

# Building Adaptable, Future-Ready Air Forces

## Operationalising IAF Doctrine for Multi-Domain Supremacy

*Anil Golani\**

Challenges in the warfighting domain have continued to plague the military leadership across the world. The application of the military instrument of power has continued to transform with the evolving character of war. From the days of total war that characterised ancient warfare until the world wars wherein total subjugation of the enemy to achieve political aims was the objective, the world has indeed come a long way. Nation states today seem to be in a perpetual state of ‘no war no peace’ where conflicts get diffused across the diplomatic, information, military and economic (DIME) spheres. Conflicts today take place in the military domain, without the fielded forces coming into direct visual contact. With an increasing range of weapons and technology assisting identification at large distances, the definition of direct contact has changed dramatically. The nebulous domains of cyber and space have intrinsically joined the battlefield apart from the cognitive domain of information warfare. Coupled with all this the increasing role of third parties or proxies in great power competition and rivalry, make crystal gazing and preparing for the next conflict even more challenging.

The advent of air power in the early 20th century sought to complement the armies and navies as primary instruments of power projection and comprehensive national power. However, as technology continued to evolve

---

\* Air Vice Marshal Anil Golani (Retd) is Director General, Centre for Aerospace Power and Strategic Studies (CAPSS), New Delhi, India.

with aircraft becoming faster and their ability to deliver with precision becoming the norm, expectations from air power continued to grow. Air power strategists like Billy Mitchell, Douhet and Trenchard, were the early proponents of air power and their thinking continues to shape and govern the employment of air forces across the world. Later in the 20th century, the theory of John Warden who propagated the five ring theory of targeting with fielded forces as the outermost ring and the enemy leadership as the centre of gravity was utilised by the coalition led by the United States to get Saddam Hussein during the 2003 Operation Iraqi Freedom. John Boyd who became famous with his theory of energy maneuverability in air combat shaped aerial warfighting becoming the gospel of air combat tactics world over. His Observe Orient Decide Act (OODA) loop theory is practised in all domains from warfighting to the corporate world even today. John Boyd was instrumental in the design and development of nimble fighter aircraft like the F-16 Falcon and the F-15 Eagle. His theory on energy manoeuvring and air combat influenced air power doctrine significantly. The advent of unmanned aerial systems, making them ubiquitous as well as cheap to increase affordability in large numbers has also significantly altered the character of war. Conflicts today see them being utilised in large numbers for a variety of roles, from intelligence, surveillance and reconnaissance to electronic warfare, target designation, loitering munitions and logistics amongst many others. Innovation in the use of FPV drones that were surreptitiously deployed in large numbers to cause significant damage to the Russian bomber fleet in the ongoing Russia–Ukraine conflict and their use in Operation Rising Lion by Israel to neutralise key Iranian military personnel and the air defence network are some recent examples of the effective use of air power to achieve military objectives.

The aim of this commentary is to look at the employment of air power and suggest means to operationalise the IAF Doctrine for effective multi-domain operations.

### DOCTRINAL PRECEPTS

The IAF Doctrine 2022 states the vision of the IAF, ‘To be an agile and adaptable air force that provides decisive aerospace power in furtherance of our national interests.’<sup>1</sup> Doctrines would be governed by technological advancements, evolving threats and operational lessons learnt from conflicts and the employment of air power. Increasing use of hybrid war concepts would require air forces to dovetail information warfare capabilities into their

concept of operations. For effective employment of air power, conduct of joint planning with centralised command, distributed control and decentralised execution is a must to achieve the desired results. This would be essential and fundamental to power projection through the air forces. Bringing together knowledge on aerospace power and understanding the utility of the aerospace domain and the country's assets towards power projection and national security should be the *sine qua non* of any air power doctrine. The IAF Doctrine focuses on the aspects that would provide guidance in Peace, No War No Peace (NWNP) and War situations to ensure continued operational success in the foreseeable future.

Air power being an enabler of multi-domain operations across the continuum of land, sea and surface forces, must ensure that its doctrinal precepts cater for seamless operations across these domains to achieve informational superiority that would give it an operational edge over the adversary. The doctrine must allow air forces to adapt nimbly against emerging threats, asymmetric warfare and use of emerging technologies like artificial intelligence for faster decision cycles that are robust and effective. Air Forces that operate as alliance or coalition partners should have doctrines that enable joint or multinational operations that facilitate unity of command and integration with their partners.

