Appraising India’s Intelligence, Surveillance and Reconnaissance Capabilities and its Advantage in the Conduct of Modern Warfare

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Introduction

The conduct of war has experienced several transformations during the last several decades, leading to a debate in academic circles over the new trends and drivers of modern warfare. Scholars agree that wars experience both continuity and change; arguing that elements of the nature of war, including violence, uncertainty, and political objectives have remained constant. However, the characteristics of war have changed over time. The changes in the characteristics of war including war-fighting strategies and weapons can be attributed to technological innovations. For example, military doctrines and concepts of total war experienced a total transformation with the introduction of nuclear weapons and the advent of long-range ballistic and cruise missiles.

In the contemporary age, modern warfare comprises evolving war-fighting concepts such as information warfare, network-centric warfare and hybrid or Fifth Generation (5G) wars, as well as precision guided weapons and advanced means of collecting and disseminating information, referred to as C4I2SR (Command, Control, Communications, Computer, Information, Intelligence, Surveillance, and Reconnaissance). These ISR capabilities are important tools of information and network centric warfare. ISR functions include different kinds of systems used for acquiring and processing information needed by military commanders and decision makers, thus forming the
principal elements of defence capabilities of any country. States rely on efficient ISR capabilities not only for deterrence and escalation dominance during wars or conflicts, but also for better situational awareness during peacetime. Major powers across the world are heavily investing in their ISR capabilities to acquire and process information required by decision-makers.

In South Asia, India continues to modernise its conventional and nuclear forces. During the last several years, the country has also invested in modernising its ISR capabilities. India’s major ISR capabilities include space-based technologies such as Remote Sensing Satellites, and Radar Imaging Satellites. The country’s airborne ISR include Unmanned Aerial Vehicles and Airborne Early Warning Radars and Control Systems (AEWACS). In order to improve its blue water capabilities, the Indian Navy is also investing in enhancing its ISR abilities. The country also plans to collaborate with the US and Israel to procure airborne ISR capabilities.

This paper is an attempt to understand India’s ISR capabilities and its implications for the South Asian region. It highlights India’s military asymmetry vis-à-vis Pakistan in the ISR domain, and also discusses Pakistan’s threat perceptions and security challenges as a consequence.

**Research Questions**

- What is the role of ISR capabilities in the conduct of modern warfare?
- How would India’s ISR capabilities give the country a relative advantage over Pakistan in information and network centric warfare?
The paper is analytical and explanatory. ‘Qualitative’ research methods are employed to conduct the study. The study utilises both primary and secondary sources of data. Data is collected from official documents, speeches, press releases, books and research papers.

**Transformations in the Conduct of War**

In words of Carl von Clausewitz, “War is more than a mere chameleon that slightly adapts its characteristics to the given case”. Transformations in the conduct of war have been occurring since the beginning of human history. There is widespread agreement amongst practitioners and scholars of military sciences that both continuity and change are part of war; where change and continuity are both ubiquitous. In order to analyse transformation in warfare or to predict the future of warfare, it is important to comprehensively understand both the enduring and changing aspects of war.

To explain this idea, scholars have separated the phenomenon of war into two parts i.e. “nature” and “character”. War has an enduring nature as it exhibits a few continuities. Clausewitz in his seminal book, On War, discussed three main elements of war that form the basis of its nature, namely: violence, chance and an instrument of policy, also referred to as the Clausewitzian Trinity. He noted, “War must involve violence. Conflicts without violence are not wars.” Similarly, chance, a second element of the nature of war, is what Clausewitz defined as the fog and friction of war. “Fog” means that nothing in war is certain or predictable, while “friction” implies that everything may go against expectations during the course of war. Finally, its use as an instrument of policy aspect is the third element in the trinity of the nature of war. Clausewitz defines war as an instrument of politics, and
a continuation of politics by other means.12 Scholars contend that these elements of the nature of war are elements of continuity as they reflect the basic fact that war is a distinctly human endeavour.

Conversely, the characteristics of warfare have been changing constantly. Clausewitz noted thus, “We shall have to grasp the idea that war, and the form which we give it, proceeds from ideas, feelings, and circumstances, which dominate for the moment.”13 Technology has had a significant influence on the means of war fighting. Moreover, military doctrines, new war-fighting strategies and organisation are other important aspects that it influences. It also implies that changes occur in both the ways and means of warfare, i.e. how wars are fought (ways) and with what tools wars are fought (means). The way in which war is fought is governed by doctrines and strategic concepts. For example, military doctrines and concepts of total war experienced a total transformation with the development of nuclear weapons and related delivery systems.14

Keeping in view transformations in the characteristics of war, advancement in technology and strategic concepts have brought about dramatic changes in the conduct of warfare during the last several decades. The characteristics of war have evolved with transformations in societies, economies, politics, technologies, and the respective security environments. Militaries across the world have adapted themselves to the changing characteristics of warfare with the help of technology and concept-driven approaches. At times, new technologies have allowed militaries to adopt new war-fighting strategies. Alternatively, sometimes new concepts have required militaries to develop new technologies. In both scenarios, the countries have responded to transformations in warfare through military
research and development (R&D), or the “Revolution in Military Affairs” (RMA).\textsuperscript{15}

