Uavs and ucavs in indian context tourism essay

Sport & Tourism

CHAPTER 5

50. Indian Army has been engaged in conventional and non-conventional conflicts ever since its formal inception in 1947. Over the past few decades, warfare has undergone a critical change from trench warfare to the modern day 4GW. The military effectiveness of UAVs has been proved in all the recent conflicts and their employability in future wars cannot be ruled out. They will form an important part of any operation whether on land, sea or air. In the Indian context they may form a part of varied operations ranging from insurgency, surveillance of border and coast line, LICO to joint services conventional operations. However, before delving deeper into the likely roles that may be performed by the UAVs and UCAVs in Indian Armed Forces, we need to consider the various constraints in their employment in the Indian context and identify some basic requirements that need to be fulfilled for integrating the UAVs into the warfighting philosophy of the Indian army. 51. Constraints in Employment of UAVs. The various constraints in employment of UAVs and UCAVs in Indian context can be listed as under:-(a) Political considerations. The increase use of drones points to a potential revolution in warfare, or at least a shift in the perspective of how wars will be fought in the future. As robotics expert P. W. Singer argues, " the introduction of unmanned systems to the battlefield doesn’t change simply how we fight, but for the first time changes who fights at the most fundamental level. It transforms the very agent of war, rather than just its capabilities."[1]Yet, these assertions have also been disapproved. Journalists challenge the claim that there are diminished civilian deaths from drone strikes, while just war scholars suggest that drones loosen the moral restraints on the use of force

and legal scholars grapple with the relation between drones and international law.[2]These accusations have been putting a strain on a superpower like USA also. Increased usage of UAVs and UCAVs by India would also need its political masters to be ready to face these concerns. Before embarking on a programme to equip Indian Armed Forces with UAVs and UCAVs, India needs to finalise a doctrine for the usage of these Force Multipliers, while also deciding on its response to the above considerations. (b)Budget constraints. In an age of decreasing defence budgets, costly manned aircrafts and the ever increasing cost of aircrew training, most of the modern armed forces around the world are realizing the need to employ UAVs for missions in the hostile dense AD environment. For example a Su 30 MKI aircraft costs $102 million each while the Searcher UAV being used by the IAF had cost $7. 5 million each. Notwithstanding the big difference in the cost, the cost of UAVs also is large enough to strain the limited defence budget of India. This cost factor would limit the amount of UAVs and UCAVs we would be able to induct in the Indian Armed Forces.(c)Lack of a joint command structure. UAV as an asset can be best utilised when its capabilities and resources are controlled centrally by a higher organisation. The inputs provided by the UAVs of all three services need to be collated and analysed at the highest level to build up the RASP(Recognised Air Space picture) which can then be used to coordinate the offensive and defensive actions at all levels. However for this to happen there is a need for a joint Command structure, to coordinate the procurement, training and operational roles of all UAVs being procured by the three services.(d)Slow speed of development of new technologies by the defence PSU’s. Defence spending in India has grown at about 17 percent during 2007–10, and with this India has

emerged as the largest arms importer in the world. By 2014, it is expected that India would become the third largest defencespender after the US and China. Despite this huge market, the current policies and structure of the industry has constrained the domestic defence production with only 30 percent of the demand being met internally.[3]India has nine Defence Public Sector Undertakings(DPSUs) and thirty–nine Ordnance Factories. With an employee base of more than 1. 8 lakh people, the size of the military–industrial workforce is similar to countries like UK and France which are among the largest producers of defence related products in the world. In spite of this large set–up, production output has remained insufficient to meet the growing needs. Also the success of DPSUs in developing new technology has been rather limited. For example, the Aeronautical Development Establishment (ADE) was given the mandate of developing a UAV for the Indian Army in 1988. As a result the Nishant UAV was developed and made its first flight in 1999, a period of 11 years.[4]With such a long gestation period, it is very difficult for the country to think about developing its own line of sophisticated UAVs and UCAVs. Since the prospect of depending largely on foreign acquired UAVs, with inherent issues like compromising on security aspects and chances of supplies being stopped in a war like situation, is not a very comfortable one, it is imperative that necessary changes be made in the organisational setup and work culture of DPSUs so that we are capable of satiating our increasing demands indigenously. 52. Basic Requirements for Integration of UAVs. Although the idea of integrating UAVs and UCAVs into the Indian Armed Forces is been thought of in many quarters, there are some basic requirements that would need to be fulfilled before we can work towards integrating the UAVs into the

