formulated, the industry must be tasked especially in communication, medicine, and IT sector to commence work on the development of usable technology by the military. The industry will have a pre-dominance role once the application is proven to benefit not only defence forces, but the commercial sector as well. Once the commercial benefits of technology are identified, the industry can expand the investment in research and final development of a product, for dual-use technologies. The key objective is to identify which

niche technologies are most critical to the country's long-term security requirements. At the same time, these high-end technologies will also propel the expansion of military-industrial complexes for commercial purposes.

Alliances are one of the oldest systems of collective security and the development of military capabilities. One of the reasons for the collapse of the Roman Empire was the absence of alliances with potential allies. Today alliances are required for technology development and filling military capability gaps.

One of the most critical decisions any government can make is to decide which technologies are essential for bridging capability gaps. It may not be possible to master the technologies of all elements of military capabilities, therefore, areas and achievable goals can be set and at the same time, an international alliance be formulated for the co-development of military technology required to fill existing capability gaps. This process should be followed up with joint ventures for the development of products for military use.

An example is the North Pole Brigade (NORDPOLBDE) formed in 1996 during the days of the Bosnia/Herzegovina conflict, called the Implementation Force (IFOR). The NORDPOLBDE had five core nations: Sweden, Denmark, Finland, Norway, and Poland. Added to the Brigade were three other nations: Estonia, Latvia, and Lithuania. The mission was to create a secure environment for humanitarian organisations working within IFOR. Each country decided what areas they could contribute where they had expertise/capabilities. The battalions that initially came were mechanized battalions from Denmark, Sweden and Poland, with one Engineer Battalion from Finland and one Logistics Battalion from Norway. When IFOR became SFOR, in December of 1996, the Norwegians recalled the Logistics Battalion and replaced it with a Mechanised Infantry Battalion, and in June of 1998, the

Finns reorganised their Engineer Battalion into a Mechanised Infantry Battalion. The Baltic countries, Estonia, Latvia, and Lithuania provided a rifle company. These changes were warranted by the capabilities possessed by each country. One must remember that international operations and military cooperation are also a platform to showcase your military capabilities and technology. A nation will be included in alliance or for military cooperation if it has the capabilities and technology to meet complex security challenges.

The previous example highlighted that India should decide what niche areas are most desirable, and attractive for future international operations and foreign military trade. What advantages does India currently have, and in what areas of S&T nation will be able to showcase its indigenous R&D at global platforms? Some possibilities are communication, IT, and perhaps medical, but there may be many others that emerge from brainstorming between government, industry, and research scholars of universities.

Another issue requiring consideration is what S&T (Basic and Applied Research) should India choose to pursue with indigenous R&D versus the development of technology through reverse engineering. The development of its own technology will allow India to tailor research to its specific defence needs. Using reverse engineering as a primary method for fast-tracking the development of new capabilities prevents the maximisation of full scientific potential and may prevent India from solving capability gaps unique to its security requirements. One visible advantage of reverse engineering is that a country can save the money spent on basic and applied research but it is unlikely to give long-term dividends for capability development. Besides losing the ability to solve unique capability gaps, another disadvantage is the prevention of the Indian industry from gaining S&T advantages that could result in potential Foreign Military Sales (FMS).

Research Parks a Way Forward to Harness Full Potential of R&D

A question: how can a country optimally leverage all three sources of S&T? One best practice is to establish research parks that include all three members of the triad. To avoid duplication of efforts, all three pillars of the research triad should be closely linked to creating an overarching system, where the best brains of the country sit down together to find solutions to technology gaps. Few countries leverage all three assets and build modern military-industrial complexes for domestic and foreign trade. Most often a university's S&T assets operate independently from the other two, whereas the government and industry S&T assets should develop greater cooperation. At times universities are willing to modify or totally change their lines of research if there are monetary resources available to fund university research. Government seed money is critical to motivating university researchers to pursue S&T useful to the defence establishment of a country. The saying "a little seed money goes a long way" would be a good adage to follow.

Conclusion

Since no country in today's connected world can be an island of excellence in itself, the difficult task for the leaders of all countries is to decide which countries are most beneficial to partner with for technology development and joint ventures for the production of systems for military use. Even the forces for the international coalition are decided by the capabilities a nation possesses. The decisions along these lines will also make a country attractive for joint ventures, foreign military trade and international defence cooperation. Military capabilities and new-generation technologies have become strategic assets.

A country must not rely solely on reverse engineering to save investment in basic and applied research. Independently developed technology and systems allow the scientific community to serve the

specific needs of a country. Industry can also focus on the lines of research once they know which niche areas are most attractive from a commercial point of view.

Investing in R&D and S&T prepares a nation for its future security. Without investing in a nation's future security, leaders render a less secure future for all citizens and create vulnerabilities and dependencies that are dangerous to future peace and posterity. The eternal battle is between the allocation of resources for current needs versus a nation's future security.

Recommendations

1. Increase the investment in Basic and Applied research to at least match the percentage of a nation's GDP as is being done by a potential adversary.
2. Find the most beneficial alliances with other nations to allow specialisation in the most useful niche technologies and capabilities.
3. To make technology as a springboard for capability development, use seed money to encourage researchers in industry and universities to combine their intellect with the best scientific minds within the ranks of the government scientific community through collaborative efforts.
4. Establish research parks where government, industry, and university scientists can work together.
5. Never forget that scarce resources require decisions to be made between current capabilities and long-term security challenges. An imbalanced division of resources between current capabilities and investments in future R&D can quickly render a nation less attractive, and irrelevant in tomorrow's world.

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Evolving Technologies—A Tool of Strategic Competition: Options for India

SP Kochhar

Abstract

The author briefly highlights how Information, Communication Technologies, Electronics and Cyber (ICTEC) and concomitant technologies are outpacing changes that are being witnessed in the environment. He then goes on to logically explain how these advancements in mobility and networking space will affect various broad sections in the military to achieve strategic dominance and leadership role. Shrinking of time and expansion of space/area of influence are clearly brought out in the now possible Network Centric Environment (NCE) that is emerging. However, at the national level, strategic and long-term economic and military dominance have to go hand in hand by achieving a sustainable competitive advantage in the world order. He then goes on to briefly examine the factors that influence strategic sustainable competitive advantage and goes on to list out where India stands in terms of international indexes. The next

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portion outlines some of the initiatives and directions are taken by the Government towards a well-thought-out vision relating these to well-articulated theory in academic circles. Citing recent bold decisions, the author expresses hope that India is on the right path of donning a leadership role in the world.

Introduction

With the advent of information technology and the information age, nations are finding it difficult for their policies and regulations to keep pace with the rapid changes brought about by technology. Borders, as we know them today, are no longer relevant as they were before; hierarchies are changing, and technology is becoming a strategic tool in the hand of Nations and individuals. The rate at which the technology-based change is happening is ever-increasing and the physical way of doing things is giving way to the digital way of doing things—digital highways are more acceptable than physical highways. Every day we have a new technology, or a new application derived out of these technologies, being adapted for ease of doing business. Time and space parameters in military parlance are getting disrupted positively—the time taken for doing things is becoming less and less while the area of influence is increasing, thus leading to greater opportunities as well as challenges. New efficiencies and adaptabilities now enabled in certain industry verticals, duly buoyed by information technology, are causing these industries in becoming critical industries of the nation.

