

INTEGRATING DRONES FOR LONG RANGE PRECISION FIRES AND TIME SENSITIVE TARGETING: AN INDIAN PERSPECTIVE

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Abstract

Application of fire power in recent conflicts has been innovative and dynamic. 'Long Range Precision Fires' and 'Time Sensitive Targeting' with loitering drones and conventional rocket and Artillery munitions assisted by spotter drones have been extremely effective. Automated and networked integration of various fire power assets, drones, weapon locating radars, EW assets and fire control system has proved very lethal. Drones have proved their efficacy in the ISR and Targeting matrix and are being extensively employed in counter terrorism as well as conventional armed conflicts. Scope of their employment will further enhance with improvement in technology and better communication facilities.

Employment of drones for targeting and other areas in defence and security sector is inescapable. India has enormous potential to emerge as global drone manufacturing hub. The Indian Armed Forces are well poised to explore and optimally exploit potential of drones. An automated and seamlessly networked Sensor Shooter Link integrating the ISR Architecture and the Targeting Entities must be ensured. A common GIS and common communication protocol will be required to achieve the same. For enormous requirement of resources, fiscal prudence and 'Atmnirbharta' will be key factors. Training of all ranks should be given a de-novo look.

INTRODUCTION

Remotely controlled, unmanned aerial aircrafts have been in use since 1930s. The USA initially employed them for ISR missions and graduated to deploying land attack bombs and torpedoes. It started employing them in combat role during the Vietnam War.¹ After the twin tower terrorist attacks of 11 September 2001, the USA has been extensively employing armed drones across the globe for counter terrorism operations. Many high-profile terrorist leaders have been killed with precision targeting using drones. Al Qaeda leader Ayman al- Zawahiri was eliminated on 31 July 2022 in a drone attack by the USA. Two Hellfire R9X missiles fired from a MQ9 Reaper drone hit him when he was standing in the balcony at his home in downtown Kabul, Afghanistan. No one else was killed or wounded in the attack.² The R9X version of Hellfire Missiles have an inert warhead without any explosives. Instead, they have metal blades that kill the target without much damage to surroundings. Earlier, targeted killing of General Qasem Soleimani, Iran's most powerful military commander,³ in a precision drone attack by the US Forces on 03 January 2020, highlighted how the battlefield has become extremely transparent and extended beyond boundaries. Efficacy of the drone attack was demonstrated by annihilating the target near a busy civil airport without any collateral damage.

Employment of drones for conventional operations have also increased exponentially. In recent conflicts, employment of fire power has been remarkably innovative and dynamic. Long range precision targeting with loitering drones as well as conventional rocket and Artillery munitions assisted by spotter drones has been extremely effective. In the ongoing Russia Ukraine War, both countries are employing drones of all kinds to complement the conventional weapons.⁴ Earlier, in Nagorno-Karabakh conflict between Azerbaijan and Armenia, the Azerbaijan forces used Turkish supplied drones to devastating effects. The Armenian tanks, guns, troops and equipment suffered heavy casualties.⁵ In Turkey-Syria conflict of early March 2020, Turkish Forces adopted the same methodology of 'drone strikes and massed Artillery fires' destroying more than 100 armoured vehicles and

killing hundreds of Syrian forces. This Turkish offensive was largely carried out leveraging Drone Artillery spotters and Electronic Warfare capabilities.⁶ This article attempts to analyse the current and near future trends in 'Targeting', highlight importance of 'integrating drones for long range precision fires and time sensitive targeting' and draw certain imperatives for the Indian Armed Forces.

