INDIAN AIR POWER: AMBITIONS TO SECURE AEROSPACE

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All armies prefer high ground to low, and sunny places to dark.[1]

— Sun Tzu

INTRODUCTION

The Indian Union War Book is the master document that lays down the duties and responsibilities of various stakeholders in the security dispensation of India. The Indian Air Force (IAF) has been given responsibility for the Air Defence (AD) of the country. Air and space constitute the two dimensions of aerospace. Regulation and control of all that happens in the third dimension, thus, devolves solely on the IAF. So, while the other Services may have (and do have) their own air arms and their own tasking philosophies, the choreographing at the macro level of all activity in the air is the responsibility of the IAF. It is, however, surprising that despite India being a fair bit ahead of many space-faring nations, its armed forces are divorced to a large extent from possession of any space hardware or being a part of the national space dialogue. While it is true that the navy now has one dedicated satellite (GSAT 7) to its name, the figure is negligible compared to the numbers owned and operated by forces of other major

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1. Lionel Giles, *Sun Tzu on the Art of War*, available at http://www.au.af.mil/au/awc/awcgate/artofwar.htm. Accessed on December 24, 2015.

nations. Thus, as the IAF approaches the centenary of its raising in 2032, this essay would debate, in four parts, what India's military hopes to achieve in the aerospace sector by 2032.

Any analysis of military capability can only be made vis-à-vis the threat that it is supposed to counter; hence, an analysis of the threat in the aerospace domain (as against the geo-political threat, which is an enormous subject by itself) would first be done followed by what Indian aerospace capability should ideally look like in 2032. This would be followed by an appreciation of what would be realistically possible in the next decade and a half vis-à-vis the ideal requirement of 2032 painted earlier. The essay would round up with an articulation of what military capability targets the armed forces, and indeed the nation, should aim for by 2047, the centenary of India's independence.

THE SALIENCE OF AEROSPACE IN WARFARE

The primacy of any one domain in warfare has been a point of contention between proponents of the three media (land, sea and air), in which war has been traditionally prosecuted. While the entry of cyber and space has added to the debate, victory or defeat would physically manifest in the three traditional ones. The advent of air power a century ago upset a lot of equations in war-fighting, a major one being one of its predominance, seen in clear terms in conflicts around the globe during the past three decades. Its impact on modern warfare came into the living rooms through television the world over in 1991 during the first Gulf War. The world saw the power of air delivered precision weapons, the capability of air-borne electronic warfare technology to influence engagements and command and control in all three domains, the amalgamation of space-based assets in the overall conduct of the campaign, and introduction of stealth to bring in the element of surprise; this has made air power the weapon of first choice of the politician everywhere. The development of air power would continue along the same vectors to reinforce its basic attributes of speed, lethality, precision, flexibility and responsiveness to bring a nation's power to bear at its point of choosing. These would form the basis of the deliberations in

this essay while evaluating the likely trajectory of Indian air power in the specified timeframes.

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THREAT IN THE AEROSPACE DOMAIN

India has no territorial designs on any other country. The sole aim of its armed forces is to safeguard its territorial integrity and help secure the national aim of economic upliftment of its people. If one was to articulate India's military ambition in the aerospace sector it would be "to possess a capability to enable the nation to use aerospace to further national interests during peacetime or in conflict situations, and prevent it being used for activities prejudicial to India's interests." This ambition has to dovetail with the geographical span of national interest as mandated by the Ministry of Defence (MoD).[2] In doing so, there may be points of friction with other countries that would arise, and by all trends and analyses, India needs to plan for challenges from China and Pakistan, that are generally seen as adversarial in nature. There is no gain saying the fact that in any future conflict, air and space superiority would be contested with an aim to secure escalation dominance in these two domains and, indeed, in the overall conflict.

CHINA

China has been exhibiting expansionist tendencies, the clearest indication coming from its 2015 National Security Paper which minces no words in

2. The MoD Annual Report of 2012-13 stated that "India's size and strategic location…….links its security environment with the extended neighbourhood, particularly with neighbouring countries and the regions of West, Central Asia, South-East Asia, East Asia and the Indian Ocean", while the 2014-15 report discusses relations with immediate neighbours and adds that, "India's geo-strategic location makes it sensitive to developments beyond its immediate neighbourhood, in West Asia, Central Asia, in the Indian Ocean Region and the Asia-Pacific region. Major geo-political and geo-economic developments are currently transforming the global security scenario into one of uncertainty and volatility." Available at http://mod.nic.in/writereaddata/MOD-English2003.pdf and http://mod.gov.in/writereaddata/AR_2013/Eng/ch1.pdf respectively. Both accessed on December 19, 2015.

