INDIAN ARMY INTERNATIONAL WEBINAR

PRAGYAN CONCLAVE 2022

CONTOURS OF FUTURE WARS AND COUNTER MEASURES

03-04 FEBRUARY 2022

CENTRE FOR LAND WARFARE STUDIES

NEW DELHI

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CENTRE FOR LAND WARFARE STUDIES

Centre for Land Warfare Studies (CLAWS), New Delhi, is an autonomous think tank on strategic studies and land warfare. CLAWS is registered under the Societies Registration Act, 1860 and is a membership-based organisation. It is governed by a Board of Governors and an Executive Council, with the Chief of the Army Staff as the Patron and the Vice Chief of the Army Staff as Chairman. The Director General of Strategic Planning at the Integrated Headquarters, Ministry of Defence, is the President of the Executive Council. The current Director of CLAWS is Lt Gen (Dr.) Ranbir Singh, PVSM, AVSM**, YSM, SM, (Retd).

Objectives

- To function as an independent Think-Tank.
- To promote study and research.
- Promotion and furtherance of intellectual thinking.
- To undertake research projects.
- To organise webinars, seminars, lectures, workshops, conferences, courses and other such activities.
- To train and assist scholars to undertake strategic studies and research.

Mandate

The mandate of CLAWS encompasses research on national security challenges, including conventional military operations and sub-conventional warfare. The Centre also focuses on conflicts in the region and security related developments in countries within India's strategic frontiers, particularly those in the South Asian region.

Vision

To establish CLAWS as a leading Think Tank in policy formulation on Land Warfare, National Security, Military Technology and Strategic Issues.

Collaborations

The CLAWS Outreach Committee has been engaging with Think Tanks and universities worldwide. As a result, joint publications have commenced with Woodrow Wilson International Centre for Scholars, USA and Bangladesh Institute of Peace and Security Studies (BIPSS), Dhaka and an Annual Dialogue with Nepal Institute for International Cooperation and Engagement (NIICE), Kathmandu.

MoUs with regard to academic collaboration has also been signed with US Army War College, NIICE, Indian Institute of Technology (Delhi), OP Jindal Global University (Sonipat, Haryana), Christ University (Bengaluru) and several other institutions.

To further enhance Professional Military Education (PME) of Army Officers, CLAWS have signed MoUs with the Manipal Academy of Higher Education (MAHE) and the Central University of Gujarat, to conduct PhD programme for Army Officers.

CLAWS Activities

Research at CLAWS is futuristic in outlook and policy-oriented in approach. CLAWS disseminates the results of its research to its members, armed forces, policy-makers, the strategic community and academia. It also seeks to contribute to developing a pro-active strategic culture for India.

CLAWS organises webinars, seminars and conferences, round-table discussions, workshops and guest lecture and undertakes research projects on national security issues, especially those pertaining to land warfare. CLAWS also holds an online podcast, *CLAWS Strategic Vision.* To encourage young scholars to express their views on strategic issues, CLAWS organises the *Field Marshal Manekshaw Essay Competition (FMMEC)* annually.

Since its inception, CLAWS has evolved as an organisation and its activities and research mandate have gradually expanded. It has organised a large number of conferences and seminars and has published several books. CLAWS' activities and research can be viewed at its website www.claws.in.

PRAGYAN CONCLAVE

प्रज्ञान

2022

‘Pragyan’ (प्रज्ञान), derived from the Sanskrit word ‘Pragya’/‘Prajña’ (प्रज्ञा) in Devanagari script), which is composed of two words- the prefix ‘pra’ meaning ‘before’ or ‘foremost’ and ‘gya’ (or ‘jna’) meaning ‘knowing’. ‘Pragyan’ could be understood to mean insight/understanding/judgment/intelligence.

However,‘Pragyan’ does not merely denote knowledge, but wisdom that is gained through critical analysis and reasoning. In fact, **it is the purest and the highest form of intellectual discourse and understanding**. This word has been used many times in ancient Indian texts such as the Yoga Sutras of Patanjali, the Vedas and the Upanishads, to refer to ‘consciousness’, ‘intelligence’, and so forth.

True to this, the Pragyan Conclave is a biennial forum, organised by the Indian Army and the Centre for Land Warfare Studies (CLAWS). The Conclave will include domain experts from across the globe to discuss and deliberate on a particular theme related to defence, security, and strategy.

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COMMONLY USED ABBREVATIONS

Artificial Intelligence	**AI**
Armed Forces Special Operations Division	**AFSOD**
Army Static Switched Communication Network	**ASCON**
Anti-Access/ Area Denial	**A2/AD**
Anti-Ballistic Missile	**ABM**
Air Defence Identification Zone	**ADIZ**
Beyond Visual Range	**BVR**
Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance	**C4ISR**
Confidence Building Measures	**CBM**
Command and Control	**C2**
Defence Space Agency	**DSA**
Defence Cyber Agency	**DCA**
Distributed Denial of Services	**DDoS**
Disruptive Technologies	**DTs**
Electro-Magnetic	**EM**
Electronic Warfare	**EW**
Human Resource	**HR**
Hypersonic Glide Vehicles	**HGV**
Intelligence, Surveillance and Reconnaissance	**ISR**
Integrated Capability Development System	**ICADS**
Indian Air Force	**IAF**
Joint Staff Qualitative Requirements	**JSQR**
Mobile Integrated Network Terminal	**MINT**
National Security Council Secretariat	**NSCS**
National Maritime Security Co-ordinator	**NMSC**
Naval Technology Acceleration Council	**NTAC**
Maritime Domain Awareness	**MDA**
Non-Contact Warfare	**NCW**
Naval Innovation and Indigenisation Organisation	**NIIO**
Observe, Orient, Decide and Act	**OODA**
Professional Military Education	**PME**
People's Liberation Army	**PLA**
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Stealth Winged Flying Test	**SWiFT**
Software Defined Radio	**SDR**
Short Range Air to Air Missiles	**SRAAM**
Surface to Air Missiles	**SAMs**
Technology Development and Acceleration Cell	**TDAC**
Terminal End Secrecy Devices	**TESD**
Tactical Access Switch	**TAS**

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EXECUTIVE SUMMARY

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General

In the last two decades, there has been a paradigm shift in the nature of conflict. The rapid geopolitical, socio-economic and technological changes in the 21st century make it very challenging for states to plan for future wars. The conflicts have become more of **achieving political objectives by non-military means, concealed use of military means** and **extensive employment of new technology-enabled systems.** There are a number of flash points; the world is witnessing a new cold war, vicious grey zone conflicts, there is nuclear, cyber rattling by some of the countries; all of which is further accentuated by the Covid-19 strategic shock.

The nations today are increasingly engaging each other on a wide band; ranging from cooperation to competition and from containing to confrontation, in consonance with their national interests. The security and strategic challenges within a sub-continent/ region are based on the **existing geostrategic location, and geopolitical environment including the demographic profile of each country, historical disputes between Nations, their economic conditions, technological threshold as well as Internal Security conditions and environmental stresses**. While some nations are challenging the globally accepted norms, and the **Rules-Based Order**. This challenge has manifested in various forms of, creeping aggression and opportunist actions, to alter the status-quo, keeping the threshold below war.Black swan events like the **COVID pandemic** coupled with the Eastern Ladakh standoff have brought the focus back on **adaptability, flexibility and inter-operability**.

Given the emerging trends in warfare, all countries have to take care of intangibleslike **cyber-attacks, information attacks, non-contact warfare, economic warfare, attacks on digital infrastructure, as also, paralysis of system of governance, and economic activities by attacking banking, financial, transportation as well as law & order systems**.

The technology which is influencing the multi-domain battle space like never before and will control the levers of economic and military powers. It has become a necessity to explore and understand the technological underpinnings shaping the future battlefields like the use of Artificial Intelligence (AI) and related technologies, including drone swarms, stealth technology, global deployment of 5G and 6G networks, and nanotechnology, and Quantum Computing. These technologies will encompass **conventional kinetic means merged with non-kinetic, non-lethal means spread across the cyber, information and space continuums**. The lack of international regulations on use of cyber-space, and plausible deniability complicates the situation even further. In future, nations could be attacked on all fronts, starting from **economic strangulation to diplomatic isolation** and **military standoffs to information black out in the form of DDoS (Distributed Denial of Services) attacks**.

Leadership must develop the ability to look beyond the horizon, and drive organisational changes to be ready for future wars. This will require continuous intellectual rigour to out-think the enemy, as also to ensure that our forces are equipped with the 'right means' to fight tomorrow's wars. The relevance of the traditional qualities of a leader will certainly continue to remain. However, leadership competence will have to rise, and the leaders of future wars will have to be enabled and equipped with diverse skill sets, including harnessing technology as second nature. In fact, a new generation warfare can only be won by leaders who are creative,

adaptive to emerging technologies and have developed prudence with profound professional knowledge.

The Indian Armed forces are honing capabilities, to undertake Multi Domain Operations (MDO). The focus is to exploit the potential of these domains, to create strategic effects on the adversary. The Armed forces are pursuing development of niche technologies in the field of space-based capabilities, Data Link and AI based Decision Support Systems to shorten the sensor to shooter loop and for making the targeting cycle highly responsive.

Civil military fusion is an essential component to grow a state's power. Indigenous industries must be stressed to outperform other states. Capacity building is the way out to resolve this dilemma. The future conflicts will witness more involvement by an increasing number of actors. Civil-military fusion will become increasingly important where intellectuals will closely work with the armed participants in conflicts.

Cyber warfare appears to lend itself more readily to defensive measures rather than offensive actions, since the latter requires high investments of time, effort and capital required and poses ethical and legal challenges, particularly to democratic nations.

The enduring nature of war entails our ability to be agile in thinking, nimble-footed in approach, and thorough in preparing response mechanisms. Given our security situation, the probability of a full-blown conflict can never be ruled out. States must diversify their investments into varied types of emerging technologies, to ensure that national interests are not compromised due to over reliance on any one type of capability which may not fructify in the desired manner.

Defining Future Wars & Conflicts. The first session on the theme '**Evolving Global Environment and Future Conflicts**' dwelt on the nature of conflicts in contemporary times while also indulging in some crystal gazing to predict the drivers and the character of future conflicts. Post World War II, there has been a significant trend towards rise in intra-state conflicts and the significant powers have increasingly desisted from the overt use of military force. The preferred tools to impose adherence of their will upon adversaries have been non-attributable, covert, economic and diplomatic sanctions and the use of niche technology to diffuse the conflicts into multiple domains like cyber, space and cognition, through propaganda, fake news and manipulative use of social media. The primary drivers of conflict continue to be geopolitics and geoeconomics with legacy issues like land and boundary disputes also responsible for some of the most intractable conflicts. Conflicts have been more pronounced in the regions with a low median age. The shift in the global economic centre of gravity towards the East is a perceptible trend that is likely to create new fault-lines and sources of conflict. Future warfare would be conducted on tangible and intangible battlefields. Also, countries continuously develop military capabilities to narrow the gap with adversaries. As Chinese economic growth slows down it may become increasingly assertive and aggressive. Non-traditional security threats like climate change will also add to the geo-political stresses in this century.

China – Pakistan Relations & its impact on security in the Region. The economic rise of China, its global engagements, growing influence and quest for dominance are shaping geopolitics and its core interests are the overseas citizens and assets. China visualises the world as made of four concentric circles with itself as the centre. In addition, another priority is

protecting China's economic interests and balancing against the most powerful country in the region, India, which China views as a competitor. It has identified key partners in different regions of the world that are essential to further its interests and ambitions, these being Russia, Pakistan, Iran, South Africa and Venezuela. Pakistan is critical for the Chinese South-Asian policy and they share a strong partnership which has a significant security component. The effect of this partnership in the South-Asian region is contradictory.

Changing Strategic Landscape in Asia and Its Impact on Future Conflicts. The global trend lately has been towards building Strategic Partnerships as against Alliances. The strategic partnership is a bilateral and multilateral relationship based on economic, political and security cooperation. China has actively advocated such partnerships even with non-state actors and interest groups including political parties. Even the USA is now building such partnerships which are flexible and issue based and can be useful in addressing shared concerns like the pandemic or terrorism. The strategic partnership will probably become a more defining feature in international politics. It offers many advantages and is very appealing to countries.

Expanding Domains of Warfare. In addition to land, sea, air, cyber and space, the cognitive domain, also known as the human brain, is the sixth domain of warfare in contemporary times. This domain influences the minds of the people seeking information and is concerned with the involuntary penetration to shape and coerce the senses in accordance with one's will. Therefore, the modern battlefield needs not just the military alone, but political, psychological, electronic and technological warriors alongside the combat soldiers. Tri-services links would also be a critical requirement for effective multi-domain operations.

Modern Air Warfare-Challenges for India. The search for aerial dominance has led to technological advancements in the fields of UAVs and UCAVs, hypersonic missiles and Anti-Ballistic Missile(ABM) defence systems. With the emergence of long-range missile systems, the concept of manned-unmanned teaming has become essential and the earlier domination of the traditional fighter aircraft is being challenged. The use of drones in recent conflicts has ushered in a new era of air warfare and is likely to be the future trend. For India, drones and anti-drone systems need to be developed expeditiously to safeguard our interests from the adversaries who have a head start in embracing these technologies.

Asymmetric Warfare: Preferred Policy for State Actors Today. The threats posed by full-spectrum, information campaigns have been adequately highlighted during recent events such as the 2016 USA elections, the 2014 Ukraine conflict and various cyber or service denial attacks faced by several countries.To guard against these threats a coordinated and cooperative inter-agency approach across all governance domains is essential. It needs critical thinking, education and awareness on the part of the populace to fight this new form of warfare.

Disruptive Technologies (DTs) and Land Forces Operations: Indian Context. Emerging DTs are fundamentally altering the nature and character of warfare. The infusion of disruptive technologies into military systems is increasingly being facilitated by the "marriage of communications and computation" and providing new tools of warfare to the military leaderships. Existing processes, doctrines and organisational structures undergo modifications, leveraging technological upgradation to shift the military and geopolitical balance in one's favour.

Cyber Warfare: Threats and Opportunities. Cyber warfare offers new threats and opportunities in the current security environment. It challenges the idea of statehood, as the state's ability to uphold its sovereignty is compromised in the cyber domain, as the inability of state instruments to effectively monopolise cyber space. Cyber warfare is heavily skewed towards defensive actions, rather than offensive actions. This is particularly true for democratic nations, following the accepted international order. Cyber-attacks are costly endeavours, requiring substantial expertise, time and resources.

Technology and Sea-power. Traditionally, the navies the world over are generally viewed as accepting more of modern technologies as compared to other war fighting services. Communication technologies, advanced weapon systems, engineering and guidance requirements on the vast oceans and the sheer effort it requires to sustain combat potential at sea, demand high levels of technological prowess. The relentless 'hide and seek' between adversaries on the oceans will continue in the future, albeit with higher technological capabilities.

Crisis Management & Escalation Control. Conflict escalation connotes an upsurge in the scope, intensity and spread of conflict. South Asia has remained deeply infested with armed conflicts of different natures and understanding escalation in this context would be critical. It is imperative for the political leadership to not let any future crisis flare up, as climbing the escalation ladder makes conflict riskier and more dangerous. War and conflict have become distinctly unpredictable between nuclear armed adversaries. A critical requirement to de-escalate a conflict situation was the availability of channels of communications. Military dialogue between senior leadership of nations is equally important. There also existed an inescapable requirement for an established mechanism for control of nuclear weapon systems, and a formal dialogue process, especially as regards nuclear doctrines. Such measures would be useful in reducing the risks of accidental use of nuclear weapons and an unmanageable conflict escalation.

Leadership Challenges in 21st Century Operational Environment. Responsible and evolved leadership will have a huge impact on the final outcome in modern conflicts, characterised as they are by multi domain and trans spectrum operations. The severity of conflicts between nations has increased manifold, with the intervention of emerging and disruptive technologies. With acquisition of modern technology, militaries around the world have become more lethal. Contrarily, new technologies have made it possible to achieve strategic objectives through non kinetic means. Leadership will have to incorporate these developments and plan national strategies accordingly.

Leadership Quotient & Training as a Winning Factor in Wars. In the military context, there exist underlying differences, but also deep linkages between two complementary components - training and education. Training is task oriented and skill based. On the other hand, education is concept based and enables one to appreciate the bigger picture of why and how things work together. It is, thus, important to provide both training and professional education to soldiers. Militaries must realise the fact that one cannot train the uneducated and the educated need the grounding of training. Achieving the correct balance between training and education is a must for the right type of soldiers.

Need for Integration to Fight Future Wars. Revolutionary technological advancements have provided militaries the capabilities to operate simultaneously across multiple domains. Emerging DTs have enabled seamless switching from one domain to another, at speeds incomprehensible to human ability. There are several factors which necessitated integration in contemporary militaries, important amongst them is the absence of clear directives from the political leadership, the inability to coordinate inter services plans for strategic goals and the non-availability of integrated doctrines. Military Integration also entailed the integration of the armed forces in consultation with other instruments of national power.

Integration Challenges in a Multi-Domain Landscape. The 21st century will witness Influence Operations at an unprecedented scale. In addition, modern warfare is a battle for various types of signatures. Therefore, cohesive signature management is essential. In contemporary times, autonomous systems are becoming increasingly important and militaries which integrate the advantages of human capabilities and machine functionalities would prevail. The process of integration might face several challenges, which includes diverse military cultures of different services, determining the appropriate level of integration within the armed forces and between military forces and other elements of National Security.

World Order and Future Joint Force. Future contours of warfare, based on a dynamic strategic landscape, necessitate leveraging military power to the strategic context and a successful transformation in the strategic military identity, transforming it to the digital information age. In the future, emerging threats like cyber, asymmetric and space warfare may be more demanding than countering traditional threats. The prudent strategy will be to strengthen military apparatus across the conflict spectrum, while remaining responsive to high-end technological threats. Military conservatism should recede and give way to a willingness to imbibe new technologies and doctrines. It is difficult to determine the possible trajectories where the future of warfare is destined, given the dynamic changes in DTs and their applications in the military domains. Organisational structures have to become far more organized, flexible and agile. Integrated approach revolves around exploiting jointmanship, necessitating adaptation to the new culture of risk taking, innovation and critical thinking. For optimising the benefits of jointness, the military must adapt to new challenges of the digital age.

Major Takeaways

Doctrinal Issues. The Conclave witnessed discussion on a number of doctrinal issues and some of the major ones are listed below:-

- It is essential for modern militaries to comprehensively integrate for enhanced operational capabilities in a multi domain environment, with concurrent formulation of joint doctrines and organisations.
- Technology has fundamentally transformed the character and nature of war and it will hereafter control the levers of economic and military powers.
- Range of tools used in recent conflicts are covert and overt, subversion, terrorism, sabotage, proxies, private military companies, violent non-state actors, psychological warfare, cyber, drones, political and diplomatic pressure, economic sanctions, strategic alignment and AI.

- Political and military leadership of the 21st century need to upgrade their technical understanding, to be competent enough to absorb the ramifications of modern warfare in all its facets.
- It is imperative to shift from coordination model to jointness doctrines to fight future multi domain wars. Organisation modifications specifically theatre commands need to evolve.
- The cognitive domain is arguably the most important emerging war-fighting domain. This domain has opened up the populace to more information making the traditional barriers inadequate.
- Doctrines need to be sensitive to human machine roles in the future conflicts.
- Four cardinal principles of **sound intelligence, credibility of force structures, perception management and timely application of combat power would be key to successful deterrence**.
- Incorporation of technology must be suitably supported by **evolutionary doctrines and associated concepts**.
- Subversion through the information domain can change the perception, undermine resilience of the populace, stir up mass opinions, inflame existing tensions and deepen fissures in society.
- In future, mass will be a weakness. Armies will have to learn to operate in smaller, more dispersed units. Manoeuvre will become increasingly difficult.
- The evolution of cyber is a vital domain for warfare. Common to all actors, the cyber domain interacts endlessly with all other domains of land, sea, air and space.
- Jointness between three services will need overhaul of individual doctrines of each service, changing them to tri-services doctrine, facilitating joint operations rather than coordinated models of achieving objectives.
- An optimal balance is required between imparting training and improving educational standards of militaries, which, if realised, will enable soldiers to take correct decisions and actions on the battlefield.
- An important component of future warfare will be Grey Zone Warfare, which is low cost, involves lesser risks and results in very little retribution.
- Development of leadership, capability, resources including funding, joint doctrines and training are critical to synchronise capabilities across all domains.

***Structural Issues*.** Some key structural issues deliberated during the conclave are as under:-

- The creation of the Defence Space Agency (DSA), and the Defence Cyber Agency (DCA) and the Armed Forces Special Operations Division (AFSOD), are steps to synergise resources and expertise, and build integrated capabilities in these domains.
- The 3 R's - **Restructuring, Rebalancing** and **Reorienting** of Forces has already been initiated based on own operational experiences and this shall remain a work in progress.
- To prepare for the future, there is a need to have robust and flexible Command and control (C2) structures with centralised command, distributed control and decentralised execution.
- The structural distinction – peace and war – is getting blurred. War implies employing any means, either armed or unarmed, to prevail over the other states.

- Ideational changes and cultures will eat embedded structures, resulting in changes which are warranted to produce desirable outcomes.
- Concerning Electronic Warfare (EW), India may have to go in for at least one network centric command, where EW is a central component with a dedicated cadre to carry out specialised tasks.
- A multi-dimensional, inter-agency and comprehensive response is essential to safeguard against disinformation campaigns.
- From the **maritime perspective**, the impending appointment of National Maritime Security Co-ordinator (NMSC) is a proposal aimed at breaking silos, and supporting cross organisational linkages.
- **Agile Combat Employment to maximise speed and range** would involve a combined force structure, optimised to take on the full spectrum of modern threats.
- ***Atmanirbharta.*** India needs to boost its indigenous capabilities in emerging technologies with faster timelines.The realisation of the concept of an *Atmanirbhar* Army, *Atmanirbhar* should be in thought and action.Towards this direction, the *IN* has instituted a **three tier organisation** consisting of Naval Technology Acceleration Council (**NTAC**), Naval Innovation and Indigenisation Organisation (**NIIO**), and Technology Development and Acceleration Cell (**TDAC**) in February 2021 last year, which is mandated to focus on technology induction in the fight component based on indigenous capability.
- UAVs will be the real game-changers in modern air-warfare. The concept of manned/unmanned teaming in which a UAV/UCAV would accompany the fighter as a Loyal Wingman is gaining currency among near peer adversaries.
- Need for a formal dialogue process and verifiable mechanism to exercise control over all nuclear weapons and their delivery systems, so as to prevent military conflicts between nuclear armed nations.
- Need to integrate the civilian and military academia/ institutions into the larger goal of technological & doctrinal research process. In this regard, the role of the private sector into Research & Development (R&D) will contribute towards nation building and capability development.

Strategies. Some of the strategies necessitated due to the impact of changing character of warfare are as under***:-***

- States require to formulate strategies to achieve cross domain deterrence, to dissuade their adversaries from launching disruptive cyber offensives.
- Developing strategies to overcome existing silos and develop cross-organisational linkages at all levels of working. The National Security Council Secretariat (NSCS) at the apex level will enable **functional integration** across various ministries.
- The modern battlefield needs not just the military alone, but political, psychological, electronic and technological warriors along with the combat soldiers to achieve the ultimate victory and success.
- Develop a customised, India specific decadal model for capability building of the armed forces, based on a comprehensive threat assessment for the next decade and incorporating capital resources available for modernisation.

- We need to be equipped, trained and ready to operate against a wide spectrum of threats ranging from drones to hypersonic missiles.
- The convergence of conventional platforms with disruptive technologies is the focal need for the Indian Army.
- The transformative and transparent nature of the modern battlefield demands a network centric approach to the conduct of military operations.
- Transition scale requires greater stimulus from all stakeholders, including Think Tanks. It underscores the importance of staying ahead of the knowledge curve.
- Indian armed forces need training and equipment not to fight the last war but to fight and win tomorrow's wars.
- Knowing that the budget will almost always remain a constraint, prioritization of procurement at the National level for key combat elements and enablers becomes very critical.
- Awareness about the exposure to manipulation is an excellent countermeasure to inoculate people against information attacks.
- A Whole of Nation Approach towards capability development and war fighting is the need of the hour.
- Adopting best HR policies for identification of new talent, which could harness the potential of DTs.
- Essential to keep all channels of communication open between nations, especially between potential adversaries, particularly during periods of tension/conflicts.
- To avoid the pitfalls of future war scenarios, the focus should be on acquiring a few small robust military systems against large platforms.
- Empower strategic and operational military leaderships, so that the armed forces are able to adapt to changes quickly enough to win future conflicts.
- New Generation Warfare will be won by leaders who are adaptive to technology and have decision making skills with profound professional and technical knowledge.

