www.dsalert.org
Committed To Defence And Security Worldwide
info@dsalert.org

DEFENCE AND SECURITY ALERT

SAARC COUNTRIES : US$ 20
REST OF THE WORLD : US$ 25
February 2014

INDIA : ₹ 120
VOLUME 5 ISSUE 5

The First and The Only ISO 9001:2008 Certified Defence and Security Magazine in India

DSA™

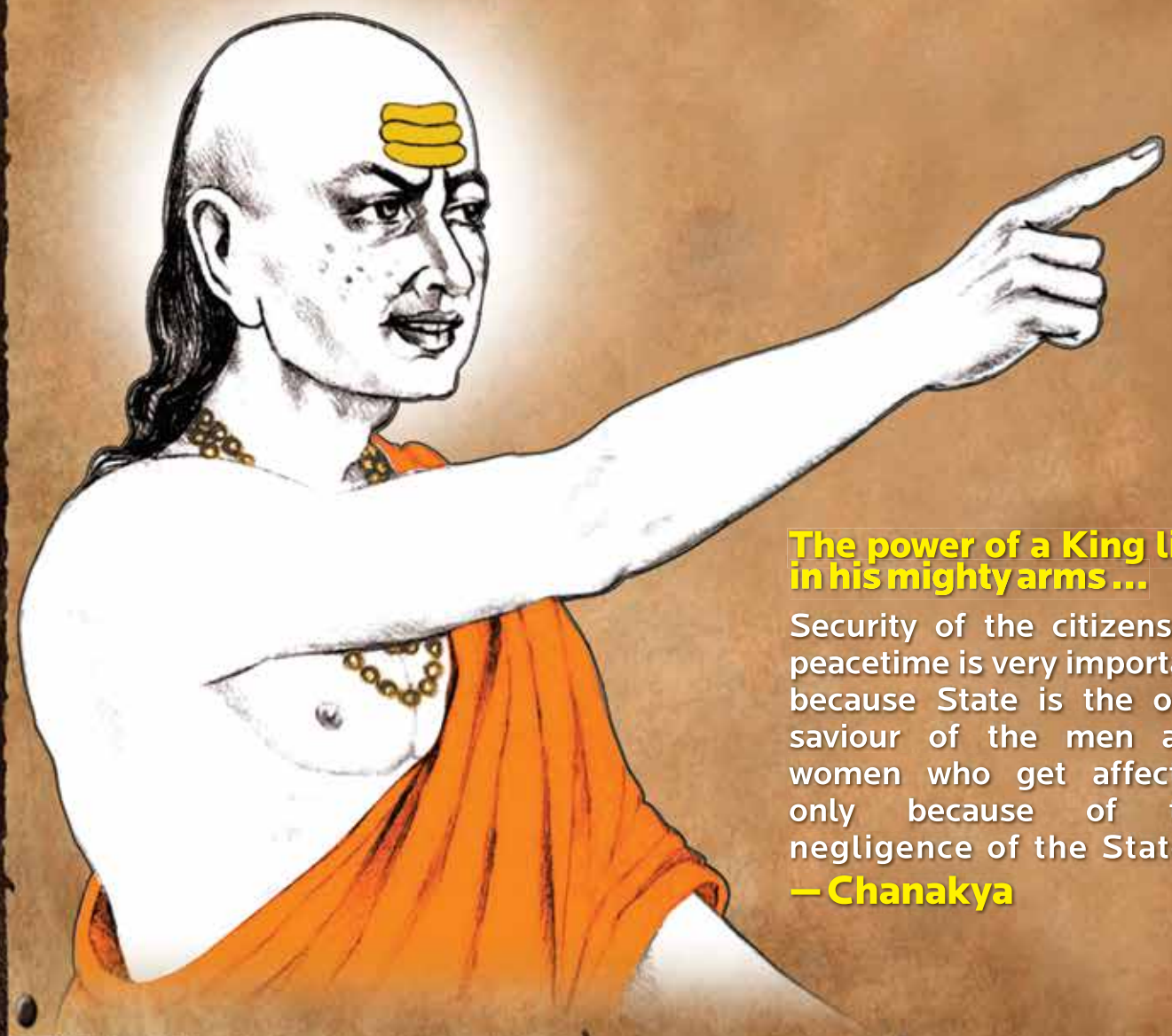
ISSN 0976-206X

THE ONLY INDIAN DEFENCE AND SECURITY MAGAZINE
AVAILABLE ON INDIAN AIR FORCE (IAF) INTRANET

INDIA'S DWINDLING ARSENAL AND DEFENCE PREPAREDNESS

THE LATEST WEAPONRY
IN DEFENCE AND SECURITY

DSA™ MISSION



The power of a King lies in his mighty arms...

Security of the citizens at peacetime is very important because State is the only saviour of the men and women who get affected only because of the negligence of the State.

—Chanakya



DSA is as much yours, as it is ours!

India's management of its defence forces has generally been poor over the decades. Its management of the Ministry of Defence has also been pathetic. So much so that the management style can hardly be called anything but babu raj. Ministers have tended to outsource authority to the part time defence specialists. Thus adversely affecting civilian-military relations. The resentment brewing in the armed forces against the civilians is palpable. That is until the military officer gets a posting in his or her headquarter in the Ministry of Defence. For then it is apparent that that failing is not entirely of the civilian bureaucracy alone, but that its military counterpart is equally culpable for the sorry state of affairs. Some ministers had the vision and the gumption to take both bulls by the horns and steer a new course in defence management. But their tenures proved to be too short lived to provide a new direction. The latest opportunity befell the unimpeachable AK Antony and that too for the longest possible time.

Raksha Mantri AK Antony will be remembered for two things. He will, firstly, have provided quite possibly the longest tenure of anyone occupying that office in the east corner of South Block. Few individuals are fortunate enough to hold executive office in the government of India for a duration as long as he has had. It reflects on the confidence that his two party bosses bestow upon him. Which is why it is a pity that he also has to be remembered for the second issue. And which is that he will remain on record for bringing decision-making to a standstill in the Ministry of Defence. In all these years in office there is not one decision taken by him that can be called *his* in terms of intellectual property rights. If he did stick his neck to take a decision it was only on the matter of year of birth of former Chief of Army Staff, Gen VK Singh. Other than that there has not been one instance of new thinking, innovative planning or some such thing.

In the meantime there have been a number of scandals and issues being brushed under the carpet. The latest in the series being the Agusta VIP helicopter matter. Even as the controversy snowballed and investigations launched, the Ministry decided to stick its head into the sand. It simply cancelled the agreement, after receiving three aircraft and paying a lot of the money. Who will service the aircraft now and how will the extra money paid be returned? A simple cost-benefit analysis of the decision to cancel suggests that India remains the loser. It lost money because of bribes paid and now it will continue to lose money. This has become part of a pattern in defence management of the country. Even as the numerous CBI investigations come to naught the enhancement of India's defence capabilities comes to a standstill.

There is no better example than what has happened to the Artillery modernisation programme. It remains a programme only on paper, while there is no hope for modernisation and the Artillery remains a neglected arm. The blacklisting of *Bofors* began the process of setting precedence and since then it has been followed ad nauseam. Every time there is a trial process all it takes to derail the selection is to make a complaint of irregularity, have a breaking news story and lo and behold the deed is done. India can wait for its guns to be upgraded, its capability enhanced and its security strengthened. The scandal that gripped the Artillery modernisation programme spread into the other arms and defence services as well.

The up gunning of the Infantry soldier remains one of the most neglected aspects of military planning. He is the most vital component of combat capability and yet remains the most ignored of all. On that score the service headquarter is as culpable as is the Ministry of Defence. For if the self does not feel the need to strengthen then the other will certainly not pay the bill. In the last decade the obsession with probity has ensured that bills may remain ignored. Even if it is at the cost of a dwindling arsenal.



Manvendra Singh

publisher's view

DSA
An ISO 9001:2008 Certified Magazine
Volume 5 Issue 5 February 2014

Chairman Shyam Sunder
Publisher and CEO Pawan Agrawal

Editor-in-chief Manvendra Singh

Director Shishir Bhushan
Corporate consultant KJ Singh

Art consultant
Divya Gupta
Central Saint Martins College Of Art & Design, University Of Arts, London

Business development
Shaifali Sachdeva
Corporate communications
Mamta Jain

Creative
Prem Singh Giri

Representative (USA)
Steve Melito
Representative (J and K)
Salil Sharma

Correspondent (Europe)
Dominika Cosic

Production
Dilshad and Dabeer

Webmaster
Sundar Rawat

IT operations
Mahendra Singh
Dhruv Bisht
Ankit Kumar

Photographer
Subhash

Circulation and distribution
Anup Kumar

E-mail: (first name)@dsalert.org
info: info@dsalert.org
articles: articles@dsalert.org
subscription: subscription@dsalert.org
online edition: online@dsalert.org
advertisement: advt@dsalert.org

Editorial and corporate office
4/19 Asaf Ali Road
New Delhi-110002 (India)
t: +91-011-23243999, 23287999, 9958382999
e: info@dsalert.org
www.dsalert.org

Disclaimer
All rights reserved. Reproduction and translation in any language in whole or in part by any means without permission from Defence and Security Alert is prohibited. Opinions expressed are those of the individual writers and do not necessarily reflect those of the publisher and / or editors. All disputes are subject to jurisdiction of Delhi Courts.

Defence and Security Alert is printed, published and owned by Pawan Agrawal and printed at Graphic World, 1686, Kucha Dakhini Rai, Darya Ganj, New Delhi-110002 and published at 4/19 Asaf Ali Road, New Delhi (India). Editor: Manvendra Singh



A Stitch In Time Saves Nine

The English proverb "A stitch in time saves nine" learnt in school ironically resonates with and mocks the current scenario of India's dwindling arsenal and defence preparedness. The Indian Republic turns 65 this year and it's still difficult to comprehend why our previous and current governments have failed to learn a lesson from this proverb and work on the commiserable condition of the armed forces and defence preparedness. Did our freedom fighters ever envisage a situation where personal lives of national leaders would be more important than issues of National Security?

Right after independence, Pakistani troops dressed like tribesmen of the North West Frontier Province attempted to wrest the Muslim majority areas of Jammu and Kashmir to supposedly bolster the pernicious concept of the "two-nation theory" based on religion. Kargil War in 1999 was a continuation of their agenda of "unfinished business of partition". Peace loving India has always strived to maintain cordial relations with neighbours whereas Pakistan has been instigating trouble by indulging in a non-stop proxy war to destabilise India by organising terrorist camps in their occupied Indian territories and cross border operations.

The most important lesson our war with China taught us was to be prepared for such attempts in future. Even though there has been a metamorphosis in the geopolitics of the Indian region, the second decade of this millennium is confronted by a very real possibility of war propelled by China and Pakistan acting in collusion across two fronts and the massive use of Jihadi terrorists as the first echelon of invasion. The situation impels India to think multi-dimensionally on defence issues and successive governments since 1999 have been remiss in preparing for the next, increasingly possible, war by inimical neighbours bent on hegemony and encirclement.

We claim we love our Motherland despite the fact that our artillery and infantry formation – the bedrock of modern warfare – and supply chain have blemished and run downhill during the last 14 years! How can we ignore important aspects of national defence and security? We at ***DSA*** believe that it is high time India constitutes an empowered committee consisting of all current and selected retired officers from the armed forces to evaluate the deficiencies in defence preparedness. A priority list of military requirements needs to be carefully articulated and acquisitions accelerated. We have been victims of our own attempts to appear clean in the face of concerted attempts by foreigners and their Indian agents to vitiate the military acquisition process through kickbacks.

Politicians have played a retro role in the acquisition process by brutally transforming contracts into scams over the past 20 years even after it was proved that the *Bofors* howitzer was a good weapon during the Kargil War. Creation of a viable military industrial complex has been hampered by an obscure FDI Policy in defence production and the inability of DRDO to at least meet the demands of major weapons indigenously. Modernisation of state police forces needs immediate attention to enhance grass roots defence in insurgency and counter-terror situations. The central government had created a scheme in 2003-2004 to help improve police establishments in the states. What have those entrusted with this important assignment done over the past nine years?

This February edition of ***DSA*** reinforces the thoughts of experts who have been leading various defence and security forces at senior levels during their tenures in office. I am sure that the content herein will be sufficiently thought-provoking to stir and shake-up the policy and decision-makers in defence and security establishment to break with the past and without losing any more time hasten the acquisition process and modernisation of the Indian defence and security forces.

Jai Hind!

Pawan Agrawal

new initiative

DSA DIALOGUE
IDEAS THAT UNITE!
An initiative of *DSA*

Mission: ***Vasudhaiva Kutumbakam:*** To endeavour to create "one world – one family"
Maha Upanishad Chapter 6, Verse 72

Vision: To offer a global interactive platform for dialogue, debate and discussion to avoid confusion, contention and conflict for a safe and secure world of peace, harmony and prosperity.

The appreciation and applauds received from the readers of Defence and Security Alert magazine from around the world have inspired the conception of **"*DSA Dialogue*"**, an online interactive platform with the objective to develop a community which influences change and is value packed with analyses on paradigm shifts in defence, security, safety, surveillance and international relations. We envision ***DSA Dialogue*** as the most sought after forum for the defence, police and paramilitary forces, coast guards, intelligence agencies, corporates, think tanks, defence and security industry, airlines, hotels, critical infrastructure and establishments in India and around the world. ***DSA Dialogue*** is a daily pulpit to share your knowledge by discussing topics which resonate with global scenarios in defence, security and international relations.

DSA DIALOGUE Focus Areas

- Airlines
- Banking and insurance
- Border security
- Corruption
- Cyber terrorism
- Cyber security
- Defence budget
- Defence forces
- Defence industry
- Defence policies
- Drugs and human trafficking
- Education
- Environment
- Entrepreneurship
- Finance
- Food
- Fundamentalism and jihad
- Future textiles
- Geopolitics
- Geostrategy
- Healthcare
- Hospitality industry
- Intelligence
- Insurgency
- Internal security
- Infrastructure
- Plants and establishments
- International relations
- Innovation
- Science and technology
- Laws and policy
- Maritime security
- Military affairs
- Migration
- Money laundering
- NATO
- Naxalism
- Politics
- Police reforms
- SCO
- Security budget
- Security and development
- Security forces
- Security industry
- Social and political discord
- Terrorism
- Others

We invite experts and analysts from the entire spectrum of 'defence', 'security' and 'international relations' to initiate enthusiastic conversations and discussions that generate new ideas, unlock hidden insights, create an engrossing outlet of thoughts and make a difference for creating a more aware, safe and secure world for all of us and our coming generations. ***DSA Dialogue*** is a great way to get feedback on an idea that you want to develop further. Having a different view and some constructive criticism is invaluable in building a global recognition for your novel idea or unique perspective.

To know more please visit: www.dsalert.org and start the dialogue now!

INDIA'S DWINDLING ARSENAL AND DEFENCE PREPAREDNESS

THE LATEST WEAPONRY IN DEFENCE AND SECURITY

SPECIAL ISSUE FEBRUARY 2014

ContentS

DSA™
An ISO 9001:2008 Certified Magazine
Volume 5 Issue 5 February 2014

ARTICLES

Modernisation Woes And Defence Preparedness — 12
Lt Gen BS Pawar PVSM, AVSM (Retd)

India's Defence Preparedness World-class Infrastructure And Manufacturing — 20
Commodore Ranjit B Rai (Retd)

Depleting Air Assets: Time To Act — 24
Air Marshal Anil Chopra PVSM, AVSM, VM, VSM (Retd)

Does Indian Navy Need A Nuclear Powered Aircraft Carrier? — 28
Vice Admiral Arun Kumar Singh (Retd)

Urgent Procurement For Optimum Preparedness — 32
Brigadier Gurmeet Kanwal (Retd)

India's Missile Capability Significant Strides in 2013 — 36
Dr Manpreet Sethi

Small Arms Are No Small Matter — 40
Colonel US Rathore (Retd)

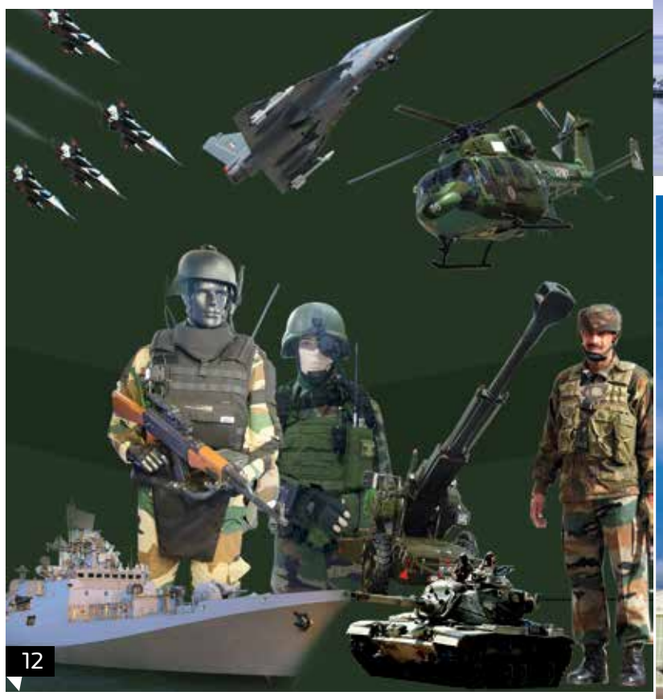
National Security 10-Point Agenda For New Government — 44
Brigadier Rahul Bhonsle (Retd)

Military Engines Perpetual Foreign Dependence — 47
Cecil Victor

Indian Navy Still Short Of Blue Water Status — 54
Cdr Sunil Chauhan (Retd)

Operation Enduring Freedom Cost-benefit Analysis — 58
Major General AK Hukku YSM (Retd)

Need for Indian Military Satellite — 62
Radhakrishna Rao







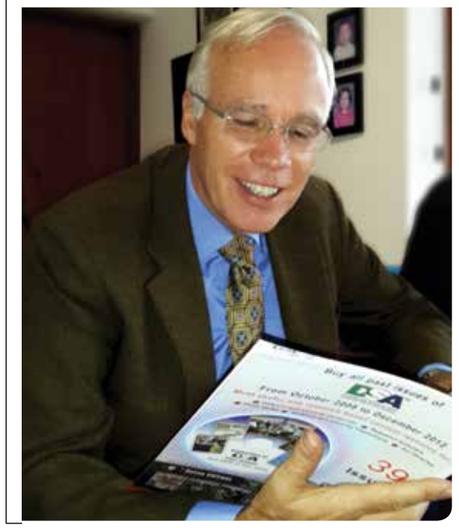




FEATURES

New Initiative By *DSA* — 3

EXCLUSIVE INTERVIEW — 6
The Norwegian Ambassador His Excellency Eivind S Homme



EXCLUSIVE INTERVIEW — 18
The Japanese Defence Attache Col Yoshifumi Inoue



Sneak Peek — 31

Dwindling Defence Capability — 50
Team *DSA*

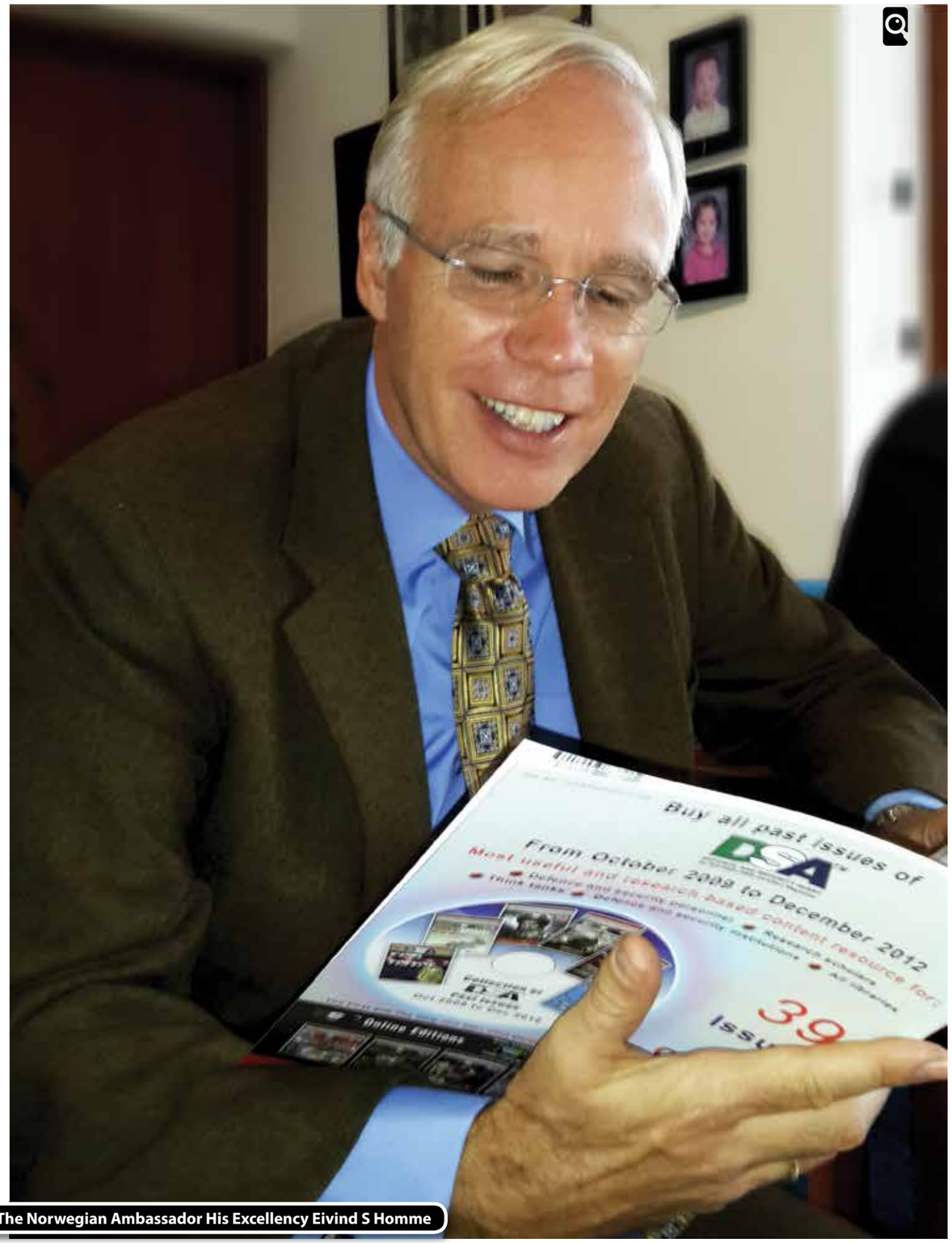
Get Connected — 67

Follow *DSA* on: facebook @dsalert

Follow *DSA* on: twitter @dsalert

For online edition log on to: www.dsalert.org

1. Download — Download the **Ocutag Snap** app from http://ocutagsnap.com
2. Snap — Look for the **Ocutag Snap** icon and snap anywhere on the image
3. Enjoy — Enjoy dynamic digital experiences!



The Norwegian Ambassador His Excellency Eivind S Homme

GROWING BILATERAL COOPERATION

Norway like India is a democracy and a market economy, based on the rule of law and respect for human rights. India and Norway are complimentary in political and economic aspirations and are therefore important partners. A partnership built on mutual interests and respect. In a wide-ranging and exclusive interview with *DSA* the Norwegian Ambassador His Excellency Eivind S Homme shares his views on the growing bilateral cooperation between India and Norway and emerging global and regional geopolitical and geostrategic scenarios.

Defence and Security Alert: **Since establishment of bilateral relations between India and Norway, both countries have enjoyed cordial, friendly and mutually rewarding association. Can you please encapsulate for *DSA* readers around the world how this relationship has developed and the interesting contours and milestones on the way.**

Eivind S Homme: Norway was among the very first countries to recognise the independent India, actually on Independence Day 1947. Our diplomatic relations date back to 1952 and our very first international development cooperation was within fisheries in Kerala in the 50's. Today India is among the leading global and regional leaders, a land of strong aspirations and of great opportunities. Norway wants to further expand our partnership as India rapidly is moving forward, to take part in and contribute towards this exciting journey.

Our bilateral military relations are still in early stages. Our point of departure for bilateral military cooperation is small, high quality military forces, as well as our NATO membership and experiences. We have like India a very long coastline and remain a seafaring nation with today the world's 5th largest merchant navy. We take pride in having one of the world's most modern and capable Navy and Coast Guard and here we should have an excellent



His Excellency Eivind S Homme admiring the latest issue of *DSA*

A future bilateral military cooperation programme will be developed gradually and could start with high level naval visits, participation in courses and exchange of lessons learned from maritime operations. The bilateral military cooperation could also include Army and Air Force and we have long been working together with India on UN peace keeping operations and excellent military equipment to offer

potential for cooperation. A future bilateral military cooperation programme will be developed gradually and could start with high level naval visits, participation in courses and exchange of lessons learned from maritime operations. The bilateral military cooperation could also include Army and Air Force and we have long been working together with India on UN peace keeping operations and excellent military equipment to offer.

***DSA*: India is one of the fastest growing economies and a leading regional power aspiring for a global role and Norway is an important member of EEA and NATO. What kind of synergies have developed between the two countries and which are the most significant areas of bilateral cooperation?**

Eivind S Homme: Norway is member of the European Economic Area (EEA) and as such we are part of the internal European market, even though we are not member of the European Union. Norway's economy is presently the 23rd world's largest. While India and Norway are different in many ways, we share fundamental values and perspectives. Just like India, Norway is a democracy and a market economy, based on the rule of law and respect for human rights. In my view India and Norway are complimentary in political and economic aspirations, therefore important partners. A partnership built on mutual interests and respect. Synergies are drawn from the fact that Norway is a capital rich country with limited manpower with an open economy. Thus, Norwegian investors seek to India with success, while India sends a number of highly skilled professionals to Norway as service providers in key sectors, not least with the IT and engineering. In addition to mutually beneficial commercial exchanges, we also have established comprehensive cooperation in higher education and research, besides valuable cultural exchanges.