Technology Bringing Paradigm Shift in Strategic Contour

While all technologies across the board are getting enhanced at various speeds, contexts and nuances, a simple scan of the environment will show that most of the technologies that are rapidly changing across all verticals are either directly in the Information and Communication Technology (ICT) domain or are complementary to this field. In fact, this domain

has now expanded to include Electronics and Cyber too—leading to the more relevant acronym ICTEC. This is a domain that transcends civil and military sectors both. Technologies like 5G, and later 6G, and concurrently enabled automation, human enhancements, digital twins, drones artificial intelligence, data analytics, blockchain, cyber currencies, quantum computing etc are all intertwined to bring in an experience that improves the way we live and work.

Primarily these technologies bring in disruptive experiences, optimise existing processes and are increasingly seeing the advent of artificial intelligence in predictive processes. The basic things that are changing as mentioned earlier are time and space, efficiency, flexibility, and adaptability—with a lot of emphasis on distributed data, software enablement and near real-time computation. Since the focus of technological change is currently around mobility, it would be wise to examine changes that have occurred in the last one decade and are likely to occur in the next few years.

The centre of attraction during the transition from 2G to 3G/4G was the smartphone, a device. The human being became interactive with the device and thus with the environment. During the change from 4G to 5G the focus of disruption now shifts to the networks and all concomitant factors. 5G is a new technology that offers very low latency, and very high speeds with massive aggregation capabilities and is thus capable of integrating an interoperating humans and machines including sensors. This opens mega possibilities, and challenges, in all aspects of life. There is no gainsaying that adjunct and complementing ICTEC technologies like artificial reality, augmented reality, virtual reality, machine learning, natural language processing, and robotics amongst others, are becoming critical in military and civil domains both.

In the military domain, the macro rules of warfighting remain the same, but these new strategic and operational tools of technologies, especially information technology, will help to secure an advantage over

the adversary by controlling information and utilising it in a shorter time frame and over longer distances, thus upsetting the Observe, Orient, Decide and Act (OODA) loop of the adversary. The factors that will get affected in this domain are briefly listed below.

- **Emerging Environment**. The environment that is likely to prevail in the near future will have high-quality, always-available networks, which are safe, secure, adaptable, flexible and connect/interoperate with multiple applications, devices and personnel at the same time. On top of these networks will reside applications derived out of legacy as well as emerging technologies mentioned above. The interconnect between the network—application—user/sensor will be through smart devices. This grid will work off data stored in core network data centres, edge data centres and many other flavours of storage. The computing will be done, by choice, over the network, edge or personal device depending on the situation. The network elements will increasingly become software-defined, having their own advantages and disadvantages—but giving a huge amount of flexibility and adaptability. This situation is akin to the NCE that has been talked about, over decades. The sensor network, whether embedded in weapon systems or stand-alone, will form an IOT network enabled by the underlying networks and software. Many of the decisions taken in this environment will be controlled by artificial intelligence and connected control systems which may include configuration/reconfiguration and operational empowerment—like the firing of a weapon system under some circumstances. The data patterns that drive the Artificial Intelligence (AI) engine will emerge out of the experience and/or simulations using Virtual Reality (VR), Augmented Reality (AR), machine learning (ML) and deep learning (DL). Of course, the critical functions will remain under the control of the human being manning the machines. The skill sets for such a situation/environment will be of a very different nature from as

prevails today. Cyber security will be ingrained from the grassroots level to the top level. Fresh challenges and opportunities for sure.

The skilling, reskilling and empowerment of human capital are equally important in the civil and military domains.

- **Time and Space**. There will be a huge reduction/compression of time available to collect, process and compute information to derive intelligence for the decision maker and thereby effect/operationalise winning strategies and plans over larger areas of influence.
- **Weapon Systems and Platforms**. Almost all weapons systems and platforms will become smart with embedded sensors and control systems. Many of the functions will be fully controlled by AI while some will require human intervention.
- **Decision Support Systems (DSS) and Battlefield transparency**. A huge amount of enterprise and environment-wide databases will be interconnected, data correlated and analysed by AI engines to arrive at DSS based on data analysis that will support the decision maker by creating a smart picture, enabling battlefield transparency like never before using software tools.
- **Logistics and Supply Chain**. The use of sensors, software tools, control systems and data analytic tools will help in more efficient flexible adaptable and Just in Time logistics, supply chain and commensurate maintenance effort. This is true for both the military and civil sectors and developments will take place in both sectors, for optimum results.
- **Human Capital**. The skilling, reskilling and empowerment of human capital are equally important in the civil and military domains. The use of ICTEC Technologies will aid in network-centric training of human capital using tools like AR, VR, AI, and 3D Printing. Robotics, data Analytics and drones will help in keeping the support

systems, based on networks, like health, etc. at an optimum level of performance. Emerging higher lethality enhanced kinetic weapons, information and cyber capability and a lesser involvement of troops—are now being increasingly seen in achieving victory over the adversary collectively.

At the enterprise level, care must be taken, however, to ensure that the planning of such a system should be articulated as a user requirement by the concerned branch and executed by a well-trained technical branch. It'll be suicidal if done otherwise or if say 5G is planned with the mind-set of 4G or 3G. Clearly, three layers emerge—first, the creation of a secure, versatile enterprise-wide network with adequate resilience—covering up too and beyond the troop deployment on borders; secure and distributed data centres with AI-based management of networks, data and connected control systems. Second, the creation of applications that will take care of the user requirements as spelt out both strategically end operationally and thirdly, adequately trained manpower to take advantage and exploit the benefits of such a network-centric environment.

All these segments will be well advised to make full use of trust technologies like blockchain, Big data, Data Analytics and derivative technologies that are emerging like Drones, 3D printing, deep fakes, etc. A different look at cyber defence and offence will also have to be built in from the drawing board stage itself. This will have to be supported by an agile and similarly placed manufacturing base and a sound supply and logistic system. This aspect will draw a lot of strength from corresponding civil systems as there are a huge number of similarities.

Opportunity for India to use Technology as a Tool of Strategic Competition

In the current environment, India has a few unique advantages that it can leverage towards its march towards leadership. These are—Demographic

Dividends at least for the next 25 years, English speaking population, an innovative bent of mind, an acclaimed leader in Information Technology nee ICT, a vibrant democracy, and resolute leadership.

It is going to be exciting times provided we change the mindset and go beyond traditional hierarchical military organisations.

However, for any nation to gain strategic importance in the world order by leveraging the sustainable competitive advantage it possesses, or can possess, to become a leader in economic, technology and military domains, there has to be a commensurate focus on its Economic and Military strengths. In the emerging information age, India certainly enjoys an inherent advantage over other nations, but is that sufficient for it to become a strategic leader in the emerging world order? The quick answer is yes it can if it handles the situation with foresight and strategic vision. There are two verticals that any nation must develop against the competition to achieve sustainable leadership using emerging technologies. The first is sustainable economic growth based on an indigenous industrial manufacturing base that caters not only for domestic needs but also for the international market, and the second is a strategic dominant military strength that is sustainable. The world has been looking at India as a very big market to be exploited by industrialised countries, especially in the consumer and defence market. They are now sitting up and looking at India with different lenses—as an emerging leader.

The government of India has already taken certain bold steps to ensure that the equipment that is deployed in such a network-centric environment and the weapon systems, etc. which are used in warfighting domain or in critical dual use, like telecom, come from only trusted sources/country, and duly tested. The military will then have to take off from there. It is going to be exciting times provided we change the mindset and go beyond traditional hierarchical military organisations.

In the common domain of civil and military, the government of India has taken certain bold and far-reaching steps, that will be strategic, and will boost the Indian manufacturing, including in the defence area. Both the carrot and the stick have been used to keep inimical agencies oblique countries out and yet Increase the domestic manufacturing base by offering incentives like Production Linked Incentives (PLI). This is adequately matched by policies and laws. A massive clean-up of archaic laws and processes is now underway for the benefit of the nation.