Conclusion

The Webinar clearly highlighted the fact that there is an urgent need for cultural transformation, digital transformation, change in the mind set, and for keeping pace with the change in disruptive technology. The contours of future wars are influenced by a host of other factors like doctrinal development, international law, strategic culture, organisational structure, apex leadership, etc. War, in the manner that it is commonly visualised may no longer exist, but a nation's desire to impose its will on an adversary will exist always. Salami slicing mechanisms are being deployed by countries to dominate other states. Countries like India, thus, need a National Security Strategy to manage its strategic and tactical interests. Thus**, there is a requirement to ensure that we analyse our doctrines, strategies, warfighting concepts, organisational structures, and lay greater focus on the leadership, which, in today's scenario must have a technological mindset and acceptance to digitalisation.**

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DETAILED REPORT

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The aspects enumerated as part of this report are based on the deliberations by the panelists. These do not necessarily conform to the views of the Centre for Land Warfare Studies (CLAWS) or that of the Indian Army or the Ministry of Defence, Government of India.

'Pragyan Conclave' – The international Webinar of the Indian Army and CLAWS was conducted on Feb 03-04, 2022, on the topic "*Contours of Future Wars and Counter Measures"* at the Chanakya Hall, CLAWS, Delhi Cantonment.

Objectives

The objective of the Webinar was to:

- To examine and evaluate the current and emerging geopolitics, geoeconomics & geostrategic environment across the globe.
- To obtain an insight into broader perceptions at international and regional levels relating to the emerging world order and its effects on the security architecture: Great power rivalry and evolving strategic landscape.
- To scan and evaluate the current and emerging trends in warfare, developing conflict spectrum and future battlefields. To provide an insight into non state organizations, sources of their strength and sustenance, Psychological Warfare and human resource strategies.
- To explore and understand the technological advancement shaping the future battlefield. Analyse the use of AI/machine learning/neural network & related technologies, examine the impact of aerial drones and stealth technology, global deployment of 5G network - nanotechnology and quantum computing.
- Counter Measures - development of policies and strategies to counter sub conventional threats, to sensitise the environment regarding exploitation of technology and ways to effectively tackle AI/ML/ Genetic algorithms /Neural Network & related technologies with specific focus on counter measures including up-scaling of infrastructure.
- Address the techno-social realm in order to evaluate rise of current and emerging trends and arrive at effectiveness of Inform & Influence operations (e.g deep fakes and bots) with focus on behavioural and policy Changes.

Modalities of Conduct

The two-day Webinar was conducted at the Chanakya Hall, CLAWS, Delhi Cantonment on 03-04 Feb 2022. The participants, both Indian and foreign, were from the armed forces (including Defence Attachés), strategic community, observers from friendly foreign countries, veterans, academia and students. Nominated Indian Army officers from field formations also participated in the Webinar.

Guest Speakers

Gen MM Naravane, PVSM, AVSM, SM, VSM, ADC	Chief of the Army Staff & Patron CLAWS
Admiral R Hari Kumar, PVSM, AVSM, VSM, ADC	Chief of the Naval Staff
Air Chief Marshal VR Chaudhari, PVSM, AVSM, VM, ADC	Chief of the Air Staff
Lt Gen Manoj Pande, PVSM, AVSM, VSM	VCOAS & Chairman, Board of Governors, CLAWS

Chairpersons

Session I	Lt Gen (Dr.) VK Ahluwalia PVSM, AVSM**, YSM, VSM (Retd)
Session II	Lt Gen (Dr.) Ranbir Singh, PVSM, AVSM**, YSM, SM (Retd)
Session III	Lt Gen Rajeev Sabherwal, PVSM, AVSM, VSM (Retd)
Session IV	Lt Gen AK Singh, PVSM, AVSM, SM, VSM (Retd)
Session V	Lt Gen Anil Ahuja, PVSM, UYSM, AVSM, SM, VSM** (Retd)

Speakers

- Lt Gen Raj Shukla, PVSM, YSM, SM, ADC,GOC-in-C, ARTRAC
- Dr. Andrew Scobell, Distinguished Fellow, China at the United States Institute of Peace
- Dr. Timothy Heath,Senior International Defence Researcher, RAND Corporation
- Lt Gen (Dr.) Rakesh Sharma, PVSM, UYSM, AVSM, VSM (Retd)
- Air Marshal KK Nohwar, PVSM, VM (Retd)
- Dr. Shashi Jayakumar, RSIS (Singapore)
- Lt Gen Philip Campose, PVSM, AVSM**, VSM (Retd)
- Prof Chuck Freilich, Former Deputy National Security Advisor, Israel
- Vice Admiral Anil Chopra, PVSM, AVSM (Retd)
- Lt Gen Arun Kumar Sahni, PVSM, UYSM, SM, VSM (Retd)
- Dr. Mary Bell, Associate Professor, Joint Advanced War fighting School, NDU
- Maj Gen Mick Ryan, AM, Former Commandant, Australian Defence College
- Brig Narender Kumar, SM, VSM (Retd)

PRAGYAN CONCLAVE

प्रज्ञान

2022

WELCOME ADDRESS

Welcome Address by Deputy Chief of Army Staff (Strategy)

Lt Gen Sanjeev Kumar Sharma, AVSM, YSM

Deputy Chief of Army Staff (Strategy)

Lt Gen Sanjeev Kumar Sharma, AVSM, YSM, Deputy Chief of Army Staff (Strategy) commenced his Welcome Address by emphasizing on the topic of the Webinar 'Contours of Future Wars and Countermeasures' as of contemporary relevance and importance for all military professionals globally. Its importance in today's context when critical disruptive technologies are just on the horizon cannot be over emphasised. Once these technologies are fielded on the battlefield, they would have potentially changed the very nature of warfare.

Military professionals have tried to gauge the nature of future war since time immemorial. However, despite this, armies have forever prepared for the proverbial- "last war". There is, therefore, a need to understand this and ensure that we do not fall into this trap. Hence, we need to envision the changing nature of warfare and ensure that we cater to it in our training, equipping, HR policies, employment philosophies, and practices.

Just looking at the contours of the operational spectrum, unlike the bygone era, today's warfare is not restricted by traditional battlespaces, boundaries, clear-cut distinction between combatants and non-combatants and more importantly by a well-defined or declared start and end to the conflict. Also the battle of perception has gained such pre-eminence on the battlefield that the belligerence today is more focused on winning the battle of narratives than an actual victory on the ground. Thus, grey zone warfare, non-contact warfare in the kinetic and non-kinetic domains of information space and cyber warfare is likely to constitute key components of any future warfare strategy.

Today, disruptive technologies like AI, hypersonic weapons, drone swarms, robotics, quantum computing are just on the threshold of being the key enablers in any future conflict. When fielded, they have the potential of changing the very concept of warfare. The conflict between Armenia and Azerbaijan over Nagorno - Karabakh was just a trailer of what we are all likely to witness in the future.

Our traditional understanding of military capabilities, in terms of military hardware like tanks, guns and other such equipment, is likely to change in favour of weapons and applications based on critical technologies.

India has a unique distinction of being the only country that faces a visceral adversary on its western border and an intractable opponent along its northern borders. Each has a different set of political objectives. Both these nuclear-armed adversaries have longstanding border disputes with India and have fought wars with India in the past. From the military standpoint, both China and Pakistan are extremely formidable threats. Their collusion and collaboration progressively become a distinct possibility. These aspects would be addressed in session by Dr. Andrew Scobell and Dr. Timothy Heath. We also need to look beyond the military domain. In the emerging security paradigm, India's security interests have to be ensured, not merely along our physical borders but in the strategic space of the extended neighbourhood and in strategic frontiers such as economic growth, energy security, technological empowerment, social security, cyber domain and strategic communications. Centres of gravity in any future conflict that today remains within the military and economic domains are likely to change - security of networks, space-based assets, and the cyber domain.

Today, it has become a necessity to explore and understand the technological underpinnings shaping the future battlefields like the use of AI and related technologies, including drone swarms, stealth technology, global deployment of 5G and 6G networks, and nanotechnology and quantum computing.

This is not to say that the conventional technologies have become redundant or there is no possibility of conflict among state actors. The convergence of conventional platforms with disruptive technologies is the focal need for the Indian Army. Discussions during this webinar will shed light on how new and evolving technologies like robotics, AI, and big data can or already affecting military operations on land, sea and air. It's important to emphasise the challenges of leadership in such dynamic times. The relevance of the traditional qualities of a leader will certainly continue to remain. However, leadership competence will have to rise, and the leaders of future wars will have to be enabled and equipped with diverse skill sets, including harnessing technology as second nature.

When the fog of war is exacerbated by the infusion of multiple domains technology and algorithmic solutions, the mantra for the leader should be back to basics. We must instil and nurture the grass-root leadership skills, which have served us unfailingly till date, like character, competence, adaptability, decisiveness, to name a few.

In conclusion, the Deputy Chief brought out that warfare today is undergoing exponential changes, there being no boundaries, no rules, pre-eminence of Information Warfare, cognitive spaces and notions of victory.

Military scholars are grappling to keep pace with the continual changes in military warfare dimensions and technologies. Military theories are being overtaken even before their last print is out. This transition scale requires greater stimulus from all stakeholders, including Think Tanks. It underscores the importance of staying ahead of the knowledge curve.

We expect the Pragyan Conclave to illuminate our strategic discourse and enrich our knowledge. This webinar will show up fresh ideas and concepts for us to take forward. The General wished to re-emphasise that by trying to envision the nature and contours of future wars, while this is important, it must be followed up with concrete action to prepare the defence forces for it. This would mean changing how we recruit, manage our human resources, train and equip our services.

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INAUGURAL SESSION

Inaugural Address by the Chief of the Army Staff & Patron, CLAWS

General MM Naravane, PVSM, AVSM, SM, VSM, ADC

Chief of the Army Staff

I extend a hearty welcome to you all, at the **Pragyan Conclave 2022**. I wish to thank the distinguished speakers and participants, for being with us today, and sharing their thoughts on the subject of '**Future Warfare**'.

The need to appreciate the future environment, and comprehend the imperatives for the Armed Forces, is something that the uniformed fraternity and '**Think Tanks**', must constantly be seized of. It is this fundamental understanding, that sets the wheels in motion, for future capability development. As wars of the future shall continue to be, a **Whole of Nation Effort**, the topic today, "**Contours of Future Wars and Counter Measures**", has significance for a wide range of stakeholders.

In the last Pragyan Conclave, that was held in March 2020, we had discussed the various nuances of the rapidly changing **Character of War**. Those were the early days of the pandemic. Unfolding events over the past two years, have reinforced much of what was discussed during the session. This webinar takes the discourse further in the same vein. I would like to briefly share, some thoughts on today's theme.

The paradigm shift in warfare is well acknowledged. We are witnessing conflicts increasingly transcending, time, space and force dimensions, and enveloping new frontiers. These wars blur the distinction, between combatants and non-combatants, front and rear, often avoid direct military engagements and resort to extensive use of proxy actors. There are ongoing hostilities between States, in the Cyber, Information, Sub-conventional and Hybrid domains, without a formal pronouncement of War. There is no '**M**' Day or '**D**' Day, as has been the case earlier. These, along with Diplomatic, Informational, and Economic coercive activities, are already being prosecuted in the Grey Zone. The aim remains to incapacitate the adversary, disintegrate his sources of power, and render the command and control systems ineffective, so as to make physical forces redundant.

We have also observed, some nations challenging the globally accepted norms, and the **Rules Based Order**. This challenge has manifested in various forms of creeping aggression and opportunist actions, to alter the status-quo, keeping the threshold below war.

Developments in Afghanistan, have again brought to focus, the use of proxies and Non-State actors to decisive effects. These actors thrive on local conditions, innovatively exploit low cost options, to devastating impact and create conditions, that limit the full use of sophisticated capabilities, available to the State.

The concept of sequential, and often graduated application of force, has also undergone significant changes. I have said this in the past and I wish to reiterate that in future conflicts, the troops on the forward-most locations ready and in a high state of alertness, may not be the ones to face the first wave of aggression.

Military doctrines and concepts have struggled to keep pace with this change and stay relevant. The military lexicon has expanded and traditional definitions have undergone a review. The concept of Victory itself has changed, as enduring success, especially against Non State actors has remained elusive for most.

However, if we go back in time, we would realise that even though there have been transformative changes, in the way wars have been prosecuted over time, the nature of war in terms of force and violence, blood and gore, has not changed. **Why do I mention this?** Because, sometimes in over zeal to look at the Future, we forget the lessons that the Past brings to us. These defining constituents, Force and Violence, have only manifested in newer forms.

It is for this reason, that **Hard Power** has always been relevant, and will continue to play an important part in the future, albeit in new ways, adapting to the changing strategic context. This is also one of the reasons, why our ancient Indian wisdom on State Craft and application of force propounded many centuries ago, remains timeless and pertinent even today. I must share with you that the Armed Forces have taken on this exploratory project of examining the relevance of **Ancient Indian Wisdom and Knowledge** to contemporary Security Challenges. In a National Seminar, conducted on this subject last week, by the College of Defence Management, it came out loud and clear, that the basic tenets espoused in **Chanakya's 'Arthashastra'**, and **Thiruvalluvar's 'Kural'** amongst other, still hold great significance in contemporary times.

In our own present context, the ceasefire on the Line of Control continues to hold, because we have negotiated from a position of strength. The developments on our Northern Borders, have also adequately underscored, the requirement of ready and capable forces, with an optimal component of Boots on Ground, backed by modern technology, to preserve our Sovereignty and Integrity.

Any discussion on the Future Contours of War, will have an overbearing tilt towards modern technologies. This is obvious because almost all modern technology tools, have the **potential for military application and disruptive impact on modern-day warfare**. This change is already making traditional core competencies irrelevant, and creating the necessity of acquiring new proficiencies. **The Israel-Hamas conflict last year, has firmly underscored the power of Artificial Intelligence. The more recent strikes last month, on the UAE by Yemen's Houthi rebels, using armed drones and missiles, reflect the rapid proliferation of these disruptive technologies to a wide range of actors. The mid-air interception of incoming missiles by the UAE & US forces stationed there is equally defining.**

Improved situational awareness, fusion of sensors, faster decision making, use of autonomous weapons, and integration of Artificial Intelligence, into every facet of warfare, will **necessitate changes to war fighting doctrines, our organisations and structures, and not to forget, our training methodology and leadership**. For militaries across the world as well as for us, this remains an ongoing challenge, and a work in progress.

From an Indian perspective, we face unique, substantial and multi-domain challenges. Disputed borders with nuclear neighbours, coupled with State sponsored Proxy War, stretches our security apparatus and resources. Our adversaries shall continue with their efforts, to achieve their strategic aims, short of conflict, by use of Grey Zone activities, in the political, military and economic domains, and do so in a collusive manner. The events in 2020 have been testimony, to the diversity of security threats in all domains, and this has brought the spotlight towards, non-contact and grey zone warfare.

We need to identify the main drivers of military technology in the digital era Warfare, to improve effectiveness, augmenting our capabilities, in both the non-contact and contact modes of warfare. The Indian Army has already initiated, adequate modernisation steps to acquire these technologies.

In order to meet these challenges, the Indian Army along with the other two Services, is undertaking a number of initiatives to stay a step ahead. We are honing our capabilities, to undertake **multi-domain operations. The focus is to exploit the potential of these domains, to create strategic effects on the adversary**. The creation of the DSA, DCA and the AFSOD are steps to synergise resources and expertise, and build integrated capabilities in these domains.

Net Enablement to fight in a Network Centric Environment is another area of focus. Our Strategic Networks like the **Network For Spectrum** and **ASCON Phase IV** have made significant headway. Efforts towards networking battlefield entities have gained momentum, with projects like **Software Defined Radio** (SDR), **Tactical Access Switch** (TAS), **Mobile Integrated Network Terminal** (MINT), and **Terminal End Secrecy Devices** (TESD). Enhanced bandwidth and robust spectrum management will contribute manifold to our interoperability and operational efficiency.

We are laying great emphasis on innovation and technologies, such as **Quantum Computing and Communications, AI** and **Drone Swarms**, and military leveraging of emerging and disruptive domains.

The 3 R's - **Restructuring, Rebalancing** and **Reorienting** of Forces has already been initiated. We are further consolidating, from our operational experiences to these changes, and this shall remain a work in progress.

The process of integration of the three Services through Theaterisation is already moving ahead to a time-bound plan. The Indian Army remains totally committed to this transformation.

Last but not the least, is our commitment to *Atmanirbharta*, the realisation of the concept of an Atmanirbhar Army, Atmanirbhar in thought and action. In the words of India's first Chief of Defence Staff, Gen Bipin Rawat :

"An Army that fights and wins its wars,
with indigenous weapons and equipment".

I would like to conclude my talk, by highlighting that, we are already witnessing '**trailers**' of future conflicts. They are being enacted daily on the information battlefield in the networks and cyber space. They are also being played along, our yet unsettled and active borders. It is for us to '**visualise**', the battlefield contours of tomorrow, based on these '**trailers**'. If you look around, you will realise that the '**sc-fi**' of yesterday, is the '**reality**' of today. We too have to 'leap-frog' to the future, skipping many stages, to an entirely new configuration.

"Just as a caterpillar mutates into a butterfly,
and not merely into a bigger and juicier caterpillar".

Special Address by the Chief of the Naval Staff

Admiral R Hari Kumar, PVSM, AVSM, VSM, ADC
Chief of the Naval Staff

I will begin by drawing the audience's attention towards Carl Von Clausewitz's epic work 'On War', where he highlights that while the **nature of war remains constant, its character changes continuously**.

Change in the character of war is therefore **not a new phenomenon**, but one that has endured since times immemorial. However, the **factors driving this change have varied**. Let me share few of the factors, which in my estimation will be key in shaping the contours of future wars.

The first factor is the contemporary geopolitical climate and more specifically, the return of **Great Power Competition**. Underscored by a multipolar world order with overlapping spheres of influence, this competition is leading to jostling between nations on a **day-to-day basis**, across regions and domains. Such competition, if **unchecked or unregulated** is likely to lead to **conflict**. We are all aware that at the operational and tactical level, this competition is **already manifesting** in the form of grey zone warfare, hybrid warfare, salami slicing, etc.

The next factor is **technology**. While technology has remained one of the **principal drivers** of the changing character of war, the recent past has witnessed a significant **increase in the rate of technology induction across militaries as well as by other actors**. I am of the view that rather than a leapfrogging approach, a **pole-vaulting approach** is required as suggested by Shri RA Mashelkar in his book from Leapfrogging to Pole-vaulting, where he suggests the need to develop military technologies is essential for us to stay ahead of the adversary. The deep-seated influence of technology on warfare has been evident. Today, technology is improving exponentially while the costs are falling exponentially. It may therefore be possible to fight and win in entirely new ways.

This brings me to the third factor that is, the evolution of **cyber as a vital domain for warfare**. Common to all actors, the cyber domain **interacts endlessly** with all other domains of land, sea, air, and space. Also, the **lack of international regulations on** use of cyber-space, and **plausible deniability** complicates the situation even further. This is one domain that merits our undivided attention.

Additionally, the contours of future wars are influenced by a **host of other factors** like doctrinal development, international law, strategic culture, organisational structure, apex leadership, etc. Overall, a complex blend of these factors will shape the dynamic strategic environment where future wars will be fought. Based on the factors that I just mentioned, I am of the view that future wars would be:

- **Multi-domain** with a **complicated escalation mechanism**.
- Catalysed by **niche technology** which would have a **disruptive impact** and may even alter the military balance.
- Given our security situation, the probability of a full blown conflict can never be ruled out. We would be naive to ignore plato's words that 'only the dead have seen the end of war'. Notwithstanding, to my mind, most future conflicts are likely to be **predominantly limited**.
- Rather, we are involved in managing these conflicts even now on a **day-to-day basis**.

Fighting these day-to-day battles, requires immediate solutions and tend to distract us from the 'The Long View', by which I mean **transformational changes** which will **instil agility** and **future-proof** our organisations from impending shocks. I will now highlight few vital aspects towards this end.

First, it must be clearly understood that developing strategies to overcome the challenges of future wars is not a Single or even a Tri-Service issue, but one which warrants focus, time and resources of every organ of the government in a synergised manner. This will require **overcoming existing silos** and **developing cross-organisational linkages** at all levels of functioning.

- The NSCS at the apex level is an example of providing such **functional integration** across various ministries.
- While organisational synergy is being ensured, **joint processes** also need to be evolved. Recent initiatives like the ICADS for joint force planning, formulation of JSQRs to enhance interoperability are initiatives which will go a long way in rationalising our processes and optimising outcomes. More such endeavours are needed.
- From the **maritime perspective**, the impending appointment of NMSC is a proposal aimed at breaking silos, and supporting cross organisational linkages.

Moving on to the issue of technology. Future wars are bound to be **technology intensive**. Therefore, there is a requirement **to innovate and evolve mechanisms** that **foster development** and **incorporation of niche technologies** at a rapid pace. Anyone who lags behind in this aspect, I am afraid, may face difficulties**!**

- Acknowledging the centrality of technology and *Atmanirbharta*, the *IN* has instituted a **three tier organisation** consisting of **NTAC**, **NIIO and TDAC** in February last year, which is mandated to focus on technology induction in the fight component based on indigenous capability.
- **Roadmaps** towards induction of key technologies like Science and Technology Roadmap, Unmanned Roadmap, *IN* Space Roadmap, etc synergise efforts across the organisation to induct niche technologies.

A word of caution here, technology alone will not be enough. Incorporation of technology must be suitably supported by **evolutionary doctrines and associated concepts**. Seamless integration of technology into our concept of operations and their optimal utility is what, we as leaders have to ensure.

This brings me to the final, and in my view a very vital facet to effectively fight future wars - **Leadership**.

- Every leader must develop the ability to look beyond the horizon, and drive organisational changes to be ready for future wars.
- This will require continuous intellectual rigour to out-think the enemy, as also to ensure that our forces are equipped with the 'right means' to fight tomorrow's wars.

Having covered the changing character of war, let me quote Colin Gray, who describes future wars by stating that '*Future war will include both change and continuity from the past*'. He further posits that the enduring nature of war is defined by being **violent, interactive,** and towards **political ends**. This enduring nature offers avenues for a creative student of military history and statecraft to **contextualize lessons from the past**, so as to imagine contemporary and future scenarios. Such endeavours will improve our ability to be agile in thinking, nimble-footed in approach, and thorough in preparing response mechanisms. **The large volume of knowledge encapsulated in our ancient texts, epics, treatises etc would be educative in this regard**.

To conclude, I would just say that, **the future is, and will always remain unpredictable, amorphous, exemplified by disorder**. No matter how hard we try to identify, trend, and foretell the future, surprises or in Donald Rumsfeld's Words 'known unknowns, and unknown unknowns' will tend to **disrupt best laid plans**. Thinking about this, takes me back to Nassim Nicholas Taleb's 2012 book 'Anti-Fragile' where he describes **anti-fragility** as the **ability not just to withstand shocks but to grow stronger with each jolt.** Therefore, I feel we must make our organisations, processes and people not only resilient or robust but also anti-fragile. How to do it – that is our challenge!

Special Address by the Chief of the Air Staff

Air Chief Marshal VR Chaudhari, PVSM, AVSM, VM, ADC

Chief of the Air Staff

Today, we stand at the **threshold of a technological explosion** that will have a **disruptive effect on the way future wars are fought**. These technologies will encompass **conventional kinetic means merged with non-kinetic, non-lethal means spread across the cyber, information and space continuums**.

Conflict follows a natural cycle of **adaptation** and **response**, but its evolution is neither **linear nor constant**. However, while we have adapted well to some of the demands of current operations, there is a growing sense that **aspects of defence** are **out of phase and lagging**. We are still optimised for conflicts that we fought in the past. **Future conflicts** are likely to be **hybrid** in nature. These forms of conflict are **transcending** our conventional understanding of what equates to **irregular and regular military action**. The **conflict paradigm** has shifted and we must adapt our approaches if we are to succeed. Challenges of the future will demand even greater **institutional agility** in the face of major resource constraints.

Agile Combat Employment to **maximise speed** and **range** would involve a **combined force structure**, optimised to take on the full spectrum of modern threats. **Deterrence** would play a significant role in **preserving strategic autonomy**. Logically, four cardinal principles of **sound intelligence**, **credibility of our force structures**, **perception management** and timely **application of combat power** would be key to successful deterrence.

What we saw during the **Arab Spring** and what we are seeing now developing in **Ukraine and Syria** are how battles of tomorrow are likely to manifest. Modern conflicts are likely to witness both **regular and irregular styles of combat**, sometimes, **simultaneously**. In future, we could be attacked on all fronts, starting from **economic strangulation to diplomatic isolation** and **military standoffs to information black out in the form of DDoS attacks**. The traditional domains of land, sea and air have further expanded to include **cyber and space** domains which will be the battle grounds of the future. China's doctrine of **Winning Informatized Local Wars** enshrines the **centrality of information** as an instrument of **prosecuting and winning contemporary wars**. The Chinese concept of '**Unrestricted Warfare**' combines elements of **information operations, cyberspace operations, irregular warfare, lawfare and foreign relations**, carried out in **peace time as well as during conflict**. This paradigm shift requires a change in our own thought process.

The contours of recent conflicts and attacks show us that the military strategy of today cannot be based on erstwhile theories of '**mass manoeuvre'** and '**holding ground'**, and we need to **continuously evolve to stay contemporary**. The nature of conflicts is also changing and a classical **force versus force battle** is becoming **less relevant** today. Future wars will call for developing **multi-domain capabilities** of our own to counter the enemy in every sphere. All **elements** of **national power** will have to **evolve to adapt** to the changing nature of warfare as well as **be alive to the new age threats**.

