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EMERGING TRENDS IN WARFARE: STRATEGISING FOR THE NEXT DECADE

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INTRODUCTION

Over the last decade, the world has witnessed the increasing usage of grey zone warfare. The blurred lines between peace and war are becoming a bone of contention for traditional and conservative military practitioners. Hybrid, asymmetric and non-kinetic avataars of warfare are raising their diabolic heads with such regularity that even those militaries which had quantitative and qualitative superiority, are standing up and taking notice. Conflicts are becoming ubiquitous in Eastern Europe, the Asian and African continents due to societal stresses based on ethnic polarities, migratory pressures and fissiparous tendencies, all of which are exacerbated by the involvement and interference of extra-regional powers due to ideological disparities. With such forms of warfare gaining predominance, Clausewitzian axioms are coming under greater scrutiny for their validity in the transformed domain of warfare.

There is increasing translucency of conflict zones in both time and space domains with a rising number of non-state and rogue state actors acting in isolation/collaboration. The rogue state, however, remains a matter of

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perception, driven largely by how the US sees the nation as per its own national interest. Anyone challenging the hegemony of the US is viewed with suspicion and labelled as a potential rogue state.

PSYOPS (Psychological Operations) has has become one of the most important tools of statecraft and an instrument of subtle warfare. Influence operations are being executed through the Media, Information Warfare (IW) and Cyber (MIC) elements to Subvert, Alienate, Influence and Lure (SAIL ops) the gullible population. Mass opinion and the population have metaphorically set sail in unknown waters. China is a proponent of the age old Sun Tzu axiom i.e. "*To subdue the enemy without fighting is the acme of skill*".[1] If war is a contest of wills, the contest can be won by subverting the national will and psyche through PSYOPS and without firing a single round.

The exponential growth in technology projected in the next 20 years based on developments in Artificial Intelligence (AI), Machine Learning (ML), big data analytics, Quantum Computing (QC), Blockchain Technology (BcT), information dominance and Neurocognitive Weapon Systems (NcWS) will pose newer challenges to managing conflicts. What the Russian President Vladimir Putin recently said, "*The nation that leads in AI will be the ruler of the world*"[2] may be a little narrow perspective since AI is a sub-set of the entire technological matrix. In a broader and real sense, "*Whoever controls and exploits information optimally and exercises info dominance, will lead the*

1. Mark Mc Neilly, *Sun Tsu and the Art of Modern Warfare* (Oxford University Press 2001), p. 18.
2. "Putin: Leader in Artificial Intellegence will Rule World", The Associated Press, CNBC, Published on September 4, 2017. Accessed on January 30, 2022, at https://www.cnbc.com/2017/09/04/putin-leader-in-artificial-intelligence-will-rule-world.html.

world". AI/ML, big data, robotics, networks, QC, BcT, neurocognition, etc. depend primarily on information.

Nations that have the ability to affect operations from, through, and to, space, would retain the proverbial high ground and achieve information dominance.

ENVIRONMENT SCAN: NEXT TWO DECADES

In a decade or two, space is likely to become the dominant domain of warfare. *From Space, To Space and Through Space* would be the central theme in technology as well as conflicts. Nations that have the ability to affect operations from, through, and to, space, would retain the proverbial high ground and achieve information dominance. Already, think-tanks in the US and China are prophesising that the role of land-based forces is likely to diminish considerably. In fact, as per many think-tanks and modern armies, "*Tank detractors also point to the Dutch decision to disband their entire tank force in 2011, the US Marine Corps' current disbanding of its tank units, and reports that the British may soon get rid of their tanks as proof that the tank's days are over*".[3] One such think-tank views the next decade as the end of tank warfare totally. With the advent of slaughterbots of varying sizes, targeting armoured vehicles can become very cost-effective and simple. Survivability of armour would be very difficult since it is difficult to counter the slaughterbots due to their miniature size and their lethality. The attack and armed helicopters are also sounding the death-knell of the armoured forces. Also, it is clear that the role of air and space vectors would grow exponentially. However, the recent Russia-Ukraine conflict apparently indicates otherwise; armoured columns extending over 40 miles! ……unchallenged and with no threats. That could possibly be due to subversion and destruction of the Ukrainian air power. Surprisingly, this conflict is not unfolding on predicted lines: no major cyber attacks, no substantive usage of unmanned platforms, no IW

