

Patentmatics Monthly Bulletin January 2018

Mixed Signals in S&T Scenario?

1. **New Year Greetings.** After an unavoidable intermission, Patentmatics is once again being resumed. I trust that its readers would continue their critical appreciation in future too.

2. **The Year 2018 is beginning with many mixed signals as far as the S&T scenario is concerned.** While on the one hand the civilian industrial R&D infrastructure in the country in the public sector and those in industries (in situ Units) continues to be essentially in state of *status quo* and in not making any significant and new pathways in absence of adequately clear policy and input initiatives by the government, on the other hand the strategic R&D sectors happily are being supported quite well by the union government through new projects and programs to make them more effective in contributing directly for national development. Thus,

(a) Cabinet approves ten indigenous nuclear power reactors for DAE/NPCIL.

In the biggest expansion of the country's nuclear power industry, the Union Cabinet gave its approval Wednesday for the construction of 10 units of the new indigenous 700 MWe pressurized heavy water reactors (PHWRs). Never before have 10 nuclear reactors been cleared in one go. The addition of 7,000 MWe is more than the combined present installed capacity of 6,780 MWe. There are 22 reactors under operation as of today.

The new reactors are of significantly higher capacities compared to the PHWRs currently under operation — the standard PHWR being used in India is of 220 MWe though two 540 MWe reactors were installed in Tarapur in 2005 and 2006. The ten reactors will be installed in Kaiga in Karnataka

(Unit 5 and 6), Chutka in Madhya Pradesh (Unit 1 and 2), Gorakhpur in Haryana (Unit 3 and 4) and Mahi Banswara in Rajasthan (Unit 1, 2, 3 and 4). The decision to step up the indigenous civil nuclear reactor programme comes amid festering concerns over the deployment of imported light water reactor-based projects in collaboration with global vendors such as [Toshiba](#)-Westinghouse and Areva. The Nuclear Power Corporation of India Ltd (NPCIL) will set up the projects deploying the proposed 700 MWe reactor units, which mark a big leap for the state-owned NPCIL that has so far been building smaller-sized 220 MWe and 540 MWe reactor units as part of the country's indigenous nuclear power programme.

Prior to the Cabinet announcement, NPCIL has said it is planning to commence work on 16 new reactors by March 2017, including eight indigenous PHWRs of 700 MWe each with a total capacity of 5,600 MWe and eight LWRs based on international cooperation — with Russia, France and the US — totalling a capacity of 10,500 MWe, a source working in the Department of Atomic Energy said.

“A total of 7,000 MWe capacity will be added. It will help produce clean energy,” Power Minister Piyush Goyal said at a briefing after the Cabinet meeting. Officials indicated that “substantial economies of scale” are being targeted, alongside “maximisation of cost and time efficiencies” by adopting the fleet mode for execution of the projects based on the 700 MWe units. “As the government marks three years of its nation and people-centric governance, in a first of its kind project for India's nuclear power sector, the ten new units will come up in fleet mode as a fully homegrown initiative. It would be one of the flagship ‘Make in India’ projects in this sector,” an official statement issued after the Cabinet meeting said.

Likely manufacturing orders of close to Rs 70,000 crore are expected to come through to the domestic industry on account of the projects and are expected to generate more than 33,400 jobs in direct and indirect employment. The Cabinet decision, the statement said, “reflects the government's commitment

to prioritise the use of clean power in India's energy mix, as part of low-carbon growth strategy and to ensure long-term base load requirement for the nation's industrialisation".

Sites for nuclear power plants are selected after carrying out extensive studies by specialised national agencies at the siting stage and the sites are recommended after these meet the criteria laid down in the Atomic Energy Regulatory Board (AERB) code on Site Evaluation of Nuclear Facilities.

(b) Air Force issues request for proposal to HAL for 83 Tejas aircraft

PTI, NEW DELHI , DECEMBER 20, 2017 19:35 IST

Defence Ministry had cleared the proposal to buy 83 fighter jets from defence PSU Hindustan Aeronautics Ltd.

Faced with depleting strength of its fighter squadron, the Indian Air Force today issued the request for proposal (RFP) to State-run aerospace behemoth Hindustan Aeronautics Limited (HAL) for the procurement of 83 Tejas light combat aircraft at a cost of over Rs 50,000 crore.

The IAF had earlier placed an order with the HAL for 40 Tejas aircraft.