## TECHNOLOGICAL ADVANCEMENTS GOVERNING THE EMPLOYMENT OF AIR POWER

Long-range precision weapons, hypersonic weapon systems, unmanned aerial systems, low observable stealth technology, Manned–Unmanned Teaming (MUM-T) or Collaborative Combat Aircraft (CCA), Lethal Autonomous Weapon Systems (LAWS) use of a network-centric environment and artificial intelligence for targeting and decision-making are amongst the many features that would govern future force structuring of air forces. The proliferation of unmanned aerial systems including loitering munitions have changed the character of war considerably. With First Person View (FPV) drones there no longer exists a necessity for a separate platform to designate targets. Air forces of the future would require a mix of manned and unmanned platforms. While fighter aircraft serve as the long arm of combat, providing flexibility and reach; with increasing use of artificial intelligence collaborative combat aircraft would invariably be doing the high-risk missions, hitherto being done by manned aircraft. With fighter pilots being susceptible and vulnerable to losses through enemy kinetic action or becoming a reliability or liability if not

trained well the reliance on unmanned platforms will continue to increase. MUM-T or CCA would replace conventional wingmen of fighter formations, with the manned fighter aircraft being in control with distributed sensors and weapons through the unmanned systems.

Unmanned systems could vary from being cheap and attributable to those like flying wings with superior stealth features, not maneuverable like conventional fighters, but with the capability to carry large weapon loads. These could be capable of carrying out autonomous and independent operations. Between these two categories unmanned aircraft systems of varying weight and configuration could be deployed depending upon the degree of air dominance and the expected threat scenario. The requirement of persistent surveillance over large airspace would increasingly be fulfilled by High Altitude Long Endurance (HALE) systems. These unmanned platforms would incorporate advanced technologies like artificial intelligence driven analytics for automatic target recognition and platform detection. These platforms would have the capability to operate for long durations, with features incorporating increased reach and survivability. In future, HALE systems could also serve as airborne command and control centres networked with other manned and unmanned systems, providing intelligence and targeting data. With secure data networks and the ability to operate in a contested airspace, these could serve as force multipliers in operations.

The increasing cost of manned fighters that adapt sixth generation technologies would force nations to not only reduce the number of squadrons but also look at collaborative development of these systems. The Global Combat Air Programme (GCAP) is the development of sixth generation fighters by the United Kingdom, Italy and Japan while the Future Combat Air System (FCAS) is between France, Spain and Germany. The United States is developing its own Next Generation Air Dominance (NGAD) fighter and there are reports of China having reportedly flown J-36 and J-50 which incorporate sixth generation technology. These aircraft would incorporate advanced stealth features, be optionally manned, have variable cycle engines to increase efficiency, have long and beyond visual range weapons with the ability to carry directed energy and close in weapon systems. The aircraft would have agile maneuverability with supercruise features and have advanced avionics and networking capabilities with sensor/data fusion. These aircraft would have the ability to switch roles carrying out electronic warfare, attack with kinetic as well as directed energy weapons and incorporate artificial intelligence and advanced networking to control unmanned systems/collaborative combat aircraft.

Future transport aircraft for the air forces would incorporate aeroelastic structures and active morphing with the ability to allow real-time aerodynamic optimisation to reduce fuel costs, and increase payload and range. The aircraft could have hybrid electric or fully electric propulsion systems to reduce costs and increase efficiency. These aircraft would have a modular design that would facilitate switching of roles from logistics to casualty evacuation and unmanned operations with ‘plug and play’ mission and sensor packages.

Next generation helicopters for air forces would increasingly feature eVTOL concepts with distributed electric propulsion. These could be autonomous or optionally piloted for various missions and roles with improved operational safety to operate in contested airspace. With tilt rotor design these helicopters would offer much greater range and speed as compared to conventional helicopters. Equipped with counter-measure suites to ensure survivability, the helicopters would also incorporate stealth technologies and advanced avionics and sensor fusion capabilities.