FUTURE OPERATING ENVIRONMENT AND BATTLEFIELD MILIEU

Incoming decades, factors like population growth, continuing globalisation, migration, rapid urbanisation, rapidly changing technologies, requirement of energy, water, oil, competition for resources and climate changes are likely to pose significant challenges in the strategic context.⁷ The emerging conflicts' environment is characterised by complexity, chaos and competition. Amidst all this, 'Gray Zones'- spaces between outright war and peace, have emerged where diverse types and numbers of actors compete for resources, access, territory, and power within states and across them.⁸

The Joint Doctrine of the Indian Armed Forces 2017 identifies the character of future wars to be ambiguous, uncertain, short, swift, lethal, intense, precise, non-linear, unrestricted, unpredictable and hybrid.⁹ The future battlefield may be characterised by intense engagements; nonlinear battles; simultaneity of operations; increased battlefield transparency; synergised and orchestrated employment of fire power resources and employment of precision and high lethality weapon systems in a hybrid warfare environment and may be under the overall backdrop of a nuclear, biological and chemical warfare threat.¹⁰

Over the past few years, almost all the military thinkers, analysts and commentators have assessed the future wars to be "short and swift". Though some contrary views; cogently arguing that "in reality the chances of a successful, short and swift war are minimal and future wars will be long with heavy political consequences" have also emerged.¹¹ The ongoing Russia Ukraine war seems to be justifying this thought process.

With these characteristics, the future military operations are likely to be across multi domain. Generally, land, sea, air, space and cyber are assessed to be the domains where competitions are going on and future conflicts might take place. But as the warfare is evolves, new domains will keep getting added. Summarising the modern warfighting, Lt Gen Raj Shukla (Retd), in a tweet dated 28 July 2023, identified eight domains - land, sea, air, subsea, seabed, EM, space, cyber and three matrices - range, speed and precision to deliver combat over match, aided by new talent pipelines, innovation and civil – military fusion. Elaborating further, he classified ‘submarines’ and ‘seabed sensors’ as different domains.¹²

Whatever be the ‘dynamics of the warfare’, ‘operating environment’ and ‘future battlefield’, the Armed Forces must adapt, develop capabilities, train and be fully prepared for all eventualities. Drones and unmanned systems have emerged as an important and potent tool for conduct of Warfare and counter terrorism operations.

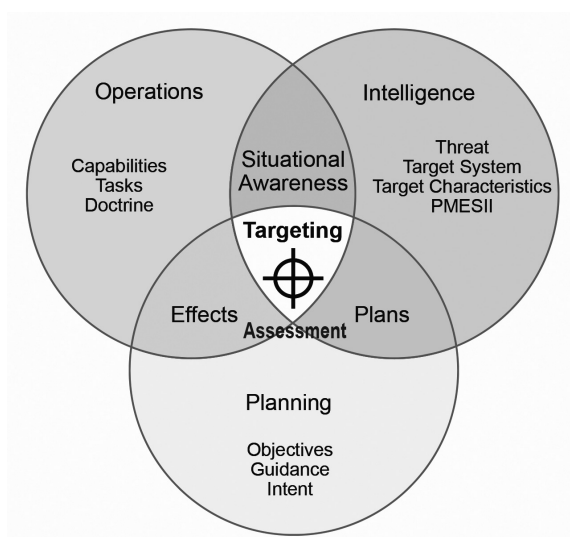
TARGET, TARGET ACQUISITION AND TARGETING - AN OVERVIEW

The US Armed Forces’ Joint Publication 3-60, ‘Joint Targeting’ has formally defined ‘Target’ and ‘Targeting’. “A ‘Target’ is an entity (person, place, or thing) considered for possible engagement or action to alter or neutralise the function it performs for the adversary. It must be consistent with national strategic direction and selected to accomplish the assigned missions. It can be a facility, individual(s), virtual, equipment or system’s capability.”¹³

For operational planning purposes, targets are categorised as ‘planned targets’ and ‘targets of opportunities’. A high-value target (HVT) is defined as a target that the enemy can least afford to lose or that provides him with the greatest advantage. A high-payoff target (HPT), is that which must be acquired and engaged to achieve success of the friendly forces. Some special types of HPTs having very high importance to mission accomplishment are termed as ‘time-sensitive’ and ‘component-critical’ targets.¹⁴

‘Target Acquisition’ is the process to locate a target with desired degree of accuracy required by the designated weapon systems to destroy or suppress it effectively.

