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World Navies 'United Through Oceans' at IFR 2016

Indian Navy's two aircraft carriers – INS Vikramaditya (in front) and INS Viraat (behind) in the Bay of Bengal during IFR 2016

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52 years
1964-2016

RELENTLESS JOURNEY OF
EXCELLENCE **SINCE 1964**

While we at SP's cherish our journey started in 1964, founded by our Founder Editor and Founder Publisher Shri S P Baranwal; we do believe that the entry into 52nd year and beyond is still a stepping stone for us. We therefore look forward to constantly evolving and expanding our qualitative efforts during coming years and coming decades.

Most Trusted Partner for Now & for Future

BAE Systems selects Mahindra for ultra-lightweight howitzer

Demonstrating its commitment to Prime Minister Narendra Modi's call to 'Make in India,' BAE Systems has down-selected Mahindra as its business partner for the proposed in-country assembly, integration and test (AIT) facility for the M777 ultra-lightweight howitzer. India and the United States are in discussions for a foreign military sale (FMS) of 145 M777A2 LW155 howitzers for the Indian Army. BAE Systems looks forward to working with Mahindra in the coming weeks to finalise details of this AIT facility and to negotiate the terms of its contractual arrangement.

In 2015, the company developed and submitted a US Government-supported proposal offering a higher degree of indigenisation on the M777 weapon system. The highlight of this is the commitment to establish AIT capabilities in India in partnership with a domestic Indian company.

PHOTOGRAPH: BAE Systems

The selection follows a detailed assessment of Mahindra's ability to fulfil the requirements and provide the best value to the M777 India programme, and in the future, grow its capability as a strategic partner for BAE Systems in India.

Dr Joe Senftle, Vice President and General Manager, Weapon Systems, BAE Systems Inc, said: "As a founding partner of defence manufacturing in India, BAE Systems is pleased to partner with Mahindra on our offer to develop an assembly, integration and test facility in India. The facility is a fundamental part of the M777 production line. A domestic assembly, integration and test facility will enable the Indian Army to access maintenance, spares and support for the M777 locally. We will continue to support the two governments to progress to contract agreement so that we may begin the process of 'Make in India' for M777." **SP**

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Indeed united through oceans

The second edition of the International Fleet Review (IFR), which concluded recently at Visakhapatnam, had over 50 navies of the world participating, making the event truly spectacular and reflecting the spirit of IFR – 'United through Oceans'.

Rear Admiral Sushil Ramsay (Retd) gives us a ringside view of the mammoth event, a long-standing tradition of the navies to showcase naval preparedness. In recent times, the IFR has come to stay as a congregation of warships of friendly foreign navies to demonstrate solidarity, mutual trust and cooperation. At Visakhapatnam, besides 65 Indian Naval warships and three Indian Navy submarines, the Indian Ocean came alive with 24 foreign ships, two ships from the Indian Coast Guard and three from Mercantile Marine. The guests of honour included the President of India Pranab Mukherjee and the Prime Minister Narendra Modi, among many others.

The President aptly referred to how IFR signified a common desire to use the seas to promote peace, cooperation and friendship, as also to develop partnerships for a secure maritime future. The navies of the world have a unique role in promoting goodwill, nurturing peace and tranquillity of the oceans.

The Prime Minister gave a nice twist to the event, focusing on how it was already reflecting the 'Made in India' aspect with nearly 37 of the Indian ships being made here. He also referred to his vision of 'Blue Economy' and that an essential part of this pursuit would be the development of India's coastal and island territories in a holistic manner.

In this issue, we have four opinionated articles by Lt General P.C. Katoch (Retd), starting with the Technology Vision 2035 which has identified 12 sectors and technologies that need to be deployed. The Vision talks about future technologies ranging from flying cars, real-time translation software, e-sensing to 100 per cent recyclable materials which can be used to solve day to day problems. Prime Minister Modi released the Vision document at the 103rd Indian Science Congress recently, promising that the government would 'make it easier to do science and research'.

In his viewpoint on spectrum, General Katoch opines that the country may not have a national security strategy, but the military has its own doctrine. Seeking a review of its decision of taking away 150 MHz spectrum from defence, he avers that it may have a negative impact on the combat capacity of the military.

In another viewpoint, he talks about how the Army's Tactical Command Control and Information (Tac C3I) System is going at an excruciatingly slow pace and that our mapping is 30 years behind, urging the forces that be to factor in information as a strategic asset.

Talking about trends in unmanned technologies, he points out to Ehang 184, a Chinese autonomous aerial vehicle which does not require the passenger to have any pilot training. The high level of flight automation and redundant systems can be militarised and scaled to other systems. However, this Chinese capability which invariably will get passed on to protégé Pakistan has its own impact on India, he surmises. Worse, terrorist outfits will have another platform to exploit.

All this and more in this edition of *SP's M.A.I.* We look forward to your feedback as to continuously improve our content. Happy reading!

Jayant Baranwal
Publisher & Editor-in-Chief

**LT GENERAL
P.C. KATOCH (RETD)**

Technology Vision 2035 – What about defence?

The Technology Vision 2035 vision talks about future technologies ranging from flying cars, real-time translation software, personalised medicine, wearable devices, e-sensing (e-nose and e-tongue) to 100 per cent recyclable materials among others which may be used in different areas to solve day to day problems

The Technology Information, Forecasting and Assessment Council (TIFAC), under the Ministry of Science & Technology, has come out with 'Technology Vision 2035,' identifying the challenges ahead and how they can be dealt with through technological interventions while realising the dream of a developed India by the year 2035. It gives details of 12 sectors and technologies that in some cases exist but need to be deployed, some in the pilot stage that must be scaled up and technologies in R&D stage. The vision talks about future technologies ranging from flying cars, real-time translation software, personalised medicine, wearable devices, e-sensing (e-nose and e-tongue) to 100 per cent recyclable materials among others which may be used in different areas to solve day to day problems.

The document was released by the Prime Minister Narendra Modi after he inaugurated the 103rd Indian Science Congress in Bengaluru recently, promising his government would "make it easier to do science and research" in India and envisioned a future in which innovation makes lives of people better. Interestingly, the document also talks of 'Blue Sky Research'; imagination that may lead to reality through curiosity driven, paradigm shattering research – like virtual courts and digital evidence, complex real-time dynamic disaster management response systems, sensing devices to be able to feel the product on Internet before buying it, machines/robots to connect all personal and emotional needs, intelligence vehicles to detect emergency situations and take over the control and interplanetary communications systems and the like. Besides the key sectors like health, education, transport, energy, food/agriculture and manufacturing, the Technology Vision 2035 also mentioned environment, information & communication technologies, infrastructure, materials, habitat and water as important areas where future technologies will be able to solve day to day problems of citizens by better utilisation of available resources and skilled manpower.

Significantly, the first such document 'Technology Vision 2020' had come under Dr A.P.J. Abdul Kalam in 1996. It would be fruitful to list out how much we have actually progressed under the first such vision because that would indicate where the pitfalls and problems are. But this takes us to the 'Technology Perspective and Capability

Prime Minister Narendra Modi delivering the inaugural address at the 103rd Session of Indian Science Congress

Roadmap (TPCR) issued in April 2013 by HQ IDS with a foreword by the then Defence Minister A.K. Antony. It lists out some 19 key technological requirements: battlefield transparency, command and control architecture, communication systems, smart radios, information dominance, electronic warfare, nano technology/micro electro-mechanical systems (MESM), artificial intelligence and robotics, chemical, biological, radiological and nuclear (CBRN) defence, miniaturisation, unmanned systems, advanced weapon systems – PGMs, air-to-air weapons, Hard Kill weapons, electromagnetic pulse (EMP) weapons, adaptive warheads, weapon guidance, space-based radars, stealth, digital systems, adaptive antenna signatures, SAGW, sensors, and sensor fusion. There is further elaboration in terms of aviation, land warfare and maritime.

The TPCR covers the period 2012-27. The question that arise here are whether a mere foreword by the Defence Minister on the TPCR enough to consider it a Ministry of Defence (MoD) document? If so, should the preamble not have listed out the futuristic threats including ongoing hybrid and asymmetric wars? What about self-sufficiency in semi-conductors, computers and telecommunication equipment? What about exploiting technologies like steerable beam technology, wide band/software defined radios, network security, common GIS, data fusion & analysis, alternatives to GPS, dynamic bandwidth management, shooting down UAVs electronically or through other means, camouflage etc? What about 'Blue Sky Research' in defence? How about 'Mind Control'? Considering that the TPCR commenced 2012, what is the progress that is made in the last five years, if at all? The fact is that presently the military does not even have common data structures, symbology and interoperable protocols; true 'system of systems' approach appears decades away. The status of the military's C4I2SR is nowhere near the required. Even the mapping requirements are decades behind schedule.

Does the MoD itself have attitudinal change to accommodate the concept of NCW? These are hardly issues that the MoD should be glossing over? Issuing a TPCR by itself is only a small part. A review every 3-5 years and periodic corrective actions are must. **SP**

The views expressed herein are the personal views of the author.

President Pranab Mukherjee and Prime Minister Narendra Modi aboard the INS Sumitra at IFR 2016, Visakhapatnam. Defence Minister Manohar Parrikar, Chief of the Naval Staff Admiral R.K. Dhowan and Flag Officer Commanding-in-Chief, Eastern Command, Vice Admiral Satish Soni are also seen.