warfighting philosophy of the Indian Armed Forces.(a)Infrastructure. In addition to the need of providing operating bases and servicing installations, secure communication links and jam resistant data links are pre requisites for the effective integration of various UAV assets. This infrastructure would require careful foresight and planning by all three services.(b)Manpower. UAVs may be able to collect millions of bits of data, but unless all data is collated, analysed and stored in a proper database, the effort of gathering the data would be a waste. Adequate numbers of photo interpreters would be required for the exponential increase in Photo Interpretation workload that would be a consequence of the use of UAVs for ISR in a big way.(c)Air Space Management. The procedures for joint control of airspace would need to cater for operations of UAVs along with other aircraft in the TBA. With the proposed induction of Aerostats and AWACS into the IAF inventory, there would be a need for better integration between Army and Air Force AD setup. (d)Endurance. An UAV can fly continuously for up to 12 hours, however like a normal aircraft it has to undergo various servicing schedules. Hence the rules of availability, as applicable to service aircraft, should be applied for them also.(e)Support Services. The support services required for the operation and maintenance of a UAV fleet also have to be carefully thought of. The spare support too would be technologically intensive and with the lack of indigenous manufacturers, the cost of operations would be high. The indigenous research establishments and production houses should be motivated to take required steps to fulfil this lacuna.

CHAPTER 6

EMPLOYMENT OF UAVs AND UCAVs AS FORCE MULTIPLIER IN INDIAN CONTEXT

" Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur. In this period of rapid transition from one form to another, those who daringly take to the new road first will enjoy the incalculable advantages of the new means of war over old."

Giulio Douhet

General

53. India faces myriad challenges and threats to its security in the present day world order. India has been engaged in a proxy war for the last several decades and has been combating terrorism perpetuated by militant and terrorist groups sponsored by external elements. It has also got not so friendly nations as its neighbours in the West and North. Add to it the necessity of ensuring integrity and sanctity of its airspace and vast maritime EEZ. It is in such a scenario that the Indian Armed Forces will be required to fulfil their roles in diverse operating conditions across the complete spectrum of conflict. With the rapid advancements in the field of UAVs and UCAVs, it is time that they are incorporated in the war fighting philosophy of the three services of the Indian Armed Forces.

Employment of UAVs by Indian Army in Conventional Operations.

54. Considerations at the strategic level while planning a campaign have greatly increased. The commanders try to achieve simultaneity by

influencing the course of battles throughout the tactical zones as well as into enemy’s operational depth. Due to the progress in surveillance and communication means, of which UAVs is an important part, Operational and Army Commanders have finally found a way to overcome the problem. Therefore, UAVs would be required mainly for reconnaissance and Electronic Warfare tasks, more so in the light of depleting and over-tasked conventional reconnaissance aircraft. The major roles that can be fulfilled by UAVs in support of conventional army operations are covered in the following paragraphs. 55. Reconnaissance Requirements. The army requires intelligence from aerial reconnaissance essentially on three areas of information, knowledge of the ground, knowledge of enemy strength and knowledge of enemy deployment. These main pieces of intelligence are utilized in planning the various offensive and defensive operations as well as for planning special operations as well. The sensors used by the UAVs for this purpose include Sideways Looking Airborne Radar (SLAR), Synthetic Aperture Radar with Doppler beam sharpening (SAR), Forward looking Infra-Red (FLIR), Infra-Red Line Scan (IRLS) and optical cameras. The major objects of intelligence which can be provided by UAVs for use by the army are as under:-(a)Location of Headquarters and troop concentration.(b)Concentration of vehicles, especially armour.(c)Administrative layout of locations, including dumps and explosives sites.(d)Movement of forces.(e)Logistic build up. (f)Enemy Artillery and mortar positions, direction of own Artillery fire on enemy and Battle Damage Assessment.(g)Positions of anti-tank guns. (h)Digging and emplacements.(j)Road blocks.(k)Prepared defensive positions.(l)Anti-air landing obstacles.(m)Demolition of roads and railways. (n)Inundation carried out by enemy or due to natural reasons.(o)Terrain

