Seminar Report

NATIONAL SEMINAR ON FUTURE CONTOURS AND TRENDS OF WARFARE

September 6, 2017

Seminar Co-ordinator: Col Akhilesh Kumar

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EXECUTIVE SUMMARY

- While it is difficult to predict the future with certainty, some of the trends of modern day wars and armies are that no great power war has taken place, after peaking in the 70s; there is rise of regional powers like China and India; armies are mostly fighting insurgents, such as those in Jammu and Kashmir or Chechnya and hybrid warfare poses additional challenges to the existing armies.

- Issues like trade, climate change, Thucydides trap and the role of the third or fourth players in a binary conflict are all potential triggers for war in the near future.

- Developments in computing which can be a broader umbrella to include robotics, artificial intelligence (AI) and cognitive computing are transforming the way militaries will function and the way wars will be fought.

- Indian Army is the best practitioner of mountain warfare with maximum experience and knowledge as officers and soldiers spend major part of their service in the mountains. But onthe contrary, they have not been able to deliver the experience and the knowledge.

- Blindly templating the lessons of Kargil War, such as maintaining the numerical superiority of 1:9 for launching offensive has limited our strategic thinking and selection of objectives in the mountains.

- Need to relook at the concept of fire support on the Line of Control(LC). Field artillery should be replaced by some accurate long-range vectors. This one significant factor can speed up our operation in mountains.

- Rashtriya Rifles can be employed in conventional operations; however, they require operational training for conventional roleas well as restructuring.

- The bureaucratic set-up in India is killing all the initiatives. We get limited to utilising what we already have. What will it take for India to enter this new age? It is not in the future, it is here. The Indian Armed Forces should be resilient enough to lead change in the field instead of becoming a victim to it.

- On the LC, in the super high altitude areas, employing division size forces is too unwieldy and slow, therefore, self-sufficient brigade groups with their own logistics support are needed for speedy and sustainable offensive operations.

- At the national level we may continue to have defensive strategy but there is a need to plan for offensive options too. We should plan warfighting and mobilisation in Ladakh during winters which gets completely cut-off during this season. Potential and capabilities of Ladakh troops should be exploited after reorganisation, restructuring and training for operations.

- The employment of Special Forces at present is very tactical, they need to be employed more imaginatively and strategically.

- Need to shift obsessive focus from Pakistan towards China. The recommended warfighting strategy should be:

  - Western Front: Unified forces, multidomain and manoeuvre warfare.

  - Northern Front: Unified, multidomain, unconventional, asymmetric, denial strategy.

  - Reserves: Rapid Deployment Force from Western Front as 'net security provider' in the region and one central reserve—dual tasked.

- The future trends of warfare are going to be determined by the comprehension of technology at the strategic level or at the level of a Grand National Strategy.

- Cybernetics is extremely important as a battle-winning factor.

- "The seamless integration of information, computers and communication technology through the cyberspace has made the intangible asset of information available to everyone."

- Today's world has transgressed from cyberspace into a cyber-ecosystem. Services which the public avails have also been improved to become 'smarter' through the integration of information technology, operational technology and consumer technology.

- Armies are moving to a network-centric warfare, with the implementation of network-enabled environments and network-

centric defence systems and so forth. This has enabled military commanders to function better in the decision-making spectrum.

- Due to the immense costs of improving the cyber-defences, it is better to be offensive in the cyber-domain as the tools for both cyber-defence and offense are the same.

- Main recommendation for the Indian army is to follow the United States Air Force (USAF) example and hire its own cybe rsecurity experts to better expand its cyber capabilities.

- Firepower is a key component in combat power. When looking at the capability development, one needs to see the firepower of the resources of all material on land, air and sea, and then assess the firepower matrix.

- To defend against air threats:
  - Countries need to be prepared by ensuring space-situation awareness in their territory and airspace. India needs to develop this technology ab initio.
  - Strengthen strategic offensive capability by operationalising the BrahMos-II, the Nirbhay cruise missile with conventional warheads and the Shaurya as well as Sagarika missile systems.