There is competition in all spheres amongst nations, industries and between individuals. To have a competitive advantage, we have to offer differentiated, cost-effective, exclusive, sustainable, and integrated services and products to the world market at appropriate levels as applicable. There will always be competitors who will be trying to enter the market with imitable or substitutable products, lower costs, better bargaining power of suppliers and highlighting disruptive factors prevailing in the internal and external environment. The aim of the country is to dynamically address these challenges, achieve and sustain the leadership position while challenging others, higher in the pecking order than us, in areas where we have inherent advantages.

The four determinants that help achieve global competitive advantage have been very clearly enunciated by Porter in his book "The Competitive Advantage of a Nation". These are—factor conditions, demand conditions, related and supporting industries, and strategy/ rivalry (Porter, 1990). 'The Porter Diamond Theory of National Advantage' explains how factors like Institutions, Infrastructure, IT and automation, R&D, Health, Skilled workforce, the markets, ease of doing business, financial stability, uncomplicated legal and administrative setup and government intent and stability can be facilitated by governments to act as catalysts to improve a country's National Advantage (Porter, 'The Porter Diamond Theory of National Advantage' n.d.).[1]

Fortunately, in the last few years, India has shown an integrated strategic resolve in all the aspects mentioned in the previous paragraph. With a very clear-cut vision, a resolute Indian government has created a favourable business environment with a sound administrative setup, legal backup, sound economic systems and a large skilled workforce to attract foreign investment into India. From expanding the spread of internationally acclaimed academic institutions, creating world-class communication infrastructure, funding indigenous R&D, streamlining the capital markets, adopting international standards, and creating a broad resolute and responsive legal framework, TO displaying a political will to take difficult but decisive disruptive decisions, both externally and internally, spread over the civil and military domain, have made the world sit up and view India as an emerging leader whose precedent-setting actions are being now emulated. The Prime Minister's clarion calls for *Atmanirbhar Bharat* and Make in India initiative are now bearing fruit, thanks to follow-up policies like Gati Shakti, the PLI scheme and proactive actions in cutting-edge technologies like 6G. These actions have tremendously improved the FDI confidence in India.

It is pertinent to note that, hey due to the slew of measures mentioned above, India's positioning in the world Competitive Index has significantly improved as shown below.[2]

- **Economic Performance:** It has improved from 37th in 2021 to 28th in 2022.
- **Government Efficiency:** It has improved from 46th in 2021 to 45th in 2022.
- **Business Efficiency:** It saw a huge improvement from 32nd rank in 2021 to 23rd in 2022.

Another important index is the global innovation index, GII, which ranks countries using digital-age innovation and deep science innovation

which are essential ingredients in the information age. Here too, India ranks 40th among the 132 economies featured by the GII in 2022.[3, 4]

Not only indexation, but practically on the ground too, it is heartening to note that the government of India has focused strongly on the emerging environment and have taken measurable steps to usher in divisions in the Ministry of Information and Electronics Technology (MIETY), Ministry of Defence (MOD), Department of Telecommunications (DOT) and Ministry of External Affairs (MEA) for the purpose of formulating not only technology and its applications but also the accompanying policies and strategy formulations. While the focus is rightly on Make in India, International collaborations haven't been lost sight of.

At the citizen level, the versatility of the Indian mind can be seen in the payment system e.g., UPI, that India has given to the world. It can easily be said that today India is at the head of the curve in the adaptation of a safe and secure digital payments system, one of its kind Aadhar and an integrated ICT network system. Other significant Indian advantages are its Democratic processes, its demographic dividend, unique geo-practical positioning, very large skilled manpower, a notable presence in international technology institutions, acclaimed expertise in software and systems, an innovative population, a new governmental focus on R&D, on startups, and on innovation hubs. With technology now becoming an integral aspect of international relations, foreign policy and military relations, India has already embarked on a path to advance its strategic interests using technological tools, amongst others.

In the recent time, for the first time India has clearly sent out signals of its firm desire for initial self-sufficiency, and later becoming a supplier of defence equipment to the world, by issuing positive indigenisation lists, Defence Acquisition Procedure 2020, opening Defence Production in areas like fighter aircraft, helicopters, submarines and tanks through a strategic partnership model and Innovations for Defence Excellence IDEX. Similarly, on a broader ambit, introducing the concept of Trusted

sources in Telecom and Trusted countries in the new Data protection bill are first-time strategic decisions that avoid isolation and yet protect the Indian interest.

Focus Areas that can Propel India to be a Global Leader in Dual-use Technologies

India needs to focus on developing dual-use technologies for both military and civilian agencies and special attention should be paid to research and development for manufacturing state-of-the-art defence platforms, Defence Minister Rajnath Singh said on October 4 while addressing an event organised by the Defence Research Development Organisation (DRDO).[5]

In dual-use technology, India needs to be focused on areas where it can develop a unique strength that is not easy to replicate so that it can achieve sustained competitive advantage in the focus areas. Clearly, India needs to tap into technologies like AI, AR, VR, Robotics, space and drones delving into its strengths of software development and using its demographic dividend to the utmost. Additionally, as a parallel track, encouraging world manufacturing to shift base into India would certainly help in achieving our goals of a leadership role. It must be kept in view that research and development take time, investment and a talent pool to drive this to compete with the best in the world. The systems that cannot be developed indigenously due to high cost and high-end technology, India must take the route of joint development with strategic partners.

In the services sector, skilled manpower pools and space segments are attractive areas to focus on. In the defence sector, however, India certainly needs to first become self-reliant in its production capabilities of the hardware, weapons, and indigenous software and spend more on Research and Development in critical sectors like defence, communications and cyber. Fortunately, discernable beginnings have been made in this direction by the Government of India.

Conclusion

The world is undergoing a metamorphic change in all sectors as it transits into the Information age. This includes the Defence sector where we see war fighting methodologies getting modified by the infusion of ICTEC in a big way in all aspects of the fighting machine. This is a time when conventional leadership roles are getting disrupted, and we are seeing the emergence of a new world order driven by technology majorly. However, the leadership of a nation can only be sustainable if it is spread over both economic and military spheres. India is uniquely placed in an advantageous position because of its inherent strengths in some technologies, its demographic dividend, and a clear political desire to achieve the leadership mantle. However, care must be taken that we do not spread our resources thin but instead concentrate on a few areas of focus where we not only have strengths, but which will also contribute to India's emergence as a leader in both economic and military domains. India will also have to put more focus on R&D-led indigenisation in dual-use technologies and services.

India is at the cusp of a change, and we must intelligently grab this unique opportunity to obtain a sustainable competitive advantage in our quest of becoming a global leader.

Notes

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Securing of Critical Infrastructure: Lessons Learned for the Indian Armed Forces from the Russia-Ukraine War

Ajinkya Jadhav

Abstract

This commentary analyses the military operations executed by the Russian Army in Ukraine to secure Zaporizhzhia Nuclear Power Plant and Azovstal Steel Plant without major damages so that these assets can be put to use subsequently. The commentary brings out the vital operational parameters required to secure such critical assets. It brings out vital lessons for the Indian Armed Forces to build capacities and to plan and prepare for such missions. It also recommends changes in doctrinal approach and training philosophy in a war scenario. Contingency planning to avoid any nuclear disaster or accident is vital for the success of such missions. The capture of ZNPP and Azovstal by the Russian Armed Forces has added a new dimension to warfare. India needs to plan and prepare for such military operations in future.