3. Benjamin Brimelow, "A Brief, Bloody War in a Corner of Asia is a Warning About Why the Tank's Days of Dominance may be Over", *Business Insider India*, November 25, 2020. Accessed on February 7, 2022.

campaigns, no PSYOPS by the aggressor despite a heavy misinformation campaign by the Western media. Therefore, drawing conclusions from such a campaign may be premature.

Internationally, targeting the state leadership through cyber operations has become *de jure* for the major powers. Nations use cyber options to influence electoral processes for control over such states, displace hostile leaderships and instate leaderships amenable to control. There is also a growing trend of reduced tolerance to transgressions by state heads, which gets amplified by the international media to subvert the hostile leadership.

In the last decade, an emerging trend has been that of the growing stature of dictators/authoritarian leaders who are challenging democracies and the new world order. Non-acceptance of the supremacy of hegemonic powers has grown considerably due to growing asymmetric capabilities and reduced aversion to risk taking. Hybrid/grey zone tactics are facilitating the capability to harass major powers without much attributability. Most nations are yet to define the bar where the grey zone tactics cross the line between peace and conflict. The dictators/authoritarian leaders are questioning the democratic and capitalists ideals and the notion of the white man's superiority.

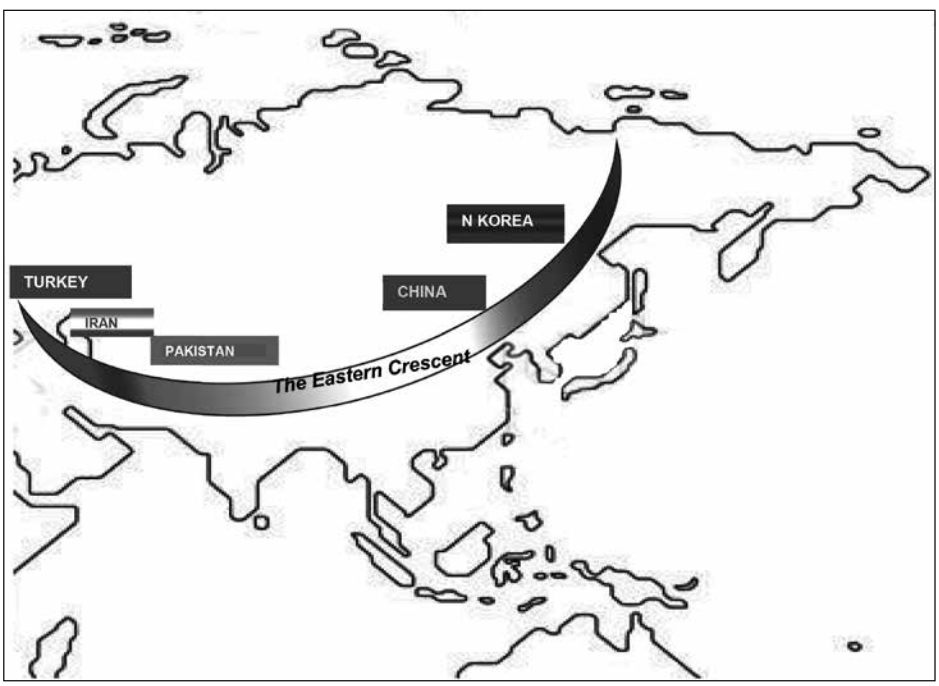
Most military theorists and strategists emphasise that future wars are likely to be short, swift wars … but … *may be not*! The possibility of protracted wars between groups of nations in alliances cannot be ruled out. Growing dynamic alliances with changing geopolitical situations and geoeconomic needs are surfacing every year. It's almost as if there is a race to join or form alliances. The North Atlantic Treaty Organisation (NATO), (Japan) Australia, United Kingdom, United States (J)(AUKUS), Quadrilateral Security Dialogue (QUAD) vs The Eastern Crescent (TEC)……. a likely worldwide conflict? Japan has shown as inclination to join AUKUS, while France has shown its disgruntlement at exclusion from the same. The QUAD's growing membership, with South Korea, Vietnam and New Zealand keen to join the QUAD+[4] is worrying the dragon. There are indications of expanding the