In the past, the rise and fall of nations was dictated by the size and prowess of their **fielded forces**. However, conflicts in the last few decades have clearly established without doubt, the **pre-eminence of Air Power** as the **Instrument of Choice** for almost all operational contingencies. Knowing that the **budget** will almost always remain a **constraint**, **prioritization of procurement** at the **National level** for **key combat elements and enablers** becomes very critical. We need training and equipment **not to fight the last war** but to **fight and win tomorrow's wars**. Similarly, our **C2 structures** also need to evolve for future wars. To prepare for the future, there is a need to have **robust and flexible C2 structures** with **centralised command**, **distributed control and decentralised execution**. There is a need to synergise the **strengths of individual services** to achieve laid down objectives.

The Armed Forces will have to **adapt to operate** in an **environment of denial**. Redundant networking at the **Strategic, Operational and Tactical level** is the need of the hour and therefore developing a **tri-services data link** is a **combat imperative**. We need to be **equipped, trained and ready** to operate against a **wide spectrum of threats** ranging from **drones to hypersonic missiles**. All modern forces are actively developing **stealth technology** to target important **C2 structures and information hubs** and cripple their adversaries. While we are also doing the same, it is essential that we also develop **counter stealth technology** to keep our systems going. A **Whole of Nation Approach** towards **capability development** and **war fighting** is the need of the hour.

The IAF is completely mindful of the **changing nature of warfare** and we have incorporated many of these things in our planning and already **reoriented our capability requirements** for future wars. This is an ongoing process and we are actively pursuing **anti-drone technology, swarm drone and stealth drone technologies** as well as **Manned-Unmanned Teaming (MUM-T)** concept involving **teaming** of **manned aircraft** with **UCAVs** in a highly **networked battle scenario**. As part of the **Air Defence Network**, we are actively pursuing development of niche technologies in the field of **space-based capabilities**, **Data Link and AI based Decision Support Systems** to shorten the **sensor to shooter loop** and for making the **targeting cycle highly responsive**.

Black swan events like the **COVID pandemic** coupled with the **Eastern Ladakh standoff** have brought the focus back on **adaptability**, **flexibility** and **inter-operability**. As a nation, there is a need for **strong and robust strategic communication**. It should be made clear to the world that India has the **capability** and more importantly, **the will,** to respond at a level that we deem appropriate and to **define our own escalation matrix**. We the men and women in uniform are the cutting edge of that response. Therefore, it is imperative that the edge is **as sharp and lethal** as possible.

Vote of Thanks by Officiating Director General Strategic Planning

Major General Atul Rawat, AVSM

Officiating Director General Strategic Planning

Respected Service Chiefs, Chief of Army Staff, Gen MM Naravane; Chief of Air Staff, Air Chief Marshal VR Chaudhari; Chief of Naval Staff, Admiral R Hari Kumar; former Chiefs of Army who are attending this webinar online, Director of CLAWS, eminent speakers, participants not only in India but abroad as well, Defence Attachés from the Friendly Foreign Countries who have joined today, Officers from three services, the entire CLAWS fraternity, esteem veterans, members of the media, ladies and gentlemen. It's indeed an honour for me to be asked to offer vote of thanks on the conclusion of the Inaugural Session, Indian Army International Webinar, the Pragyan Conclave, 2022.

It is our privilege to host three Services Chiefs for the very first time together under CLAWS platform. We thank them for taking out their valuable time from their busy schedule to grace this event and sharing their thoughts on this contemporary issue. Your presence and views have indeed enriched the stature of this event. We are also fortunate to have been joined by renowned personalities from the strategic community, foreign militaries, academia and Think Tanks. I am also thankful for our eminent speakers as well as all other participants including our esteem veterans who are joining us today. Together you add value to the event and bring a well of knowledge and experience to meaningfully take the Webinar theme forward. This webinar 'Contours of Future Wars and Counter Measures' is an excellent platform for us to explore and exchange views about the nature of future wars and bring about clarity regarding its nuances. It is still a challenging, considering the fast changing domain, enable us to frame counter measures in Indian context.

We keenly look forward to the discussions and valuable recommendations for the Armed Forces. I would say that the stage has been well said by three Services Chiefs in their addresses underscoring the need for greater understanding of the subject. In the end, it remains upon me to extend our heartfelt gratitude to Lt Gen VK Ahluwalia, Director, CLAWS and his entire team for organising this event despite the challenges posed due to pandemic.

PRAGYAN CONCLAVE

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2022

DAY I

SESSION I: EVOLVING GLOBAL ENVIRONMENT AND FUTURE WARS

SESSION II: THE EXPANDING DOMAINS OF WARFARE

SESSION I: EVOLVING GLOBAL ENVIRONMENT AND FUTURE WARS

Sub-Theme 1: Defining Future Wars & Conflicts

Chair and Panelist - Lt Gen (Dr.) VK Ahluwalia, PVSM, AVSM YSM, VSM (Retd)**

Director CLAWS

Highlighting the focus of the Session, the Chairperson - Lt Gen (Dr.) VK Ahluwalia began his address by acknowledging the fact that the global environment is evolving rapidly, and there is a need to understand and keep pace with the change. Due to rapid economic, strategic, and geopolitical changes, it is uncertain whether the movement is towards a bipolar or a polycentric world order. However, whatever it may be, during such transitions, there will always be competition, friction, turbulence, and new alignments among the nation-states. Elaborating on the theoretical construct of power transition theory, he said that the weaker state attempts to challenge the dominant power as it becomes more robust against it and such transition always brings in a new set of challenges. Speaking about the 'Thucydides Trap' postulated by Allison Graham, he said it is a situation when a growing power competes against an existing power. Also, in the last 500 years, there have been 16 such situations of which 12 turned into a war.

The trend among the significant powers is that they wish to achieve their political, territorial, or strategic objectives by ensuring that they do not cross the threshold of an overt war. They attempt to achieve their objective by non-military means or by concealed employment of military force using tools like IW, propaganda, fake news, offensive cyber tools, drones, guided munitions, and hybrid troops. Many of them are operating in a grey zone environment – an environment that oscillates between peace and war. They are looking for ambiguity and to leverage non-attributability. There has been a progressive increase in violent non state actors

and a progressive increase in inter-state conflicts worldwide. There have been trends towards deviation from international norms, resulting in the erosion of the nation-state's sovereignty and competition for natural resources, oil, energy and markets which also leads to conflicts.

Talking about the future war and conflicts, Gen Ahluwalia quoted Plato when he said, 'Only the dead have seen the end of war'. Three decades ago, Admiral Joseph Nye had said that despite many efforts to prevent it, 'there may be war'; therefore, it may be correct to assume that there will be no conflicts and war. It is more important that we understand the trends by joining the dots. We may be able to identify the flashpoints the world over, it is difficult to crystal gaze and predict future wars with any accuracy. Few questions will always remain unanswered and most countries have gone wrong in predicting when and where about the wars, who will be fighting whom and which alliance will work and so on.

Mentioning the 2021 report by Stockholm International Peace Research Institute (SIPRI), the General said that despite the raging pandemic and declining national income around the world, there has been a steady increase in military expenditure world over at the rate of 2.6% per year in 2020 in comparison with 2019. Region-wise, it has been highest in Africa (5.1%) and Europe (about 4%). The question is why such a situation is prevailing? He said that pandemics has not deterred armed conflict; in fact, armed conflicts increased during the pandemic in 2020. Trying to figure out, he queried-is it because of anxiety, or is it because of fear or is it an occasion to exploit the opportunity to meet political objectives? He mentioned that there was a 40% increase in armed conflicts in sub-Saharan Africa in 2020 compared to 2019. There is an ongoing war in Ethiopian province of Tigray, the war in Yemen is a major humanitarian crisis, the Middle East and North Africa continue to remain the 'least peaceful regions of the world', there was conflict in Armenia and Azerbaijan, the ongoing crisis in Kazakhstan and Ukraine as also in Afghanistan. Therefore, during the pandemic the conflicts have further intensified. Chinese PLA's moves across the LAC, on a wide front, have resulted in a military standoff, skirmish and casualties on both the sides. Though the talks are on and there is some thaw but the standoff continues. Further, towards the East, the South China Sea, East China Sea and Taiwan continue to be in the news and remains tense.

So, what are the factors that tend to shape the world? Up to 1945, it was predominantly inter-state war. Post 1945 and from the mid 1950s, there was a progressive increase in intra-state conflicts and it is also known as the golden period of insurgency and terrorism. Almost 95% conflicts since 1945 are intra-state civil wars. All the data and statistics suggest that regional and extra-regional powers are involved. There are regulars, non-regulars, state actors, non-state actors and contractual forces. The range of tools used in recent conflicts are covert and overt, subversion, terrorism, sabotage, proxies, private military companies, violent non-state actors, psychological warfare, cyber, drones, political and diplomatic pressure, economic sanctions, strategic alignment, AI and its applications.

Gen Ahluwalia said that looking at armed conflicts by type, there is an apparent increase in intra-state conflicts and a decline in inter-state conflicts. Africa remains at the top; next comes Asia and the Middle East. Interestingly, there is an excellent relationship between terrorism moving in line with the growing intra-state conflicts, and this trend will continue. There is another crucial aspect-the age profile of the world. Wherever there is a young demography with mass

unemployment, poor governance, poor social structures, socio-economic inequality, these are the areas that have the maximum number of conflicts. The median age in Africa, Asia and Central America is in the teens and twenties. In 2020, India's median age is about 28.4 and China's is 38.4. In Africa, in many countries it is in the teens and that is the area that in 2020 recorded much higher armed conflicts. Therefore, countries with a young demographic profile are also the epicentre of intra-state conflicts and terrorism.

What are the factors that will shape the contours of future wars? Geopolitics remains the prime reason for all war. The recent developments that have resulted in geopolitical competition are instability in the Middle East, North Africa, the US pull-out from Afghanistan, the crisis in Kazakhstan and Ukraine. China's rise is well known over the last two decades as also the fact that China has been assertive and aggressive. It has moved in with the Belt and Road Initiative (BRI) into Asia, Africa, Central Asia and eastern Europe to achieve political, economic and strategic advantage. As China moves into the Indian Ocean Region, there is a strategic encirclement shaping the geopolitics of the countries in South Asia particularly those which are in close vicinity of India.

Geopolitics and Geoeconomics are complementary; geopolitics influences geoeconomics. The economic centre of gravity has progressively moved from the West to the East and so has the balance of power. According to a study, in 2030, of the four large economies, three will be from Asia-China, India and Japan. Therefore, the balance of power is undoubtedly moving to the East. On 25 January 2022, the IMF announced that the global economy has slowed down to grow at 4.4%. At 9% (downgraded from 9.5%), India remains the fastest-growing large economy in the world. In 2019, Michael Beckley had written that China's economic condition has declined steadily since the 2008 financial crisis and when rising powers have suffered economic slowdowns in the past, they've become more repressive at home and more aggressive abroad.

Social media is the prime tool along with state sponsored media whether electronic or print for waging a psychological campaign. It has a two-fold aim, one to change the perception of public at large and second to undermine the political institutions of the adversary. Talking about cyber, space, electromagnetic and AI, Gen Ahluwalia said that these are a much more contested domain today than in the past. In the 2015 White Paper on defence, China said that future wars would be fought in the information domain. Hence, great emphasis has been given to 'Informationisation' by PLA. A study in 2017 envisioned a system of systems confrontation and explained that warfare would be conducted on tangible and intangible battlefields. The tangible battlefield includes land, sea, air and space domain. Intangible battlefield includes EM spectrum, cyberspace and psychological cognition. Therefore, countries around the world are developing cyber capabilities to meet the need of the hour. In the space and nuclear domain, countries are involved in proliferation and the rules and regulations that are not adhered to will become sources of conflict soon.

World over, a number of countries have territorial and boundary disputes. India has boundary disputes with China and Pakistan and this continues to remain a source of conflict. All three countries maintain a 'no loss of territory' stance. President Xi Jinping has said that there will be no loss of territory given to it by its predecessors. When all countries have such an outlook, negotiations become difficult, and disputes may not get resolved. South Asia remains the

epicentre of terrorism. With China and Pakistan being all-weather friends, there could be a collusive threat to India in the future. Quoting Michael E O' Hanlon (author of Future of Land Warfare), the Chairperson said that South Asia has significant potential for large-scale operations by ground forces, whether in the context of inter-state conflicts, severe internal violence or complex humanitarian catastrophe due to environmental and natural disasters. He agrees with this statement of the author.

He continued to state that it is well known that disputes compounded by territory linger and are the primary source of conflicts. Also, countries continuously develop military capabilities to narrow the gap with adversaries. The current areas of development lie in developing capabilities in terms of niche technology, AI, swarm drones, guided munitions, working on hybrid tools and operating in a grey zone environment to maintain ambiguity and leverage non-attributive returns. The Chair concluded his talk by drawing attention to the fact that climate change may not affect in the short term, but will do so after 40-50 years. Due to global warming, there shall be an increase in the earth's temperature by 1^{o} Celsius by 2100. It will lead to an unacceptable rise in sea level in the countries around the South China Sea, Bangladesh, India, Maldives, and others in the region, leading to many future challenges. It is, therefore, important that leaders should be aware of the changes in geo-political-economic-technology-strategic domains, and their cross term impact on security in the region.

Sub-Theme 2 : China - Pakistan Relations & Its Impact on Security in the Region

Dr. Andrew Scobell, Distinguished Fellow, China
United States Institute of Peace (USIP)

Talking on China-Pakistan relations and its impact on security in the region, the speaker, Dr Andrew Scobell, said that-before looking at Pakistan and South Asia, it is essential to focus on Chinese understanding and perspective of the wider world. Since the late 1970s, China has adopted a reform policy and opening to the outside world. It meant modernisation and growth of the Chinese economy. The most important driver of the great Chinese leap outside is sustained economic growth, desire for more significant global influence and to counter the US influence worldwide. In recent decades, as China has become a global power, in the sense that China is present and engaged in every country and region worldwide, more emphasis has been given on Chinese overseas interests. Its core interest is to protect its citizens and assets abroad.

The Chinese leaders see the world in four concentric circles with Beijing at the centre, which the speaker called the 'ring of insecurity'. Fundamentally, even as China grows stronger, its leaders remain insecure. The most important ring of insecurity is within Chinese borders, that is China's domestic security, stability and continued Communist Party rule. Beyond that are three external rings and the second most important ring encompasses China's immediate periphery. The third ring includes China's Indo-Pacific neighbourhood and the fourth ring extends to the rest of the world. China has identified key countries that it considers vital to cooperate with to advance its interest and expand its influence in each ring. Five countries-Russia, Pakistan, Iran, South Africa and Venezuela have been identified by Beijing as critically crucial in a specific region of the world. These countries are considered China's pivotal regional partners. So, in Central Asia, that country is Russia. In South Asia, that regional pivot partner is Pakistan. Further, in the Middle East, the influential country to cooperate with is Iran. In Africa, that country seems to be South Africa and in Latin America, that country is Venezuela.

China has a global interest and approach, but it does pay close attention to various regions and seems to have a region-by-region strategy. In South Asia, China's regional priority appears to be its internal stability and this refers to stability in China's far west in Tibet and Xinjiang

province. In addition, another priority is protecting China's economic interests and balancing against the most powerful country in the region, India, which China views as a competitor. To further these priorities China has engaged in a range of activities-political, economic and military.

For China, Pakistan is the most crucial country in South Asia in order to achieve its interests in the region. It is no exaggeration to call Pakistan a lynchpin in China's South Asia policy. It is not only crucial for regional stability in South Asia but also for Central Asia. Pakistan's other importance to China is its ability to act as a counterweight to India. It is also the largest purchaser of Chinese armaments and the most important country in China's global Belt and Road Initiative. Also, China has invested more in Pakistan than any other country globally. Over a period, there seems to be an unusual increase in mutual understanding and trust between Islamabad and Beijing, which is rare between China and any other country. The sustained high level of trust has resulted in close security cooperation. In recent years, Pakistan's geostrategic importance for China has risen, although its global geopolitical significance has declined. China seems to have doubled down on cooperation with Pakistan while simultaneously broadening out its reach to other countries across South Asia.

To characterise China-Pakistan relationship, many terms have been used. Some claim it is an alliance, but the speaker said it is not an alliance, but certainly China-Pakistan relationship has a significant security component. Despite many tensions and bumps in the relationship between the two countries, they have managed to maintain a steady cooperative partnership. In terms of the impact of the China-Pakistan relationship in the region, the speaker considered it contradictory. Some elements of China-Pakistan relations are conducive to peace, while others contribute to conflict. Overall, to the speaker, China's influence on Pakistan has generally been conducive to stability in South Asia and supportive of peace in the region.

Sub-Theme 3 : Changing Strategic Landscape in Asia and its Impact on Future Conflicts

Dr. Timothy R Heath, Senior International Defence Researcher

RAND Corporation

Speaking on the Changing Strategic Landscape in Asia and its Impact on Future Conflicts, Dr. Timothy R Heath said that the issue of strategic partnerships must be viewed from a different angle of the broader issue of disintegration and transformation of the nation-state. Some exciting and far-reaching transformations are happening in all the nation-states and governments worldwide, especially in the developing world. This change will play an essential role in analysing future conflict and war.

Highlighting the critical global political and economic trends, the speaker said that in the US, NATO and developed countries in the West, one generally finds considerable polarisation and entrenchment of beliefs during recent times. Many western countries are not interested in getting involved in an overseas war, mainly because there has been a decline in inter-state wars and there is an economic decline of the West and growing economic strength in the non-western countries.

Another significant geopolitical trend is China's rise and realignment in Asia. China's economic power is well documented, but China is also looking to build its own 'Client State' networks. Countries that depend on China economically and politically rely on the Chinese leadership to help them achieve their goals and in return, China expects greater cooperation on some of its political issues. China has laid a vision of the Belt and Road Initiative and in many ways, we can say that it is a vision in which there is a network of countries which, with varying degrees, have become clients and are dependent on China. China is looking to build a relationship with countries that allows Beijing to influence and protect Chinese investments worldwide. Also, there is an upheaval in the Islamic world and Europe. The European Union is divided like never before, with Britain leaving the EU and other countries experiencing turmoil.

The strategic partnership is a bilateral and multilateral relationship based on economic, political and security cooperation. China has been a very active proponent of strategic partnerships. China opposes alliances for political reasons and in many ways, strategic partnership is suitable for the fluid post-cold war era. In a study published in 2011 by some Indian scholars that ranked Indian strategic partners, Russia was first, followed by the US and France. This may possibly be

different today. The strategic partnership, unlike alliance, is not confined to the national government. China's definition of strategic partnership is very open and includes multilateral groups of governments such as the Shanghai Cooperation Organisation (SCO) and it also includes non-state actors and other interest groups. China has been very deliberate in choosing this kind of open-ended definition of strategic partners because China sees many BRI countries fragmented politically, especially in Africa.

US has also shown interest in Strategic partnerships and has published official documents on the importance of the same. The shift occurred after the cold war, when the US became interested in the more flexible approach of security partnerships and cooperation. The US also found strategic partnerships useful to address a broad range of issues. In some ways it carries less risk for the US. According to the US State department website, the US has many bilateral and multilateral strategic partners.

On the other hand, China is building its own strategic partnership network. The BRI provides the road map through which China hopes to build a network with some priority countries worldwide. Also, the partner can be sub-national as well. It carries some exciting implications in the future. China is involved in supporting political parties and non-state actors in countries experiencing conflicts and a good example is Afghanistan, where it was quick to build a partnership with the Taliban when it saw the national government losing control of the country.

The strategic partnership will probably become a more defining feature in international politics. It offers many advantages and is very appealing to countries. The big countries are looking to build flexible and cooperative relationships that can address a wide range of issues. These partnerships often involve multiple partners and such a partnership can offer value to address a wide range of shared concerns, including the pandemic and terrorism.

Special Address by Lt Gen (Dr.) Rakesh Sharma, PVSM, UYSM, AVSM, VSM (Retd)

Lt Gen (Dr.) Rakesh Sharma, PVSM, UYSM, AVSM, VSM, (Retd)
Distinguished Fellow with CLAWS & VIF
Member of Executive Council of MP - IDSA & GCTC

Lt Gen (Dr.) Rakesh Sharma in his Special Address analysed the conceptual understanding of Pragyan He questioned whether the Pragyan Conclave is about studying current doctrines, strategies and building on them. The time has come to challenge the status quo, to contest shibboleths, to rethink and provide direction to policy-makers. For him, the question on modern warfare is critical to obtain a firm analytical foundation to contemplate future and prospective warfare. In this vein, he set the stage by questioning what would be the likely political aims translated into military aims and objectives for future conflicts.

It is a conventional notion that war and warfare over history have rigid definitions in terms of its nature, character etc starting three centuries ago. National security and military doctrine, capabilities and structures are defined to follow these rigid definitions. Historically on the first page of Clausewitz's 'On War', it's written, 'War is an act of force to compel the enemy to do our will'. War is taken as a state of usually open and declared armed hostile conflict between states or nations. War in this kind of formulation is organised, often prolonged conflict that is carried out by state and non-state actors, characterised by extreme violence, social and economic disruption. He opined that in the 21st Century and for the future, contemplating and defining war is one of the most serious problems. He empathically stated that today's strategic leaders need to conceptualise what war is all about and broaden their horizons, since war is no longer limited to conflicts between states and with non-state actors. It has a wide spectrum ranging from the

all-out conventional warfare on one end of the spectrum to even peacetime on the other. War, in the manner that it is commonly visualised may no longer exist, but a nation's desire to impose its will on an adversary will exist always and to impose the will of a nation on an adversary does not require an armed conflict. It can be done in many ways. That is the conceptualisation of future wars. He cited the example of Operation PARAKRAM when the nation's will was imposed on the adversary. Nevertheless, it is not called a war but a method of coercion. He quoted the then Defence Minister's statement in Parliament that between 19 December 2001 to 16 October 2002, the Indian army, in J&K and the Western front, suffered 1874 casualties. He questioned the belief that it was not a war despite the high number of casualties, but was called coercion. He stated that in contemporary times, coercion is war, just that the methodology has become different.

Gen Sharma opined that in the changing nature of warfare, the challenge to the territorial integrity in Eastern Ladakh in the recent past, is also war. He coined a new definition of future warfare, especially for India, stating that, 'war is the rational execution of all means available to bring about sufficient adherence and acceptance of our national will to an adversary, resulting, if essential in armed conflict, but armed conflict is only when all other means fail'. Imposition of will continues to be part of the definition but armed conflict is not essential in this definition of war. He further asserted that we are yet compelling our enemy to do our will. In this new conceptualisation, he deviated from the traditional definition of war, as war meaning only armed conflicts, but suggested that war is not only an act of armed aggression but it's a desire and the actions of a nation state to impose its will. Will, becomes more important and method of doing it is just different. To him, a methodology of regime change, which was carried out for Saddam Hussein, was war. A few more instances he quoted were Kargil in 1999 and Estonia in 2007, where cyber-attacks and fake news were used to cause riots and looting. He quoted the instance of Russian Spetznaz soldiers called the 'Little Green Man' who went inside Ukraine and took over a large chunk of Ukrainian territory in Crimea without firing a shot, which according to him was war. In addition, Facebook, Twitter and other social media accounts were used by Russians, as per the American version and the report of 2020, which influenced the minds of large number of American populace for the election of 2017. Regime change is what the adversary wanted. This nature of activity is not an armed conflict but it is a typology of war. He stated that it is apparent that coercion is war.

In future, command, control and communication systems by themselves will independently gather information about targets that need to be hit and decide the priority to execute tasks. The role of satellite communication is increasingly important because it will make tactical commanders actually visualise and see what is happening across on the other side, identify targets and take them on in tens of seconds. This has not been witnessed historically in warfare. In the current times, movement and massing of large forces has become impossible due to the nature and capabilities of surveillance resources. Thus, in future, mass will be a weakness. Armies will have to learn to operate in smaller, more dispersed units. Manoeuvre will become increasingly difficult. The transparency of the ongoing Russian build-up across Ukraine is the latest example. He stated that it has been argued that military offensives will no longer be possible against forces that have embraced technology because 'to move will mean to be seen'.

While concluding, he asserted that in the near-visualisation of 21st century, there is no satisfactory answer to how a war will end or if it will end at all. The other question is related to how the armed conflict will end. In this case, the response is 'when sufficient adherence to our national will has been achieved'. This concept encourages nation states to define objectives of a war and objectives of armed conflicts distinctly and also those actions and events, which must occur in order to bring an end to armed hostilities. The old notions of territory, Prisoners of War (PoW), the destruction of enemy's war fighting machines may not be suitable to declare the end of a war. Victory will need to be redefined as success in newer forms. Hence, in future war, challenges posed to an adversary may or may not use kinetic force at all. Victory will transform into success, which will still be measurable by the capitulation in some form by the adversary, but that may not be in kinetic form. Time has arrived to rethink war and get on to the modern concepts of war-fighting.