***DSA*: The Norwegian Foreign Minister visited India in November 2013. What are the critical components of the Joint Commission sessions during the visit? Do we have a road map to guide our joint endeavours in the global arena?**

Eivind S Homme: The Joint Commission (JC) meets regularly at the level of Foreign Minister / Minister of External Affairs. While Minister of External Affairs Salman Khurshid paid a very successful visit to Norway in June last year, Norway's Minister of Foreign Affairs Børge Brende came to India last November, on one of his very first foreign visits after taking office in September. The next meeting of the Joint Commission is planned for later this year. We aim to make it a central platform for exchange of views and enhanced cooperation in international affairs. Our 8 Joint Working Groups (JWG) have in this regard proved to be productive within their respective sectors, as they offer concrete follow-up and with the private sector on both sides also being engaged. The Norwegian Government's India Strategy from 2009 enjoys broad support across the political spectrum in Norway and is as such our road map for our way forward.

***DSA*: We appreciate Norway extending its support to India's bid for a permanent seat in the UN Security Council. What are your views on the geopolitical and geostrategic scenarios developing in various parts of the world and what role can India and Norway play to encourage peaceful coexistence?**

Eivind S Homme: Norway was among the first countries to actively support India's bid for permanent membership of the United Nations Security Council. I believe that the strong growth and development we have witnessed in Asia, Africa and Latin-America over the past decade and the corresponding interdependence that comes with globalisation, are all making the world a better place. Our challenge is to manage this interdependence in order to maintain peace, development and respect for human rights. This will require that all countries accept that with increased power and influence come greater responsibility – in sharing the burden, protecting the individual and respecting international law and promote economic development and stability globally. I believe India and Norway, as strong democracies, can play important roles – both individually and together – in promoting and protecting these values, both at the national levels and on the global stage. Our recent bilateral UN Consultation with India made clear we share such goals.

Norway was among the first countries to actively support India's bid for permanent membership of the United Nations Security Council. I believe that the strong growth and development we have witnessed in Asia, Africa and Latin-America over the past decade and the corresponding interdependence that comes with globalisation, are all making the world a better place. Our challenge is to manage this interdependence in order to maintain peace, development and respect for human rights

***DSA*: There are many Joint Working Groups set up under the auspices of the India Norway Joint Commission, one on Maritime matters. Do we have any JWGs on defence and security? What kind of collaboration and cooperation exists in this domain and what direction it may take in the coming years and decades?**

Eivind S Homme: At the moment there is no Joint Working Group on Defence and Security. As mentioned we need first to develop concrete cooperation within the military domain with a step by step approach.

***DSA*: The annual bilateral trade between India and Norway is around US$ 1 billion. What new areas can be explored to accelerate and augment economic cooperation and bilateral trade between our countries?**

Eivind S Homme: With bilateral trade a modest US$ 1 billion per year and Norwegian investors currently have more than US$ 8 billion invested in India, we need on both sides to work hard to increase our economic cooperation. I see great potentials for this. The Norwegian Government's Pension Fund – Global – the world's largest sovereign wealth fund – has invested US$ 4 billion and would like to see a tenfold increase. Telenor, the Norwegian telecom giant, has a similar investment in a joint venture known here as Uninor. Norway is also one of the world's largest exporters of oil and gas, the second of seafood and the seventh largest producer of hydropower in the world. So there should be very good prospects for increased cooperation in the energy sector, both renewables including hydropower and petroleum. Maritime transport, marine resources and telecommunications all have potential for further growth in the short and medium term. The defence sector is another untapped potential, where Norway has a lot to offer India in niche products where we are world leaders.

***DSA*: The world is transiting from a unipolar to a multipolar world order and there is much ado about US pivot shifting to Indo-Pacific region. Do you think this will completely transform the security environment in the region? As a NATO member, what challenges and opportunities does this changing scenario present to Norway?**



His Excellency Eivind S Homme with Mr Pawan Agrawal, Publisher and CEO of *Defence and Security Alert (DSA) magazine*

Norwegian investors currently have more than US$ 8 billion invested in India, we need on both sides to work hard to increase our economic cooperation. I see great potentials for this. The Norwegian Government's Pension Fund – Global – the world's largest sovereign wealth fund – has invested US$ 4 billion and would like to see a tenfold increase. Telenor, the Norwegian telecom giant, has a similar investment in a joint venture known here as Uninor

Eivind S Homme: US have always had Asia and the Indo-Pacific high on its agenda. I do not think the current development will influence the general security environment in the Indo-Pacific region in a negative way. Norway has herself gradually paid more attention to Asia and the Indio-Pacific region over the last decades. We have developed a national Asia strategy that also includes a specific Indian strategy. As a direct result of the greater Norwegian emphasis toward Asia we have participated quite substantially in NATOs Afghanistan mission and we have actively participated in the counter piracy operations outside Somalia and in the Indian Ocean for many years. Asia is not any longer far away, this region is growing in importance for our economy and security.

DSA: **Norwegian State Secretary Mr Oystein Bo in his speech at the Indian-Norwegian Defence Industry Seminar in New Delhi recently spoke of growing interest of Norwegian defence industries in the burgeoning Indian market. Can you please enlighten our readers on the understanding and agreements reached between Indian and Norwegian companies? What kind of potential do you see for the Norwegian defence industries?**

Eivind S Homme: The visit from the Norwegian Deputy Minister of Defence, Mr Oystein Bo, in December underlined the importance by my Government towards India also in the defence sector and he brought with him the biggest Norwegian defence industry delegation ever to visit Asia. It demonstrated that the Norwegian government will be actively supporting the Norwegian Defence Industry in their efforts to gain access to the Indian

Global terrorism is an important issue for both countries and is on the agenda when our leaders meet. We share a common concern regarding this global challenge and believe in working closely together to tackle it



His Excellency Eivind S Homme with Norwegian Defence Attache Captain Hogne Rykkje

defence market and the belief that Norway here have much to offer India. Mr Bo was hosted by his counterpart Minister Mr Jiendra Singh, had meetings also with other high level Indian officials and opened and participated in a joint Indian-Norwegian Defence Industry seminar. The Norwegian Defence Industry has a number of high quality niche products that could be well suited for India. It is here for the long run, being fully aware of the Indian acquisition system. It is also prepared to cooperate with local industry, including transfer of both technology and knowhow to make local production possible.

DSA: **Both India and Norway are targets of global terrorism. What joint strategy and mechanisms have our countries devised to counter the menace which is disturbing our peaceful development?**

Eivind S Homme: Global terrorism is an important issue for both countries and is on the agenda when our leaders meet. We share a common concern regarding this global challenge and believe in working closely together to tackle it. Norway experienced a terrible terror attack at Utoya as recently as in July 2011. This surprising terror attack has resulted in many practical changes in how Norway deals with terrorism and we are willing to share them broadly, including with India.

DSA: **Your message for the people of India and *DSA* readers in the prevailing security environment in the world and the way ahead.**

Eivind S Homme: This year Norway will celebrate the 200 years anniversary for our constitution and parliamentary democracy. It has proven to be a solid basis for our economic development and inclusive social model, often named the Nordic model. We believe our prosperity gives us a special obligation to contribute towards the international fight against poverty and for a more fair world order. Economic cooperation and growth will be an important factor to contribute towards a more secure world. Norway will continue to support the Indian quest for economic prosperity and social development. If India is to succeed, we are all to benefit. While economic growth is a must, it is increasingly important to ensure growth with equity and social justice. History teaches us; social injustice anywhere is a threat to peace and security everywhere. Norway greatly appreciates working closely with India to address this and other challenges in the years to come. DSA

MODERNISATION WOES AND DEFENCE PREPAREDNESS

Despite the Defence Acquisition Council headed by the Defence Minister giving in principle approval for the Long Term Integrated Perspective Plan (2012-2027) and the five year defence plan (2012-2017) – a positive development for the first time in many years – but that's where it rests, as no follow up action has been taken so far by the MoD.





LT GEN BS PAWAR PVSM, AVSM (RETD)

The writer is an alumnus of Rashtriya Indian Military College and National Defence Academy and was commissioned into Artillery in June 1968. He fought the 1971 war as an Observation Post Officer in the Uri sector of Jammu and Kashmir. He was the Brigade Major of an Infantry and Mountain Brigade and a Director in the Perspective Planning Directorate. He commanded a Rocket Regiment and has the distinction of commanding the largest Artillery Brigade in Jammu and Kashmir. He was Maj Gen Artillery, Western Command during Operation Parakram. He also headed the Army Aviation Corps and was the Commandant, School of Artillery. He hung his boots in September 2008. A defence analyst, he writes for a number of defence journals and publications. He is a member of the Governing Council of the Rotary Wing Society of India.

India today lives in and is adjacent to some of the most troubled regions in the world. It faces many threats and challenges to both its external and internal security, the foremost being the long festering dispute over Jammu and Kashmir with Pakistan and the unresolved territorial and boundary dispute with China. The recent assertiveness of China (the Daulat Beg Oldi intrusion and subsequent standoff) and its nexus with Pakistan, leading to an increasing military presence in the Gilgit-Baltistan area of Pak-occupied Kashmir and the Gwadar Port, are serious security challenges for the Indian military and do not augur well for long-term peace and stability in the region. The insurgencies in Jammu and Kashmir and the North-eastern region fuelled by Pakistan and China respectively, the Maoist threat in India's heartland and the likely deteriorating security environment in the Af-Pak region (in the wake of American troops withdrawal later this year) has further vitiated India's strategic environment. The prevailing situation has forced India's military to plan and prepare for the possibility of a 'two front' war in any future conflict on our northern and western borders.

Bottlenecks Galore

In such a strategically adverse environment, the Indian military needs to modernise and create force structures that are capable of undertaking network centric operations on land, sea and air while fighting a two front war. Although the Indian armed forces have drawn up elaborate plans for modernising and qualitatively upgrading their capabilities for future combat, including the ability to secure the sea lanes of communication and project power in India's area of strategic interest, the pace of modernisation has been slow due to the lack of adequate funding (deterioration of Indian economy in last two years and resultant cuts in defence budget), policy paralysis, delayed decision-making, low-technology defence industrial base and the flawed procurement policy of the government. This despite the Defence Acquisition Council headed by the Defence Minister giving in principle approval for the Long Term Integrated Perspective Plan (2012-2027) and the five year defence plan (2012-2017) – a positive development for the first time in many years – but that's where it rests, as no follow up action has been taken so far by the MoD.

In this entire military modernisation and transformation process the navy and air force are moving forward though slowly, but the manpower intensive army's progress has been extremely sluggish to say the least. While there seems to be a political and bureaucratic obliviousness to the strategic reality, the military is well seized of the realisation that unless India takes immediate measures to accelerate the pace of its military modernisation and upgradation the gap with China, which is only a quantitative gap at present, will soon become a qualitative gap, given the rapid rate of PLA modernisation and infrastructure build-up in Tibet. Likewise, the slender edge that the Indian armed forces now enjoy over Pakistani armed forces in conventional conflict is being eroded as Pakistan is spending considerable sums of money on its military modernisation under the garb of fighting radical extremism and the flaunting of the availability of tactical nuclear weapons.

Reality Check

The army has been grappling with ill-equipped infantry battalions, lack of modern artillery howitzers, night blindness, obsolete air defence, aging helicopters and shortage of ammunition for years now. This aspect was amply elaborated upon in the leaked letter of former Army Chief Gen VK Singh to the Prime Minister, highlighting the critical deficiencies in equipment, weapon systems and ammunition. With the 1.3 million army lagging far behind in the modernisation / upgradation process, its war fighting capability stands compromised. Most of its weapon systems are bordering on obsolescence and need to be replaced. Ambitious plans to transform the army from threat-based to capability-based force by 2022, proficient in conducting hybrid missions, countering asymmetric threats and fighting a two front war, have been thwarted by the MoD's hidebound bureaucracy and vacillating decision-making at the highest level. The status of the combat arms and some others are elaborated below.

The modernisation of Infantry, a key element of any army is yet to take off. The Infantry today lacks the basic personal weapons in terms of assault rifles and carbines with the locally developed INSAS 5.56 assault rifle finally being discarded – the army is in the process of acquiring the same through imports

The modernisation of Infantry, a key element of any army is yet to take off. The Infantry today lacks the basic personal weapons in terms of assault rifles and carbines with the locally developed *INSAS 5.56* assault rifle finally being discarded – the army is in the process of acquiring the same through imports. The thrust of Infantry modernisation was to enhance the battalion's capability for surveillance and target acquisition at night and boosting the firepower. Plans include the acquisition of shoulder-fired missiles, hand-held battlefield surveillance radars and thermal imaging devices for night effectiveness. The *F-INSAS* (future infantry soldier as a system) project which is under







development has also been delayed. This programme is the lynchpin of infantry transformation to become a fully networked, all terrain and all weather personal equipment platform force, for the digitised battlefield of the future, but its implementation is still in the distant future.

Mechanised Infantry

Mechanised forces are the driving force of Indian military's conventional deterrence in the plains, but currently the mission reliability of a large number of its tanks and infantry combat vehicles (ICVs) is low and they are mostly night blind. The fleet is being upgraded and modernised gradually – the army has already equipped two regiments with the indigenously developed *Arjun* tanks. An additional 124 *Arjun Mark-II* tanks have been ordered subject to their satisfactory performance – these tanks will have upgraded capabilities of fire power (missile firing), mobility, protection and night capability. Also to meet its immediate operational requirements the army had inducted 657 *T-90S* Main Battle Tanks from Russia and an additional 1,000 are being built locally under licence at the Heavy Vehicles Factory, Avadi. The *T-72 M1* upgrade programme under 'Project Rhino' for enhancing its accuracy and fire control system and giving it night capability is also under progress. The mechanised infantry is currently equipped with the BMP-II infantry combat vehicles named *Sarath*. These are being upgraded for better performance and providing night fighting capability. There has also been a problem with the availability and quality of ammunition being produced within the country, forcing the army to import the same from Russia quoting operational necessity.

The Indian Navy's modernisation plans have finally begun to pick up steam. Numerically the plan intends to make the Indian Navy the third largest fleet in the world. The centrepiece of the scheme revolves around the acquisition of aircraft carriers and nuclear-powered submarines

Obsolete Artillery

The army's artillery modernisation programme continues to stagnate with no fresh induction since the *Bofors* gun in 1986 (410 pieces) and their availability is also down to half. Today most of the guns held in the inventory of artillery are either obsolete or reaching obsolescence and have limited ranges making them irrelevant in today's environment. The proposal under the Artillery Rationalisation Plan to acquire a mix of around 3,000 155 mm / 52 calibre towed, mounted, self-propelled tracked and wheeled and ultra lightweight (155 mm / 39 calibre) howitzers through imports and local licensed manufacture has not made any progress. Tenders for almost all these guns have been issued, withdrawn and re-issued with several rounds of inconclusive trials conducted. The only silver lining in this entire sordid saga was the likely induction of 145 *M777* ultra light howitzers being acquired through the direct foreign military sales route from the United States. However this acquisition now is also in doubt with the BAE Systems shutting down its facilities in UK due to financial constraints – the blame rests squarely on the MoD due to its indecisiveness on concluding and finalising this project. Under the circumstances the manufacture of the upgraded version of the desi *Bofors* (155 mm / 45 calibre) by the Ordnance Factory Board (OFB) is at best a stop gap / adhoc measure to tide over the current critical situation, but does not address the precarious state of the artillery. The other critical areas which need to be addressed on priority are non-availability of self-propelled howitzers and ammunition which impact adversely on army's operational capability. As per reports trials for tracked and towed howitzers are currently on but one needs to wait and watch till the final outcome and signing of contract – even then it will take nothing short of 4-5 years before any of these guns can start trickling in, provided history of last minute cancellation does not repeat itself.

Modern Air Defence

The Corps of Army Air Defence (AAD) is also faced with problems of obsolescence. Despite a widely accepted need to modernise, there has been no significant additions to the AAD inventory in decades excepting the *Tangushka* air defence weapon system. The vintage *L-70*, the *Zu-23-2* Twin Gun, the *ZSU-23-4 Shilka* (SP), the *SAM-6 (Kvadrat)*, and the *SAM-8 OSA-AK* air defence (AD) gun systems among others, need to be replaced by more responsive modern air defence systems that are capable of defeating current and future threats. The abysmal state of AAD is a tale of our inability to recognise the rapidly changing nature of air threat and ever changing technologies. The upgrades planned / being carried out on some of the above systems is not modernisation but measures to tide over the current dismal situation with no eye on the future.

Helicopter Fleet

The army aviation's growth and transformation continues to be stunted and stymied due to unwarranted inter-Service bickering and the MoD's reluctance to act on the same, despite the attack helicopters now forming part of the army. The delay in the replacement of the current vintage fleet of *Chetak / Cheetah* light observation helicopters is a matter of grave concern. This fleet is 40 years old and its maintenance / spares availability itself has become a nightmare. The current self-created impasse on the 197 replacement helicopter project will severely impact the operational capability of the Indian Army, especially in high altitude areas and the Siachen Glacier. The army today lacks critical assets like attack helicopters and tactical lift capability – an imperative in any future conflict.

The recent raising of two mountain divisions and the government sanction for the mountain Strike Corps, will pay the required dividends only if they are equipped with requisite and suitable equipment or else it will be an exercise in futility. Finally, the efficacy of the Indian Army to manage future conflicts will depend on the speed with which it moves, concentrates and regroups rapidly over varied terrain, employs precision weaponry and integrated Command Control Communication Computers Intelligence Interoperability (C4I2) systems to operate under a nuclear overhang which ultimately depends on its transformation and modernisation – for this it is essential that the 1.3 million strong army overcomes operational hollowness within strict deadlines.

Navy's Ambitious Plan

The Indian Navy's ambitious Maritime Capabilities Perspective Plan seeks to dominate the Indian Ocean region by acquiring blue water operational capability while effectively countering current and emerging threats closer to the coastline. The Indian Navy has proposed to base both its operational fleets around an aircraft carrier though eventually it plans to graduate to three carrier battle groups. On the submarine scene while the *INS Chakra*, a nuclear-powered submarine leased from Russia, has already joined the fleet, *INS Arihant*, the first of three to four indigenously designed and developed nuclear-armed submarines, is expected to become fully operational by late 2014. India has also begun to induct Russian Nerpa-class submarines, which will give the much needed fillip to the submarine fleet and considerably enhance sea-denial capabilities.

The Indian Navy's modernisation plans have finally begun to pick up steam. Numerically the plan intends to make the Indian Navy the third largest fleet in the world. The centrepiece of the scheme revolves around the acquisition of aircraft carriers and nuclear-powered submarines. The *INS Vikramaditya* (Russian Navy's ex-*Admiral Gorshkov*) which was under retro-fitment in Russia since 2008 has finally entered service after inordinate delay. *Vikramaditya* will carry the *MiG-29K* aircraft which have already started arriving in India from Russia. While aircraft carriers and submarines dominate the modernisation programme, the navy also plans to expand to a fleet of 150 ships in the next ten to fifteen years, with 50 warships now under construction and 100 new vessels in the acquisition pipeline. Plans for accretions to the naval aviation fleet are also progressing smoothly with the *Boeing 737 P-8I* maritime reconnaissance aircraft and the *MiG-29K* being inducted. Additionally *Kamov Ka-31 AEW* helicopters are also in the pipeline and the navy is looking at replacing its obsolete *Chetak* fleet as well as inducting multi-role helicopters in the NH-90 class for which the process has already begun. Further, the navy's amphibious landing capability has been enhanced considerably by the acquisition of the

RAMPANT OBSOLESCENCE



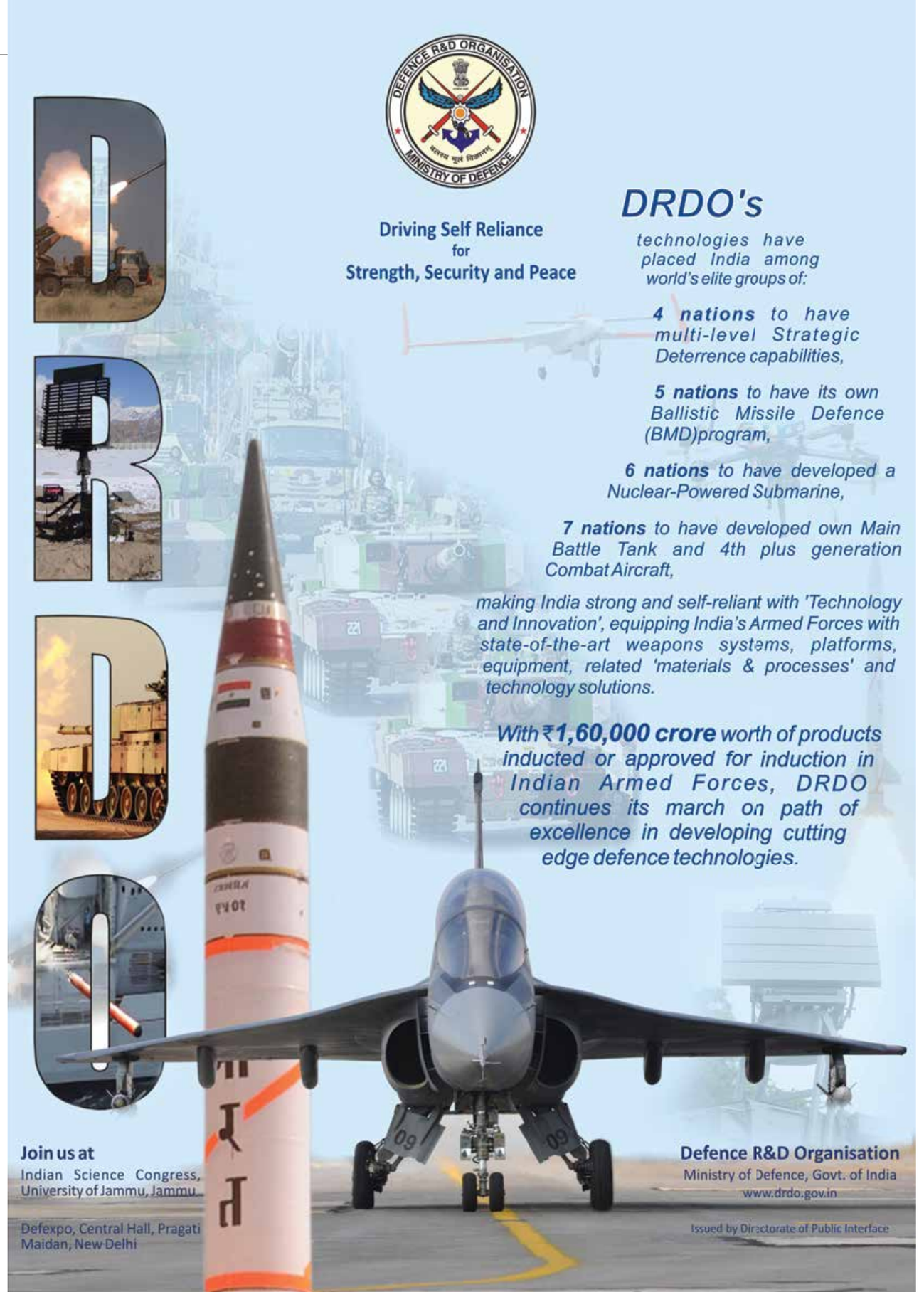
INS Jalashwa (ex–*USS Trenton*) as well as other landing ships while additional capabilities for amphibious warfare are being rapidly developed. As a result of these efforts, the Indian Navy is on the cusp of acquiring the capabilities necessary to join key strategic partners such as the US Navy in safeguarding the sea lanes of communication in the northern Indian Ocean and ensuring unfettered freedom of the seas for trade and commerce.

MMRCA Needs Acceleration

The Indian Air Force's future plans focus on providing the strategic outreach that India needs as a growing regional power and to project power where necessary in order to defend vital national interests. Accordingly the air force has been undergoing a modernisation programme to replace and upgrade its ageing and outdated equipment. The statement of the Air Chief on the 80th anniversary of the air force last October that the air force will complete 75 per cent of its ambitious modernisation programme by 2022 (end of 13th plan) is a pointer in that direction. But a major cause of concern is the depleting fighter fleet which is down to 34 squadrons at present against the planned 42 by 2022, due to decades of neglect. The plans to acquire 126 multi-mission, medium-range combat aircraft in order to maintain an edge over the regional air forces, is stuck in the procurement quagmire – this is a very serious shortcoming in India's defence preparedness. *Tejas*, the indigenously designed light combat aircraft, which was expected to replace the obsolescent *MiG-21*, is still far from becoming fully operational, despite the operational acceptance accorded to it last year. India is also concurrently in a joint venture with Russia is developing the fifth-generation fighter which is expected to fly it in 2015 – a claim which sounds hollow and doubtful at present. The upgrade programme for the *Su-30 MKI* and the *Mirage* is on track. The modified *Su-30 MKIs* will be capable of carrying the *BrahMos* cruise missile and the upgraded *Mirage* (as per claims) is expected to reach the level of next generation fighter. Airborne Early Warning aircraft are being acquired from Israel as well as being developed indigenously. To enhance Indian military's strategic reach the air force has acquired six *C-130J Super Hercules* aircraft and has placed an order for another six from the United States in a direct government to government sale. The process has also been set into motion to induct *C-17 Globemaster* heavy-lift aircraft from US. Although a contract has been signed with a Swiss firm for 75 *Pilatus PC-7* basic trainer aircraft, India's fleet of jet trainers continues to be deficient. The air force currently lacks the required punch in terms of fighter aircraft arsenal, a critical factor in providing strategic outreach or in deciding the outcome of a future conflict.

A major cause of concern is the depleting fighter fleet which is down to 34 squadrons at present against the planned 42 by 2022, due to decades of neglect. The plans to acquire 126 multi-mission, medium-range combat aircraft in order to maintain an edge over the regional air forces, is stuck in the procurement quagmire – this is a very serious shortcoming in India's defence preparedness

Today the Indian military's defence preparedness is far from satisfactory. It is no secret that both China and Pakistan continuously monitor Indian war preparedness where shortfalls in military inventory provide windows of opportunity for military adventurism and assertiveness against India. India's military modernisation plans are moving ahead but at a very slow pace. Only a future ready military can march into the coming decades with confidence, well prepared to tackle challenges looming over the horizon. This requires bipartisan support across the political spectrum due to the fact that no alternative exists for addressing the emerging threats and challenges, but for India to quickly modernise and upgrade its armed forces. DSA







INDO-JAPANESE STRATEGIC AND GLOBAL PARTNERSHIP

India and Japan established "Strategic and Global Partnership" in 2006 at the summit meeting between Dr Manmohan Singh and Mr Shinzo Abe. Since then the bilateral relations have been on an ascending trajectory. In an exclusive interview with *DSA* Col Yoshifumi Inoue, the Japanese Defence Attache expounds his prospective on growing Indo-Japanese partnership.