4. Jagannath Panda, "Making 'Quad Plus' a Reality", *The Diplomat*, January 13, 2022. Accessed on January 30, 2022.

QUAD to PENTA or HEXA to rope in as many allies as possible to counter the growing belligerence of the fire-spewing dragon (China) and the bellicose bear (Russia).

To counter the growing threat of the QUAD+/(J)AUKUS, another possible counter-alliance that is emerging is *The Eastern Crescent of dictatorships* (see Fig. 1). Turkey, Iran, Pakistan and China are already in an informal anti-US grouping. Only time will tell if North Korea will join this fledgling alliance against democracies. Most of these countries are headed by either a dictator or an authoritarian leader/military, and their leaders have consolidated their positions through constitutional amendments in the recent past (Turkey, China, Russia).

Fig 1: The Eastern Crescent of Dictatorships



The inherent anti-democratic cultural bias amongst these nations keeps them at loggerheads with liberal societies. China and Russia, on the opening

The changing international order and concepts of warfare have also heralded newer concepts of victory. Territorial gain may become secondary unless it has attached economic/ military utility, and absolute destruction of the enemy is possibly prohibitive in the present world order.

day of the Winter Olympics, declared a "no limits" partnership, backing each other over stand-offs on Ukraine and Taiwan, with a promise to collaborate more against the West.[5] A conflict between two nations amongst the opposing alliances may draw the others in support—diplomatically, informationally, economically and militarily (direct/indirect depending on the changing terms of the alliance) either individually or collectively. Collective action by a whole or part of an alliance could snowball out of proportion to invite the entire alliance to pit itself against the other, involving a large population on earth in conflict, leading to disastrous consequences for humanity.

The three countries likely to be most affected by any conflict initiated by the TEC are the USA, Japan and India: the USA, since most of these nations are passionately hostile to the US and harbour deep-seated resentment at US hegemony; and Japan and India would get drawn into the conflict not just due to their affiliation but more so because they sit astride the crescent and have traditional bitterness with the chief protagonist, China. India has two hostiles to contend with, both residing at the centre of the crescent and with which India has fought wars and had multiple conflicts. The prognosis does not look good for India. It is sitting on a tinderbox and does not have a reliable ally. Russia is going way beyond the horizon whilst the USA cannot be relied upon, based on decades of our experience as well as the recent volte-face witnessed in the case of Ukraine.

The changing international order and concepts of warfare have also heralded newer concepts of victory. Territorial gain may become secondary unless it has attached economic/military utility, and absolute destruction

5. Tony Munroe, Andrew Osborn, and Humeyra Pamuk, Reuters, February 5, 2022, https://www.reuters.com/. Accessed on February 7, 2022.

of the enemy is possibly prohibitive in the present world order, especially amongst nuclear armed adversaries. Other notions of victory would become predominant. Moral ascendance, ideological suppression, diplomatic shaming, economic sanctions/ deprivation/exclusion, stalemate in contests, denial of access, etc. are the emerging notions of victory. Inter-state conflicts have three primary bases viz. economic, ideological and isms. All other reasons eventually fall under these three. The notions of victory would emerge from the basis of conflict and the cost of conflict in all-round terms.

India, as a nation, needs to awaken to the challenge and catapult its military deterrence capabilities in future wars to levels beyond the US and Chinese capabilities, especially in asymmetric warfare capabilities and information dominance.