SESSION II : EXPANDING DOMAINS OF WARFARE

Sub-Theme 1: Expanding Domains of Warfare

Lt Gen (Dr.) Ranbir Singh PVSM, AVSM, YSM, SM (Retd)**
Former Army Commander Northern Command &
Director General of Military Operations

Highlighting the focus of the Session, the Chairperson - Lt Gen (Dr.) Ranbir Singh mentioned that for the past several years, expanding domains of warfare or MDO or all domain operations, have been creating their own bandwagon effect. All experts have been writing or speaking in seminars on newer domains of warfare. These expanding domains of warfare represent a series of visionary leaps that have taken place to address the question as to how future wars will be fought. To some, these represent somethings that have always existed while for others they are something new that need to be taken notice of. Whatever the case may be, they represent the *where, when and how* the warfare is changing and deserves our undivided attention. The Chairperson quoted one of the greatest truisms of war, as per British military historian Liddell Hart, *'the real target in war is the mind of the enemy commander, not the bodies of his troops'*.

This Maxim touches the core of understanding the nature of warfare. War is a competition between adversaries, a contest of actions and counter actions between contestants and competitors. And these competitions unfold in the domains accessible to each competitor, whether land, sea, air or newer intangible domains-space and cyberspace.

Dominating in war is not about dominating a particular domain. It is about dominating the adversary or enemy. In contemporary conflict as competitors increasingly gain access to various domains of warfare, it is likely that competitors will seek to offset the adversary's dominance in one domain by acting more aggressively in another domain. Thus, dominance in one or more domains is important. But to dominate an enemy, the ability to conduct the operation in more than one domain simultaneously and the ability to switch from one domain to another is important. Using them to the advantage of a particular side will constitute success. The main impetus for change in how the military conducts warfare is largely based on changes in technology and the ability of a military to manoeuvre. When new technology is introduced to the battlefield one must adapt the scheme of manoeuvre and update tactics, techniques and plans accordingly.

As with all advances in adversary's capabilities, militaries seek to develop technology, personnel, training, procedures in order to mitigate and defeat the emerging threats. The most recent offering of militaries, the world over, is the concept of MDO. So far, the discourse has been about five domains- land, air, maritime and the newer domains of cyber and space in the hope that a joint military force of the future will be able to achieve a competitive advantage over an adversary by presenting multiple complementary threats that each requires a response- thereby exposing the adversary's vulnerabilities to other threats. For the Chairperson, MDO are the way to provide effects with timing and tempo that the enemy cannot compete with. In India, the armed forces are in the midst of the most profound transformation conceptualising the manner and ways they would fight the future wars.

In all domains, including space and cyber, each armed service has developed concepts for employing capabilities in all these dimensions simultaneously and continuously to out-manoeuvre and defeat enemy forces. While a shared vision of the future is good to have, the armed forces' ability to fully exploit a new approach towards warfare and to synchronise capabilities in all domains will depend on the development of leadership, culture, capabilities, resources, including funding, joint doctrines and training.

Gen Ranbir introduced the sixth domain of warfare, which is under consideration due to the rise in the importance of information operations, the cognitive domain, arguably the most important emerging war-fighting domain, that is the human brain. This new battle-space is not just about influencing the hearts and minds of the people seeking information; it is about involuntarily penetrating, shaping and coercing the mind in the ultimate realisation of the Clausewitzian definition of war i.e, to compel an adversary to submit to one's whim. And the most powerful tool in this war is the brain-computer interface technologies that connect the human brain to various devices. There is less emphasis in this domain on bloodshed and more on incapacitating the adversary, the key to which is capabilities in the domains of cyber, space and electromagnetic spectrum. This sixth domain is neither isolated nor removed from other domains; coordinated attacks across all domains will continue to be the norm and the military thinkers will have to account for the subtleties of the human mind and the increasing reliance on the brain-computer interface. The cognitive domain is becoming increasingly importantwith the introduction of space and cyber technologies. The domain has opened up the populace to more information making

the traditional barriers inadequate, making it easier for any actor, state or non-state, to make effects in any domain. The traditional barriers are being outpaced at sharing information by entities like Twitter, Facebook and other social media platforms.

Today, the military commanders are caught up in two wars being fought concurrently. One which is fought on the ground with the manpower and firepower available at their disposal. Second, the information war which is mainly fought, though not exclusively, through social media and all the other means of conveying or impacting psychological operations. Ultimately, what matters is, who won the war of words and narratives rather than who had more potent weaponry and more manpower or battle combat ratio. Therefore, we should expect all domains to be contested in the future. Our adversaries will possess significant integrated defence capabilities, air defences, long range fires as well as sophisticated ISR, EW and Cyber capability. It may no longer be possible to maintain total dominance in all the domains all the time. The crux lies in our ability to get past the adversary's integrated defence capabilities, avoid isolation and fracturing of any of our domains and preserve our freedom of action. We must be able to penetrate their defences at a time and place of our choosing in more than one domain, open up windows of domain superiority to allow manoeuvre inside the enemy's integrated defences.

The rate and speed of future events will not allow the time to synchronise federated solutions. To present the enemy with multiple dilemmas, we must cohesively integrate our solutions before the battle starts or even before it is joined. Especially in the Indian context, we are in the throes of immense security concerns between our Western and Northern neighbours. Pakistan has mastered the art of employing regulars and irregulars along with non-state actors and terrorists. It is already waging a hybrid war of sorts in J & K and China's doctrine of unrestricted war conceptualises combining different forms of warfare. It brings about that in a future war, a nation will no longer use armed forces alone. The whole nation and the society would become a part of the battle given the penetrability of cyber, space, information and economic warfare. We face an environment of a rising China and an increasingly belligerent Pakistan that will bring an integrated multi-domain approach to war-fighting to try and counter our conventional strength. The threats of the future will undoubtedly compel us to change the way we must fight. Our adversaries will leverage technological advances to blend space and cyber operations as the battle field acquires a multi-domain complexion. This invokes us to evolve a multi-domain response combining fires across domains and creating the desired impact. A multi-domain warfare capability will have to be structured to a net-centric war-structure and orchestrated like so.

In conclusion, Gen Ranbir reiterated that the proliferation of different warfare tools and the resultant expansion of the battlefield means that no particular service, whether it is the army, air force, or navy can guarantee victory all by itself. The modern battlefield needs not just the military alone, but political, psychological, electronic and technological warriors along with the combat soldiers to achieve the ultimate victory and success.

Sub -Theme 2: Modern Air Warfare: Challenges for India

Air Marshal KK Nohwar, PVSM, VM (Retd)

Former Vice Chief of the Air Staff

Air Marshal KK Nohwar began his talk by stating that the Pragyan Conclave is taking place at a very important time in history when the world is witnessing geopolitical uncertainty like never before. The Speaker asserted that the situation is tending to change the second postulate of the Concept Note for this conclave that states," …*war between great powers and their allies has become almost non-existent*…". Mentioning the large Russian concentration across Ukraine, he questioned whether the US and Russia are merely shadow-boxing and indulging in a staring contest, as to who blinks first or as the Russian President Putin says, that US is whipping up tensions over Ukraine, while the US on its part, warns that Moscow is fabricating a pretext for an attack on Ukraine. Referencing the recent joint statement on 03 Jan 2022 by the P5 that '…*a nuclear war can never be won and must never be fought*…', he asserted that it reduces the risk of nuclear conflict ever starting. With Russia knocking on the doors of Ukraine and China showing aggression increasingly against Taiwan by repeatedly violating Taiwan's Air Defence Identification Zone (ADIZ), this joint pledge suggests a renewed commitment by the P5 to prevent a confrontation from turning into a nuclear showdown.

The Speaker quoted Field Marshal Erwin Rommel, who had said after the second battle of El Alamein that, '…*the future battle on the ground will be preceded by battle in the Air*. *This will determine which of the contestants have to suffer operational and tactical disadvantages and be forced throughout the battle into adopting compromise solutions*…' For him, this holds good in modern times too. He endorsed the statement of the CAS who had earlier said that the timely application of air-power would be significant.

In the present time and foreseeable future, airpower involves force on force engagement in the quest for airpower dominance. All other classical roles of airpower will endure, these roles being-Counter Air Operations (CAO), Offensive Counter Air (OCA) and Defensive Counter Air (DCA), SEAD or the Suppression of Enemy Air Defence and Interdiction etc. He deliberated that advanced aerospace nations are exploring the concept of manned/unmanned teaming in which UAV/UCAV would accompany the fighter as a Loyal Wingman, and in most cases, fly ahead of the fighter to search the space for enemy aircraft and launch missiles on behalf of the fighter that would soon arrive on the scene and mop-up the remaining enemy aircraft. This is the dilemma faced by the US in the contingency of the attempted invasion of Taiwan by China. There would be great emphasis on robust Electronic Warfare system (EWS) to degrade the capability of the ingressing fighter aircraft. Hardened, secure, jamming-resistant, data links would be pre-requisites for greater domain awareness. Tri-services data link would therefore be a critical requirement for effective MDO. Stealth would be desirable because even countries like the US are now thinking of having only one or two stealth aircraft in their inventory and others would be legacy fighters like the F-15 EX and F-16. For prosecuting integrated multi-domain warfare, reliance on space based assets would be critical. Formation of the DSA and its work towards the creation of space situational awareness is a step in the right direction for protecting our vital space based assets. AI enabled decision support systems would shorten the sensor to shooter loop.

Air Marshal Nohwar emphasised, that Hypersonic Glide Vehicles (HGV) will remain the real threat. With the recent proposal by China to sell DF-17 HGV to Pakistan to cater for the threat from the S-400, which India is acquiring, this threat from Pakistan, in the future, will be significant and will need to be addressed. In 2012, the US carried out experiments with the Counter-Electronics High Power Microwave Advanced Missile Project being mounted on cruise missiles to enter hostile airspace and cause severe damage to electronics on the ground. The enemy's C2 centres were neutralised with short bursts of microwave energy. A microwave weapon could also be fitted on a UAV or a cruise missile and remains a potent threat for the future. The UAVs will be the real game-changers in modern air-warfare. From the Bekaa Valley War to the recent strikes against the UAE, UAVs and Drones have shown their usefulness in the prosecution of the dull, dangerous and dirty missions worldwide.

The Nagorno-Karabakh conflict is referred to as ushering in the era of drone wars. But the wars between the great powers are very unlikely as per the postulate of the Concept Note. Citing the example of the Houthi rebels in Yemen and Saudi Arabia, Air Marshal Nohwar said that loitering munitions, have been used effectively by the Houthis against the ARAMCO Oil Refinery and they managed to neutralise about 50% of the output. Drones have also been used in a similar time frame in September 2021 for dropping arms, fake Indian currency notes and drugs into Indian territory by Pakistan. This was followed by the attack on the Jammu air base. The offensive use of drones for targeting terrorist training camps, launch bases close to the International Border (IB) or LC needs consideration. Training in the use of UAVs needs to be stepped up. In 2011, the USAF, for the first time, trained more UAV pilots than traditional fighter pilots. Drone swarms can be innovatively used offensively to great advantage and this aspect needs serious consideration.

Speaking about the challenges for India, Air Marshal Nohwar said that with the development of J-20, J-31 in China and the PLAF having already operationalised the J-20, this is an operational void that the IAF faces presently. The induction of the Rafael has offset this void to some extent but not entirely. Results of exercises carried by the US AF using its F-22 against legacy fighters indicate an unquestioned superiority of the Stealth platform. Therefore, development of the Advanced Medium Combat Aircraft (AMCA), India's 5th generation fighter aircraft programme, needs to be hastened. The other programmes of the Aeronautical Design Agency are Tejas MK II and the Omni Role Combat Aircraft (ORCA), which is yet to be approved. The development of the stealth UCAV, Ghatak, started with the concept of the AURA, i.e., the Autonomous Unmanned Research Aircraft in 2009. Then a test bed for the UCAV was envisaged in the form of SWiFT, which is Stealth Winged Flying Test bed, following which the development of the Ghatak will be taken up. With go-ahead given in 2016, the SWiFT is being developed as a one ton test bed for the Ghatak and will subsequently be used as a loyal wingman. While operational details are not known, it is expected to fly by 2025.

Talking about India's other indigenous projects, Air Marshal Nohwar highlighted the BRAHMOS, the Nirbhay subsonic cruise missile, the Hypersonic Technology Demonstrative Vehicle (HSDTV), AGNI series of ballistic missiles, the Prithvi Air Defence Missile, the Akash Surface to Air and the Astra Air to Air Missile (AAM). With the induction of Rafael, complete and likely early induction and operationalisation of S-400, India would have built up a substantial air power capability that would cause a strong deterrence against Pakistan and a dissuasive posture against China in future. However, he reiterated that the greatest challenge remains the early operationalisation of projects with Hindustan Aeronautics Limited (HAL) and Aeronautical Development Agency.

Sub-Theme 3 : Asymmetric Warfare - Preferred Policy for State Actors Today

Dr. Shashi Jayakumar
RSIS, Singapore

Dr. Shashi commenced his talk by clarifying that while some of the threats in the cyber domain originate from military intelligence arms of various nations and state security apparatus, he would not forensically dissect the organisations but rather expound on the nature of the threat itself. There are many threats from full spectrum warfare, which are called hybrid or state sponsored subversion by some, but he would restrict to his area of expertise that involves disinformation, fake news, cyber and certain aspects of radicalisation. Fake news/ misinformation of the kind that every country experiences, like rumours, misreporting, misunderstandings, intentional, even organised falsehoods, for profit or mischief with/without a wider agenda does not concern us much right now, but what does, is the coordinated behaviour, disinformation attacks at scale, information operations by adversaries, but also at times by friendly states which have certain objectives in mind to undermine the social resilience of Singapore through multi-faceted attacks. Disinformation is one, but could also involve cyber attacks.

He said, that a masterful exposition of Russian operations and social media manipulation is reflected in Peter Pomerantsev's book *'Nothing is True and Everything is Possible'*. The key takeaway from his book, is that through propaganda you have the ability to create a new reality and target populations. You need to watch out for a reconditioning like a boiled frog scenario where the people's resilience gets undermined and the strength of the people to resist gets demotivated.

Dr. Shashi referred to the article *'The Nature and Content of a New-Generation War'* published in Dec 2013 by Col SG Chekinov and Lt Gen SA Bodganov of the Centre for Military-Strategic Studies, in which they laid out the full spectrum, multi-faceted attack in which some of the key methods used may not be of military nature alone. He clarified, that though he cites the examples of Russia, it is not alone and several other states use similar methods as well. He spoke about Gas lighting, which means making the target doubt one's reality. Some of these are

used by official news channels such as Russia Today. The efforts are sometimes so good that it is indistinguishable from genuine journalism. That this subversion can change the perception and undermine resilience, is the key issue.

Referring to some case-studies, the speaker spoke about the 2016 US elections and the 2018 mid-term elections, which were a case of artificial creation and manipulation of perceptions by Russian trolls and bot-armies, which had the effect of stirring up mass opinions and inflaming already existing tensions and deepening already existing fissures in society. The Russian group aimed through algorithms, bots and human control in the back end to stir up, aggravate racial tensions and feed both the right and the pro-African Americans' fissures within society. He said that the Kremlin trolls created groups like the 'Stop Islamisation of Texas'. There was another Facebook group called the 'United Muslims of America' which had more than 300,000 followers. The trolls were actually feeding both sides to create fissures. In other words, fake news by the use of bots and algorithms had real world consequences.

The new offensive operations by the Russians were really to give the Americans an idea that they could get in and out of the US democratic electoral system at any time they wanted. In other phishing attacks, Russian military operatives sent fake disguised emails to more than 300 people associated with the Democratic National Convention in 2016. One of them was the Clinton Campaign Chairman John Pedesto, who fell for the scheme and unwittingly handed over more than 50,000 emails to Russians which had a decisive impact in turning the election Trump's way.

Dr. Shashi went on to say that it's not just the Russians and information is not just about fake news, disinformation and manipulation. Still, because of influence and interference, we have had the breakdown of the Westphalian notion, which has persisted for over 300 years, that a state should not interfere in the sovereign affairs of others.

Dr. Shashi highlighted the key differences between the Russian and the Chinese manifestation of cyber operations. In China there are a large number of young, patriotically motivated individuals who are willing to do Beijing's bidding and many of them have never been state-sponsored operatives. These cyber-troopers have been quite effective when required, for instance, to create tweet storms on flashpoint issues such as China's manipulation in Taiwan. Citing an Australian case-study, he said that it is important because, out of growing concern for the Chinese manipulation operations in Australia, the Australian government initiated a multi-agency effort to uncover the real magnitude of these operations. What does China wish to achieve? One issue that has some resonance in Singapore, is the idea that China wishes to have all overseas Chinese do its bidding. Taking the case study of Singapore, Dr Shashi highlighted that Singaporean Chinese are very different from Chinese in China, having lived for many generations in Singapore. Mr BilahariKausikan, a retired and influential Singapore diplomat, is one of the few who calls out Chinese information operations that are very sophisticated, may originate in the Chinese media sphere and somehow cross over to the Singapore social media sphere. He points out that the basic bottom line is that awareness about the exposure to manipulation is an excellent countermeasure to inoculate people.

Dr. Shashi mentioned that to counter these threats, reinforcing social cohesion is most important. It is clear that the real issue is not information operations, but foreign interference and there is now a law, in Singapore, looking at hostile information campaigns. One of the lessons to be learnt from the Russian and Chinese operations is that some manner of multi-agency coordination is essential. In Singapore, not just one agency has been made responsible for looking at hostile information campaigns like the French have done. Despite various issues, the French model is worth studying because even as the French tend to centralise, when the Macron leaks happened there was a lot of emphasis on united inter-agency government strategy.In Singapore, major terrorist drills are conducted. But herein lies the issue - while Singapore is quite well prepared for kinetic threats, but how about the boiling-frog scenarios where the resilience and the will to resist is slowly being undermined. Now, these issues are coming to the forefront. In the total defence concept, a new pillar, the first in 25 years, concerning digital i.e, cyber and disinformation, was recently added.

To sum-up, Dr. Shashi said that those on the defensive side are always playing catch up. In the future there will be actors going beyond the basic information operation campaigns, using PR companies that are legitimate, also deep fakes, technical arms race in terms of technological innovation, better hybrid models and bots armies controlled either by AI or humans as well. As fake news is concerned with being launched in multi-dimensional ways, a multi-dimensional and comprehensive response is essential. While cooperation and coordination across all areas of government is required there is also a need for some sort of inoculation, critical thinking and resilience on the part of the people. From his experience, he asserted that those nations that have high trust in key leaders and institutions tend to do better because when the threat is exposed, the people tend to believe the Government rebuttal or its point of view.

PRAGYAN CONCLAVE

प्रज्ञान

2022

DAY II

SESSION III: EMERGING DISRUPTIVE TECHNOLOGIES

SESSION IV: LEADERSHIP AND ESCALATORY MECHANISM

SESSION V: INTEGRATION IN A MULTI-DOMAIN LANDSCAPE

Special Address By Lt Gen Philip Campose, PVSM, AVSM**, VSM (Retd)

Lt Gen Philip Campose, PVSM, AVSM, VSM (Retd)**
Former Vice Chief of the Army Staff
Distinguished Fellow, CLAWS

Gen Philip Campose commenced his Special Address by giving out a geopolitical scan. He remarked that the 20th century was characterised by very violent conflicts. However, initial trends in the 21st century conflicts pointed to a general reduction in the levels of violence and greater reliance on technology. He stated that coercion, disruption and precision are the new buzzwords of future warfare, if lessons learnt from the Lebanon and Afghan wars were to be examined. In the current era, war by other means is being preferred in conflict situations rather than violent clashes with collateral damage. Full-fledged conventional wars are the least preferred option, even for militarily stronger players. The weaker players, in any case, are inclined to opt for subterfuge and sub-conventional. Use of technology is becoming increasingly common among all players.

In the future, there would be threats of conflict and violence in the erstwhile Republics of the Soviet Union, as Russia tries to regain its influence, with a consequent pushback from the US and a few European nations. The new cold war between the US and China is also likely to result in conflicts in other parts of the world, mostly proxy wars. The Middle East is likely to continue simmering due to intra Islamic sectarian confrontations and the battles for supremacy within the Ummah among the Sunni Nations. Israel may not get directly involved in armed hostilities out of Palestine, preferring technology predominant attacks while focusing on its short term and long-term security interests.

The speaker felt that flashpoints in the next few decades are likely to continue to affect a few countries in the Middle East, North Africa, parts of Sub Saharan Africa and Central Asian states, including Afghanistan. As far as India is concerned, the external threats will emanate essentially from China, mostly in the form of military coercion, involving intimidation or even limited armed

confrontation. The prospects of violent conflict confrontation would be the highest in Eastern Ladakh, as China continues its efforts for salami slicing, to enhance depth to its National Highway 219, passing through Aksai Chin and to the China-Pakistan Economic Corridor (CPEC), passing through Gilgit-Baltistan and PoK. It is also likely that certain places in Arunachal Pradesh, especially areas in the proximity of Tawang, will be subjected to coercive actions and where possible, China would resort to intimidatory or assertive actions, on occasions, in collaboration with Pakistan.

In such a situation, what should India do to prepare itself to deal with future contours of conflict? Firstly, India must strengthen its deterrence posture in all domains of warfare. and not allow it to weaken. Secondly, India should strengthen and modernise its conventional strategic military capabilities and plug any gaps in this regard. Thirdly, there is a need to rebalance and reorient our forces in keeping with the current and emerging threats. India should continuously expand its technological capabilities in battlefield surveillance, increase battlefield transparency, improve its sensor to shooter connectivity, long range precision weaponry and air defence.

Gen Campose further elucidated that with Non-Contact Warfare(NCW) at the centre of focus of the different services, operational and logistic resources of the three services must be integrated to achieve optimum effect. The speaker also stressed that theaterisation and other related higher defence control and command structures must be put in place at the earliest.

Gen Campose recommended enhancement and upgradation of India’s technological warfare capability, in keeping with global trends as well as the myriad of threats the nation faces. AI, quantum Computing, Big Data Analytics, cyber warfare, and drone warfare capabilities should be the priority areas for military research and development efforts. India must convey it clearly to its potential adversaries that it can and will use its capabilities against them if provoked. India must ensure access to latest technologies from more advanced countries and progressively ensure self-reliance in this regard.

Concurrently, it is critical to implement effective protective measures to guard national vulnerabilities, particularly the critical infrastructure, from disruptive attacks in both the physical and technological realms. Military leadership must reorient to this transformative approach and its technology-based changes. Technological skills must be imbibed at all levels of leadership. At the national level, improving awareness among the decision makers and the public at large about military matters should be encouraged. A collective or whole of nation approach will fetch levels of support for the military and contribute to gaining access to the country's vast resources. Unless that happens, the country will always be short of resources to meet the needs of the future. Towards the end, Gen Campose said that there is an urgent need to formulate and promulgate a holistic National Security Strategy, which clearly sets out the *Ends, Ways, and Means* to create secure conditions for achievement of national and strategic goals, objectives and interests. Unless such guidance is provided to all agencies and departments of the government, it would be difficult to meet future security requirements in an effective and timely manner.

SESSION III: EMERGING DISRUPTIVE TECHNOLOGIES

Sub-Theme 1: Disruptive Technologies and Land Forces Operations: Indian Context

Lt Gen Rajeev Sabherwal, PVSM, AVSM, VSM (Retd)

The COAS Chair of Excellence & Distinguished Fellow, CLAWS

Lt Gen Rajeev Sabherwal chairing the session on “Emerging Disruptive Technologies” briefly, set the context for deployment of disruptive technologies in the Indian subcontinent. He emphasised the need to acquire technologies, which would provide enormous dividends in future battlefield operations. Perplexed by the ubiquitous use of disruptive terminology, Gen Sabherwal clarified its meaning for the audience. The speaker also deliberated on the question of whether technology facilitated new wars and brought about new challenges in the battlefield. New technologies, right from the American Civil War to World War II, have been invented to fulfil the needs of war. Thus, traditionally, technology has been driven by war in a major way. However, such linear interactions between technology and requirements of warfare underwent changes around the end of the Cold War. The information age dawned as the Soviet domination ended in Eastern Europe. In military parlance and strategic discourses, this new development culminated in what came to be known as “smart entities”, wherein communication and computation came together to affect traditional domains of warfare. According to Gen Sabherwal, any sensor, shooter and decision maker who could send and receive data, while also processing large quantities of valuable data, is termed as “smart”.

The speaker brought out how, in the modern age, technology drove the way wars are fought, in contrast to historical patterns. The rapid pace of disruptive technology is not only easy to leverage, but it also gives out of proportion and asymmetric advantages to its users. One essential feature of DTs is their information and communication driven elements. This

suggested that technologies are not static entities, but dynamic, containing data within itself, which could be utilised for optimisation of military operations. Gen Sabherwal described, how network centric warfare constitutes disruption by smart entities like sensors, shooters and decision makers, which work in a network architecture. Interrupting this network centric ecosystem is possible as new computing capabilities make initiating cyber-attacks easier. Likewise, new forms of communications make EW more likely. This implies that incorporation of new technologies into military systems gives greater opportunities to adversaries to conduct new operations to trouble existing systems. In future wars, Gen Sabherwal forecasted, swarm technologies - small drone quadcopters - will effectively alter the way wars are fought over multiple physical domains. Thus, Gen Sabherwal, by citing empirical evidence justified his proposition that ultimately "technologies drive war".