***Defence and Security Alert*: India and Japan are old friends and now strategic partners. Please share with *DSA* readers around the world the contours of India Japan Global Partnership and how this is important for regional and global security?**

Col Yoshifumi Inoue: Japan's relationship with India is founded on the historical and cultural ties as well as on the shared values of democracy, respect for human rights and rule of law. Japan and India established ''Strategic and Global Partnership'' at the summit meeting between the two Prime Ministers, Dr Manmohan Singh and Mr Shinzo Abe in 2006 and have been intensifying their ties through high level exchanges spearheaded by the annual visits of Prime Ministers to each other's capital.

In the economic field, The Japan-India Comprehensive Economic Partnership Agreement (CEPA) took effect in August 2011, which will eliminate about 94 per cent of the tariffs between Japan and India within 10 years. India has been the largest recipient of Japanese Official Development Assistance (ODA) for the past several years. Delhi Metro is one of the most successful examples of Japanese cooperation through its ODA Loan. Both countries are steadily implementing Delhi-Mumbai Industrial Corridor (DMIC) project which adopts innovative and comprehensive approaches for much needed infrastructure development in India.

On the security front, in 2008, the Prime Ministers of Japan and India signed the Joint Declaration on Security Cooperation. The Action Plan formulated in 2009 specifies



a wide range of cooperation in security field. As Maritime States, both Japan and India have vital interests in the security of sea lanes connecting East Asia, Middle East and Africa. Both countries work together in the security field such as anti-piracy and the United Nations Peace Keeping Operation. Our ''Strategic and Global Partnership'' contributes to the peace and stability in the region and the world.

***DSA*: According to a recent BBC World Service poll, 42 per cent of Japanese people view India positively. This is very encouraging as people to people relations strengthen the government to government relationship. Your comments please.**

Col Inoue: Needless to say, people to people relations are important in strengthening the relationship between the two countries. I believe that the visit to India by Their Majesties Emperor and Empress of Japan last year strengthened the friendly ties between the people of both countries.

Personal contacts and interactions between the armed forces of the two countries are intensifying as well. For example, Japan and India send the student officers to military educational facilities of each other such as staff colleges and National Defence College. Japanese cadets of National Defense Academy visited Indian National Defence Academy last year. This kind of interaction will deepen the mutual understanding and widen the base of relationship between Japan Self Defense Forces (JSDF) and Indian Armed Forces.

***DSA*: India and Japan recently held the first meeting of Joint working group to explore modality for cooperation on *US-2* amphibian aircraft. What is the status of this important Indo-Japanese collaboration?**

Col Inoue: Japan and India held the first Joint Working Group on *US-2* amphibious aircraft on 23 December 2013. This initiative has the twofold significance of defence collaboration and industrial cooperation and both sides are working hard to make this project a success.

***DSA*: Mr Itsunori Onodera The Japanese Minister of Defence, visited India in January 2014 and held a Defence Ministerial Meeting. Please share with our readers the prospects of India-Japan Defence Cooperation.**

Col Inoue: On the occasion of the Defence Ministerial Meeting, the two Ministers appreciated the progress such as the second bilateral exercise between the Japan Maritime Self Defense Force (JMSDF) and Indian Navy in December 2013. As mentioned in the Joint Press Release issued at the end of the meeting, the Defence Minister of India will visit Japan in 2014 and the third "2 plus 2" Dialogue and the fourth Defence Policy Dialogue (Administrative Vice Minister / Secretary of Defence level) will be held in Delhi in 2014.

Service level cooperation and exchange will also be conducted. JMSDF and Indian Navy will conduct a joint exercise in Japan in 2014. The exchange on UN Peacekeeping Operation between Japan Peace Keeping Training and Research Center, Joint Staff College, Central Readiness Force (CRF) and Centre for UN Peacekeeping (CUNPK) of Indian Army will be promoted. Japan Air Self Defense Force (JASDF) and Indian Air Force will discuss the possibility of conducting staff talks and professional exchanges.

***DSA*: Future threats if any are going to be of full spectrum and network centric. What kind of expertise and technologies can Japan share with India in this domain?**

Col Inoue: "Bilateral Talks on Cyber" were held for the first time in November 2012. Indian Army and JGSDF will conduct the expert exchanges in humanitarian assistance / disaster relief (HA / DR) and counter terrorism. Japan and India will continue to exchange each other's experience and know-how to address these new and emerging challenges in security sector.

***DSA*: What kind of security cooperation are India and Japan contemplating in Indo-Pacific region?**



The Japanese Defence Attache Col Yoshifumi Inoue

Col Inoue: Maritime cooperation between Japan and India is crucially important for the stability in the Indo-Pacific region. "Maritime Affairs Dialogue" was held in January 2013. The two Prime Ministers Mr Abe and Dr Singh decided at the summit meeting in May last year to conduct, on a regular basis and with increased frequency, bilateral exercises between JMSDF and Indian Navy. The second bilateral exercise between JMSDF and Indian Navy was conducted off the coast of Chennai in December 2013. In addition, joint exercises between the two Coast Guards have taken place on an annual basis since 2000 and the latest exercise was held in Cochin in January 2014. Japan and India will seek to further strengthen the cooperation in Maritime domain.

***DSA*: What challenges do you foresee in East Asia? Japan has shunned war and war preparedness. Will this prompt Japanese rethink on their strategy due to changing geostrategic scenario in the region?**

Col Inoue: "National Security Strategy" adopted by the Cabinet on December 17, 2013 states, "Northeast Asia is home to a host of actors, such as countries with large-scale military forces, or those possessing nuclear weapons or continuing with nuclear development. Yet a regional cooperation framework in the security realm has not been sufficiently institutionalised." North Korea has enhanced the capability of WMDs and has repeatedly taken provocative actions. China has been rapidly advancing its military capabilities without sufficient transparency and has taken actions that can be regarded as attempt to change the *status quo* in the East and South China Sea. In East Asia, security environment has not seen any improvement in recent years.

Japan will continue its path to peace and Japan's peaceful orientation will never sway. No nation can maintain its own peace and security alone. Hence, Japan will contribute even more actively to the peace and stability of the region and the world. DSA

INDIA'S DEFENCE
WORLD-CLASS INFRASTRUCTURE

Strangely, though 20 per cent of the government's budget is spent by the defence forces, defence infrastructure which constitutes national assets is not dovetailed into the national plan of the Planning Commission for infrastructure.



"Infrastructure is the basic physical and organisational structure essential for an enterprise and includes the services and facilities necessary for functioning effectively. It includes a set of inter-connected elements. Infrastructure is an important parameter for judging capability of the nation and it is a component of Comprehensive National Power". – A General Definition of Infrastructure

This article must begin with a definition by military strategists, who have defined the term 'military infrastructure' to refer to military buildings, rear line repair facilities and permanent installations necessary for the support of military personnel and their hardware to practice 'warfare' and be 'ready for war'. This definition applies to Indian Armed Forces which comprise India's 1.3 million strong army stationed nationwide and in heights of the Himalayas and deserts safeguarding over 10,000 km of hostile and friendly borders, the 120,000-air force personnel in bases with flying machines, radars and missiles and the 60,000 strong navy and equal number of civilian employees in dockyards. The navy and coast guard are employed in guarding ports, coasts and sea lines of communications (SLOCs) and need shore infrastructure to sustain the fleet and the ships deployed 'out of country' to show the flag in support of India's diplomacy.

Military infrastructure also includes headquarters, barracks, airfields, communication facilities, reliable and timely logistic supply systems, military support equipment, weapons and their maintenance depots and port installations and dockyards that support the navy. The nation's roads and railways are critical for the army for transportation, termed, 'Reserve Rolling Stock'(RRS). War wastage reserve ammunition (WWR) is stored in specially built fireproof depots, most times underground or in areas away from populations. War reserve fuel is stored in tanks as part of military infrastructure, though the reserves may be maintained by oil companies. Good infrastructure adds to the teeth of the armed forces. Its availability normally precedes induction of a weapon or system.

Planning Military Infrastructure

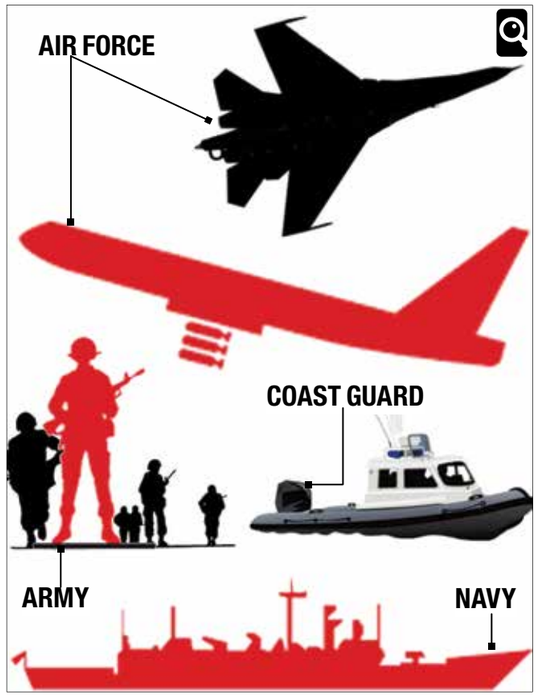
The industrial base of the nation assists and stands in

PREPAREDNESS AND MANUFACTURING



COMMODORE RANJIT B RAI (RETD)
The writer is author of *A Nation and Its Navy at War* and served as Director Naval Operations and Intelligence in the Indian Navy and nine years with USA's largest project carrier shipping company.

for infrastructure and is considered the backbone of the armed forces to ensure supply hardware to the military and to sustain it in war. In India's case there is much



to discuss before specifics of each Service are analysed, as India went through a long period of import substitution. Good and efficient infrastructure costs money, needs foreign technology and gestation period to build and needs a strategy for development. More importantly it needs avoidance of duplication between the three Services. This is part of 'Defence Economics', a less studied subject in India as the Planning Commission of India is the high body under the Prime Minister that is tasked to look into national infrastructure planning. It does so with experts on its rolls and within the available resources and allocates funds accordingly.

The poor state of the nation's ammunition depots and roads leading to Tibet and Chinese borders and in the North-east are only now being attended to. They were left to MoD and neglected. Currently, excuses are proffered that it was a strategic policy decision to deny Chinese the roads, in case of inroads. This depicts the thinking

Yet strangely, though 20 per cent of the government's budget is spent by the defence forces, defence infrastructure which constitutes national assets is not dovetailed into the national plan of the Planning Commission for infrastructure. This needs remedy. Military infrastructure can be shared in the nation and a good example was when Indian Navy set up a very modern computer system supplied by ICL of UK at the Bombay Dockyard in 1970, the spare computer time was hired out to Tatas and Oil Companies to use at night. Similarly if the widely spread military commands are co-located facilities can be shared.

Planning for military infrastructure is left to the overworked Ministry of Defence (MoD) to plan and build as requested by each Service. The poor state of the nation's ammunition depots and roads leading to Tibet and Chinese borders and in the North-east are only now being attended to. They were left to MoD and neglected. Currently, excuses are proffered that it was a strategic policy decision to deny Chinese the roads, in case of inroads. This depicts the thinking. Mules are employed for the last mile in the army's forward areas to transport material. Mobility is critical and depends on infrastructure. The Indian Air Force is also improving its forward airfield runaways. Signs of improvements in Air Force Base Depots are visible.

The Border Roads Organisation (BRO) was set up fifty three years ago to build roads when other means were not available. The BRO is a quasi-military organisation and being controlled by two government ministries, has limitations. The BRO was set up to support the armed forces and meet their strategic needs and maintain the operational roads and infrastructure of the Army General Staff in border areas. BRO was dedicated for development and sustenance of the infrastructure and to achieve international levels of quality in a cost-effective manner. It was also tasked to contribute to the socio-economic development of the border states. Private sector companies have come up in India and offer an alternative.

Infrastructure Of The Armed Forces

From 1944, Britain's economy was depleted and infrastructure projects were neglected in India. At Independence in 1947 the Indian armed forces were bequeathed legacy

military infrastructure by the British as India was denied the advantages of the 'Industrial Revolution', so India had much catching up to do. The Indian armed forces acquired modern weapons in the first four decades after Independence from the West and the Soviet Union. These included modern guns (105 mm, 130 mm and much later 155 mm howitzers), tanks (*AMX*, *PT-76*, *T-72s* and *T-90s*), planes (*Mysteres*, *Aurogans*, *Hunters*, *Vampires*, the *MiG* series, *Su-7s* , *Jaguars* and *Mirages*) and ships (cruisers *INS Delhi* and *Mysore*, aircraft carriers (*INS Vikrant* and *Viraat*, with planes and helicopters) and destroyers (*Rajput, Rana, Ranjit*), frigates (*Brahmaputra, Betwa*, *Beas*, *Khukri*, *Kuthar*, *Kirpan* and *Petyas*). MoD beefed up a shipyard for building frigates at Mazagon Dock Ltd at Bombay (Nilgiri class *Leanders*), which has served the navy well but it is situated in the most congested part of Mumbai and has an order book of over Rs 200 crore.

The government since Independence therefore was on the horns of a dilemma and till the 1980s India's economy stuttered along at a Hindu rate of growth. The government was obliged to wipe out poverty, hence the defence budgets were always kept low, hovering around 3 per cent of the GDP. India also fought four wars not of its making and an expensive military foray into Sri Lanka. The wars perforce, generated a mentality that acquisition of weapons and hardware is more important and infrastructure would follow when funds are available. No one can be faulted for that. From 1989 the army got bogged down in fighting terrorism in Kashmir and anti-national separatist activities in the North-east states of India which are still neglected areas as far as infrastructure and industrialisation is concerned.

The Mumbai and Visakhapatnam dockyards are in the centre of metropolises and the explosion of INS Sindhurakshak on 14th August, 2013 could be a symptom of overburdened infrastructure. Naval Armament Depots are in the centre of cities. Large naval ships armed with lethal missiles and torpedoes in the centre of populations could become tinder boxes

First Indigenous Aircraft

In the 1960s the Hindustan Aeronautics Ltd (HAL) invited a German airplane designer Kurt Tank to India and HAL produced the *Marut* and *Gnat* planes for the IAF but the programmes fizzled out. Shipbuilding infrastructure in PSUs continued. In the 1980s MDL built-up excellent submarine building infrastructure in its East yard and built two modern HDW submarines with help from IKL of Germany but due to a corruption scandal, the construction stopped and facilities went waste. Today the Indian Navy's submarine strength is at a low of 13 aging submarines and six *Scorpenes* are under construction at MDL in the same yard and infrastructure for the new submarines is being set up at naval bases.

It is to the credit of India's armed forces that they made do with legacy infrastructure (called *jugad* in Hindi ie improvisation) wherever they could, so the leaders cannot be faulted, but what the leadership can be faulted for is that India has become the world's leading importer of military hardware and still leans on aircraft engines, submarines and aircraft and other equipment to be sent abroad for maintenance as infrastructure facilities are still lacking. Office structures like the Service headquarters in New Delhi next to the impressive new DRDO HQ and South Block and in many stations are housed in World War II barracks. A lot of infrastructure needs re-construction and renewal.

Naval Installations In Populated Areas

India's only two naval dockyards are at Mumbai and Visakhapatnam which are also premier naval bases. Both are chock-a-block full of warships berthed one alongside others. The decommissioned aircraft carrier *Vikrant* has been occupying the premier inner Ballard Pier while alternate infrastructure for *Vikrant* to be grounded as a museum has been debated for two decades. The Mumbai and Visakhapatnam dockyards are in the centre of metropolises and the explosion of *INS Sindhurakshak* on 14th August, 2013 could be a symptom of overburdened infrastructure. Naval Armament Depots are in the centre of cities. Large naval ships armed with lethal missiles and torpedoes in the centre of populations could become tinder boxes.

The Visakhapatnam port has a narrow entrance which could be blocked, locking the eastern naval fleet in war. It is also the major port handling maximum tonnage in India. The mercantile traffic competes with naval traffic in that congested port. With a large naval acquisition programme of fortyfive ships on order and some more at the Request for Proposal (RFP) stages, the navy will need a larger infrastructure. The coast guard also has a large expansion programme of five offshore vessels and over 50 Fast Patrol Boats (FPBs) and shares berths with the navy in some ports.

The army has had explosions in legacy ammunition depots which are being modernised and some legacy depots are near populated areas. This explains the need for greenfield infrastructure sites for the army and new naval bases. By releasing some land in the centre of cities and cantonments by the armed forces the financial receipts can be employed for the new infrastructure, as South Korea, UK and USA have followed in the last decade.

The navy has set up phase I of the Karwar naval base at *INS Kadamba* and has received *INS Vikramaditya* but Phase II which has been sanctioned recently to set up a dockyard, an airfield, additional berths and facilities is lagging. But it is a beginning. A new modern submarine base in Project Varsha is being progressed south of Visakhapatnam at Rambilli. The Varsha base will de-congest Visakhapatnam where the nuclear submarines *INS Chakra* and *INS Arihant* with massive buildings for additional nuclear submarines and nuclear support facilities have already been set up. This poses a challenge as it will be very difficult to shift, but may have to.

PSUs Core Of Military Industrial Complex

Government Public Sector Undertakings (PSUs) were given the task to build hardware for the armed forces but facilities for maintenance support were always lacking. India does not have a modern military industrial base and though the private sector has become capable it has not been allowed a level playing field against the PSUs to thrive with military orders. Foreign Direct Investment (FDI) was kept down to 26 per cent in defence with strict rules leaving no incentive for foreign firms to transfer technology. Offsets have done little to improve infrastructure, except in air force bases where American planes have been inducted. The Indian Navy has done well in warship design and construction with results but cost of ships in PSUs and time to build is invariably higher and longer than foreign builders. This can be attributed to legacy building techniques and low productivity. This is being addressed by introducing modular construction in PSU shipyards which need infrastructure of large sheds and cranes for transportation of modules.

The AFNet replaces the IAF's old communication network set-up using the Tropospheric scatter technology of the 1950s making it a netcentric combat force. The IAF project is part of the overall mission to network all three Services. The Air Force also launched a 3G network for its staff, becoming the first among the forces to have a 3G network, named AFCEL (Air Force Cellular)

There is another term 'critical infrastructure' that has been widely adopted to distinguish infrastructure elements that, if significantly damaged or destroyed, would cause serious disruption of the dependent system and even the military. The National Disaster Management Authority of India has been entrusted with this task and includes infrastructure leading to measures to meet loss of transportation in case of a nuclear strike.

Communications Grids

The communications infrastructure including Internet servers, satellites and transmitters are critical infrastructure of the nation. The armed forces have done well with secure fibre optic backbones and widespread mobile services. The Air Force Network (AFNet) is an (IAF) owned, operated and managed modern state-of-the-art, fully secure gigabyte digital information grid. The AFNet replaces the IAF's old communication network set-up using the Tropospheric scatter technology of the 1950s making it a netcentric combat force. The IAF project is part of the overall mission to network all three Services. Defence Minister AK Antony inaugurated the IAF's AFNet on 14 September 2010 dedicating it to the people of India as part of India's communication revolution. This is a good example how legacy communication infrastructure is replaced on available facilities. The air force also launched a 3G network for its staff, becoming the first among the forces to have a 3G network, named AFCEL (Air Force Cellular).

India has to rise to be world-class with infrastructure and compete and export hardware and services in competition in the world market against first world militaries. India with its population, geographical position and military strength has a place to take up in the world. The three theoretically grounded development policies postulate, that a nation can rise on the tripod of economic, military and industrial strength. The military will need planning for infrastructure as it acquires world-class hardware from abroad and locally. The first step for better infrastructure is less theoretical and more pragmatic on how to face the limitations imposed by the MoD processes and the Defence Research and Development Organisation (DRDO). The defence industry has a large role to play. It also needs innovation for the three Services to synergise their infrastructure and harmonise with Planning Commission. DSA



DEPLETING AIR ASSETS TIME TO ACT

In my opinion there is a three pronged approach that is required. First is to accelerate the purchase of already selected systems. Second is to improve indigenous capability with a long-term strategy. Third and no less important is to improve serviceability of existing systems.

Geostrategically India is located in the most threatened region of the world. In close proximity, the Middle East has been a boiling pot and in perpetual state of conflict. Pakistan is the epicentre of world terrorism. India has serious boundary disputes with its two nuclear neighbours and has had wars with them. With emergence of muscle flexing China as a world economic and military power, the focus has shifted to Asia-Pacific region. Developing India had no choice but to maintain the world's third largest armed forces. Unfortunately the build-up of military assets has not kept pace with the increasing threat perception. Lack of state-of-the-art military-industrial complex forces imports of military hardware. For last five years, India has been the biggest importer of arms in the world.

Scandal Ravaged

The identification, selection and induction of a weapon platform invariably take a decade. Complex procedures, bureaucratic red-tape, technical specification changes, political interference and reported financial kickbacks have caused many a delay. The scandals in *Bofors* gun purchase for Indian Army, the *Barak* naval missile scandal, and more recent AgustaWestland VVIP helicopters of Indian Air Force (IAF) are cases in point. The Defence Procurement Procedure (DPP) has been repeatedly refined, but more needs to be done to hasten procurements. Direct government to government purchase as used to happen in Soviet era and the recent FMS route with USA is the fastest and least controversial and in India's best interest. The end result of delayed procurements is extensions to obsolete weapons and platforms, reduced operational efficiency, flight safety risks and a compromise of national security.

Aerospace: The Place Of Action

Aerospace is the place of all action. Armies and navies are investing larger parts of their budgets in aerial platforms. Indian Army will soon have more helicopters than IAF and has been eyeing fixed-wing ground attack aircraft. Indian Navy's second aircraft carrier *Vikramaditya* and the recently acquired Boeing *P-8I* aircraft have made a quantum increase in its air power. Notwithstanding the recent induction of the Special Operations Lockheed *C-130-J-30* and heavy-lift Boeing *C-17 Globemaster*, and significant number of *Su-30 MKIs*, there are many purchases that are held up. IAF today is at a low of 34 combat squadrons. It may take 15 years to reach the authorised 45 squadrons. The asymmetric advantage over Pakistan has reduced considerably and China is pulling way ahead with two fifth generation fighters under development and mixed bag of transport aircraft and helicopters already flying. In my opinion there is a three pronged approach that is required. First is to accelerate the purchase of already selected systems. Second is to improve indigenous capability with a long-term strategy. Third and no less important is to improve serviceability of existing systems.

Accelerate Procurements

After a gruelling selection process, the French *Rafale* has been selected as 4th Gen-plus fighter. This 'omni role' fighter will bring a new dimension to India's national security. It incorporates the most advanced technologies and can very efficiently perform all types of missions in all-weather, day or night conditions. It's capability to also do stand-alone operations gives it high levels of strategic flexibility. Aircraft is combat proven in Afghanistan, Libya and Mali. French Air Force's initial *Rafale* strike missions over Mali were launched from mainland bases 6,300 km away. Four *Rafale* aircraft launched at short notice at night destroyed 21 pre-designated rebel targets in the middle of Mali. For this nine hour plus mission, each aircraft carried either, six 500 GBU-12 laser-guided bombs and a Thales Damocles designator pod, or six Sagem 'Hammer' AASM (Armament Air-Sol Modulaire), air-to-ground modular GPS precision guided smart bombs. They landed back at N'Djamena in Chad having been air-refuelled six times. The new generation reconnaissance pods contain long-range infrared band and visible spectrum sensors that can image from high altitude, as well as designed for high-speed, low-altitude missions. *Rafale* can launch 12 'Hammer' from two aircraft within a minute and hit targets dispersed over a wide area. It can also now carry the longer-range 500 GBU-22 and larger 2,000 GBU-24 laser-guided bombs. Availability rate of the



The end result of delayed procurements is extensions to obsolete weapons and platforms, reduced operational efficiency, flight safety risks and a compromise of national security

Rafale was over 90 per cent, despite the tough deployment conditions. IAF has seen similar availability rates on its *Mirage 2000* aircraft. Mali also saw interoperability of *Rafale* with some of the aircraft types which also fly with IAF. These included, the Boeing *C-17*, Lockheed Martin *C-130*, the IAI *Heron* UAV and chartered *Il-76*, among others. In Afghanistan and Libya, *Rafale* has been tested in deserts, rough seas and high mountains. They have flown air defence, long-range strike, maritime strike, reconnaissance and SEAD (Suppression of Enemy Air Defences) missions. These missions are a great example of how IAF will be able to use the *Rafale*.

Rafale's Potential

Rafale's max take-off weight at 2.5 times its empty weight gives it great fuel and weapon carriage combinations and an external load of phenomenal nine tons. Visual and Beyond Visual range (BVR) MICA missile variants, modular bombs with option of GPS / infra-red / inertial kits, long-range stand-off air-to-surface (ground / sea) weapons, laser-guided bombs, 2,500 rounds per minute 30 mm canon, make it a very potent weapon platform. Stealth features and electronic warfare suite improve its survivability. Aircraft has a great man-machine interface. High reliability and modular concept, even for the M-88 engine, would reduce maintenance man-hours, costs and down-time. Would also reduce spares inventories. Embedded in design is easy accessibility, making it a maintenance man's dream machine. Extended mission range will allow the IAF dominance and power-projection through 'air-sovereignty' missions across Indian Ocean littoral and match India's global standing and aspirations. Benefits of transfer of modern technology would mean imbibing extensive technical knowledge. France is the only western country outside USA with all range of aviation technologies in its basket. Already flying AESA radar, advanced cockpit avionics, on-board oxygen generating systems, reduced RCS stealth features and certain



AIR MARSHAL ANIL CHOPRA PVSM, AVSM, VM, VSM (RETD)

The writer is highly decorated and qualified aviator with more than 3,400 hrs of flying experience on over 40 types of aircraft, Test Pilot and Qualified instructor and examiner of Indian Air Force. In near 40 years of Operational career in Indian Air Force, held important appointments such as Command of No. 1 Squadron (Mirage 2000), Air Officer Commanding of two major fighter bases. Team leader for an aircraft upgrade project in Russia. Commanded the prestigious Aircraft and System Testing Establishment where 4 prototypes were under testing and development at that time. Served as Assistant Chief of Air Staff (Inspections), directly responsible for Operational, Maintenance and Administrative Quality audit of entire Indian Air Force. In the last two years of service, served as Air Officer in Charge Personnel managing the Human Resources of entire IAF.

self-protection features are all new to the sub-continent. The aircraft will enter service with IAF three years after signing of contract. Delays in signing contract have implications and are best avoided.