The RFP for 83 Tejas light combat aircraft has been issued today, setting the ball rolling for finalizing the contract for the mega deal, official sources said.

The Defence Acquisition Council, the Defence Ministry's highest decision-making body on procurement, had in November last year approved purchase of 83 Tejas Mark 1 A by IAF at a cost of Rs 50,025 crore.

The sources said the final deal for the procurement is likely to be inked within the next five months.

They said out of the 83 LCA, 10 will be used for training purposes.

According to official figures, 14 squadrons of the MiG 21, MiG 27 and MiG 29 are due for retirement in the next 10 years which will bring down the fighter squadron strength to 19 by 2027 from the current 33.

The strength may be further reduced to 16 by 2032.

In an interview to PTI, HAL Chairman and Managing Director T. Suvarna Raju had said most of the 42 modifications in Tejas sought by the IAF, including weaponisation of the aircraft, had been carried out.

“Tejas is a four-and-half generation world class fighter jet. There is no doubt about it. We can improve its various parameters. We are proud of Tejas. Every Indian will be proud of it. We will ensure enhancement in its quality and performance,” Raju had said.

There have been views in the IAF that the Tejas aircraft was not enough to maintain its combat readiness and it needed to quickly procure a fleet of foreign single engine fighters to deal with any possible security challenges faced by the country in the backdrop of the dwindling size of its fighter fleet.

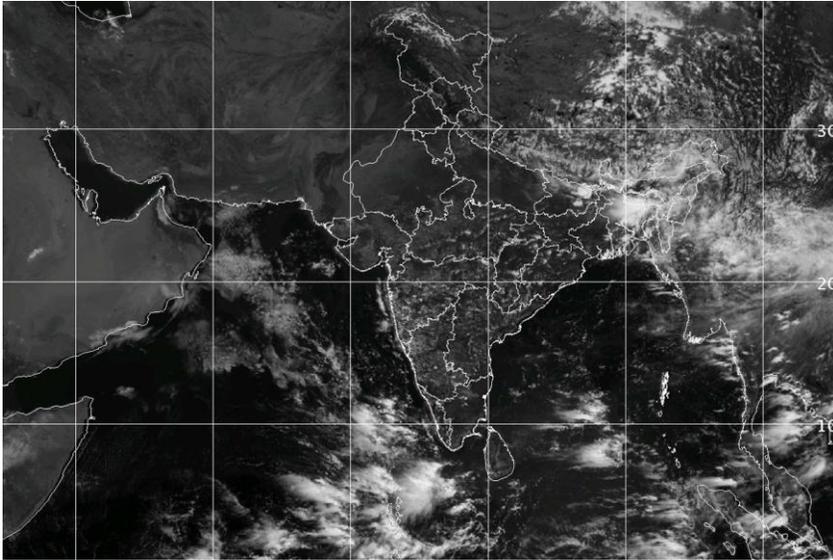
The IAF believes that it has to have a wide mix of aircraft to maintain an operational edge over its adversaries.

The HAL CMD had said that the four-and-half generation Tejas would be able to deliver what is expected of it.

The lifespan of the jet would be a minimum of 30 years just like any other frontline combat aircraft, he said.

The combat jets are classified under various generations depending on their avionics, capability and weapons systems.

{c} ISRO has its hands almost full with its programs, with its applications scenario expanding very fast, To quote an ISTRO document,



Earth Observation



With a humble beginning in early 60s, Indian space program has matured as a symbol of the country's sophisticated technological capabilities and its

growing regional and global prestige. Over the last four decades, Indian Space program has made remarkable progress towards building the space infrastructure as the community resource to accelerate various developmental processes and harness the benefits of space applications for socio-economic development.

The Indian Space programme has the primary objective of developing space technology and application programmes to meet the developmental needs of the country. Towards meeting this objective, two major operational systems have been established – the Indian National Satellite (INSAT) for telecommunication, television broadcasting, and meteorological services and the Indian Remote Sensing Satellite (IRS) for monitoring and management of natural resources and Disaster Management Support.

The Indian Remote sensing programme is driven by the user needs. In fact, the first remote sensing based pilot project was carried out to identify coconut root-wilt disease in Kerala way back in 1970. This pilot project led the development of Indian Remote Sensing (IRS) satellites. These IRS satellites have been the workhorse for several applications - encompassing the various sectors such as agriculture, land and water resources, forestry, environment, natural disasters, urban planning and infrastructure development, rural development, and forecasting of potential fishing zones.