intelligence like:-(i)Road classification.(ii)Road density.(iii)Natural obstacles. (iv)Hydrographical characteristics of rivers and canal. 56. Electronic Warfare Tasks.(a)ESM. Today the reconnaissance platform has to bring back as much information as possible on the enemy emitters, his radio stations, radars, electronic data link, and even mobile stations such a tanks or aircraft. This is called electronic intelligence for the radars and related devices and communication intelligence for simple radio messages. The task in each case calls for finding the enemy’s operating frequencies, recording the transmission and in almost all cases also plotting the location of the source by the time of arrival, direction of arrival or triangulation techniques if we are using several listening stations. The UAVs can be effectively used during peacetime to build up a database of known enemy emitters, with their location and electronic signatures, which can be used during hostilities to support own operations.(b)ECM. UAV ECM is a tactic that utilises unmanned UAV as ECM support or precursors to assist strike aircraft or other strike vehicles in penetrating AD radar and missile defended target areas by jamming, ejecting chaff, dropping expendable jammers or decoys, acting as decoy themselves and performing other ECM related tasks. UAVs carrying EW equipment will increase the probability of a successful attack by own Air Force. 57. Other Tasks.(a)Psychological Operations. UAVs can be utilised as a platform for radio and television broadcasts as well as to drop pamphlets and leaflets over enemy area to persuade enemy troops and population to join our cause.(b)Precision Strikes. UAVs can be employed to strike HVTs like command and control centres without the risk of losing own aircrafts. (c)Combat Search And Rescue. UAVs can be employed to search hostile area for downed aircrew, stranded soldiers and ships so as to plan and enable

their safe recovery.(d)Employment In Space Warfare. High altitude and long endurance UAVs can serve the role of Low Orbit Satellite, employing Directed Energy Weapons (DEW) to destroy sensitive electronic equipment, communication networks and satellites.(e)Bomb Damage Assessment. UAVs can be utilised for assessment of real-time destruction of target to enable commanders to plan reengagement.(f)UAV assisted Fire Support. The UAVs could be used to assist in Direction Of Own Arty Fire(DOOAF) and thus provide a safe and suitable alternative to Air Observation Posts(AOPs). The UAVs may also be used to assist in engagement of tgts by laser designation for employment of Precision Guided Munitions(PGM).(g)Deception Operations. The Israelis made use of Radar Cross Section(RCS) enhancers on its UAVs to deceive the Syrians during the Bekaa valley operations. Such measures can be employed to deceive the enemy and make him open up his radars, divert their Combat Air Patrol (CAP) and waste their Air Defence (AD) weapons.(h)Alternative Communication Network. The UAVs can serve as a relay for communication and data links in remote regions or in shadow areas. They could also serve as an alternative communication network over long ranges in case of failure of main systems.

Employment of UAVs by Indian Navy

58. India is located at the base of continental Asia with a coastline of 7516 km. The sea area around India is among the busiest in the world, with over 100, 000 ships transiting the shipping lanes every year. The peninsular projection of country into the Indian Ocean and the island territories of Andaman and Nicobar give India a stake in the stability and security of these waters. Peace time surveillance of India’s coastline is of considerable

importance not only from the security view point but also for protection of natural resources and preservation of marine environment. The effective surveillance of the Indian Exclusive Economic Zone (EEZ) however involves a vast area and is a highly daunting task due to the limited resources and capabilities of the Coast Guard and the Navy. Surveillance by manned platforms in itself is not just resource intensive but also exorbitantly costly and strenuous for the aircrew. For effective and gap free surveillance of large area there is a requirement of employing combination of various types of UAVs including MALE and HALE BAMS(Broad area Maritime Surveillance) along with specialised UAVs as Vertical Take-Off UAV (VTUAV). UAVs in conjunction with manned aircraft could be assigned the following tasks in support of maritime operations:-

Peace Time Operations.

(i)Persistent Surveillance of the country’s coastline.(ii)Prevent penetration of any sea borne intruder.(iii)Protect the country’s rights and interests in the EEZ.(iv)Support Search and Rescue missions.(v)Tracking of suspect vessels. (vi)Enhance the surveillance cover of own ships involved in Anti-Piracy operations.(vii)Assist in hydrographic mapping of the coastline.(b)War Time Operations.(i)Over the horizon targeting operations with long range anti-ship missiles.(ii)Electronic warfare missions for ship's self-protection.(iii)Command and control against air attacks.(iv)Reconnaissance of Sea Lines of Communications.(v)Ship observation and identification.(vi)Anti-missile decoy.(vii)Photo reconnaissance.(viii)Destroy en naval assets using UCAVs. (ix)Anti-Submarine Warfare(ASW).(x)Support littoral warfare by providing

surveillance cover, reconnaissance of the shore characteristics and measuring the depth of the water.

