



Centre for Air Power Studies (CAPS)

Forum for National Security Studies (FNSS)

13th SUBROTO MUKHERJEE SEMINAR Air Power in the Changing Geo-Political Environment

November 03-04, 2016

Day 1: November 03, 2016

Inaugural Session

Air Mshl Vinod Patney, SYSM PVSM AVSM VrC (Retd), Director General, CAPS while welcoming all present to the 13th SM Seminar, expressed his satisfaction over the fact that the Government had taken notice of the discussions held on the subject of “Make in India” during the conference with CII on Energising Indian Aerospace Industry. He expressed concern over the threats that the nation faces due to terrorism and the need for Cyber Security. Strategic agility is one of the major attributes of Air Power and the need to integrate cyber, space and air-operations cannot be over emphasised. In the Inaugural Address, Air Mshl S B Deo PVSM AVSM VM VSM, AOC-in-C, Western Air Command, acknowledged the contribution of CAPS as an important component in helping to decide how air power is applied. Speaking on strategic agility he said that we should draw lessons from how air power has been used in the subcontinent and in the middle-east.

SESSION-1: GEOPOLITICAL DYNAMICS : IMPLICATIONS FOR INDIA

Chairperson: Shri Kanwal Sibal (Former Foreign Secretary)

The Chair highlighted three regional geopolitical developments which will affect India in the near future: Russia's relationship with Pakistan; strengthening of Russia-China relationship; and the ambiguous stand of the US towards the Pak-China nexus.

INDO-US RELATIONS: WHAT'S DRIVING THE CHANGE

Ms Meera Shankar (Former Ambassador to USA)

End of the cold war, and the opening up of the Indian economy have influenced India-US relations in the recent past. The nuclear deal of 2008 opened the way to cooperation in civil nuclear energy and addressed the issues which had constrained relations in the past. Defence, security and economy are other factors steering India-US relationship today. The mutual interests are converging in the Asia-Pacific region where China's growing assertiveness is a concern. That said, importance of the US-China relationship cannot be underestimated. While we develop stronger ties with US, we must also strive to strengthen relations with other countries of the region: Japan, Australia and Vietnam etc. and build own capabilities for the future. Indian American community is serving as a bridge between the two countries. However, views differ on handling of situations in Afghanistan, the Middle-east, West Asia and the unsettled situations in Iraq and Syria. Those differences do not affect the relationship adversely.

INDO-RUSSIAN TIES: WHAT WILL KEEP US FRIENDS?

Shri Ajai Malhotra (Former Ambassador to Russia)

The speaker presented his argument in two parts: The first part dealt with the worldwide geopolitical situation with respect to Russia. The second part focussed on India-Russia relations. Russia's extreme concerns are: NATO (its eastward expansion) and the US support to Georgia (and now to Ukraine). The worsening ties with the US suggest brewing of a new cold war. Sanctions against Russia since 2014 have drawn Russia closer to China. Notwithstanding the fact that China has overtaken Russia as USA's prospective challenger for pre-eminence, the US is set to maintain its importance for the next few decades.

Resolved border issue has enabled Russia-China to pursue broader strategic concerns. China does not want to sacrifice its self-interests in return for closer ties with Russia. India's relations with Russia have been a pillar of its foreign policy; the two remain strategic partners. There is a political consensus on friendly ties in both the countries across the party lines. The two do not perceive a threat from each other in the strategic sense. In fact they seek to draw benefit from each other in the domain of defence and economy. India's closeness with US (and others, like Japan and Australia) will not be at the cost of Russia. There is a need to strengthen ties and to continue to collaborate and cooperate in the fields of economy, defence, cyber security, oil and gas and nuclear energy. Importantly, much meaning must not be attached to the recent Russia-Pakistan military exercises. India too has been carrying out similar exercises with various countries like China, US etc. But we must draw the line and pass on the message to Russia that continuous cooperation with Pakistan should not be at the cost of India.

SINO-INDIAN RELATIONS: HOSTAGE TO HISTORY

Shri Jayadeva Ranade, President, Centre for China Analysis and Strategy

China today is India's biggest challenge in terms of territorial security, global national issues and our environmental resources. Today, when we look at India-China relationship, we see that new dynamics are coming into play. Rather, it is a new great game that China has started and which is changing the realities in our neighbourhood. If we see India-China relations in this backdrop and the actions that China has been taking in the last one or one and a half years, the bilateral relationship is at a critical stage. The decisions and events of the next 2-5 years could mark a new phase in the relationship, which could go either way. Some issues that need to be flagged are China's treatment of the US as a power in decline and China's high morale and assertiveness due to its rise militarily and economically. China's One Belt One Road (OBOR) initiative is being assessed as a big win for China. It links China's production centres to the natural resource centres around the world. It will enable China to rival the US on global issues. China-Pakistan Economic Corridor (CPEC) has direct implications for India. It is a strategic move which is pushing the Chinese military envelope closer to India. China has linked the settlement of India-Pakistan border in