After a gruelling selection process, the French Rafale has been selected as 4th Gen-plus fighter. This 'omni role' fighter will bring a new dimension to India's national security. It incorporates the most advanced technologies and can very efficiently perform all types of missions in all-weather, day or night conditions. It's capability to also do stand-alone operations gives it high levels of strategic flexibility

Helicopter Gunships

For over 20 years IAF has operated the *Mi-25* and *Mi-35* attack helicopters. In spite of upgrades, they are overdue for replacement. The AH-64 *Apache* is a four-blade, twin-engine attack helicopter with a tail wheel-type landing gear arrangement and a tandem cockpit for a two-man crew. It features a nose-mounted sensor suite for target acquisition and night vision systems. It is armed with a 30-millimeter M230 chain gun. The four hard points mounted on stub-wing pylons, typically carry a mixture of AGM-114 *Hellfire* missile and *Hydra 70* rocket pods. Longbows also have a station on each wingtip for an AIM-92 *Stinger* twin missile pack. The AH-64 has a large amount of systems redundancy to improve combat survivability. Over 1,000 AH-64s have been produced to date. The US Army is the primary operator. It is the primary attack helicopter of multiple nations, including Greece, Japan, Israel, Netherlands and Singapore and is being produced under license in the United Kingdom as the AgustaWestland *Apache*. Aircraft has served in conflicts in Panama, the Persian Gulf, Kosovo, Afghanistan and Iraq. Israel has made active use of the *Apache* in its military conflicts in Lebanon and the Gaza strip. Induction of the 22 AH-64 *Apache* needs to be hastened.

Heavy Lift Choppers

Boeing-manufactured CH-47 *Chinook* was chosen over the Russian *Mi-26* heavy lift helicopters. Fifteen helicopters will replace IAF's ageing Russian *Mi-26* fleet. It is a twin-engine, tandem rotor heavy-lift helicopter. Over 1,179 have been built to date. The CH-47's primary roles include troop movement, artillery emplacement and battlefield resupply. It has a wide loading ramp at the rear of the fuselage and three external-cargo hooks. Aircraft has considerable combat exposure, having first arrived in Vietnam in November 1965. Its most outstanding missions in Vietnam were of placing artillery batteries in mountain positions inaccessible by any other means. The CH-47D has seen wide use in operations in Afghanistan and Iraq. The *Chinook* is being used in air assault missions, inserting troops into fire bases, casualty evacuation (casevac) and also combat logistic missions bringing food, water and ammunition.

Ab Initio Trainer Aircraft

Another area that requires urgent attention is flying training aircraft. For basic stage the fast track procurement of *Pilatus PC-7 Mk II* made a big difference. In the absence of viable indigenous basic trainer programme, more of these need to be procured and options clause exercised. The intermediate stage *Kiran* aircraft is already overstretched. HAL should concentrate on getting the Intermediate Jet Trainer (IJT), christened *Sitara*, quickly to operational status. The shortage of 500 pilots is hinged on availability of training aircraft. The future for aviation is unmanned. More Unmanned Aircraft Systems (UAS) need to be procured. Indigenous development has to be accelerated.

SAM Batteries

In addition to the aircraft, there is a list of surface-to-air missiles (SAM) and ground based radars that need urgent procurement. These include indigenously designed and built 25 km range *Akash* missile to replace older Soviet era SAM-IIIs. To develop with Israel a variant of the *Barak* SAM as IAF's Long Range SAM (LRSAM) with 70 km effective range. Induction of at least four more Israeli Aerostat radar systems, while India's Defence Research and Development Organisation (DRDO) evolves its own aerostats. The indigenous *Rohini* and *Reporter* ground-based radars must grow in numbers in the meanwhile. Need for early induction of mountain radars to cover the northern border. The current fleet of three *Phalcon* AWACS would increase to five while DRDO completes development of indigenous EMB-145 based AEW&C aircraft. The indigenous Ballistic Missile Defence (BMD) system based on the *Swordfish* radar derived from the Israeli *Green Pine* radar and the *Prithvi* or Advanced Air Defence (AAD) missiles should be in place in next eight-ten years.

Improve Indigenous Capability

Like the Russians during the Soviet Union days, Chinese mastered the art of reverse engineering. No country parts with high-end strategic technologies. One has to beg, borrow or steal. Transfer of Technology contracts has never been easy to implement. When Soviet Union broke up, scientists were picked by the Western countries, Israel and China with small inducements. India should have done the same. If India can have a world-class space programme then getting indigenous aircraft capability should not be so difficult. It is time to get our act together. There is a need to appoint an independent task force free from bureaucratic control. Development of Light Combat Aircraft (LCA) did afford us a learning opportunity. Delay in LCA has been the single most important reason for our dwindling aircraft strength. India has had great scientists but most have been poor project managers. There is a need to hire professional higher management to head defence labs and PSUs.

China has been more open to taking Foreign Direct Investment (FDI) in defence. Most countries have very successfully leveraged the offsets contracts to gain access to technologies. The total value of the *Rafale* radar, electronic communications and self-protection equipment is about 30 per cent of the cost of the entire aircraft. The offset clause of 50 per cent means nearly US$ 10 billion worth of work for Indian companies. The Hindustan Aeronautics Limited (HAL) could be direct beneficiary. History shows us that when HAL started *Jaguar* assembly, it greatly improved component manufacture, sheet metal work, milling of turbine blades and other manufacturing practises. Setting up of *Mirage 2000* overhaul again brought many industry best practises and also changed the mind-set and work culture at shop floor and management levels. The big question is does the HAL have the capacity to absorb such huge amounts within short time frames. Has HAL built enough vendor-base to outsource tasks?

Open data on the Internet indicates most IAF aircraft fleet serviceability hovers between 50 to 70 per cent. When including operational sub-systems serviceability, effectively nearly half the inventory is operationally unavailable. Every 5 per cent improvement in serviceability would mean adding three squadrons to the inventory



Will HAL be able to maintain the production quality standards? Indian industry too has been waiting to jump onto the bandwagon and get their share of the pie. In May 2001, Indian government opened defence industry for up to 100 per cent private sector participation and up to 26 per cent Foreign Direct Investment (FDI), both subject to licensing. Major private-players in defence sector today are Tata Advanced Systems Limited (TAS), Larsen and Toubro, Kirloskar Brothers, Mahindra Defence Systems and Ashok Leyland. Dassault was looking for a strong cash rich Indian offset partner. Their focus initially was on Tatas who had history of aviation links and could make easier to handle partners. Reliance Industries being the very big cash rich group was their other choice. Indian industry strengths are well known. They can take on anything from small component manufacture, electronics, software, heavy engineering, sheet metal work, high quality milling etc. MoD may wield the stick and synergise activities of DRDO, HAL and industry.

Accelerate Serviceability

Open data on the Internet indicates most IAF aircraft fleet serviceability hovers between 50 to 70 per cent. When including operational sub-systems serviceability, effectively nearly half the inventory is operationally unavailable. Military controlled Pakistan prides itself in maintaining high aircraft serviceabilities and considers this a force multiplier when equating with India. A large number of imported systems mean long supply chains. IAFs experience with Russian fleets has been a lead time of up to 18 months for spares and repairs. Such time frames are operationally and financially unaffordable. To illustrate, 1,000 aircraft force with 50 per cent serviceability effectively would leave only 500 aircraft for combat. Every 5 per cent improvement in serviceability would mean adding three squadrons to the inventory. The serviceability could be increased by small investments *vis-à-vis* new purchases. A better model is already operating in some western fleets wherein the foreign manufacturer ensures door to door pick up and supply of spares and these need to be emulated across all types. Life cycle cost calculation for all procurements should be mandatory.

Avoid Munitions Obsolescence

Most armaments and munitions have finite storage life and also operational life. Invariably it is around ten years. These can be extended after some costly checks. Replacements and procurements have to be anticipated. Obsolescence has to be catered for. Quantities stocked have to match the operational plans. Rs 400 crore aircraft with just two days of armament stocking is good for nothing. This very crucial aspect of procurements needs much greater attention.

India has been ruled continuously by foreign powers for past 1,200 years. History tells us security needs highest priority and attention. IAF's aircraft numbers have dwindled over a few decades. The writing has been on the wall. More needed to have been done much earlier. Time to act is now.

DOES INDIAN NAVY NEED A NUCLEAR POWERED AIRCRAFT CARRIER?

This article analyses the need for a third large aircraft carrier and whether it should be nuclear powered or conventionally powered. Both the *Vikramaditya* and *Vikrant* will use the simpler (and cheaper) STOBAR (Short take off but arrested recovery) which uses a ski jump ramp to launch fighters with only about 180 metres for a runway and use arrester wires for recovery within 50 metres of landing. The next indigenous Indian aircraft carrier should be a conventionally-powered, 65,000 tonne, STOBAR type with "affordable aircraft".



STOBAR and STOVL

The Indian Navy has always aimed at maintaining a balanced fleet which comprises units capable of operating on the surface of the oceans, below the waves and in the air. While submarines are needed for sea denial and strategic deterrence roles, the aircraft carrier and its surface escorts are needed for sea control. The navy has recently signed the contract with South Korea to induct two Mine Countermeasures Vessels and build six more in Goa Shipyard and the Defence Acquisition Council on 23 December 2013, cleared the induction of 262 *Barak* anti-missile defence (AMD) missiles, 16 shallow water 700 tonne Anti-Submarine Warfare (ASW) corvettes, so some loopholes in our maritime defence capability have been plugged. In addition the DAC also cleared the 30 year old case for acquisition of two badly needed Deep Submergence Rescue Vessels (DSRVs) for submarine rescue, possibly due to the loss of the submarine *Sindhurakshak* on 14 August 2013. It is hoped that these clearances by the DAC, finally materialise. India desperately needs to induct more conventional and nuclear submarines (SSNs), while its indigenous production of SSBNs needs to be speeded up. This article analyses the need for a third large aircraft carrier and whether it should be nuclear powered or conventionally powered. It also looks briefly at means to find additional funds for the depleting submarine fleet.

The Carrier Saga

The Indian Navy acquired its first aircraft carrier the second hand 16,000 tonne *INS Vikrant* from the United Kingdom in 1961. This light fleet escort aircraft carrier served the Indian Navy well for 40 years before being decommissioned. In the 1971 Indo-Pak War it played a stellar role in the creation of Bangladesh by enforcing a sea blockade and also attacking the ports and coastal airfields of the then East Pakistan. In 1988, the Indian Navy acquired its second aircraft carrier (from the United Kingdom) the second hand 28,000 tonne *INS Viraat*, which continues to serve today though it is over 50 years old. While I will explain terms like CATOBAR, STOBAR and STOVL in the next four paragraphs, it may be worth noting that the original *INS Vikrant* was initially a CATOBAR ship (it used a single steam catapult to launch its subsonic *Sea Hawk* jet fighters and *Alize* ASW aircraft in about 35 metres runway length, while aircraft recovery was made in 30 metres, using arrester wires) but by 1989 was converted to STOVL when it began to operate the newly acquired subsonic *Sea Harrier* jet fighters (these jets can take off vertically with very low flight endurance due to high fuel consumption and land vertically and also take off from a ski jump ramp in 180 metres (with more flight endurance than vertical take off). The *INS Viraat* was inducted in 1988, as a STOVL ship, with subsonic *Sea Harrier* jets. Both these vintage carriers used the *Sea King* helicopter for ASW roles and the *Chetak* helicopter for Search and Rescue (SAR) roles. The *Viraat* today also deploys the *KA-31* helicopter for Airborne Early Warning (AEW) roles.

The latest such American carrier (USS Ford) has cost US$ 13 billion at 2013 prices and embarks US$ 10 billion worth of aircraft ie this single aircraft carrier and its aircraft are presently equal to more than half the total Indian defence budget of US$ 40 billion! Hence cost, along with available technology will play a major part in what kind of air capability the Indian Navy chooses for the future

Vikramaditya / Vikrant Era

The 44,570 tonne aircraft carrier, *INS Vikramaditya* (ex-Russian Navy *Admiral Gorshkov*, but made completely new after a very major refit-cum-modernisation lasting almost 10 years), was commissioned into the Indian Navy on 16 November 2013. This ship will remain the largest ship in the Indian Navy for many years to come. It is almost twice the size of the ageing aircraft carrier, *INS Viraat*, which is expected to be decommissioned after 2018, when it will be replaced by the 37,000 tonne indigenous aircraft carrier, the "new", *INS Vikrant* (presently fitting out at Cochin shipyard). Both the *Vikramaditya* and *Vikrant* will use the simpler (and cheaper) STOBAR (Short take off but arrested recovery) which uses a ski jump ramp to launch fighters with only about 180 metres for a runway and use arrester wires for recovery within 50 metres of landing. These two medium sized ships will also use the *Sea King* helicopters for ASW role, the *KA-31* helicopters for AEW role and the *Chetak* helicopter for SAR role. The shipborne and heliborne radars along with the *MiG-29K* fighters will ensure that all enemy surface and aerial threats will be neutralised before they can enter an "air bubble" of 400 nautical mile radius around the aircraft carrier.

The smaller aircraft carrier in service, the 28,000 tonne, *INS Viraat* uses STOVL (Short take off but vertical landing) for its ageing subsonic *Sea Harrier* fighters. STOVL is the simplest and cheapest option available, provided a suitable aircraft is available. Unfortunately the only suitable modern aircraft for STOVL (the under development American *F-35*), will cost over US$ 200 million per aircraft at 2013 prices.

Both the *Vikramaditya* and *Vikrant* will have a service life of about 50 years and will be capable of embarking and operating about 32 aircraft each, comprising a mix of 20 supersonic fighters (*MiG-29K* costing US$ 40 million each and / or the home built *LCA Mk 2* costing US$ 30 million each) and 12 helicopters. Media reports indicate that the Indian Navy is planning to build a third aircraft carrier of about 65,000 tonnes, which may or may not be nuclear propelled. Another debate is as to whether it should be STOVL or STOBAR or CATOBAR. The CATOBAR option includes using the latest EMALS (Electromagnetic Aircraft Launch System) which the Americans have introduced in 2013 in the latest 103,000 tonne "nuclear-electric" aircraft carrier, the *USS Ford*. America is the only nation producing the steam catapult for the CATOBAR system and will replace it with the more sophisticated EMALS system in the next few years. Hence induction of a CATOBAR system into the Indian Navy would mean reliance on a single vendor for the ship's lifetime support of the system.

US / French Navies

A total of 10 navies operate about 22 aircraft carriers. Only the US and French navies operate nuclear propelled aircraft carriers. The US Navy operates 10 nuclear powered 100,000 tonne aircraft carriers, with each ship capable of embarking about 55 fighters and another assortment of about 35 different aircraft cum helicopters



VICE ADMIRAL ARUN KUMAR SINGH (RETD)

The writer retired as Flag Officer Commanding-in-Chief of the Eastern Naval Command, Visakhapatnam. His key appointments included Director General of the Indian Coast Guard (during the Tsunami of 26 December 2004) and Commander-in-Chief of the Tri-Service Andaman and Nicobar Command. He is also a prolific writer on maritime, strategic and nuclear issues.



To avoid frequent expensive and time consuming reactor nuclear refuellings, the American aircraft carriers refuel reactor uranium only after 25 years, by using reactors with highly enriched uranium (HEU) which at over 93 per cent enrichment is weapons grade and requires special metallurgy. India, presently does not have this capability and its limited uranium stocks are best used for nuclear weapons and nuclear submarine propulsion

for other roles (Anti-Submarine like the *S3 Viking* aircraft, Airborne Early Warning like the *Hawkeye* aircraft, Search and Rescue helicopters etc). These 10 American carriers use the CATOBAR system (Catapult take off but arrested recovery) for aircraft launch (in 100 metres) and recovery (in 50 metres). Each American aircraft carrier has four steam catapults and can launch aircraft every 20 seconds. The CATOBAR System is complex and the costliest option, but ensures a higher sortie rate of aircraft for various missions and also permits aircraft to take off with full fuel and armament, even if they are slightly underpowered. The latest such American carrier (*USS Ford*) has cost US$ 13 billion at 2013 prices and embarks US$ 10 billion worth of aircraft ie this single aircraft carrier and its aircraft are presently equal to more than half the total Indian defence budget of US$ 40 billion! Hence cost, along with available technology will play a major part in what kind of air capability the Indian Navy chooses for the future.

The French Navy operates about 18 *Rafale* jets from its single 37,000 tonne nuclear powered aircraft carrier (CATOBAR type, using two American steam catapults and arrester wires) but due to expensive and time consuming nuclear refuelling (which takes over 2 years) of its medium enriched uranium (MEU) reactors (about 40 per cent enrichment) every six years, it appears to have given up the plan to build a 70,000 tonne nuclear powered aircraft carrier.

British Gambit

To be effective in a hostile enemy environment, an aircraft carrier needs to embark at least 36 jet fighters, in addition to about 12 helicopters. This requires a ship of about 65,000 tonnes. The need for a 65,000 tonne aircraft carrier is in keeping with the trend in medium sized navies such as Russia and China which operate one such (STOBAR type) carrier each and the United Kingdom which is building two such (STOVL type) carriers for delivery in 2016 and 2018 respectively, at an estimated cost of about US$ 5 billion each. Indeed, media reports indicate, that the British, finding these ships (and their fighter aircraft the American *F-35*, costing over US$ 200 million each) to be prohibitively expensive, are ready to sell one of these carriers to India, which has apparently declined, in favour of indigenous construction. The indigenous 37,000 tonne aircraft carrier *INS Vikrant* was limited in size due to the constraints of Cochin Shipyard whose dry dock can only build aircraft carriers upto 40,000 tonnes. Today, for the first time India has the capability to build and repair aircraft carriers upto and over 100,000 tonnes, thanks to the massive dry dock (one ready and second one will be ready by 2015) in Pipavav Shipyard in Gujarat. This is important as China, with its growing economy is planning to launch a 110,000 tonne aircraft carrier (STOBAR type) in 2020 and it should start sea trials by 2025.

N-propulsion Debate

While nuclear power gives a submarine total stealth by enabling it to remain submerged (and practically undetectable) for a patrol duration of about 90 days, it does not provide the same stealth to an aircraft carrier, which, being on surface, is visible and detectable by enemy radars and surveillance satellites. Also, nuclear power does not mean unlimited endurance as it is widely believed. Depending on its level of enrichment a typical reactor will give a vessel 240 days at sea at economic speed for five (about 30 per cent uranium enrichment) to 25 years (over 93 per cent Uranium enrichment). Hence to avoid frequent expensive and time consuming reactor nuclear re-fuellings, the American aircraft carriers refuel reactor uranium only after 25 years, by using reactors with highly enriched uranium (HEU) which at over 93 per cent enrichment is weapons grade and requires special metallurgy. India, presently does not have this capability and its limited uranium stocks are best used for nuclear weapons and nuclear submarine propulsion. For these reasons, the next indigenous Indian aircraft carrier should be a conventionally powered , 65,000 tonne, STOBAR type with "affordable aircraft" and the US$ 3 to 4 billion saved, should be utilised to make up the alarming and well-known shortfalls in our submarine force levels (including induction of a second *Chakra* type SSN) and this should be the top priority at present.

sneak peek

DSA™

The First and the Only ISO 9001:2008 Certified Defence and Security Magazine in India

Announces March 2014 Issue on



Women in Defence and Security



Defexpo 2014



Role of DRDO in National Defence

For subscription write to: subscription@dsalert.org ■ online@dsalert.org

Or call: +91-11-23243999, 23287999, 9958382999


Bofors 155 mm howitzer

URGENT PROCUREMENT FOR OPTIMUM PREPAREDNESS

The leakage of an ultra-sensitive Top Secret letter will certainly have an adverse impact on national security as it has given undue advantage to India's military adversaries by publicly disclosing sensitive information about the deficiencies in weapon systems, ammunition and equipment in service in the army. However, now that these facts are in the public domain, these must help to focus the nation's attention on the need to speedily make up the shortages.

Defence preparedness is a function of the training and morale of the combatants, the suitability of the force structure, the efficacy of the weapons with which the force is armed, the adequacy of the supporting equipment, the availability of the right quantities of ammunition and explosives and, the serviceability state of the war machinery. Due to critical deficiencies in several of these elements, the present state of defence preparedness – particularly that of the army – leaves a lot to be desired.

More than anything else, the former Army Chief, Gen VK Singh's leaked letter to the Prime Minister and the CAG's report, both of 2012, revealed that the state of defence preparedness is a cause for serious concern. Parliament's Standing Committee on Defence has noted these developments with concern. Attributing the deficiencies to 'hollowness' in the defence procurement system, Gen VK Singh reportedly wrote in his letter to the PM: "The state of the major (fighting) arms ie Mechanised Forces, Artillery, Air Defence, Infantry and Special Forces, as well as the Engineers and Signals, is indeed alarming." According to Saikat Datta (*DNA*, March 28, 2012), some of the major issues the COAS raised are:

- The army's entire tank fleet is "devoid of critical ammunition to defeat enemy tanks."
- The air defence is "97 per cent obsolete and it doesn't give the deemed confidence to protect … from the air."
- The infantry is crippled with "deficiencies of crew-served weapon" and lacks "night fighting" capabilities.
- Elite Special Forces are "woefully short" of "essential weapons".
- There are "large-scale voids" in critical surveillance; night fighting capabilities.

Enemies Forewarned

The Army Chief's letter brought into the public domain what has been known for long to army officers in service and those who have retired from service – that there are glaring deficiencies in the army's arsenal. The leakage of an ultra-sensitive Top Secret letter will certainly have an adverse impact on national security as it has given undue advantage to India's military adversaries by publicly disclosing sensitive information about the deficiencies in weapon systems, ammunition and equipment in service in the army. However, now that these facts are in the public domain, these must help to focus the nation's attention on the need to speedily make up the shortages and give the army the wherewithal that it needs to fight and win future wars.

General VK Singh is not the first COAS to have apprised the PM about the poor state of preparedness; his predecessors have done so as well. General KM Cariappa had gone to Pandit Nehru to ask for additional funds for military modernisation and was reported to have been told that India did not need an army; it needed a police force as India had no enemies. The ignominious defeat of 1962 followed.

Long-standing Problem

The late General Bipin Joshi had written to PM Narasimha Rao to urge him to help the army to make up the long-standing large-scale shortage of ammunition. While the shortage was worth over Rs 10,000 crore, Army HQ had reportedly identified a "bottom line" figure without which the COAS said the army would remain unprepared for war.

While the COAS pointed out several operational deficiencies, the most critical ones include the complete lack of artillery modernisation since the Bofors 155 mm howitzer was purchased in the mid-1980s, "night blindness" of the army's infantry battalions and mechanised forces and the fact that the air defence guns and missile systems are 97 per cent obsolescent

Perhaps the country's precarious financial condition in the early 1990s did not allow PM Narasimha Rao to provide the necessary funds to immediately make up the shortage. The critical deficiencies remained and a few years later when the Kargil conflict took place, the whole nation heard the COAS, General VP Malik, make the chilling statement on national TV, "We will fight with what we have."



BRIGADIER GURMEET KANWAL (RETD)
The writer is a Delhi-based defence analyst.

Approximately 250,000 rounds of artillery ammunition were fired in the 50-day Kargil War. It is well known that India had to scramble to import 50,000 rounds of 155 mm ammunition for its *Bofors* guns, besides other weapons and equipment during the Kargil conflict. Stocks of tank ammunition and those for other artillery and air defence guns were also low and it was just as well that the fighting remained limited to the Kargil sector and did not spill over to the rest of the LoC or the plains.

Government orders authorise the stocking of sufficient ammunition to fight a large-scale war for 50 to 60 days. This is known as the "war reserve". As the Army Chief's letter and the CAG report bring out, not enough new stocks were apparently procured to make up even the ammunition expended during the Kargil conflict. Stocks of several critical varieties of ammunition for tanks and artillery guns have fallen to as low as less than 10 days war reserves. Also, ammunition has a shelf life of about 12 to 15 years, at the end of which it is no longer usable for combat but can still be used for training. Hence, the shortages continue to increase every year if action is not taken to constantly make up the deficiency.

Wither 'Transformation'?

The other major issue highlighted in the letter written by the COAS pertains to the continuation in service of obsolescent weapons and equipment and the stagnation in the process of military modernisation aimed at upgrading the army's war-fighting capabilities to prepare it to fight and win on the battlefields of the 21st century. While the COAS pointed out several operational deficiencies, the most critical ones include the complete lack of artillery modernisation since the *Bofors* 155 mm howitzer was purchased in the mid-1980s, "night blindness" of the army's infantry battalions and mechanised forces and the fact that the air defence guns and missile systems are 97 per cent obsolescent. The inadequacy of the intelligence, surveillance and reconnaissance systems, with an adverse impact on command and control during war, adds to the army's difficulties.

This sorry state of affairs has come about because of the flawed defence planning and defence acquisition processes in existence, a grossly inadequate defence budget and the inability to fully spend even the meagre funds that are allotted. Funds are surrendered quite often due to bureaucratic red tape – civilian as well as military, scams in defence procurement and



the frequent blacklisting of defence firms accused of adopting unfair means to win contracts.

Dysfunctional NSC

Long-term defence planning is the charter of the apex body of the National Security Council which meets very rarely due to the preoccupation of the PM and other members of the Cabinet Committee on Security (CCS) with day to day crisis management. As such, the 15-years Long-term Integrated Perspective Plan (LTIPP) and five-year Defence Plan do not receive the attention that these merit.