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Introduction

Kamandaki, a renowned statesman of ancient India wrote in 'Nitisara or The elements of polity' that 'Territory, allies and wealth' should be gained from war.[1] A just war should be economical and should result in acquiring resources that will enhance the state's economy. The military aim derived would be to capture territory by destroying the enemy's military and the associated war-waging potential. At the operational and tactical level, the formations and units would be tasked to employ all means of modern military technology to destroy the combat forces and capture territory. The military besides destruction and capture of territory has an imp role in securing critical infrastructure in enemy territory which can enhance the economy of the country. The wars of the 21st century are fought under the cloud of the grey zone, the battle lines are blurred even at the tactical level and the influx of disruptive technologies has further made the battle zone more complex.

The Russian campaign against Ukrainian civilian infrastructure would have thousands of potential military targets to choose from power stations, energy supply networks, water resources, internet, rail, and transport hubs. Any attacks that succeeded in disrupting the supply of food or medicines could have a devastating impact on the economy of Ukraine,[2] especially if timed to coincide with the coldest periods of the coming winter season. Destruction or blockade was however not the only military aim of the Russians, securing critical infrastructure such as the operations to secure Europe's largest nuclear plant in Zaporizhzhia, Azovastal Steel plant or the Chornobyl nuclear assets is a unique military operation that has lessons for the Indian Armed Forces to learn. This commentary will focus on the need to build capacities and capabilities

for the Indian Army to ensure the security of critical infrastructure in enemy territory in a war scenario to further the national aim of building the economy. Although there are a large number of critical assets such as dams, power plants, cyber hubs, atomic energy plants, airports, ports, petroleum resources, nuclear plants, and strategic bridges, which need to be secured intact, however, this commentary will focus only on the lessons learnt from the Russo-Ukraine war.

Russo-Ukraine war- Zaporizhzhia Case Study

Zaporizhzhia, is an important town in Ukraine's southeast that houses the largest nuclear power plant in Europe. Ukraine has four nuclear power stations comprising 15 reactors. The Zaporizhzhia nuclear power plant (ZNPP) has six reactors, which can together produce about 5,700 MW of electricity. Nuclear energy caters to about half of Ukraine's power demand. Russian forces attacked the plant on the night of March 3, 2022, early in the invasion, and took control of it relatively easily.[3] The Kremlin's actions around the Zaporizhzhia nuclear power plant represent a new dimension in warfare. While sporadic fighting continued over the following months, the situation escalated dangerously in August 2022 with increased shelling, which the Russians and Ukrainians blamed on each other leading to concerns of a major nuclear disaster. Buildings inside the nuclear complex were hit, though no significant damage was reported. Radiation levels around the site were reported to be stable, meaning there has been no leakage.[4] However, the situation remains extremely volatile. This is the first time that a nuclear installation has been caught in a military conflict, that too one that is in operation. It is very important to analyse the criticality of securing the nuclear plant and the military expertise to execute such a task. Nuclear power plants are built for peacetime operations, not wars. However, the amount of energy these nuclear plants can generate is a huge economic resource for any country which plans to seize it in the eventuality of war.

Technical Parameters to Ensure Safety. In order to plan a complicated military operation to secure a strategic asset in a foreign land, the military must consider certain technical parameters for the safety of the plant.[5] The first being the criticality of maintaining the physical integrity of the facilities consisting of reactors, fuel ponds or radioactive waste stores. The second being no sudden disruption in the safety, security and regulating systems of the reactors. Third, the operating staff must be secure and be able to fulfil their safety and security duties and have the capacity to make decisions free of undue pressure. The fourth point is there must be a secure off-site power supply from the grid for all nuclear sites. The fifth issue being there must be uninterrupted logistical supply chains and transportation to and from the sites. Sixth, there must be effective and functional on-site and off-site radiation monitoring systems and emergency preparedness and response measures; and lastly, there must be reliable communications with the regulator and key technical manpower.

Role of Russian Military. Russian military in a swift and bold operation secured the critical asset of ZNPP on March 3, 2022. It is assessed that the key elements involved were the Spetsnaz and Rosgvardiya.[6] Spetsnaz are the special forces of the Russian military they have close linkages with GRU which is the Russian Intelligence service. Spetsnaz (FSB) Federal Security Service a specialised organisation has a unit named 'Vympel' which consists of four sub-units and is tasked and trained for securing strategic targets, such as nuclear plants, atomic power plants, etc.[7] The 'Rosgvardiya' are the National Guards of the Russian Federation and are mandated to guard important military facilities and are assessed to secure the perimeter of the assets. The exact composition of the force level to execute such an operation is unknown but the technical expertise to secure the nuclear assets to ensure the safety parameters mentioned above was ensured by the military. It brings us to the fact that the task force deputed to secure the nuclear plant had

technical experience as well as the skill to secure such a critical installation without causing a nuclear accident.

The Risk Factor. Securing a nuclear asset in the middle of a conventional war is a unique achievement by the Russian military. This feat comes with a huge amount of risk. This is the first time in the history of warfare that a functional nuclear installation has been caught in a military conflict. By end of August 2022, the last remaining external power supply line to the complex was disrupted due to the shelling and small-arms gunfire and the station had to fall back on emergency generators. Nuclear plants are heavily dependent on external electricity for a variety of needs, including the operation of water pumping systems to keep the reactors cool. The line was restored, but for a few hours, it brought the world to the brink of a major nuclear disaster. The prolonged conflict in the region thus increases the possibility of a nuclear disaster.[8] Modern nuclear reactors are built to withstand considerable shock and impact. They have several layers of reinforced steel and concrete, and also elaborate fire security systems. Most of these reactors can survive earthquakes of magnitude eight or higher. They are also designed to shut down automatically when they sense major natural hazards. Automatic machine gunfire or even artillery shelling is unlikely to cause harm or result in a nuclear accident. However, it is difficult to predict the impact of ICBMs or rocket attacks on the reactors.[9] There is a human element in running a nuclear power plant, the operators are the first and last layers of defence for the facility and the population. They are the first responders to prevent the nuclear accident. Hence, it is pertinent that the staff of the reactor be secured first and protected at all costs to ensure the reactor remains functional.

The possibility of an appreciated major nuclear accident in a war scenario cannot be ruled out. Buildings and water pools used for storing used and unused nuclear fuel rods may not be as strong as the reactor itself, and can suffer significant damage in a rocket or even artillery attack.

The worst thing that could happen is if a site is deliberately or accidentally shelled and the containment building which houses the nuclear reactor is hit. These containment buildings are not designed or built for deliberate shelling. They are built to withstand a minor internal explosion of, say, a pressurised water pipe. But they are not designed to withstand a huge explosion. Zaporizhzhia nuclear reactor is already facing a live threat.[10] Cooling systems powered by external electricity are extremely crucial to the safe operations of nuclear reactors, which have to handle temperatures in the range of thousands of degrees Celsius. A non-functional cooling system can lead to the reactor melting, or exploding, under tremendous heat, resulting in an uncontrolled release of nuclear radiation. There are other threats as well. Rogue elements could try to utilise the war situation to steal nuclear material from the site. The proliferation of Private military companies and their growing role in the ongoing Russo-Ukraine war increases this risk factor. Closer to Indian borders this risk is very real and poses a big challenge in the Indian subcontinent. Ukraine is a signatory to the Nuclear Non-Proliferation Treaty as a non-nuclear weapons state. Each of its nuclear facilities is under IAEA safeguards. That means every bit of nuclear material and fuel, every kilogram of uranium and every gram of plutonium has to be accounted for and reported.