International Fleet Review: An instrument of power projection

The second edition of the International Fleet Review was held at Visakhapatnam from February 4 to 8, 2016. The review had over 50 navies of the world, which made this event spectacular and truly reflecting the spirit of IFR 2016 – 'United through Oceans.'

[By **Rear Admiral Sushil Ramsay (Retd)**]

Naval fleet reviews are a long-standing tradition of the navies, the world over. Historically, such events were held to showcase the naval preparedness as a prelude to war or a demonstration of maritime warfighting capabilities to deter potential adversaries. This perspective on naval reviews, however, has changed substantially in the recent times and the off shoot of the traditional naval reviews has given birth to what has come to be known as the International Fleet Review (IFR). IFRs have come to stay as a congregation of warships of the friendly foreign navies to demonstrate solidarity, mutual trust and cooperation to safeguard the global commons. The IFR provides the host nation an opportunity to demonstrate its own maritime prowess to contribute to maintaining peace and harmony within the maritime domain of own interests.

While for the past several decades, the Indian Navy has deputed its warships to participate in IFRs organised by several maritime nations, the first of its own indigenous avatar was IFR 2001 held at Mumbai. Before that the Indian variant of naval reviews was designated as the President's Fleet Review (PFR), with its first edition held in 1953. Since then ten PFRs have been organised and its last edition was held in 2011 again at Mumbai. The PFR aims at assuring the country of Indian Navy's preparedness, high morale and discipline. IFR 2016 is the eleventh edition of Fleet Reviews and the second edition of IFR.

President's Review

The President of India Pranab Mukherjee reviewed the fleet of warships of the Indian Navy and the participating foreign navies in the Visakhapatnam harbour on February 6, 2016. IFR 2016 displayed in the world view, the Indian Navy's capabilities, discipline, valued principles of friendship across the oceans, mutual trust and com-

mitment to safeguard the maritime heritage of mankind. Appropriately then, the IFR logo depicted the three operating dimensions of the Indian Navy, with a ship, submarine and an aircraft, as also the letters I-F-R formed an integral part of the logo. The Dolphin was chosen as the mascot depicting friendship across oceans and the theme for the IFR 2016 was 'United through Oceans'.

After a 21-gun salute and ceremonial guard of honour, the President embarked INS Sumitra, an indigenously built naval offshore patrol vessel, designated as the 'Presidential Yacht'. The President was received by Prime Minister Narendra Modi, Defence Minister Manohar Parrikar and Chief of the Naval Staff Admiral R.K. Dhowan. The President's Yacht weaved through the 70 ships lined up on parade in Visakhapatnam harbour. A spectacular fly-past was conducted as a part of the static review of the fleet. Towards the final stage of the review, a mobile column of warships and submarines carried out high speed steam past alongside the President's Yacht.

In addition to 65 Indian naval warships and three Indian Navy submarines, the review also included 24 foreign ships, two ships from the Indian Coast Guard and three from Mercantile Marine. Several enthralling waterfront activities by sail boats, water skiing display and helicopter demonstrations added fervour to the power projection. Along the way, the President also witnessed demonstrations in the form of breathtaking fly-past by Naval Air Arm and a daring display by the elite Marine Commandos. The fly-past comprised 15 formations of 45 aircraft including two formations from the Indian Coast Guard. It also showcased the latest acquisitions of the Indian Navy such as MiG-29K, long-range MR aircraft P-8I and AEW helicopter Kamov-31.

Presidential Address

Speaking on the occasion, the President said that the IFR 2016 while showcasing the prowess of the Indian Navy, has brought together navies from across the globe here on Indian shores, signifying our common desire to use the seas to promote peace, cooperation and friendship, as also to develop partnerships for a secure maritime future. Presence of foreign countries in such large numbers has made this international event spectacular and truly reflects the spirit of this IFR; we are indeed 'United through Oceans'. The President said that "the navies of the world have a unique role in promoting goodwill, nurturing peace and tranquillity of the oceans. Ships and personnel participating at this momentous fleet review are ambassadors of great nations that they represent.

"My special compliments to the Indian Navy, especially the Eastern Naval Command, for the meticulous planning and flawless conduct of today's splendid Fleet Review. An event of such magnitude could be organised only by the involvement and support of the people."

Prime Minister's Address

A most colourful City Parade in which the participating navies along with few Naval Bands of foreign navies, IN troops, sea cadet corps, veterans, etc. took part. Prime Minister Narendra Modi who presided over the function said, "My profuse thanks to the men and

President Pranab Mukherjee unveiled the IFR sculpture during the IFR 2016 in Visakhapatnam. Prime Minister Narendra Modi, the Governor of Andhra Pradesh and Telangana E.S.L. Narasimhan, Defence Minister Manohar Parrikar, the Chief Minister of Andhra Pradesh N. Chandrababu Naidu and Chief of the Naval Staff, Admiral R.K. Dhowan are also seen.

(Top, L-R) Breathtaking aerobatics by a Catwalk Grumman biplane of the Scandinavian Airshow team over the Bay of Bengal; Indian Navy P-8I flanked by fighters; (Above, L-R) Four Sea Harriers in formation; A Chetak helicopter flying past Indian tricolours.

women of the Indian Navy for their tireless dedication for making this Fleet Review a truly historic success. For me personally, witnessing the harmony among the best of international navies here has been a rewarding experience. Today it is our pleasure to welcome 50 foreign navies from every corner of the globe at India's second International Fleet review—the first one on India's East Coast. Your participation is a message of cooperation and friendship that we deeply cherish. On behalf of my countrymen, I thank you all for accepting our invitation and joining in this event with such spirit. The oceans and world's waterways are global commons. *Vasudhaiva Kutumbakam* – the concept of whole world as a family – is perhaps most vividly witnessed on the oceans of the planet that connect us all.

"We take pride in the fact that of all the Indian naval ships participating in this Fleet Review, at least 37 are 'Made in India' – a number that will surely rise in the coming years. An important part of India's transformation is my vision of 'Blue Economy' in its widest sense. The Blue Chakra – or the wheel – in our National Flag, represents the potential of the Blue Economy. An essential part of this pursuit is the development of India's coastal and island territories: but not just for tourism.

IFR Events

IFR activities were kick-started by the Chief Minister of Andhra Pradesh N. Chandrababu Naidu paying homage to the martyrs of the War Memorial on February 4, 2016. Admiral R.K. Dhowan, Vice Admiral Satish Soni, Flag Officer Commanding-in-Chief and Commanding Officers of visiting foreign naval ships laid wreaths at this War Memorial as a mark of respect to the fallen heroes.

The Maritime Exhibition on the theme 'Innovation, Youth and Indigenisation' was inaugurated on February 4 by Naidu at Andhra University Engineering College grounds.

A grand opening ceremony for the International Fleet Review 2016 was held at Command Stadium, INS Satavahana on February 5, 2016. Governor of Andhra Pradesh E.S.L. Narasimhan was the chief guest and Naidu graced the occasion as the guest of honour. The event was attended by various members of Parliament, State Ministers, Member of Legislative Assembly and Legislative Council of Andhra Pradesh. In addition, members of foreign delegations and ships from 50 countries attended this mega event. Bollywood stars Akshay Kumar and Kangana Ranaut made appearance as brand ambassadors of IFR.

International Maritime Conference

The International Maritime Conference with theme 'Partnering Together for a Secure Maritime Future' was held on February 7-8. Admiral D.K. Joshi (Retd), Chairman, National Maritime Foundation (NMF), launched the conference with his opening remarks. Thereafter, the theme address was delivered by Admiral Dhowan. Manohar Parrikar delivered the keynote address at the conference.

(Top) Illuminated silhouettes of the naval ships in the Bay of Bengal; (Above, L-R) Participants from various navies across the world at the opening ceremony, Indian and foreign naval ships undertaking a Passage Exercise (PASSEX) in the Bay of Bengal.

Session I on 'Importance of Ocean and Navies in Global Geo-Strategic Matrix' was moderated by Admiral Madhvendra Singh (Retd), former Chief of the Naval Staff. Lt General Dan Leaf (Retd), USA, spoke on 'The Importance of Oceans and Navies in Geostrategic Mix'. Second speaker was Professor Ye Hailin of, China who spoke on 'South China Sea Disputes: Perceptions and Misperceptions among the Players'. This was followed by a presentation on 'No Way But "Hi" Way!' by Vice Admiral Anup Singh (Retd), Indian Navy. Rear Admiral Antoine Beaussant of, France made a presentation on 'Maritime Security and Navies: The Future Challenges in the Indian Ocean'. A presentation on 'Towards a New Maritime Strategy for Medium Powers: Defining the Challenges for the Medium Power Navy' by Rear Admiral James Goldrick (Retd), Australia and this was followed by a presentation on 'Maritime Cooperation, and Building Bridges between Maritime Neighbours and Partners' by Professor Renfrew Christie, South Africa.

Session II on 'Regional Perceptions and Approaches for Maritime Cooperative Engagement' was moderated by Ambassador K.V. Bhagirath, Secretary General, Indian Ocean Rim Association. The first presentation on 'Japan's Security Role in the Indo-Pacific Region' was made by Professor Eiichi Katahara, Japan. This was followed by a presentation on 'Globalisation, International Liberalism and the Maritime Cooperation Nexus' by Rear Admiral Raja Menon (Retd), Indian Navy. Next subject of presentation was 'Cooperative Maritime Engagement in the Indo-Pacific Region' by Professor Geoffrey Till, UK. First Admiral Amarullah Octavian, Indonesia spoke on 'Indonesian Approach and Perspective on Asia's Regional Maritime Cooperative Engagements' and the last speaker, Professor Ataur Rahman, Bangladesh, spoke on 'Building Partnerships in the Bay of Bengal: Opportunities and Challenges'.