Employment of UAVs by Indian Air Force.

59. The employment of UAVs by the Israeli Air Force and the US Air Force in various campaigns has highlighted the Force Multiplier advantage that can be gained by their integration in air campaigns. Intelligence gained from air reconnaissance can be utilized by the Air Force for various tasks such as monitoring ground activity and locating high value armour, army forces and resupply activity. Information regarding enemy air assets can be easily given by the UAV without endangering costly aircraft and pilots. The information which is provided by these UAV missions can be transferred in real time to strike aircraft and attack helicopters to guide them onto their targets. Their possible future contributions in various air operations are described below: - (a)COUNTER AIR OPERATIONS. With the development of armed UAVs and rapidly developing UCAVs their role in Counter Air Operations (CAO) will only increase. Predator and Reaper UAVs have become the basis of development of combat UAVs which may be likely replacement of fighters. UCAVs like X-47, MiG SKAT, nEUROn and Boeing’s Phantom Ray are being developed with matching potentials of a fighter ac. Once as capable as fighters these UCAVs will start contributing equally to CAO. Concepts like airborne AD radar on board UAVs is under trial and once established they will take Air Defence/ Defensive Counter Air campaign to new levels.(b)COUNTER SURFACE FORCE OPERATIONS. Employment and success of UAVs commenced with their invaluable contributions in Tactical Recce. Tactical Battle Area (TBA) is a very lethal environment where weapons of all calibres are deployed by both sides.

One of the primary purposes for the employment of UAVs is reducing the risk to human life in high threat environments. With rapid advancement of sensor technology most of the tactical recce is now UAV based. The real time high quality motion video and imageries provide battlefield transparency which was unimaginable few years back. Armed UAVs like Predator and Reaper have high payload carriage capability (Reaper UAV can carry up to 14 missiles). These can now be employed for Air Interdiction, Battle Field Interdiction and Battlefield Air Strikes. UCAVs and armed UAVs by virtue of their inherent long endurance and precision capability can be used to carry out Search and Strike missions against targets of opportunity in conditions of air superiority. Time Sensitive and Dynamic Targeting can thus be best achieved by these high endurance combat machines.(c)COMBAT SUPPORT OPERATIONS. On 17 December 2011, a U. S. Marine Corps K-Max helicopter UAV[5]in Afghanistan made its first combat supply delivery, bringing 1. 5 tons of food and other items to a combat outpost. This mission took 90 minutes. This capability can be utilised to air maintain remote outposts in inaccessible border areas without being detected or endangering human life to enemy fire. Israel’s project of Air Mule being planned to be utilised as platform for Casualty Evacuation is another challenge to manned platforms. UAVs ability to contribute in Electronic Warfare by means of ELINT and COMINT also makes them a better choice vis-à-vis manned EW platforms which are more vulnerable to enemy action. Their inherent long endurance and real time data linking ensures availability of EW platform for a long time and data safety. All this also ensures higher battlefield transparency thereby, minimising decision dilemma for commanders in the battle. With the integrated employment of the UAVs/ UCAVs with manned fighters, these are

potent enablers in future air battles in the most economical manner presenting a perfect example of the Effect Based Ops. Having proved their utility in classic roles such as preferred ISR platforms, these systems are increasingly proving their enabling abilities in the roles such as OCA/AD and CSFO.

Employment of UAVs by Indian Army in Non-Conventional Operations.

60. India has been engaged in a proxy war for the past few decades and has been combating terrorism in various parts. The Indian Armed Forces have been fighting a long drawn battle with these inimical forces over terrain varying from the ice clad mountains of the Himalayas to the dense rainforests of the North Eastern states. The use of UAVs and UCAVs by the forces could act as a Force Multiplier in helping to neutralise the terrorist threat. With their extended endurance and ability to loiter they will be able to present a potent threat to those effecting Low Intensity Conflict. Armed UAVs can contribute in the execution of war on extremists by finding, fixing, tracking and targeting them. The threat of an Armed UAV ready to attack them is likely to be a big deterrent to the insurgents and is likely to adversely affect their morale. The various roles in which UAVs could be used in Low Intensity Conflict Operations(LICO) are as follows:-(a)Intelligence Gathering. LICO requires extensive use of Intelligence. With the introduction of UAVs, a sustained surveillance on militant hideouts, launch pads, infiltration routes and communication is possible. The incorporation of night/all-weather imagery sensors and Synthetic Aperture Radar has enhanced all weather intelligence gathering capability. COMINT sensors can