“‘Targeting’ systematically analyses and prioritises targets and matches appropriate lethal and nonlethal actions to create specific desired effects to achieve the objectives. It links intelligence, operations and plans across all levels of command and phases of operations. The purpose of ‘Targeting’ is to integrate and synchronise fires into joint operations by utilising available capabilities to generate a specific lethal or nonlethal effect on a target.”¹⁵ The targeting overview is depicted below:



PMESII - Political, Military, Economic, Social, Information and Infrastructure

Targeting Overview¹⁶

Source: Google Image

The publication further elaborates, “Targeting encompasses many processes, all linked and logically guided by the joint targeting cycle that continuously seek to analyse, identify, develop, validate, assess, and prioritise targets for engagement. Targeting process is categorised as ‘deliberate’ and ‘dynamic’.”¹⁷

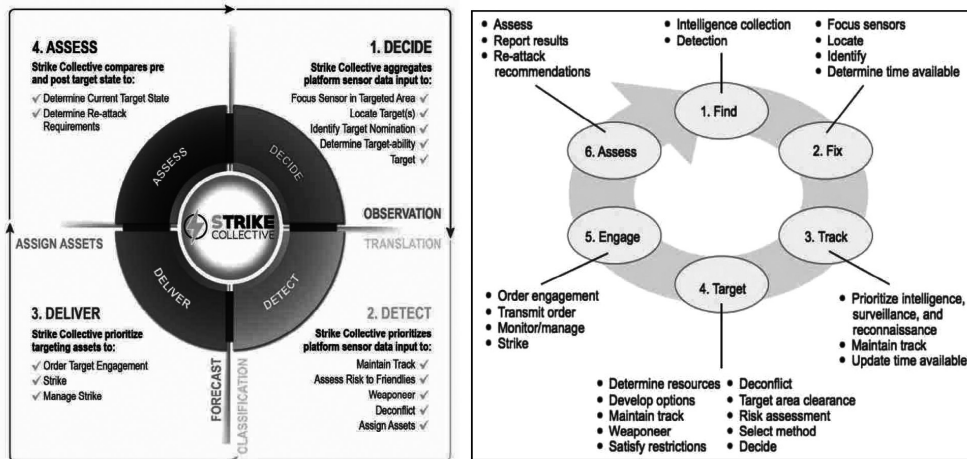
Joint Targeting Cycle¹⁸

Source: Google Image

Correlation of ISR and Targeting also needs to be highlighted. ISR is the process of integrating the intelligence cycle with surveillance, target acquisition and recce tasks in order to enhance the commander's decision-making capability and facilitate the targeting process. ISR operations focus on production of information and intelligence required by the decision makers. Drones are one of the most important resources in this ISR and Targeting matrix. They have provided enormous flexibility and tremendous advantage to military planners.

TARGETING PROCESS

There are a number of targeting processes that various Armies have adopted to engage enemy targets. One such process is - decide, detect, deliver and assess (D³A) process.¹⁹ Another process is 'find, fix, track, target, engage and assess' (F²T²EA) process. Generally related to dynamic targeting, the F²T²EA process is also referred as 'kill chain'.²⁰



D³A Targeting Process

F²T²EA Targeting Process

Source: Google Image

EMERGING TRENDS IN TARGETING-EXTENSIVE EMPLOYMENT OF DRONES

In recent conflicts involving Russia-Ukraine, Turkey-Syria, Armenia-Azerbaijan and Libya; capabilities of various weapon systems have been on display. Certain very interesting trends have emerged in ISR and Targeting. Automated and networked integration of various firepower assets, drones, weapon locating radars, EW assets and fire control system have proved to be a very lethal combination. Drones have played the most important role in this 'ISR and Targeting Cycle'. They are being employed for various combat roles like intelligence gathering, surveillance, target acquisition, jamming the communication and attack with loitering munitions as well as for supporting logistics.