- The problem of inadequate missiles is met by the 'Arsenal Aim' concept. It envisages the use of vehicles (such as the C-130) to carry hundreds of missiles, which can be used to queue on to the stealth fighters.

- Future can be said to consist of large stealth unmanned aerial vehicle (UAVs) carrying a large number of missiles, sixth-generation fighters can be considered an alternative to the problem of inadequate missiles and fighters. Next-generation aircrafts must know how to fly at hypersonic speeds, be multifunctional, super manoeuvrable and unnoticeable.

- China's operational Centre of Gravity is considered to be her dependence on external merchandise trade. Chinese reliance on sea-based trade, despite many of its exports coming inland, is due to the ease of transportation. Routes such as Malacca Straits, Cape of Good Hope, and so forth, are the lynchpins to China's strategic well-being and should be exploited to their own advantage.

DETAILED REPORT

CLAWS conducted a National Seminar on the 'Future Contours and Trends of Warfare' on September 06, 2017. Important issues highlighted at the Seminar are given below.

INAUGURAL SESSION

Welcome Address

During the inaugural session, issues meriting considerations were raised; what should be the nature of war in the future, what should be the character of war in the future, and what are the strategies to adopt to look at the war in the future. During the seminar, an analysis is needed of the characteristics and dynamics of war. The discussion on nature of war will be taken after considering characteristics and strategies that we need to adopt. Clausewitz said that waging war is the business of government—continuation of policy by other means, and therefore, war is an instrument of policy to achieve political objectives, and in that pursuit use violencethat is, basic nature of war. The focus of the seminar is to address various forms of war, the spectrum of conflict in detail and how it will be segmented or divided further by different forms of violence. The seminar should also examine the human emotions that shape the war, the trinity defined by Clausewitz and look at new concepts and ideas.

Keynote Address

The COAS spoke on key issues affecting the army's perceptions and preparations for a future war. He highlighted the primacy of land forces in the current as well as future wars. He stressed that it is not only the armed forces that go to war, but also is between two nations

and require whole of nation's effort—polity, industry and the people. The COAS emphasised that we must be prepared for conflict on both fronts. Nuclear weapons are weapons of deterrence but, to say that nuclear weapon states do not go to war is also not true, war lies in the realm of reality. There appears to be no likelihood of reconciliation with our western neighbour as their polity, military and people have been made to believe that India is their long-term enemy, all out to bring their nation to pieces. He stated that the proxy war by our western neighbour is testing the tolerance limit of our nation, thus increasing the scope for conflict. For the northern neighbour, flexing of muscles has started; salami slicing,taking over territory in a very gradual manner and testing our limits of threshold is something we have to be wary about and remain prepared for the emerging situation. Whether these conflicts will be limited in time and space or whether they will fan into an all-out war along the entire front with the western adversary taking advantage of the situation developing on the northern borders is very much likely. The COAS also spoke about the non-contact warfare which is gaining ground and may find better application between nations before militaries are launched in the battle, as seen during Doklam standoff, where China resorted to cyber, information, legal and coercive warfare, just short of actual confrontation between the two forces.

SESSION I: FUTURE CONTOURS OF WARFARE

In the opening remarks, the Chair highlighted the overriding influence of information and technology,and non-contact warfare overtaking contact warfare. With increasing number of stake holders, the potential for competitions, conflict and hostilities are also rising. There is a paradigm shift in the nature of conflict. International order does not apply to non-state actors. Resource constraints, energy needs, ideological differences and extremism are contributing to a spectrum of conflicts, including internal armed conflict adding it a new dimension.

Interrelationship between offense and defence has to be understood and redefined. Role of Special Forces in strategic and operational dimension requires a relook and greater deliberation. Today, sub-conventional conflict has become a new normal. India is faced with a dual threat; conventional threat on its two fronts as well as sub-

conventional one. The nation has chosen to be prepared for this conventional threat and also adapt to fight the sub conventional war by creating Rashtriya Rifles, Assam Rifles and beefing it up by infantry and all arms and services.