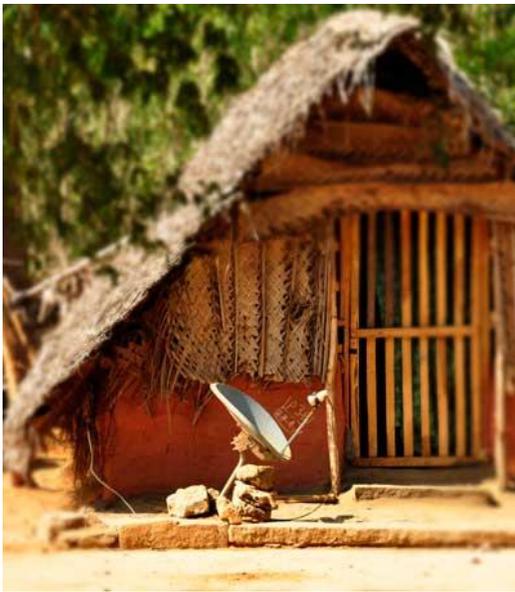
A well knit network “Natural Resources Management System (NNRMS)” involving central & state Governments, private sectors, academia and Non-Governmental Organizations is in place for enabling the integration of Remote Sensing, contemporary technologies and conventional practices for management of natural resources.

Satellite Communication

The communication satellite series, which started with the APPLE satellite, grew into a very large constellation of satellites in the INSAT and GSAT series. These satellites revolutionized the technological and economic growth of

the country. The INSAT satellite system is one of the largest domestic communication satellite systems providing regular services in the areas of telecommunications, business & personal communication, broadcasting, and weather forecasting & meteorological services. Today, newer initiatives have been taken to expand the INSAT applications to newer areas like Tele-education, Tele-medicine, Village Resource Centre (VRC), Disaster Management Support (DMS) etc., have enabled the space technology to reach the common man in India. The INSAT system has extended the outreach to less accessible areas like North- East, other far-flung areas and islands.

Indian Space Research Organisation (ISRO) has made remarkable progress towards building the space infrastructure - as the community resource to leapfrog the developmental processes. The launch of INSAT system has been the major catalyst in the rapid expansion of television coverage in India apart from growing applications like DTH, Satellite News Gathering, VSATs, Internet services etc. Use of INSAT for e-governance and developmental communication applications is also fast expanding.



[Disaster Management Support](#)



Disaster management support, in terms of space based critical infrastructure and services, is yet another community centric deliverable. One of the elements on which the space based Disaster Management Support (DMS) systems have been built is emergency communications systems. The DMS programme of ISRO/DOS, a convergence of space communications and remote sensing capabilities, is an effort to have technologically robust and a compatible system, which could strengthen India's resolves towards disaster management.

Satellite Navigation

Satellite Navigation service is an emerging satellite based system with commercial and strategic applications. ISRO is committed to provide the satellite based Navigation services to meet the emerging demands of the Civil Aviation requirements and to meet the user requirements of the positioning, navigation and timing based on the independent satellite navigation system. To meet the Civil Aviation requirements, ISRO is working jointly with Airport Authority of India (AAI) in establishing the GPS Aided Geo Augmented

Navigation (GAGAN) system. To meet the user requirements of the positioning, navigation and timing services based on the indigenous system, ISRO is establishing a regional satellite navigation system called Indian Regional Navigation Satellite System (IRNSS).

Climate and Environment



ISRO has designed and developed indigenous systems for ground based observations of weather parameters. It includes (i) Automatic Weather Station (AWS) to providing hourly information on critical weather parameters such as pressure, temperature, humidity, rainfall, wind and radiation from remote and inaccessible areas; (ii) Agro Metrological (AGROMET) Towers to measure soil temperature, soil moisture, soil heat and net radiation, wind speed, wind direction, pressure and humidity; (iii) Flux Tower for multi-level micrometeorological observation as well as subsurface observations on soil temperature and moisture over the vegetative surfaces; (iv) Doppler Weather Radar (DWR) to monitor severe weather events such as cyclone and heavy rainfall; (v) GPS Sonde and Boundary Layer LIDAR (BLL) for observing vertical

profiles of atmospheric parameters (Reference: “From a Fishing Village to Red Planet”, Edited by Manoranjan Rao, BN Suresh and VP Balagangadharan, ISRO Publication, 2017)

To summarize, the three strategic sectors have been very well supported and provided for by the GOI through adequate programs to be implemented in time and which would significantly expand and augment their Self Reliance capabilities as well. *And yet what are their challenges too? Some of them can be summarized as below:*

(a) Wassenaar Arrangement Admits India as Its 42nd Member

India has been admitted as the 42nd member of the Wassenaar Arrangement, a global export control regime. This development will burnish India’s nonproliferation credentials and broaden its access to sensitive technologies.