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articulating that one of the strategic tasks of its armed forces "…is to safeguard Chinese overseas interests."[3] This is a major doctrinal shift and an indication of China's ambition to aggressively pursue what it sees as its national interests resulting in increased apprehension among its neighbours about its long-term plans. Chinese troops have violated areas in India's northern borders and it has gone on an island and airstrip building spree in the South China Sea. A clear manifestation of its resolve in advancing its viewpoint has been its declaration of an Air Defence Identification Zone (ADIZ) in the East China Sea. The development of the DF 21A anti-ship ballistic 'carrier killer' missile as part of its Anti-Access and Area Denial (A2AD) policy has made the Americans devise their Air-Sea battle concept, now in the process of being superseded by the Joint Concept for Access and Manoeuvre in the Global Commons (JAM-GC) strategy.[4] India too is in the South China Sea area as part of its 'Act East' policy for oil as well as to develop relations with countries in that region – that there is an attempt to balance China in this outreach is plain to all observers. Closer home again, the presence of People's Liberation Army (PLA) troops in areas of Pakistan Occupied Kashmir (PoK) under the ostensible requirement of safeguarding Chinese workers and interests in the China-Pakistan Economic Corridor, is a clear indicator of the application of the new declaration. One commentator has described the presence of Chinese troops as the creation of a ChOK – China Occupied Kashmir.[5]

3. Anthony H. Cordesman and Steven Colley, "Chinese Strategy and Military Modernization in 2015: A Comparative Analysis," CSIS Paper, p.3, available at http://csis.org/files/publication/150901_Chinese_Mil_Bal.pdf. Accessed on December 17, 2015.
4. Harry J Kazianis, "Air Sea Battle's Next Step: JAM-GC on Deck," available at http://nationalinterest.org/feature/air-sea-battles-next-step-jam-gc-deck-14440. Accessed on March 22, 2016.
5. Shailesh Kumar, "Pakistan Occupied Kashmir (PoK) Becomes China Occupied Kashmir (ChOK)," available at http://www.nationaldefence.in/2016/03/pakistan-occupied-kashmir-pok-becomes_15.html. Accessed on March 17, 2016.

What would China's aerospace forces be like in 2032? At the rate at which its aviation industry is progressing, the strike arm of the People's Liberation Army Air Force (PLAAF) would include the 4.5 Generation Su-35 fighter that it is acquiring now from Russia, various versions of upgraded Su-27 fighter aircraft as also its indigenous stealth J-20 [not yet a Fifth Generation Fighter Aircraft (FGFA) due to the absence of an engine that gives it super cruise ability] in squadron service. While the upgraded H-6K would be the mainstay of its bomber fleet, the project of the long range stealth bomber, if successful, should result in these aircraft being on the verge of entering service.[6] Force multipliers in terms of Air-Borne Warning and Control System (AWACS) would be a plenty (KJ-2000 and KJ-500) while the Flight Refuelling Aircraft (FRA) fleet would be augmented with new IL-78s on order as also the FRA versions of the under development Y-20 heavy lift transport aircraft. The Y-20 is reportedly at the end of its prototype testing stage now and can presently carry a payload of 50 tonnes; with the installation of the new indigenous WS20 turbo-fan engine that is under flight testing, the payload will augment considerably to 70 tonnes. With 34 new Il-76s on order, and many medium lift aircraft already in its inventory, the airlift capability could indeed be impressive. Also around 2032, the AWACS version of the Y-20 could be in service, adding to the PLAAF's AD capability. The existing substantial heli-lift potential would improve even further with the fruition of the Advanced Heavy Lift (AHL) helicopter programme that is ongoing with Russia. Thus, the combined fixed-wing and heli-lift capability would translate into increased mobility and more rapid deployment across India's borders.

The AD system has been greatly modernised with new reverse engineered, as well as indigenous systems. The impending acquisition of the very modern and lethal S400 AD system from Russia would add an over the horizon long distance punch; going by China's track record, a reverse engineered S-400 with more advanced Chinese electronics can be expected in a decade's time.

6. Bill Gertz, "Stealth Bomber Race Underway," *The Washington Times*, November 4, 2015, available at http://www.washingtontimes.com/news/2015/nov/4/inside-the-ring-stealth-bomber-race-underway/?page=all

China's naval aviation is making steady progress. Its aircraft carrier, the *Liaoning* and its second carrier (first indigenous one) would be fully operational by 2032. The J15 fighter (Su-33 reverse engineered) would be the mainstay of the naval aviation strike force. There are reports that a carrier based version of the Shenyang stealth J-31 is under development;[7] if this be true, then this aircraft too should be operational, since the basic J-31 is already in an advanced stage of prototype testing. The naval J-31, if the programme fructifies, would truly revolutionise naval air power since all ship-based air defence systems cater only to non-stealth aircraft; the large amount of changes required on air defence systems onboard ships of its adversaries can well be imagined. With a stated ambition of having a four carrier battle group navy,[8] China's power projection into the Indian Ocean would become operationally feasible.

The reorganisation of the higher defence organisation and the creation of Theatre Commands by China is a step towards enhancing jointness in military operations. The amalgamation of all missile forces and the nuclear arsenal under a newly created PLA Rocket Forces (PLARF) Command would introduce unity of effort in the application of the PLA doctrine, which subscribes to extensive use of surface-to-surface missiles against an adversary's infrastructure and surface assets (on both land and sea). Though primarily aimed towards targets in its east, the PLA may try and offset the disadvantage in the Tibetan region of low payload of its offensive aviation assets due to reduced density at high altitude airfields, by using its PLARF munitions.