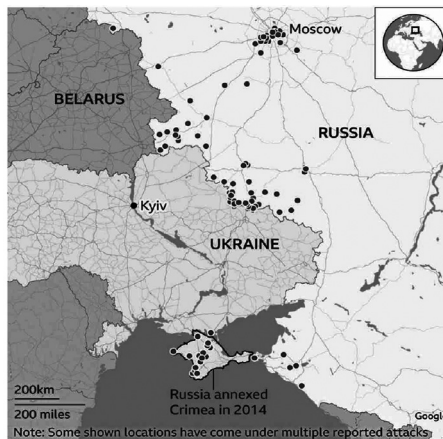
Russia-Ukraine War. The ongoing Russia Ukraine war is witnessing extensive employment of drones by both the belligerent countries. According to a report published on 19 May 2023 by the Royal United Services Institute (RUSI), a British think tank specialising in defence issues, "the Ukrainian military is now losing some 10,000 drones a month on the battlefield, or more than 300 a day". In the beginning of the war large-scale tactical

UAVs, like the Turkish Bayraktar TB2, were being employed by Ukraine to attack Russian tanks columns. However, now mainly smaller UAVs, often of civilian origin are being employed.²¹ Though many commentators have questioned this claim but the importance that drones have been accorded is not to be missed.

As per another report in the Washington Post, drones have been integrated into every phase of fighting by both countries, with extensive fleets, Air Defence and jamming systems.²² Apart from employment in combat role by two sides, drones are also being used by journalists to collect information and reporting from otherwise inaccessible war zones.²³ Some analysts have assessed that in April 2022, Russian flagship 'Moskova' was sunk by Ukraine, innovatively employing drones. Probably, the ship's defences were diverted by the Turkish make 'Bayraktar' drone and then Neptune anti-ship missile was used to attack the ship and destroy it.²⁴

According to Russian media reports monitored by BBC Verify, more than 120 suspected drone attacks have taken place this year in Russia and Russian-controlled territory in Ukraine. Oil facilities, airfields and energy infrastructure have all been targeted.²⁵

Reported drone attacks on Russian targets



Source: BBC research (data from 1 January to 1 August 2023).

Turkey's Lethal Fire Assault decimating Syrian Forces in the Battle of Idlib in March 2020 has brought Artillery integrated with UAVs and cyber assets for EW, to renewed prominence in 21st century military operations. Turkey reportedly jammed the Syrian radars, acquired the targets using the UAVs and delivered a deadly fire assault with guns and rockets. As spotters for Artillery, the UAVs are filling in a risky role that used to be performed by slow-flying observation planes for directing accurate Artillery fires.²⁶

Russian Concept of Reconnaissance - Strike and Recce - Fire System. This innovative and integrated employment of UAVs for target acquisition, cyber-attacks followed by a lethal fire assault of rockets and Artillery was first demonstrated by the Russians against the Ukrainian forces in July 2014 in "Zelonopillya Rocket Attack."²⁷ As per a report in 'The Washington Post', "a single Russian Artillery 'fire strike' destroyed almost two Ukrainian mechanised battalions, in a few minutes."²⁸ It was an innovative and audacious employment of firepower integrating EW assets, UAVs, and firepower assets like rockets and guns.

Russia traditionally has been the biggest proponent of the 'firepower supremacy'. As per the Global Firepower 2023 data, it has the largest Artillery in the World.²⁹ Russia undertook a massive modernisation drive of its firepower resources as well as its concepts of application. To counter NATO Forces' air superiority, it invested heavily in precision guided missiles like Iskander and Kinzhal and advanced Artillery weapon systems like the 2S35 Koalitsiya 155 mm self-propelled howitzer and the 9A53 Uragan M1 multiple rocket launchers. Simultaneously, considerable efforts were put in for development of the drones and the UAVs. For Artillery, special targets potter drones with approximate ranges of about 40 Km were designed. The modern T14 Armata tanks are fitted with tethered target acquisition drones. A UAV company equipped with drones like Eleron, Granat and Orlan has been grouped with each mobile brigade.³⁰

Analysing the Russian Artillery modernisation, Roger N McDermott, a Senior Fellow in Eurasian Military Studies, The Jamestown Foundation,