Kashmir with settlement of their own border issue with India. China has blocked India's NSG membership bid because China does not want India to be a part of another International forum which would raise India's profile. China supports to Pakistan is well known. Creation of the west zone as part of the recent Chinese military reforms (comprising almost one third of the PLA) has a distinct pro-Pakistan tilt. The area of operations of this military zone comprises Afghanistan, Pakistan and the Central Asian Republics. The Indian Prime Minister's remark on Balochistan has put into jeopardy the CPEC and has made the Chinese concerned about the situation in Balochistan. China cannot achieve the OBOR and CPEC unilaterally without India's help. India is unwilling to be a party to the CPEC. This gives us scope to manoeuvre. The relationship between India and China is at a cusp and could go either way

Session II: Peering into the Future

***Chairman: Air Marshal Vinod Patney SYSM PVSM AVSM VrC (Retd),
Director General, CAPS***

FUTURE OF MANNED AIR COMBAT

**General Gary North, VP, Customer Requirements, Lockheed Martin
Aeronautics**

UAVs are less popular in the armed forces. It will be sometime before they could be trusted with transportation of humans or other high value cargo. While they are being used for tactical strikes, launch of missiles from UAVs is still far in the future. It is possible to have integration of air-to-air manned and unmanned aircraft working side by side. In future, integrated operations between unmanned and piloted air combat vehicles will be possible. Open system architecture is the key to achieve such integration in the future. Artificial intelligence and human augmentation will enable such processes. The future of manned aviation still stands tall. Man cannot separate himself from the battle space. There is a certain glory, pride and honour in doing the job and leaving them to machines is something impractical and dangerous. Balance between mission, task and risk must be worked out Warfare cannot be effectively dealt with by "machines", including in the air.

FUTURE OF NUCLEAR DETERRENCE STRATEGIES

Dr. Manpreet Sethi, Senior Fellow, CAPS

The future of nuclear deterrence strategies is relevant in today's time owing to the implications it will have for the next 15 – 25 years in order to realise political forecasts and technological developments. After the end of the Cold War Nuclear weapons remain a form of “insurance” The prevailing international political climate and several other factors have resulted in President Obama not being able to fulfil his commitments to nuclear weapons free world (NFWF). The nuclear-deterrent situation in the future will be extremely complex in a world where simultaneous capabilities are being developed and enhanced. The lack of uniformity brings a complexity and leads to brinkmanship appearing as the new norm as part of several countries' nuclear strategy. Russia now mixes its nuclear issues with other political issues. Since 2001, defence has got mixed with nuclear deterrence, thereby increasing instability in the nuclear field. Nuclear deterrence rests on modern systems. The future will see leaner but meaner arsenals in the nuclear space. There are plans for replacement of nuclear weapons in US, UK Russia and France with further build up and new delivery systems in countries such as Russia, China, India, Pakistan and DPRK. Improved navigation and accuracy with integration of sensors, receivers, satellite positioning and tracking systems do make experts in the nuclear field question whether the weaponisation of space will actually come about. Nuclear deterrence will face cyber challenges in the future. Nuclear deterrence has become more complicated with new technologies. There has been a blurring of lines between conventional and nuclear weapons which needs to be prevented effectively. There has been a downturn in US-Russia bilateral negotiations and no such relationship exists among India-China or India-Pak due to absence of trust or confidence. No major multilateral nuclear-arms control is likely in the near future. India must continue investing in building credible nuclear deterrence and remaining loyal to its doctrine. Further, investment in research and development for new technologies and insistence on strategic stability through talks or various other platforms is imperative for India to reverse the blurring of lines between conventional and nuclear weapons.

Session III: Technology – Essential Enabler for the Path Ahead

Chairman: Air Marshal NV Tyagi PVSM AVSM VM VSM (Retd), Former Deputy Chief of Air Staff and Distinguished Fellow, CAPS

ENGINE POWER – WHERE WILL IT COME FROM IN THE FUTURE?

Conrad Banks, Chief Engineer, Future Programmes, Rolls-Royce

It is important to know whether the plateau of technology has been reached, and what the next game changers are. In the field of unmanned platforms there is still a capability gap. The gas turbine which is power dense, dominates the combat platform as opposed to the battery capability. The world is never going to fully depend on battery run machines, especially in the combat arena. Thus, gas turbines will continue to dominate the combat platform. It can thus be said that the aerospace electric revolution has begun. The Embedded Starter Generator (ESG) and the X-Plane are a few of the recent advances that have led to this transformation. Further, distributed propulsion is going to be at the front of future aircraft (not necessarily combat but transport aircraft for sure). These are some of the “game changers” in the future of air engine power. Others that are likely to follow are open rotors, pressure gain combustion, variable cycles etc that are to be introduced in the future. India needs to engage in cooperation and collaboration efforts.