The 11th Defence Plan, which terminated on March 31, 2012, was not formally approved by the government till then and, hence, did not receive committed budgetary support that would have enabled the three Services to plan their acquisitions of weapons and equipment systematically, rather than being left to the vagaries of annual defence budgets.

Consequent to the leakage of the Chief's letter and the major uproar in Parliament that resulted, the Defence Minister is reported to have approved the 12th Defence Plan 2012-17 and the LTIPP 2012-27 in early-April 2012. While this is undoubtedly commendable, it remains to be seen whether the Finance Ministry and, subsequently, the CCS will also show the same alacrity in according the approvals necessary to give practical effect to these plans. It has not happened so far.

The MoD must take stock of the army's preparedness for war and internal security challenges. It must identify the causes behind the inadequacy of defence preparedness. The defence budget has dipped below 2.0 per cent of the country's GDP despite the fact that the Service Chiefs and Parliament's Standing Committee on Defence have repeatedly recommended that it should be raised to at least 3.0 per cent of the GDP if India is to build the defence capabilities that it will need to face the emerging threats and challenges and discharge its growing responsibilities as a regional power in Southern Asia.

The government will do well to appoint a National Security Commission to take stock of the lack of preparedness of the country's armed forces and to make pragmatic recommendations to redress the challenge posed by prevailing deficiencies and inadequacies that might lead to yet another military debacle. The inability of the defence procurement and production processes to deliver results, the unbelievably low levels of defence indigenisation, the shortfall in production and the poor quality of weapons, equipment and ammunition produced by ordnance factories and the shoddy performance of the quality control organisations, need to be carefully examined. Some measures to improve the management of national security so as to enhance defence preparedness are given in the box above. DSA

Measures For Better Management Of National Security

●Formulation of a comprehensive National Security Strategy (NSS), including internal security, after undertaking a strategic defence review.

●Immediate appointment of Chief of Defence Staff to guide the defence planning function, formulate integrated tri-Service operational plans and provide single point military advice to the Cabinet Committee on Security (CCS).

●According of CCS approval for LTIPP 2007-22, the long-term integrated perspective plan of the armed forces and for the ongoing 12th Defence Plan 2012-17 and provision of guaranteed budgetary support for capital acquisitions.

●Enhancement of the defence budget in stages to 3.0 per cent of the GDP for meaningful defence modernisation and for building capacities to upgrade the present military strategy of dissuasion against China to deterrence.

● Implementation of long-pending procurement projects including artillery and air defence modernisation, F-INSAS, FICV, C4I2SR, the acquisition of MMRCA fighter aircraft, aircraft carriers and submarines, in a time-bound manner.

● Enhancement of the financial limits of commanders and PSOs to enable speedy procurement of fast moving stores like ammunition and other consumables.

●Review of the performance of ordnance factories and defence PSUs with a view to encouraging the private sector defence industry and efforts aimed at indigenisation.







INDIA'S MISSILE CAPABILITY SIGNIFICANT STRIDES IN 2013

Besides the act of the test itself conveying a signal, much more can be gleaned through an analysis of the nature of the test in terms of the actor(s) engaged in the exercise and the characteristics of the tested missile. In April 2013, the *Agni II* was subjected to a training trial by the Strategic Forces Command (SFC), the organisation entrusted with the task of managing India's operational nuclear capability and which would be required to swing into action in case of deterrence breakdown.

Signalling is an important component of credible nuclear deterrence. Demonstration of the ability to build nuclear hardware, such as nuclear warheads and delivery systems of adequate range and reliability, are important constituents of this. The other two dimensions, which may be described as the software of nuclear deterrence, include having the resolve to use that capability and most importantly, the communication of both the capability and the resolute political will. It would make no sense to have the capability and the steadfastness to use it, but not to credibly convey the same to the adversary. Indeed, if the purpose of nuclear deterrence is to stop the adversary from contemplating use of nuclear weapons in the first place, this obviously requires making him believe that deterrence breakdown, triggered by his own action, would cause him more harm than good.

Sign Language

The communication of signals to play on the psychology of the adversary may be undertaken through official statements, information on conduct of meetings of the National Command Authority to convey seriousness of consideration of nuclear scenarios, or through conduct of military war games involving nuclear simulation, or through periodic testing of missiles to demonstrate acquisitions / improvements in delivery vectors. The last of these steps was particularly in evidence in 2013 as India steadily strode towards operationalising its own version of credible minimum deterrence. A number of ballistic missiles – ranging from the still under development *Agni V* to the already inducted short and medium range *Prithvis* and *Agnis* were subjected to trial launches during the year.

Besides the act of the test itself conveying a signal, much more can be gleaned through an analysis of the nature of the test in terms of the actor(s) engaged in the exercise and the characteristics of the tested missile – type, range, level of mobility, fuel propulsion etc. This article undertakes a brief examination of the nine missile tests that India undertook in 2013 to highlight some trends that contribute to enhancing the credibility of India's nuclear deterrence. It concludes by identifying some of the future challenges that yet remain to be conquered.



DR MANPREET SETHI
The writer is an ICSSR Senior Fellow affiliated to Centre for Air Power Studies, New Delhi.

A test of Agni V, the second for this longest range missile that India has tested so far, took place on 15 September 2013. Presently being tested with a single warhead, it has been hinted by the highest levels of DRDO leadership that work towards enhancing the capability of the missile to be able to carry multiple independently targetable vehicles (or MIRVing) is continuing apace

Missile Tests In 2013

India began the year 2013 with the first ever test of its nuclear capable underwater ballistic missile from a submerged pontoon. Though this missile, the *K-15* or *Sagarika*, with a range of 700 km had undergone several developmental trials before this, the high point of the event was the launch of the missile from an underwater platform and its success in meeting all objectives of the mission.

In April 2013, the *Agni II* was subjected to a training trial by the Strategic Forces Command (SFC), the organisation entrusted with the task of managing India's operational nuclear capability and which would be required to swing into action in case of deterrence breakdown by executing the political decision to undertake nuclear retaliation. In order to prepare itself for all eventualities, the SFC has been engaged in a number of activities including missile testing. In April last year, it undertook the test of the two stage, 2,500 km range *Agni II* missile fuelled by a solid propellant that enables it to be rail mobile. In fact, the missile was inducted into the armed forces in 2004. On the occasion of the test in 2013, the DRDO, which has been the developer of all Indian missiles, claimed that the systems of *Agni II* had been perfected over the years so that it can today be brought into ready-to-fire mode in only 15 minutes.

A test of *Agni V*, the second for this longest range missile that India has tested so far, took place on 15 September 2013. A three stage solid fuelled propellant equips this missile with a capability to go as far as 5,000 km, thereby increasing its strategic reach into the valuable areas and vulnerable points of China. Presently being tested with a single warhead, it has been hinted by the highest levels of DRDO leadership that work towards enhancing the capability of the missile to be able to carry multiple independently targetable vehicles (or MIRVing) is continuing apace, though a political decision to do so has yet not been taken.

The next set of missile tests took place on 7 and 8 October 2013 and these were of the *Prithvi II*, a short range ballistic missile of 350 km. The tests were carried out by missile regiments of the SFC as part of their training exercises. Though liquid fuelled, the missile is equipped with manoeuvring capabilities that can help it evade interception by missile defences of the adversary and has an advanced inertial guidance system

All land based variants of Agni are rail and road mobile, thereby increasing survivability. Therefore, testing of these missiles must be accompanied by other steps necessary to cover the existing inadequacies in India's roads, bridges and rail infrastructure to support a missile like Agni V which will weigh 50 tonnes

that provides it with a good level of accuracy. The same missile was tested once again on 3 December 2013 by the SFC, thereby making it its third test within two months.

Meanwhile, on 23 November 2013, the SFC also tested *Dhanush*, the naval variant of *Prithvi*. A single stage missile with a liquid propellant, it can be launched from sea to hit land or sea based targets with a conventional or a nuclear payload. Earlier the same month on 8 November 2013, India had also tested the *Agni I* that has a strike range of 700 km. Launched from a mobile platform by the SFC as part of its regular training exercise, the *Agni I* is solid propelled and a single stage missile.

Finally, India ended 2013 with the test launch of *Agni III* on 23 December 2013. A two stage solid fuel ballistic missile with a range of 3,000 km, the missile was launched from a rail based mobile launcher. It is reported to have an advanced navigation system that equips it with a high degree of accuracy. This test too was carried out by the Strategic Forces Command.

Overall then, 2013 was remarkable for India's missile testing since a total of nine test launches were conducted covering a wide gamut of capabilities. In fact, the only missile that was not tested in the year was the *Agni IV*, a 3,500 km missile that is still under development. It is interesting to see some of the trends as are visible from this range of testing that India undertook.

Significance Of The Tests

The first interesting fact that emerges from this brief recount of the tests that took place in 2013 is that except for two tests – that of the *K-15* SLBM and of *Agni V* – which were conducted by the DRDO as part of developmental trials, all other missiles were test launched by the Strategic Forces Command as part of the training exercises of its missile units. Also, since these were of missiles that had been inducted into service some years ago or some like the *Prithvis* that had been operational for many years now, the tested missiles were drawn from existing stockpiles. Both these factors point to a greater credibility of the operational arsenal that India has managed to build over the last fifteen years since the test of the nuclear weapon in 1998.

It is also clear that India is focused on building and maintaining both short and long range ballistic missiles to cater for a range of threats. It should also be highlighted that the advantages of liquid fuelled missiles in terms of allowing greater manoeuvrability is being retained in the *Prithvi* class of missiles, while reaping the advantage of mobility (rail and road) in the case of the solid fuelled *Agnis*. All land based variants of *Agni* are rail and road mobile, thereby increasing survivability. India's extensive road and rail network offers the option of moving missiles around, including the addition of dummies for deception, if other logistic requirements of adequately hardened infrastructure and sufficient fuel reserves to ensure freedom of movement can be met. Therefore, testing of these missiles must be accompanied by other steps necessary to cover the existing inadequacies in India's roads, bridges and rail infrastructure to support a missile like *Agni V* which will weigh 50 tonnes. Indeed, unless serious attention is paid to building the road and rail infrastructure that can sufficiently support the missile of the size and weight of *Agni V*, it would negate the advantage of its mobility.

In the year 2014, as also in the long-term, India will have to focus primarily on two other capabilities. The most important of these is the need for submarine launched ballistic missiles of longer ranges going up to at least 3,000-5,000 km. The second, development of multiple reentry vehicles (MRVs) and manoeuvrable reentry vehicles (MaRVs) that can drastically change trajectory to evade interception in the terminal stage

Solid fuelled missiles also offer the benefit of a quick response and longer storage life. A liquid fuelled missile takes a longer time for preparation and in case of non-use of the missile after fuelling, the fuel must be drained out at the earliest owing to its highly corrosive nature. In contrast, a solid fuelled missile offers a less cumbersome option in terms of ease in storage and transportability. Compression of preparation time for a nuclear use, though not especially significant with a no first use strategy that does not demand the missiles to be on hair trigger alert, nevertheless could offer the benefit of easing logistics of coordination of different elements of the arsenal in times of crisis.

Focus For Future Capabilities

In the year 2014, as also in the long-term, India will have to focus primarily on two other capabilities. The most important of these is the need for submarine launched ballistic missiles of longer ranges going up to at least 3,000-5,000 km so that they can reach targets that would constitute unacceptable damage for the adversary while keeping themselves out of harm's way. A submarine version of *Agni V* or thereabouts would, therefore, be the next technological challenge for the DRDO in service of credible deterrence even as the newer versions of the *INS Arihant* get ready.

Secondly, focus has to be retained on improving the penetrability of Indian missiles. Given that China has a sort of operational ballistic missile defence, though currently of a low order, the ability of Indian missiles to evade interception will be a necessity to convey the capacity to cause unacceptable damage. Development of multiple reentry vehicles (MRVs), which hit the same target with many bombs and manoeuvrable reentry vehicles (MaRVs) that can drastically change trajectory to evade interception in the terminal stage, are capabilities that will help in buttressing credible deterrence.

Power projection is a valid task of a missile and the very act of testing sends a powerful signal. All tests that India conducted in 2013 will have been duly noted by India's regional adversaries as well as by the international community. They do play a critical role in nuclear signalling and the scale and range of missile testing last year indicates significant strides towards credible deterrence. DSA



SMALL ARMS ARE NO SMALL MATTER

Despite realising the creeping obsolescence of our small arms inventory – the 9 mm carbines, 7.62 mm SLRs and 7.62 mm LMGs – we did not take action to initiate an indigenous development or importing a new weapon system.





COLONEL US RATHORE (RETD)

The writer is a risks and threats analyst and defence and security expert. He was commissioned into Indian Army in 1980. He has a rich experience of participating in various operations in different terrains. He commanded an infantry battalion during Operation Parakram – the general mobilisation after terrorists attacked Indian Parliament in December 2001. He is founding member of Centre for Land Warfare Studies – Indian Army's think tank. Post-retirement, he is associated with Security Sector Skill Development Council and has been instrumental in drafting National Occupational Standards for Private Security Sector – first of its kind in India.

Indian Army has been struggling with obsolescence, shortages and procurement delays. One often gets to read about how it is coping with its night-blind main battle tanks and vintage artillery guns, anti-aircraft guns and helicopter fleet. But the plight of Indian infantry goes unheard. Known as the "Queen of Battle", this glorious arm guards country's frontiers, fights insurgency and terrorism and remains battle-ready for conventional operations is armed with obsolete and obsolescent small arms. Small arms like pistols, carbines, rifles and light machine guns (LMGs) are personal weapons for officers and men. These, as compared to tanks, guns and helicopters are low technology pieces and quite affordable in monetary terms. Yet, we are faced with a situation where our Armed Forces, Central Armed Police Forces (CAPFs) and State Police (Civil and Armed) are inappropriately armed. Seems, we do not have a small arms philosophy for security forces in place. In all, there are about 4.8 million security personnel in the country armed with disparate personal arms – from World War I vintage .303 *Lee-Enfield* rifles to assorted array of state-of-the-art assault rifles, sub-machine guns and pistols.

We have been rather slow in realising the requirement for a change in our small arms inventory. In fact, every time it was a rude shock that forced us to change. In 1962, 7.62 mm Self-Loading Rifles (SLRs) were hurriedly imported from USA and supplied to the frontline divisions in NEFA, where our troops were fighting the Chinese with .303 rifles. In 1965, after obtaining technology from USA the production of 7.62 mm SLRs started in the ordnance factories. Mercifully, we fought 1965 war with 7.62 mm SLRs.

Inappropriate Small Arms

During Punjab insurgency, police and army faced insurgents armed with *Kalashnikov* rifles. Punjab police had to hastily import *Kalashnikovs* to address the disadvantage it faced *vis-à-vis* insurgents. Again in 1987, Indian troops fighting the Liberation Tigers of Tamil Eelam (LTTE) were outclassed by the rebels armed with *Kalashnikovs*. As a stop-gap measure we imported some *Kalashnikovs* urgently and also converted the single-shot SLRs into automatic rifles. Such was the desperation that our troops preferred to use *Kalashnikovs* captured from the LTTE rebels over their own rifles. In 1989, armed insurgency erupted in Kashmir. Insurgents were armed and equipped by Pakistan with latest *Kalashnikovs*, *Pika* guns and under-barrel grenade launchers. Again we resorted to some off-the-shelf buying for *Kalashnikov* rifles. Similarly, the CAPF and state police whenever employed in counter-insurgency and counter-terror operations were faced with similar disadvantage. Despite realising the creeping obsolescence of our small arms inventory – the 9 mm carbines, 7.62 mm SLRs and 7.62 mm LMGs, we did not take action to initiate an indigenous development or importing a new weapon system.

Post World War II, it was realised that 7.62 mm ammunition was too powerful for killing or injuring a person. Though it was effective at longer ranges but generated harsh recoil, needing a robust weapon to absorb. It was felt that 7.62 mm weapon was designed for 'overkill'. Since, a smaller calibre weapon could also inflict the desired casualty on the enemy; the battle-load of a soldier could be reduced. This philosophy led to the development of 5.56 mm calibre for small arms. In 1964, *M16* rifle was produced for the US Army. In late seventies, NATO countries adopted 5.56 mm as the calibre for the future. Gradually, Soviet Bloc countries and China also followed suit.

Shortcomings Of 5.56 mm Guage

The US troops were dissatisfied with the performance of 5.56 mm weapons in Vietnam and Iraq and now in Afghanistan. During the engagements at longer ranges the short-barrelled 5.56 mm weapons have been found wanting. Among the NATO nations, a discourse is gaining momentum to find an intermediate calibre (between 5.56 mm and 7.62 mm) for small arms. The consensus is gravitating towards 6.8 mm as the calibre of the future.

In late eighties Indian Small Arms System (*INSAS*) project to develop a 5.56 mm carbine, rifle and LMG for the Indian Army was undertaken by Defence Research and Development Organisation's (DRDOs) Armament Research and Development Establishment. The project was marred by its slow pace. As against the deadline of 1998 to equip all forces with *INSAS* series weapons, it was only in that year, Indian Army troops were first seen marching with *INSAS* rifles during the Republic Day parade. Induction of *INSAS* LMG lagged behind the schedule and the carbine was still on the drawing board stage. The 5.56 mm ammunition was also scarce as no manufacturing facility was in place. Ordnance factories could never meet the demand of the army.

INSAS rifle design is heavily inspired by *Kalashnikov* weapon system and also includes features from *FN FAL* (Belgium), *HK G3* (Germany) and even .303 *Lee-Enfield* rifles; but it suffers from poor integration. Though the publicised characteristics of *INSAS* weapons are impressive and comparable to small arms used by Chinese and Pakistan armies, but their performance on the ground has been below par. See tables.

Characteristics	*INSAS* (India)	*G3A3* (Pakistan)	*QBZ-95* (China)
Calibre	5.56 X 45 mm	7.62 X 51 mm NATO	5.8 X 42 mm
Magazine	Box, 22 rounds capacity	Box, 20 rounds capacity	Box, 30 rounds capacity
Type of Fire	Semi-auto and three round burst	Semi-auto and auto	Semi-auto, auto and three round burst
Rate of Fire	600-650 rounds per minute	500-600 rounds per minute	650 rounds per minute
Barrel Length	464 mm	450 mm	490 mm
Length of Weapon	960 mm	1,025 mm	743 mm
Weight of Weapon (Without magazine)	4.15 kg	4.40 kg	3.3 kg
Range	400 M	400 M	400 M – 600 M
Grenade Launcher	The design catered for rifle grenade and UBGL, but it did not succeed		Can launch grenade and also mounts an UBGL

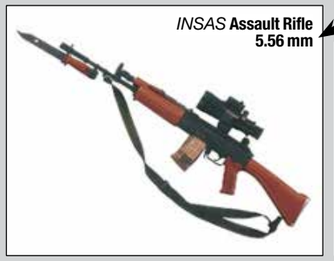






Table 1: Characteristics of Assault Rifles: India, Pakistan and China



Characteristics	LMG *INSAS* (India)	*MG1A3* (Pakistan)	*QBZ-95 LSW* (China)
Calibre	5.56 X 45 mm	7.62 X 51 mm NATO	5.8 X 42 mm
Ammunition Feed	Box magazine, 30 rounds capacity	Belt-fed	80-round drum magazine
Type of Fire	Semi-auto and auto	Auto	Auto
Rate of Fire	650 rounds per minute	1,150-1,300 rounds per minute	650 rounds per minute
Barrel Length	535 mm	565 mm	600 mm
Length of Weapon	1,050 mm	1,225 mm	840 mm
Weight of Weapon (Without magazine)	6.23 kg	11.5 kg	3.9 kg
Range	700 M	800 – 2,200 M	600 M – 800 M

Table 2: Characteristics of LMGs: India, Pakistan and China

Characteristics	*Amogh* (India)	*MP5A2* (Pakistan)	*QBZ-95B* (China)
Calibre	5.56 X 30 mm	9 mm	5.8 X 42 mm
Ammunition Feed	Box magazine, 30 rounds capacity	Box magazine, 30 rounds capacity	Box magazine, 30 rounds capacity
Type of Fire	Semi-auto and auto	Semi-auto and auto	Semi-auto and auto
Rate of Fire	700 rounds per minute	800 rounds per minute	800 rounds per minute
Barrel Length	330 mm	225 mm	369 mm
Length of Weapon	800 mm	680 mm	609 mm
Weight of Weapon (Without magazine)	2.95 kg	2.54 kg	2.9 kg
Range	700 M	100 M	300 M – 500 M



Table 3: Characteristics of Carbines: India, Pakistan and China

When *INSAS* rifle was used during Kargil conflict, its shortcomings appalled the troops. Faulty design, poor metallurgy and shoddy craftsmanship led to stoppages, breakages, overheating and barrel bulge. The design underwent a series of modifications but weapon's chronic defects persisted. The rifle failed to win the confidence of troops. Later, *INSAS* LMG and carbine were also introduced but could not make any impact. In just seven years of its induction, idea of replacing *INSAS* was gathering momentum within the army. In 2005, erstwhile Royal Nepal Army too complained about the malfunctioning of *INSAS* rifles during its encounter with Maoists, which it had received as largesse from India. The armed forces and CAPF meandered through the transitory phase caused by the *INSAS* experiment, but never got a trustworthy replacement to 7.62 mm weapons. During the interregnum, in the absence of a comprehensive small arms philosophy, all forces imported a variety of small arms independently.

Standardisation Lost

At least with 7.62 mm weapon system, armed forces and CAPFs had some kind of standardisation; its rifle, LMG and medium machine gun used interchangeable ammunition. With piecemeal introduction of *INSAS* rifle, forces were compelled to retain old 7.62 mm SLRs (or *Kalashnikovs*) for firing grenades as *INSAS* rifle grenade could never be developed; the 7.62 mm LMGs because *INSAS* LMG came after much wait and vintage 9 mm Carbines as *INSAS* Carbine never made it.



Standardisation in the forces' inventory, which *INSAS* weapons could have brought in, never materialised. It is noteworthy that during long-drawn process of trial and error, many cash-strapped East European and CIS countries and the erstwhile USSR itself were willing to offer *Kalashnikov* weapon technology on favourable terms.

Forces' modernisation is a continuous process; driven by 'one-third rule' ie one-third of the inventory should be of cutting edge technology, one-third of current technology and the rest – near-obsolescence technology. Due to the failure of *INSAS* project, forces are saddled with weapon systems, which deserve to be phased out immediately.

Small Arms, Big Business

Small arms trade is a big business; according to the 2012 Small Arms Survey, the legal trade of small arms and light weapons in 2012 was worth US$ 8.5 billion. Countries like Singapore, Israel and Italy are leaders of small arms industry. The DRDO and ordnance factories despite having such a huge captive demand from security forces have not been able to exploit the market potential of small arms trade, due to sub-standard R&D and poor project management.

Fed up with experimentations by DRDO and ordnance factories, army in 2011, declared its intention to scout for a new generation assault rifles and carbines in the world market. Soon, leading CAPFs too joined the chorus. Fresh orders from army for *INSAS* rifles on ordnance factories dried up during 2012-13. Shamed by the guilt of being unable to deliver, the DRDO and ordnance factories could not protest against the army's decision to buy arms off-the-shelf.

Despite the preponderance of fire from artillery and aircraft in the battlefield, the outcome of skirmishes at infantry section level in conventional and unconventional operations is still influenced by the quality and volume of rifle and LMG fire. Their firepower and accuracy should be overwhelming, irrespective of engagements at short or longer ranges. The CAPFs also are deployed in near-identical operational tasks like army; hence, their requirement for an assault rifle cannot be much different from army.

The wish list (box on right) for an ideal assault rifle is very exhaustive, but it should have some basic minimum characteristics.

Innovative Idea

The army is said to have opted for a multi-calibre assault rifle which can fire both – 5.56 and 7.62 mm ammunitions in conventional and counter-insurgency operations respectively. The multi-barrel assault rifles are not widely used by world armies, except for some Special Forces and armies of Canada, Chile, Italy, Mexico and South Africa are using Beretta's *ARX-160* multi-calibre assault rifle in small numbers. Multi-calibre weapon technology is yet to mature for mass use. Amongst the four-five vendors – Beretta, Ceska, Colt, IWI and Sig in the reckoning only Beretta has a multi-calibre weapon with matured design, which places it ahead of others.

When most of the world armies are still equipped with either *Kalashnikov* or 5.56 mm rifles, is opting for multi-calibre rifle a prudent decision? Would it not have been better to opt for separate assault rifles for conventional and counter-insurgency roles? If successful, it will certainly place Indian Army ahead of other armies. If unsuccessful, the army will lose valuable time and opportunity to modernise.

Assault Rifle: The Wish List

- Accuracy – should be able to engage a target with open sights and other sights at minimum, intermediate and maximum ranges. A firer should be able to fire single shot, controlled burst or automatic with ease and accuracy. Weapon should not generate excessive recoil.
- Accessories – weapon should be able to accept accessories like bayonet, sights, bipod, silencer, blank firing attachment, sling etc. For assault rifle bayonet is an important accessory, the infantry cannot do without it.
- Ambidextrous – weapon should be convenient for use by right or left handed soldiers. Operations like use of safety catch, cocking, aiming, firing, change of barrel or magazine, spent case ejection etc should not hinder a firer.
- Ammunition – should be able to fire a variety of ammunition – ball, tracer, armour piercing, blank etc. Ammunition should be interchangeable with carbine and LMG of the same family. Should be able to receive ammunition from a box or drum magazine or belt.
- Dependability – a weapon stopping during operations is quite dreadful to a soldier. Stoppages due to dust, sand, snow, low temperatures, jerk, fall or inadequate maintenance are very common. It should work with minimum lubrication. Dependability of a *Kalashnikov* rifle is a matter of envy for all other small arms producers.
- Ergonomy – the weapon should be small and manageable. It should be usable by soldiers of different height and built. Soldiers from all arms and services, paratroopers, Special Forces, paramilitary and police should be able to adapt to its features. It should have telescopic / foldable butt. Weapon should be operable from vehicle, armoured personnel carrier, patrol vessel and helicopter.
- Grenade Launching – should be able to fire grenades either from its muzzle or through an attached under barrel grenade launcher.
- Life – barrel life should be at least 30,000 rounds.
- Maintenance – should need minimum maintenance.
- Multi-barrel – the weapon should have a short and long barrel of the same calibre, OR
- Multi-calibre – the weapon should be able to take multi-calibre barrels and ammunition depending upon the battlefield conditions.
- Range – weapon should be able to deliver effective fire at close quarters and out to 600 M with the help of target designator / open sight / optical sights.
- Rate of Fire – should be able to fire more than 600 rounds per minute, but not at the cost of accuracy.
- Sights – firer should be able use a number of sights such as open, optical, night, laser, close-quarter battle, grenade launching etc depending upon the battlefield situations.
- Weight – fully assembled rifle without its magazine and accessories should not be weighing more than three kg.