Russia using ZNPP as a Shield and Weapon. As the war progressed post capture of the nuclear plant on March 2022, it shifted from shield to weapon. Russia realised that any issue related to the safety of nuclear power plants will automatically get headlines in the Western media. Russia hopes the threat of nuclear accident will persuade NATO to push for a ceasefire or to end support for Ukraine.[11] Hence, the capture of this strategic asset is a critical weapon in the hands of the Russians.

The Capture of Azovstal Steel Plant

Azovstal is one of the largest metal plants in Europe and thus a huge economic source. For decades, it was key to the Soviet Union's railroad

system and shipbuilding efforts. It was privatised in the 1990s after Ukraine's independence. The massive complex of warehouses, railroad tracks and industrial-strength furnaces sits on four square miles along Mariupol's coast, across the river from the city's downtown district. Before the invasion, the plant employed more than 10,000 people, according to company documents. Buried underneath the plant is a network of bunkers and tunnels dating back to the Soviet era. The Ukrainian army did use this facility as a defensive enclave and put-up stiff resistance to the invading Russian forces. For weeks after the Russian forces laid the siege on this vital asset, these subterranean spaces have become shelters for hundreds of civilians, many of them Azovstal employees their family members and a defensive stronghold for the Ukrainian army.[12] Russia claimed the capture of Mariupol was complete after the last bastion of Azosvtal steel plant fell on May 9, 2022.

Vital assets such as nuclear power plants, electricity power grids, cyber hubs, internet services, natural gas resources, airfields, ports etc might have to be identified for securing intact.

Recommendations for Indian Armed Forces

Identification of Critical Assets. In case of a hot war scenario in the Indian context, it is essential that the military in conjunction with the other government agencies identifies critical assets the capture/seizure of which will further the national aim, enhance the national economy, avoid any disaster/accident, provide rich energy resource to the nation. This is a national effort at the strategic level and the same has to be a whole government effort involving multiple agencies to plan such an operation in conjunction with the military. Vital assets such as nuclear power plants, electricity power grids, cyber hubs, internet services, natural gas resources, airfields, ports etc might have to be identified for securing

intact. Accurate and reliable intelligence is critical for the success of such operations.

Capability Development. The vital lessons brought out during the ongoing Russo-Ukraine war reflect the need for building capacities and developing capabilities to plan and execute such tasks. The assessed composition could be a heterogeneous one with the special forces taking the lead supported by technical experts in the field, force level for perimeter security and adequate air, AAD and missile cover to guard against any strike to avoid any disaster.

Doctrine & Training. This is a unique mission for the armed forces. The Russians have proved that such a task is in the realm of execution. The armed forces are traditionally trained to capture by the employment of firepower, force and shock action. Special forces across the world execute special operations by maintaining continuous strategic surveillance and direct action. Doctrinal changes in our operational philosophy will have to be incorporated by combining stealth and precision to first carry out strategic surveillance and then secure these critical assets with minimum or no damage to the asset. The special forces who are capable of operating in covert as well as overt modes are best suited for such tasks. New mission-specific training methods will have to be incorporated towards the accomplishment of such tasks. A lot will depend on the joint training of the heterogeneous task force which is tailor-made for such a mission.

Contingency Planning. The technical parameters as mentioned above and the safety concerns take priority as any accident would lead to a catastrophe, jeopardising the entire national effort. The major concern in the Indian sub-continent is the unconventional threat. The concern of critical assets falling into the hands of terrorists looms large in this typical grey zone environment. Hence, it is absolutely critical for the Indian Armed Forces to guard against such misadventures which can be a major threat to national security. Timely action by the armed forces to secure such assets is vital in the interest of the country. This is

a complex mission and will have to be deliberated upon with details to cater for all the contingencies. As the situation unfolds in Ukraine more contingencies will emerge and the situation will have to be monitored to draw important lessons from the conflict.

Conclusion

The Russo-Ukraine war has brought out a number of lessons for the entire world. The demonstration of securing vital assets in Ukrainian territory by Russia has been a first of its kind of military operation. Indian Armed Forces should draw out vital lessons in addition to this commentary. Leveraging important assets towards enhancing the economy and furtherance of national aims is crucial for national security, especially in a war scenario. Capacities and capabilities need to be developed to achieve these goals. Planning and preparation will have to be carried out at all levels from strategic to tactical level involving all elements of national machinery. Contingencies will have to be thought of and inculcated in the plans. The capture of ZNPP and Azovstal by the Russian Armed Forces have added a new dimension to warfare. India needs to plan and prepare for such military operations in future.

Notes

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Managing the Imminent Obsolescence of Legacy Platforms

Bimal Monga

"We are seeing the very nature of combat change; tanks alongwith fighter jets and warships are being pushed into obsolescence …"

—Rob Lee, collating the views of military analysts[1]

Abstract

Large weapon platforms have been targeted with increasing ease, so much so, that it raises the alarming spectre of them being Left Out of Battle (LOB), in contemporary wars. They are being challenged by nimbler, easy-to-use, cheaper weapon systems. Not surprisingly fighter jets, warships, tanks and even guns are being pushed towards obsolescence. We therefore require to critically review the future of legacy platforms, especially when similar or much more lethal impact is possible with smaller and smarter systems. Military analysts are unanimous in their view—modern militaries must transition to new tools of warfighting; this will not only obviate being saddled with obsolete or near obsolete weapon platforms but importantly circumvent the pitfalls of preparing for a war of yesterday. A roadmap to effect this transition, however, requires astute planning and intricate stage manage.

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Background

The larger the platform, the easier it is to acquire and target; no wonder large ships, aircraft, tanks and guns are being repeatedly targeted with increasing ease, so much so, that it raises the alarming spectre of them being Left Out of Battle (LOB), in contemporary wars! This development has been rapidly precipitated by the intense exploitation of the erstwhile under-utilised third (vertical) dimension and the electromagnetic spectrum—to not only enhance battlefield transparency but also improve targeting, using multifarious platforms (and domains), lethal and non-lethal, manned and unmanned- all significantly smaller, cheaper and agile.

In the backdrop of such developments, where do large, bulky, legacy platforms fit in? Philips O'Brien analyses, *"Russian invasion of Ukraine (and other recent conflicts) have illustrated the diminishing power of the heavy and expensive units of military power; their role has been challenged by nimbler, easier to use—and crucially, cheaper systems. Tanks, fighter jets and warships are being pushed into obsolescence, giving way to new tools of conflict".*[2] A quick overview of some of the legacy weapon platforms, in recent conflicts around the globe, corroborates O'Brien's View.

Legacy Platforms

Combat Aircraft. The dense air defence (AD) environment combined with the constraints of weather, terrain and payloads, and most importantly the high risk to pilots and aircraft, has increasingly placed, the role of combat aircraft under the scanner. The proliferation and success of cheap, man-pack anti-aircraft weapon systems have starkly stood out in recent conflicts, as has the inability of combat aircraft to operate with erstwhile impunity, due to these very threats. In contrast, the success of drones and loitering munitions, in the very same environment, to supress and destroy ground based assets has been stunning. Admiral James Stavrides (Retired), US Navy has correctly analysed the changing scenario, "the concept of close air support is increasingly at risk … the capability to

use swarm drones to attack relatively less manoeuvrable platforms augurs badly for expensive manned aircraft …"[3]

Ships. The slow-moving, large aircraft carriers and warships are now being viewed as lucrative high-value targets which can be acquired, trailed and destroyed without much ado by comparatively cheaper missiles. The example of Moskva, the flagship of the Russian Black Sea Fleet, being sunk by two Ukrainian homemade anti-ship missiles, is a reflection of the challenges which await large sea-borne platforms. China, in fact, to offset the overwhelming advantages of the USA, in the sphere of large warships, had much earlier inducted missiles, often referred to as the 'Carrier Killers'. However, with her growing ambitions to be counted amongst the premier seafaring nations, the shoe is firmly on the other foot now; smaller littoral nations have prepared their own arsenal of 'Carrier Missiles'—to do to China, what it always aimed to do to the US Navy! The perceived primacy of huge aircraft carriers over unmanned sea drones, torpedoes and other disruptive weapon systems—all cheaper, smaller both in size and signature, and capable of swamping and sinking the enemy ships with much lesser effort and resources—is being challenged, and rightly so.