The Chair then highlighted the pace of disruption that has accelerated in modern times as compared with disruption that happened in the post-industrial era. Technological adoption has altered fundamental ways of executing the business of war. For nation states, incorporation of modern technology provides opportunities to enhance their capabilities and bridge gaps of power asymmetry relative to other states, when the traditional matrix is always skewed towards larger states. Small states have effectively exploited the disruption of new technologies to shift the balance of power in their favour, at the expense of others, even traditionally more powerful nations. Technology as an independent variable equalised the power equation, if effectively deployed by smaller states. Moreover, due to technological progression at a faster pace, kinetic warfare is getting transformed or shifting to non-kinetic warfare. In future, it may not be necessary to carry out attrition warfare when similar destruction could be achieved by indulging in non-kinetic warfare, including cyber and EW.

Gen Sabherwal differentiated evolutionary technology from revolutionary technologies, which are unexpected, discontinuous and which alter the status quo. DTs are revolutionary at their core, but become disruptive due to the manner of their application. Inclusion of DTs into the military domains must lead to some new way of conducting military operations and in creation of a new kind of warfighting mechanism. Closely related but distinct, is the RMA, which necessarily means the application of new technologies, resulting in doctrinal changes. Such doctrinal modifications necessitate the development of new organisations. For instance, cyber and EW has led to doctrinal changes in warfare, which in turn have led to the development of new organisations to deal with newer technological challenges. The speaker believed that India must invest in multiple emerging technologies. Yet, the predicament is that not all emerging technologies are at a mature and implementable stage. Hence, India must diversify by simultaneous investments of human and financial capital in multiple fields - cyber, electronic, AI, quantum, nano and other emerging technologies. These newer technologies would help India prepare for the relentless demands of future wars. Gen Sabherwal recommended focussing on specific key military technologies like- Rail Guns, autonomous ground vehicles, Loitering Missiles (LMs), unmanned stealth UCAVs, hypersonic weapons etc. The speaker concluded that it is in India's national interest to leverage the multiple benefits of emerging technologies with its core strength in Information technology (IT), to achieve maximum preparedness for future warfare.

Sub -Theme 2: Cyberwarfare : Threats and Opportunities

Prof Chuck Freilich
Former Deputy National Security Advisor, Israel

Prof Chuck Freilich elaborated on the threats and opportunities that cyber warfare impacts on a state. He felt that cyber developments would substantially impact state power and military might and that cyber technologies would have substantial disruptive effects on the nature and character of war. There is a need to reassess whether DTs would require states to fundamentally alter their perspective on national security requirements. The question, though gripping, is complex and requires deep reflection.

Prof Freilich enquired if cyber warfare poses a challenge to the idea of statehood. He opined that usually, states have the monopoly to use force against individuals or other states. Contrarily, state authority is contested in the cyber domain. To put it simply, states do not have a monopoly on the use of force in the cyber domain. This monopoly is only possible in physical domains, where tangible effects can be observed. Cyber domain remains virtual, and many states fail to acquire the requisite capabilities to deal with such challenges. Further, states have little or no control over cyber borders, which implies that cyber technologies can easily seep percolate inside, without states being aware of such threats. Tracking, detecting and perceiving these threats is usually quite difficult and time consuming. Ultimately, since the adversary is invisible, traditional military components are often ineffective in dealing with such threats. On the contrary, countering such threats require the total commitment of state resources to develop and promulgate cyber defence models to counter the disruptive effects of the cyber threats. In comparison to new emerging technologies, the cyber domain has made waging wars reasonably simpler. It had provided a level playing field to small states and non-state actors to influence the wills of more powerful states.

Prof Freilich posed another interesting question - whether cyber-attacks could cause systemic destruction involving political, economic and military disruption - undermining the ability of the state to function effectively? Prof Freilich asserted that unlike nuclear weapons, which are localised, cyber weapons are not constrained by de jure borders that determined the territorial limitations of states. Distinctively, in the cyber domain, codes are weaponised to do damage mostly in a non-kinetic manner, dissimilar to how conventional weaponry functions and whose lethality can be observed. Such tangible observations are not always possible in the cyber

domain and thus, cyber weapons have unmatched capabilities for disruption. However, cyber weapons' potential for disruption remains to be fully demonstrated. Until then, its ability to affect systemic changes would remain uncertain.

Prof Freilich questioned whether cyber-attacks are more escalatory in practice than conventional means of warfare. States conduct cyber operations to sow doubts regarding the ability of other states to continue to exercise their influence. Employing cyber capabilities to launch cyber-attacks necessarily means creating security dilemma for other states. The primary advantage of such actions includes disruption of a state's activities, without any loss of life. The reluctance to employ conventional weapons by any state stems from the possible aggressive retaliation from the adversary. However, for cyber-attacks, such consequences may be minimised, essentially due to plausible deniability regarding the origins of such attacks. Hence, the majority opinion remains that cyber warfare is comparatively less escalatory. Counterintuitively, cyber operations are performed under the radar, quite invisible to the general populace. Such invisibility provides greater leeway to national leadership to employ cyber weapons more often, without accountability. Empirically, states generally respond to a cyber-attack with retaliation by another type of cyber weapon, rather than kinetic means of warfare. Hence, cyber-attacks can be considered less escalatory in nature.The next query posed by Prof Freilich was whether cyber warfare was offensive pre -dominant or defensive cyber actions more prominent? Proponents assert that cyber warfare is offensively oriented and that advancements in software technologies would create new opportunities for attackers and correspondingly, make the job of cyber defenders much harder. Conversely, proponents of cyber defence argue that offensive cyber capabilities require considerable investments in time, expertise, efforts and funds.

Prof Freilich examined the impact of cyber warfare on four classical dimensions of military strategy - ***detection, defence, deterrence and defeat***. Due to paucity of time, Prof Chuck elaborated only on the impact on deterrence and defeat. "Can cyber deterrence be achieved", he enquired. US and Britain national security policy states that cyber deterrence can be achieved. The sheer number of cyber-attacks suggests that deterrence in the cyber domain is not quite easy to achieve. Yet, feasibility and viability of cyber defence is demonstrated in case of a few cyber-attacks. It has become apparent that absolute cyber deterrence is not feasible, but cross domain deterrence can be established, speculated Prof Freilich. This essentially implies that deterrence can be ascertained by retaliating in an asymmetric fashion. Such responses would possibly dissuade adversaries from further cyber-attacks, effectively instituting deterrence. It was plainly stated by Prof Freilich that defeating an adversary in the cyber domain is not possible and what states must practically aspire to achieve cyber superiority, with the requisite ability to disrupt, complemented by adequate defensive capabilities to thwart the actions of their adversaries.The Speaker concluded by affirming that cyber technologies may or may not have fundamentally changed the nature of warfare and that underlying propositions related to warfare remain unaltered. However, cyber power, in fact, has superseded the traditional balance of power in the world as elucidated. Harnessing cyber power has paid significant dividends in diplomatic arrangements and has considerably enhanced economic potential of states.

Sub -Theme 3: Technology and Sea Power

Vice Admiral Anil Chopra, PVSM, AVSM (Retd)
Distinguished Fellow, CLAWS & VIF

Vice Admiral Anil Chopra stated that a common belief prevalent about the Navy is that it is the most technologically advanced service among the tri-services. At sea, technology is quintessential. Oceans are vast, hostile environments not suitable for sustenance without technological support. Ship design, propulsion and warfighting capabilities require sophistication in achieving a degree of professional advancement. Besides the threat of human adversaries, ocean going crews need to be aware of other threats like accidental fires, flooding etc. Naval ships are in constant threat of detection by the enemy. Thus, it is important for the Navy to constantly adapt and incorporate new technologies.

VADM Anil Chopra said that oceans are “unbroken interconnected continuum”, with no physical borders dividing the limits of a state’s sovereign jurisdiction. Access to one part of a water body means accessibility everywhere on that body or interconnected ones. There is, however, the advantage of constant mobility and the opportunity to perform offensive manoeuvres. However, targeting an adversary's platform is still difficult. Given the fact that oceans are not controlled by any one state, it is used as a medium, thus populated by vessels or platforms of different nations. In other words, identifying any vessel at sea is difficult. Besides the problem of identification, constantly tracking a large number of vessels is another challenging task. The importance of submarines cannot be overstated and the advent of submarines has made naval warfare *“two-dimensional”*. With evolution of newer technologies, dimensions of conflicts at sea are evolving, to include space, cyber and electro-magnetic threats.

In contemporary times, VADM Chopra mentioned that RMA due to emerging DTs has transformed maritime warfare. He recounted his personal experience and compared the technological changes in the Navy, since he first got commissioned till he retired. Weapons, communication, engineering, signalling and practically every aspect of Naval vessels have undergone significant changes as technological advances occurred. Communication technologies enables robust sensor to shooter linkages, which culminates in a network of devices interconnected to each other. Common operating tactical pictures provides information dominance and facilitates rapid decision making to accomplish desired tactical outcomes. Tracking is also being revolutionised through the mechanism of Maritime Domain Awareness (MDA). However, VADM Chopra admitted, that the advanced systems, become more fragile and far more complicated, prone to shut down and may possibly leading to complications.

The Speaker specified broad objectives of technology in warfare. Technology has enabled omnipresence of kill chains in the areas of interest. A multitude of sensors and shooters, with seamless communication and data links, enable real time observation of the tactical

environment through the means of drones, cameras and other devices. Simply put, battlespaces in the future would be saturated by similar systems. It necessitates a systems integration conceptualisation, wherein all devices, entities and elements are connected to AI and other emerging DTs, that constantly evaluate and examine an overload of data on priority. Sensors would aid the process of making battlespaces more transparent but they would also dilute the stealth and opacity of navies. Against common perception, the Speaker affimed that submarines would not become unviable in the future oceanic battlefield. Navies would continue to strive to operate by stealth and deploy counter-probing measures, including jamming decoys and blinding radars. Thus, the unending game of hide and seek would continue to manifest.

Almost always, the capabilities to seek out, dwarf the capabilities to hide, for instance, the omnipresent Synthetic Aperture Radar (SAR), searching relentlessly. These capabilities demand massive processing capabilities to make sense of the profusion of data being collected, collated and evaluated. Moreover, offensive cyber operations can disrupt these systems. Unmanned systems are proliferating but countermeasures will preclude any one system from dominating. Speed, stealth, accuracy and destructive capabilities of weapon systems aboard naval vessels will continue to improve but their effects will be offset by the constant improvements in defence systems. VADM Chopra emphasised that the *"game of kill and counter-kill will carry on"*. The speaker speculated about the likely implications for the under-water domain due to emerging new technologies. *Observe, Orient, Decide and Act (OODA)* loop would continue to compress, given the rapid adoption of disruptive technologies which will continue to compress time available for decision making.

VADM Chopra established a significant link between technology as an independent variable and its possible impact on the principles of war - concentration of force, manoeuvre and surprise as the dependent variable. The former will influence or bring some changes in the latter. Likewise, warfighting concepts like the US distributed maritime operations would field dispersed forces, which will coalesce and attack, whenever warranted. He declared that technological advancements would continue to disrupt status quo in military matters. Earlier military innovations like gun powders etc had caused significant revolutions in the nature of warfare. One may expect similar upheavals from emerging technologies. While the military is equipped to adapt to new technologies and produce counter measures, it was important to not put all the eggs in one basket, as reliance on single technology would be detrimental. Hence, states must diversify into different technologies. The speaker, in conclusion, cautioned about over reliance on cyber and AI systems, as they carry risks of becoming redundant with time. Though it is commonly believed that unmanned platforms result in reduction of manpower, this may not hold true in all circumstances as it results in increased manpower requirement in servicing and maintenance fields. Besides, technology, leadership, morale, preparedness etc. affect the outcome of warfare. Thus, emerging technologies must be combined with combat readiness, practical training and high standards of leadership to achieve success.

SESSION IV: LEADERSHIP AND ESCALATORY MECHANISM

Sub-Theme 1: Crisis Management & Escalation Control

Lt Gen AK Singh, PVSM, AVSM, SM, VSM (Retd)

Distinguished Fellow, CLAWS

Gen AK Singh chaired the Session III on Leadership and Escalatory Mechanism. He delivered a nuanced perspective on Crisis Management and Escalation Control, specifically locating the deliberations in the context of India-Pakistan relations. Gen AK Singh stated that India and Pakistan had clashed militarily many times, the last two occasions being fought under the shadow of the nuclear umbrella. The last clash between the nuclear armed neighbours occurred in Pulwama, where 40 Indian personnel lost their lives. India retaliated by undertaking counter strike surgical operations deep inside Pakistan's territory in Balakot. Such armed combat resulted in fatalities. Similarly, the standoff in Ladakh with China resulted in a precarious and fragile situation. It is imperative for the political leadership to not let the crisis flare up, as climbing the escalation ladder makes conflict riskier and more dangerous, beyond levels that controlling the situation becomes nearly impossible.

The Chair elaborated on the origins of escalation in the strategic discourse. Literally, escalation connotes an upsurge in the scope, intensity and spread of conflict, especially the transition from low to high intensities of conflict, where incrementally the concentration of force increases and subsequent destruction surges with time. Apparently, the word escalation was first coined by Herman Kahn, an American geo-strategist. His famous work explicating on the theoretical dimension of escalation includes the well-known book titled "On Escalation". Gen AK Singh, however, evinced that there is a discernible dearth of scholarly literature on escalation and its application in the Indian subcontinent context. South Asia remains deeply infested with armed

conflicts of different natures and understanding escalation in this context would, nevertheless, be indispensable. Notwithstanding, the contributions by Stephen Cohen, including "*Nuclear Weapons and Nuclear War in South Asia*" and "*Four Crises and a Peace Process"*, the dearth in scholarly literature continues.

Gen AK Singh conceptualised the escalation matrix, defining it as the growing severity of conflicts. Escalation usually manifests in different levels of violence - which is increasingly intensifying - leading to, cumulatively, large scale loss in either human lives or related activities. Indeed, this reflects the dilemmas of chicken's game or prisoner's dilemma, wherein anticipation of the adversaries' actions propels either pre-emptive or reactionary responses. Therefore, the onus lay upon the political class to assuage the concerns of the actors involved and mitigate the fears of conflict escalation. However, such logical deductions may not always work, as some nation states did not always follow a rationale, of which a classic example was North Korea. Under such circumstances, rational and responsible actors were obligated to respond with caution when dealing with rogue elements. The chair further stressed the important role played by military, diplomatic and political elements to de-escalate a conflict situation. Necessarily, the political decision must be and remain in perfect sync with the diplomatic and military components. If national interests were not aligned properly, executing strategic decisions would be problematic.

He also pointed out that lessons could be drawn from a study of the Cuban Missile crisis of 1962, to augment decision making skills and formulation of credible responses in crisis situations. The contemporary case of the Ukrainian crisis could be a major source of empirical evidence to test prevalent theories of escalation. The study would have to specifically analyse the deeper rationale that sustained conflicts and the actors who controlled the escalation - whether it was the Russian leadership or their adversaries in Ukraine or was it the NATO powers?

Correspondingly, Gen AK Singh proposed that war and conflict became markedly unpredictable between nuclear armed adversaries, specifically India and Pakistan. Yet, both countries were consistently unable to resolve their disputes. India reached an understanding with China at the political level and established a mechanism to deal with border disputes. However, the levels of trust and confidence instilled through these processes was shattered when China resorted to violence, resulting in the loss of 20 Indian lives. Gen AK Singh suggested that peace could only be reached when the "basic contradiction" between parties is settled. States could, possibly, exercise self-restraint to limit a conflict and make it more localised, so that intervention by other nations could be prevented. This is what transpired during the Kargil and Balakot conflicts, when both the conflicting parties resolved not to retaliate beyond a point and thus, climbed down the escalation matrix. Would the consequences have been completely different if diverse situations and responses were imagined. What if Pakistan had intercepted the Indian air strike? How could the situation have been handled? An important component to de-escalate a conflict situation, as described by Gen AK Singh, is the significance of channels of communications. For instance, during the Kargil conflict, several channels of communication were open. This was not the case during the Balakot crisis, where alternate or additional channels of communication were non-

existent. This could have seriously exacerbated the conflict. Therefore, it is essential to build on existing channels of communication, whether diplomatic or governmental level.The Chair felt that military dialogue between senior leadership of the two nations was equally important. Gen AK Singh recommended that both nations must develop a formal crisis management and escalation control mechanism to deal with future conflicts.

The Speaker mentioned the CBMs that existed between India and Pakistan in the nuclear domain. However, there existed inconsistencies in the nuclear doctrines of both countries. India's nuclear doctrine was clearly enunciated, while Pakistan's nuclear doctrine was ambiguous, perhaps deliberately so. Incorporation of Tactical Nuclear Weapons(TNWs) in Pakistan's war fighting doctrine is extremely worrisome. Gen AK Singh recommended certain measures to diffuse tensions in bilateral relations. All of these measures would be very useful in reducing the risks of accidental use of nuclear weapons and an unmanageable conflict escalation in South Asia.

Sub-Theme 2 : Leadership Challenges In 21st Century Operational Environment

Lt Gen Arun Kumar Sahni, PVSM, UYSM, SM, VSM (Retd)
Distinguished Fellow, CLAWS & USI

Gen Arun Sahni elucidated on the leadership challenges in the 21st century operational environment. He emphasised that military leadership was critical for the final outcome in future MDO. Nuances in leadership issues and ingrained perspective, which were inherited from training academies, need to be relooked at, with the changing circumstances of the 21st century. Experience and knowledge guided the evolving view on the role of leadership in the current geostrategic context, which was quite ambiguous. Due attention must be paid to this issue as it is critical to enhancing confidence of the leadership and their decision-making capabilities.

Gen Sahni mentioned the strategic changes taking place in the current geopolitical environment. He highlighted the geostrategic realities that are being manifested in the intensifying rivalry between the US and China. The rivalry is the result of structural changes, wherein changes in polarity, influenced by the state's power, culminated in the current standoff for global influence between the US and China. While the US still maintains the lead in military terms, its economy is comparatively saturated, while China is making significant headways in the technological domain, surpassing the US in certain critical technologies. To counter the inexorable rise of China, the US has assiduously resorted to cultivating multilateral organisations and alliances. In this context, the recent example of the QUAD is a major development. Four nation states, concerned with the rapid rise of China, with convergent interests, came together to form the QUAD, as a dialogue platform to start with. It is essential that political leaders understand these developments and formulate future national strategies accordingly.

Gen Sahni remarked that the threat landscape was in a state of rapid flux, albeit with a degree of continuity. The magnitude and gravity of geopolitical threats have increased exponentially with the application of emerging disruptive technologies in military systems. Diverse threats, emerging from different socio-economic and non-traditional realms, and their increasing complexity transcended conventional threats. Nation states, in the current geopolitical milieu, needed to provide for their security, not only in the traditional, military domain, but also in non-traditional realms, like human security, environmental security etc. More importantly, states have militarised the cyber and space domains, and their pre-occupation with application of new age technologies have made the multi-domain battlefield inherently more complex. In addition, a plethora of non-state actors of varying capabilities and ideologies are in a constant conflict with nation states, challenging their sovereignty in different manners. The Speaker also acknowledged the disparate threats emanating as a consequence of factors like social inequality, climate change and resource scarcity in the modern world. To deal effectively with these threats, new changes or modifications are necessary in organisational structures and operational perspectives of the military, including the willingness to adapt to deal with new realities and complexities of the future battlefield.

Further, he raised the pertinent issue of the transformative character of war. He conceded that technological progression in the military domain worldwide has significantly enhanced the lethality, reach and accuracy of weapon systems. This, in turn, has resulted in increased potential for destruction in future wars. To deal with such challenges, methodological changes were warranted in the manner of conduct of warfare, with concomitant changes in military doctrines and strategies. Modern information and communication technologies made closer intersection and interaction possible between different components of warfare. Independently, this has led to capability enhancement - case in point the “smart” weapon systems in the battlefield - evolving innovative and disruptive weapon systems.

Robots, AI and UAVs would be increasingly deployed simultaneously and collaboratively in future military conflicts. More importantly, Gen Sahni stated that future battlefields would be more “transparent”, which implied that due to the extensive proliferation of a variety of sensors, cameras, drones and other surveillance expedients, the capacity for generating real time intelligence would increase exponentially. This, in turn, would significantly enhance the ability of decision makers to predict the fallout of events in the battlefield. The network centric conceptualisation of executing military operations was far reaching in its impact, but the skills required to undertake such operations needed to be constantly learnt and upgraded. In contemporary times, cyber weapons have encroached into both the private sector and government enterprise. Thus, the battlefields were now extended, practically limitless, wherein adversaries were achieving their strategic objectives without resorting to the traditional methods of warfare of fighting protracted, violent wars and of territorial conquest. To ensure effective and optimal utilisation of such capabilities in the battlefield required cogent and efficacious performance by military leadership.

Gen Sahni reflected on the likely impact of these transformative reconstructs in modern warfare. Multi Domain and full spectrum operations would become a reality and disruptive technology

would radically alter the manner of fighting wars. Speed and mobility would become more complex as a result of network centrism. Inherently, warfare has become a “no contact” war, wherein grey zone practices have blurred the distinction between peace and war. New warfare mechanisms facilitates the achievement of objectives through alternative means, which were not accessible in the past. States today employ different facets of manipulative strategies, for instance, influence operations through social media, to enforce their wills on their adversaries. Leadership needs to be mindful of such disruptions and should be enabled to take decisions, with complete cognizance of the impact these technologies may have on the flow of operations. It is imperative, therefore, that leadership prepare for the future and adapt to new challenges at the earliest. Compartmentalised or independent operations would become obsolete, given the exigency to integrate in a multi-domain battlefield, with multiple technology linkages. Given this context, the OODA loop would get substantially compressed, making decision making by leadership a critical determinant, influencing final outcomes.

In conclusion, Gen Sahni recommended a few measures to meet the challenges of the future battlefield, as given below:-

- Adopting best HR policies for identification of new talent, which could harness the potential of disruptive technologies.
- Technological mindset was an essential attribute for future military leaders, who needed to be empowered with the necessary skill sets to exploit the potentialities offered by emerging, DTs.
- Endeavour to achieve the right mix of basic military attributes with relevant professional military education.
- Continuous learning curve offered leadership the possibility to acquire effective skilling mechanisms.
- Increased domain specialisation by incorporating specialists in the decision making cycle.
- Greater focus on Emotional Intelligence.

Sub-Theme 3 : Leadership Quotient and Training as a Winning Factor in Wars

Dr. Mary Bell
Associate Professor
Joint Advanced Warfighting School, National Defence University, USA

Dr. Mary Bell commenced her talk with the concepts of training versus education. The two aspects are often talked about jointly. Militaries around the world have been familiar with a basic level of training, but education is a different field by itself. In the context of the US military, the idea of education dates back to the US Revolutionary War. The founding father of the US, George Washington directed religious soldiers embedded in the ranks to teach other soldiers to read. Interestingly, this measure was not meant to improve their performance as a soldier but was designed to enhance their quality of life. Washington seemed to have realised that literacy would improve the soldiers' perspectives as well as their attitudes, which would ultimately improve their ability to perform their military duties.

Dr. Bell stated that the debate on training versus education is relevant, to be able to recognise that there is an underlying difference between these two complementary components in the military context. However, understanding the distinction between the two requires a deeper understanding of the purpose of militaries. The US Department of Defence Joint Publication-I is the Capstone publication for US Joint Doctrines. It defines military power as the integration with other instruments of National Power to advance and defend American values, its interests and objectives. It is only when military power is combined with diplomatic, informational and economic power that a nation could achieve its objectives.

Gen Mark A Milley, Chairman of Joint Chiefs of Staff of the US, stated that, *"We serve for our children, if the sole purpose of the military is not merely to be destructive, but to advance and defend our objectives and interest, making the world a better place for children, then the question naturally follows, what does the military need to do, to effectively integrate with the other instruments of national power".* According to author Daniel Burst, the definition of training is task oriented. Training is skill based. An individual is trained to do something in a specific way with a specific purpose, e.g, learning how to assemble and disassemble a rifle, learning to hit a target, learning to use spreadsheets to capture data etc. However, training does not provide the depth needed for problem solving and innovation. On the other hand, Burst defines education as something that is concept based. Education enabled one to understand and appreciate the bigger picture of why and how things work together. Education encourages people to think and

to analyse, evaluate, synthesise and apply information in a creative manner to formulate an argument or to solve a problem. In the military context, for example, education would encompass learning about different theories of war, learning how international relations attempt to explain how countries and world leaders think about the world etc.

Education incorporates the process of thinking and understanding world cultures and looking at situations from multiple perspectives. Training is narrowly focused, while education has a broad focus. In a 1997 monograph, authors Kim and Anderson wrote that the founding fathers of the US considered it important to provide both training and education to their soldiers. The idea that military personnel were only trained to kill, became increasingly anachronistic in the late 20th century. The lines drawn between those who need education and those who need training have become blurred, if not irrelevant. Education without training has been correctly understood as being insufficient to meet the requirement.