In space, China is progressing rapidly with many innovative scientific experiments, including a space station. Its Beidou [a la Global Positioning System (GPS)] system is on its way to full operationalisation by 2020 and it has a panoply of satellites for Intelligence, Surveillance, Reconnaissance (ISR), Electronic Intelligence (ELINT), data relay, communications, and counter-

7. "FC-31 / J-31 (Jianjiji-31 fighter aircraft 31)," available at http://www.globalsecurity.org/military/world/china/j-31.htm, March 17, 2016. Accessed on April 1, 2016.
8. Ankit Panda, "Is this China's first Homemade Carrier,"? October 2, 2015, available at http://thediplomat.com/2015/10/is-this-chinas-first-homemade-aircraft-carrier/. Accessed on January 20, 2016.

space capabilities.[9] However, what is worrying is that it has very overtly demonstrated its Anti-Satellite (ASAT) capability with its 2007 successful engagement of a satellite in space;[10] more ASAT tests have been reported although a kill has been avoided. Its WU-14 hypersonic glide vehicle is well into its prototype testing phase and on its operationalisation, China could possess prompt global strike (strike anywhere on the globe within one hour of the decision being taken) and anti-Ballistic Missile Defence (BMD) capability, something that only the US is on its way to acquiring. What the Chinese armed forces lack is actual war-fighting experience, a handicap that they are acutely aware of, and are trying to redress, by greater engagements and air exercises with Western style forces like those of Pakistan, Thailand and Turkey

When China's likely military capabilities, that would be state-of-the-art in 2032, are coupled with its ever increasing economic progress and engagement with countries all round the globe, the picture that emerges is one of a country that considers itself profoundly important on the world stage and a challenger to the United States.

PAKISTAN

Pakistan has hitched its fortunes with that of China. From the geo-political angle, Pakistan is also an important, and essential, cog in the attempts of the West, primarily the US, to make the Taliban and Al Qaeda ineffective (and neutralise them, if possible); the entry of the Islamic State in Syria (ISIS) has only complicated the issue further. Pakistan's utility to China is vital, exemplified by its $ 46 billion China Pakistan Economic Corridor (CPEC) project. Due to the negative asymmetry with India in terms of the size of its economy, population, industrial output and conventional military strength, Pakistan can never be an existential threat to India. After having gone through three tumultuous decades of internal strife, some argue that

9. " China is Second Most Powerful Global Military Space Power with Destructive 'Counter-Space' Capabilities," available at http://myidst.com/en/space/item/451-china-is-second-most-powerful-global-military-space-power-with-destructive-counter-space-capabilities. Accessed on March 17, 2016.
10. Ibid.

Its coherent strategy of projecting itself as being an unstable nuclear weapons player brings an element of international inquisitiveness whenever there is an increase in Indo-Pak tensions.

Indo-Pak relations seem to be looking up slightly under the combination of the present political and military leadership, as seen from the bonhomie demonstrated recently between the leadership of the two countries and the commencement of a Comprehensive Security Dialogue. However, such periods of relative positivity have occurred earlier too, only to relapse into the status quo of uncertainty and hostility, demonstrated so starkly by the terror attack on Air Force Station, Pathankot, on January 2, 2016; hence, it would be wise to err on the side of caution and view Pakistan as a security challenge for the next two decades at least and evaluate its aerospace threat accordingly.

Pakistan has well equipped and capable conventional armed forces. Its use of sub-conventional and irregular warfare against India as a matter of state policy through the use of so-called non-state actors has been well documented and accepted by the world. Its coherent strategy of projecting itself as being an unstable nuclear weapons player brings an element of international inquisitiveness whenever there is an increase in Indo-Pak tensions. As a commentator in the *Asia Times* wrote,[11] "Pakistan has a strategy of pointing a gun to its own head and threatening the US that it would shoot itself unless US aid continues"—implying that if Pakistan becomes unstable, then nuclear weapons may fall into the hands of terrorist entities. State-sponsored cross-border terrorism, however, continues and Pakistan links it to the Jammu and Kashmir (J&K) issue which is vexed, intractable and unlikely to be resolved soon. Hence, Pakistan's aerospace capabilities need to be factored in in India's security calculations.

The Pakistan Air Force (PAF) is a capable force with a modern and automated air defence system. Its assets are a mix of upgraded legacy Mirage III fighters, Chinese origin J-7s and the very capable F-16s, eight

11. Spengler, "Blazing Saddles in Pakistan," available at http://www.atimes.com/atimes/South_Asia/MK29Df03.html. Accessed on March 17, 2016.

more of which have been cleared for sale recently. There are also reports that Pakistan wants to buy 10 more F-16s, and it has given a veiled threat that if this doesn't happen, the PAF would go in for Russian fighters (the Su-35 is being hinted at).[12] The JF-17, a multi-role light fighter aircraft born out of China-Pak collaboration, is a recent entrant in the PAF's inventory. It is being upgraded with air-to-air refuelling capability, Beyond Visual Range (BVR) missiles and a modern Active Electronically Scanned Array (AESA) radar; it is interesting to note that though the prototypes of aircraft and upgrades are developed and tested in China, the production is taking place in Pakistan, with Pakistan aggressively marketing the aircraft abroad. The point is that its aviation industry is slowly but surely making progress. By 2025, as India aims to get stealth aircraft like the Russian Fifth Generation Fighter Aircraft (FGFA) and/or the indigenous Advanced Medium Combat Aircraft (AMCA) by 2030, Pakistan is likely to pitch-in for the Chinese stealth J31 fighter that is specially made for export. PAF air crew are experienced, follow a Western style ethos in air operations and have been carrying out live air-to-ground engagements in their strikes against the rebels in the AfPak border areas. In the space sector, Pakistan has a modest programme and does not have any major achievements; it banks on foreign manufacturers and launch agencies for its satellite requirements. However, the fact remains that when it comes to a crunch situation, China can be expected to fulfill Pakistan's ISR needs for intelligence and targeting inputs.