CHALLENGES & SOLUTIONS: MODERN ISR CONCEPT OF OPS & TECH

Col (Res) Zvi Stessel Rafael Industries, Israel

In the effort to develop capability for effective identification of one’s adversary, air defence proves to be one of the best techniques. Essentially, this would involve components starting from an airborne pod with the versatile capability to penetrate the atmosphere. Further, the resolution of imagery cannot be compromised at any cost. This means not only vertical resolution but standoff capability as well. This is important because an air borne pod cannot always cross a certain border due to political reasons or territorial limitations. Also, the airborne pod may not want to reveal the area it is targeting and thus wider range would enable the concealment of such information. Lastly, resolution is important so as not

to compromise the image when zoomed in. Real time communication is an important component of the air borne system. The capability to decipher and filter out only relevant information up into the pod effectively and quickly can only be done through real time communication, which is undetected and uninterrupted. Information can further be integrated with an ISR cloud, allowing upload and download of data. This cloud would be accessible by analysts who could operate from their respective mobile units. Removal of human analysts with machines, seems almost impossible as nothing can replace the accuracy and spontaneity of a human mind.

LIFE SUPPORT FOR A MARS MISSION

Gp Capt Vipin Sharma, Chief Research Officer, Institute of Aviation

Medicine

USA, Russia and China have achieved manned space programs, while India has just begun through ISRO's Plan Progression. Indian space development has had experience with satellites, launch vehicles, missions and indigenous development. Mars has an extremely inhospitable environment with a thin atmosphere composed of carbon dioxide and nitrogen, argon, neon, oxygen and small amounts of water vapour and methane. No life forms have been discovered on the planet and the average temperature is 55 degrees Celsius. Mars has been chosen for a mission because it contains fundamental materials for life (water, oxygen, nitrogen and carbon) and its evolution is comparable to that of Earth. India's efforts towards a Mars mission through Mangalyaan seem to be the most cost effective. This can thus be the next giant step for mankind but not necessarily the most peaceful step, due to which it has to be heavily supported by technology. The effects on the human being in Mars are not only worrisome but also prove the extent of technology and training required for the same. The main causes of concern for human health are the cardiovascular effects, red blood cells and bone and calcium metabolism which makes it advisable to have a doctor amongst the crew sent on a mission. Solutions for radiation exposure can only come from technology as no amount of training would help reduce the risks. Thus, effective contingency plans need to be devised for a mission such as this, along with investment in knowledge acquisition, conceptualisation and execution. Currently,

simulators such as the head down tilt, water immersion and parabolic flight are available but more are needed.

Day-2: November 4, 2016

Session-IV: Training for the Future Environment

Chairman: Air Marshal KK Nohwar PVSM VM (Retd), ADG, CAPS.

TRAINING FOR NEXT GENERATION WARFARE

Air Marshal Ramesh Rai VM (Retd) Former AOC-in-C, Training Command

Conflict is non-conventional and irregular when the enemy is a non-state actor; which primarily refers to armed militants or terrorist organisations. In order to secure victory in a non-conventional conflict, manoeuvring is the key since, for the non-state actor, there is only one dimension to this type of conflict, i.e., the military dimension. However, for the state actor there are various dimensions that are notable; namely, the military, economic, diplomatic and political. The future conflicts will have unrestricted warfare, which will include the use of all means of weaponry and war techniques such as guerrilla, ecological, financial, trade and psychological warfare. The formation of a complex battle space will require specialized training for those wishing to enter it. The future training trajectories will have a 'whole nation' approach and they will include techniques to counter terrorism, insurgency and guerrilla tactics. Conventional warfare requires a redefinition, as it is no longer limited to land, marine time or air. Conventional warfare, has spread to other fields such as space and cyberspace. Due to this expansion, the future-training trajectories will include network-enabled operations, drone warfare, 5th Gen systems, and fly and fight in cyber space.

MODERN SYSTEMS FOR COST EFFECTIVE FLYING TRAINING

Air Cmde Ashit Mehta (Retd) BAE Systems India

Network-enabled Operations are the future of any kind of warfare and they are thus an inescapable tool for war fighting in which success or failure will depend on networking

and training. Future warfare will be dependent on unmanned systems. Training would be done as a part of the networking force, which will result in the growth of the combined arms employment concept. Airpower's role in a networked environment will need to conceptualise the concept of employment as a fighter. There is a need for development of a Live Virtual Construct environment which is an advanced learning environment wherein live, virtual and constructed simulation is integrated into one mix. Cyber space is a new domain. It is the key component of future warfare along with other domains coordinated and integrated. We have to learn the cyber conditions, operations, threats and vulnerabilities to build a cyber warfare loop. Cyber space comprises of spectrum and data and it serves the digital data, information, knowledge and networking. It is unique and it has its own peculiarities like distance and time etc. Hence, it is essential to learn to control the cyber space domain in order to protect our own data and information flow over internet networks.

Closing Session

In his valedictory address, Air Mshl NJS Dhillon AVSM, SASO HQ WAC lauded the effort of CAPS in spreading awareness on Aerospace issues. He congratulated the Centre for the efficient conduct of the Seminar. Air Mshl V Patney SYSM PVSM AVSM VrC (Retd), DG CAPS, thanked the speakers and the participants.