provide valuable inputs on the modus operandi of the militants and insurgents. Remote and inaccessible areas like the far reaches of J&K, North Eastern mountains and Chhatisgarh/ Jharkhand can be put under persistent surveillance. Large numbers of long endurance UAVs like Heron and Hermes positioned in the airspace at vantage positions can rapidly be used to gather intelligence of any emerging situation. Smaller UAVs like Shadow, Raven and Micro-UAVs can be usefully employed by security forces in dangerous and tricky scenarios of urban warfare.(b)Overcoming Terrain Restrictions. The problems of surveillance of theinhospitable mountainous terrain can be overcome by use of HALE UAVs likeHeron, Global Hawk and Darkstar. These UAVs have the potential to fly over the high Himalayan ranges and carry out surveillance for long durations. The datalink capability being based on SATCOM links would overcome the LOS restrictions of terrain experienced by MALE UAVs.(c)Reducing Sensor To Shooter Time. Time Sensitive Targeting (TST) is of great importance. In Indian context many incidences can be accounted where the intelligence grid having detected a significant activity failed due to sensor and shooter grids being different. This is a common occurrence in the fight against terrorism in J&K and North East. A case of suspected militants being tracked and identified as real militants can be immediately tackled by the use of UCAVs.(d)Precision And Calibration Of Attacks. The lethal precision is today complemented by the design of small precision guided munitions such as Small Diameter Bomb6 (SDB) of 250 pounds with a warhead of only 22 kg that can penetrate up to 2 meters of concrete while reducing the collateral damage to nearby buildings due to the blast. The targeting of insurgents hiding within the populace is a complex task since identification of these small groups of non-uniformed fighters is

very difficult.(e)Targeting. Armed UAVs and UCAVs armed with countermeasurescan be used to carry out precision assault operations. Smart, Precision Guided Munitions (PGMs) and Limited Effect munitions deployed from Armed UAVs and UCAVs in the air, would give commanders quick and effective reactive capabilities in large operations.(f)Convoy Escort And Protection. Indian armed forces are deployed on active duties across the length and breadth of the country. For obvious operational and logistical needs these forces need to operate their vehicle convoys. These vehicle convoys in many cases have been put to attacks like mortar attacks, small arm fires, grenade attacks and roadside IED explosions. Mini-UAVs such as SkyLite-B are designed to maintain persistent presence over known areas of activity with adequate low light, IR sensors for detection of large groups of people, blocked routes or significant infrastructure changes. (g)Communication Relay Systems. Many Indian Army and Air Force units are deployed at very remote locations. Establishing communication with such remotely located units at times is difficult. UAVs with Communication relays can critically cut down link-up time between formations, allowing for quicker transfer of operational data, particularly during ambushes and storming missions. An airborne relay can effectively connect to units operating in mountainous area, where terrestrial radio communications are typically masked and screened by the terrain[6].

Employment of UAVs and UCAVs in Joint Services Environment.

61. Modern UAVs do not operate independently but are part of the larger " net-centric" modern battlefield. This concept of an integrated battle space,

fusing command and control, intelligence, and battle management systems, is a force multiplier. The goal should be to reach a stage whereby intelligence data, targeting information, and key command and control communications can be passed instantaneously between all weapon systems and units on the battlefield. With their persistence and advanced sensors, modern UAVs are a critical element of the " net-centric" battlefield. The enablers that would be necessary in establishing joint service interoperability can be listed as follows:-(a)Common operating picture (COP) to be shared within forces.(b)C2 for dynamic retasking within/between components. (c)Real Time distribution of video/ data with common links.(d)Responsive sensor-to-shooter kill chain.(e)Common terminology/TTPs among three services.(f)Common training for joint missions.(g)Common processing, exploitation, and dissemination architecture.(h)Airspace Management. 62. A large and robust UAV force has the definite potential to change India’s strategic scene in the future, with implications for conventional and nuclear deterrence.(a)Conventional Deterrence. A large fleet of long-range, advanced reconnaissance UAVs would increase India’s growing surveillance satellite capabilities. The capability of UAVs for persistent station keeping for long periods means that they could well serve as " gap fillers" for space-based platforms that can not remain " on station" permanently. This capacity would be mainly valuable during a crisis situation. UAVs, for example, could constantly monitor Pakistan and China’s ballistic missile sites. Linked to active (e. g., the Prithvi anti-ballistic missile interceptor) and passive (e. g., warning sirens) defenses, UAVs would enhance India’s ability to counter a nuclear (or biological or chemical) weapons strike with ballistic missiles. (b)Nuclear Deterrence. UAVs could also augment the nation’s nuclear