Militaries must realise the fact that one cannot train the uneducated and the educated need the grounding of training. Yet, despite the obvious and practical necessity of both education and training, the debate over the importance of training and education continues to rage on. Dr. Bell illustrated the debate on education versus training by using a metaphor. She argued that in the military, health and fitness were highly prioritised. But, essentially, what was more important for a soldier, better endurance or more strength? Dr. Bell stated that a soldier required to possess both endurance and strength. A soldier with only strength would not last in a protracted conflict. Therefore, both capabilities were essential.

Towards the end, Dr. Bell talked of the necessity of fine balancing between the two different, but interrelated aspects. Achieving the correct balance between training and education is a must for the right type of soldiers. If a soldier was trained only to do certain tasks, that soldier would possibly be deficient of the necessary education to gainfully employ his knowledge in a way which achieved favourable results for the nation. Conversely, if soldiers were well educated on theory and history, but lacked the necessary training to apply their knowledge, they would be found inadequate on the battlefield. Dr. Bell concluded by stating that the focus of militaries must not dwell on the debate between training and education, but should endeavour to integrate training with education. An appropriately balanced mix of the two essential aspects was bound to yield better results.

Special Address by Lt Gen Manoj Pande, PVSM, AVSM, VSM

Lt Gen Manoj Pande, PVSM, AVSM, VSM

Vice Chief of the Army Staff &

Chairman, Board of Governors, CLAWS

Making sense of future wars is a very complex task. Thus, we need to contextualise future warfare. The landscape is hazy, as there are numerous theories and opinions on what future wars will look like and how we will need to fight them. Will it be 'contact' or 'non-contact', kinetic or non-kinetic, single or multi-domain, algorithm driven decisions or intuitive thought, sub-conventional or conventional, and so on, or will it be all or none of the above?. Never before has the operational spectrum been so clouded, as is now. This uncertainty is primarily due to the Revolution in Information Affairs, characterised by digitisation which has compressed the time dimension, resulting in technological advances at break-neck speed. The "Cause and Effect" continuum has accelerated to such an extent that before the study of a phenomenon is completed, the phenomena itself morphs or changes completely. The challenge for the scholars and doctrine-drivers is to stay ahead of this constant tussle between theory and reality.

I am happy to note that various sessions of the Webinar have been designed to holistically examine the contours of future wars and look at counter measures. The quality of Subject Matter Experts and the sub-themes, reassures us that we can shed adequate light on this very complex subject. I would like to share a few thoughts on the topic at hand.

An important component of future warfare will be Grey Zone Warfare. Violent conflicts across the globe in the past few years are already giving us an insight into the contours of future wars. The linkages between Nation States in a technology-driven flat world will ensure that the strategic contest is limited, at least initially, to non-contact and non-kinetic measures. What was earlier 'Cold War' can at best be now defined as 'Cold Peace'. As nations are unable to decouple their inextricable multi domain dependencies, we are increasingly witnessing Grey Zone Warfare, which is low cost, involves lesser risks and results in very little retribution. Grey Zone campaigns are typically built around non-military tools, as part of the tactics of remaining below key thresholds of response. They employ diplomatic, informational, cyber, historical half-truths, proxy forces, terrorists, economic leverages and other tools & techniques, to avoid the impression of military aggression.

Graduating to the future, warfare would essentially be fought in multiple-domains, by a joint force. This force will operate in Land, Sea, Air, Cyber and Space domains and must be fully integrated and enabled for dynamic responses. Modern warfare will see use of covert swarms of Miniature Spy Drones, Unmanned Ground Vehicles, Missiles with Adaptive Guidance, Sentry Robots and Offensive Robotic Systems.

At the centre of it would be AI or computer algorithms, that can perform many functions, such as vision, decision-making and ability to process vast quantities of information - capabilities that are normally associated with humans. Will such decision making be successful? Or will it only be an aid to be used at the discretion of decision makers, remains to be seen.

It is very clear that it is technology which is influencing the multi-domain battle space like never before, and the same will guide the destiny of nations in international power relations. Technology will control the levers of economic and military powers. The strategic conclusion is that technology has fundamentally transformed the character and nature of war.

The future battlefield milieu, though being technology-centric, will also need a new kind of leader. Nature of future war will be a complex interaction of political objectives, human emotions, cultural and ethnic factors, and above all military skills, in an ever-blurring line between war and peace. A leader in the future will have to cope both with the rapidly changing environment and meet the expanding challenges of the world, undergoing unprecedented and accelerating changes.

The key to preparing a nation to deal with uncertain security challenges is to empower the strategic and operational military leadership, so that the armed forces are able to adapt to changes quickly enough to win future conflicts. In fact, the new generation of warfare can be won by leaders who are creative, adaptive to technology and have developed decision making skills with profound professional knowledge.

Let us now look at the way ahead. Understanding and accepting the growing importance of new technologies, their application in warfare and impact on doctrines, is the cornerstone to achieving transformation in the armed forces. Changes in organisation and operational concepts will facilitate this transformation. The incorporation of AI into military and national security realms will fundamentally change the way wars are fought and won. Whichever nation triumphs in the AI race will hold a critical and perhaps insurmountable military and economic advantage.

Legacy challenges of our unsettled and disputed borders have become more complex in the face of changing character of future wars. New tools of aggression, riding on disruptive technologies and hostile actions that exploit the ambiguous Grey Zone of traditional war and peace have transformed the battle-space. The rapidly expanding domains of Cyber, Space and Informatics necessitate a new approach to warfare. The concept of Multi Domain Operations as a structured attempt to find answers to these new levers of competition and

combat, is finding traction amongst modern militaries the world over. This requires synergistic application of resources.

We need to shed the classic war and peace disposition and enhance inter-agency cohesion. In fact, the critical need for all organs of the state to work in unison towards the national objective has been the core take-away of the past year.

We also need to address the techno-social realm i.e, the social media, in order to evaluate the rise of current and emerging trends and arrive at measures to counter Information and Influence Operations, such as deep fakes and bots, with a focus on perception change and policy safeguards.

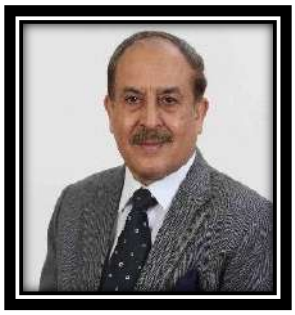
To succeed in war, we will have to be pro-active in building a credible deterrence, thereby, defeating the adversary's efforts to achieve its strategic goals and deterring military escalation. We are cognisant of these requirements. To build capabilities and capacities to fight in a multi-dimensional war, Indian Army is actively involved in modernising and evolving, keeping the future of conflicts in mind. At present, Indian Army is building a credible and balanced force posture, to deter escalation towards an armed conflict.

To conclude, the Webinar could not have been timed more appropriately, since the nature of future warfare will rapidly undergo shifts, due to the interaction of myriad variables affecting all dimensions of war. It remains especially pertinent when geo-political complexity is contextualised, and the emerging rivalries are understood. It is high time for the Indian security establishment to decipher the changing dynamics and respond accordingly.

I am sanguine that CLAWS Webinar - Pragyan 2022 will shed light on these pertinent issues and not only make valuable recommendations for the Armed Forces but also add to the knowledge of the national security community.

SESSION V: INTEGRATION IN A MULTI-DOMAIN LANDSCAPE

Sub -Theme 1: Need for Integration to Fight Future Wars



Lt Gen Anil Ahuja, PVSM, UYSM, AVSM, SM, VSM (Retd)**
Distinguished Fellow, VIF

Adjunct Fellow, Delhi Policy Group

Gen Anil Ahuja highlighted two major aspects regarding the changing nature of warfare-development of new generation weapons and battle support systems and the AI led RMA. These revolutionary technological advancements have provided militaries the capabilities to operate simultaneously across MDO. Consequently, success in multi domain operations was predicated in the ability to integrate and operate seamlessly across multiple domains.

In recent times, diverse and new fields have developed in warfare, i.e. EM warfare, AI, cyberspace, space and psychological domains. Accordingly, nations have incorporated these newly developed tools to undertake all-encompassing conflicts. Emerging, disruptive technologies enabled rapid and seamless switching from one domain to another, at incomprehensible speeds. In such situations, success would be assured only by true and comprehensive integration between different domains and by the ability to operate in a dynamic manner across domains. This could be achieved through evolved concepts of military operations and technological intervention.

The Chair spoke of the need for jointness and integration in addressing future military conflicts. The two terms define the state of functioning between the three services. The Chair stated that in the 1971 War of Bangladesh Liberation, Indian Armed Forces operated jointly on land, sea and air, but the operations were not, strictly speaking, integrated, even though India achieved success and a major victory. Jointness, by and large, remains the only mode for successful functioning in the contemporary battlefield environment. The Chair then elucidated the factors which drive the necessity for integration in contemporary times. Firstly, there is an absence of clear directives from the political leadership, as a result of which, military planning and procedures remained compartmentalised. Secondly, planning for operations is based on a single perception of National Security and National Defence Policy, in the absence of a mechanism for joint planning. Thirdly, the absence of a central authority at Command / Service Headquarters to coordinate inter services plans for a strategic objective, combined with the non-availability of integrated concepts and doctrines. The Chair gave the example of the Kargil conflict, which was named as Operation Vijay by the Army

and Operation Safed Sagar by the Air Force. Finally, there was a lack of integrated C4ISR, resulting in lack of coordination, as far as preparing the intelligence picture was concerned.

Gen Ahuja remarked that the scope and content of warfare today extended beyond the tactical or strategic realms and well beyond the military domain into geopolitical domain. The reality was that in the current geopolitical environment, conflicts were being undertaken to achieve larger national goals rather than mere military objectives. Hence, jointness between the services would not suffice to execute operations across multiple domains. It was complete integration which was the need of the hour. He also highlighted the use of 'Salami Slicing' tactics that is being implemented by some nations. The intention behind such tactics was to undertake and persevere with small-scale tactical operations, avoiding escalation or a full-blown military conflict. Incremental objectives are being achieved progressively. Changes in status quo are gradually achieved by the aggressor, and it gets difficult to undo their impact, without initiating direct military confrontation. Therefore, to respond in a credible manner to such actions, it is essential to achieve multi-domain integration.

Military Integration entailed the integration of the armed forces in consultation with other instruments of national power. It is important that interoperability is achieved organically, without political and bureaucratic fallouts or intervention. Synchronisation in cyberspace, technical intelligence and internal security was of utmost importance. Such levels of coordination pose major challenges in terms of trust, service culture and natural inertia. The ultimate goal of such integration is the evolution of common situational awareness. China is doing such an integration at the level of the Central Military Commission and at the Central Commission on Integrated Military and Civil Developments. Russia, likewise, is doing the same at the National Defence Management level.

Gen Ahuja recommended the development of a National Security Strategy formulation and implementation group at the apex level. This could be in line with the PLA's Strategic Support Force, UK's Division Six, 77 Brigade for tackling hybrid, ISR, cyber and IW and Russia's Battalion Tactical Groups. Every country would require to evaluate its threat perceptions and review its organisational construct accordingly. The US has aimed to conduct MDO in single theatre by 2028 and in multiple theatres within the next decade or so. In Indian context, we will also have to consider phased operations.

The Chair recommended a few possibilities for India to prepare for future wars. The starting point could be the evolution of a national strategy and joint doctrine. This should form the basis of formulating of new Union War Book. This could be the basis for a new set of guidelines and procedures for integration among the three services. Apex level integration could be organised at the National Security Council Secretariat level, which could be followed by next level integration at the HQs Integrated Defence Staff (IDS) level. Organisational structures in theatre command could be evolved in a phased and time bound manner. Lastly, interoperability with strategic partners would enhance the effectiveness of operations being conducted. The Chair concluded by highlighting the necessity of achieving the aforesaid, to ensure requisite preparation for future warfare challenges.

Sub-Theme 2: Integration Challenges in a Multi-Domain Landscape

Maj Gen Mick Ryan, AM (Retd)

Former Commandant, Australian Defence College

Maj Gen Ryan began by asserting that wars in the 20th century or earlier were mostly fought on land, sea or in the air. However, in the 21st century, warfare has graduated from traditional domains into cyberspace and actual space. Consequently, future military operations would require to be conducted in disparate domains concurrently.

Gen Ryan then spoke of the key trends that are seen to be driving integration. Firstly, there are different appreciations of time and AI, cloud computing etc have changed the pace of operations to well beyond the scope of human comprehension/ability. Secondly, there has been a progressive shift from large masses of artillery, tanks, etc which were employed earlier, to fewer, more robust and precision-based weapon systems. Thirdly, the speaker remarked that the 21st century would witness Influence operations at an unprecedented scale, due to the evolving battle for influence, where strategic space below the threshold of war was as important as the space above it. Next, the speaker emphasised that modern warfare was a battle for signatures. EM warfare provided the ability to make everything visible. Real time pictures of troop build-up, vehicular movement and other combat activities were readily available. Hence, in such situations, strategic signature management of both, own forces as well as the adversaries', was important. Lastly, Gen Ryan highlighted the need for human-machine integration. In contemporary times, autonomous systems are becoming increasingly important. Thus, militaries which intelligently integrated the advantages of human capabilities and machine functionalities, would prevail over their foes.

The speaker enunciated that armed response is not the only option available to nations today. It is possibly a mix of armed and non-armed, military and non-military, lethal and non-lethal responses that a nation would employ to produce the desired outcomes. The speaker gave the examples of China and Russia, which, he said, are taking the lead as far as the pace of integration within systems is concerned. The speaker highlighted that AI and emerging technologies were changing PLA concepts, doctrines and military organisations. The PLA has developed Systems Confrontation and Systems Destruction Warfare, which sought to ensure integration of its own systems, but also sought breakdown of the

adversary's integration. While the PLA's theory of warfare embraced the concept of systems confrontation, its theory of victory in modern warfare aimed at waging systems destruction warfare. Paralysis of the decision-making process could occur through kinetic or non-kinetic means, as either type of attack may destroy or degrade key aspects of the enemy's operational system, making it ineffective. In its recently released National Security Strategy, Russia also laid great emphasis on military integration. The new strategy focused on use of offensive actions to out manoeuvre an adversary and made it difficult for cyber adversaries to execute offensive actions. The US and UK have also worked on this aspect and have formulated strategies for achieving integration.

Gen Ryan highlighted the challenges that the process of integration might face. Foremost is the challenge of integrating the diverse military cultures of different services. The next challenge would be to correctly determine the appropriate level of integration and whether all aspects or components needed to be integrated or was the requirement a little more nuanced. Finally, there is the necessity to determine the level of integration required between military forces and other elements of National Security.

Gen Ryan enunciated what he called Ryan's Equation. This equation is directed at the 21st century integrated strategic advantage. This advantage is a combination of new ideas, new and evolved organisations, novel measures of military effectiveness, the pursuit of an integrated intellectual edge and an end goal or purpose with the aim of generating an integrated strategic advantage. The emphasis seems to be on the nature of warfare, which has been influenced by evolving strategic environments and technological applications. This result in a more nuanced and complex conceptualisation of warfare. Gen Ryan prescribed adapting to these complexities with new ideas, which would provide the necessary discourse, facilitating changes in the structure of higher organisations. Gen Ryan recommended adopting integration as an important element in military organisations so as to cope with future battlefield challenges.

Sub-Theme 3: World Order and Future Joint Force

Lt Gen Raj Shukla, PVSM, YSM, SM, ADC

GOC- in-C, ARTRAC

Gen Raj Shukla conceptualised future contours of warfare based on the dynamic strategic landscape. He emphasised on three aspects which, in his opinion, were critical for future jointness among the armed forces. The first attribute focused on leveraging military power attuned to the strategic context. Military power makes sense only when it is contextualised, according to the changing geopolitical dynamics. The second attribute underlines the changing paradigm and its impact on jointness, which impacts the effectiveness of operational and tactical manoeuvres. Since this paradigm occurs essentially due to the change from industrial era military to new domains of warfare, it is increasingly imperative to make genuinely substantial progress and not incremental progression. Thirdly, for a successful transformation, significant changes in ideational structures of military discourse are pertinent. This involves substantial modifications in the strategic military identity, transforming it from the industrial age to the digital information age, characterised by niche capabilities.

India's future strategic challenges are mostly concerned with the threat from China on its Northern borders, wherein territorial intrusions are comparatively less important, because the Indian armed forces are well adapted to counter such actions. Coping with military misadventures of China is foremost, but other challenges from the Western frontier, like those in Afghanistan also need to be considered. Moreover, the China-Pakistan bonhomie exacerbates the problem in Afghanistan, with Iran desirous of its own share of the pie. Pan Turkish aspirations adds to the instability in the region. In addition, threats from the Arab countries coalesce to worsen the situation. Given these changing contours, countering traditional threats may become redundant, while making nations more vulnerable to emerging threats like cyber and space warfare.

Gen Shukla advised strengthening the military apparatus across the conflict spectrum, through a more nuanced approach to counter-terrorism and conventional threats, while

remaining responsive to high-end systemic and technological threats.The interface of DTs, like AI in primary domains will act not only as enablers in future wars and conflict, but will increasingly be seen as the drivers of the military domain. Enemies will become anonymous and tracing them will become difficult. Hence, coherent and cogent responses need to evolve concomitantly which requires adeptness in both kinetic and non-kinetic domains.

The GOC-in-C recommended a more profound response in both kinetic and non-kinetic expressions/domains. Recently, China deployed A2/AD capabilities to contest US pre-eminence in the Taiwan region. It also shifted the onus of crisis escalation on the Americans, whereby any transgression would be treated as facilitating escalation. China has altered its combat philosophy from A2/AD strategy to shock all strategy, catching its adversaries by surprise. This has also manifested in China's operational preparedness in case of the Taiwan contingency, which policymakers in China believes achievable by 2028 as against the earlier envisaged target of 2035.

Organisational structures have to become far more organized, flexible and agile. Integrated approach revolves around exploiting jointmanship, necessitating adaptation to the new culture of risk taking, innovation and critical thinking. One such area where this is exhibited are theatre commands, but without an attendant cultural renaissance and changing perceptions, bridging the existing gap would be difficult to achieve. "Culture eats structure for breakfast" signifies the malleability of the entrenched structure, which are rigid and unable to cope up with changing dynamics. The General stressed a joint paradigm for the new age of warfare, whereby leveraging tri-service capacity is an outdated prophecy. For optimising the benefits of jointness, the military must adapt to new challenges of the digital age.

The GOC-in-C recommended that during contemporary times, cross pollination of multiple stakeholders involved in the national security ecosystem, which includes military leadership, corporate players and the scientific community. China has displayed the importance of civil-military fusion as they have correctly understood that strategic objectives cannot be achieved by any single service. Gen Raj Shukla described the concept of an optimal civil military fusion in the Indian context, wherein DRDO, DPSUs, start-ups, private sector, academia and think-tanks must associate to form a national security enterprise. Integration must be driven by the inevitability of integration and not by hierarchy.

The GOC-in-C recommended a carefully choreographed roadmap for dealing with digital contingencies and challenges. He reiterated the application of AI in military system provides a distinctive first mover advantage. Simultaneously, information superiority would be as critical in future wars as is firepower. The foundation of Information Dominance is based on Electromagnetic dominance, which is now increasingly being considered as a sword arm of future warfare. In conclusion, Gen Raj Shukla predicted that any future conflict with China would be determined by capabilities in information and electronic dominance. Given its technological superiority over India, China could easily blind India's electronic and communication systems and adversely impact India's offensive capabilities. Given such possibilities, India needs to prepare in earnest for future warfare.

VALEDICTORY ADDRESS

Brig Narender Kumar, SM, VSM (Retd)
Visiting Fellow, CLAWS

Wars & Future Wars : An Appreciation

Delivering the Valedictory Address, Brig Narender Kumar, SM, VSM (Retd) brought out that the contemporary world is witnessing a changed geo-political environment; a migration from what it was during the Cold War years and later during the era of Iraq & Afghanistan wars. Earlier, wars were fought between Nations, now non-state actors too. It is difficult to distinguish between a war and a rebellion.

Till recently, war was defined as when two states engaged in hostilities to pursue their political objectives. But today, non-state actors hold state territory and are also fighting the state. The question must be asked as to whether these scenarios would be called a war, conflict or armed rebellion. As the information age progresses, more things are taking place outside the realm of state control. Data theft, disinformation campaigns, population subversion and exacerbating people's disaffection towards the state are new realities that each state must face.

Are We Still Looking for a Decisive Victory

In this context, it must be asked if India is still looking for a decisive victory in today's geopolitical environment or the wars will be fought to achieve relative political strength. All threats, challenges and conflicts today do not require a kinetic response and due to their very different nature, they require non-kinetic response measures by employment of technology or even economic measures. All this will require capability development. Further, technology possession is not enough, but how, where and when it will be applied across different domains will be critical in deciding outcomes. Cosmetic changes to organisational structural reforms will not suffice to win future wars.

It must be noted that wars are evolutionary and future wars are already here. It is crucial to pick up on the emerging trends early on and the new toolkits must be brought out to fight these conflicts. There has been an emergence of new technologies and their applications in real world scenarios in recent times. For instance, Israel is developing laser technology to the extent that can be deployed as a laser wall on their southern border to safeguard against any missile attacks from Iran or non-state actors. Plucking of satellites in orbit has been recently demonstrated by China and autonomous weapons akin to the one that killed one of Iran's top nuclear scientists may become a standard weapon of choice, as states develop similar technologies.

Moral & Ethical Dimensions of War

Another area that requires a relook is the moral and ethical dimensions of the conflict. They may not look necessary today, but may probably lose relevance in future wars. If we look at the Syrian conflict which displaced millions of people, the belligerents did not relent to the United Nation's (UN) calls for aid access. Thus, it can be presumed that in future, immoral and unethical tactics might become more common for states while they will attempt to minimise the impact of conflicts on their domestic population.

The future conflicts will also witness more involvement by an increasing number of actors. Civil-military fusion will become increasingly important where intellectuals will closely work with the armed participants in conflicts. The technological developments and the nature of human society at large can easily allow the weaponisation of seemingly peaceful technologies like genetic engineering, which can wreak havoc on specific countries or have a global impact.

Preparing for Future Wars

Preparing for future wars is a crucial tenet of any discussion on the matter. The methodology of this preparation will involve doctrinal push or technological pull. Securing the right talent for the armed forces and the military-industrial complex is an absolute necessity. China is an excellent example of having structuralised its efforts to incorporate academia into its national security strategy, with 862 universities ascribed to the defence ministry. The defence industry oversees research in concerned areas at these universities. Every year, about 10,000 students from the top seven Chinese universities are absorbed by the defence ministry as interns and those with the best performance are given employment. Currently, these figures are not very encouraging in India.

Ensuring greater participation of armed forces personnel like those who hold M.Tech in systems development should be a priority. There is a need to promote further Indian Institute of Technology (IITs) and other premier science institutes in India and enable greater integration with the Ministry of Defence (MoD), Defence Public Sector Undertakings (DPSUs) and colleges like Military College of Electronics and Mechanical Engineering (MCEME) and College of Military Engineering (CME). There is thus, a need for a conceptual reorientation, if India wants to leap forward. The current methods of fighting conventional wars are obsolete. In light of new and emerging technologies and their successful applications, there is a need for innovative ways of force restructuring.

The older Clausewitzian notions of structured and well-defined wars must be conceded for the intricate domains of warfare deciphered by Kautilya and Sun Tzu which remain relevant even today. Some other historical examples that require attention are Genghis Khan and Maharaja Ranjit Singh. The former used different tactics, force structures and weapons systems to fight various battles across China, as his army swept the country. Meanwhile, the latter was the first one in India to have made the strategic decision of capturing the mountains in Afghanistan, to defend India against foreign attacks.

There is a need to reassess the India capability to deal with the PLA's Strategic Support Force (SSF). India has created three agencies; however, these agencies are without the Electronic Warfare (EW) component and may not be enough to handle the threat from the SSF. India may have to go in for at least one network centric command where EW is a central component. The problem with the current set up is the lack of a dedicated cadre for executing such specialised tasks. The next decade will be a dangerous time for India, as it seeks to transition to new and emerging technologies, some of which may not be mature enough for operational use.

In the end, it is important to note that internal conflicts remain a strong distraction for the armed forces, which may hamper their preparedness for future wars if they continue to persist. India must find solutions to its protracted internal conflicts, with participation from the military.

CONCLUDING REMARKS

Lt Gen (Dr.) VK Ahluwalia, PVSM, AVSM, YSM, VSM (Retd)**

Director, CLAWS

In the concluding remarks, Lt Gen (Dr.) VK Ahluwalia (Retd), Director, CLAWS applauding the Webinar, stated that the Pragyan 2022 Conclave has been a great success and it has been able to discuss and make certain recommendations on contemporary issues related with the 'Changing Domains of Warfare'. He explained that 'Pragyan' as the name indicates, does not merely mean 'knowledge'; instead, it has a larger meaning: it entails '*wisdom' having gained through critical analysis* and *reasoning* along with recommendations for a *roadmap, and a strategy to move ahead*. Therefore, Pragyan 2022 has been able to bring out key issues, including discussions on **cultural transformation, digital transformation, change in the mind set, and keeping pace with the change in disruptive technology.** He conveyed his appreciation to panelists and speakers who have shared their experiences and have given great insight on the nature of future wars.