Security Environment of the Future and Changing Character of Warfare

What will be the future conflicts that lead to war? Can a Doklam or a South China Sea lead to war today? Issues like trade, climate change, Thucydides trap and the role of third or fourth players in a binary conflict are all potential triggers today. What will be the nature of war? Will it turn on attrition or manoeuvre? How can little victories be turned into strategic victories? How will the use of technologies like cyber warfare, robotics, and AI change the management with the military? What role can small, specialised forces (may be a battalion of officers with linguistic skills or airborne forces) play in the future? What will be the decisive means of transport (e.g. A large part of the Second World War was planned around railways)? This becomes crucial as a large part of our borders are in the mountains.

Some of the trends of modern day wars and armies are that no great power war has taken place; after peaking in the 70s, the numbers in armies have started declining; the actual numbers of equipment have gone down because of their exorbitant costs; computers and the back-end support which provides the computing backbone to operations are growing in number; the venture of big powers has given the way to the rise of regional powers like China and India; armies are mostly fighting insurgents like in Jammu and Kashmir or Chechnya and hybrid warfare poses additional challenges to the existing armies.

Wars of the recent past like the Arab-Israel War, 1967–1973 or the India-Pakistan War, 1971 with large armies on either side are unlikely today. Nuclear weapons have changed the balance substantially. The United States is unwilling to act against North Korea but did go to war against Iraq twice.

Modern armies need to have credible deterrence plus the ability to deal with lower-level hybrid warfare. Additionally, hybrid warfare

is on the rise. The Pakistanis have perfected this tactic by using jihadi proxies against India, pinning down a much larger nation and army.

Impact of Technology on Warfare (AI, Robotics, etc.), Trends in Nuclear Deterrence and Space Warfare

There is major focus worldwide in the field of Robotics, AI and cybernetics. We as a nation are far behind in these developments and largely reliant on other nations to forge a way forward. These developments in computing will revolutionise the way military operations will be undertaken in the future.

Quantum computing has various aspects like the light quantum, simple gate principles and the adiabaticprinciple. Focus must be laid on the fact that quantum computing can make communications unhackable. The way to counter this is quantum resistant algorithms, an area where India is wholly lacking. The concept of adaptive algorithms is feasible if organisations put their mind to it.

Cognitive computing mimics the human brain. When a cognitive computing system is front loaded with information, it can use its own operational experience and take action based on rational analysis. How relevant are tanks when the world you are going to face is making such technological leaps? This is a matter of major concern.

What a Gray X-series computer could do even twenty years ago is now done by a microbot. That is how much the miniaturisation scale has been narrowed.

In the field of robotics, artificial swarm intelligence is operational. Autonomous armies of land robots and air robots are operating right now. The United States has already deployed it in small numbers. There are swarms with an attack leader who adjudicates which robot performs which function. The United States is experimenting with this in Maryland. Russia and China have their own developments as well.

There are no barriers to where ideas can be picked up from; even science fiction is not off limits. Robert Goddard got the idea of multistage rockets from H. G. Wells. Plume spotting of North Koreas missile by aerial micro-vehicles allowed the United Statesto become aware of the specifics of North Korean capability.

SESSION II: CHANGING CHARACTER OF LAND WARFARE

Operations in Mountains, Special Operations, Counterterror Operations: Challenges and Solutions

Both India and Pakistan are linearly deployed along the LC, with heavy density of troops on the LC and little deployment in depth or limited reserve. This is a major weakness on both the sides, however, we are somehow unable to exploit this weakness because of some tactical practices we have inculcated over a period of time. The biggest obstacle is our over-reliance on the field artillery to project the forces in the depth areas. Redeployment to support the depth battle leads to loss of the pace of operation and limits our objective. The whole concept of fire support on the LC should be replaced by some accurate long-range vectors. This one significant factor can speed up our operation in mountains.

Rashtriya Rifles can be employed in conventional operations, however, they lack operational training for a conventional role and are also currently deployed in penny packets in the counterterrorism grid. Their effective employment is also impacted by their organisational structure which is 50 percent infantry and 50 percent other arms. There is a need to identify the Rashtriya Rifles battalions which can be employed in the conventional role and have a greater percentage of infantry in those units.