Washington DC, highlighted that, the Russian weapon systems like Artillery and precision missiles receive target information from the UAVs and other forward-spotters, transmitted in real time through the Strelets intelligence management and communications system. This facilitates high precision fires in a very short time. The UAVs are integral part of the divisions of heavy duty Artillery and help in precise aiming at the target. ROS, the Russian variant of network centric warfare, aims to integrate all units and subunits operating in the battlefield. To ensure the speed and continuity of the fire impact on the enemy, 'Reconnaissance-Strike' and 'Reconnaissance-Fire complexes' are being created.³¹

The Russian Armed Forces conducted a strategic command staff exercise, Tsentr 2019. Extensive use of UAVs in combat operations was probably the most important aspect exercised in it. The Exercise witnessed independent use of drones for reconnaissance, identification and designation of the targets for strike by aviation and field Artillery. The usage of drones and UAVs in conjunction with field Artillery is a critical element of Russia's Reconnaissance-Fire System, greatly enhancing speed of action and accuracy in fire control.³²

Israel Defence Forces (IDF) have also given lot of emphasis on integrating firepower from various air, sea and landbased platforms, interconnected through a single C4I network. The Artillery corps is responsible to destroy the fixed targets as well as targets of opportunity. The distinct advantage with the landbased launchers and other infrastructure is that, once connected, they all are relatively simple. Here again, the drones and UAVs play important role in targeting methodology. In addition to increasingly precise and longer-range missiles and munitions, the Artillery corps is operating UAVs.³³

It is abundantly clear that drones will be an important component of the ISR Targeting Architecture. They have amply demonstrated their efficacy in recent conflicts. Scope of their employment will further enhance with improvement in technology specially AI and better communication facilities.

IMPERATIVES FOR THE INDIAN ARMED FORCES AND RECOMMENDATIONS

Relevance and importance of drones, not only for Defence but various other sectors like Industry, Infrastructure, Agriculture, Logistics, Supply Chain Management, Retail, Communication, Journalism, Mass Media and many other fields have been well understood by all stakeholders. It has been identified as a niche technology and a core area of research and development for Atmnirbhar Bharat. A conducive policy ecosystem is being created with Drone Regulations 3.0. Industry needs and public safety concerns are being balanced by the Indian Government. This will give a boost to India's fast developing drone industry.

In a report titled, "Making India the Drone Hub of the World", Federation of Indian Chambers of Commerce & Industry (FICCI) in collaboration with Ernst & Young (E&Y) has estimated that, by 2025, the global drone market is likely to be of US\$ 54 Billion. For India, the drone manufacturing potential could be worth US\$ 4.2 Billion by 2025 and grow to US\$ 23 Billion by 2030. The Nation has the potential and the opportunity to emerge as a drone hub on the global stage.³⁴ Considerable efforts are being put in by all to exploit this opportunity.

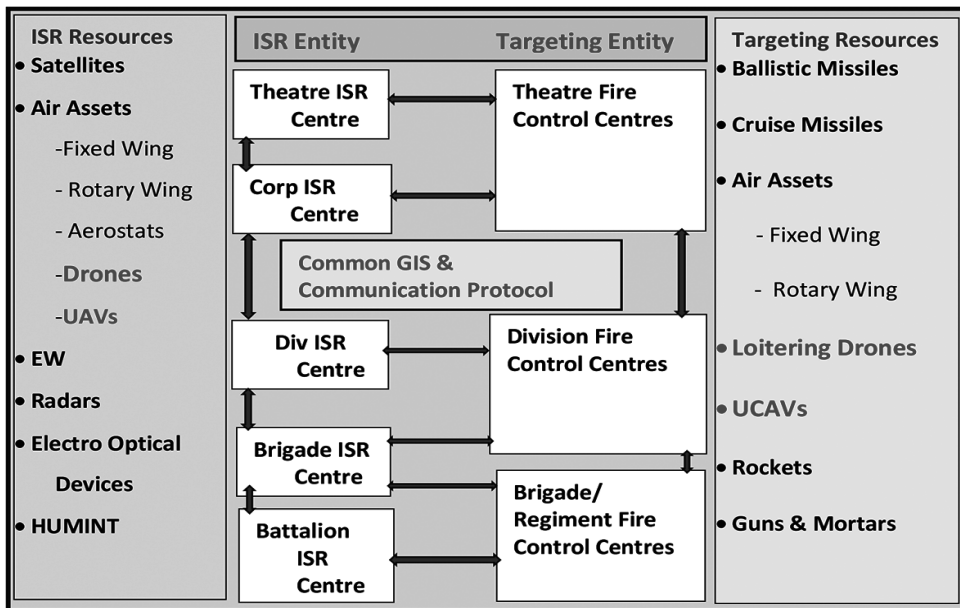
Indian Armed Forces are on a cusp of transformation. Modernisation and transformation of the three Services are being given impetus. With the polity and the bureaucracy on board and a CDS in place, things seem to be set for integration of the three Services. It is a matter of time when the Joint Theatre Commands will be in place. Though; it will just be a beginning of the transformation. Lots of ground has to be covered for being a lean, mean, agile and a modern force.