Vice Admiral Satish Soni delivered the valedictory address which brought curtains down on the conference and was followed by the closing remarks and a vote of thanks by Dr Vijay Sakhuja, Director, NMF.

Passage Exercise

Finally, 54 ships which participated in IFR 2016 sailed out of Visakhapatnam harbour in the first ever Passage Exercise with combined participation of 20 foreign warships from 17 nations on February 9, 2016. As per old maritime tradition the visiting foreign ships are generally escorted to the open seas on their way home.

Passage Exercise emerged as a grand finale to IFR 2016 when 54 ships sailed out in two groups of 27 ships each. The first group was under the command of Rear Admiral Ravneet Singh, Flag Officer Commanding, Western Fleet, embarked on INS Vikramaditya and the second group under the command of Rear Admiral S.V. Bhokare, Flag Officer Commanding, Eastern Fleet embarked on INS Viraat.

This made a grand spectacle conforming to the growing combat of the Indian Navy. This indeed augured very well to witness Indian Navy's capability to operate two carrier battle groups as the true instrument of power projection. **SP**

Spectrum woes – Ignoring military requirements

LT GENERAL
P.C. KATOCH (RETD)

The government would do well to review its decision of taking away 150 MHz spectrum from defence by weighing how much money it would make by auctioning the 150 MHz vis-à-vis the negative impact this would have on the combat capacity of the military

Developing India requires loads of money and spectrum sure is lot of money. As per media reports ₹4,69,000 crore (about $70 billion) worth upcoming spectrum sale around March 2016 is likely to hit Bharti Airtel, Vodafone India and Idea hard even if the sale is a partial success, warns brokerage Credit Suisse, the other being the entry of Reliance Jio Infocom. This is likely to be the largest quantum of spectrum to be sold at once, with an estimated value of $60 billion to 70 billion, and even a partial sale ($10-15 billion) could be a serious hit on operator returns, that is not reflected in stock prices.

The government is also expected to auction premium 4G spectrum in the 700 MHz band in the upcoming airwaves sale, barring a strong recommendation from the Telecom Regulatory Authority of India (TRAI) to the contrary, which is unlikely. More so, as the estimated value of this premium 4G spectrum alone is pegged at $45-49 billion, out of the estimated $70 billion gross value of all airwaves, across bands. But what has been most disturbing is the news that the Department of Telecommunication (DoT) is likely to get 150 MHz spectrum from the Ministry of Defence (MoD). Since the media refers to a harmonisation plan between DoT and defence having been approved by the Cabinet in January 2015, surrender of 150 MHz spectrum can be taken as certainty. As per media reports, DoT and the Defence Ministry had signed a memorandum of understanding (MoU) in 2009 to get some spectrum freed from the latter for commercial mobile telephony services. As part of the MoU, Defence Ministry had agreed to vacate 150 MHz out of 300 MHz that it holds in the frequency bands ranging from 1,700 MHz to 2,000 MHz. This band includes frequencies that can be used for transmitting 2G, 3G and 4G mobile signals. In return, DoT had committed to set up an exclusive defence network for its communication services.

DoT expects to complete Phase I of spectrum harmonisation in three months, freeing at least 150 MHz of airwaves for mobile services in 1,700-2,000 MHz band. As the Phase I of spectrum harmonisation covers six-seven telecom circles for 1,700-2,000 MHz bands, the 150 MHz quantum of radio waves would be available in those areas initially. This is a grossly negative development that is directly related to the combat capacity of the military and in turn national security. There is no denying that the government wants effective allocation of frequencies to support programmes like Digital India, Smart Cities, etc, and having earned ₹82,000 crore ($13 billion) in March 2015 through spectrum sale, the urge is to make more quick money. But the nature of high mobility of military operations and their logistics support requires wide use with high speed capacities of voice, data and image communications, etc. Control, surveillance, reconnaissance and reporting systems play a vital role in the command and control system. Many of these requirements can be only met with the use of radio systems. The equipment of military communications adds and multiplies the power of forces. That is why the use of radio frequencies' spectrum is evaluated as one of the preliminary conditions for successful military operations. Simultaneous to projects like Digital India, Smart Cities etc, the military too is capacity building for net-centric warfare (NCW) and going for Digital Military.

Neither DoT's optical fibre cable (OFC) alternate project can support mobile operations nor can DoT ever sustain and maintain the vast alternate OFC required especially in difficult far-flung areas and even the hinterland. Moreover the logic that more spectrum would be made available to Defence Ministry during war is outright stupid because the need for spectrum to sustain requisite C4I2SR during conventional war is no different from the ongoing hybrid war that we are constantly battling. Moreover, armed forces all over the world have enhanced their spectrum requirements for increased demands of C4I2SR, drones, communication requirements including video coverage. As it is, there is no dedicated continuous band has been allocated for defence, and intermittent bands for civil use are disturbance prone. Moreover, how much did DoT gain from spectrum that Defence Ministry surrendered during 2G/3G in late 2000 and did DoT not complete the promised alternative on plea of lack of funds?

Technology is developing fast and has brought an extended variety of user services. The success of certain applications (mobile radio-telephony, equipment with low power, digital media, various military systems, etc) naturally has caused an increase in the needs for frequencies from the civilian and military sectors. This has often brought civil administration to have tendencies to decrease the amount of frequencies in the interest of military forces. We are also at a disadvantage because of the military having been kept out strategic formulations and our MoD being sans military professionals. It is not difficult to decipher that the 2009 MoU between DoT and Defence Ministry referred above was either arbitrary decision of the MoD without military inputs or the military inputs were ignored. Every military force has a goal to ensure and have permanent access to radio frequencies to meet its vital military tasks based on strategies, doctrines and policies. We may not have a national security strategy but the military has its own doctrine. The government would do well to review its decision of taking away 150 MHz spectrum from defence by weighing how much money it would make by auctioning these 150 MHz vis-à-vis the negative impact this would have on the combat capacity of the military. **SP**

C4I2SR – Is this getting adequate attention?

LT GENERAL
P.C. KATOCH (RETD)

While Services are progressing individually towards NCW capabilities, an integrated C4I2SR structure to link the strategic, operational and tactical domains needs to be established

The increasing importance command, control, communications, computers, information and intelligence (C4I2SR) is unquestionable. Battlefield requirements have changed with long-range precision weapons, increased lethality and high mobility. Space and cyberspace have added new dimensions. Battlefield transparency, technological superiority, information advantage, telescoped sensor to shooter link and decision cycle are of vital importance. We must exploit technology to boost combat potential at strategic, operational and tactical levels transcending the physical, information and cognitive domains of war. Optimising C4I2SR enables defence forces transform into net-centric warfare (NCW) capable forces. Net-centricity requires a reliable and robust communications network that ensures interoperability within the services, entire security establishment and concerned government agencies.

C4I2SR can mould public opinion and assist in perception management. While services are progressing individually towards NCW capabilities, an integrated C4I2SR structure to link the strategic, operational and tactical domains needs to be established. Roadmaps of information and communications must converge into an integrated information communication technology (ICT) road map, which has yet to take off. Under the elusive dedicated defence band. Services need to focus on spectrum management and technology to telescope bandwidth. Resistance to change apart, senior officers, especially those in decision-making hierarchy dealing with the C4I2SR network, need to make extra effort to understand technology. Intransigence and in service bureaucracy is not permitting the much needed C4I2SR network to progress with the desired momentum.

Adding to these negative factors is the government apathy towards appointing a Chief of Defence Staff despite strong recommendations made by the Kargil Review Committee a decade back. Importance of interoperability increases manifold owing to future joint operations and situational awareness to enable cohesive application of joint forces. Challenges that need to be overcome are frequent changes in requirements, security architecture, connectivity matrix and points of exchange of information, integration, legacy systems, standards and protocols, functionalities and procedures, time sensitivity, human resource issues, training of users and management of trained manpower. Implementation strategy should include operational interoperability, joint doctrine, identification of information required and its form, time frame in which information is required, joint training

To respond to 21st century battlefield requirements, the defence forces need to usher in change

standards, technical interoperability and interface requirements of various systems. Architecture of the systems must have a common database, compatible communications and applications standards. Middleware technology should be developed to achieve interoperability. Integration of legacy systems needs to be taken care of after evaluating the residual life and viability of such systems. Strategic surveillance can be ensured by fusing data from all strategic sources such as satellites and then fused data being made available in real time. A design of common applications for integrated C4I2SR is also required.

C4I2SR system can be viewed as the final state which would act as a force multiplier. Besides, more results would appear like integration of various sensors, weapon platforms and logistics operating in varied environments of the three services in a seamless manner. Robustness imparted to the system should enable its survivability during operations including nuclear contingencies. The system should be operational from land, air and sea. Synergy in warfare can only be achieved if there is interoperability between disparate systems of the services. Some of the issues related to interoperability concern the organisation/environment where development takes place, while others are related to the actual development process itself. Command and control functions have to be re-scripted. The battlefield needs to be 'flattened' and hierarchical set ups in various systems and subsystems including communication have to be adjusted according to the requirements of changing times. Finally, while indigenous systems are very much desired the government must ensure a level playing field allowing equal opportunities to the private industry, drawing in the best technology.