It needs to be noted that the military forces of almost all of India's neighbours have been equipped with Chinese armaments, implying that China's influence on them cannot be neglected; this is a challenge for Indian diplomacy.

The other nations in India's vicinity are not a security challenge but can be major irritants if they side with China and or Pakistan. It needs to be noted that the military forces of almost all of India's neighbours have been

12. Farhan Bokhair, "Pakistan Looks to Buy Another 10 F-16s," available at http://www.janes.com/article/58678/pakistan-looks-to-buy-another-10-f-16s See also, "Pakistan Needs to Replace 190 Planes by 2020," available at http://www.dawn.com/news/1245714. Both accessed on March 22, 2016.

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WHAT SHOULD THE INDIAN ARMED FORCES BE LIKE IN 2032?

The import of the cliché that "capabilities take time to build but intentions can change overnight" can be neglected only at one's own peril and, hence, an evaluation of what Indian aerospace power should look like in 2032 must factor in an assessment of the threat emanating from the modernisation trajectories of the armed forces of the adversaries.

The deterrent value of India's military's strength should be inviolate so that no country interrupts India's drive for economic upliftment of the masses. If deterrence breakdown occurs, there is no doubt that India's response to any misadventure or an anticipated one (preemption is hinted at here) would be led from the air. The disadvantage of difficult terrain that prevails on the frontiers, especially the northern border, would be overcome by taking the fight deep into the adversary's territory to make it difficult for him to fight a land battle on the borders.

To manage a two-front collusive challenge mounted by China and Pakistan, the IAF should have its full complement of 42 fighter squadrons. This implies first arresting the depletion of fighter squadrons (due to phasing out of the MiG-21/27 fleet) and then rapidly building up their numbers. The process warrants that the 36 Rafale multi-role fighter aircraft should already have been inducted and there should be no hiccups in the flow schedule of the Su-30s to their contracted number of 272 by 2019.[13] But the major difference in arresting the slide in squadron strength and making up of numbers would be made by the induction of 20 Light Combat Aircraft (LCA) Tejas Mk1 and 100 Tejas Mk1A and a "…new fighter," as India's defence minister stated in February 2016.[14]. These should ideally be complemented

13. Air Mshl BK Pandey, "A Wake-up call from CAG," January 10, 2016, available at http://idrw.org/a-wake-up-call-from-cag/. Accessed on January 13, 2016.
14. "India Likely to Select Fighter Plane Under 'Make in India': Manohar Parrikar," PTI report , *Economic Times*, February 17, 2016, available at http://economictimes.indiatimes.com/news/defence/india-likely-to-select-fighter-plane-under-make-in-india-by-year-end-manohar-parrikar/articleshow/51023295.cms. Accessed on April 8, 2016.

by the IAF's reportedly stated requirement of 15 AWACS and 19 FRAs.[15] The airlift component is already in place with the acquisition of all the C-17 and C-130 and the upgradation of An-32 and Il76 aircraft; the induction of the Airbus C295, that would be replacing the old warhorse Avro aircraft, should complete the picture. The heli-lift component should be in place with the full operationalisation of the 15 Chinook helicopters contracted for, and the availability of the three remaining heavy lift Mi-26 after their life extension —in fact, the Mi-26 fleet should be at the fag end of its life with the IAF. The Mi-25 attack helicopters would have been phased out and the 22 Apaches from the US should have been operationalised.

The AD system, with its obsolescent Pechora and OSA-AK Surface-to-Air Missile (SAM) systems, should have been revamped with the potent indigenous Akash SAMs and the quick reaction Spyder system from Israel. The Medium Range SAM (MRSAM) being developed with Israel should also be inducted by 2032.

In 2032, the naval air arm would be based around the INS *Vikramaditya* and the indigenous INS *Vikrant*. The second indigenous carrier, the INS *Vishal*, would be availabile to the Indian Navy only in the 2030s as it is still on the drawing boards, with major decisions like on the propulsion system (conventional or nuclear), type of aircraft and aircraft launch system et al yet to be taken. The full complement of 45 MiG29Ks for the *Vikramaditya* and *Vikrant* should have been inducted by 2032 and both carrier aviation groups operationalised. The naval air arm should have sufficient numbers of Maritime Reconnaissance (MR) and Anti-Submarine Warfare (ASW) aircraft and helicopters for the Indian Ocean Region (IOR).