Converting the divisions into brigade groupings is already under consideration. In the super-high-altitude areas, employing division size forces is too unwieldy and, therefore, self-sufficient brigade groups with their own logistics support are needed for speedy and sustainable offensive operations. Similar is required for Line of Actual Control (LAC), particularly in Arunachal Pradesh due to poor communication infrastructure in the state. Application of reserve corps or divisions in those areas is very difficult. There is a need to plan for various contingencies for operations on LC/LAC.

Even for heliborne operations, our operations should be relooked seriously, loss of one helicopter in an operation should not jeopardise the entire operation.

We may continue to have a defensive strategy at the national level but there is a need to plan for offensive options. In the northern command,

we have to plan for winters; Ladakh gets totally cut-off during winters from our side and we should look at warfighting and mobilisation in Ladakh during winters. Ladakh Scouts are outstanding in mountains, however, there is a need for their reorganisation, restructuring and training for operations.

Our armed forces are lagging behind in the technological developments; the employment of drones should be made innovatively and extensively.

The employment of Special Forces at present is very tactical, although we do not have a global role or ambition,we need to look at how we can employ this force strategically.

New Strategy and Doctrine for Warfare (Manoeuvre, Attritional and Low-intensity conflict [LIC])

The warfighting concept has evolved through a process of political aim and Vision—national security strategy—strategic challenges—warfighting concept and—capabilities. In our case, there is no political aim given, no national security strategy published and therefore, military leadership evaluates its challenges and plans warfare. Thus, in India, warfighting concepts and capabilities to execute are planned and trained for without any National Security Strategy, political vision or concurrence. The question is, will acronyms of the past that dictated strategy like, 'worst-case scenarios, two-front war', 'punitive deterrence' and 'dissuasive deterrence', 'loose, but not an inch of territory', 'threats-cum-capability model', 'under nuclear overhang' and the 'effect of non-strategic nuclear weapons', continue to rule the roost ad infinitum?

Worst-Case Scenario: Two-Front War/Collusive Support

Worst-case scenarios focus on great vulnerabilities, signify the failure of foreign policy and require extraordinary resources. Thus, which country in the world other than India talksabout a two-front war and fighting two enemies? No country in the world would say we are ready for multi-front war except India. We donot have a gross domestic product (GDP)allocation of three percent,whereas, we need 4.5percent of GDP to prepare for a two-front war.

War-Fighting

- Need to shift our main focus from Pakistan to China.
- Western Front.
  - Shed deterrence as operation philosophy, in favour of an offensive warfighting strategy, war winning strategy.
  - Shed linearity in defence occupation. Holding of linear defences, where imperative, by Paramilitary forces (PMF)/Central Police Organizations (CPOs).
  - Adopt manoeuvre warfare as the main form of operation.
  - Reorganise Force levels to adopt the above strategy. The pivot and strike corps be reorganised into 10–15 scalable Battle Groups depending on their area of employment, and all to be configured as strike force, only for offensive operations. We need to conduct effect-based/rapid decisive operations by agile, versatile, lethal and technologically superior, tailored battle groups.
  - Entire western front should be a unified battle area of Indian Air Force and Army with overlapping capabilities and responsibilities. Need to converge and integrate capabilities across multidomain air-land-sea-cyber-electromagnetic spectrum and saturate the battle zone.
- Northern Front
  - Like Chinese, we need to fight irregular, avoid bunker syndrome, establish grids, employ Special Forces and force multipliers.
  - Use Info-warfare in all its manifestations—dominance, disinformation, psychological, cyber, space, electromagnetic spectrum, hacking, jamming, satellites—you name it. Create an Info Warrior force, get geeks, get out of the uniformed mode.
  - Undertake asymmetric, unconventional warfare, including exploitation of the third dimension.
  - Retain strong tailored reserves—counter offensives/riposte as credible dissuasion.
- Reserves
  - One Corps/Corps less adivision to constitute Rapid Deployment Force from Western Front as 'net security provider' in the region.

    o   One Corps,ex-Western Front as central reserve—tasked against People's Republic of China (PRC) with dual task.