To respond to 21st century battlefield requirements, the defence forces need to usher in change. Through this transition to NCW capabilities, the requirement of information superiority and information assurance will remain dominant. Our present status is that: Army's Tactical Command Control and Information (Tac C3I) System is inching forward at an excruciatingly slow pace; Project Army Strategic Operational Information Dissemination System (ASTROIDS) and the Tactical Communication System (TCS) are yet to see the light of the day; common software for the Defence Communication Network is yet to be developed; our mapping is 30 years behind, to name a few. The bottom line is to ask ourselves have we really acknowledged information as a strategic asset? SP

The views expressed herein are the personal views of the author.

COAS presents President's Colours to the Corps of Signals

General Dalbir Singh, the Chief of Army Staff (COAS), presented the President's Colours to the Corps of Signals of Indian Army at Jabalpur on February 15. Lt General Balwant Singh Negi, Army Commander, Central Command, was also present. The Colour Presentation Parade was commanded by Brigadier Kanwar Vinod Kumar, Commandant, 1 Signal Training Centre. The honour has been bestowed upon the Corps of Signals in due recognition of its meritorious service rendered to the Nation since raising. To commemorate this historic event the Chief of Army Staff also released a First Day Cover.

The COAS reviewed the parade and during his address, appreciated the efforts and advanced technologies being used by the Corps in the field of telecommunications. He also appreciated the high standard of parade conducted at 1 Signal Training Centre. Earlier the Corps of Signals had received the Regimental Colours on February 20, 1965, and February 15, 1981. SP

Visit of Indian warships to Male

Indian naval ships Vikramaditya, Mysore and Deepak are visiting Male from February 15-18, 2016, after participating in the International Fleet Review. The ships are part of the Indian Navy's Western Fleet based at Mumbai.

INS Vikramaditya, one of the two aircraft carriers is a state-of-the-art ship, capable of operating a versatile range of high-performance aircraft, such as the MiG-29K fighters, Ka-31 AEW helicopters, multi-role Seakings and utility Chetaks. The ship is over 285 metres long and 60 metres wide. Her 23 decks scale a height of 60 metres. She is accompanied by indigenously constructed INS Mysore, a frontline missile destroyer, and INS Deepak, the fleet tanker.

During the visit, the warships will have professional interactions with the Maldives National Defence Force (MNDF) for further enhancing the close cooperation between the two forces. In addition, a number of sports and social engagements, aimed at strengthening ties and mutual understanding between the two navies, are also planned.
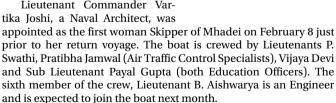
The Flag Officer Commanding Western Fleet, Rear Admiral Ravneet Singh, NM, is flying his flag onboard the Vikramaditya which is commanded by Captain Krishna Swaminathan, INS Mysore is commanded by Captain M. Paul Samuel and INS Deepak is commanded by Captain Sujit Kumar Chhetri.

India and Maldives are close maritime neighbours with strong and extremely cordial defence and diplomatic relations. The Indian Navy and the Indian Coast Guard, in conjunction with MNDF, regularly undertake surveillance in the Maldivian EEZ. The current visit highlights the importance accorded by India to bilateral relations with Maldives and seeks to strengthen the existing bonds between the two countries. SP

Mhadei sailing with an all-women crew enters Chennai

The Navy's famous sailing vessel Mhadei, skippered and crewed by an all-women crew of naval officers for the very first time, entered Chennai port recently, after participating in the International Fleet Review 2016. The sail boat had left Visakhapatnam on February 9 and is scheduled to make stops at Chennai and Kochi ports en route before reaching her home port at Goa.

Lieutenant Commander Vartika Joshi, a Naval Architect, was appointed as the first woman Skipper of Mhadei on February 8 just prior to her return voyage. The boat is crewed by Lieutenants P. Swathi, Pratibha Jamwal (Air Traffic Control Specialists), Vijaya Devi and Sub Lieutenant Payal Gupta (both Education Officers). The sixth member of the crew, Lieutenant B. Aishwarya is an Engineer and is expected to join the boat next month.

The women officers are training to form an all-women crew that would attempt to circumnavigate the globe next year. Mhadei will remain at the ports of Chennai (February 13-16) and Kochi (February 23-26) on her return journey. She will eventually return to Goa on March 2. This is the first all-women crew to man any ocean-going sailing boat of the Navy. All the crew members are volunteers and are driven by their passion for adventure and a love for sailing and the seas. SP

PHOTOGRAPHS: PIB, Indian Navy

President confers Honorary Rank of General of the Indian Army on General Rajendra Chhetri, COAS, Nepalese Army

The President of India Pranab Mukherjee conferred the Honorary Rank of General of the Indian Army on Prakhyata Trisahkati-Patta General Rajendra Chhetri, Chief of the Army Staff, Nepalese Army, for his commendable military prowess and immeasurable contribution to fostering Nepal's long and friendly association with India, at a special investiture ceremony held at Rashtrapati Bhavan recently.

The citation read out on the occasion says: "General Rajendra Chhetri's selfless service, sincere devotion and commitment to excellence are in keeping with the finest traditions of military service and reflect distinct credit upon himself and the Nepalese Army. Throughout his exemplary career, General Chhetri has demonstrated dynamic leadership and outstanding professionalism. General Rajendra Chhetri has contributed to promote the existing bond of friendship, based on goodwill and mutual understanding, between Indian and Nepalese Army as well as other armies of the world. In recognition of his commendable military prowess and immeasurable contribution to further fostering the long and friendly association with India, President of India is pleased to confer the honorary rank of General of the Indian Army on General Rajendra Chhetri".

Among the dignitaries present on the occasion were Manohar Parrikar, Minister of Defence; General Dalbir Singh, Chief of the Army Staff; Air Chief Marshal Arup Raha, Chief of Air Staff; Vice Admiral P. Murugesan, Vice Chief of Naval Staff and Defence Secretary G. Mohan Kumar. **SP**

Exercise Surya Kiran IX commences

The 14-day Indo-Nepal combined military exercise Surya Kiran IX at general area, Pithoragarh commenced on February 8, 2016, and will culminate on February 21, 2016. A combined ceremonial parade was held by both the participating contingents. The Nepal Army is being represented by officers and troops of the elite Shree Rudra Dhoj battalion while an infantry battalion is participating on behalf of Indian Army. The combined battalion level exercise is being conducted under the aegis of Panchshul Brigade of Central Command.

This is the ninth Indo-Nepal combined exercise and during the next 14 days of combined training, emphasis would be laid on upgradation of tactical and practical skills by sharing each other's experiences and also on enhancing interoperability in jungle warfare and counter terrorism operations in mountain terrain. The role and importance of armed forces in disaster management in both the countries has assumed increasing significance in recent years. focus will also be laid on humanitarian aid and disaster relief operations which also includes medical and aviation aspects.

Brigadier Sanjay Sharma of Headquarter Central Command was present during the opening ceremony and interacted with the soldiers of both the contingents. In the opening address, he emphasised that both the armies have a lot to learn from each other especially in our approach towards handling the modern day challenges of addressing terrorism and also in disaster management as it has been one of the most important challenges for both countries after the recent calamities. Senior Nepalese Army officials are also likely to attend the combined exercise alongwith their Indian counterparts during the validation phase of the exercise. **SP**

Indo-Seychelles joint military exercise begins on February 15

The Seventh Joint Military Training Exercise between the Indian Army and the Seychelles People's Defence Forces (SPDF) – Lamitye 2016, is on at Seychelles Defence Academy (SDA), Victoria, Seychelles, from February 15-28, 2016. The SPDF is represented by 20 personnel from Tazar (Special Forces Unit) and 32 from Seychelles Infantry. The Indian contingent comprise of an infantry platoon and representatives from the Special Forces. India and Seychelles have been conducting joint exercises since 2001 and 'Exercise Lamitye', which means friendship in Creole, is conducted biennially with the aim of enhancing military cooperation and interoperability between the two countries.

The concluding phase of the exercise, incorporating a tactical exercise will be witnessed by senior military officers from both the countries who will review the standards of interoperability achieved by both the contingents. . **SP**

PHOTOGRAPHS: PIB, DPR

**LT GENERAL
P.C. KATOCH (RETD)**

Passenger drone – New platform for terror?

Ehang 184, a Chinese autonomous aerial vehicle, showcased at Consumer Electronics Show in Las Vegas during January 2016, does not require the passenger to have any pilot training. The high level of flight automation and redundant systems can be militarised and scaled to other systems.

Intelligence reports of Pakistani terrorists using drones for terrorist attacks against India have been on for past two years. It may be recalled that in January 2015, a drone crashed on the White House grounds, raising questions about safe use of commercial and consumer drones in the US and in April 2015, a drone with traces of radioactive material in a bottle and mounted with a camera was discovered on the roof of Prime Minister Shinzo Abe's office in Tokyo. A recent study in the US brings home the chilling conclusion that one single disciple of 'Lone Wolf Terrorism' is capable of killing millions, which incidentally is being propagated by the ISIS. The New York Police Department (NYPD) has been concerned about potential terror attack from the air through a drone armed with a deadly weapon.