What this portends for India is the desperate need to modernise at a galactic pace and put its money where its mouth is. India, as a nation, needs to awaken to the challenge and catapult its military deterrence capabilities in future wars to levels beyond the US and Chinese capabilities, especially in asymmetric warfare capabilities and information dominance. This will need concerted will, effort and funding, along with a lot of tightening of the belt at the national and military levels. Conventional, traditional and orthodox thought processes need to be purged. Progressive and non-geometric concepts need to be encouraged and adopted. The subsequent paragraphs indulge in some crystal ball gazing on the futuristic technologies that are likely to shape the conflict zone.

CHANGING FACE OF TECHNOLOGY

"It is currently estimated that AI and robotic systems will be ubiquitous across the operational framework of 2035."[6] Humans and computers have been working together everywhere for decades now, but as separate entities. The machines were undertaking clearly delineated automated functions.

6. RAS MDO White Paper 2018: 25, https://info.publicintelligence.net/. Accessed on January 29, 2022.

This distinction is now wearing away fast, as AI and neuro-technological progress is ramping up and eroding the distinction between human and machine cognition. Neurotechnology, which is used to detect, affect, and target human brain activity (e.g. improve, repair, degrade or manipulate cognitive skills), on the one hand, and AI, which is used in computers, sensors, and robotic systems, on the other, are complementing each other to evolve the future in neural networks. A 'neural network' is a specific form of AI, consisting of a set of algorithms resembling the working human brain. A 'neuron' in a neural network is a mathematical function that collects and classifies information according to a specific architecture.[7]

Neurocognitive or cyborg networks, on the other hand, are hybrid systems of human and artificial intelligence, i.e. brain-computer networks that integrate the cognitive advantages of humans and computers. The neuro-cognitive warrior is a neurally enhanced and integrated system structure, boosting human cognition with machine capabilities. The implications of *integrating*, not just combining, or 'teaming' human and machine cognition are enormous.[8] In another decade or two, this line may blur to such an extent that this distinction may even become obsolete.

Neuroscientific progress has been made in areas such as neuro-intelligence (intelligence fusion and predictive analytics), neurocognitive enhancement of war-fighters (adaptive and interactive brain-computer interfaces), and neuroweaponry (target recognition, coordination, and control of weapon systems), using AI for human decision support and cognitive enhancement.[9]

China is already developing 6G technology, which is 100 times faster than 5G and with wireless transmission speeds of 206.25 gbps, it can penetrate even the '*black barrier*' of hypersonic weapons. According to Chinese research, ground experiment findings have revealed that these terahertz waves may easily enter and exit the plasma created by a hypersonic weapon at 10 times

7. James Chen, "Neural Networks", December 8, 2021, https://www.investopedia.com/terms/n/neuralnetwork.asp. Accessed on January 29, 2022.
8. Ibid.
9. K. Nørgaard, and M. Linden-Vørnle. "Cyborgs, Neuroweapons, and Network Command", *Scandinavian Journal of Military Studies*, 4(1), 94–107. DOI: http://doi.org/10.31374/sjms.86

the speed of sound or even faster "as if the black barrier does not exist."[10] However, despite China claiming success, it is still at a very nascent stage, with ranges achieved below 60 km on the ground, nowhere near what is desired.

The technological advancements are enabling a quantum jump in logistics management with a fusion of customised production with 3D printing, rapid and accurate transportation, real-time tracking and in-the-hand delivery systems using unmanned delivery platforms. This could very easily manifest into the military domain for operational logistics purposes within a combat zone or even across distant zones. Imagine a company or a platoon surrounded by enemy forces that is running out of ammunition to hold ground, is delivered the ammunition by a drone delivery system and provided Battlefield Air Strike (BAS) by a group of Unmanned Combat Aerial Vehicles (UCAVs).

Delivery of supplies and medical equipment/support to the frontline could be possible. Imagine injured soldiers medically evacuated by a drone taxi under the cover of UCAVs. AI enabled prosthetics delivered to field hospitals and reduced time windows for recovery from battle injuries, all adding to the combat potential and support functions. The utilisation is restricted only by imagination and will.