SESSION III: FUTURE WARFARE IN THE FIELD OF AIR, MARITIME, CYBER AND FIREPOWER

Probability of a conventional war in today's times is low;however, larger strategic considerations would be taken into account when engaging in any type of warfare.

One way of looking at warfare in today's context is looking at it in the form of a classical triangle. The sides of the triangle are: the ability to deliver firepower, the ability to maintain surveillance and the ability to create a strategic rift.

Since Operation Desert Storm, analysts state that military power can also be analysed using dimensional analysis (concepts of mass, length and time). In this case, mass=firepower and length=ability to deliver ordinance. Both mass and length have increased exponentially in modern times. Time is a factor which keeps shrinking due to these advancements. Technology is leading to shrinking of manpower in conventional armiesnamely, UAVs, remote-controlled submersibles and so forth. Another aspect which needs to be added is miniaturisation. The future trends of warfare are going to be determined by the comprehension of technology at the strategic level or at the level of a Grand National Strategy.

Role of Cyber Warfare in Future Warfare

Cyber is extremely important as a battle-winning factor. A good understanding of cyberspace will enable the army to execute tasks with greater efficiency.

The seamless integration of information, computers and communication technology through the cyberspace has made the intangible asset of information available to everyone. Today's world has transgressed from cyberspace into a cyber-ecosystem through the integration of information technology, operational technology and consumer technology.

An area of concern when considering the cyber defence strategy is the issues existing in the national cyber security domain which

can infringe upon military functioning. Armies are moving to a network-centric warfare, with the implementation of network-enabled environments and network-centric defence systems, and so forth. This has enabled military commanders to function better in the decision-making spectrum. The military and the non-military landscapes have become intertwined in such a manner that as far as the concepts of cyber-domain and cyberwarfare are concerned, no one is living in isolation anymore.

With the increase in dependency on the cyber domain, threat vectors have also increased. Cyber attacks impact the general population of a country with the main purpose of denying the population of the country the basic services they need to effectively function.

Due to the immense costs of improving the cyber-defences, it is better to be offensive in the cyber-domain as the tools for both cyber-defence and -offense are the same. The US: Cyber warfare is analogous to our conventional capabilities. Cyber-defence and perception management are both run under separate wings of the military.

Russia terms it 'information-technical, confirmation-psychological'. The main aim of their cyber program is to affect the belief and attitude of the adversary. China also follows the same model as the Russians. White Paper statement: "cyber-attack not only includes penetrating computer systems and transmitting the information to the military leadership but also uses cyber tools to dominate the entire social order of the enemy."

Preparation of the battlefield continues to happen both in peace and war time. In the cyber domain, it is the planting of malware, creating backdoors, and so forth. Concern is that India is doing 'too little, too late' with its cyber capabilities. A recommendation for the Indian army is to follow the USAF example and hire its own cyber-security experts to better expand our cyber-capabilities.

New Concepts in Air Warfare, Airborne and Heliborne Operations in Indian Context

- Postulates:
  - Limited wars are a possibility.
  - Violent and non-state actors could use nuclear weapons, dirty

> or not, to cause massive destruction and disruption to civilian life, which can spin out of control and lead to an all-out war.

> ▪ Air dominance, air superiority, strategic bombing and air bombing operations appear as concepts of a bygone era, proven false, as every country continues to upgrade its Air Force to become the dominant air power.

- China has achieved laser targeting of satellites to degrade command and control centres. Takes precedence when conducting computer-network operations.

- Precision attacks by fighter aircrafts are important to ensure air superiority. High-value aircraft assets and targeting of same will be commonplace in unconventional warfare.

- To defend against air threats:

  ▪ Countries need to be prepared by ensuring space-situation awareness in their territory and airspace. India needs to develop this technology ab initio.