For instance, the US’ development of the Prompt Global Strike conventional missile and ballistic defence missile systems is an example of how doctrines drive technology. In order to protect national interest and defend allies, which is an important part of the US National Security Strategy,\textsuperscript{16} the country has long sought weapons that could accurately eliminate targets thousands of miles away. Therefore, the Prompt Global Strike conventional missile and missile defence systems provide profound weapons to meet doctrinal needs and security commitments.\textsuperscript{17} Alternatively, the anti-access/area denial (A2/AD) strategy requires technological support. An effective A2/AD strategy relies on long-range air and missile defences, attack aircraft and offensive ballistic and cruise missiles. China, for example, exercises the A2/AD strategy to keep US military forces at bay in its immediate areas of concern, including the disputed waters in the region. Chinese A2/AD capabilities include advanced ballistic and cruise missiles together with air and maritime defence systems aimed at deterring US military operations.\textsuperscript{18}

Given the several transformations in warfare, military practitioners and scholars in strategic studies agree on the emergence of numerous RMA over the last several decades. In simple words, RMA may be termed a significant change in technology in conjunction with the adoption of new operational tactics and particular organisation,\textsuperscript{19} marking fundamental discontinuities from the existing status quo.\textsuperscript{20} This explanation implies that a technological innovation alone does not bring about a revolution. RMA counts on three pre-requisites including technological development; doctrinal
innovation; and organisational adaptation.\textsuperscript{21} For example, countries took a number of years to effectively use tanks. The application of operational concepts such as Blitzkrieg required substantial organisational and cultural changes. These organisational and cultural adaptations were reflected in the new combined arms operations centred on the German Panzer division.\textsuperscript{22}

Andrew Marshall, former Director of the Office of Net Assessment in the United States Department of Defence, explained that RMA, “occurs when the application of new technologies into a significant number of military systems combines with innovative operational concepts and organisational adaptation in a way that fundamentally alters the character and conduct of conflict. It does so by producing a dramatic increase – often an order of magnitude or greater – in the combat potential and military effectiveness of armed forces.”\textsuperscript{23}

Based on different RMA pre-requisites, scholars have classified the stages of RMA in different ways.\textsuperscript{24} The current generation of RMA is characterised by technological advances in precision guided weapons, stand-off strikes, advanced means of collecting and disseminating information. Several capabilities used for the collection and dissemination of information are referred to as C4I (Command, Control, Communications, Computer, Information) and ISR (Intelligence, Surveillance, and Reconnaissance).\textsuperscript{25} For example, both the 1991 and 2003 Iraq wars are considered important stages of the current RMA as they demonstrated the use of weapons based on new technologies and contributed towards an enhanced command and control and strategy.

In short, the contemporary RMA is based on the incorporation of information sciences into the military
sphere. Each constituting block of the current RMA continues to influence the characteristics of war. More precisely, the ISR capabilities remain crucial for emerging concepts such as hybrid warfare, information warfare and network centric warfare. These concepts and applications of ISR are discussed in the subsequent paragraphs.

**Intelligence, Surveillance and Reconnaissance and Current RMA**

ISR capabilities are essential for the acquisition of information. Their role is to provide a clear and complete assessment of an adversary’s capabilities and the related threat environment in order to allow militaries to conduct swift and effective operations. These capabilities are also significant for strategic decision making. In this modern age, states are required to have efficient ISR capabilities in place in order to acquire information regarding a large number of hostile elements or adversaries. States rely on advanced ISR capabilities to acquire better situational awareness during conflicts or peace time. The ISR may be defined as “an activity that synchronises and integrates the planning and operation of sensors, assets, and processing, exploitation, and dissemination systems in direct support of current and future operations.” While providing clarity to the concept, this definition implies that the capabilities used for ISR remain indivisible and dependent on its components.

In order to understand the interdependence and indivisibility of ISR components, it is important to discuss them individually. Intelligence is the sum of various actions including collection, processing, integration, evaluation and the interpretation of available information concerning foreign nations, hostile or
potentially hostile forces or elements, or areas of actual or potential operations.\textsuperscript{31} This information is acquired through observation, research, and analysis. Intelligence covers the acquisition of information on hostile elements from strategic to tactical and from national to local levels. Intelligence also requires synthesising of new information with existing contextual knowledge to produce accurate assessments needed for informed decision making regarding adversaries or hostile targets. It involves the analysis of data gathered through surveillance and reconnaissance. Surveillance can be explained as the systematic observation of an adversary’s activities on ground or surfaces, underground, sea or undersea, airspace, and outer-space levels as well as its people with the help of different capabilities and visual, aural, electronic and photographic methods. In essence, surveillance is not oriented towards a specific target, it thus remains passive in the form of a sustained process. On the contrary, reconnaissance operations are designed to actively collect information against specific targets for a specified time. Reconnaissance is the collection of information aimed at validating the intelligence or predictions. It involves a broad spectrum of activities involving an adversary’s activities, resources, weather and geographical conditions. Usually, reconnaissance missions are carried out ahead of military operations.\textsuperscript{32}