Global reach of most aviation platforms in the next decade is a reality. Unmanned Combat Aerial Vehicles (UCAVs) and Remotely Piloted Aircraft (RPAs) already have a global presence and long endurance. The endurance of manned platforms is limited by human factors and not by technology. *Icosasonic* to *TriaConta* vehicles like the Fractional Orbital Bombardment Systems (FOBS) have the capability to circumnavigate the globe at exo-atmospheric orbital levels at 27 Mach and decelerate to sub-hypersonic velocities for terminal attack anywhere on the globe. Media reports indicate that China has tested a system that appears to incorporate a glide body into a FOBS, a nuclear weapons delivery system that places warheads into Low Earth Orbit (LEO) prior to de-orbiting them onto their targets.[11]

10. Sakshi Tiwari, https://eurasiantimes.com/ January 29, 2022. Accessed on February 7, 2022.
11. Timothy Wright, "Is China Gliding toward a FOBS Capability", www.iiss .org. Accessed February 17, 2022.

The biological hard limit on our longevity—barring disease and disaster—is as high as 150 years. It is envisaged that by 2035, the rich are likely to benefit by a 25 per cent increase in life expectancy with better terminal health status.

Enhancement in human biological capabilities through biotech, nanobots, exo-skeletons, AI-based individual medicare, and enhanced prosthetics is likely to increase life expectancy and provide augmented fitness not just for the rich but also the combatants. This can have a profound effect on the endurance, strength and combat capability of soldiers on the ground, enabling a reduction of numbers in the army and an upscaling of capabilities. Every government remains on the lookout to develop a leaner, meaner force that gives the best bang for the buck. The biological hard limit on our longevity—barring disease and disaster—is as high as 150 years.[12] It is envisaged that by 2035, the rich are likely to benefit by a 25 per cent increase in life expectancy with better terminal health status. By 2050, average life expectancy could increase to 115 years or longer for people with access to premium medical care.[13] What this portends in military terms is longer service age for combatants with enhanced physical and medical fitness leading to a smaller and fitter force structure. Even during conflicts, recovery from serious injuries would entail much shorter cycles. Injured/decapitated personnel could be sent back to battle zones with artificial AI enhanced limbs/restructuring within a few days. There would be no use for smaller calibre weapons aimed at injury—the only option would be higher lethality weapons with kill capability which can penetrate the exo-skeleton and personal defence shield structure.

IMPLICATIONS FOR THE FUTURE

The implications of all these geopolitical, geoeconomic and geostrategic developments and the capabilities generated by the rapid advancements in technology are grave for the security of any nation. For India, a major power

12. John Lietzig, World Economic Forum, weforum.org. Accessed on February 13, 2022.
13. "Life in 2050—A Glimpse at Medicine in the Future", https://interesting engineering.com. Accessed on February 13, 2022.

aspirant surrounded by inimical forces on the west and north, and no reliable ally or iron-clad alliance, the future forebodes of a far from peaceful existence. High dependence on energy imports, a large component of the population remaining below the poverty line, a gullible semi-literate population highly vulnerable to PSYOPS through social media, a growing restive revisionist section of the society, increasing right-wing culture, left-wing extremist/Naxalism, Counter-Insurgency (CI)/Counter-Terrorism (CT) upheaval in the Kashmir Valley, all these add up to toxic internal challenges. The heady cocktail of internal challenges and external threats is an obstacle perched for losing balance. With pragmatic resource allocation, prioritisation of defence acquisitions and especially in asymmetric capabilities, it may be possible to ride out the bucking rodeo and tame the bronco.

Space cannot be separated from cyber or IW: the need is to combine these capabilities and the structures that cater to these capabilities. It would be prudent to merge the three into a single entity which coordinates the development of capabilities for future network and info-centric warfare and eventually controls the employment of such systems, machines and weapons.