  ▪ Strengthen strategic offensive capability by operationalising the BrahMos-II, the Nirbhay cruise missile with conventional warheads and the Shaurya as well as Sagarika missile systems.

- Emerging challenges for Air power:

  ▪ Increased reliance on information warfare, cyber attacks and electronic warfare to degrade the adversary's networks.

  ▪ Greater reliance on cruise missiles, short-range and medium-range ballistic missiles in the opening rounds of conflict.

  ▪ Use of state-sponsored terrorists to carry out attacks against our security forces (ongoing).

- The problem of inadequate missiles is met by the 'Arsenal Aim' concept. It envisages the use of vehicles (such as the C-130) to carry hundreds of missiles, which can be used to queue on to the stealth fighters. Will need to stay in friendly territory for fear of being targeted.

- Future can be said to consist of large stealthy UAVs carrying a large number of missiles and programmed by the USAF.

- Sixth-Generation fighters can be considered an alternative to the problem of inadequate missiles and fighters. Sixth-Generation

fighter technologies have been listed in Air Superiority 2030, a study carried out by the USAF. Main intention is to achieve air dominance by 2030.

- Threats to space-based assets: Kinetic energy weapons, directed energy weapons, laser capabilities, Satellite communications and satellite navigationjamming, space debris (man-made and natural). India needs to build up its space service capabilities.

- Future concepts: Usage of swarms of UAVs, from surveillance to disruption to conducting functional kills. Especially useful if the swarms are capable of travelling at hypersonic speeds, giving them better opportunities to combat and kill enemy aircraft. Combining AI into the swarms will enable them to accurately identify the person controlling the enemy swarm and thus neutralise the enemy without completely destroying the aircraft.

- Hypersonic Strike Aircraft: Example is China's hypersonic glide vehicle, giving China the capability to hit any target in the world within an hour.

- Russia is exploring Plasma Stealth (plasma generators on the wings of the aircraft, generating a bubble of air, covering the entire aircraft). Can be used on both stealth and conventional fighters and will ensure that radar does not detect the fighter.

- Making UAVs in laboratories from a molecular level using chemical processes or Chem-Computers.

Maritime Warfare in Indian Context: Is a Paradigm Shift the Need of the Future

There is near unanimity that the strategic Centre of Gravity is the Communist Party of China. However, their operational Centre of Gravity is considered to be her dependence on external merchandise trade. Chinese reliance on sea-based trade, despite many of its exports coming inland, is due to the ease of transportation. Routes such as Malacca Straits, Cape of Good Hopeand so forth, are the lynchpins to China's strategic well-being.

Future operational and tactical environment will be defined by a Mature Precision-Strike Regime. Will involve next-generation weaponry and give land-based armies the capability to target and strike naval targets.

CONCEPT NOTE

Warfare:An Examination

War is not merely a political act but a real political instrument, a continuation of political intercourse, a carrying out of the same by other means.

— Clausewitz

Politics is centred on national interests, which revolve around national security, economic prosperity and values, finally resulting in the security of the nation. Politics, therefore, gives rise to diverse strategies of statecraft, which may be a mix of actions of diplomacy, ideological, economic and fundamental values, with employment of the traditional instrument of hard power, the military at an appropriate time. War by nature is violent, and as a choice, is a last resort because of its destructive nature. The nature of war has remained violent for centuries; however, it is now on the cusp of further expanding its range and destructive power.

Clausewitz further defined war as an activity within the trinity of reason, violence and chance. By combining the instrument of politics with the instrument of violence, it can be premised that the changing character of world politics will inevitably entail a change in the character of warfare.

Offence and defence have been the two fundamentals of warfare. All doctrines, strategies, concepts and forms have been crafted in relation to and in support of these fundamentals. An important element in the change is technology, now referred to as Revolution in Military Affairs.