Space was famously called the next frontier in the 1960s. The reality is that it has got embedded in all aspects of warfare due to the capabilities it affords in the realm of Command, Control, Communication, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR). While militarisation of space has taken place through its use as an enabler, its weaponisation would

15. Gulshan Luthra, "India to go in for 10 More AWACS," available at http://www.indiastrategic.in/topstories1910_IAF_to_go_in_for_10_more_AWACS_Rafale_deal.htm. Accessed on January 21, 2016.

not have happened (hopefully) due to international consensus. The Indian Regional Navigation Satellite System (IRNSS), which would afford satellite-based navigation (*a la* GPS) would be fully operational, and dependence on the GPS and Russian GLONASS should have been removed. Net-centric warfare, which all warfare would be in the coming decades, is heavily dependent on the use of space assets. An Indian Space Command should be functional to regulate and control all military space and space related issues. Turf wars should have been stymied by a political fiat and the nominated lead Service should have operationalised the command.[16] However, it needs to be ensured that space does not become just a tool to support terrestrial warfare but is treated as an independent arena where warfare could take place. More satellites, solely dedicated for military use, should have been placed in orbit for the armed forces.[17]

LIKELY INDIAN AEROSPACE CAPABILITY IN 2032, INCLUDING SHORTFALLS

The IAF chief stated in a press conference on October 4, 2015, that the force expects to reach its full strength of 42 combat squadrons only by 2027.[18] This would indeed be an achievement because frequent delays in procurement from abroad and in production by Hindustan Aeronautics Limited (HAL) have continuously pushed forward this schedule; in February 2009, Defence Minister A K Antony had said that the IAF's combat fleet would reach the

16. The IAF has a 'natural' claim to be made the lead manager for the Space Command, as is the case almost everywhere. There are many reasons for this. Four major ones are: (a) space operations are almost a mirror image of air power operations; (b) the satellite footprint required by the air force strike assets, by virtue of their long ranges, is extensive and subsumes that required by the navy and army; (c) space assets detect missile launches and warn the air defence system of the nation that is mandated to the air force by the Union War Book; (d) only space can be the enabler for networking aerial assets – the other Services surely require networking too but their targeting is not as dynamic as from the air.
17. The Indian space programme is primarily civilian led and driven, and information on its military space programme is extremely sketchy.
18. Ajai Shukla, "Indian Air Force Chief Expects Full Strength of 42 Squadrons by 2027," *Business Standard*, October 5, 2015, available at http://www.business-standard.com/article/current-affairs/indian-air-force-chief-expects-full-strength-of-42-squadrons-by-2027-115100500037_1.html. Accessed on January 3, 2016.

figure of 42 squadrons by 2022.[19] The inflow of Su-30s from HAL had been slow and only 204 of the 272 contracted aircraft had been delivered by March 2015.[20] The Rafale contract should get signed in 2016 and, on a very optimistic note, with the deliveries commencing in 2019, the full complement of 36 aircraft may come in by 2024 or so. The AMCA, depending on the way the design and development proceeds, would come into service only by the mid-2030s, to replace the MiG-29 and Mirage-2000. So, some other aircraft would be required to make up the numbers; this would happen only through the 60-odd pending Sukhois (the full lot would be in by 2019)[21] and through the Tejas Mk1A route. The first squadron of the Tejas Mk1, with only four to six aircraft, as against a squadron strength of 16, is supposed to be raised by end-2016, as per the IAF chief—the snail's pace being due to the slow production rate of HAL.[22] Even with an optimistic production rate of eight aircraft per year, HAL would be able to deliver the 20 Mk1s only by 2018-19. With the Mk1A still requiring clearance post resolution of the IAF's major observations, the commencement of their service entry would not be before 2022. Thus, there is a need for some numbers in the 2018-25 timeframe to cover the phasing out of the MiG-21 variants and MiG-27 during this period. It is here that the pitch being made by the US for its F-16/18[23] and by Sweden

19. "Indian Air Force's Fighter/Attack Aircraft ," available at http://www.globalsecurity.org/military/world/india/air-force-equipment-fighter.htm. Accessed on January 11, 2016. The website quoted India's Defence Minister AK Antony's written reply to a query in the Rajya Sabha, "During the period 2007-2022, the strength at the end of 11th, 12th and 13th Plan periods is expected to increase to 35.5, 35 and 42 Squadrons respectively,"
20. Report No 38/2015 of the Comptroller and Auditor General of India, 2015, p. 56, available at http://www.saiindia.gov.in/sites/default/files/audit_report_files/Union_Compliance_Defence_Air_Force_Report_38_2015_chap_2.pdf. Accessed on January 12, 2016.
21. Pandey, n.13.
22. Kalyan Ray, "IAF Wants to Induct 120 Tejas," *Decan Herald,* October 4, 2015, available at http://www.deccanherald.com/content/504353/iaf-wants-induct-120-tejas.html. Accessed January 13, 2016.
23. Manu Pubby, "'Make in India' Boost: Boeing & Lockheed Martin Offer to Locally Manufacture F16 and F/A 18 Jets," *Economic Times,* April 6, 2016 available at http://economictimes.indiatimes.com/articleshow/51707047.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst. Accessed on April 8, 2016.

The naval air arm would be centred around the already operational INS *Vikramaditya* and the indigenous INS *Vikrant*, which is supposed to join the navy in December 2018; even accounting for delays, 2020 would be a reasonable date on the outside.

for its Gripen[24] comes into play. Both countries have offered to shift their production plants to India under the 'Make in India' programme for producing the 100-odd aircraft required to fill the gap of the reduced Rafale purchase. The slide and build-up in IAF squadron numbers, therefore, would be arrested only by the mid to end-2020s with the stabilising of the Tejas Mk1A production line and the inflows of the remaining Su-30s, Rafale and the 'some other' multi-role combat aircraft[25] (one of F-16, F-18 or Gripen).