India is world's top drone importer after UK and France. Between 1985 and 2014, 22.5 per cent of world's UAVs were imported by India. Within the country we have multiple manufactures marketing drones, remote controlled toys for children, cam-copters for surveillance and private clubs indulging in drone flying adventure. Drones are being used in the country for shooting concerts, movies, private parties, police organisations for surveillance, National Disaster Relief Force (NDRF), and for surveillance and intelligence gathering by armed forces.
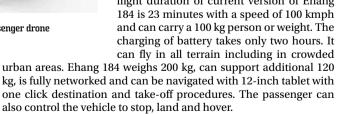
But then another terrorist threat of hacking and cyber attacks through drones emerged during the DEF CON 22 Hackers Conference held in last August at Las Vegas, in the United States with a US company called 'Aerial Assault' displaying a quadcopter modified as a flying hacker that scans the world below for insecure devices and vulnerable Wi-Fi ports. This hacker-quadcopter can be bought just for $2,500 and can be turned into a malware injector, and reportedly is the first unmanned aerial penetration tool for sale to the public. This invention opened up new dimensions for both terrorism and in cyber warfare, as there has never been such capability before, as this model is the first drone armed with automated hacking tools, the drone loaded with an array of software capable of looking for weaknesses in any unsecured wireless networks in range, recording information about vulnerabilities, and capturing the precise GPS

Ehang 184 passenger drone

coordinates of the target. Penetration testing was usually being done through the existing networks. However, arming a drone with the software means that hackers can sneak up on networks not intended for communication with the outside world, which are usually less secure. So now hackers would have a new weapon in their arsenal; a drone loaded with software capable of probing any wireless network in range, and relaying the data to its operator.

As is all this was not enough, passenger drones have now been developed that don't require the passenger to have any pilot training. China's Ehang 184, Chinese autonomous aerial vehicle being one example, showcased at the Consumer Electronics Show in Las Vegas during January 2016. It can have mounted camera pods for recording. Ehang 184 is a fully automated electric, vertical landing unmanned aerial vehicle (UAV) with redundant fly-by-wire, networked with encrypted sensors. The high level of flight automation and redundant systems can be militarised and scaled to other systems. Ehang 184 has developed flight control software that not only autonomously develops a flight plan and adjusts it according to data from its sensors, but the flight control system can also refuse to take off in certain conditions (like thunderstorms) as well as diagnose and remedy damage (like birdstrikes), and includes emergency landing protocols. The flight duration of current version of Ehang 184 is 23 minutes with a speed of 100 kmph and can carry a 100 kg person or weight. The charging of battery takes only two hours. It can fly in all terrain including in crowded urban areas. Ehang 184 weighs 200 kg, can support additional 120 kg, is fully networked and can be navigated with 12-inch tablet with one click destination and take-off procedures. The passenger can also control the vehicle to stop, land and hover.

Other countries too are developing flying cars and India's Technology Information, Forecasting and Assessment Council (TIFAC) in its Technology Vision 2035 includes development of flying cars. However, this Chinese capability which invariably will get passed on to protégé Pakistan, and its military applications both in the conventional and subconventional mode need to be taken note of. Terrorist organisations sure have another platform to exploit. **SP**

Tejas fires Derby missile in Jamnagar

Continuing with its successful stride of flight trails in 2016, India's light combat aircraft (LCA) Tejas achieved a major milestone on February 5. One of the limited series production (LSP) platforms fired a Beyond Visual Range air-to-air missile (BVRAAM) missile Derby for the first time.

According to sources associated with the project, the LSP-7 from Tejas flightline fired the missile in Jamnagar as part of its scheduled weapon trials. These weapon trials are part of the final operational clearance (FOC) mandate.

Tejas is also scheduled to fire a close combat missile (CCM) Python-5 missile as part of the FOC trails. The LSP-7 along with LSP-4 were part of Indian flying assets at the just-concluded Bahrain International Air Show 2016. **SP**

Embraer Phenom 100 for UK training programme

The Embraer Phenom 100 business jet was selected to provide multi-engine pilot training to armed forces aircrew in the United Kingdom. The contract with Affinity Flight Training Services will provide five aircraft to the UK Ministry of Defence's Military Flying Training System (UKMFTS) programme. The contract includes support services and an option for additional follow on aircraft.

The Fixed Wing programme is intended to replace the elementary, multi-engine and basic flying training that is currently delivered on ageing platforms with a new fully integrated solution that provides state-of-the-art training aircraft, ground based training devices and courseware all derived from the training design developed by Ascent Flight Training, the training service provider of the MFTS programme in UK. In 2014, Affinity was selected by Ascent Flight Training to provide and operate the aircraft selected for the MFTS programme.

"We are very proud to be selected in such an important programme for United Kingdom's Ministry of Defence", said Jackson Schneider, President and CEO of Embraer Defense & Security. "The Phenom 100 is a very reliable, cost-effective and easy to operate aircraft that was also selected to provide flight training services to major international airlines".

The UKMFTS takes United Kingdom armed forces aircrew from initial training through elementary, basic and advanced flying training phases preparing them for their arrival at their designated operational conversion units. The system is operated by Ascent Flight Training, a consortium formed by Lockheed Martin and Babcock International under a private finance initiative contract for the UK's Ministry of Defence. **SP**

Beechcraft signs T-6C contract for UK training

Beechcraft Defense Company, LLC, a subsidiary of Textron Aviation Inc., announced it has signed a contract with Affinity Flying Training Services to provide 10 Beechcraft T-6C Texan II military training aircraft to the UK Ministry of Defence's Military Flying Training System (UKMFTS) programme.

A second contract has also been signed to include five years of engineering services, parts support, maintenance training and the placement of on-site Field Service Representatives who provide ongoing technical expertise to UKMFTS maintenance personnel.

With deliveries beginning in the first quarter of 2018, these aircraft will support Team Affinity, a joint venture between Elbit Systems and KBR (Kellogg, Brown and Root), who was selected as the preferred bidder to provide aircraft and maintenance services to the UKMFTS programme.

The T-6C trainers will replace Shorts Tucano T1 aircraft and join the fleet of Beechcraft King Air 350ER turboprops, which are already providing live and synthetic radar training for Royal Navy observers as part of the UK MFTS Rear Crew Training programme. **SP**

Air Vice Marshal R.D. Mathur promoted to the rank of Air Marshal

Air Vice Marshal Rajiv Dayal Mathur who had been Assistant Chief of Air Staff in charge of the Indian Air Force's Air Warfare Strategy Cell besides its Space, Cyber, Air Traffic Services and Media & Public Relations Directorates, has been promoted to the rank of Air Marshal on February 15, 2016.

Commissioned into the Fighter stream of the Indian Air Force in June 1982, the officer has over 5,000 hours of flying experience in a variety of operational and training roles. He had earlier served as Air Defence commander at Ho Eastern Air Command and commanded a frontline Air Force Station and a Fighter aircraft squadron.

Air Marshal Mathur has undergone postgraduate courses at the Defence Services Staff College, Wellington, and the National Defence College, New Delhi, and holds M.Sc. and M.Phil degrees in Defence and Strategic Studies from Madras University.

For his meritorious service, he has been awarded the Vishisht Seva Medal in 2003 and Ati Vishisht Seva Medal in 2014 by the President of India. **SP**

F-35A Lightning II completes first Trans-Atlantic crossing

An Italian Air Force (Aeronautica Militare) F-35A Lightning II aircraft completed very first transatlantic ocean crossing, arriving at Naval Air Station Patuxent River, Maryland, from Cameri Air Base, Italy, on February 5.

F-35A aircraft AL-1, the first international jet fully built overseas at the Cameri, Italy, Final Assembly and Check Out (FACO) facility, was piloted across by the first Italian Air Force F-35 pilot, who completed training at Luke Air Force Base, Arizona, last November and had 50 hours of flight time on the F-35 Lightning II. The aircraft will begin three months of electromagnetic environmental effects (EEE) evaluation and certification while at Naval Air System Command's Integrated Battlespace Simulation and Test (IBST) facility.

AL-1 will join the F-35 international pilot training fleet at Luke Air Force Base in May, the first of five F-35s Italy has committed to the international training fleet there.

AL-1's arrival in the US demonstrates Italian industry's capability to build and sustain a fifth-generation fighter, an achievement made possible through the close partnership between US and Italian Governments and defence leadership. **SP**

France orders four C-130J aircraft

The Directorate General of Armaments (DGA) on January 29, 2016, ordered four new-build C-130J Hercules from the United States Air Force (USAF). Two of the four aircraft will be able to refuel helicopters in flight.

This order follows the decision by Jean-Yves Le Drian, the Minister of Defence, on December 15, 2015, during the latest meeting of the Ministerial Investment Committee. The first two aircraft will be delivered by the end of 2017 and in early 2018, and the two tanker aircraft in 2019.

These aircraft will strengthen the central segment of the tactical transport fleet of the Air Force, currently composed of the C-160 Transall and the C-130H Hercules. These aircraft are particularly overworked and fatigued by various overseas operations, where environmental conditions are straining the equipment.

A key measure in the updating of the current military programme law, this acquisition was completed in a very short time. It is conducted through the foreign military sales (FMS) acquisition procedure. **SP**

New MD 530G Scout attack helicopters to Malaysia

MD Helicopters Inc. (MDHI) announced that it succeeded in its bid to supply six MD 530G Scout attack helicopters to Malaysia's Ministry of Defense. MDHI will deliver the launch helicopters to the Malaysian Army Aviation (Pasukan Udara Tentera Darat; PUTD) beginning in the fourth quarter of 2016, with the full fleet to deliver by the end of Q1 2017.