In his remarks, Gen Ahluwalia pointed out that there is a need to understand that every region and sub-region will have different challenges and will need a different approach to address them. For instance, the challenges of Central Africa will be different from the challenges in the Middle East or North Africa. Similarly, the challenges in Indian subcontinent and the South China Sea will be different despite these being within the same region. Thus, the security and strategic challenges within a sub-continent/ region are based on the **existing geostrategic location, and geopolitical environment including the demographic profile of each country, historical disputes between Nations, their economic conditions, technological threshold as well as Internal Security conditions and environmental stresses**. In such a complex geo-political-strategic scenario of region-specific challenges, it would be most appropriate to formulate policies and strategies which address India's security concerns. It would, therefore, not be correct to adopt a uniform policy for threats and challenges facing different regions.

Gen Ahluwalia quoted Matthew Symonds who posited, **"War is still a contest of wills, but technology and geopolitical competition are changing its character".** Though, technology is the driver of future warfare but geopolitical competitions are equally important, including the ones in the economic domain. Over the last decade, conflicts have become more of **achieving political objectives by non-military means, concealed use of military means** and **extensive employment of new technology-enabled systems.** Thus, warfighting concepts have been changed primarily to exploit the opportunity that the adversary offers in a similar way as what happened between Armenia and Azerbaijan's conflict over Nagorno Karabakh. Inciting or supporting *colour revolutions* was something that was never heard earlier, but the whole world witnessed several colour revolutions during the first two decades of 21st Century. Thus**, there is a requirement to ensure that we analyse our doctrines, strategies, warfighting concepts, organisational structures, and lay greater focus on the leadership, which, in today's scenario must have a technological mindset and acceptance to digitalisation.** Along with the rapid changes in the geopolitical landscape, 4th Industrial Revolution - fusion of technologies – has been instrumental in changing the character of warfare. Senior leadership, in particular, need to understand the impact of disruptive technologies, and the effects of Information Warfare (IW), propaganda, and fake news which is intended to change the public's perception at large. It has **two-fold aims:**

- **To change the perception of the public and the fighting force to one's advantage.**
- **To undermine the political and governing institutions of the adversary country.**

He gave the example of the recent Ukraine-Russian conflict as well as the Middle East where nations have witnessed frequent use of information operations. Similarly, India's military stand-off with China at Galwan and elsewhere, too showcased an immense amount of propaganda and fake news being propagated by the state-sponsored media tools from Chinese side. Therefore, **India needs to change its mindset in handling the contemporary conflicts and acknowledge the nuances of major military operations.**

Gen Ahluwalia re-asserted that new technology will shape future wars, eg, **swarm drones, miniature drones, robots, offensive use of cyber domain, electromagnetic spectrum, and** robust and effective **Intelligence, Surveillance, Reconnaissance (ISR) capabilities,** to name a few. This will also include other essential facets of warfare including **Information Warfare, Psychological Warfare, Special Operations and leadership.** Given the emerging trends in warfare, all countries have to take care of intangibleslike **cyber-attacks, information attacks, non-contact warfare, economic warfare, attacks on digital infrastructure, as also, paralysis of system of governance, and economic activities by attacking banking, financial, transportation as well as law & order systems**.

Giving his views, Gen Ahluwalia stated that according to the Report published by Institute for Economics and Peace (IEP) in 2021, South Asia continues to remain second least peaceful region of the world, out of nine regions that were evaluated. While referring to India's security, he further deliberated upon handling the external threats and challenges from across the border,

and that India has to resolve its internal conflicts too. It spends nearly five percent of its GDP on preventing and containing violence as well as the consequences of that violence. We must also pay due diligence to *Jānapada*, which means territory, an important aspect mentioned in KautilyaArthashastra, and published as a chapter in CLAWS's publication, 'Future of Land Warfare'. G**eopolitics is an art of giving and taking based on mutual interest; *Jānapada*is an asset, and like any other asset with the Nation, it may be negotiated to resolve disputes, if it provides significant political, economic and strategic mileage.** Just as India has resolved its land and maritime disputes with Bangladesh, and deserves much appreciation, it would be appropriate that border disputes should be resolved between India and China, and other neighbours.

He mentioned that The Chinese concept of **Unrestricted Warfare** addresses a number of domains. **The 2021 report of the US Department of Defense (DoD) mentions China's Military-Civil Fusion Development Strategy where all efforts of the universities, entrepreneurs, industries** and **the health sector are directed to support military build its capabilities.** In a similar way, India too has to change its mindset and incorporate all governmental institutions, academia, private sector and other elements of national power in developing its military capabilities.

Territory is an emotive issue for India, China and Pakistan and has political fallouts. Therefore, India needs to build the perception at the right levels. **Michael E. O'Hanlon** stated "**On balance, it is hard to escape the conclusion that South Asia contains major potential for large-scale operations by ground forces, whether in the context of interstate conflict, severe internal violence, or complex humanitarian catastrophe in which the effects of natural disasters are compounded by weak governance and political instability"**. Similarly India too, has to remain sensitive of these external and internal threats and challenges that South Asia faces.

On behalf of the Indian Army and CLAWS, the Director thanked all the distinguished panelists for their insightful presentations and the participants for their thought provoking questions. He also thanked and appreciated the overwhelming support from the Friendly Foreign Countries (FFCs) for the Webinar. He also thanked the Indian Army for their support, and Col Jaswinder Singh and the Team CLAWS who worked tirelessly to put the entire event together, in keeping with the spirit of PRAGYAN. In conclusion he stated that we need to focus on the cultural renaissance faced by us as a Nation. The policies and decisions we make to counter the challenges need to be implemented on ground with a sense of urgency.

PRAGYAN CONCLAVE 2022
KALEIDOSCOPE

Inaugural Session of three Chiefs in progress

CLAWS Faculty at Chanakya Hall

Team Pragyan 2022 with DCOAS (Strat) & Offg DG SP

Session I & II: Chair and Panelists

Session III-V: Chair and Panelists

Pragyan 2022 Coordinator (S)

Captive Audience at Chanakya Hall

Key Discussions

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QUESTIONS FROM THE AUDIENCE

QUESTIONS FROM THE AUDIENCE

The Audience participated very actively during all the interactive sessions held over two days during the course of the Webinar. There were numerous thought provoking questions from the participants. To ensure brevity of this report, only few questions are mentioned as follows and their answers have been already covered in the Detailed Report above.

Session I

- ***Question.*** What do you think is the critical vulnerability of the China-Pakistan strategic partnership, as we have witnessed a mass protest in Gwadar city against CPEC, which is the crucial bilateral area of interest?

- ***Question.*** China is now directly challenging the global world order led by the US. It is also taking various initiatives, particularly in a niche domain, to increase its area of influence. The world is now looking towards the US for leadership and when that kind of leadership does not come from the US, China is taking up the space. Do you think it can be rehearsed and how?

Session II

- ***Question.*** 5G technology has already reached various parts of the world since 2019. Looking at the dominance of Chinese companies in this sphere, is there any likelihood of advantage China vis-a-vis the rest of the world in employment of 5G technology?
- ***Question.*** How can Indian Air Force gain tactical edge over others in increasingly prevalent limited wars where the full military might not be politically feasible to be deployed?

Session III

- ***Question.*** What are the key Disruptive Technologies (DTs) that will impact land forces operations in the coming future? How does the integration of technological components impact the effectiveness of land forces operations?
- ***Question.*** What is the way forward when it comes to establishing sustainable international norms for managing a whole array of cyber-crimes and its myriad manifestations?

Session IV

- ***Question.*** Can the dependency on machine systems be a boon or bane in tactical domain operations? How do you see technological disruptions impacting the responsibility, risk assessment and decision making at the tactical level?
- ***Question.*** Why would modern militaries not want to foster diversity of opinion by excluding the civilian world from its education system? Does it make sense to involve professional civilian educators in a manner which limits their capacity to shape the curriculum of militaries?

Session V

- ***Question.*** What are the key challenges that militaries face when executing integration in a multi-domain operational environment?
- ***Question.*** Given the limited resources available with India, the dilemma whether to invest for boosting conventional capabilities or in disruptive technologies for a multi domain conflict, what should be the priority for India, given the plethora of challenges on its Northern and Western Borders.

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CONCEPT NOTE

INDIAN ARMY INTERNATIONAL WEBINAR

'PRAGYAN CONCLAVE 2022'

CONTOURS OF FUTURE WARS AND COUNTER MEASURES

CONCEPT NOTE

In the past half century, there has been a paradigm shift in the nature of conflict. Conventional wars between states have become exceedingly rare and those between great powers and their allies almost non-existent, mainly because of the mutually destructive power of nuclear weapons, International legal constraints and the connectedness of global economies and the declining appetite for violence among relatively prosperous societies. On the other hand, sectarian or ethnic extremism, intra-state or civil wars have been numerous, especially in fragile or failing states and have usually proved long lasting, and it is likely that these kinds of smaller, more localised wars would continue in future. In an increasingly globalised world today, the new security challenges are a result not entirely of conventional inter-state rivalries, but of economic, demographic and societal fault lines that are transnational in nature.

The rapid geo-political, socio-economic and technological changes in the 21st century make it very challenging for states to plan for future wars. The non-state actors, motivated on the basis of one or more combinations of religious, fundamentalist, ethnic, ideological, sectarian and socio-economic fault lines are increasingly engaging in irregular warfare, pitched at the sub conventional level. The nation states have also emerged as major players engaged in sub conventional conflict, employing irregular or proxy warfare to achieve their foreign policy goals. This may or may not be pitched under the shadow of the looming conventional threat.

There are a number of flash points; the world is witnessing a new cold war, vicious grey zone conflicts, there is nuclear, cyber rattling by some of the countries; all of which is further accentuated by the Covid-19 strategic shock. The nations today are increasingly engaging each other on a wide band; ranging from cooperation to competition and from containing to confrontation, in consonance with their national interests.

Any future war would essentially be fought in multiple domains, possibly by a joint force on its own, in an independent theatre. The joint force must, therefore understand the different land, sea, air, cyber and space domains and be capable of operating effectively in all of them when called upon to do so. Modern warfare may see use of covert swarms of miniature spy drones, unmanned ground vehicles, missiles with decision-making powers, sentry robots and offensive

robot strikers. At the centre of it all is Artificial Intelligence (AI), or computer algorithms that can perform many functions, such as vision, decision-making and ability to process vast quantities of information, capabilities normally associated with humans.

From the above, it is very clear that it is the technology which is influencing the multi-domain battle space like never before and the same will guide the destiny of nations in international power relations. Technology will control the levers of economic and military powers. The strategic conclusion is that technology has fundamentally transformed the character of war, and may be its nature too, in a significant measure. Wars in the future may be without extreme violence, aggression, destruction and mortality, and yet cause enough suffering to achieve political success.

The nature of future war may just be a complex interaction of political objectives, human emotions, cultural and ethnic factors, and above all military skills in an ever-blurring line between war and peace in present day context. A leader in future will have to cope both with the rapidly changing environment and the expanding challenges of the world undergoing unprecedented and accelerating changes. The key to prepare a nation to deal with uncertain security challenges is empowering the strategic and operational military leadership so that the armed forces are able to adapt to changes in circumstances quickly enough to win future conflicts. In fact, a new generation warfare can only be won by leaders who are creative, adaptive to emerging technologies and have developed prudence with profound professional knowledge.

Objectives of the Seminar

The seminar aims to achieve the following objectives: -

- To examine and evaluate the current and emerging Geo-politics,Geo-economics & Geo-strategic environment across the globe.
- To obtain an insight into broader perceptions at international and regional levels relating to the emerging world order and its effects on the security architecture: Great power rivalry and evolving strategic landscape.
- To scan and evaluate the current and emerging trends in warfare, developing conflict spectrum and future battlefields. To provide an insight into non state organizations, sources of their strength and sustenance, Psychological Warfare and human resource strategies.
- To explore and understand the technological advancement shaping the future battlefield. Analyse the use of AI/machine learning/neural network & related technologies, examine the impact of aerial drones and stealth technology, global deployment of 5G network - nanotechnology and quantum computing.
- Counter Measures - development of policies and strategies to counter sub conventional threats, to sensitise the environment regarding exploitation of technology and ways to effectively tackle AI/ML/ Genetic algorithms /Neural Network & related technologies with specific focus on counter measures to including up-scaling of infrastructure.

- Address the techno-social realm in order to evaluate rise of current and emerging trends and arrive at effectiveness of Inform & Influence operations (ex. deep fakes and bots) with focus on behavioural and policy Changes.

Themes

In order to address the subject **'Contours of Future Wars and Counter Measures**, the seminar will deliberate upon four themes with apposite sub- themes as mentioned below: -

- Evolving Global Environment and Future Wars
- The Expanding Domains of Warfare
- Emerging Disruptive Technologies
- Leadership and Escalatory Mechanism
- Integration in A Multi-Domain Landscape

Session One: Evolving Global Environment and Future Wars

This session will analyse the emerging trends in warfare and crystal gaze into the future battlefields. It will also focus on changing contours of land warfare and strengths and vulnerabilities of the forces. The Speakers will focus on the following issues: -

(a) Defining Future Wars and Conflicts.

(b) China-Pak Relations & its Impact on Security in South Asia.

(c) Changing Strategic Landscape in Asia & its impact on Future Conflict.

Session Two: The Expanding Domains of Warfare

This session will examine the way technological revolution is influencing land warfare. The speakers will focus on the following issues: -

(a) Expanding Domains of Warfare.

(b) Modern Air Warfare-Challenges for India .

(c) Asymmetric Warfare: Preferred Policy for State Actors Today?

Session Three: Emerging Disruptive Technologies

The speakers will focus on the following issues: -

(a) Disruptive Technologies and Land Forces Operations: Indian Context.

(b) Cyber Warfare: Threats and Opportunities.

(c) Technology and Sea-power

Session Four: Leadership and Escalatory Mechanism

The speakers will focus on the following issues: -

(a) Crisis Management & Escalation Control.

(b) Leadership Challenges in 21st Century Operational Environment.

(c) Leadership Quotient & Training as a Winning Factor in Wars.

Session Five: Integration in A Multi-Domain Landscape

The speakers will focus on the following issues: -

(a) Need for Integration to fight Future Wars.

(b) Integration Challenges in a Multi-Domain Landscape.

(c) World Order and Future Joint force.

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PROGRAMME

DAY ONE: 03 FEBRUARY 2022

0900-0945h	**Tea & Registration**	
INAUGURAL SESSION		
1000 - 1010h	**Introductory Remarks** by Col Jaswinder Singh, Senior Fellow, CLAWS	
1010 - 1020h	**Welcome Address** by Lt Gen Sanjeev Kumar Sharma, AVSM, YSM, DCOAS (Strat)	
1020-1030h	**Inaugural Address** by General MM Naravane, PVSM, AVSM, SM, VSM, ADC, COAS and Patron CLAWS	
1030 - 1040h	**Special Address** by Admiral R Hari Kumar, PVSM, AVSM, VSM, ADC**,** Chief of the Naval Staff	
1040 - 1050h	**Special Address** by Air Chief Marshal VR Chaudhari, PVSM, AVSM, VM, ADC, Chief of the Air Staff	
1050 - 1100h	**Vote of Thanks** by Maj Gen Atul Rawat, AVSM, Offg DG SP	
1100 - 1130h	**Tea & Interaction and Group Photograph**	
SESSION I: EVOLVING GLOBAL ENVIRONMENT AND FUTURE WARS		
1130-1150h	**Opening Remarks cum Defining Future Wars & Conflicts** by Lt Gen (Dr.) VK Ahluwalia, PVSM, AVSM**, YSM, VSM (Retd), Director CLAWS	Chair cum Panelist
1150-1205h	**China-Pak Relations & its Impact on Security in the Region by** Dr. Andrew Scobell, Distinguished Fellow, China at the United States Institute of Peace	
1205-1220h	**Changing Strategic Landscape in Asia & its Impact on Future Conflict** by Dr.Timothy Heath, Senior International Defence Researcher, RAND Corporation	
1220 -1250h	Q & A	
1250-1350h	**Lunch & Interaction**	

SESSION II: THE EXPANDING DOMAINS OF WARFARE		
1400-1410h	**Special Address** by Lt Gen (Dr.) Rakesh Sharma, PVSM, UYSM, AVSM, VSM, (Retd)	
1410 -1425h	**Expanding Domains of Warfare by Chair** by Lt Gen (Dr.) Ranbir Singh,PVSM, AVSM**, YSM, SM (Retd)	Chair cum Panelist
1425- 1440h	**Modern Air Warfare: Challenges for India** by Air Marshal KK Nohwar, PVSM, VM (Retd)	
1440 -1455h	**Asymmetric Warfare: Preferred Policy for State Actors Today** by Dr. Shashi Jayakumar, RSIS (Singapore)	
1455 -1525h	Q & A	
1525h	**Tea & Dispersal**	

DAY TWO: 04 FEBRUARY 2022

1000-1015h	**Special Address** by Lt Gen Philip Campose, PVSM, AVSM**, VSM (Retd)	
SESSION III: EMERGING DISRUPTIVE TECHNOLOGIES		
1015- 1030h	**Disruptive Technologies and Land Forces Operations: Indian Context** by Lt Gen Rajeev Sabherwal, PVSM, AVSM, VSM (Retd)	Chair cum Panelist
1030- 1045h	**Cyberwarfare: Threats and Opportunities** by Prof Chuck Freilich, Former Deputy National Security Advisor, Israel	
1045- 1100h	**Technology and Sea-power** by Vice Admiral Anil Chopra, PVSM, AVSM (Retd)	
1100-1130h	Q & A	
1130-1150h	**Tea & Interaction**	
SESSION IV: LEADERSHIP AND ESCALATORY MECHANISM		
1150-1205h	**"Crisis Management & Escalation Control"** by Lt Gen AK Singh, PVSM, AVSM, SM, VSM (Retd)	Chair cum Panelist
1205-1220h	**Leadership Challenges in 21st Century Op Envt** by Lt Gen Arun Kumar Sahni, PVSM, UYSM, SM, VSM (Retd)	
1220 - 1235h	**Leadership Quotient & Training as a Winning Factor in Wars** by Dr. Mary Bell, Associate Professor, Joint Advanced Warfighting School, NDU	
1235-1305h	Q&A	
1305 - 1400h	**Group Photograph and Working Lunch**	
SESSION V: INTEGRATION IN A MULTI-DOMAIN LANDSCAPE		
1400 - 1415h	**Special Address** by Lt Gen Manoj Pande, PVSM, AVSM, VSM, VCOAS & Chairman, Board of Governors, CLAWS	
1415 - 1430h	**Need for Integration to Fight Future Wars** by Lt Gen Anil Ahuja, PVSM, UYSM, AVSM, SM, VSM** (Retd)	Chair cum Panelist
1430 - 1445h	**Integration Challenges in a Multi-Domain Landscape** by Maj Gen Mick Ryan, AM, Former Commandant, Australian Defence College	
1445 - 1500h	**World Order and Future Joint Force** by Lt Gen Raj Shukla, PVSM, YSM, SM, ADC, GOC-in-C, ARTRAC	
1500 - 1530h	Q & A	
1530 - 1540h	**Valedictory Address** by Brig Narender Kumar, SM, VSM (Retd)	
1540-1555h	**Concluding Remarks** by Lt Gen (Dr.) VK Ahluwalia, PVSM, AVSM**, YSM, VSM (Retd), Director CLAWS	

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BIO DATA OF GUEST SPEAKERS, CHAIRPERSONS & PANELISTS

BIO DATA OF GUEST SPEAKERS, CHAIRPERSONS & PANELISTS

GENERAL MM NARAVANE, PVSM, AVSM, SM, VSM, ADC
CHIEF OF THE ARMY STAFF

General MM Naravane is an alumnus of the National Defence Academy and the Indian Military Academy, he was commissioned in the Sikh Light Infantry Regiment in June 1980. He is an alumni of the Defence Services Staff College, Wellington and Higher Command Course, Mhow. The General Officer holds a Master's Degree in Defence Studies, an MPhil Degree in Defence and Management Studies, and is currently pursuing his Doctorate.

In a distinguished military career spanning almost four decades, he has the distinction of tenanting key command and staff appointments in Peace and Field, both in the North-East and Jammu and Kashmir. He has also been part of the Indian Peace Keeping Force in Sri Lanka. He has commanded a Rashtriya Rifles Battalion, raised an Infantry Brigade, served as Inspector General Assam Rifles (North) and has commanded a prestigious Strike Corps. His staff assignments include Defence Attaché at Yangon, Myanmar, and an instructional appointment in the Army War College.

After successfully commanding the Army Training Command in Shimla and the Eastern Command in Kolkata, he held the appointment of Vice Chief of the Army Staff before assuming the appointment of the Chief of the Army Staff on 31 December 2019.

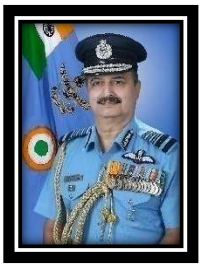
ADMIRAL R HARI KUMAR, PVSM, AVSM, VSM, ADC
CHIEF OF THE NAVAL STAFF

Admiral R Hari Kumar, is an alumnus of J-Squadron, 61 Course National Defence Academy. He was commissioned into the Indian Navy on 01 Jan 1983 and has specialised in Gunnery.

Admiral R Hari Kumar has commanded Coast Guard Ship C-01, INS Nishank, INS Kora, INS Ranvir and INS Viraat. His other sea-going appointments include Fleet Operations Officer and Fleet Gunnery Officer of Western Fleet, EXO of INS Vipul, GO of INS Ranjit, Commissioning GO of INS Kuthar and Commissioning GO VII of INS Ranvir. His ashore appointments include Command Gunnery Officer at HQ Western Naval Command, Naval Advisor to Government of Seychelles, Training Commander INS Dronacharya. His Flag appointments include Commandant of Naval War College at Goa, Flag Officer Sea Training, Flag Officer Commanding Western Fleet, Chief of Staff Western Naval Command, Controller Personnel Services and Chief of Personnel at IHQ MoD (N), and CISC/ VCDS at HQ IDS.

The Flag Officer had served in the Civil - Military Operations Centre of UN Mission in Somalia (UNOSOM I) at Mogadishu from Dec 1992 to Jun 1993. He attended the US Naval Staff Course at Naval War College, Rhode Island in 1996, Army Higher Command Course at AWC, Mhow in 2004, and the Royal College of Defence Studies, London in 2009. He holds a B.Sc. from JNU, MA (International Studies) from Kings College, London, MPhil (Defence & Strategic Studies) from Mumbai University and PG Diploma in Shipping Management from Narottam Morarjee Institute of Shipping, Mumbai. He was awarded the Vishisht Seva Medal in 2010, Ati Vishisht Seva Medal in 2016 and Param Vishisht Seva Medal in 2021. Prior to taking over as Chief of the Naval Staff, the Admiral R Hari Kumar was Flag Officer Commanding-in-Chief Western Naval Command.

AIR CHIEF MARSHAL VR CHAUDHARI, PVSM, AVSM, VM, ADC
CHIEF OF THE AIR STAFF



Air Chief Marshal VR Chaudhari PVSM AVSM VM ADC was commissioned into the fighter stream of the Indian Air Force on 29 Dec 1982. He is an alumnus of the National Defence Academy, Flying Instructors' School and Defence Services Staff College, Wellington. The Chief has a rich and varied experience of operational flying, having flown over 3800 hours.

During his career, he has held numerous Command and Staff appointments and has been an Air Force Examiner on fighter and trainer aircraft. He is a Cat 'A' Qualified Flying Instructor and an Instrument Rating Instructor and Examiner. The Chief has the unique distinction of being an instructor at Defence Services Staff College, Wellington as well as Defence Services Command and Staff College, Zambia.

The Air Chief Marshal has commanded a frontline fighter squadron and two important fighter bases. Some of his notable assignments include Assistant Chief of the Air Staff (Air Defence), Assistant Chief of the Air Staff (Personnel Officers) and Deputy Chief of the Air Staff, where he spearheaded several major procurement cases of the IAF. He later was Air Officer Commanding-in-Chief of Western Air Command and Vice Chief of the Air Staff before taking over as Chief of the Air Staff on 30 Sep 21.

LT GENERAL SANJEEV KUMAR SHARMA, AVSM, YSM

DEPUTY CHIEF OF THE ARMY STAFF (STRAT)

Lt Gen Sanjeev Kumar Sharma, AVSM, YSM assumed the appointment of DCOAS (Strat) at Integrated HQ of MoD (Army) on 01 Jul 2021. Prior to assuming this key appointment, he was serving as the Director General Military Intelligence. Lt Gen Sanjeev Kumar Sharma, AVSM, YSM is an alumnus of Rashtriya Military School, Bengaluru and was commissioned in to 11th Bn the RAJPUTANA RIFLES in December 1983 from Indian Military Academy, Dehradun.