The attack helicopter fleet would comprise the 22 Apaches and around 20 Mi-35s as also the advanced light helicopter Dhruv (WSI) versions in substantial numbers—both with the IAF and army aviation. The light combat helicopter, whose prototype testing is underway, would start entering service with the IAF by 2022 and reach its figure of 60 machines by the mid-2030s.[26]

The weapons holding of the IAF would have undergone a marked qualitative change, with substantial increase in the potency and range of their application. Thus, select Sukhoi-30s would be equipped with the 290-km range BrahMos supersonic air-to-ground missile and the Meteor mounted on the Rafale would give a BVR range in excess of 150 km! It is safe to assume that the 'new' fighter selected would also come with modern weapons and BVR capability. Similarly, the holdings of Precision Guided Munitions (PGM) would have gone up substantially.

24. Gerard O'Dwyer, "Sweden Pitches Sale of Saab's Gripen-NG Fighter Jet to India," *Defense News*, February 18, 2016, available at http://www.defensenews.com/story/defense/international/europe/2016/02/18/sweden-pitches-sale-saabs-gripen-ng-fighter-jet-india/80566588/. Accessed on April 8, 2016.
25. Ray, n.22.
26. WSI stands for Weapon System Integration. The ALH Dhruv (WSI) would have anti-tank missiles, air-to-air Mica missiles of French origin, 70 mm rockets and a chin mounted gun. The Light Combat Helicopter (LCH) would have two pilots in tandem seating with essentially the same weapons load.

The naval air arm would be centred around the already operational INS *Vikramaditya* and the indigenous INS *Vikrant*, which is supposed to join the navy in December 2018;[27] even accounting for delays, 2020 would be a reasonable date on the outside. By 2022, the INS *Vikrant* should have gained operational status and, given the availability of necessary surface, air and space infrastructure, the MiG-29K fleet on these two carriers would enable India to enforce sea control over a vast volume of air and sea space. The capability to deliver firepower onto shore targets would also exist but would depend on the availability of in-flight refuelling assets of the IAF. The Tejas Mk2s, which the navy desires, has a question mark over it, considering the slow progress of the programme.[28]

As the An-32 fleet starts phasing out at the end of the 2020s, it would be logical to assume that these aircraft would be replaced by the C-295s, as it would make operational and logistic sense to have commonality in the low to medium airlift aircraft fleet.

The IAF would have a very substantial airlift capability with 10 C-17s, 12 Il-76s, 6 C-130s, around 100 An-32s and the increasing strength of C-295 aircraft which will start flowing in three to four years from now. As the An-32 fleet starts phasing out at the end of the 2020s, it would be logical to assume that these aircraft would be replaced by the C-295s, as it would make operational and logistic sense to have commonality in the low to medium airlift aircraft fleet. The heli-lift capability would be impressive and would be based around 15 Chinooks and 159 x Mi-171V5s, with the Dhruvs, Chetaks/ Cheetahs (yes, they will still be around till 2030 at least) and the incoming Ka-226s providing the light utility heli-support.

27. Statement by Minister of State for Defence in Parliament,. "Government Targets to Deliver India's First Indigenous Aircraft Carrier by 2018 end," December 6, 2015, available at http://www.dnaindia.com/india/report-government-targets-to-deliver-india-s-first-indigenous-aircraft-carrier-by-2018-end-2152516. Accessed on January 19, 2016.
28. The IAF has decided to acquire 40 Tejas Mk1s and 80 Mk1As, exiting the Mk2 programme in which major changes to the aircraft have to be made to accommodate the high powered F-414 aero-engine. So, the question is whether it would be economically wise to continue the programme for just 40 odd aircraft that the navy requires.

With the induction of the S-400 lethal SAM system from Russia, 45 firing units of Akash SAMs (from Bharat Electronics Limited),[29] Spyder quick reaction missiles and MRSAMs, coupled with their networking with AWACS and new indigenous ground radars, the air defence environment would have undergone a substantial increase in potency. Long range weapons (BVR missiles, supersonic BrahMos surface-to-surface missile systems) and dynamic targeting capability with improved ISR due to the networking of AWACS, Airborne Early Warning (AEW) aircraft and Space-Based Surveillance (SBS) would give the IAF the ability to look deep and strike far; a caveat here needs to be added that this network-centricity would still be work in progress due to the staggered induction schedule of such assets, especially space satellites. It is surmised that military personnel would have been brought into the planning and decision-making loop with the Space Command having been operationalised. The creation of the Space Command would also convey the point that space would not be treated as an adjunct to 'air' but be a 'military medium' in its own right with its own dedicated personnel and Human Resource (HR) policies. The existence of an embryonic aerospace power should be visible by 2032 even as a true indigenous arms industry starts making an impact.[30] Also visible in the centenary of the IAF should be a clearly defined map for the next two decades, which would encompass the centenary of the modern Indian nation.