With this installation, MD Helicopters becomes the only rotorcraft original equipment manufacturer (OEM) to introduce and field two new Scout attack helicopter programmes, each within 12-months from award. "Our legacy is firmly rooted in service of the warfighter; delivering fast, agile, highly – capable scout attack helicopters for the protection of the United States and our partner nations," said Lynn Tilton, Chief Executive Officer for MD Helicopters. "Perfectly suited for Malaysia's operational environment, we are honoured that the MD 530G—our next-generation light scout attack helicopter—was selected by the Malaysian Prime Minister, Minister of Defence and the Chief Defence Force (CDF) to be the newest addition to the Malaysian Armed Forces." **SP**

Russia, India joint project on helicopters

Russian Helicopters holding company and the Hindustan Aeronautics Limited (HAL) are working on the exterior appearance of the Ka-226T light multi-role helicopter that will be manufactured both in Russia and India.
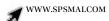
The agreement on the joint work in helicopter engineering between the two countries' governments was signed during the official visit of Prime Minister Narendra Modi to Moscow last December. Around 200 Ka-226T helicopters and derivative models are to be built under the agreement. Sixty machines are to be manufactured in Russia and the rest by a joint effort in India. The agreement also contemplates maintenance, operation, repair, and technical support of helicopters.

"Negotiations are currently underway in India between Russian Helicopters and HAL. The parties are discussing the prospect of involving several companies in the Ka-226T project under the framework of the 'Make in India' programme. At this point options for the helicopters' exterior design are being decided on, the areas of responsibilities are being allocated, and cooperation issues are being elaborated", Ekaterina Pavlova, spokesperson for

Russian Helicopters holding company, was quoted as saying by RIA Novosti.

Designed by a subsidiary of Russian Helicopters, Kamov company, the Ka-226T light multi-purpose helicopter is manufactured at the Kumertau Aviation Production Enterprise. It has a coaxial rotor design providing superior handling and power-to-weight ratio. **SP**

Camcopter S-100 – Successful flights with 'Detect and Avoid' system

Schiebel and the Netherlands Aerospace Centre (NLR), the Netherlands Coastguard and the Royal Netherlands Air Force conducted a series of successful flights with a newly developed airborne Detect and Avoid System at the airport of Den Helder in December 2015.

The AIRICA (ATM Innovative RPAS Integration for Coastguard Applications) project marks a major step forward in the process of safe integration of RPAS (remotely piloted aircraft systems) into all classes of airspace.

During a special demonstration held at De Kooy Airfield in Den Helder, Schiebel provided its unmanned helicopter, the Camcopter S-100, onto which the NLR developed AirScout Detect and Avoid System was installed. The Netherlands Coastguard provided a Dornier Do-228 as 'intruder' and the Royal Netherlands Air Force contributed with an Alouette helicopter as 'intruder', and provided the Air Traffic Control services.

Several scenarios were successfully executed where the Camcopter S-100 'unexpectedly' encountered an intruder aircraft. The system then determined in real time the corrective action to ensure the necessary separation from the intruder aircraft.

The AIRICA project is funded through the European SESAR programme (part of the Single European Sky initiative) and the key focus – integration of an RPAS into the airspace for Netherlands Coastguard´s applications – was effectively demonstrated during the flights.

Edwin van der Pol, Head of Operations Kustwacht, said: "In the future we hope to use unmanned systems for our search and rescue operations. These trials are important to achieve regulations for bringing RPAS into non-segregated airspace."

Chris Day, Head of Capability Engineering at Schiebel, said: "This demonstration is another positive step towards unmanned air systems gaining access to a broader range of airspace." **SP**

Elbit Systems introduces Skylark3

Elbit Systems has developed the Skylark3, a new autonomous mini-unmanned aircraft system (UAS), best suited for brigades and divisions in 'beyond the next hill' reconnaissance, counterinsurgency and force protection missions, as well as for use in a range of civil applications, such as border and coastal security and anti-terror operations. The new system has already been selected by an undisclosed customer.

Leveraging the proven technology and operational experience of the Skylark family of mini-UAS, Skylark 3 offers a wide range of system enhancements, including a significantly larger range (more than 100 km), flight endurance (up to 6 hours) and payload capacity (up to 10 kg). Launched via a pneumatic launcher, mounted either on the ground or on a vehicle, Skylark 3 offers upgrades such as improved payloads with better target detection, classification and surveillance capabilities. These deliver superior electro optical/infrared (EO/IR) video and photographic imaging in both day and night operations and in adverse field conditions. The aerial vehicle incorporates an electric motor which reduces sound signature and enables operating over long distances and at high altitudes, has a 4.8-metre wingspan and a maximum take-off weight of 45 kg. It has a service ceiling of 15,000 ft.

To support interoperability, Skylark 3 uses the same advanced technologies and know-how found in other Elbit Systems' UAS. In addition, through a shared GCS, two Skylark 3 vehicles can be assigned to the same mission simultaneously, meaning a consistent target acquisition is maintained from two aspects. This also offers ground forces the ability to significantly extend the flight endurance of their mission by UAS hot-swap. **SP**

Anka carries out first missionary flight

Anka, an unmanned aerial vehicle developed by the Turkish Aerospace Industries (TAI), carried out its debut missionary flight in the eastern province of Elazig on February 5.

Taking off from Elazig Airport, Anka (Phoenix in English) ascended to an altitude of 19,000 feet to carry out a four-hour exploration and observation flight. Designed and developed by TAI, a Turkish Armed Forces Foundation company, Anka is a medium-altitude, long-endurance (MALE) drone.

It has initially been deployed in Elazig due to the current strategic needs of the Turkish General Staff, said Deputy Defense Minister Suay Alpay at the launch of the Anka's first flight. "We are currently doing a very critical thing, struggling against terror," Alpay said.

Work on the Anka dates back to December 2004, and in 2013 the Turkish Government signed a deal with TAI for an order of 10 Ankas and ground stations.

In 2014, military and defence officials moved ahead with a plan to add satcom capabilities to the Anka, while also bringing together a task force that would design and develop an indigenous engine for the drone.

The Anka's debut flight was controlled and observed from the ground control centre by Turkish Armed Forces Foundation General Manager Orhan Akbas, TAI Chairman Nejat Bilgin, rocket developer Roketsan Chairman Emin Alpman, and domestic defence firm Havelsan Chairman Yüksel Öztekin. **SP**

Terrorism is a crime against humanity: Rajnath Singh

Appropriate legal and structural frameworks to fight against the menace of terrorism is being created in the country, says Union Home Minister Rajnath Singh while addressing the International Conference on Counter-Terrorism at Jaipur on February 3, 2016

The Union Home Minister Rajnath Singh addressing the International Conference on Counter-Terrorism, organised by the India Foundation at Jaipur has said: "Today much of the world is grappling with the scourge of terrorism and its dangerous consequences. Terrorism is seeking to destabilise the geopolitical order in several parts of the world. It is doing so in pursuit of an insane interpretation of faith and philosophy that is violently anarchic and allergic to diversity which is the essence of humanity and its habitat.

I firmly believe that Terrorism is a byproduct of a perverse mind. This perversion has no love for human beings or the humanity. Terrorism has no religion because religions do not allow crimes against humanity. Simply put, terrorism is a crime against humanity.

Unfortunately, while the world acknowledges the threat of terrorism, there is no consensus even on the definition of terrorism. The UN has adopted numerous resolutions to fight terrorism. All these resolutions amply show the resolve of the world. Sanctions stipulated by UN Security Council resolutions are often rendered ineffective by vested interests of some countries in the absence of a consensus definition of terrorism.

The challenge of terrorism gets compounded when certain states use it as an instrument of their foreign policy. They make perverse distinction between 'good' and 'bad' terrorists. When the states begin covertly raising and indoctrinating bands of youth and equipping them with lethal weapons and weapon systems of mass destruction to promote their geopolitical agenda, the magnitude of threat amplifies many times. It makes the task of defeating terrorism much more difficult.

So long some countries continue using terrorists as instruments to promote their geopolitical agenda, the fight against terrorism will lack due resolve. The world must accept the reality without any loss of time that there is no 'good' terrorist.

As we struggle to arrive at a consensus on relatively simpler issues such as definition of terrorism, terror groups are becoming deadlier by the day. From traditional forms of terrorism, we are now witnessing cyber terrorism, narco terrorism and bio terrorism. Use of dirty bombs also cannot be ruled out. Modern weapons, technology, and communications are being used by terror groups to enhance their lethality and impact.

Revolution in technology including the information technology has brought marked improvement in quality of life of the people.

Ironically it has also given unprecedented destructive power in the hands of the terrorists. Now they also operate in small nodes, widely dispersed, invisible and connected through digital networks. Never before in the human history, small groups of non-state actors could have access to so much destructive power.

We are a country full of diversity with multilingual, multireligious and multiethnic society. These conditions are actively utilised by anti-national elements and other enemies to foment trouble in our country. To counter such threats we need to undertake sound preventive and responsive security measures. Most of the terrorist attacks in India emanate from Pakistan and it will have to show some sincerity and take concrete steps to rein in the various terror groups operating against India from its soil. If Pakistan takes concrete action against terrorists on its territory it will not only improve the bilateral ties between both the countries but also bring peace and stability in the South Asian region. The government of India will stand by Pakistan if it takes decisive action against terrorists and their organisations.