Indian Armed Forces have correctly appreciated the potential of drones and are well poised to exploit it. Effective liaison must be maintained with Industry and all other stakeholders involved in research and development and subsequent mass production of drones.

Integration of drones for 'Long Range Precision Fires' and 'Time Sensitive Targeting' is amply demonstrated by the Armed Forces of various countries

in the ongoing conflicts as well as exercises. Employment of drones for the same by the Indian Armed Forces, as well, is inescapable. The framework to enable it will require considerable resources, efforts and coordination at all levels. Certain recommendations to streamline the same are elaborated below:

- Emphasis in the Indian Armed Forces has generally been on the ISR ops. The aspect of ‘**Joint Targeting**’ must also be incorporated at every level.
- To ensure effective, real or near real time target engagement, an automated, networked and seamless **Sensor Shooter Link** will have to be established. Integration of the ISR Architectures and Targeting Fire Control Entities at all levels is a must. A **common GIS** and **common communication protocol** ensuring seamless connectivity across all the three Services as well as other entities having stakes in the National Security is a foremost requirement for this.



Networked ISR – Targeting Architecture

- Importance of satellites for ISR has been amply demonstrated by the US private company, Planet Lab. Founded by three former NASA engineers in 2010, it now operates the largest private satellite constellation of the Earth observation satellites.³⁵ It has been commercially supplying satellite images across the globe. India must consider its own constellation of low earth orbit small satellites for continuous surveillance and reconnaissance. It will boost the Armed Forces' C4I2SR capabilities thereby strengthening the sensor-shooter link. It will also improve the connectivity and data transmission between ground stations, air-borne assets and space.³⁶
- The Battlefield Surveillance System (**BSS**) must be fielded on priority. The system has made very good progress over the years. Once fielded, further improvements desired by the users can be incorporated, subsequently. Its integration with Targeting Entities should be ensured on priority.
- Firepower resources must have their own integral, automated and networked observation and target acquisition systems. **Drones, UAVs and RPAS must be incorporated in the overall ISR and Targeting matrix.**
- Requirement of resources for an automated and networked ISR - Targeting Architecture including drones is likely to be enormous. It can only be met with **Indigenisation. Fiscal prudence** and **Atmnirbharta** will be key factors.
- With data automation, inventory management has become easy and **Theatre or terrain specific equipment** might be a better idea.
- **Training** of all ranks including Strategic and Op Leaders will need a de-novo look. Technical threshold of the soldiers will have to be enhanced.

CONCLUSION

The future battlefield will be unpredictable. The nature of warfare is dynamic and will keep changing continuously. Drones will have a very important role and wide employability in Defence and Security Sector. In

the recent conflicts, drones have proved their efficacy for the kinetic as well as non-kinetic operations. India has the potential to be a global drone manufacturing hub in near future. The Defence Forces must exploit this opportunity optimally.

The Indian Armed Forces will have to be fully prepared for any eventuality. 'Targeting' must be approached in a holistic manner. Drones must be integrated for 'ISR and Targeting' as well as other areas like logistics and communication. Networking the battle space, strengthening the ISR grid, integrating the Firepower assets with drones and fire control systems will be key battle winning factors in future.

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