The General has served in varied operational environments including OP PAWAN and OP MEGHDOOT. He commanded the battalion in an active Counter Insurgency environment in the North East, commanded an Infantry Brigade on the Line of Control in Jammu and Kashmir and thereafter commanded 26 Infantry Division and 11 Corps in the Western Sector. He has held prestigious staff appointments at Military Operations Directorate, HQ Army Training Command, HQ 41 Artillery Division, HQ 15 Corps and HQ Northern Command. He is an alumnus of Defence Services Staff College, College of Defence Management and National Defence College. The General Officer is a recipient of Ati Vishisht Seva Medal and Yudh Seva Medal. He holds a Doctorate degree in Defence and Strategic Studies form Pune University.

MAJOR GENERAL ATUL RAWAT, AVSM
OFFICIATING DIRECTOR GENERAL STRATEGIC PLANNING

Major General Atul Rawat, AVSM was commissioned into the 21st Battalion the Mechanised Infantry Regiment in Dec 1986. The Officer is a third-generation Officer and an alumnus of RIMC/NDA/IMA. During the 35 years of his commissioned service the Officer has served in varied area from LC/LAC, HAA, CI and in the Deserts. The Officer has tenanted varied Staff appointments – Col GS Pre Commission Trg in HQ ARTRAC, Col GS HQ CIF (K), Col Q Lands HQ Central Comd and Brig Adm HQ Eastern Comd. During the comd of his unit, the Officer was responsible for the induction of A Vehicles in North Sikkim to the heights of 14000 feet and above. Besides his own Battalion, the Officer has commanded 27 Armoured Brigade and 4 RAPID along the Western Front. The Officer has also served in UN Mission in Angola.

The Officer is a graduate of DSSC Wellington and CDM Secunderabad. The Officer has been awarded the AtiVishisht Seva Medal and commended by the Chief of the Army Staff thrice and GOC C-in-C Eastern Comd once for distinguished service.The Officer is currently posted as ADG (SP) in the Strategic Planning Directorate of the Army HQ.

LT GEN (DR.) VK AHLUWALIA, PVSM, AVSM, YSM, VSM, (Retd)**
DIRECTOR, CLAWS

After a career that spanned over 40 years in the Indian Army, he retired as the Army Commander, Central Command in 2012. Thereafter, he served as a Member, Armed Forces Tribunal, Jaipur-Jodhpur Benches. He commanded an Infantry Brigade in Uri Sector, Mountain Division in Kargil and Corps in Leh - Ladakh Sector. While commanding the Division in Kargil, his Division was awarded the BNHS National Green Governance Award 2005 by the Prime Minister of India, for conceiving and implementing the unique concept, ‘Operation Green Curtain’. He was also the first Indian Brigadier to attend the National Defence Course, at Dhaka.

A Doctorate in 'Internal Security and Conflict Resolution', he has also authored a book, 'Red Revolution 2020 and Beyond', and co-edited cum contributed in, *'Surprise, Strategy and Vijay: 20 Years of Kargil and Beyond'*, *'COVID-19 and its Challenges' and* '*Bangladesh Liberation@50 years'.*

DR. ANDREW SCOBELL
DISTINGUISHED FELLOW, UNITED STATES INSTITUTE OF PEACE

Dr. Andrew Scobell is a Distinguished Fellow in the China Program at the United States Institute of Peace in Washington DC. He focuses on China's armed forces, defence policy, and China's relations with countries and regions around the world, with a particular emphasis on the Korean Peninsula, Taiwan Strait, Southeast Asia, South Asia, Central Asia, and the Middle East. He previously spent more than ten years as Senior Political Scientist at the RAND Corporation, where his research and publications focused on China and the Indo-Pacific. Prior to RAND, Scobell was Associate Professor at the George H. W. Bush School of Government and Public Service and founding director of the China Certificate Program at Texas A&M University. From 1999 to 2007, he served as Associate Research Professor in the Strategic Studies Institute at the U.S Army War College. He is also Adjunct Professor at Georgetown University's Edmund A. Walsh School of Foreign Service. Scobell earned a PhD from Columbia University. He was born and raised in Hong Kong. Prior to COVID, Scobell made regular research trips to the Indo-Pacific.

DR. TIMOTHY R. HEATH
SENIOR INTERNATIONAL DEFENCE RESEARCHER, RAND CORPORATION

Dr. Heath is a senior international defence researcher at the RAND Corporation. He served as the senior analyst for the USPACOM China Strategic Focus Group. He has twenty years of experience researching and analyzing military and political topics related to China. Dr Heath is fluent in Mandarin Chinese, he has an extensive experience analyzing China's national strategy, politics, ideology, and military, as well as Asian regional security developments. He has a Ph.D. in political science from George Mason University and a MA in Asian Studies from George Washington University.

LT GENERAL (Dr) RAKESH SHARMA, PVSM, UYSM, AVSM, VSM (Retd)
MEMBER OF EXECUTIVE COUNCIL OF MP - IDSA & GCTC
& DISTINGUISHED FELLOW WITH CLAWS & VIF

Lt Gen (Dr) Rakesh Sharma was commissioned in Gorkha Rifles in 1977, and had a career in the Army spanning forty years. He has had extensive operational experience in Jammu and Kashmir, North East and on the Western Borders. The officer had trained the Botswana Army for three years

in Africa, and attended the National War College at Abuja, Nigeria. Lt Gen Rakesh Sharma attended the NDC at New Delhi. He was Research Fellow at IDSA and has done PhD in Defence Studies. General Rakesh Sharma commanded the Fire and Fury Corps in Ladakh, facing both Pakistan and China. The General was the Adjutant General responsible for the Human Resource Management of the Indian Army. He is regular participant in seminars, lectures in various institutions, and regularly writes for newspapers, military journals and contributes chapters in edited Books. He is currently on the EXECUTIVE COUNCIL of Institute for Defence Studies and Analyses (IDSA) and Global Counter Terrorism Council (GCTC) and DISTINGUISHED FELLOW with Vivekananda International Foundation (VIF) and Centre for Land Warfare Studies (CLAWS).

LT GEN (DR.) RANBIR SINGH, PVSM, AVSM, YSM, SM, ADC (RETD)**
FORMER ARMY COMMANDER NORTHERN COMMAND, DEPUTY CHIEF OF ARMY STAFF & DIRECTOR GENERAL OF MILITARY OPERATIONS

Lt Gen Ranbir Singh was commissioned into the Army on 13 Dec 1980. He has done his MSc from Defence Services Staff College, Wellington; M Phil in Defence and Management Studies from Army War College, Mhow; M Phil in Defence and Strategic Studies from National Defence College, New Delhi and MA from King's College London. He has also recently completed his PhD in Disaster Management. An expert in Counter Insurgency operations, Military Strategy, Operational Art and Information Operations, he has held extremely important Command, Instructional and Staff appointments including UN assignments in Rwanda and Sudan. He was responsible for planning and execution of surgical strikes against terrorists in Myanmar in 2015 and POK in 2016. He was also at the helm of affairs in Northern Command during the abrogation of Article 370 and 35 A in J&K and Ladakh. He is currently the Director, CLAWS

AIR MARSHAL KK NOHWAR, PVSM, VM (RETD)
FORMER VICE CHIEF OF THE AIR STAFF

An alumnus of NDA, he was commissioned into the Indian Air Force on 24 Jun 1972. He flew the MiG-21 and later commanded a MiG-27 Squadron & has 3400 hours of flying to his credit. The Air Marshal is a Qualified Flying Instructor & a Fighter Combat Leader, he is a graduate of DSSC, Wellington and Air War College (USA).

His command appointments include CO of 9 Squadron, Commandant Tactics and Air Combat Development Establishment (TACDE), AOC 16 Wing, AF and AOC-in-C, Eastern Air Command. His important staff assignments include Chief Operations Officer (COO) 33 Wing, Dy Comdt College of Air Warfare (CAW), Principal Director Air Staff Inspection (PDASI), and ACAS (Plans). He served as the Chief of Staff at Andaman & Nicobar Command, Deputy Commander-in-Chief of Strategic Forces Command (both tri-Service appointments), & Senior Air Staff Officer (SASO), Training Command. He retired as the Vice Chief of the Air Staff

in May 2012. Air Marshal Nohwar was the Director General, CAPS from 02 May 2018 to 31 January 2021.

DR. SHASHI JAYAKUMAR
SENIOR FELLOW, HEAD OF CENTRE OF EXCELLENCE FOR NATIONAL SECURITY & EXECUTIVE COORDINATOR OF FUTURE ISSUES & TECHNOLOGY, RSIS

Dr. Shashi Jayakumar was educated at Oxford University where he studied History (BA 1997, D.Phil, 2001). He has published in various peer-reviewed journals and edited volumes on topics relating to medieval history (the focus of his doctorate). He was a member of the Singapore Administrative Service from 2002-2017. During this time, he was posted to various ministries, including the Ministries of Defence, Manpower, Information and the Arts, and Community Development, Youth and Sports. He was from August 2011-July 2014 a Senior Visiting Research Fellow at the Lee Kuan Yew School of Public Policy. His research interests include extremism, cyber, social resilience, and political history.

LT GEN PHILIP CAMPOSE, PVSM, AVSM, VSM (RETD)**
DISTINGUISHED FELLOW, CLAWS

Lt Gen Philip Campose, PVSM, AVSM**, VSM (Retd) was commissioned in the Infantry in 1974 and transferred subsequently into the Mechanised Infantry in 1982. He retired as the Vice Chief of the Indian Army in 2015. He has commanded an independent Armoured Brigade, a division on the line of control in J&K, the Desert Corps and the Western Army. He has headed the Land Vector at the Strategic Forces Command and also held the appointment of Director General of Perspective Planning (now Strategy Planning) at Army Headquarters. His book 'A National Security Strategy for India - the Way Forward' was released in 2018.

LT GEN RAJEEV SABHERWAL, PVSM, AVSM, VSM (RETD)
THE COAS CHAIR OF EXCELLENCE & DISTINGUISHED FELLOW, CLAWS

An alumnus of NDA and IMA, he was commissioned in the Indian Army in December 1981. A graduate of Defence Services Staff College, Wellington, Higher Command Course, Mhow and National Defence College, New Delhi, the Officer tenanted various command and staff appointments. He commanded the 39 Mtn Div Signal Regt during Op PARAKRAM in J&K as well as tenanted the appointment of Chief Signal Officer, Southern Command. He has held important staff tenures like GSO 2 (Ops) in CI Ops in EC, GSO 1 (Ops) in the Western Theatre and has twice served in the prestigious Military Operations Directorate as Dir, MO-10 as well as DDG MO (IW).The General officer was the first paratrooper to be appointed as Signal Officer-in-Chief and as the flag bearer of the Corps, steered transformational changes inherent to the Digital Battlefield across entire spectrum of conflict.

PROF CHUCK FREILICH
ADJUNCT ASSOCIATE PROFESSOR OF POLITICAL SCIENCE, COLUMBIA UNIVERSITY, FORMER DEPUTY NSA, ISRAEL

Prof Chuck Freilich has been a long-time Senior Fellow at Harvard's Belfer Center. He has taught political science at Harvard, Columbia, NYU and Tel Aviv University.

He is the author of Zion's Dilemmas: How Israel makes National Security Policy (Cornell Press 2012); Israeli National Security: A New Strategy for an Era of Change (Oxford Press 2018); and Israel and the Cyber Threat: How the Startup Nation Became a Global Cyber Power (2020). He has published numerous academic articles and over 150 op-eds, and appears frequently on US, Israeli and international TV and radio stations.

VICE ADMIRAL ANIL CHOPRA, PVSM, AVSM (RETD)
DISTINGUISHED FELLOW, CLAWS & VIF

Vice Admiral Chopra has the unique distinction of having been the Commander-in-Chief of both the combatant commands of the Indian Navy, i.e., the Western Naval Command and the Eastern Naval Command, as well as being the Chief of the Indian Coast Guard for three years in the immediate aftermath of the 2008 Mumbai terror attacks.

He has been a Member of the National Security Advisory Board (2017-19), and of the apex Defence Acquisition Council, chaired by the Raksha Mantri, (2008-11).At sea, the Admiral commanded the Navy's sword-arm, the Western Fleet; the aircraft carrier, INS Viraat; the destroyer, INS Rajput; and the missile corvette, INS Kuthar.

He has also been Chairman of the National Offshore Security Coordination Committee, the National Maritime Search and Rescue Board, the National Oil Spill Disaster Contingency Board, and Patron of the Sea Cadet Corps.

LT GEN AK SINGH, PVSM, AVSM, SM, VSM (RETD)
INDEPENDENT DIRECTOR, OP JINDAL UNIVERSITY
DISTINGUISHED FELLOW, CLAWS

Lt Gen A K Singh (Retd) the erstwhile Lt Governor of the Andaman & Nicobar Islands and Puducherry, Ex GOC-in-C Southern Command has been an alumnus of NDA, Staff College Camberley, UK, Malinovsky Tank Academy, Moscow & the Higher Command & National Defence College courses.

The General has commanded the 7th Cavalry, a T-90 Tank Brigade, an Armoured Division and the most powerful Strike 1 (Corps), and has the distinction of conceiving and executing some of

the largest ever manoeuvres in recent times. He has held key Operational appointments including Brigade Major of the Kargil Brigade and three appointments in Military Operations Directorate. The General has co-edited two books recently, namely *Military Strategy for India in the 21st Century* and *Battle Ready for the 21st Century*

LT GEN ARUN SAHNI, PVSM, UYSM, SM, VSM (RETD)
DISTINGUISHED FELLOW, USI & CLAWS

Lt Gen Arun Sahni, second generation and a decorated soldier, superannuated as *Commander in Chief of an Army Command* on India's Western borders. Earlier he commanded the India's largest Army Corps in the North East, deployed on the LAC with China and borders with Myanmar & Bangladesh. The Corps was also responsible for active Counter Terrorist Operations, in six of the seven NE States.

Recipient of the *Sword of Honour and President's Gold Medal*on commissioning, for standing first in order of merit, he has consistently been a high achiever. Over a career spanning 40 years, he has served in most of the active and challenging operational environments in India and abroad, to include Sri Lanka (Op Pawan), North East and J & K. He *trained for a year with the British A*rmy, was a military *diplomat* in Russia for three years and has tenanted critical and prestigious key appointments at the apex level of the army.

DR. MARY S BELL

ASSOCIATE PROFESSOR,JOINT ADVANCED WARFIGHTING SCHOOL (JAWS), NDU

Dr. Bell is the faculty chair for the Joint Advanced Warfighting School's (JAWS) Operational Art and Campaign Planning Course. She is also the faculty lead for an elective on cyberspace, intelligence, and information considerations. She has a Ph.D. in International Studies from Old Dominion University, an M.A. in International Relations from St. Mary's University at San Antonio, Texas, and a B.A. in International Business from New Mexico State University.

She has over 20 years of service in the U.S. Army with experience in Aviation and Intelligence. She flew the UH-60 Blackhawk helicopter in South Korea, Hawaii, throughout the U.S, and Haiti in support of Operation Uphold Democracy. She also flew the C-12 Huron and EO-5B/C Airborne Reconnaissance Low (ARL) to support Operations Palmetto Ghost and Palmetto Shield, Counter Drug operations for U.S. Southern Command.

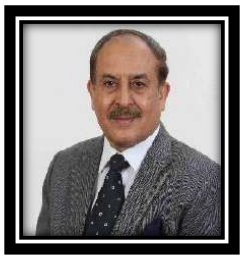
LT GEN MANOJ PANDE, PVSM, AVSM, VSM
VICE CHIEF OF THE ARMY STAFF & CHAIRMAN, BOARD OF GOVERNORS, CLAWS

Lt Gen Manoj Pande, PVSM, AVSM, VSM, an alumnus of National Defence Academy, was commissioned in December 1982 in the Corps of Engineers (The Bombay Sappers). The General Officer has commanded an Engineer Regiment during Operation PARAKRAM in the sensitive Pallanwala Sector of Jammu and Kashmir, along the Line of Control.

The General Officer is a graduate of Staff College, Camberley (United Kingdom) and has attended the Higher Command (HC) and National Defence College (NDC) Courses. In his 38 years of distinguished military career, he has tenanted important and challenging command and staff appointments in different operational environment which include command of an Engineer Brigade in the Western Theatre as part of Strike Corps, an Infantry Brigade along Line of Control in Jammu and Kashmir. A Mountain Division in the High-Altitude Area of Western Ladakh and an op Corps in Eastern Theatre, deployed along the Line of Actual Control (LAC) and in Counter Insurgency Operations area of Eastern Command.

His staff exposures include Brigade Major of a Mountain Brigade in the North East, Assistant Military Secretary (AMS) in Military Secretary's Branch, Colonel Q of a Mountain Division in High Altitude Area and Brigade General Staff (Operations) at Headquarters Eastern Command. The General Officer has served as Chief Engineer in the United Nations Mission in Africa. He has also tenanted the appointments of Additional Director General in the Military Operations Directorate at Army Headquarters, Chief of Staff at a Command and Director General Discipline Ceremonial & Welfare at the Army Headquarters. He has also been Commander-in-Chief Andaman & Nicobar Command and General Officer Commanding-in-Chief Eastern Command. The General Officer has taken over as Vice Chief of the Army Staff & Chairman, Board of Governors, CLAWS with effect from 01 Feb 2022. For his illustrative Service, the General has been conferred with the award of Param Vishisht Seva Medal, Ati Vishisht Seva Medal, Vishisht Seva Medal, the Chief of Army Staff Commendation and twice with GOC-in-C Commendation.

LT GEN ANIL AHUJA, PVSM, UYSM, AVSM, SM, VSM (RETD)**
DISTINGUISHED FELLOW, VIF & ADJUNCT FELLOW, DELHI POLICY GROUP



Lt Gen Anil Ahuja, is a former Deputy Chief of Integrated Defence Staff for Policy Planning and Force Development. He commanded a Corps and a Division in the Eastern Theatre. He has also been the Additional Director General Military Operations. He served as the Defence Attaché to Vietnam, Cambodia, Lao and was an UN Military Observer in Angola. He was the founding co- chair of India – US DTTI Inter Agency Task Force (DIATF) and has been the member Secretary of the Defence Acquisition Council (DAC) during the period 2014 – 2016. He is a graduate of the National Defence College. Since retirement, in Aug 2016, he is a Distinguished Fellow at the Vivekanand International Foundation (VIF) and a Senior Adjunct Fellow for Defence Policy at the Delhi Policy Group.

MAJOR GENERAL MICK RYAN, AM (RETD)
FORMER COMMANDANT, AUSTRALIAN DEFENCE COLLEGE

Major General Mick Ryan graduated from the Royal Military College, Duntroon, in 1989. Career highlights prior to unit command include: in 2000, serving with the 6th Infantry Battalion Group, in East Timor; in 2003, being the lead planner for development of the first ADF Network Centric Warfare Roadmap; and in 2005, serving as the Deputy J3 for the Multi-National Security Transition Command – Iraq, in Baghdad. In January 2013, was appointed Director General Strategic Plans in Army Headquarters. During his time in this appointment, he was responsible for Army's contribution to the Defence White Paper and Force Structure Review.

He is a Distinguished Graduate of the United States Marine Corps Command and Staff College, and a graduate of the USMC School of Advanced Warfighting. Most recently, in 2012, he graduated with distinction from the Johns Hopkins University, School of Advanced International Studies, with a Masters in International Public Policy.

LT GEN RAJ SHUKLA, PVSM, YSM, SM, ADC

GOC-in-C, ARTRAC

A graduate of the National Defence Academy and the Indian Military Academy, Lieutenant General Raj Shukla was commissioned into the Regiment of Artillery in December 1982. In a career spanning four decades, the Officer has seen extensive service in the field- he commanded a Medium Regiment in the Eastern / Desert Theatres, an Infantry Brigade in Counter Insurgency Operations, an Infantry Division along the Line of Control in the Valley and a Pivot Corps along the Western Borders.

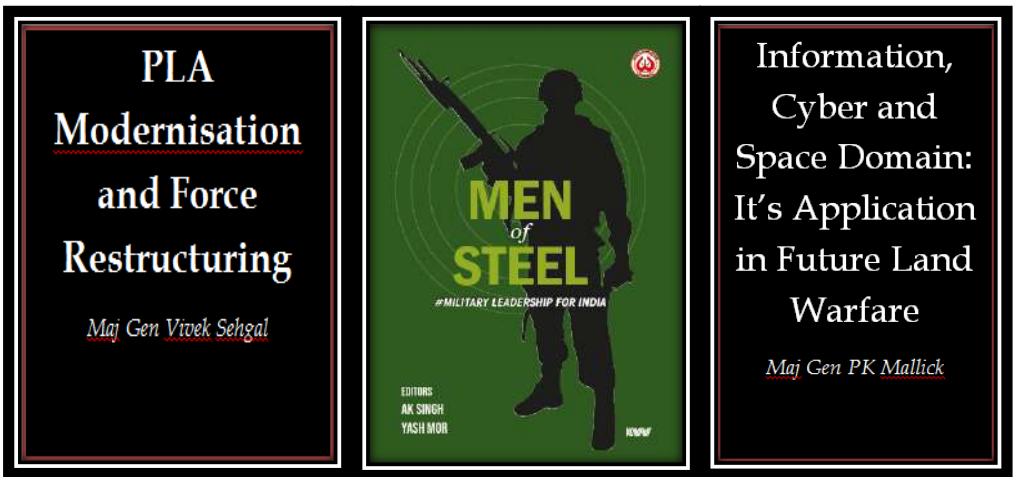
An alumnus of the Defence Services Staff College Wellington, the College of Defence Management - Secunderabad and the National Defence College - New Delhi, the General Officer has served two tenures at the Military Operations Directorate dealing with Doctrines / Force Structuring and till recently was the Director General, Perspective Planning at Army HQ, addressing issues relating to Military Futures and Forces Modernisation. He has also been Commandant of the Indian Army's prestigious training establishment and think tank - the Army War College.An aviator, as also a recipient of the Param Vishisht Seva Medal, the Yudha Seva Medal and the Sena Medal, General Shukla is presently the Honourary Aide-de-Camp to the Honourable President of India. The Officer also has an abiding interest in strategic – military affairs. He has authored numerous articles / publications and lectured / participated in various seminars in India and abroad. The General Officer is currently the 22nd General Officer Commanding- In-Chief of the Indian Army's Army Training Command (ARTRAC) which looks at India's Strategic - Military Futures, Threats & Opportunities, Technology Initiatives, Training, Professional Military Education and Capacity Building.

BRIG NARENDER KUMAR, SM, VSM (Retd)
VISITING FELLOW, CLAWS

Brig Narender Kumar, SM, VSM, an Infantry Officer commissioned in 5 Madras. He served in Counter Insurgency and Counter Terrorism areas, in Sri Lanka as a part of IPKF, served in J&K and Northeast India. He served as part of Training Team in Bhutan from 1991 to 1993 and with UN Mission in Africa from 2000 to 2001 in Ethiopia and Eritrea. He has commanded a Rashtriya Rifle Unit (Counter-Terrorist Operations) in J&K and later as Brig commanded a counter insurgency sector of Assam Rifles in the North East. He was awarded the Sena Medal for counter terrorist operations in J&K and the Vishisht Seva Medal for Counter-terrorist operations in the Northeast.

He has authored two books, edited two books and published more than 225 articles, chapters and papers. He was the founder Editor of Samman Veterans Journal. He is currently a Visiting Fellow at the Centre for Land Warfare Studies, Delhi. He was also awarded Scholar Warrior Award by the Centre for Land Warfare Studies for the year 2021.

CLAWS UPCOMING BOOKS



*Cover(s) for Representation Purpose Only

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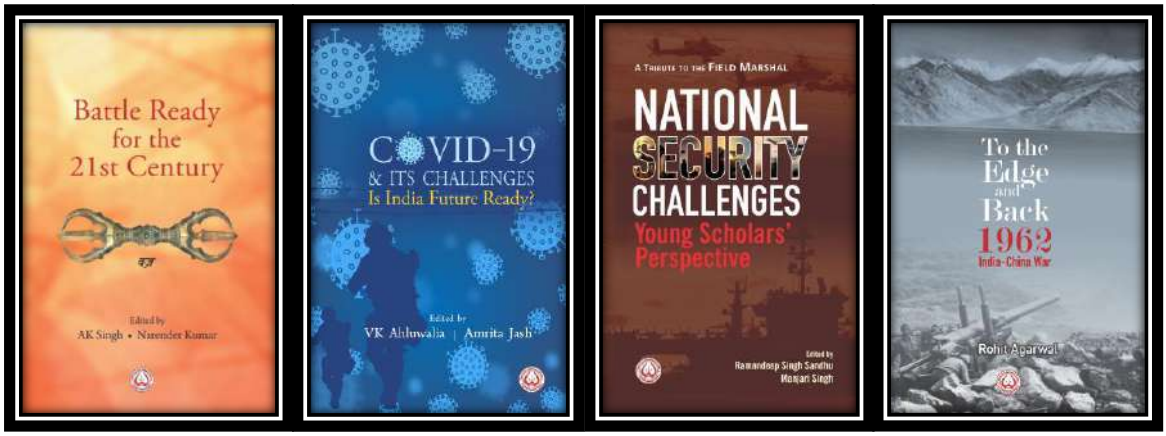

Pragyan Conclave 2022 Team with GOC-in-C ARTRAC

Pragyan Conclave 2022 Team