For India Mumbai and Pathankot terror attacks have signified a tectonic shift. Mumbai terror attack in 2008 brought terror across the seas to our economic capital causing large number of casualties on innocent civilian population. Likewise in the recent attack on Pathankot air base, there was a conscious effort to target sensitive assets of the country and also cause large scale casualties, thus taking the dynamics of terror attack in India a notch higher. However, it goes to the credit of our security forces and intelligence agencies that they not only prevented any damage to our capabilities and assets but also achieved it with minimum casualties to own security personnel.

Security Forces also ensured that there were no casualties to families including trainees from friendly foreign countries. For such a brave act they deserve the highest accolades.

I can say this with conviction as terror attacks in the past on air-bases of other countries such as Pakistan and Sri Lanka had led to major damages to their air assets including large number of casualties.

After the Pathankot terror attack the government is reviewing its counter-terror strategy. We are now formulating an effective strategy which would help in preventing our country from such terror attacks in future. We are fully equipped and prepared to deal with cross border terrorism or any kind of terrorism. We are working on a National

Security Strategy aiming to achieve seamless coordination between all the agencies.

We had advance intelligence input on Pathankot. It helped our security agencies in neutralizing the possible impact of this terror attack.

Proper assimilation, analysis and timely sharing of intelligence inputs hold key to any successful strategy against terrorism. The government is increasing its capabilities in this area as well. We are also stepping up vigil at our international borders and strengthening our border infrastructure to ensure fool proof security in the border areas.

Terrorism is hydra-headed monster fed by a massive supply of funds through different routes. We need to put a plug on the flow of funds to curb terrorism. Drug trafficking, *hawala* transactions and supply of counterfeit currency are some of the known sources of terror funding. It is a big challenge to cut the supply lines of terrorist organisations and their activities. There has to be global strategy and better coordination among like-minded nations against terrorism, if we want to disrupt the supply of funds to terror activities

Given the ever increasing threat of terrorism in India, our national security strategy is now aiming at creating an environment which provides full opportunity for unhindered growth and development to every section of the society. We are also looking forward to create appropriate legal and structural frameworks to fight against the menace of terrorism. We want to insure that all terror related cases are thoroughly investigated and followed up properly and regularly in the courts. Our guiding principle while handling terror related cases should be *'koi begunaah fanse nahi, aur koi gunahgaar bache nahi.'*

We also solicit and appeal for full cooperation on issues pertaining to National Security from opposition too because we need to rise above partisan politics on issues of national importance.

Lack of consensus on matters like national security will adversely affect the country's national interest.

It is a cause of grave concern that the cyber world is being exploited by terror groups such as DAESH or ISIS to radicalise the gullible youth of our country. Since many security experts and intellectuals are present here, I appeal to all of you to use the word DAESH to mention ISIS in future because this terror organisation is seeking legitimacy through the word 'Islamic State'. The cyber world is also enabling 'Lone Wolf Attacks' across the world. Exploiting the power of Internet and ideological motivation, terror groups like DAESH and Al Qaeda have already flooded the Internet with literature pertaining to bomb making and suicide attacks which present a risk of emergence of 'DIY' (Do it Yourself) Terrorists. India also needs to be mindful of this possibility.

We have adopted a multi-pronged strategy against the attempts to radicalise the youth of the country. On the one hand we have successfully de-radicalised our youth and on the other hand our security agencies have also taken action certain individuals for their links and association with terror organisations. The security experts believe that India's strategy against radicalisation is far more positive and effective than other countries of the world.

We are hopeful and firmly convinced that together we can neutralise any threat to our country. We also would like to assure various dignitaries and participants from friendly foreign countries that India stands firmly behind the International Community in the fight against terrorism. **SP**

Directorate of Coordination, Police Wireless to celebrate 70th Raising Day

The Directorate of Coordination, Police Wireless (DCPW) will celebrate its 70th Raising Day on February 19, 2016. The Directorate came into existence this day in 1946 initially as "Inspectorate of Wireless" and was later accorded the status of Directorate of Coordination (Police Wireless), a subordinate organisation, under the Ministry of Home Affairs in 1950. It is entrusted with the responsibility of coordinating for developing and establishing the police telecommunication network in the country and also to advise MHA on all police telecommunication matters.

The DCPW operates a round-the-clock Inter State Police Wireless (ISPW) Network through its 31 stations in all States capitals/ Union Territories (UTs) for delivering emergent messages pertaining to law and order. It has an extensive network of very small aperture terminals (VSATs) spread over the entire country and extending connectivity to all district/state headquarters and National Capital Delhi through its satellite based network namely Police Network (POLNET). This satellite-based network has been actively involved in facilitating communication among various State Police/Central Armed Police Forces (CAPFs). The Directorate has an established high frequency (HF) communication network at its HQ and Inter-State Police Wireless (ISPW) stations located in all State capitals and UTs. The DCPW is a nodal advisory body to the Ministry of Home Affairs for the police telecommunication in the country and for laying down technical specifications for communication equipment to be inducted in the police forces in the country. It acts as a nodal agency for coordinating various police communication services of States/UTs/CAPFs. Radio communication security matters for all State/UTs Police and CAPFs are also coordinated by DCPW. It is a member of advisory body for frequency allocation to Wireless Planning and Coordination Wing (WPC) of the Department of Communication and IT.

Acting as the Central Distributing Authority (CDA) for Cryptographic Documents and Devices being used by the State Police Radio Organisations, the Directorate runs the Central Police Radio Training Institute, a full-fledged national level police wireless training institute to cater the needs of States/CAPFs and other security organisations to improve the efficiency of their technical, operational and cipher manpower. To meet the communication needs of State Police Organisation/CAPFs, the Directorate maintains a reserve stock of radio communication sets. The DCPW has a technical workshop entrusted with the responsibility of carrying out serviceability testing/repair of radio equipments and its accessories.

Since the first Inter-State Police Radio Control Station was established in New Delhi in the year 1949, the DCPW has many landmarks to its credit. First use of closed circuit television (CCTV) for 'Crowd Control' was done in the year 1974, during the Kumbh Mela at Haridwar. Work on implementation of 'pilot project' relating to the National Police Telecommunication Network Plan was initiated by DCPW in 1990. In 2003, a DCPW team visited Afghanistan for restoring their communication under the directions of the Ministry of External Affairs. During the 2004 Asian tsunami, telecommunication link were restored in the ravaged Andaman & Nicobar Islands by an expert team of DCPW using POLNET VSATs terminals. In September 2014 when Srinagar was flooded, an emergency team was rushed from DCPW to restore wireless communication with Delhi and the task was accomplished successfully. In April 2015 also, during Nepal earthquake, a team was rushed to Kathmandu from DCPW to restore wireless communication between Indian Embassy in Kathmandu and New Delhi and supported NDRF team in relief and rescue mission. **SP**

Saab and Kalyani Group joint venture

Swedish defence and security company Saab, together with Indian company Kalyani Strategic Systems Ltd (KSSL), the defence arm of Kalyani Group, announced preparations for a joint venture company in India for the SRSAM and VSHORAD air defence programmes.

The joint venture, which will be set up by Saab and KSSL, will handle the main part of production and delivery of these air defence systems to the Indian customer. The production in India will comprise of subsystems and systems for SRSAM and VSHORAD with the aim to transfer production as well as development knowledge to India.

"I am glad to announce our contribution to 'Make in India' through our agreement with KSSL and the Kalyani Group to establish a joint venture company in India for the air defence programmes. The JV is already under preparation within both companies, and will be ready to launch soon", says Görgen Johansson, head of Saab Business Area Dynamics.

To secure production quality, orders of missile parts have already been issued to KSSL and production-readiness reviews are ongoing. Saab and KSSL are already planning for the technology transfer for different packages within the programmes.

"The joint venture company will combine Saab's knowledge and experience as a developer and supplier of high-technology radar and missile systems, with the engineering excellence and manufacturing capabilities of the Kalyani Group. The joint venture will create a global supplier in the area of ground-based air defence systems based in India", says Amit Kalyani, Executive Director at Kalyani Group.

Saab's proven track record of offering strong, second-to-none,

long-term industrial partnerships and technology transfer has helped us to constantly exceed expectations and deliver more than promised. **SP**

CSIR-NAL and Tata Advanced Systems announce MoU for indigenous Mission Computer

The Integrated Global bus Avionics Processing System (IGAPS) popularly called Mission Computer, is a CoreAircraft Computing Platform with features like ARINC 664 global bus, ARINC 818 fibre channel video bus and ARINC 653 compliance. This sophisticated state-of-the-art onboard computing system has been successfully designed, developed and integrated for the first time in India by CSIR-National Aerospace Laboratories (CSIR-NAL), Bengaluru, for civil avionics requirements in line with 'Make in India' initiative.

To take this development further to the Indian and worldwide market incorporating application specific upgrades and airworthiness approvals resulting into a certified product, CSIR-NAL and Tata Advanced Systems Limited (TASL) have signed a memorandum of understanding (MoU) to undertake this as a collaborative effort between the two organisations towards furthering the 'Make in India' National Mission of the Government of India.