Evolution of Modern Warfare

World War II ended with the use of nuclear weapons, the spectrum of conflict thus expanded to total war. The spectrum thus ranged from LIC at the lower end to Nuclear War at the higher end. Post-World War II, conventional war and LIC as manifestation of the Cold War existed

parallelly in different parts of the world. Chemical and biological agents continued their presence in the conflict spectrum—while these have been banned by most nations, some are still not signatories to the conventions. Nuclear deterrence prevented nuclear conflicts, but on the other hand, conventional wars, LIC and terrorism continued in smaller measure. Further, terrorism has become the scourge of the 21st century, morphing into many forms of suicide bombings and lone wolf attacks. Limited wars in the conventional domain continue to be a possibility where disputes of territorial nature or ideological differences persist. Unbridled proliferation of dual-purpose technologies and concepts into the hands of violent non-state actors will make the future conflict more complex.

Today, the spectrum of war has been further subdivided by new strategies and technological means at the disposal of protagonists, the lower and middle segments have seen the inclusion of terrorism, asymmetric warfare, hybrid warfare and cyber and space, to cite a few examples.

Hybrid war uses a combination of military and non-military means, including the use of Special Forces, media and psychological war. Adversaries in the present and future warfare will come in different hues, visible and invisible. The unprecedented access afforded by global media, with their projection into the 'citizens living rooms' through Television screens, will increase the significance of perception management which is so integral to hybrid warfare.

As for conventional warfare, its basic forms, manoeuvre warfare and attrition warfare have taken many new shapes over the centuries. From these came various military doctrines and strategies: 'expanding torrent', blitzkrieg, Maginot Line, Fortress Nodal Point Defence, Fighting In Built-Up Areas, Fight Follow on Forces, Air-land Battle, Sea-Air Battle, Cold Start Doctrine, to name a few.

It also needs mention that Special Forces are playing an increasing role in warfare. Special Forces are strategic assets for a strategic effect. Their integration with the conventional military is transforming the way conflicts are being undertaken. Further, the likelihood of employing Special Forces in covert role to gain exponential dividends makes them a potent and powerful force to gain exponential results.

Impact of Technology

Precision weapons are changing the very concept of engagement of targets in a battlefield, leading to need for change of tactics, operational art and strategy. Development in time compression and speed will soon have battles that would be fought employing platforms such as hypersonic vehicles and missiles without having to actually go into the tactical battlespace. Prompt global strikes (PGS) is now the new normal, with attendant challenges, how and what—the implications need evaluation.

Space and Cyber

Space and cyber warfare have added new dimensions by making war real time and distantly controlled while eliminating collateral damage to achieve desired results.

Space-based assets have become pivotal to strategic security and play an essential role in conduct of future military operations. Leading spacefaring nations of the world have described space as the fourth dimension of warfare and are integrating space-based assets in their concept of operations. Therefore, capability development in the space arena is becoming critical in prosecuting future wars.

Cyber warfare will invariably form an essential component of every scheme of future conflicts, where operations are likely to be intensely net-centric. Cyber terrorism is seen as a much safer, low cost and easily operable option, which can be implemented from any part of the globe making it more lethal and destructive, thus necessitating strong countermeasures. Cyber warfare is in a continuum and is detached from conflict timelines; hence, response measures have to be suitably instituted. Non-contact war has been given a fillip by technology.

Maritime and Air

The Navy's doctrine strategy of sea control or sea denial in the Indian Ocean is being challenged with the power projection capability of adversaries; hence, it needs further evaluation in that context. The creation of a blue-water navy from a brown-water force is under serious consideration. Capability of sea forces to project their power 'forward from the sea' by virtue of four modern attributes, namely, aircraft carriers, precision missiles, long-range

guns and amphibious forces will continue to dominate the future of naval warfare.

Airpower has evolved from support force to power projection forces—the 1967 Arab-Israel war and Bangladesh operations demonstrated the power of air, if used imaginatively. Air dominance, air superiority, strategic bombing and airborne operations appear as concepts of a bygone era. How will use of air power evolve and provide greater value in the future—based on precision firepower, stealth and lethality—to shape the battlefield in conventional wars, irregular wars and counterterrorism. The role of air power in intelligence gathering, target acquisition, surveillance, reconnaissance, logistics and selective precision engagement requires fresh assessment. Armed drones will obviously find a prominent place in the airpower doctrines of the future, taking a lead from the US Central Intelligence Agency's successful use of this remotely controlled means of intimidation and distant targeting with a light footprint that has changed the face of warfare.