While certain quarters of the military and government keep pushing for structural changes such as Joint Theatre Commands, the need of the hour is to develop capabilities for future warfare which is going to be predominantly informatised warfare. Space cannot be separated from cyber or IW: the need is to combine these capabilities and the structures that cater to these capabilities. It would be prudent to merge the three into a single entity which coordinates the development of capabilities for future network and info-centric warfare and eventually controls the employment of such systems, machines and weapons. Take a leaf out of the Chinese People's Liberation Army (PLA) reorganisation, wherein the PLA Strategic Support Force (PLASSF) was created with the Space Systems Department (SSD) and Network Systems Department (NSD) cohabiting under the PLASSF for a

comprehensive networked warfare capability. The China Advanced Info-Optical Network (CAINONET) is progressing at a rapid pace to provide seamless connectivity and data sharing between the various war-fighting elements under the Central Military Commission (CMC), as witnessed in eastern Ladakh in late 2020, with the last mile Optical Fibre Cable (OFC) laying by the PLA.

The biggest market in the world is the arms market and the biggest business is that of conflict. Contracts for arms sales run into billions of US dollars and geostrategic compulsions are set aside in some such contracts for economic reasons. The Stockholm International Peace Research Institute (SIPRI) data of the last three years indicates that the total world defence spending as a ratio of world Gross Domestic Product (GDP) rose from 2.19 per cent in 2019 to 2.33 per cent in 2020 despite a shrinking of the world GDP in 2020 due to the pandemic. The estimated spending in 2021 places the amount in excess of $2.2 trillion, an estimated 11 per cent increase.[14]

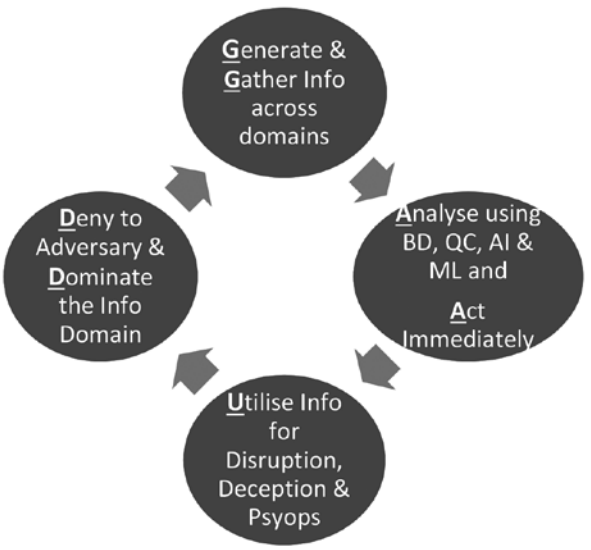
The ascription of mutual structure and responsibility to humans and systems is key to the employment of neurocognitive weapons systems. There would be a substantial swing from automated decision support to collective risk management. The benefits of such a collaboration are manifold; ensuring human judgement and accountability over actions whilst exploiting the advantages of exponential processing powers of AI and ML.[15]

The result of such enormous changes is that the human remains the limiting factor in the response mechanism. With near instantaneous information/data availability and incrementally faster progression of the operations, there is going to be a shrinking of the Observe, Orient, Decide and Act (OODA) loop. In the future wars, the observe and orient activities would be real-time and near simultaneous, while decisions and actions would have to be prompt. The OODA loop would transform into the

14. SIPRI Fact Sheet, April 21, https://www.sipri.org. Accessed on February 13, 2022.
15. "Complex Operational Decision-Making in Networked Systems of Humans and Machines: A Multidisciplinary Approach", National Research Council, www.nap.edu/ catalog/18844/ complex-operational-decision-making-in-networked-systems-of-humans-and-machines. Accessed on February 17, 2022.

Generate and Gather, Analyse, Utilise, Deny and Dominate (GAUD) loop (see Fig. 2) with the ultimate aim of dominating the information domain and imposing own will over the adversary through non-kinetic means.