The Mission Computer, a key electronic system on air and defence platforms for subsystem integration and control, and its variants will be manufactured in India and cater to the Indian and global markets. Further, the Mission Computer will be used for wide ranging applications across various aerospace and defence platforms. The collaborative partnership with CSIR-NAL reinforces TASL's continued efforts to develop, integrate and maintain critical pieces of technology for large Aerospace and Defence systems within India as part of the 'Make in India' initiative, and strive to become a preferred partner to the Indian and global aerospace & defence industry.

For CSIR-NAL, this MoU is a land mark achievement in realising commercialisation of developed technologies enabling Indian industries to compete globally and achieve self-reliance in a high technology strategic area. "This is one of the best example of public private collaboration effort towards 'Make in India,'" said Shyam Chetty, Director, CSIR-NAL.

"This collaboration with CSIR-NAL reinforces TASL's continued commitment towards indigenous design, development and manufacturing of key systems and subsystems for aerospace and defence applications, leveraging the technology developed by major aerospace and defence labs in India" said S. Ramadorai, Chairman, TASL.

The IGAPS is one of the most technologically challenging aircraft core computing platform to be ever designed within the country for civil avionics requirements. This development is part of CSIR-NAL's vision of achieving self-reliance in indigenous design and development of complex airborne systems for national aircraft programme needs. The avionics architecture whose life-cycle costs are currently estimated to be approximately in millions of dollars is an architectural change which will enable it to keep up with the growing demand of low operating cost and high performance requirements demanded by industry today. **SP**

FLA programme takes flight

DARPA's FLA programme aims to develop and test algorithms that could reduce the amount of processing power, communications, and human intervention needed for unmanned aerial vehicles to accomplish low-level tasks, such as navigation around obstacles in a cluttered environment

They may not have zoomed flawlessly around obstacles like the Millennium Falcon did as it careened through the hull of a crashed Star Destroyer in Star Wars VII. But the sensor-loaded quadcopters that recently got tested in a cluttered hangar in Massachusetts did manage to edge their way around obstacles and achieve their target speeds of 20 metres per second. Moreover, the quadcopters were unmanned... and real. Thus was the initial phase of data collection for Defense Advanced Research Projects Agency's (DARPA) Fast Lightweight Autonomy (FLA) programme recently deemed an encouraging success.

The FLA programme is developing a new class of algorithms aimed at enabling small unmanned aerial vehicles (UAVs) to quickly navigate a labyrinth of rooms, stairways and corridors or other obstacle-filled environments without a remote pilot. The programme seeks to develop and demonstrate autonomous UAVs small enough to fit through an open window and able to fly at speeds up to 20 metres per second (72 km per hour)—while avoiding objects within complex indoor spaces independent of communication with outside operators or sensors and without reliance on GPS.

DARPA's FLA programme could reduce the amount of processing power, communications, and human intervention needed for UAVs to accomplish low-level tasks, such as navigation around obstacles in a cluttered environment. If successful, FLA would reduce operator workload and stress and allow humans to focus on higher-level supervision of multiple formations of manned and unmanned platforms as part of a single system.

FLA technologies could be especially useful to address a pressing surveillance shortfall: Military teams patrolling dangerous overseas urban environments and rescue teams responding to disasters such as earthquakes or floods currently can use remotely piloted UAVs to provide a bird's-eye view of the situation, but to know what's going on inside an unstable building or a threatening indoor space often requires physical entry, which can put troops or civilian response teams in danger.

DARPA's FLA programme recently demonstrated that a commercial quadcopter platform could achieve 20 metres per second flight while carrying a full load of sensors and cameras. The FLA programme aims to develop and test algorithms that could reduce the amount of processing power, communications, and human intervention needed for UAVs to accomplish low-level tasks, such as navigation around obstacles in a cluttered environment.

DARPA researchers recently completed the first flight data collection from the common quadcopter UAV platform that three research teams are using for the programme. The flight test data validated that the platform—which uses a commercial DJI Flamewheel 450 airframe, E600 motors with 12″ propellers, and 3DR Pixhawk autopilot—is capable of achieving the required flight speed of 20 metres per second while carrying high-definition onboard cameras and other sensors, such as LIDAR, sonar and inertial measurement units.

During the testing, researchers also demonstrated initial autonomous capabilities, such as 'seeing' obstacles and flying around them at slow speed unaided by a human controller.

"We're excited that we were able to validate the airspeed goal during this first-flight data collection," said Mark Micire, DARPA Program Manager. "The fact that some teams also demonstrated basic autonomous flight ahead of schedule was an added bonus. The challenge for the teams now is to advance the algorithms and onboard computational efficiency to extend the UAVs' perception range and compensate for the vehicles' mass to make extremely tight turns and abrupt maneuvers at high speeds."

The three performer teams are Draper, teamed with the Massachusetts Institute of Technology; University of Pennsylvania; and Scientific Systems Company Inc. (SSCI), teamed with AeroVironment.

The test flight and data collection took place at Otis Air National Guard Base, Cape Cod, Massachusetts, in a former aircraft hangar that was transformed into a warehouse setting with simulated walls, boxes and other obstacles to test flight agility and speed. The test run also resulted in several crashes. "But the only way to achieve hard goals is to push physical systems and software to the limit," Micire said. "I expect there will be more flight failures and smashed quadcopters along the way."

With each successive programme milestone flight test, the warehouse venue will be made more complicated by adding obstacles and clutter to create a more challenging and realistic environment for the UAVs to navigate autonomously.

"Very lightweight UAVs exist today that are agile and can fly faster than 20 metres per second, but they can't carry the sensors and computation to fly autonomously in cluttered environments," Micire said. "And large UAVs exist that can fly high and fast with heavy computing payloads and sensors on board. What makes the FLA programme so challenging is finding the sweetspot of a small size, weight and power air vehicle with limited onboard computing power to perform a complex mission completely autonomously."

The FLA programme's initial focus is on UAVs, but advances made through the programme could potentially be applied to ground, marine and underwater systems, which could be especially useful in GPS-degraded or denied environments. SP

Taylor Swift suffers security breach

Grammy winner Taylor Swift and Calvin Harris are one of the most followed and adored couples today. But their popularity is now becoming a threat. The 'Bad Blood' singer recently suffered a security breach at her Bel Air home, and it looks like the incident has come as a blessing in disguise for the singer's relationship with DJ Calvin Harris.

Swift's security was threatened when a suspicious-looking man was reportedly seen wandering around the singer's driveway. The trespasser, apparently began yelling for her to come outside, but the neighbours notified the cops, who later came and arrested the man. This sounds scary, but it looks like it was an eye-opener for singer's boyfriend, who is now very serious about Swift's security and has reportedly asked her to move in with him so that he can protect her.

"Calvin was very concerned to learn that Taylor could've come to harm. He told her the simple solution would be to move in with him, so he can protect her and she won't be in any danger," the source told *Hollywood Life*. According to the report, the DJ is acting like a doting boyfriend and has even allegedly offered to pay whatever it takes to beef up the security and keep his lady love all safe.

"She has her own security, but Calvin has suggested using more and has offered to pay the bill to keep her safe," the source added. SP

Woman hurls flower pot at Prime Minister's convoy, detained

In a security breach, a woman was detained recently for allegedly hurling a flower pot at Prime Minister Narendra Modi's convoy in Delhi. The incident happened when Modi's convoy was passing through Vijay Chowk in central Delhi.

The woman wanted to meet Modi at his office, but was stopped by the security personnel. Following this, the woman got into an argument with the security men guarding the Prime Minister's convoy. During the argument with the cops, the woman allegedly pushed a flower pot kept at one of the guard rails, which fell on the road ahead of the convoy.

The woman, who reportedly works at a central government office, has been apprehended by the Delhi Police for questioning. SP

Andheri court orders FIR against airport officials

The Andheri court on February 9 ordered to register a first information report (FIR) against the few officers from organisations of Bureau of Civil Aviation Security (BCAS), Airports Authority of India and Airport Operator GVK-MIAL. This comes after a RTI activist had approached court after the local police failed to register the case.

The court on February 9, ordered the local police to register an FIR under section 156(3) of CrPC Act after an Ahmedabad-based RTI activist Vishwas Bhambhurkar approached the court. D.B. Patange, the Additional Chief Metropolitan Magistrate (ACMM) of 22nd Court, Andheri, ordered Sahar Police to register an FIR against G.V. Sanjay Reddy, Chairman, Rajeev Jain, CEO, Mumbai International Airport Private Limited, the then Regional Executive Director of Western Region, K. Hemalatha, current Regional Executive Director along with Western Region, Jayant Dasgupta, General Manager, Air Traffic Control–Mumbai, V.S.P. Chinson, General Manager (Aero), Western Region, Airports Authority of India, B.S. Tripathi, Senior DCOS, BCAS and commence investigations in the illegalities surrounding the multi-level car parking (MLCP) at the T2 Terminal at Chhatrapati Shivaji International Airport (CSIA).

"While the norms issued by BCAS state that there should be a distance of at least 100 metres between the terminal building and car parking area, this has not been followed in the development of the new terminal building and MLCP is a part of the terminal building. Such a glaring security lapse was not only allowed at the time of construction, commercial operations has started despite the MLCP not having any security clearance from BCAS," said Bambhurkar. "In these surcharged times, especially since Mumbai has been at the receiving end of various terror attacks, this glaring lapse is too huge to be ignored. Furthermore, if the Headley disposition is anything to go by, CSIA is a sitting duck, as even a parliamentary panel has reported," he alleged. SP

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