Further, airborne operations are entering a new phase with stealth technology. Combined with covert operations they would have potential as force multipliers, especially for secret operations.

Objective of the Seminar

Today, we aim to analyse, discuss and seek views from experts on future trends in warfare and the broad contours of conflict spectrum and how we prepare for the same.

Conduct of Seminar

The seminar seeks views from experts on future trends in warfare and the broad contours of conflict spectrum. The issues for discussion are:

- Trends in security environment.
- Future contours of warfare.
- Characteristics of war—likely to change or modify.
- Spectrum of war and its further subdivision.
- Technology and its Impact on warfare.
- Hybrid warfare.

- Cyber warfare.
- Nuclear warfare.
- New doctrines and strategies in Mountains, Plains / Desert.
- Future of airborne operations.
- Employment of Firepower for strategic roles.
- Air and Maritime Warfare and future dimensions.

Programme

The proposed programme and session details are attached separately.

Participants

The participants will be from the three services, strategic community, veterans, academia and media.

Venue

Ashoka Hall, Manekshaw Centre, Delhi Cantonment, New Delhi.

Seminar Coordinator

The coordinator for the seminar is Colonel Akhilesh Kumar, whose e-mail address isakhileshk854@gmail.com and contact number is 9811685877.

PROGRAMME

0930–1000h	Tea and registration
1000–1035h	**Inaugural Session**
1000–1005h	Welcome remarks by Lt Gen BS Nagal, PVSM, AVSM, SM (Retired), Director, CLAWS.
1005–1035h	Keynote address by Gen Bipin Rawat, UYSM, AVSM, YSM, SM, VSM, ADC, COAS.
1035–1215h	**Session I: Future Contours of Warfare**
1035–1045h	Opening Remarks by Chair : Lt Gen AK Singh, PVSM, AVSM, SM, VSM (Retired)
1045–1115h	Security Environment of the Future and Changing Character of Warfare by Dr Manoj Joshi
1115–1145h	Impact of Technology on Warfare (AI, Robotics, etc.), Trends in Nuclear Deterrence and Space Warfare by Professor Bharat Karnad
1145–1215h	Interactive Session including Closing Remarks by Chair
1215–1230h	Tea Break
1230–1400h	**Session II: Changing Character of Land Warfare**
1230–1240h	Opening Remarks by Chair : Lt Gen Philip Campose, PVSM, AVSM**, VSM (Retired)
1240–1310h	Operations in Mountains, Special Operations, Counterterror Operations: Challenges and Solutions by Lt Gen DS Hooda, PVSM, UYSM, AVSM, VSM** (Retired)
1310–1340h	New Strategy and Doctrine for Warfare (Manoeuvre, Attritional and LIC) by Lt Gen Rakesh Sharma, PVSM, UYSM, AVSM, VSM (Retired)
1340–1400h	Interactive Session and Closing Remarks by the Chair
1400–1445h	Lunch
1445–1625h	**Session III : Future Warfare in the Field of Air, Maritime, Cyber and Fire Power**
1445–1455h	Opening Remarks by Chair: Commodore C Uday Bhaskar (Retired)
1455–1515h	Role of Cyber Warfare and Firepower in Future Warfare by Lt Gen Arun Kumar Sahni, PVSM, UYSM, SM, VSM (Retired)

1515–1535h	New Concepts in Air Warfare, Airborne and Heliborne Operations in Indian Context by Air Marshal KK Nohwar, PVSM, VM (Retired)
1535–1555h	Maritime Warfare in Indian Context: Is a Paradigm Shift the need of the Future by Vice Admiral Pradeep Chauhan, AVSM**, VSM (Retired)
1555–1625h	Interactive Session including Summing Up by the Chair
1625–1630h	Vote of thanks by Lt Gen BS Nagal, PVSM, AVSM, SM (Retired), Director, CLAWS
1630h	Tea and Dispersal