(b) The members of the Wassenaar Arrangement, during their two-day plenary meeting in Vienna, decided to admit India. In a statement, they noted:

(c) *Wassenaar Arrangement participating states reviewed the progress of a number of current membership applications and agreed at the plenary meeting to admit India which will become the Arrangement’s 42nd participating state as soon as the necessary procedural arrangements for joining the WA are completed.*

(d) Formally known as the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, the organization is designed to regulate the export of sensitive technologies that could possibly lead to “destabilizing accumulations,” according to its guidelines.

(e) Since its founding in 1996, the Arrangement has become an important component of the global nonproliferation regime, with member states exchanging information on their transfers of conventional weapons and dual-use goods to states outside of the arrangement.

- (f) To be admitted to the Arrangement, states must meet certain criteria, including acquiescence to a range of global nonproliferation treaties, including the Nuclear Nonproliferation Treaty (NPT).**
- (g) India's admission to the Arrangement is not predicated on this requirement; New Delhi has never signed the NPT and has sought to burnish its nonproliferation credentials through its behavior and policies since its nuclear breakout in 1998.**
- (h) Though admission requires consensus, the United States' backing for Indian admission into the Arrangement — reaffirmed prominently by the Obama administration — helped New Delhi's case.**
- (i) Moreover, the U.S. backing for India in the aftermath of the two countries' bilateral agreement on civil nuclear cooperation in 2005 helped New Delhi acquire a waiver from the Nuclear Suppliers Group in 2008 and accede to the Missile Technology Control Regime (MTCR) in 2016.**
- (j) India has also applied for membership in the Australia Group, an informal export control grouping concerned with the nonproliferation of chemical and biological weapons.**
- (k) India's admission to the Wassenaar Arrangement was in part facilitated by China's nonparticipation in the Arrangement. (Beijing does informally maintain export control standards largely in line with those required by the Arrangement.)**
- (l) In 2016, China opposed India's accession to the Nuclear Suppliers Group, frustrating New Delhi, which had invested considerable diplomatic capital into its membership campaign. Membership in the group is by consensus.**
- (m) India's membership in the Wassenaar Arrangement partly hinged on a lack of consensus, with Italy having objected to New Delhi's participation until the two countries repaired their bilateral relationship this year following a multiple-year spat over the fate of two Italian marines who killed two Indian fishermen in 2012.**

Earlier in 2004, India had updated its export control lists to bring them in line with international standards, including those required by the Wassenaar Arrangement.

In essence, India has now also accepted the Dual Use Doctrine based export restrictions of relevant materials and systems hoping that it would further enhance the NPT membership. To give one example from nuclear technology, the Isolation Amplifier which is used in all Reactor Control Systems is also of use in standard high voltage control systems. Similarly the Inertial Guidance Control Systems used widely in Satellite/Launch Vehicle Systems are widely used in all civilian aircrafts too. And so on! For the field of materials, the numbers are far more with Maraging Steel being a significant example. All such systems are now regulated on the one hand by the Dual Use doctrine and more significantly by IPR/TRIPS too, save DAE for the present for the latter.

3. Obviously these Departments will have to initiate systematic and serious efforts concurrently to strengthen their related S&T activities to State-of-art levels, for example, IPR literacy and implementation of related steps, identification/separation of Dual Use materials and systems, and so on. **Undoubtedly these are no easy tasks!**

4. Last but not the least; our overall national economy is far from comfortable with significant budget deficits, will these strategic programs be adequately supported with required funds? With very low growth in the manufacturing sector, will any of them venture into industrial R&D at all? With a more or less total absence of any new initiatives from both civilian PSUs and private sectors, Applications Oriented/ Industrial R&D will continue to be essentially from government R&D Units only as has so far ben too!. With enormous problems involved in T/T from public funded R&D units to industries, one cannot expect any significant results here too in the immediate future!

In summary, with the mixed signals continuing so far, the end result for the immediate future need not be very bright for civilian and indigenous R&D, though the strategic sectors are certainly better placed.

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