Tanks. The vulnerability of tanks has been ruthlessly exploited by drones and loitering munitions, one conflict after another, leaving behind an ugly trail of metallic carcasses; this has prompted military thinkers to raise a number of questions. Has the easy accessibility of cheap and lethal drones, and the proliferation of anti-tank missiles, hastened the obituary of tanks on the battlefield? Will they turn out to be battleships of the 21st century, rendered obsolete by new technologies and tactics? Is it time to consider reducing tank inventories (as the US Marine Corps is already doing) and use the resources to move towards new systems, notably much smaller, nimbler and unmanned?[4] Can new weapon systems like Loitering Munitions and Unmanned Ground Vehicles (UGVs) be worthy successors of tanks? Is it prudent to pursue time and cost-intensive programmes to develop and induct a new generation of tanks?

Jacob Parakilas, Rand Military Researcher sums it up, "The tank was key at one point; now drones may be the most decisive weapon system".[5] There are no easy answers; smaller, lighter and more agile tanks backed up with revised tactics and contemporary employment philosophies, will not only have to overcome the challenges posed by niche platforms but more importantly, embrace them into their own fold.

Guns. Long-range firepower, earlier the exclusive domain of artillery, has been extensively supplemented with the use of drones and missiles, in recent conflicts—importantly, with telling effect; this has led to certain pertinent questions—are loitering munitions and missiles the future of artillery? Or will, cheaper salvos fired over longer distances by tubular artillery, continue to hold sway on the battlefield, as they have, since WW-I? The idea to replace guns with other systems like drones/ loiter munitions, etc. might seem preposterous at present, especially due to their existing constraints of the prohibitive cost, limited TNT, susceptibility to EW jamming and inability to achieve preponderance of firepower. However, with higher volumes and better technology, the cost will eventually go down and the capability to inflict damage is bound to be scaled up, and the swarm drones may, in future, be the answer to a preponderance of firepower. The trends worldwide, suggest that major global powers are investing a lot of resources in developing modern howitzers and ammunition systems, which can fire deeper, with greater precision and lethality. The attendant advantages of overwhelming firepower—at a reasonable cost, and most significantly, with lesser danger to own troops and equipment, continues to make the 'idea of artillery', enduring. However, this is not to discount the fact—that slow-moving and vulnerable towed artillery will have to be replaced with new systems, sooner rather than later. Franz-Stefan Gady, Research Fellow, IISS sums up, "A debate should certainly happen about the future of towed tube artillery; although I would caution to hasten against reaching conclusions about its obsoleteness".[6]

EW Platforms. Similarly, the wide range of EW platforms and different kinds of radars and jammers backed up with massive generators, large vehicles and easy-to-pick-up antennas and canopies have been the first ones to be targeted in almost all conflicts—rendering the adversary blind, with the first hard or soft strike. Do we, therefore, require to look for some alternatives—which may be smaller, have a less prominent signature and are seemingly innocuous? Various nations are already in the advanced stages of developing powerful, composite and compact, mobile systems, which can perform all the spectrum-related functions from a single platform. These developments are not only transformational but revolutionary.

Some Fundamental Questions

In the backdrop of such developments, the diminishing relevance of legacy platforms and the increasing significance of smaller, niche weapon systems are stark. This leads us to three fundamental questions:

- Do we require to persist with old legacy platforms or would a transition to new weapon systems which are better suited to the wars of the future be more prudent? In the overall context, *is the platform important or the effect?*
- The inventories of large militaries are so densely populated with traditional weapon platforms, that any change is bound to be resisted. *Therefore, what is the roadmap for initiating a change in the weapon profile and mindsight of the decision makers?*
- The overwhelming advantages of legacy platforms have been to a great extent countered and negated by cheaper, smaller weapon systems. Technology has ensured that the cheaper and easy-to-proliferate 'antidote' of any new weapon system, comes up in near-same-timeframe as the new weapon system itself. *So are we staring at a battlefield where the defender holds all the aces?*

Let us analyse each of these aspects separately.

New weapon systems and technologies have exposed the constraints of large platforms, notably with respect to their survivability, mobility, obsolescence, cost and manning.

Are Platforms Important or the Effect?

Nations, over the last two centuries, have built their capacities around expensive and large platforms; therefore—larger ships, aircraft, tanks and guns, overwhelm the inventory of powerful militaries. While such large platforms have served well, in various conflicts, including the World Wars, the conviction that—'bigger the weapon platform, the better it is', so deeply entrenched in our mindsets and engraved into military philosophies—is being challenged, with each military campaign. New weapon systems and technologies have exposed the constraints of large platforms, notably with respect to their survivability, mobility, obsolescence, cost and manning. Militaries today are at loss to comprehend and absorb Rapid Revolution in Weapon Technology (RRWT), triggered by niche hi-tech systems, which not only target the vulnerabilities of such massive platforms, but are poised to become viable and effective replacements for these very platforms. The concept of 'large *and few*' has been replaced with '*small and many*'.

Philips O'Brien[7] states, "*… Russia's botched invasion of Ukraine has illustrated the diminishing power of heavy and expensive military power … there is an urgent requirement of pivoting away from the platform-centric view of warfare." Seth Moulton, an Iraq War Veterans, points out "… look at weapons which are on top of the Ukrainian's wish list; it is not towed howitzers (or tanks or fighter aircraft) … on top of their list are armed drones, anti-tank missiles and anti-ship missiles"*. The question, therefore—are whether the platforms are important or the effect? The writing on the wall is clear and so is the answer—platforms are merely the means to deliver the effect; if a task can be performed by a nimbler,

smaller and more survivable weapon system, then why persist with bulky legacy platforms, weighed down by their inherent constraints?

Initiating A Changeover in the Weapon Profile and Thought Process

New warfighting technologies call for new and niche systems … all this costs money and resources. The only way to invest in new capabilities is by divesting oneself of legacy capabilities. The US Marine Corps has in fact made 'divest to invest' the cornerstone of its modernization effort. It is reducing infantry battalions, aircraft, artillery and tanks, to free up resources to facilitate the induction of new technology weapon systems. General David Berger, US Marine Commandant is emphatic, *"… We will have to operate under the assumption that we will not receive additional resources; we must therefore divest certain existing capabilities to free resources for essential new capabilities"*.[8]

However, to put things into perspective, the legacy platforms which served us well over the last century, cannot be wished away overnight—their replacement requires time, and resources—which are scarce; importantly, doctrines and philosophies of their employment require to be formulated. A roadmap for their induction, nonetheless, needs to be devised:

- At first, instance, upgrade and modernize a proportion of existing legacy platforms to enhance their survivability and lethality—to ensure their continued relevance and efficacy.
- Plan induction of new systems in a phased manner, carefully synchronising their induction with the de-induction of old platforms.
- Stage-manage the transition carefully to ensure minimum turbulence and disruption; allow new systems to supplement existing platforms for a period of time—before completely replacing them.
- Concurrently revise employment philosophies of legacy platforms and devise new doctrines for new systems.