deterrence by consolidating its " second strike" capability. Though India already has a potent retaliatory capability— based upon a triad of land-based, nuclear-tipped ballistic missiles; submarine-based, nuclear-armed cruise missiles and air-delivered nuclear bombs—UAVs could still augment the aerial component of the triad. UAVs can operate from comparatively small and remote sites and require much less ground infrastructure than manned aircraft, making them hard to locate, let alone hit. They would thus be highly likely to survive a first strike and a potential attacker would have to take this into account before deciding upon a nuclear strike.

Recommendations

63. The military effectiveness of UAVs has been proved in all the recent conflicts and their employability in future wars cannot be ruled out. They will form an important part of any operation whether on land, sea or air. In the Indian context they will form a part of varied operations ranging from insurgency, surveillance of border and coast line, LICO to full-fledged Joint services conventional operations. Certain recommendations for optimum utilisation of this platform in the Indian scenario are as follows:-(a)Joint UAV Doctrine. Presently all three services are vigorously pursuing UAV procurement. The three services and other security agencies such as Coast Guard, BSF, CRPF and police must sit together and develop a joint UAV doctrine that analyses their exploitation across the spectrum of conflicts from routine policing and peacetime surveillance through LICO and up to conventional wars. This would lead to demarcation of areas of responsibility of various agencies under varying situations and in effect define the command and control structures at the operational level.(b)Joint Command

Structures. While individual services may be allowed to pursue their own training and employment during peace time, all UAV assets of the participants must be brought under a unified command during operations to avoid duplication of effort, ensure centralised control and better air traffic management.(h)Force Structure Planning. Induction plans for the future (especially vision 2020) should include induction of all the types of UAVs/ UCAVs in adequate numbers. This will ensure tactical flexibility and application of air power in all roles.(b)Information Sharing. Information gathered by the UAV should be collated centrally and shared optimally for better transparency of the battlefield. Modern data link systems, secure and closed loop communication would ensure real time display of data reducing the decision making cycle as well as fog of war.(c) Air Traffic Management (ATM). The dependence of security forces on UAVs would only continue to grow. With increasing civilian air traffic, the presence of large number of UAVs would pose serious challenges in airspace management. With the proliferation of UAVs and their inherent limitation in the aspect of situational awareness, it is imperative that fool proof ATM SOPs be incorporated. For better ATM and safe flying environment UAV flight plans have to be dealt with in a similar fashion as manned aircraft. UAVs with Collision Avoidance Systems and Identification Friend or Foe (IFF) Systems should help in resolving the air space management dilemma.(d)Infrastructure Building. The infrastructure development required to support an ever expanding UAV fleet must not be lost sight of. The requirement of a support system and spare management needs to be coordinated at the highest level. In India there are many unused airstrips which are unsuitable for manned aircraft because of their short length. These could be activated for UAV operations which in

addition to increasing the employment options would also help in decongesting the existing bases.(e)ISR Cycle. There is a requirement to integrate the Intelligence input of UAVs from all three services to give a composite picture. The Command Headquaters of the three services must liaise for the same during peace time.(f)Datalinking. The UAVs and the ground station must be integrated in the overall Operational Data Linking projects of the three services for real time information flow and tasking. It would be ideal if ground stations are not specific to type of UAV and there is large interoperability built in.(g)Development in UAV technology. India must strive for indigenous development of UAVs with long endurance, UAVs for under slung cargo drop, Rotary UAVs for employment in ships and urban areas and miniature UAVs for a variety of clandestine missions.(j)Training. The increasing usage of UAVs by the three services would require a pool of well trained and qualified operators to optimally utilise the capabilities of the systems. Also the requirement of photo interpreters would also increase exponentially. The three services need to start capacity building in this regard. Induction of ab-initio trainees in the UAV fleet would enable continuity, better strategy planning and increase the operational effectiveness of this potent platform.