Fig 2



The observe phase of OODA is replaced by the generate and gather information. Not just observation of information or events, the future entails that the information as generated by own forces as well as information gathered on the adversary be taken into consideration. The amount of information will be in huge quantities and would, therefore, need computing assistance through AI/ML, big data analytics and QC for collation and sorting. There would be real-time transmission/reception of data between various elements of own forces in numerous domains (space, IW, EW, cyber, weapons, location of assets, logistic elements, etc.).

The orient phase is replaced by the analyse and act phase. Again the analysis would be done with the assistance of AI/ML, big data analytics and QC, which would present the filtered and sorted operational picture with possible outcomes and a prioritised decision matrix for taking action.

The act phase would be replaced by the deny and dominate phase, in which the aim is to completely deny the use of the information domain to the adversary and, thus, dominate the contest of wills and win the battle.

The analysis and action would be assisted for the combatant or the commanders. Therefore, the extremely fast tempo of operations would see a large shrinking of timelines and there would be little time for the orient phase, if our forces have to stay inside the loop and retain the edge.

The decide phase would be replaced with the utilise phase, wherein along with the action taken, the information will be utilised for disruption of the enemy activity cycle and deception measures to further degrade the situational awareness of the adversary, causing confusion in its information domain, Command and Control (C2) centres or the forces opposite. The information can also be tailored and utilised for PSYOPS, one of the pivotal Centres of Gravity (CoGs) in the present concepts of warfare.

The act phase would be replaced by the deny and dominate phase, in which the aim is to completely deny the use of the information domain to the adversary and, thus, dominate the contest of wills and win the battle.

The quantum jump in technology will place enormous demands on humans despite the automation of processes. Challenges will emerge in human cognitive abilities to cope with the information explosion, assimilation of technology, decision-making and ethics. These challenges will multiply manifold for military leaders who would have to absorb all the transition and lead their hybrid teams. There will be an imperative to create and deploy independent and autonomous weapon systems capable of decision-making even for a kill option. However, this depends on a highly elaborate and collaborative network command and a governing framework of cyborg ethics to secure human control and responsibility in military operations. The challenges of an omnipresent information overload that exceeds the limitations of human cognitive capacities will have to be supported by cognitive supplementation. Added to this would be a continued disruption

in major spheres of human life, widening of disparity between the haves and the have-nots which will cause societal stress and which could manifest itself into the military rank and file.

AI-enabled brain-computer networks have the potential to reconfigure the classical hierarchical structure of military command, prompting a shift to a more collaborative and flexible network command regime i.e. a new form of '*network command responsibility*'.

Can autonomous robotic systems be held accountable for their actions? Will they be able to comply with legal and ethical conventions of International Humanitarian Law? Which circumstances could warrant the use of neurocognitive weapon systems?

LEGAL AND ETHICAL FRAMEWORK

The question that begs to be answered is whether—and how—these concepts can be applied to cyborg systems that, per definition, are not entirely human? What kind of military capacity is a cyborg warrior? A war-fighter or a weapon system? A human or a machine? A heterogeneous assemblage—or rather a 'nexus'—of human and non-human capacities.[16]

Growing concerns are being raised about how they will affect the future of military Command and Control (C2), including the legal and ethical implications of weaponised neurocognitive systems. Can autonomous robotic systems be held accountable for their actions? Will they be able to comply with legal and ethical conventions of International Humanitarian Law? Which circumstances could warrant the use of neurocognitive weapon systems? And who can ultimately be held responsible for decisions and actions performed by cyborg warriors?

Given that neuroscience technology is still in its early growth stages, many of these issues are still somewhat abstract. Yet the developments in AI-based neural interfaces and the fast paced developments in military Command, Control, Communications, Computers, Information,

16. Nørgaard, and Linden-Vørnle, n. 10.

Intelligence, Surveillance, Reconnaissance (C4I2SR) will drive neuro-cognitive technologies and neuro-ethical considerations.