The massacre of Russian legacy platforms like tanks, aircraft and helicopters, in Ukraine is therefore going to be the norm and not an exception.

This exercise is however not going to be easily accepted, as some of the military leaders continue to question the efficacy and longevity of the 'so-called new capacities, to be built at the cost of the 'tried and tested' platforms. "… *political and military leaders will have to, in fact, start conceiving an entirely different battlefield, full of lighter, smaller, more mobile, and in many cases autonomous or remotely operated weapons*".[9] They will have to *come to terms with the concept of having an aircraft without a pilot, a tank without crew, a ship without a captain (or a gun without a gunner) … Seth Moulton, bluntly states "today's dissenting Generals are failing to comprehend how much technology is changing the battlefield and how quickly the services must adapt …*"

Moulton's thoughts, on this aspect, are profound—*we can afford to be over-invested in a new type of warfare that never comes to pass, rather than be under-invested in this new type of warfare that does come to pass.*

Does the Defender Hold All Aces on the Battlefield Now?

It is assessed by military analysts that anti-tank and anti-aircraft weapons will not only achieve longer ranges, but their lethality and accuracy will also improve manifold; similarly, drones, other unmanned platforms and missiles will have improved ranges and endurance, smaller signatures and enhanced lethality. Such capabilities along with other disruptive technologies will form the cornerstone of a defender's inventory and enable him to keep at bay, if not defeat much stronger adversaries. The massacre of Russian legacy platforms like tanks, aircraft and helicopters, in Ukraine is therefore going to be the norm and not an exception. *Similarly, "… Navies which want to risk having their ships near the shore will have to contend with huge salvos of anti-ship missiles and drones … investing in*

large World War-II era material such as heavy tanks, enormous aircraft carriers and super expensive fixed-wing aircraft has never been riskier … as less expensive but lethal systems continue to improve, the investments required to protect larger, more expensive weapons systems will be financially crippling …".[10] The dice, in today's battlefield, is heavily loaded in favour of the defender—who is heavily armed with weapons to target the very same legacy platforms, which not so far back, would have assured certain victory. T.X. Hammes summarises, "… *with an improvement in defensive firepower—the forward movement by the attacker has been made very difficult; the balance of modern warfare has inexorably titled against the attacker*".[11]

The defender, however, cannot afford to sit smugly. A focused attacker will always find ways to overcome the advantages of the defender, by innovative use of weapons or tactics. For instance along the Northern Borders, where the Indian Army as a defender holds a disproportionate advantage, Lt Gen Panag (Retd) feels the PLA can neutralise the 'predominance of the defence' in high altitude terrain by not getting involved in "close infantry combat" over unfavourable terrain. If at all it chooses to use force, its pattern of attack will be driven by high-end technology with overwhelming use of PGMs, cyber and electronic warfare. The much romanticised 'blood and guts' close combat is a relic of the last century.[12]

Conclusion

> 'In 20 years, when we look back, I believe that it will be difficult for us to imagine how we fought without these (niche) systems.'
>
> —Dr Glenn Lamartin, US Defence Systems (AT&L)

Rapid Revolution in Weapon Technology (PRWT) has spurred development in a class of smaller, cheaper, smarter and more agile platforms which are threatening to nudge old legacy platforms out of the battlefield.

Military analysts are unanimous in their view—modern militaries must transition to new forms and tools of warfighting; this will not only obviate being saddled with obsolete or near obsolete weapon platforms but also circumvent the pitfalls of preparing for a war of yesterday. The task is challenging as it requires resources and more importantly a willingness to accept the stark reality and move forward. As we go along, many more transformational and niche systems and technologies will emerge, at a pace faster than we have been accustomed to; our planning, will therefore have to be flexible, dynamic and nimble-footed to not only absorb new technologies and nudge out old systems, but most importantly embrace new ideas.

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Book Reviews

War Transformed: The Future of Twenty-First-Century Great Power Competition and Conflict
Mick Ryan

Naval Institute Press (2022)
ISBN: 978-1682477410, 312 pp., Rs 3481

Vaibhav Kullashri

The global geopolitical, geo-economical, and geo-strategical landscape is changing at a rapid pace. On the one hand, the Russia-Ukraine war has forced the military pandits to rethink conventional means of warfare, negating the idea that war in the future will be short and precise. On the other hand, the possibility of a nuclear strike is looming large with so much uncertainty. The emergence of China-US rivalry, the tumultuous future of Taiwan and adjoining areas, persistent economic and political instability in and around the Indian subcontinent, and the economic slowdown of the European Union are the events that will shape the future discourse on conflict globally.

War is a constant in human civilisation and will continue to remain so. With this context, the book *War Transformed: The Future of Twenty-First-Century Great Power Competition and Conflict* by Maj Gen Mick Ryan is timely and relevant for future military strategies. As a retired

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Australian army general, Mick Ryan tries to put his experience, with a career spanning more than 30 years, in words. His key focus remains on the disruption caused by the emergence of China, the evolution of technology, and the emphasis on professional military education. Released just before the ongoing Russia-Ukraine crisis, the renowned General is correct when he says that technology alone will not prove decisive in the 21st century and humans will continue to fight with the tools in hand. He was also right when he mentioned that surprise would continue to remain an enduring aspect of international relations which generally does not include sudden and unanticipated events but goes beyond that. Here, he mentioned Sun Tzu's dictum, which says, "Attack where they (the enemy) are unprepared. Go forth where they will not expect it".

In the 'era of acceleration,' the author mentioned that for the fourth industrial revolution, rapid change is happening in demography, information technology, biotechnology, space, communication, and many more. These changes fundamentally change how societies interact and nations compete among themselves. These changes propel militaries worldwide to change, and if they fail to do so, they will be defeated; therefore, they have no choice but to adapt to these military revolutions. The militaries of the aspiring nation must undergo the arduous task of developing strategy, building a new organisation, and educating and developing people to face the emerging challenge in the 21st century.

The theme which resonates throughout the book is that technology alone cannot be a decisive factor, as in current circumstances, it is the level playing field. Technology development remains crucial, but combining technology with new ideas and organisation will prove decisive in future wars. Therefore, how factors play an essential role when technology is at play. Those who know how are the forerunners in the revolution in military affairs. The author describes it more as a cultural phenomenon and emphasizes professional military education, which according to him, will play an essential role in future conflicts.

The six themes that cover the author's argument are; first, war is inevitable and remains a human preoccupation. Second, military power is not only about the military but goes beyond it. Third, it is important to adopt change at every level to face the upcoming future challenges. Fourth, the ethical aspect will be crucial in the future human-machine decision-making process. Fifth, it is crucial to examine how different people perceive war differently. Lastly, professional military education is important to have a wider ecosystem of military education.

While the nature of war is constant and will remain so, the character of the war is continuously changing. The author highlighted technology as a critical element in changing the character of warfare. Also, the book stands out in the vast array of sources and expert opinions that the author has given to justify his argument. The book focuses on China's rise and the disruption it is causing to the current global order.

In four chapters and conclusion, the author tries to review how technology and the new strategic competition drive different ways of thinking about military operations and institutions. In the introduction, the author put forward China's belligerent attitude at the Indian border and how it shapes the future course of action for both militaries. Here, he mentioned that the leaders that will take existing ideas and evolve them into new war-fighting strategies and concepts would have an edge in future conflicts.