It is planned to import 65,000 pieces from the selected vendor to equip 120 infantry battalions deployed on western and eastern commands. After the transfer of technology the weapons will be produced by ordnance factories. If the procurement process sticks to time schedule, arming of army's 360-odd infantry and Rashtriya Rifles battalions will take up to four years and last soldier will be armed with new assault rifle by 2020. Similarly, some 44,000 pieces of carbines are to be imported to replace 9 mm carbines. Decision on replacing *INSAS* LMG is yet to be taken. This process is likely to commence in 2014. It is a big-ticket purchase – close to US$ 2 billion.

What happens to the CAPFs and state police? Would these still be wielding antiquated weapons? While we must modernise the army, the CAPFs and police should also be adequately armed to deal with modern threats and that is only possible if we have a comprehensive philosophy. DSA



NATIONAL SECURITY
10-POINT AGENDA FOR NEW GOVERNMENT

To undertake the process of building capacity to face the Chinese juggernaut there would be a need to outline the agenda and commitment to implement the same from the very outset by various stakeholders. What is of concern is also continued dependence on imports for arming the military. India's arms imports have risen by 59 per cent from 2003-07 and are 109 per cent higher than that of China. This will create external dependencies impacting strategic autonomy.

In normal course, by June this year India will have a new government. Given the general consensus of need for adopting a more robust defence posture, political profile of the government may not be as important as the will to implement an agenda which is derived from a review of the security environment, planned trajectory, hindrances and likely gaps. Building optimum defence capability assumes particular importance in coming years given that India's main competitor in the Asian security space, China is expected to assume its second tier objectives of building a strong and resilient People's Liberation Army (PLA) which is regionally focused by 2020.

To undertake the process of building capacity to face the Chinese juggernaut there would be a need to outline the agenda and commitment to implement the same from the very outset by various stakeholders. It is expected that this will be undertaken by political parties in their election manifestos. Some suggestions may be relevant and are attempted herein.

Security Environment

While shift of global power from the West to the East or to Asia has been seen as a mark of growing importance of the Continent, this has also brought with it security challenges that are likely to increase over a period as reconfiguration of equations state and non-state are happening at a rapid pace. With reference to India's periphery, the rise of the PLA as an integrated force with informationised jointness between the four services: Army, Navy, Air Force and the Second Artillery will be a dominant factor in the security matrix. Synergy with the Pakistani military and nuclear establishment will provide the PLA, ability to expand its influence beyond the land and maritime boundaries of China. Presence of the PLA Navy in the Arabian Sea and the Bay of Bengal may be a reality with the army strengthening the launch pad in Tibet.

On the Western front developments in Afghanistan remain uncertain despite extensive capacity building of government and security forces in Kabul. If the example of Iraq is anything to go by, the situation could deteriorate over a period wasting away NATO's intervention in the past few years. This in turn would provide the momentum to the Pakistani intelligence establishment to reignite the flagging militancy in Jammu and Kashmir and intent to prepare the ground was evident in 2013 with an increase in incidents of infiltration and ceasefire violations the latter reaching an all time high of 200. Looking beyond the region, West Asia remains in turmoil with a large pool of Indian migrants and dependence on flow of oil and gas, instability in the region would impact our economy as well as energy security.

Internally while militancies remain at a low ebb, in 2013 there has been an increase in violence in Jammu and Kashmir and Left Wing Extremism affected states in Central India. Hinterland terror by groups as the Lashkar-e-Taiba and Indian Mujahideen could cause disruption impacting the economy as well as safety and security of the common man. A robust defence and security architecture to establish deterrence with a view to ensure territorial sovereignty and safety of our people will be a priority task for the new government.

Present State Of Deterrence

While there has been some progress in capacity building in the past few decades this has been incremental and is non-holistic thus resulting in gaps such as close fire support and light helicopters for the Indian Army, under sea and air defence capability of the Indian Navy and combat strike potential of the Indian Air Force. What is of concern is also continued dependence on imports for arming the military with recent SIPRI report stating that between 2008-2012, India's arms imports have risen by 59 per cent from 2003-07 and are 109 per cent higher than that of China. This will create external dependencies impacting strategic autonomy. The impact of the same was evident with hollowness in the army highlighted by former Chief of Army Staff General VK Singh in a letter to the Prime Minister in 2012. Thus deterrence assurance remains low. There are a number of organisational issues that are of concern as well and impact performance of the armed forces. Primary amongst these is civil military relations and jointness.

There is also a perception of lack of effective interface between the political head of the Ministry of Defence, the Defence Minister and Service Chiefs despite a number of mechanisms that have been established for this purpose. Thus well established norms for regular interaction be it face to face or through directives need to be strengthened to overcome poor communication

The Agenda

Against this backdrop agenda for accretion in expanding defence potential would have to focus on ten key issues as outlined below:



BRIGADIER RAHUL BHONSLE (RETD)
The writer is Director Security Risks Asia, an Asian risk and knowledge management consultancy based in New Delhi and specialises in risk management and future warfare.

1 Establish Political Control Over The Military: One of the main grouses of the armed forces is that civil control of military has come to mean subservience to the bureaucracy. Armed forces function in a structured hierarchy that has been institutionalised over the years, delegation is the norm in civil government and this could be one of the reasons for this view. There is also a perception of lack of effective interface between the political head of the Ministry of Defence, the Defence Minister and Service Chiefs despite a number of mechanisms that have been established for this purpose. Thus well established norms for regular interaction be it face to face or through directives need to be strengthened to overcome poor communication. This would surmount challenges faced in the past of a serving Chief taking redressal through court of law.

2 Services Jointness And Ministry Integration: Lessons from other armed forces in the world have highlighted that Jointness in the services and integration of the Ministry of Defence can happen in any one of the three ways – a national security crisis, an act of parliament or incrementally. At present India has adopted the last named evolutionary model that is slow and will not achieve desired results by end of the decade. A national crisis should not be hoped for, under the circumstances an act of parliament or a top down approach remains the most viable option and needs to be considered on priority. Services jointness should also include creation of theatre commands, integration of training and establishing the promotion chain through a joint ladder.

3 Graduating To The Information Age: Armed forces the world over have graduated to the information age, the Chinese call it informationisation. This need not be an incremental process and once again a lead from the top would be necessary by setting the ball rolling for a system of systems be it operational, logistics or administrative.

4 Accountability In Acquisitions: Delayed acquisitions are costing the nation dearly. This is not just in terms of operational readiness of the armed forces but also increased cost of delayed procurement. At present acquisitions process lacks accountability thus blame cannot be pinpointed whether it is the military, the DRDO, defence production or the Ministry of Defence. A result is light helicopters tender has been cancelled once in the final stage while it is likely to a second time, artillery guns have not been inducted in the army for the past

20 years while the famous MMRCA *Rafale* contract is under commercial negotiations for a period of over one year. A system of accountability with strict time norms for each step in the procurement process has to be introduced to overcome this ill.

While indigenisation is a priority, this has not taken off as once again there is no responsibility fixed for this purpose. The Department of Defence Production has to have a sufficiently senior officer preferably a special or additional secretary with the sole charter of indigenisation. This will ensure focus, as present organisation of this very important section of the Ministry is not amenable to this objective

5 Level Playing Field In Defence Procurement: A level playing field in defence procurement is essential, this is not just in terms of removing preference for defence public sector but tax norms for the private sector so that adequate incentives exist for long-term players to enter into this domain that has been a holy cow for too long.



6 Focus On Indigenisation: While indigenisation is a priority, this has not taken off as once again there is no responsibility fixed for this purpose. The Indian Navy has done well to nominate a Directorate of Indigenisation. The Department of Defence Production has to have a sufficiently senior officer preferably a special or additional secretary with the sole charter of indigenisation. This will ensure focus, as present organisation of this very important section of the Ministry is not amenable to this objective.

7 Proactive Approach for Controlling Corruption: The approach to controlling the menace of corruption at present is reactive. Thus the Ministry of Defence reacts only once a deal has been exposed by other agencies including the media. Invoking the integrity clause or encashing bank deposits do penalise the defaulting company and should continue but also result in delay in induction of essential military weapons and equipment. The Ministry of Defence and the armed forces must create internal organisational structures including full time surveillance of the acquisition process to deter corruption.

8 Curbing Financial Profligacy: For the economy of the country to come back on the 8 per cent growth trajectory is likely to take some time given global uncertainties and internal inadequacies which are quite evident. No magic wands are going to work under the circumstances. Curbing financial profligacy through curtailment of non-operational essentials needs urgent attention.

9 Quality Of Human Resource: There is a need for improving quality of human resources in the armed forces be it at the intake level or through in-service training to face the challenges of the informationised battlefield of the future.

10 Single Point Advice: A much debated issue, single point advice to the Ministry of Defence is need of the hour. In case Chief of the Defence Staff is not immediately practicable, nomination of a permanent Chairman Chiefs of Staff Committee should be made at the earliest. Consideration of upsetting the chain of promotions and so on should not come in the way for a measure that is essential in the interest of national security.

There are no runners up in war and while war avoidance is a laudable objective for the nation, unless capabilities are created for the same, this may not be achieved by the end of the decade. Some suggestions have been offered based on a general scan of the environment and essential needs which demand deliberation and fleshed out in greater detail. DSA

MILITARY ENGINES
PERPETUAL FOREIGN DEPENDENCE

Here is a case to go back to the basics and first produce an engine with assured thrust given Indian contrasting conditions of employment in both “hot” and “high” almost simultaneously in one mission and basing the qualitative staff requirements for any weapons platform of the user Services on that one pre-eminent parameter.





CECIL VICTOR
The writer has covered all wars with Pakistan as War Correspondent and reported from the conflict zones in Vietnam, Laos and Cambodia in South East Asia as well as from Afghanistan. He is author of *India: The Security Dilemma*.

When the incumbent Scientific Adviser to the Minister of Defence Dr VS Arunachalam unveiled the indigenous main battle tank (MBT) development project in the late 70s and explained why a foreign engine was to be used to “prove” the systems and sub-systems on-board the proposed weapons platform, a perceptive journalist had pointed out that an imbalance in the thrust-to-weight ratio is all it would take for the project to founder. And sure enough that is exactly what happened to three of the major national defence-related projects that were based on the flawed proposition that a parallel indigenous engine development programme could some day replace the foreign engine. The MBT, the Light Combat Aircraft and the helicopter projects have all suffered major time (several decades) and cost (in hundreds of crore) overruns not to mention the additional tens of thousands of crore worth of tanks and aircraft bought from Russia to fill the gap left by the absence of an indigenous main battle tank and the Light Combat Aircraft. Here is a case to go back to the basics and first produce an engine with assured thrust given Indian contrasting conditions of employment in both “hot” and “high” almost simultaneously in one mission and basing the qualitative staff requirements for any weapons platform of the user Services on that one pre-eminent parameter.

Tank Engine Scrapped

The indigenous tank engine which Dr Arunachalam stated would produce a thrust of 850 horsepower was to be turbocharged to produce the 1,400 horsepower that the German MTU engine would be producing and, thus, was supposed to fulfil the demands of the users, the Indian Army. In reality it never reached a thrust more than 700 horsepower and was never in a position to be able to replace the German MTU engine which itself was plagued by overheating and frequent breakdowns during cross country runs. Such were the complaints about the *Arjun* tank’s foreign engine that the Defence Research and Development Organisation suspected that the tank was being sabotaged and it set up a ‘black box’ to monitor interference with it. As far as the indigenous engine was concerned death pangs were seen even in the prototype stage and hence it became necessary to continue with the German engine into the series production stage. Only a small number of *Arjun* tanks were ordered by the army in two requisitions of 124 tanks each (total 248) which in no way meets the requirements for a favourable cost-benefit situation for which at least 500 need to be ordered.

Kaveri A Letdown

Much the same happened with GTX-35VS Kaveri gas turbine engine for the prestigious Indian project of creating an indigenous light combat aircraft. Parallel development was done by the Gas Turbine Research Establishment of the DRDO even as nine American General Electric F404 engines were brought from the US company to “prove” the prototypes of the *Tejas* light combat aircraft.



It turns out that not even the F404 engine produces the required thrust and it is proposed to incorporate a more powerful General Electric derivative the F414 for the next production lot of the indigenous Indian aircraft. Thus from the word 'go' two of India's prestigious "indigenous" weapons platforms are totally dependant on foreign engines

It turned out that the indigenous GTX-35VS engine was overweight by about 100 kg and not producing the 95-100 kilonewton (KN) thrust required to fly the LCA to its optimum capacity with full weapons load. It turns out that not even the F404 engine produces the required thrust and it is proposed to incorporate a more powerful General Electric derivative the F414 for the next production lot of the indigenous Indian aircraft. Thus from the word 'go' two of India's prestigious "indigenous" weapons platforms are totally dependant on foreign engines.

Helicopter Engines

Somewhat more strange is the case of one of the longest serving helicopters in the Indian Air Force fleet. Under a deal with Aerospatiale of France for license-production of *Alouette* helicopters (*Chetak* and *Cheetah*) by Hindustan Aeronautics Limited. India never exercised the option of joint development with France of an engine for an updated version. It was only after the indigenous *Dhruv* was commissioned into service that a joint venture was launched with the French company Turbomeca (which produced the engine used to power the *Cheetah* and *Chetak* Indian derivatives) for a helicopter engine named Shakti which is being retrofitted to the earlier versions of the *Dhruv* that are currently using a foreign engine. If this had been done three decades ago the cost and time overruns in creating the *Dhruv* would have been minimised. More particularly because the entire Indian military establishment was acutely aware of the series of embargoes and denial of technology that India was subjected to for not complying with the Nuclear Non-Proliferation Treaty and engaging in nuclear tests in 1974 and 1998.

Designer Dependence

Beginning with the Arunachalam era (when the major Indian projects supposedly intended to lead the country through phases of self-reliance based on licensed production of foreign equipment and competence-building to the desired goal of self-sufficiency – as in missiles – were launched) there has been an unexplained creation of weapons platforms that were designed in a manner that no existing engine could have carried without a gross imbalance between thrust and weight. Obsolescence was built into the *Arjun* tank (first named *Chetak* after Maharana Pratap's famous warhorse) by designing its girth and weight beyond anything that the Indian railway system could bear. The chassis was so large that it could not be moved from one part of India to the frontlines on the western sector without major changes in the rail carriages, tracks and bridges along the route from Babina and Jhansi in central India (where the tank regiments were based in peacetime) to the battlefront in Punjab and Rajasthan hundreds of kilometers away.

Carrying a weight of 58.5 tonnes and operating in the 50 degree plus centigrade temperature ambiance of the Indian deserts and plains little wonder that the German MTU engines collapse from sheer exhaustion caused by trying to suck oxygen from an ambient atmosphere that has been "rarified" by the heat. That the phenomenon exists is admitted by the scientific community when discussing aircraft operating in Indian "hot and high" conditions because it affects engine performance and the ability of the platform to carry its full designed load. Similar is the case with the *Tejas* aircraft that is now totally dependent on a foreign (in this case American) engine because the indigenous engine (the Kaveri gas turbine) was itself too fat and heavy and does not produce the requisite thrust-to-weight ratio even though the airframe of the *Tejas* has had to be manufactured from lighter composite materials to reduce its weight. The other problem that has to be dealt with is the tendency of the engine to "throw" compressor blades. This could be because of bad foundry work or inherent weakness of the metal used in fashioning the compressor blades. As far as the tank is concerned things have been made worse for the *Arjun* tank by the user's (army) insistence on more protection and the addition of explosive reactive armour (ERA) to an already overweight platform taking the total weight of the *Arjun I* to 62 tonnes and of the *Arjun II* to 67 tonnes.

Undoing A Legacy

Little wonder, then, that the current generation of scientists in the Defence Research and Development Organisation are working actively to undo the legacy of the Arunachalam era. They are talking of reducing the weight and girth of the next generation Indian main battle tank chassis from 58.5 tonnes to something around 50 tonnes. The experimental Tank X has already undergone a slimmer trim embodying the basic concept that a weapons platform must be in consonance with its ambiance and not disruptive and dependent on major changes in its operating environment. Something in the range of 48-50 tonnes powered by an engine attuned to Indian weather conditions is what should have, *ab initio*, been the objective of India's early venture into military self-sufficiency.

By going back to the drawingboard to redesign a slimmer, trimmer main battle tank the Indian Army is in the process of striking a balance (thrown up by seminars and brainstorming sessions) between protection, survivability, mobility and lethality in its next-generation main battle tank. The scientist-tankman collegium will have to find a via media between protection and mobility on the one hand and survivability and lethality on the other. Nonetheless, even while taking two steps backwards from the legacy of its most prestigious military platforms the DRDO needs to revisit its position on engines that will be required to power its future generation of equipment. Learning from the experiences of the engines for the main battle tank, the *Tejas* aircraft and the *Dhruv* helicopter there appears to be an urgent requirement for removing the shortcoming in the indigenous engines used in these products. Within the ambit of the public-private partnership there is space and expertise available to work together to produce engines for fighting vehicles (tanks and infantry combat vehicles), aircraft (fighters and transport) helicopters of larger capacities and engines required for marine craft. In every one of these segments India is dependent at least for the engines on foreign sources.

Time To Leapfrog Technology

As far as the Kaveri gas turbine engine is concerned, it needs to be ascertained whether a weight loss of 100 kg alone would drastically rectify the thrust-to-weight ratio of a *Tejas* aircraft that is being slated to carry new kinds of weapons like the *BrahMos* missile or any other weapon that may be in the process of development in the various DRDO laboratories. The expertise collected while developing new materials like titanium alloys in the MIDHANI (Mishr Dhatu Nigam) laboratory can be employed to the weight reduction process. Changing the material used in the components and sub-assemblies could make a substantial difference. Since nano-technology is the buzzword in military circles, the process can be employed in weight and size reduction. The use of nano-technology in fashioning compressor blades could revive the Kaveri engine and obviate the need to 'reinvent the wheel' at least in aero-engine design and construction.

Some expertise has been gained in modular design of aero-engines through the Indo-French joint venture in developing the Shakti engine which can gainfully be employed in the design and development of other types of engines required for platforms used in land and marine environments.

Since initial efforts have been made in the tank, Kaveri and helicopter engines it would be more appropriate to use them as stepping stones for future applications. The joint venture with the Russians in the production of a fifth generation fighter aircraft must revolve around the transfer of technology of the engine to be used in that category of fighters. It is heartening to note that, as in the case with the tank engine, it has not been decided to scrap the Kaveri. There is talk of employing the core called Kabini in the proposed unmanned combat aerial vehicle. That leads one to hope that there will be an incremental advancement and growth based on the gas technology in other engines required for the emerging Indian military industrial complex.

As far as marine engines are concerned there is all the more urgency in creating a sound base because the navy is one Service that has contributed the most to self-reliance and self-sufficiency as envisaged by former Prime Minister Jawaharlal Nehru and the much-maligned Defence Minister Krishna Menon whose contribution in the establishment of the foundations of the Indian military industrial complex has been interred with his bones. All but two of dozens of different sizes of warships required for the Indian Navy are being constructed in Indian shipyards. However, all of them are built around foreign engines. This needs to be rectified.

The future of the Indian military industrial complex depends very largely on the engines required for its weapons platforms. We have learned lessons from the mistakes of the past. It is time to change gears. DSA



DWINDLING DEFENCE CAPABILITY

The Prime Minister stated during the Combined Commanders Conference in November 2013 that the military should be prepared for more cuts. It should be a matter of shame for us that 67 years post Independence we continue to import 77 per cent of our defence needs despite a full-fledged DRDO, Ordnance Factories Board and host of Public Sector Undertakings.

Fully into wars in Iraq and Afghanistan, the US military undertook a study on the battle capacity of the forces. The findings included that while billions were spent on big ticket weapon systems, requirements at the ground level were ignored. India is in a similar situation with capability gap between the PLA and our military is widening exponentially and the two and half front threat spearheaded by China and Pakistan that we have to deal with ourselves. Yet, we have done little to build the indigenous military-industrial complex to acquire some measure of self sufficiency.

Big Ticket Syndrome

The GSLV-D5 launch demonstrated our cryogenic capability. Also, over the past year landmarks are: On-board nuclear reactor of *INS Arihant* gone critical; arrival of *INS Vikramaditya*; operational clearance to LCA *Tejas*; mountain strike corps sanctioned; launch of IRBM *Agni V*; underwater *BrahMos* test; testing *K-15 Sagarika* SLBM; induction of *C-130J Super Hercules* and *Globemaster III*; induction of *Pilatus PC 7 Mk II* tainer aircraft; commissioning of ALH-*Dhruv* Squadron by navy etc. But these need to be viewed in backdrop of the leaked letter by Gen VK Singh, former Army Chief to the Prime Minister, which is just one of the several similar letters written by many Service Chiefs and Chairmen, Chiefs of Staff Committee in the past. Ironically, importance of its contents were lost in the maze of allegations as to who leaked the letter, ignoring voids and shortages amounting to not being prepared for war.

Ground Realities

Public is unaware that such voids and shortages are brought to the notice of MoD officials and the Prime Minister during the Army Commanders Conferences and Combined Commanders Conferences held twice every year, in addition to monthly, quarterly, yearly reports. If Chiefs write to the Prime Minister or Defence Minister it is out of frustration over inaction by policy makers, who are unaccountable and don't care. If the Henderson Brooks-Bhagat Report on the 1962 war with China is not being de-classified it is because it will expose incompetence and inadequacies of policy makers; Nehru and Krishna Menon to be precise. Post the Gen VK Singh leaked letter episode, the Parliamentary Standing Committee on Defence outlined the "huge gap between the required and existing force level", ageing aircraft, scarcity of choppers, not enough tank ammunition and shortage of artillery guns, our defence expenditure being lowest compared to US, China, Pakistan, Russia and France. Additionally, we need to take serious note of ground realities, some of which are:

Public is unaware that such voids and shortages are brought to the notice of MoD officials and the Prime Minister during the Army Commanders Conferences and Combined Commanders Conferences held twice every year, in addition to monthly, quarterly, yearly reports. If Chiefs write to the Prime Minister or Defence Minister it is out of frustration over inaction by policy makers, who are unaccountable and don't care

NCW Capability

A country like Italy fielded an NCW capable Brigade three years back. In our case, intra-Service net-centricity in navy and air force is more because their weapon systems cannot function without it, but army is lagging behind. Lack of appropriate higher defence structures, void of network culture and inadequate political push, all are contributing factors. Lack of an NCW doctrine has resulted in disjointed NCW architecture. Neither voice or data networks nor radio communications of the Services are interoperable to desired degree. Networks of the three Services do not talk to each other; respective Intranets are not interoperable either. Common standards and protocols, common data applications, common secrecy algorithm and common GIS are yet to be evolved. Army will likely fully field the Battlefield Management System by 2022-23 provided there are no further delays. Other components of army's TAC C3I System are hiccupping away to show some progress primarily because of PSUs monopoly.

Jointness

Jointness in the Services is a misnomer. Integration of HQ IDS into MoD, as was envisaged, has been resisted because of corruption in defence procurement – of which there have been several incidents but no bureaucrat has ever been punished. Appointment of a CDS with full

operational powers is imperative in face of mounting threats but the government is not amenable to even a Permanent Chairman of Chiefs of Staff Committee, which at best can only serve as stop gap. A military cannot be run by Committees. Try replacing a Service Chief with a Chairman Army Commanders Committee and you will literally kill decision-making. There is no move to establish Integrated Theatre Commands and Integrated Functional Commands.

Military-industrial Complex

It should be a matter of shame for us that 67 years post Independence we continue to import 77 per cent of our defence needs despite a full-fledged DRDO, OFB and host of PSUs. Every DRDO project is behind decades with mammoth cost overruns. Occasionally, MoD issues a warning for face saving, without follow up. Imports facilitate massive bribes and corruption prohibits optimising private sector participation, latter kept to the bare minimum. We fail to learn from well equipped forces like in Japan where defence production is fully privatised. The state of affairs in India can be best viewed through the letter by Manibhai Naik, CMD of L&T to the Prime Minister in 2011 saying, "Defence Production (MoD) Joint Secretaries and Secretaries of Defence Ministry are on the Boards of all PSUs – sickest of sick units you can think of who cannot take out one conventional submarine in 15 years now with the result that the gap is widening between us and China and bulk of the time we resort to imports out of no choice. The defence industry which could have really flowered around very high technological development and taken India to the next and next level of technological achievement and excellence is not happening." This is despite the fact that technology is available off the shelf globally, foreign firms are amenable to transfer of technology and even giving the source code and we simply need to superimpose our own security overlays. DRDO, PSUs and OFB products are not in the top 10 in same category compared to global products. Glaring examples of these are the *Arjun* tank, *Saras, Kaveri* engine, *Akash*, *Nag*, *Indra* Radar, NVDs, even bulletproof jackets and clothing. Many are developed without prior consultations with military and thrust upon them. The poorly designed *Saras* trainer crash killed three IAF personnel. Why did we waste so many years and money on the *Saras* and waited for deaths of IAF personnel before inducting the *Pilatus*?



Fiscal investments in R&D are grossly inadequate. There is little governmental direction and coordination. We boasted of the underwater BrahMos test in 2013 but the submarine that can fire it will only come by year 2030. This is despite, six submarines being developed in India under license

Critical Technology Focus

Fiscal investments in R&D are grossly inadequate. There is little governmental direction and coordination. We boasted of the underwater *BrahMos* test in 2013 but the submarine that can fire it will only come by year 2030. This is despite, six submarines being developed in India under license. Road maps do exist for developing laser technology, directed energy weapons etc but they are moving at excruciatingly slow space. There are no plans to leapfrog technology as being done by China and even Pakistan, possibly because reinventing the wheel implies more funds to line the pockets of people with vested interests.