VISION 2047

What would the picture be like in the hundredth year of the Indian state? The steps being taken to set up an indigenous military industrial complex

29. Manu Pubby, "Defence Ministry to Clear Rs 5,000-Crore Procurement Contract for 'Made in India' Akash Missile Systems," *The Economic Times*, August 8, 2015, available at http://economictimes.indiatimes.com/news/defence/defence-ministry-to-clear-rs-5000-crore-procurement-contract-for-made-in-india-akash-missile-systems/articleshow/48397910.cms. Accessed on January 10, 2016.
30. It would still be a long road ahead but the 'resolute' entry of the private sector in the defence manufacturing sector (Reliance, Larsen and Toubro, Tatas, Mahindra *et al*) and far-reaching recommendations of the Dhirendra Singh Committee which have been included in the Defence Procurement Procedure, 2016, is the basis for this assessment. The government too has started holding the Defence Research and Development Organisation (DRDO) and Defence Public Sector Undertakings (DPSUs) to account.

should have borne fruit by then. The Jaguar, MiG-29 and Mirage 2000 fleets would have been phased out as also the early Su-30 MKI entrants. The AMCA would be forming the bulk of the offensive strike element of Indian air power, as also the Russian origin FGFA (if the programme proceeds successfully in the 2020s) and the next generation of aircraft should be entering service. The Sukhois would still be around, albeit their modernised and upgraded versions. Combat support elements (flight refuellers, AWACS et al) would have proliferated in numbers and capability while air defence would be one homogeneous entity. The decade of the 2040s would see the maturing of usable artificial intelligence in 'intelligent' war-making machines; true Unmanned Combat Aerial Vehicles (UCAV) would be a reality in the field of aerial combat, if the development schedule of UCAVs, as given out in the US Air Force's (USAF's) UAS Flight Plan:2037, proceeds as per schedule.[31] Whether India would be somewhere there in that timeframe, is difficult to forecast, but steps towards such capability would certainly have been taken.

Hypersonic vehicles (whose design phase has presumably started) would be bridging the supposed gap between air and space and would be in service, while space itself would have seen a proliferation of secure Indian satellites. If the sanctity of space had been breached in the interim by any country through weaponisation, India too would have taken steps to acquire this capability through the Defence Research and Development Organisation (DRDO) and the advanced space programmes of the Indian Space Research Organisation (ISRO). Space assets would have given India the capability to support and sustain power projection capabilities offshore.

The plan for the air force, as elaborated above, exists but requires money —and lots of it! Where would it come from, with defence allocation being less than 2 percent of the Gross Domestic Product (GDP) till now, and likely to remain so in the future?

31. "Air Force Unmanned Aerial System (UAS) Flight Plan System (UAS) Flight Plan 2009-2047," available at http://archive.defense.gov/DODCMSShare/briefingslide/339/090723-D-6570C-001.pdf. Accessed on April 8, 2016.

An additional factor is that since most acquisitions would come under the 'Make in India' concept, additional jobs and revenue would be generated in the internal sector and, hence, would be attractive to the national leadership; it is also assumed, from experience, that there would be greater Research and Development (R&D) towards indigenisation since the private sector would be the beneficiary of the new acquisition policies.

BUDGETARY SUPPORT FOR MODERNISATION PLANS

The government is surely doing a tight-rope walk with its finances, considering the large outlay necessary for the 'civil and social' sectors, and it would be naïve to assume that all the demanded cash would be made available; however, it will also be unrealistic to presume that the government would turn a blind eye to the basic minimum requirements of defence. For example, for the Rafale acquisition, the defence minister has categorically stated that post the 2016-17 budget, " ..adequate money has been kept…" for the project.[32] Similarly, the army's artillery modernisation plan is being addressed through the M-777 howitzer deal for which a private sector major has been selected by BAE Systems to be their Indian production partner;[33] and for the navy, unstinted government backing has got the nuclear powered INS *Arihant* on steam and operational. It is a known fact that such critical high value acquisitions are funded by the government through special allocations and similar action can be expected for pending vital acquisitions like the 'some other fighter aircraft' that the IAF would get through the 'Make in India' proposal[34]. Thus, the acquisitions mentioned in this essay can be taken to be substantially realistic in the given time span (from now to 2032/2047). An additional factor is that since most acquisitions would come under the 'Make in India' concept, additional jobs and

32. "Adequate Funds Kept for Rafale Deal: Manohar Parrikar," *Business Standard,* March 4, 2016, Available at http://www.business-standard.com/article/current-affairs/adequate-funds-kept-for-rafale-deal-manohar-parrikar-116030400659_1.html. Accessed on April 10, 2016.
33. "BAE, Mahindra Join Hands for M777 Howitzer Unit," *The Indian Express,* February 18, 2016, available at http://indianexpress.com/article/india/india-news-india/bae-systems-selects-mahindra-as-india-partner-for-m777-howitzer-gun-deal/. Accessed on April 10, 2016.
34. See Ray, n. 22.

revenue would be generated in the internal sector and, hence, would be attractive to the national leadership; it is also assumed, from experience, that there would be greater Research and Development (R&D) towards indigenisation since the private sector would be the beneficiary of the new acquisition policies. Has such optimism been expressed earlier too but not with commensurate results to show on the ground? The answer is yes, but the difference this time is the enhanced government resolve that is visible to change the *laissez faire* defence industrial sector.