The first chapter examines the transformation that occurred during the industrial revolution and how it changed the war, military organisation, and mainly the nation's war-making capacity. The chapter further examines the changes that the current industrial revolution, fourth, is making and how its key aspect can be understood while thinking about the possible war in the future. Further, the second chapter completely examines the war. Here, the author brought about the whole record of warfighting since the evolution of humans and concluded that war remains a constant phenomenon. It also examines the key determinants

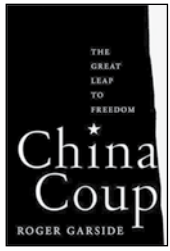
for changing the character of the war and how military power can exploit those changes for their benefit; thus, understanding the war becomes critical for policymakers in general and the military in particular.

Chapter 3 elaborates on the effectiveness of military institutions and their idea in shaping the future course of the war. It dwells on the idea of what makes a military organisation effective, and it identifies the character of war as the key element in shaping effective military institutions. Chapter 4 is unique in the sense that it focuses on the people who fight a war and underlines the need for evolution in the recruitment, training, and development of leadership among military people. The man behind the machine remains the crucial element in the face of war, and their capacity and capability to thrive in a more lethal, ambiguous, and challenging environment are crucial.

At last, the conclusion puts forward all the aspects of ideas, organisation and people to build future military power. It takes into consideration that nations must adapt to the enduring change to keep themselves relevant. It lays out a series of propositions that are designed for military leaders to develop a strategy for the 21st century. It is up to the military institution to absorb or adopt the change and take risks to provide their nation with a competitive edge in the decades to come, which will be generally uncertain and challenging.

All in all, the book justifies the title and is a must-read for all military professionals and also for students of international relations and defence and strategic studies. Also, the book must be part of war college curricula as it has the potential to spark debate and discussion among the policymakers for creating military institutions and combining technology and ideas with those institutions for a battle ready for the future.

China Coup: The Great Leap to Freedom
Roger Garside



University of California Press (2021)
ISBN: 978-0520380974, 256 pp., Rs. 1729

Ashu Maan

> *"Through painstaking efforts, the Party has found a second answer to the question of how to escape the historical cycle of rise and fall. The answer is self-reform. We have significantly boosted the Party's ability to purify, improve, renew, and excel itself, addressed the problem of lax and weak self-governance in Party organizations at the root, and steadily fostered and developed a political atmosphere of integrity within the Party. By doing so, we have ensured that the Party will never change its nature, its conviction, or its character."*

The above lines were spoken by Xi Jinping in his speech at the 20th National Congress of the Communist Party of China (CPC). In China, there is a belief that what rise ultimately falls and what falls ultimately rises, and there is no escaping this cycle. This was aptly depicted in the 'Romance of the Three kingdoms,' written during the Ming Dynasty (1368-1644) by Luo Guanzhong.

The central theme of "China Coup: The Great Leap to Freedom" is the change in the political structure of China. The author, Roger Garside, lays out a hypothesis that there will be a coup d'Etat in the CPC, perpetrated by none other than the outgoing premier Li Keqiang. The

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book states that the coup will start with the United States Securities and Exchange Commission (SEC) announcing 'suspension of trading on all US exchanges of the securities issued by five of the Chinese companies with the highest capital valuations. The suspension of trading sets into motion a plan laid out by Li and Wang Yang that ultimately leads to Xi's forceful resignation backed by the Standing Committee of the Politburo.

However, the coup is not the boldest claim or the most far-fetched idea of the author. The author further goes on to claim that the coup will bring forth political and economic reforms in China that would include democracy, economic liberalisation, and rule of law. As far as wishful thinking goes, the author's assertion of China becoming a democratic country takes the cake.

Xi Jinping is the most powerful leader in CPC since Mao Zedong. His dominance in the party has made him a modern-day 'emperor' after he abolished the term limit for the President and virtually became China's "President for Life." The author predicted a coup in the party before the 20th Party Congress. However, the party congress has happened and not only did a coup not take place, the author's protagonists i.e., Li Keqiang and Wang Yang have been excluded from the politburo. Although to the author's credit, some anomaly did happen before the Party congress with rumours of a coup d'Etat.

The book is divided into ten chapters. The first and the last chapter are a semi-fictitious accounts of the coup and its aftermath based on real people. The eight chapters in between form the main body of the book and deal with the underlying reasons for the coup. The main body talks about the apprehensions of the Party, the proliferation of individualism in China, the lack of morality in public, the huge internal debt, and corruption. If the body of the book is summarised in a sentence it can be termed as "Everything that is Wrong with China."

Garside's analysis and theory are backed by his experience as a long-time diplomat who served in Beijing during the cultural revolution (1966-

1976), a stint at the World Bank and the London Stock Exchange, and as a Professor of China Studies at the US Navy Post-Graduate School. Garside has pointed towards a combination of factors that can lead to a coup within the Party. First, he draws a historical parallel where he compares Xi with Mao Zedong. He states the mayhem brought forth in the Party and China due to Mao's hard-line campaigns and economic stance and compares them to Xi's outlook on economic and foreign policy and their effect on the Party. The second factor is Xi's assertive stance on foreign policy. The Party believes that Xi's "Wolf-Warrior Diplomacy" has put China on a collision course with the US Due to China's assertive foreign policy, autarkic economic policy, and emphasis on ideology under Xi, the US deems China as a challenge to the rules-based world order established after the second world war.

Garside's book will have a huge appeal among those who believe in the far-fetched idea of China becoming a liberal democracy with an open economy, rule of law, human rights, and follower of rules-based order. However, the argument seems unconvincing seeing the current scenario in the Party. While the idea of an internal coup in the Party can be entertained up to an extent, imagining a democratic China in the short-term is merely wishful thinking.

Coming to the prospects of a coup in the Party. Xi Jinping has become the most powerful leader in the Party since Mao. He has packed the politburo with loyalists in the 20th Party Congress. The people Xi has chosen have no source of power other than Xi and are unlikely to even show dissent against him, conspiring a coup is virtually impossible. Second, even the Central Military Commission (CMC) has filled Xi with a loyalist, patrons, and people with similar ideological leanings. This also makes it very difficult for the People's Liberation Army (PLA) to go against Xi. Albeit there is large-scale public anger against Xi due to Zero Covid Policy. However, in the absence of a leader, China's population doesn't have the capability or the capacity to organise a revolution against

Xi. While the protests in China are not being ruthlessly suppressed yet, Xi is likely to follow the Hong Kong playbook and deal with the perpetrators surreptitiously. And as Garside has mentioned, China's internal security budget under Xi has superseded the external security budget thus indicating Xi's iron hold over the public.

However, political change is not impossible in China. It is bound to happen sooner or later. As mentioned earlier in the review, China follows a 'cycle of rise and fall' and the Party is at its zenith. It is rife with corruption, is out of ideas, and is averse to change. This rigidity in the Party and aversion to change will surely be responsible for its fall. Although that doesn't mean that China will become a democracy. The fall of the Party can bring forth chaos and instability in China. It can also result in hardliners taking over and taking China backwards, rather than forward. In conclusion, the possibilities are interminable, and it is not necessary that a political change will bring forth democracy, it can bring a power much worse than Xi Jinping.

All said and done, Garside's book makes up for an interesting read. It is a melting pot of fantasy, information, scenarios, and exciting ideas. The book reminds us that the Party is not a cohesive unit and there are deep divisions within. It raises a pertinent question of political instability in China. Usually, Party leaders have chosen their successors, even Mao chose Hua Guofeng. But Xi has been averse to choosing a successor, and that can result in a political struggle and instability in case of his sudden death or incapacity. With China's current political and economic standing in the world, that instability can have consequences for the whole world.

The book is an interesting read for beginners in China Studies. Moreover, the highly dynamic nature of China's Political system doesn't completely rule out the possibility of a Coup but such a Coup, if it happens, will be to reassert the dominance of the Party rather than bring about democracy.

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