Air Defence

The Army Air Defence (AAD) equipment is about three decades obsolete, L/70 guns (major component) more than four decades. Steps are being initiated for replacements and upgrades but did we have to wait for this state of affairs? The indigenous *Akash* SAM was primarily developed to replace vintage *Kvadrat* system for AD cover during fast paced mechanised manoeuvres but failed during mobility tests and acquiring and engaging targets on the move though such technology existed in indigenously developed naval platforms and tanks in service with the army. So, *Akash* was given to IAF to replace *Pechora* missiles to beef up layered AD of static areas like airfields. Recently, two regiments of *Akash* have been contracted for AAD supposedly with the 'higher mobility' version though it is still unclear whether these platforms will replace the *Kvadrat* systems or will be used static. Now a wide array of radars and SAM systems are planned for induction, contracts worth over Rs 17,000 crore having been signed with more to come. Ironically, AD units of Pakistan are better equipped including quick-reaction missiles and man-portable SAMs like laser-guided *Stingers* and *Mistral*. India has launched procurement process for three types of SAMs (medium-range, quick-reaction and man-portable short-range missile systems) to replace AAD's *Kvadrat, Strela* and other systems. These will be in addition to two regiments of the indigenous *Akash* systems. The AAD will also need a Rs 200 crore ground infrastructure for these two *Akash* regiments. The IAF is in the process of getting eight *Akash* squadrons, first one having been deployed at Gwalior. In addition, a Rs 750 crore project is underway to upgrade about 50 *Shilka* anti-aircraft systems (imported from Russia in 1980s) that are equipped with four 23 mm automatic cannons. Simultaneously, AAD units are also inducting some 30 three-dimensional tactical control radars, which can track airborne targets up to a range of 90 km, plus over 15 low-level lightweight radars, which can be used in mountainous terrain, for over Rs 1,500 crore. How soon the new systems will be fielded is anybody's guess but meanwhile the AAD continues to be grossly underequipped. Army's AD Control and Reporting System (ADC&RS) is running way behind schedule, needs to be mated with its IAF counterpart and fielded early. As per initial plan, the fielding of the Test Bed was to be done in December 2009 but this is yet to materialise.

Air Lift Vs Para Drop

Induction of six *C-130J Super Hercules* and four *Globemaster 17 III* with six more in pipeline are all very fine but these aircraft are meant for strategic lift. As for airborne and heliborne capabilities, it is a matter of serious concern that we have not conducted a full scale airborne or a heliborne exercise of a complete battalion group, leave aside lifting the Parachute Brigade in two lifts.

Artillery

Hardly any artillery guns have been procured since 1980s. The stock of *Bofors* guns has also dwindled from the 400 imported to below 200. One hundred and eighty pieces of 130 mm / 39 calibre *M-46* Russian guns have been upgraded to 155 mm / 45 calibre by Soltam of Israel. Army had successfully tried and selected BAE Systems *M-777* ultra light artillery guns from the US more than a year back but the procurement has been delayed over an anonymous letter alleging bribes. In addition in 2012, tenders had been floated for 1,580 towed guns of 155 mm / 52 calibre, 100 tracked guns of 155 mm / 52 calibre and 180 wheeled and self-propelled guns of 155 mm / 52 calibre but provisioning of these would take many years. The Mountain Strike Corps itself needs fielding of requisite artillery before it is fully raised.

Army had successfully tried and selected BAE Systems M-777 ultra light artillery guns from the US more than a year back but the procurement has been delayed over an anonymous letter alleging bribes. The Mountain Strike Corps itself needs fielding of requisite artillery before it is fully raised

Below Par Small Arms, Clothing

It should be a matter of shame for us that the military and the police forces have to import assault rifles, carbines and light machine guns. The *INSAS* rifle produced 15 years after 17 5.56 mm assault rifles from 11 countries were provided is nowhere close to the 10 top models in the world. The indigenous bulletproof jackets, winter clothing, NVDs are all inferior quality.

Communications

The Tactical Communication system that should have been fielded a decade back, is still years away. The Defence Communications System meant to provide strategic communications within the three Services does not include developing the requisite software.

Defence Budget

The military works out Long Term Integrated Procurement Plans but these are without a National Security Strategy, which should be the basis of any such planning. Defence modernisation funds were cut by Rs 10,000 crore during the fiscal 2013-14. Now the Prime Minister stated during the Combined Commanders Conference in November 2013 that the military should be prepared for more cuts. What needs to be borne in mind here is that army's existing ammunition and equipment deficiencies stand at Rs 41,000 crore and the Rs 90,000 crore cost of raising the Mountain Strike Corps spread over seven years, will itself need specific budgetry allotment during 2013-2014. In addition developing the infrastructure to deploy this Corps will likely entail another yearly cost of about Rs 25,000 crore. Such expenditure would be needed over and above the modernisation plans of the military, as discussed above.

A country which faces threats on two and a half fronts cannot but strengthen its military as the vital part of its Comprehensive National Power. But, the fact today is that the political-bureaucratic-military system of India has become dysfunctional. These causes need to be seriously examined and addressed. Unless and until we do this, our defence capability will continue to remain inadequate and 1962 type reverses will remain a possibility. DSA

INDIAN NAVY
STILL SHORT OF BLUE WATER STATUS

Doubtless this purchase-construction of more capabilities, increased spending, increased deployments of such capabilities and active exercise with other navies underlines Indian Navy's long-term vision to develop into a true blue water force with power projection capabilities. But the grand vision is not without its impediments and challenges.



The Indian Navy turned 63 last year but its quest for blue water status remains tenuous and mercurial. Undoubtedly the Indian Navy has seen very remarkable and outstanding strategists and planners at its helm who laid down a sound plan for the navy to be truly a maritime nation's navy, to safeguard its vital economic and security interests linked to the seas, with the intrinsic determinants of global reach and mobility, power projection and adequate sea control and sea denial capabilities. But the Indian Navy's zealous drive of "transforming itself from a 'brown water' coastal defence force to a formidable 'blue water' fleet", has been painfully long and hurdled with critical shortfalls and is as yet not near fruition, challenged as it is by the tedious political and procurement system.

Indeed the last year saw crucial developments in the Indian Navy with the first indigenously built ballistic missile nuclear submarines, (SSBN), the *Arihant*, going critical; its first indigenously-built aircraft carrier the *Vikrant* being launched; the Russian-overhauled *Vikramaditya* charting course for Indian shores and the launch of the GSAT-7 communication satellite for its exclusive use and to provide it with netcentric capabilities.

Ambitious Plans

These developments do indeed mark a new phase in Indian Navy's quest to become a true blue water navy and are the manifest major milestones in the ambitious steps put forth by navy in its Maritime Capability Perspective Plan (MCPP) 2005 for a projected 160 ship-strong fleet, including 90 front-line combat platforms, with three aircraft carriers, 60 major combatants, 34 submarines and close to 400 aircraft of different types. The plan envisaged a formidable three dimensional force with satellite surveillance and networking for force multiplication.

The development of such a force structure continues concomitantly with stepped up efforts to improve India's defence industrial base, building-up its strategic potential including ballistic missile submarines, nuclear (SSBNs), development of sea-based strategic missiles, force multipliers, quality of weapon sensors and networking of platforms. The pace of purchasing and construction has been accelerating, particularly with government approval in April 2012 of the five-year Defence Plan for 2012–17 and the Long Term Integrated Perspective Plan (LTIPP) for 2012–27, one of the biggest modernisation phases for the Indian Navy with the Ministry of Defence approving acquisitions worth over US$ 49.6 billion for the next 15 years. Under these plans, the Indian Navy will be inducting more than 90 fighting platforms in the next ten years. The order book is indeed laden heavy with over 43 ships under construction at various Indian shipyards and around 50 more ships in the pipeline which include the seven Frigates under the P17 A, four P15 B Destroyers, three Krivak Class Frigates, eight waterjet Fast Attack Craft, eight Mine Hunters, one Cadet Training Ship, two Deep Submergence and Rescue Vessels (DSRVs), four LPDs, 16 shallow water ASW corvettes, 11 OPVs and the two indigenous Aircraft Carriers, two Diving Support Vessels, four Hydrographic Survey Vessels and six submarines under P75-I.

Outdated Platforms

Doubtless this purchase-construction of more capabilities, increased spending, increased deployments of such capabilities and active exercises with other navies underlines Indian Navy's long-term vision to develop into a true blue water force with power projection capabilities. But the grand vision of navy to be a blue water force and credible sea power is not without its impediments and challenges. Despite the success of *Vikrant* and *Arihant*, defence production has been marred by serious technical and organisational problems, leading to significant delays. Navy is functioning with ships that have outlived their lives and should be decommissioned but which have not been phased out as replacements have as yet not materialised. The fleet profile of the navy is heavily skewed with over 45 per cent of the fleet comprises of ships over 20 years old, another 40 per cent of ships between 10-15 years old and only 10 per cent of the ships in the desired 0-10 years operational age.

Areas Of Weakness

While the Indian Navy's modernisation programme with build-up of force structure and balance as envisaged is indeed robust, these developments should not obscure the fact that there remain many areas of weakness in the Indian Navy. The pace of Indian Navy's acquisitions and construction programme continues to advance in full throttle, but regrettably the induction of weapons and sensors to make these platforms combat worthy has not kept up and the vision of Indian Navy appears to be consigned and relegated to a 'numbers' game with 'floating platforms' with inadequate combat potential. In terms of percentages, about 80-90 per cent of the planned build-up has been in the 'float' (hull, body work, platforms), about 60 per cent in the 'move' (propulsion) and less than 30 per cent in the 'fight' (weapons and sensors) category.

To ensure that a navy has the capability to fight and win in distant waters, to attack or to defend itself, it must have the 'right weapons' and the 'right sensors' to enable 'right identification and classification' and the 'right shooting of the weapons' that is an integrated battle management system, which involve technologies that net together 'sensors-to-shooters' in a seamless way

To ensure that a navy has the capability to fight and win in distant waters, to attack or to defend itself, it must have the 'right weapons' and the 'right sensors' to enable 'right identification and classification' and the 'right shooting of the weapons' that is an integrated battle management system, which involve technologies that net together 'sensors-to-shooters' in a seamless way. Without this capability platforms remain mere platforms. The requisite weapons and sensors capabilities for offence and defence and to 'fight' must be acquired and built-up in tandem with the force build-up.

Weapon systems and sensors are key to survivability and the technological superiority of warships is not solely dependent on its sea worthiness or endurance, but sensors and systems for fulfilling their roles. In this the Indian Navy's main power arsenal – missiles, torpedoes and medium calibre guns are vintage with no cutting edge technologies. Critical deficiency exists in the areas of anti-ship missiles, surface-to-air missiles, naval guns and heavyweight torpedoes.

Baraks Still To Come

The navy's surface-to-surface missiles (SSM) inventory comprises a large number of Russian missiles which are getting obsolete. The *Barak-1* missile programme which was conceived in 2005 in collaboration with Israel to replace the Russian missiles with a new generation technologically advanced system has been delayed and the likely induction cannot take place before 2017. The present stock levels of *Barak-1* bought in 2002 as a substitute for the failed indigenous *Trishul* programme are not adequate to arm all ships fitted with the *Barak* system. India is yet to develop its indigenous capability in this regard. For anti-ship missiles, Indian Navy has a number of imported weapons which are outmoded with unreliable



CDR SUNIL CHAUHAN (RETD)

The writer is a Defence, Aerospace and Homeland Security professional and an independent researcher focusing on international security issues, maritime strategy, military affairs and force structuring, defence procurement and policies, climate change and disaster risk management. He was commissioned in the Indian Navy in 1985. He is a Fellow of the International Congress on Disaster Management (FICDM) and a Certified Master Trainer of Trainers from Emergency Management Institute (EMI), Emmetsburg, US. He is also a resource for Indian Institutes and Agencies for training on security issues, conducting table top exercises and risk assessment.

There is as yet no anti-missile defence shield for the fleets, the frontline warships, including the aircraft carriers Viraat and Vikramaditya. It is only recently on December 13, that the Defence Ministry cleared the Rs 880-crore proposal to buy 262 missiles from Israel to arm the Barak-1 anti-missile defence systems

probability of hit. The naval version of the *BrahMos N1* has been developed and has been inducted in many ships and is becoming the primary anti-ship missile of the Indian Navy. But the *BrahMos N1* of course is yet to be tried out successfully for assured circular error probable (CEP) and probability of hit. Further its size precluded its fitment on board smaller ships.

For underwater offence, Indian Navy has torpedoes, rockets and mines. The existing inventory of torpedoes is generally procured from Russia and other Western countries. Both the Italian lightweight torpedo and Russian heavyweight torpedoes are old technology and obsolete. Limitations of speed and range make them highly vulnerable to detection, tracking and hence evasion and destruction. Further the range of the ship / air and submarine launched torpedoes are lower than the submarine capability of ship detection. An upgraded inventory of torpedoes stands delayed till 2017. Indian Navy has to perforce to continue piecemeal induction of the old Russian torpedoes to fill the capability gap and maintain stock levels.

In the sensors domain too there are critical deficiencies in new generation surveillance and fire control radars. With introduction of new radar technologies, 4D radars, Multi-Function, Phased Array, Synthetic Aperture Radars, Cognitive Radars and Quantum Radars to meet the changing multi-mission requirements of modern naval warfare, the Indian Navy is clearly disadvantaged. The present surface surveillance radars of the Indian Navy, the S band surveillance radars MR 310 and Fregat of USSR inventory and BEL packaged RAWL from European sources, are of outmoded technology and have become almost obsolete and fail to provide an effective surveillance cover for the fleet. To fill this void the Indian Navy issued a tender for 31 surface surveillance radars just last year to meet its urgent operation requirements, but the procurement and finalisation of the product under the 'Buy and Make India' route is unlikely to materialise before 2017, with the planned phased induction till 2022. For air surveillance, shortchanged again by DRDO / BEL efforts at indigenising, the navy is urgently exploring options for new generation 3D Air Surveillance Radar for detection of hostile air platforms, UAVs and sea skimming missiles. But the case is yet to be progressed and the tender is not yet issued, though the RFI was issued in 2011.

At sea, the Indian Navy's air defences remain critically weak, with missile stocks for existing ships critically low and shrinking. There is as yet no anti-missile defence shield for the fleets, the frontline warships, including the aircraft carriers *Viraat* and *Vikramaditya*, with the Indian



Ministry of Defence having delayed the decision on the *Barak-1* deal pending the Central Bureau of Investigation kickback probe. It is only recently on December 13, that the Defence Ministry cleared the Rs 880-crore proposal to buy 262 missiles from Israel to arm the *Barak-1* anti-missile defence systems fitted on the navy's frontline warships, a critical acquisition that was hanging fire for several years. Though the proposal has been cleared the actual delivery of the missiles is unlikely before 2017.

Long Range Maritime Strike

The Naval Aviation arm, long treated as a poor cousin of surface combatants in the Indian Navy, is also expanding with the induction of the *MiG-29K*, the *P8I* long range maritime reconnaissance and anti-submarine warfare aircraft, commissioning of the first ALH *Dhruv* squadron at Kochi and an order book of eight additional medium-range maritime reconnaissance aircraft, UAVs, multirole helicopters and the upgrade of the *Sea King 42 B* and the *Kamov 28* fleets.

With India's expanding maritime zone of interest covering the entire Indian Ocean and extending to South China Sea from the Malacca Strait, the requirement for navy stands at close to 30 long-range maritime reconnaissance aircraft for its maritime surveillance and patrolling duties. Though the *Il-38s* with the navy have been refurbished and the *Tu-142s* are also being updated as a stop gap measure, the challenges before the Indian Navy are daunting and the navy urgently needs to modernise its maritime surveillance fleet. Indeed once all the 12 *P8I* aircraft are inducted, they will help plug major gaps in the Indian Navy's ability to maintain surveillance in the Indian Ocean region. But the navy will have to wait for over four more years to get all surveillance aircraft as all the 12 *P-8Is* will not be delivered before 2018. The aircraft's range of 600 nautical miles and loiter time of six hours on station with cruise speeds in the region of 445 knots are not adequate to provide 24 hours all round surveillance and could lead to gaps. Though mid-air refuelling capability will further extend range, however, currently the only mid-air tankers in India belong to the Indian Air Force – the Russian *Il-78 Mk I* tankers. Naval Aviation holds the key to achieving the 'blue water' aspirations of the Indian Navy.

The CAG audit of the Indian Naval Arm in 2011, under 'strength and capability', 'modernisation and upgradation', 'acquisitions', ' repair, 'maintenance and spare management' and ' aviation training', revealed that the current status of the Naval Aviation Wing's fleet would not only render it ineffective in achieving these goals but would rather make it vulnerable to the growing sophistication of enemy capability.

UAVs In Larger Numbers

The *P-8Is* and the future MRMR are bigger platforms and are meant for high seas but to have an effective round the clock surveillance of the 7,000 km coastline, the navy requires UAVs. The Indian Navy has inducted the Israeli built *Searcher* and *Heron* UAVs which provide strong local and area specific coverage, but with new challenges emerging from the state and non-state actors, the navy must have round the clock patrolling facilities with smaller platforms from smaller naval stations, hence their deployment needs to be increased. The Indian Navy operates two squadrons of *Heron* and *Searcher Mk-II* UAVs, based in Kochi and Porbandar, along the country's west coast. A third squadron

The navy planners had indeed foreseen the sordid prospects and had worked out a comprehensive 30 year submarine building plan, which envisaged phased induction of 12 new submarines each by 2012 and by 2030. But it is 2014 now and navy is yet to get a single of the 12 planned submarines

was commissioned in Ramanathapuram in Tamil Nadu in 2012. There are plans to have at least two more squadrons of UAVs. Serious gaps will continue to remain in navy's maritime surveillance capability for limited sea control and realising its blue water capability.

Not Enough Submarines

Underwater, the navy is in all sorts of trouble with an aging fleet of submarines that is straining under pressure. The Indian Navy's submarine fleet – its underwater combat arm is indeed sinking. The loss of *Sindhurakshak* further underscored the enduring problems of safety and reliability and the weakness of India's conventional submarine fleet. Submarines are a vital part of the navy and critical for sea denial and dissuasion operations, but the existing inventory has been depleting at fast rate and the operational and readiness states are dismal. While the navy was supposed to have 24 submarines as per a plan drawn up in 1985, its present holding is just 12 and the navy is finding it difficult to operate even these due to age-related factors. The navy has only 10 remaining conventional submarines.

The navy planners had indeed foreseen the sordid prospects and had worked out a comprehensive 30 year submarine building plan, which envisaged phased induction of 12 new submarines each by 2012 and by 2030. But it is 2014 now and navy is yet to get a single of the 12 planned submarines. The six Project 75 *Scorpene* submarines under construction in the Mazagon Dock Limited (MDL) in Mumbai with technology transfer from DCNS of France is delayed by over four years behind the original schedule of 2012-2016 and will be inducted beginning 2016. The torpedo fit, the Black Shark from WASS a subsidiary of Finmeccanica Group, shortlisted for these boats is also in jeopardy because of fall out effect from the scrapping of the AgustaWestland VIP helicopter deal.

The Project 75-I procurement, for additional six air-independent propulsion (AIP) submarines as follow on to the P75 programme also does not appear to be high on the priority. The planned five midget submarines procurement launched in 2009 too is progressing tediously and cannot be expected to be complete before 2016.

With the kind of capabilities on the anvil, the Indian Navy is seriously working towards transforming itself into a credible maritime force to tackle multi-dimensional challenges of the future India and to fast realise its blue water aspirations. But with the successes so far – *Arihant*, *Vikrant* and rapid force augmentation, notwithstanding the navy has nautical miles to go before its vision is achieved. DSA

OPERATION ENDURING FREEDOM COST-BENEFIT ANALYSIS

With more than 30,000 dead; double that figure would be the number wounded and more than four times would be those who have been traumatised by the war in homes in troop-contributing nations and Afghanistan itself. These are, by any standard, staggering figures of the human cost of Operation Enduring Freedom.



A cost-benefit analysis is usually undertaken for commercial ventures. For a change let us apply this method for assessing the cost of Operation Enduring Freedom and see what benefit has been achieved thereof. We will consider the cost first and then evaluate benfits.

ISAF in Afghanistan comprises 49 troop contributing countries that fight under NATO's umbrella. The cost incurred by ISAF falls under two categories: human cost and financial cost. The ultimate human cost is difficult to calculate. Not only does it involve personnel killed and seriously injured, one has to take into account the number of lives of their kith and kin shattered as a result of the war. The latter category cannot be quantified, as the suffering of the family members extends into perpetuity. It is easier to reduce the human cost to a numerical figure in terms of those who died in Enduring Freedom: 3414 as on 12 January 2014. At least double that number would have been injured and four times, if not more, would be the number of lives back home traumatised by the inevitable tragedy of war.

This is just one side of the story. People of Afghanistan too have borne their share of death and destruction. Afghan fatal casualties according to estimates of United Nations Assistance Mission in Afghanistan (UNAMA), Human Rights Watch and Associated Press (AP) are close to 30,000 killed. These are approximate figures, as those who died in remote areas where these organisations do not have access, will never be known. Double that figure would be the number wounded and more than four times would be those who have been traumatised by the war. These are, by any standard, staggering figures of the human cost of Operation Enduring Freedom.

Financial Costs

Now look at the financial cost. A report released by Harvard University Kennedy School in 2013 indicates that the US has already spent almost US$ 2 trillion for the military campaign in Iraq and Afghanistan. This of course is not all. Congressional Budget Office Report estimates that by 2020 the price of treating Iraq and Afghanistan war veterans alone would be US$ 8 billion annually. Add to this Opportunity Cost of War, that is if these enormous amounts had been invested in creating jobs and other commercial ventures the benefits would have far surpassed the levels of expenditure.

These are the investments made in Operation Enduring Freedom and will continue to be made at least till December 2014, some will go well beyond that date. If the elusive Bilateral Security Agreement (BSA) is concluded this year, the cost of maintaining about 14,000 Allied troops in Afghanistan will continue to mount for the next ten years and many years after that.

Now look at the financial cost. A report released by Harvard University Kennedy School in 2013 indicates that the US has already spent almost US$ 2 trillion for the military campaign in Iraq and Afghanistan. This of course is not all. Congressional Budget Office Report estimates that by 2020 the price of treating Iraq and Afghanistan war veterans alone would be US$ 8 billion annually

Did these human and financial investments produce the desired result in Afghanistan?

What were the desired results? These are set out in the stated mission of ISAF in Afghanistan, which is:

"In support of the Government of the Islamic Republic of Afghanistan, ISAF conducts operations in Afghanistan to reduce the capability and will of the insurgency, support the growth in capacity and capability of the Afghan National Security Forces (ANSF) and facilitate improvements in governance and socio-economic development in order to provide a secure environment for sustainable stability that is observable to the population."

Insurgency

The insurgency in Afghanistan is alive and kicking. According to the US Department of Defense assessment of December 2013, "Afghan Taliban continue to contest control of Government of Islamic Republic of Afghanistan over sparsely populated areas particularly in the south and south east" and along portions of Highway 1. Gen Joseph Dunford Jr, commander ISAF, claims that the Al Qaeda numbers have been reduced to about 75. This figure could increase alarmingly post NATO's disengagement in December 2014. Recent intelligence reports have indicated that Tehrik-i-Taliban (TTP) and Lashker-e-Taiba (LeT) have also established presence in Afghanistan and joined hands with the Afghan Taliban.Each one of these outfits is connected to Al Qaeda. Given the appropriate environment sans NATO, Al Qaeda's resurgence should not come as a surprise. As of now the will and capability of the insurgents continue to pose a serious threat in Afghanistan.

Threat To Indian Interests

NATO forces are set to withdraw from Afghanistan by 31 December 2014. If the BSA is not signed there would be no residual forces staying behind leaving a big power vacuum in Afghanistan. In the event Taliban is bound to make a concerted effort to seize as much real estate as is possible, including Kabul. It may be able to grab southern and eastern provinces and creep upto Kabul. This could precipitate a civil war as other warlords will oppose Taliban's efforts to grab power by encroaching on their strongholds.

Even if a residual force is left behind, Taliban will sustain the insurgency targeting the force and Afghan Government. Internal conflict will continue as before.

In both options Taliban will rely heavily on Pakistan's support. Either way the proxy war between Pakistan and India in Afghanistan will carry on unmitigated.

The developing scenario in Afghanistan has serious ramifications for India's national interests and security. India's close relationship with Afghanistan, Iran and Central Asian States is extremely important for developing trade as well as tapping the region's rich energy resources so essential for India's economic growth. Therefore, a



MAJOR GENERAL AK HUKKU YSM (RETD)

The writer is a former infantry officer of the Indian Army. He served as the Indian Military Attache in France with concurrent accreditation to Benelux countries. Later he was the Chief Military Intelligence Advisor in the Cabinet Secretariat, following that a Centre Director in NTRO. After retirement he has been speaking on South Asia in the US, across Europe and in Malaysia.




Afghan National Army (ANA)

An integral part of transition is the making of ANSF into a competent force capable of taking on the responsibility of national security. They have to reach the stipulated strength of 352,000, be fully equipped, trained, with adequate command and control structures and be capable of conducting operations independently. It is now expected that the strength will be fully fielded not before 2017

Taliban and Pakistan nexus, inimical to India, will remain a threat to Indian economic interests in the region.

On the other hand, once Taliban's efforts to gain control over Afghanistan stabilise at some level, Mullah Omar's forces are bound to look east, first towards Pashtun areas of Pakistan and then further towards India, particularly Kashmir. Additionally, if the situation in Afghanistan develops even partially in favour of Pakistan, it may be tempted to divert Taliban fighters to Kashmir. Hopefully the new political dispensation and military leadership in Pakistan will be realistic enough to avoid taking such a perilous risk.

India's security planners have to keep a close watch on the developing situation in Af-Pak region and plan options with eyes of Argus for safeguarding its national interests.