China, like any country, has vulnerabilities across the Indo-China border and the vast expanse of the high altitude Tibetan plateau. While its good communication infrastructure begets it many advantages, it also affords a professional adversarial force many avenues to nullify them, especially through the use of air power.

CONCLUSION

Aerospace power, being the weapon of first choice in modern conflict, would give India the capability to safeguard its interests in a proactive way and to project power aggressively (if required) in the years leading to the IAF's centenary. The challenge is to accelerate the development of an indigenous arms industry, refresh doctrines to keep them contemporary and relevant, and train leaders to use aerospace power's full potential. The assets of the IAF may have reduced in numbers but the potency remains adequate for deterrence and driving home an advantage, if deterrence fails. Is it sufficient for a two-front conflict? The media and certain commentators have gone overboard quoting the observation of the IAF's vice chief, "Numbers are not adequate to fully execute an air campaign in a two-front scenario.'[35] What is not being discussed is the next part of his statement that says that the probability of a two-front scenario is an appreciation that one needs to carry out. Herein lies the crucial element of assessments made at the government

35. "IAF: Don't have the Numbers to Fully Fight a Two-Front War," *The Indian Express,* http://indianexpress.com/article/india/india-news-india/do-not-have-the-numbers-to-fully-fight-two-front-war-iaf/

level with inputs from different sources – and which are not available to the media and the lay public.

War is a multi-disciplinary event involving the Services, diplomacy and political apparatus *et al*. There is scarcely a country that is likely to have an infallible military dispensation and there are many ways to address the perceived gaps that may exist; these redressal mechanisms are not restricted to the military kind only. The continuous debate on China, its growing military capabilities and its aggressive posturing necessitate a dispassionate and professional appraisal. While this subject is vast and qualifies for an independent study by itself, China, like any country, has vulnerabilities across the Indo-China border and the vast expanse of the high altitude Tibetan plateau. While its good communication infrastructure begets it many advantages, it also affords a professional adversarial force many avenues to nullify them, especially through the use of air power; air power is an effective tool for deep interdiction. The Indian Army and the IAF, being professional outfits, would be having plans and appropriately equipped formations to address these challenges. The Indian Navy is modernising and the Indian Ocean is its backyard, with the attendant advantages. China has to be concerned with protecting its unfriendly eastern sea board too, where it has been trying to expand its influence in a rather aggressive manner, raising the hackles of literally all its neighbours. Its extensive use of Information and Communication Technology (ICT) lends it to a soft kill attack through electronic warfare in the full electromagnetic spectrum, while any aggressive intent demonstrated against space assets would draw an appropriate response. The 'rise' of China, though impressive, has still some distance to go as it has to address the needs of its under-developed hinterland, which has been neglected, while all attention has been directed at the coastal regions where most of the benefits of its development have been concentrated – this will take up considerable resources and administrative energies as also the attention of its leadership. The Uighur problem in its Xinjiang province is not likely to go away in a hurry and it would be recollected that the last war it fought was against the relatively tiny Vietnam—the results were pretty disheartening for China, considering the

positive asymmetry it had in all military and non-military sectors. Thus, while a two-front confrontation for India is theoretically possible, it is not easy for a nation to go to war when its vital interests are not at stake. Thomas Schelling has said that in the strategy of war, the event (war) is not a constant sum game as in game theory but a variable one, as "…the sum of the gains of the participants is not fixed so that more for one inexorably means less for the other,"[36] In the event, China, like any other country, would have to weigh its chances carefully before committing to war since the perception of 'victory' and 'defeat' would be different for each participant. It did not take any military action in any of the Indo-Pak wars/confrontations that have taken place in the past seven decades. If tensions were to rise again between India and Pakistan, would China, a country aspiring to become a great power and a world statesman, commit itself to kinetic action on behalf of its client state or would it instead take political steps to diffuse the situation? In matters military, the operations staff knows best and when one talks of evaluation of the political thought process of a potential adversary, then the national civilian leadership dons the role of the executing agency – the Indian leadership, irrespective of the party in power, is sagacious and perceptive in evaluating threats to the nation's security. Uneducated views, due to lack of information or pure ignorance of realities has led to ill advised writing and scare-mongering, with some 'analysts' even saying that due to "business as usual" (*whatever that means*), "Indian air power has been driven to its knees."[37] Far from it — there are urgent issues for sure which the government needs to tackle, and while its numbers build up, it is incumbent on the IAF to nurse its formidable capacity for the long term and maintain its deterrent capability. It is a challenge that is not new; it is a challenge that comes the way of the armed forces of a nation that has to address critical social obligations; it is a challenge that the IAF is adept at tackling head-on as it moves towards its centenary.

36. Thomas Schelling, *The Strategy of Conflict* (London: Oxford University Press, 1970), p. 5.
37. Abhijit Iyer-Mitra and Angad Singh, "Indian Air Power," in Sushant Singh and Pushan Das, eds., *Defence Primer: India at 75* (New Delhi: Observer Research Foundation, 2016), p. 43. Also available at http://www.orfonline.org/wp-content/uploads/2016/03/Military_Layout.pdf. Accessed on April 11, 2016.