A large number of issues would crop up in the legal domain due to the mutual mash-up of human and artificial intelligence in the emerging domain of neurospace. A Special Legal Cell on '*Legal Structure and Ethics in Unmanned Operations*' needs to be formed to establish a framework for future policies and legal/ethical aspects in future domains. There is a pressing need of governing principles and guidelines, including the legal and ethical aspects of cyborg warfare. The cell needs to comprise technical experts from the private industry who are currently dealing with Manned and Unmanned Teaming (MUM-T) issues in their organisations, personnel from the operational branch with legal knowledge and a deep understanding of the emerging domains, and last, but not the least, legal experts specialising in cyber and Information Technology (IT) laws. The future leadership needs to be ingrained with the basic understanding of cyber, IT and neurocognitive rules, regulations and laws.

INDIAN IMPERATIVES

The Indian military structure remains quagmired in traditional and hierarchical mindsets, unmindful of the need to initiate change and set the tone for the next 20 years. The global reach of most aviation platforms in the next decade will facilitate and affect influence across the globe, providing an ability to safeguard economic interests beyond the region with an increased economic footprint/influence. The emerging need to safeguard national interests across the globe and in space would dissolve/expand traditional boundaries. Unless the higher defence organisation and the leadership look beyond the Straits of Malacca and Hormuz as our sphere of influence, we will remain constrained in our perspectives. As an emerging space power, India should not be constrained by geography and geographical mindsets.

Military processes have a gestation period of at least a decade. Therefore, what you want in 2035, you have to think of in 2022, and set in motion by

2025, to reap the benefits in 2035. Some processes and Human Resource (HR) development may even take two decades. Despite budgetary constraints and the imbroglio over whose share is more, there are local resources which can be tapped to harness the latent knowledge available within the country. Some private entities are emerging as promising developers in the field of robotics, neurocognition and AI/ML. There is a need to create special purpose vehicles funded by the ministry and led by the IAF to rope in such firms and co-develop for tailored military usage.

A new force for developing, harnessing and exploiting these futuristic technologies and capabilities requires to be created from scratch; and the entire process seen through for the next two decades and beyond. This new force could encompass capabilities of space, cyber, PSYOPS, media, IW, bio-warfare, biotech and neurocognitive systems. The armed forces need to shed the traditional infantry, armoured, aircraft carrier, submarine, ships, fighter, manned aircraft-centric focus and start the transition in this decade itself to stay relevant in the coming decades. Training programmes need to start including these technologies for development as well as the legal aspects of employment of such technologies. Also, as highlighted earlier, the IAF needs to start work on the legal framework by setting up a Special Legal Cell to be able to execute such operations under a robust C2 set-up.

CONCLUSION

Adapting the American and Chinese models/structures has become fashionable in military circles. The growing rhetoric on structural changes to emulate foreign structures is indicative of a short-nosed perspective of immediate satiation. We need an independent model that suits our requirements! A model that leverages the best capabilities of each force, merges the common needs, simplifies the inter-operability processes, gets all on the same level, removes the weakest links and propels the three Services into the future as a coherent, cogent and capable force. The foundation of such joint structures must rest on availability of inter-operable systems with seamless connectivity between them, a joint training structure at all levels

[why do we carry out joint training only for the officers and not for the Other Ranks (ORs)?], enhanced joint manning at the field and operational levels, and a common legal, logistics and administrative framework to enable effective management. Once the foundation has been set, solidified and tested for future load bearing, this needs to be followed by simulation of operational scenarios in joint structures to ascertain the capabilities and weaknesses as well as the friction points. Having ironed out the creases, sharpened the edges and established the efficacy of the structures, the time would be appropriate for a legislative move to set up such structures.

Securing the interests of any nation is a dynamic process that witnesses changing fortunes, ups and downs, changing allies and adversaries, expanding and contracting national interests and growing aspirations of its population. The military is the national guarantor of all these facets and, thus, it cannot let the nation down, let alone fail, for its failure lays the nation bare to subjugation. Military leaders need to be the harbingers of this change through intensive study, open-minded pursuit of knowledge facilitating clarity of thought and persuasive argumentation to drive the national narrative on security concerns.

Technology only assists in fighting the battle,
It is the employment of technique that wins wars.

—Dax