## LEADERSHIP AND TRAINING

It is always the human behind the machine who makes the difference in conflicts. As conflicts become complex and multi-domain with the infusion of technology, the air warriors of tomorrow would need to be technically adept and have the ability to adapt themselves to the emerging scenarios. Increased use of artificial intelligence, virtual and augmented reality would be required to replicate realistic and complex scenarios in a simulated environment to ensure safe and cost-effective training. The paradoxical nature of war means that the tactics that work well enough today may, as a result, so impress an alert and agile enemy that it is able to ensure that those tactics will not work well tomorrow.<sup>2</sup> Training of future air warriors would increasingly need to focus on adaptability and resilience in a scenario where the speed of decision-making would be of essence. The Observe, Orient, Decide, Act (OODA) loop theory propagated by John Boyd emerged from his energy maneuvering concept of air combat to gain an edge over the adversary. In fast-paced aerial duels that occur at supersonic speeds with beyond visual range missiles and weapons it is extremely important for the pilots, operational planners and system operators to stay at the top of the decision-making loop. With large force engagements becoming the norm, realistic training in a networked environment would hone the skills of air warriors.

Integrated training and joint exercises with other services as well as with other air forces are considered essential. There would be a need for air warriors to understand the strengths and limitations of surface forces in order to capitalise on the strengths of air power with its attributes of speed, precision, agility, reach and firepower to achieve military objectives. Training with other air forces in joint, bilateral and multilateral exercises would increase interoperability, facilitate learning from each other's best practices and doctrines. This training should form an essential part of the training curriculum of air forces as operations during natural calamities and humanitarian disasters would require a combined effort by air forces in the region. Similarly, air forces of coalition/alliance partners need to regularly train together in order to deliver effectively as and when the need arises.

Professional military education would play a major role in the training and career development of air warriors. Warfare has changed to becoming multi-domain with a whole-of-nation approach wherein all the instruments of national power may be applied in synergy. It is important for military leaders to not only understand this, but also realise the limitations and the implications of the utility of force in any conflict. As John Boyd opined it is people, ideas and hardware, in that order<sup>3</sup> that would make the difference in any conflict. History is replete with examples of how, when done well, successful strategic leadership can transform even the most seriously disadvantaged situations for the better. Yet, when it fails, it can turn likely victory into certain defeat. Leadership matters and it can always be cultivated by learning from history, gaining knowledge that transforms into wisdom and subsequently into strategy for the military instrument of power being utilised. To be successful, leaders need to follow a four-pronged strategy. First, leaders need to quickly grasp the overall strategic situation in any conflict and craft the appropriate strategy to get the big ideas right. These big ideas must then be communicated effectively to the last man in the organisation which will make them important stakeholders in the conflict. Third, the implementation of the big ideas must be pursued resolutely with determination and lastly, leaders must have the sagacity and wisdom to refine, adapt and augment their strategy as they go along.

Carl von Clausewitz, the famous Prussian strategist and the author of *On War* considered to be seminal on strategy, spoke of the trinity of friction, uncertainty and chance in any conflict. *Friction* refers to the unpredictable elements that complicate military operations in the battlefield; *uncertainty* caused by the lack of information; and *chance* that induces randomness in

military operations. A successful leader should have the ability to navigate through this complex web and emerge victorious in the end as the ultimate auditor of military competence is war and there are no runners-up in this game. When air power is fit for its purpose, both tactically and operationally, but high policy is fundamentally flawed, airmen will perform in vain, no matter how magnificently they do so.<sup>4</sup> United States air power in Vietnam was fatally flawed as it operated independently and resorted to strategic bombing which had limited effect on the Viet Cong that resorted to guerilla warfare. Similarly, the use of Israeli air power in the 2006 Israel–Hezbollah conflict exposed the limitations of conventional air power in an asymmetric conflict. The air force leadership not only has to get the big picture right but should also have the courage of conviction to convey to the political decision-makers the limitations of air power in situations where doctrinal precepts preclude the utilisation of this important tool of military power. If utilised in such situations, the results could prove to be counter-effective with long-term implications on the nation's ability to use air power. The political decision of not using air power in the offensive role during the 1962 India–China conflict cost the nation dearly and this defeat still rankles the military leadership. Sound professional acumen with operational experience and the moral courage to withstand political and bureaucratic pressure in national interest is the key to effective leadership. The air force leadership should have a clear understanding of joint operations for effective employment of air power rather than seeking independent solutions.