ANSF

An integral part of transition is the making of ANSF into a competent force capable of taking on the responsibility of national security. They have to reach the stipulated strength of 352,000, be fully equipped, trained, with adequate command and control structures and be capable of conducting operations independently. It is now expected that the strength will be fully fielded not before 2017. Afghan Air Force (AAF) and Special Mission Wing (SMW) are forecast to be fully operational after 2015.

However, Afghan National Army (ANA) is now in the lead. NATO is not planning, executing or leading operations. It is now in mentoring and training roles, but will continue to help ANSF in operations, if needed. NATO has retained important functions relating to logistics, air support and operational emergencies.

NATO Training Mission in Afghanistan is working relentlessly to make ANSF sufficiently operational to assume its role. Undoubtedly ANSF is far better trained and equipped now. But there are serious concerns about corruption, illiteracy and professional efficiency. The big question remains: will ANSF be able to withstand the tide of Taliban post 2014 and achieve what ISAF could not over more than a decade?

Ministerial Problems

There are problems at the ministerial level also. The Ministry of Defence (MoD) is developing at a slow pace. Shortcomings have been reported in provision of combat support by Combat Support Services. MoD has also been found wanting in long-term planning and budgetary issues. ISAF is currently providing the required advice to MoD relating to these matters.

The Logistics, Information, Communication and Technology Departments of the Ministry of Interior (MoI) have also not performed satisfactorily. US Department of Defense has assessed that these departments will not be capable of functioning independently by December 2014.

As far as improvement in governance is concerned, not much has been achieved. Karzai's government continues to be blamed for corruption and inefficiency. Its writ is largely confined to Kabul, rural and remote areas have not seen much change. They are more under the influence of Taliban and warlords, who often provide instant justice to the aggrieved.

Opium production continues to play a vital role in the economy, politics, administration and insurgency in Afghanistan. Closely linked to corruption and power in the Afghan society, illegal opium trade has defied control measures over the years. As transition commenced, opium production went up

Opium production continues to play a vital role in the economy, politics, administration and insurgency in Afghanistan. Closely linked to corruption and power in the Afghan society, illegal opium trade has defied control measures over the years. As transition commenced, opium production went up. According to United Nations Office on Drugs and Crime (UNODC) the area under poppy cultivation was 36 per cent higher in 2013 as compared to 2012. UNODC attributes the increase in crop production to pull out by ISAF troops, high opium price and a lack of political will to control the situation. It has expressed concern that the profits will go to warlords jockeying for power in the ongoing election process. In addition Taliban will skim off its share leading to strengthening of its capabilities.

Development Programmes

The development programmes pursued by the UNAMA, Provincial Reconstruction Teams (PRTs), NGOs, different countries, numerous organisations and institutions have made a great contribution in the fields of health, education and communication. But all that is out of ISAF's scope of activities. However, it is undeniable that much of the success achieved in developing Afghanistan would not have been possible without ISAF's relentless pursuit of its strategic mission.

Yet, sadly the basic problems in Afghanistan, connected as they are with insurgency, corruption and warlordism have remained almost unaltered. Insurgency has not been defeated, ANSF's capabilities are doubtful, governance leaves much to be desired, while security and stability in Afghanistan remain elusive. Results achieved by Operation Enduring Freedom do not appear to be commensurate with the monumental human and financial costs incurred by ISAF, at least not yet. DSA



NEED FOR INDIAN MILITARY SATELLITE

India has a well conceived plan to support its defence forces with a range of small, cost-efficient and easily replenishable space platforms in addition to putting in place a mechanism for protecting Indian spacecraft from the anti-satellite devices and putting out of commission "rogue, enemy spacecraft." In particular, RISAT-2's revisit capability of four to five days is considered advantageous in the dynamic monitoring of the developments of strategic importance.

In recent years, access to a range of spacecraft meant for a variety of end uses, has become a critical factor in enhancing the efficacy of a battlefield strategy in its varying manifestations. Indeed, in the context of the rapidly changing warfare dynamics, the dependence of defence forces on "space assets" for staying at the winning edge of the war, has become all the more pronounced. In the Indian context, the glaring intelligence failure suffered by the Indian defence forces, during and before the 1999 Kargil skirmish with Pakistan, was traced to the failure of the Indian defence establishment to provide the Indian armed forces sustained and uninterrupted access to the "satellite capabilities." There is no denying the point that in the inhospitable and difficult to access Himalayan heights, satellite resources could serve as a major game changer for the Indian defence forces. As it is, the stunning success with which the US led allied forces were able to realize their strategic goals speedily and efficiently, in both Afghanistan and Iraq, stand out as a testimony to their well co-ordinated and synchronised use of satellite resources on a real time basis.

Job-specific Satellites

Meteorological satellites forecasting weather for facilitating bombing raids and missile launches, navigation satellites guiding lethal weapons to designated locations, reconnaissance satellites locating the exact geographical position of military targets, electronic ferret satellites gathering data on radar frequencies, communications satellites providing real time secure links between defence forces scattered over a vast geographical swathe for a coordinated strategy and ocean watch satellites snooping on the naval movement of adversaries have all become puppets on a string of modern day warfare.

By all means, satellites hold the key for well co-ordinated and synchronised operations of a battlefield strategy by seamlessly integrating weapons systems, missiles, radars and sensor suits, UAVs, weaponised drones, electronics and communications network, fighter jets, transport aircraft, logistics and support systems and defence forces spread across a vast geographical swathe for sustaining "strategic superiority" from the word go. Space capability is also vital for the network centric warfare strategy in that it has the potential to short circuit the sensor to shooter loop.

Denying an adversary access to space either through the degradation or destruction of his satellite resources or through rendering his ground facilities dysfunctional could be a well planned strategy to sustain superiority at all stages of warfare. Indeed, this approach to the ancient art of warfare has opened up the possibility of turning the once peaceful and tranquil outer space into the battlefield of the future by deploying a range of anti-satellite and killer satellite devices in outer space.

Fourth Dimension Warfare

Of course, India has a well conceived plan to support its defence forces with a range of small, cost efficient and easily replenishable space platforms in addition to putting in place a mechanism for protecting Indian spacecraft from the anti-satellite devices and putting out of commission" rogue, enemy spacecraft." India is keen that it should not be found lacking in preparing for the fourth dimension of the warfare. According to the Indian Defence Ministry sources, the lightweight satellites designed for a wide ranging missions for the use of Indian defence forces would be jointly developed by Indian Space Research Organisation (ISRO) and Defence Research and Development Organisation (DRDO). Small, networked satellites would help expand the Indian military's intelligence, surveillance and reconnaissance capabilities, reveal Indian Defence Ministry's fifteen years Technology Perspective and Capability road map. But the biggest problem ahead is how to involve ISRO, a civilian space agency committed to the peaceful uses of outer space, in the exercise of building defence satellites without attracting international censure. As it is, ISRO has already come under the US trade sanctions for its alleged role in the perfection of the so called dual use technology. Moreover, during 1990s many US think tanks had assiduously propagated the view that India's nuclear capable ballistic missile *Agni* had benefited from the solid fuel technology developed by ISRO for India's four stage civilian space vehicle SLV-3.

Revisit Advantage

As part of this road map, Hyderabad based Defence Electronics Research Laboratory (DLRL), a constituent of DRDO, is developing the Electronics Intelligence (ELINT) satellite for launch sometime during the middle of this decade. This satellite, to be developed in tieup with the ISRO, will feature a Synthetic Aperture Radar (SAR) to facilitate round the clock operations. It will help the Indian defence forces monitor trouble spots along its international borders under all weather conditions. Of course, right at the moment, Indian defence forces can access the capabilities of RISAT-1 and RISAT-2 microwave remote sensing satellites being operated by ISRO for keeping a tab on the troops build-up along India's borders with China and Pakistan on a round the clock basis. In particular, RISAT-2's revisit capability of four to five days is considered advantageous in the dynamic monitoring of the developments of strategic importance. Similarly, the Cartosat series of cartographic satellites being operated by ISRO could be useful for getting an insight into the landscape features and terrain characteristics in the inhospitable border areas by the Indian armed forces. Remote sensing and surveillance are considered the two faces of the same coin. The civilian remote sensing satellites are routinely harnessed for surveillance and reconnaissance. Indian defence forces would need to access the space based surveillance capabilities for monitoring enemy troop activities, warships, airfields and missile test sites as well as observation of the Indian air space.

As a follow up to the August 2013 launch of India's first-ever dedicated military satellite GSAT-7, meant for the exclusive use of Indian Navy, it is planned to orbit GSAT-7A as the dedicated Indian Air Force (IAF) satellite for linking-up India's airborne early warning and control systems aircraft with each other as well as with ground and air-based radars

As envisaged now, the future communications satellite systems for the use of Indian defence forces will make an enhanced use of Ka-band frequency, which, in turn, makes for a greater bandwidth potential per satellite at a reduced power usage and that too with lower cost of ground supporting stations. Among the capabilities referred to in the roadmap is a satellite based communications network with high data rates and multi-band operation for voice, data and related end uses.

IAF Satellite

As a follow up to the August 2013 launch of India's first-ever dedicated military satellite GSAT-7, meant for the exclusive use of Indian Navy, it is planned to orbit GSAT-7A as the dedicated Indian Air Force (IAF) satellite for linking-up India's airborne early warning and control systems aircraft with each other as well as with ground and air-based radars. The Defence Space Vision 2020 of IAF outlines the need to harness satellite resources in a big way to augment the Indian defence capabilities. According to the Defence Space Vision 2020, IAF has identified outer space as an area of intense focus to sustain India's strategic lead.

As it is, satcom systems like GSAT-7A are widely used by military commanders for two way communications with forward echelons which can help improve the tactical battlefield decision-making process and boost the capability to carry out surveillance and reconnaissance. Exclusive defence space platforms store and transfer information and data to multiple military units. This type of synergy is critical for the coordination of disparate forces operating across a large expanse of the geographical sprawl. Satellite based communications, surveillance of the vulnerable spots of adversaries and navigation and precision targeting all go to serve as game changer. Combination of space assets and conventional military capabilities helps eliminate prospects of surprise and in turn, helps deter the opponents from going in for a conventional battlefield strategy. It is taken for granted that for meeting their strategic communications needs, all the three wings of services, would use both fixed and mobile satellite systems. Easy to operate and highly efficient mobile satcom terminals come in handy when the topography to be negotiated is inhospitable and difficult to access.



RADHAKRISHNA RAO
The writer specialises in space technology, aeronautics, defence and security issues. He is a Visiting Fellow at Vivekananda International Foundation. Before taking to full time writing he was associated with the Indian Space Research Organisation (ISRO) for about two decades.


Indian Regional Navigation Satellite System

India's first exclusive defence satellite, GSAT-7, was launched by means of an Ariane-5 vehicle of the European space transportation company, Arianespace, in August 2013. The home-grown, multi-band communications satellite GSAT-7 would help the Indian Navy network its onshore and offshore resources to boost its striking power. The Rs 1,850 million GSAT-7 dedicated defence space platform is considered the forerunner of India's futuristic military satellite constellations. GSAT-7 will prove valuable for laying the ground rules for the efficient and integrated use of the defence satellite constellations that India would put in place in years ahead.

As it is, Indian Navy used to depend on Inmarsat, a major global mobile satellite communications service provider. But then the dependence on a commercial satellite service provider for meeting the strategic needs cannot be a sound option. From the security point of view, relying on a home grown space platform makes for a win win development. Indeed, India's maritime security will get a fresh impetus from GSAT-7. The satellite would help the Indian Navy to come out of its limitation in terms of line of sight and ionospheric effects while setting up communications links. The secure and reliable communications capabilities made available by GSAT-7 will help the Indian Navy bolster its blue water combat capabilities. With its large footprint over the Indian Ocean Region (IOR), GSAT-7 will help Indian Navy network all its 140 warships, 13 submarines and 200 aircraft along with its ground based "resources and assets". It will serve as a "force multiplier" and "game changer" by enhancing Indian Navy's expertise in the area of network centric operations. The robust communications link up facilitated by GSAT-7 will substantially enhance India's maritime security over a wide swathe of eastern and western flanks of the Indian Ocean Region (IOR). Using GSAT-7 potentials, Indian Navy would be in a position to link-up its long range missiles, radars as well as its air defence systems on all of its sea based assets to a central room.

Indigenous Global Network

Though under an agreement, India can access restricted navigation signals from the Russian Glonass navigation space platform for military purposes, India's home-grown IRNSS (Indian Regional Navigation Satellite System) will lay the foundation for an indigenous space based global positioning system (GPS). The first of the IRNSS satellite was launched by means of the four stage Polar Satellite Launch Vehicle (PSLV) in July 2013. By all means, an operational GPS system like IRNSS, whose full configuration would boast of seven satellites, would be a major force multiplier for the Indian defence forces. Moreover, the satellite navigation capabilities will be of immense use in refining the network centric warfare techniques. Similarly, the proposed Indian tri-Service aerospace command would need a large and independent GPS capability that could be accessed any time to boost its combat superiority. Though some of the transponders of civilian satellites have been made available to the Indian military, only a network of dedicated satellites would sustain the demand for network centric command and control to ensure the security of the Indian mainland. In particular the access to satellite navigation capability enhances the hitting accuracy of missiles and precision weapons used by all the wings of Services.

Clearly and apparently satcoms offer terrain and environmental independent communications platforms. The need for redundancy underpins the deployment of a range of satellites. Defence satellites should have an in-built mechanism to automatically and rapidly recover from signal blockages, due to man-made objects, terrain conditions including towering mountain ranges, foliage, weather and associated environmental features.

DRDO Initiative

On its part, DRDO has come out with a perspective plan to launch a range of dedicated satellites meant for the exclusive use of the three wings of the service. Meanwhile, DRDO chief Avinash Chander has highlighted the need for India to put in place an effective mechanism to fully monitor the Indian Ocean Region (IOR) in a complete, three dimensional manner. To accomplish this objective, he has highlighted the need for India to develop and deploy about 80-100 satellites covering IOR. Of course, these satellites will have a short life span and would need to be replenished periodically to ensure the complete surveillance and monitoring of IOR on a regular basis. "They should be ready to use ones which can be launched at a short notice. These satellites, which will have a short service life span, would need to be replenished periodically to ensure the complete surveillance of IOR on a regular basis,"said Chander. Referring to the growing Chinese space based capability dedicated to the monitoring of IOR, Chander observed, "There are 19 Chinese satellites keeping a watch over the Indian Ocean." The growing Chinese space based ocean surveillance capability has been a matter of concern for US strategic planners. Many US think tanks hold the view that the expanding Chinese space based surveillance capability could in the years ahead pose a serious threat to the US dominance of the global oceanic waters.

As part of the space warfare strategy, India would need to develop the so called "directed energy" weapons, which, is a collective reference to destructive devices fashioned out of lasers, microwaves and sub-atomic particles. What makes laser an ideal device for use as a weapon is its inherent quality moving straight without getting diffused or dissipated. China is known to be working on space based laser weapons to knock down "hostile and rogue" satellites. Laser, the high energy beam, has the potentials to heat up the outer surface of missile or a satellite until it is put out of commission. Imaging surveillance satellites are highly vulnerable to a laser device as their functions depend on devices which are sensitive to light. However, space based laser weapons are yet to assume a practical shape. Dr Saraswat, the former head of DRDO, had some time back said that the laser based space sensor would be of help in monitoring and tracking space based killer devices.

During 1980s, the US Defence set up had toyed with the "fanciful idea" of launching a space based laser driven battle system aimed at knocking down enemy spacecraft and missile, with stunning precision. However, this project aimed at creating a constellation of 20 laser weapon firing satellites orbiting at an altitude of 1500-km could not take off due to technological complexities, budgetary constraints and lack of political support.

According to DRDO, the technology developed for *Agni-V* long range ballistic missiles has opened up the possibility of building-up a space delivery system for orbiting lightweight satellites with a short turnaround time. On another front, *Agni-V* can also form a part of the anti-satellite system. "*Agni-V* gives you the boosting capability and the kill vehicle with an advanced seeker that will be able to home in on to the target satellites," said Saraswat. The Defence Ministry's Technology Perspective Map refers to the development of "anti-satellite weapons for electronics or physical destruction of satellites in various orbits" and the need for India to stay at the forefront of the development in the area of space weaponisation. By combining the best of the technologies developed by ISRO and DRDO, India should be able to assemble a reasonably good infrastructure for the eventuality of facing a space war in the future.

China's ASAT Facilities

The anti-satellite test carried out by China in early 2007 heightened the clamour in India for preparing the country for space war. While addressing the United Commanders Conference in New Delhi in mid-2008, Indian Defence Minister AK Antony made India's concern vocal over the "emergence of anti-satellite weapons a new class of heavy lift-off boosters and improved array of military space devices in our neighbourhood". Antony wondered as to how long India would "remain committed to the policy of non-weaponisation of space even as counter systems are emerging in India's neighbourhood." Obviously, Antony's reference was to China. Subsequently, an Integrated Space Cell was set up with a view to utilise India's space based assets for defence purposes.

India cannot remain complacent or indifferent to the Chinese advances in space technology with particular reference to its applications for space war efforts. Indeed, the successful accomplishment of a range of experiments including manual docking in June 2013 by Chinese astronaut trio, ostensibly meant to acquire expertise for building an autonomous orbiting space station by the end of this decade could also give a significant thrust to Chinese space war efforts. An autonomous orbital complex would help China boost its space war efforts by serving as a strategic outpost in the final frontiers. "The most important point is that China is developing docking techniques and technology, which in turn, means precision control for thrusters and the likes which has obvious military and anti-satellite implications," says Dean Chang, a research fellow at the Heritage Foundation's Asian Studies Centre in Washington.

In China, the dividing line between space activities and defence projects are as thin as they are tenuous. Meanwhile, strategic analysts hold the view that the Chinese plan for a permanent space station by the end of this decade could give it a strategic edge in the event of a war involving "space assets"

Avinash Chander has been projecting the need for India to develop a space war capability with both defensive and offensive features. He is clear that India should ensure the security of its space assets in the context of the efforts to develop anti-satellite capabilities by space-faring countries including China. According to Chander, two major aspects of space security are denial of access to adversaries and ensuring the safety of our space assets. "Currently, our satellites are not protected. The only way to counter the enemy attack on our satellites is shooting down their satellites," argues Chander. The view of Chander is that to ensure the safety and security of Indian space assets, a constellation of small satellites – in the weight range of 30-60-kg – with the warhead that can be activated from the ground in the event of an enemy attack need to be deployed. But then the killer satellite device based on kinetic energy is the only one aspect of the space war.

In the aftermath of the Chinese anti-satellite test the then ISRO chief G Madhavan Nair had stated that though it was well within the capability of ISRO to develop and deploy a system to knock-down a rogue, enemy satellite in orbit, India's concern is to keep outer space a zone of peace and tranquillity. The Chinese anti-satellite test involved the use of a medium range, ballistic missile to destroy an aging weather watch satellite located at an altitude of 537 miles. This was the first demonstration of China's well-conceived plan to perfect a satellite killer device as a prelude to its "space weaponisation programme".

China's Warlike Act

In China, the dividing line between space activities and defence projects are as thin as they are tenuous. Meanwhile, strategic analysts hold the view that the Chinese plan for a permanent space station by the end of this decade could give it a strategic edge in the event of a war involving "space assets". China is also building a new family of heavy lift space vehicles to support its long-term space and defence projects. The Chinese satellites constellation for earth imaging, reconnaissance, surveillance, tele-communications and navigation are regularly used by the units of the People's Liberation Army(PLA).

As things stand now, China's rapid military modernisation accompanied by a well-conceived plan for deploying a range of space weapons could be an attempt to compete militarily across the board with the USA. But at the same time India could not remain complacent to Chinese advances in space technology with its overwhelming strategic and militaristic orientation. DSA

Hosted by

Ministry of Defence
Republic of Indonesia

INDO DEFENCE 2014 EXPO & FORUM

THE 6TH INDONESIA'S OFFICIAL TRI-SERVICE DEFENCE EVENT

THE 6TH INDONESIA'S OFFICIAL TRI-SERVICE DEFENCE EVENT

"World Defence Technology Improvement"

5 - 8 November 2014
Jakarta International Expo Kemayoran
Jakarta - Indonesia



www.indodefence.com

featuring

incorporating with:

INDO AEROSPACE 2014 EXPO & FORUM featuring INDO HELICOPTER 2014 EXPO & FORUM
INDONESIA'S OFFICIAL INTERNATIONAL AVIATION, AIRCRAFT AND AIRPORT TECHNOLOGY EVENT
THE 1ST SOUTH EAST ASIA'S INTERNATIONAL HELICOPTER EVENT

INDO MARINE 2014 EXPO & FORUM
Indonesia's No.1 Marine & Port Technology, Shipping Logistics, Security and Industry Event

Supported by

Official Publication
IHS Jane's

Supporting Publications

Organised by

PT. Napindo Media Ashatama
Jl. Kelapa Sawit XIV Blok M1 No. 10, Kompleks Billy & Moon - Pondok Kelapa | Jakarta 13450, Indonesia
Phone: 62-21 865 0962, 864 4756/85 | Fax. : 62-21 865 0963 | E-mail: info@indodefence.com

get connected

DSA™

DEFENCE AND SECURITY ALERT

The First and the Only ISO 9001:2008 Certified Defence and Security Magazine in India





Subscribe Now!

You Pay

TENURE	COVER PRICE	DISCOUNTED PRICE	SHIPPING CHARGES			
INDIA			DELHI / NCR	REST OF INDIA	DELHI / NCR	REST OF INDIA
1 year	₹ 1440	₹ 1008	₹ 400	₹ 700	₹ 1408	₹ 1708
2 years	₹ 2880	₹ 1872	₹ 800	₹ 1400	₹ 2672	₹ 3272
3 years	₹ 4320	₹ 2592	₹ 1200	₹ 2100	₹ 3792	₹ 4692
SAARC COUNTRIES						
1 year	US$ 240	US$ 156	US DOLLARS	120	US DOLLARS	276
2 years	US$ 480	US$ 288	US DOLLARS	240	US DOLLARS	528
3 years	US$ 720	US$ 396	US DOLLARS	360	US DOLLARS	756
REST OF THE WORLD						
1 year	US$ 300	US$ 195	US DOLLARS	240	US DOLLARS	435
2 years	US$ 600	US$ 360	US DOLLARS	480	US DOLLARS	840
3 years	US$ 900	US$ 495	US DOLLARS	720	US DOLLARS	1215

	1 Year	2 Years	3 Years
I would like to subscribe to ***DSA*** for	☐	☐	☐
I would like to gift a subscription of ***DSA*** for	☐	☐	☐

Name (Self)..... Organisation .....
Billing Address..... City..... Pin code .....
Shipping Address..... .....City.....
State.....Pin code.....Tel.....Mob.....
E mail id.....
DD / Cheque No.....Dated.....Drawn on.....
for ₹ ..... in favour of OCEAN MEDIA PRIVATE LIMITED,
Payable at New Delhi. **Please add ₹ 50 extra for all outstation cheques.**

Terms and Conditions

- Minimum subscription is for one year ie 12 issues. Your subscription will start with the next available issue after the receipt of your payment. ***DSA*** issues will be dispatched through Postal / Courier Services, as advised by the subscriber.
- Please forward the completed subscription form with all the required details. ***DSA*** will not be responsible for any theft, loss or delay once the magazine has been dispatched. Please mention your subscription ID in all your future communications with us.
- Please inform our subscription department about non-receipt of your copy latest by 20th day of the month, failing which the request for re-dispatch will not be entertained.
- Subscription prices can also be viewed at the following web link **http://www.dsalert.org/dsa-subscription/print-edition**
- Print and Online editions can be subscribed online through credit card via Payment Gateway.
- The terms and conditions may change without any prior notice. This offer is for new subscribers, valid from 1st April 2013.
- **This subscription form supersedes all the previous. Please address all your subscription related queries through E-mail: subscription@dsalert.org or call us at: +91-11-23243999, 23287999. Write to us at: Subscription department, Defence and Security Alert (DSA), 4/19 Asaf Ali Road, New Delhi - 110002 (INDIA).**

For print edition login at: www.dsalert.org/dsa-subscription/print-edition
For online edition login at: www.dsalert.org/dsa-subscription/online-edition



DSA is available with Ocutag Snap app for All Smartphones

You may pay by Credit Card / Debit Card through Payment Gateway.

*Indian subscribers may pay in INR as per the prevailing conversion rates.

You get

- Access to view and download the current issue.
- Access to *DSA* Archives, Blogs, Newsletters etc.
- Access to other information available only on the *DSA* website.

You can

- Post your comments.
- Subscribe to past issues.
- Submit articles.
- Participate in Quizzes, Competitions and Discussions etc.

To subscribe

Mail at: subscription@dsalert.org or Call: +91-11-23243999, 23287999,+ 91-9958382999

Or write to Subscription Department, Defence and Security Alert, 4/19 Asaf Ali Road, New Delhi - 110002, India

Or Login at: http://www.dsalert.org/dsa-subscription/online-edition

Are you a leader

in defence and security
products and technologies ?

For Indian market

Advertise in the leading

Indian Defence and Security Magazine





THE ONLY INDIAN DEFENCE AND SECURITY MAGAZINE AVAILABLE ON INDIAN AIR FORCE (IAF) INTRANET



DSA™

DEFENCE AND SECURITY ALERT

The FIRST and the Only ISO 9001:2008 CERTIFIED Magazine in India

4/19, Asaf Ali Road, New Delhi, India, www.dsalert.org, info@dsalert.org, advt@dsalert.org

To know about *DSA* focus areas, readership, global presence, circulation, distribution and rates etc please ask for our print and online edition media kits.

RNI NO. DELENG/2009/31195

Buy all past issues of

DSA™

DEFENCE AND SECURITY ALERT
An ISO 9001:2008 Certified Magazine

From October 2009 to December 2012

Most useful and research based content resource for:

- Defence and security personnel
- Research scholars
- Think tanks
- Defence and security institutions
- All libraries



39 Issues In One CD

The First and The Only ISO 9001:2008 Certified Defence and Security Magazine in India

DSA™ Online Editions

Also available on Magzter
MAGZTER
http://www.magzter.com

Download and read *DSA* on
iOS Android Web Amazon Windows 8



To order and to subscribe please contact our Sales Team

Mail to: info@dsalert.org
or Call: +91-11-23243999, 23287999, + 91-9958382999