### ADAPTIVE LEADERSHIP

Robert Brovdi joined the Ukrainian military after the Russian invasion of Ukraine in February 2022. Responsible for Ukraine's innovation in drone warfare he was instrumental in modernising and organising drone operations to carry out deep strikes into Russian held territory with telling effect. Rapidly rising through the ranks he was awarded the title 'Hero of Ukraine' in May 2025 and made the commander of the Ukrainian Armed Forces' Unmanned Systems Forces in June 2025. The demands of leadership have continued to evolve with the changing character of war, becoming much more demanding and challenging with technological advances, evolving operational concepts and complex geopolitical challenges. Transformational and adaptive leaders who use ingenuity with skill and foresight to operate in contested, multi-domain and network-centric warfare environments will be key to success in future conflicts.

## CONCLUSION

Air power, since its inception more than a century ago, has evolved and grown into a potent instrument of national military power. Being technology-intensive the cost for research, development and production of airborne platforms has skyrocketed with the proverbial axe of budgetary constraints impacting air forces across the world. Most air forces, having grown from being integral components of armies during the early years have had to struggle to prove themselves as independent forces capable of achieving military objectives in a cost-effective manner. Force planning with all these constraints, coupled with new and emerging technologies that are capital-intensive make force planning for the future challenging to say the least. A sound understanding of the doctrinal precepts of the employment of air power is an absolute necessity, not only for the practitioners but also for the decision-makers at the political level who take policy decisions on the equipping of air forces and its employment in national security.

With fifth and sixth generation technologies that incorporate stealth features, network-centric capability, sensor fusion, adaptive engines, long-range stand-off munitions and agile manoeuvring capabilities the cost of airborne platforms has become prohibitive. There would be the necessity to incorporate multi-mission capability in these platforms with plug-and-play architecture that would act as a force multiplier. The proliferation of unmanned aerial systems incorporating a variety of roles from intelligence, surveillance, reconnaissance, targeting, hard kill, and functioning as collaborative combat aircraft, the challenge would be to plan for an optimal mix between manned and unmanned systems.

The generally acknowledged characteristics of systems of air warfare in the near future are low observability, MUM-T, a highly networked environment and increasing autonomy. The key capabilities and resources to develop will therefore be stealth technologies, especially with respect to ease of maintenance, highly secure networks, highly accurate Global Navigation Satellite System (GNSS), independent navigation, autonomy and decision support systems. Therefore, it logically follows that the means which will enable denial of the same through enabling technologies would be counter-stealth sensors, penetration and denial of networks, GNSS denial and navigation disruption and increasing the chaos of the system as a whole to create decision dilemmas for the manned and unmanned systems would also be required.

Professional military education and training for future wars would require air warriors to not only be professionally sound with knowledge on the employment of air power but also have a good understanding of joint force operations. There would be a growing need for the practitioners of air power to educate the other services on the advantages that would accrue on its employment in terms of precision, reach, flexibility and firepower apart from learning about the prosecution of operations by the surface forces. The limitations on the use of air power in asymmetric warfare and its employment under adverse situations must also be well understood. Professional trust is necessary between the services so that each is not pursuing its own self-fulfilling aims but competently employing its combat power for the benefit of the joint force as a whole. Finally, leadership matters because it is people, ideas and things in that sequence which would make the difference between victory and defeat.

## NOTES

1. 'Doctrine of the Indian Air Force IAP 2000-22', Air Headquarters, New Delhi, Chapter 1, p. 1.
2. Edward N. Luttwak, *Strategy: The Logic of War and Peace*, Harvard University Press, 2001, Chapter 6.
3. Robert Coram, *Boyd—The Fighter Pilot Who Changed the Art of War*, Backbay Books, New York, 2002, p. 354.
4. Colin S. Gray, *Airpower for Strategic Effect*, Air University Press, Alabama, 2012, p. 174.