Explained simply, the ISR deals with the observation and analysis of events and the production of useful, timely information to support a national interest. It depends greatly upon the integration and synergy, cooperation, coordination and interoperability amongst capabilities and civilian and military organisations, including land, air, sea and space domains.\textsuperscript{33} For ISR capabilities to be effective, it is crucial to synchronise capabilities to support better situational awareness.
Moreover, synchronisation of ISR remains an essential element required to overcome the several challenges posed by factors including numerous hostile events; large amounts of data; and time constraints related to the observation, processing of and response to activities. An effectively integrated ISR capability provides clear intelligence, putting militaries in an advantageous position both during peacetime and conflicts.\textsuperscript{34}

Moreover, the ISR is an essential ingredient of the current RMA. In the words of Admiral William A. Owens, the former US Vice Chairman of the Joint Chiefs of Staff, the current RMA is a “system of systems”,\textsuperscript{35} signifying a combination and synchronisation of different technologies. The system of systems paradigm signifies a hierarchy of command structures and technologies; forces and delivery systems on all platforms. Such capabilities would allow analysis of large amounts of data, rapid mobilisation of forces and required military operations with the help of integration of military command, forces and weapon platforms. In simple terms, the integration of C2, ISR capabilities, and weapons help in the acquisition and analysis of information by automated systems. The availability of critical information on hostile elements provides decision makers the opportunity to make accurate decisions to accomplish campaign objectives by detecting the adversary, and in the mobilisation, planning, and operation of their own forces enabling the military to attain battle-space domination against adversary forces. Owens defines this capability as a chess game in which “all the enemy’s pieces remain visible and vulnerable, while all the friendly pieces also stay visible and commandable.”\textsuperscript{36}

The system of systems paradigm also involves two relatively overlapping, critical modern concepts of
warfare, namely information warfare (IW) and network centric warfare (NCW). The ISR serves as the backbone of the IW and NCW.\(^{37}\) In simple terms the IW pertains to the protection of one’s own information while affecting or exploiting an adversary’s information. It involves the collection, storage and transformation of data in order to reduce uncertainty or to gain control over an important element of the nature of war that Carl von Clausewitz has described as “chance”. According to Clausewitz, chance is the fog and friction of war. Whereas “fog” means that nothing in war is for certain or predictable, “friction” implies that everything may go against expectations during the course of war.\(^{38}\) ISR, being an important part of the IW, helps in the assimilation, synthesising, and delivery of information in time. Consequently, the acquired battle-space awareness and domination lead to at least minimising the fog of war.

On the other hand, the NCW is conceptualised as information superiority-enabled operations. The principle is based on the interconnection and cooperation of geographically dispersed military units including ISR, C2 and weapon platforms. The interoperability of these units and the ability to perform in a network become possible with the help of information and communication technologies. Therefore, military operations derive their combat power through the networking of sensors, decision makers, and shooters. This networking of different platforms allows military forces to achieve shared awareness, a high tempo of operations, greater speed of command, and increased survivability.\(^ {39}\) ISR, together with C4\(^ {40}\) provides support to the NCW by linking friendly force in a war theatre, provide battle-space awareness and enabling the military to conduct swift and effective decision making. The C4ISR, collectively, are resources for networking amongst information processing, target acquisition
systems and weapons systems. These help in carrying out joint and complex operations with speed and accuracy. The C4 elements cover forward and rear command and control technologies, computer processing and secure communications. As C4ISR systems are a series of military functions for coordinating operations, they help in the coordination and execution of rapid operations.  

However, both the IW and NCW remain heavily dependent upon information. As discussed earlier, it is only well-synchronised ISR capabilities that allow states to acquire an edge in information dominance. The acquisition of information dominance could be described succinctly with the help of US Air Force Colonel John Boyd’s proposed model for rapid decision-making. John Boyd’s proposed concept is called observation-orientation-decision, action (OODA) loop, which refers to the C4I network. The OODA is based on four components in which three components (observation-orientation-decision) are information centric while the remaining component (action) is associated to movement and firepower. The superiority of information helps complete the loop faster. It implies that the acceleration of the OODA loop would enable swift operations. In order to enhance both loops of OODA, the networking of C4ISR plays a crucial role. Therefore, the completion of rapid OODA loop provides a state with information dominance which is an advantage over the enemy in a battle to stay one step ahead of the enemy, and maintaining initiatives.

Given the significance of ISR capabilities for emerging IW and NCW concepts, countries around the globe are either indigenously developing or procuring such systems. India is not oblivious to these new requirements of modern warfare. Its evolving ISR capabilities and
continued efforts for peace and wartime situational awareness and battle-space domination are discussed in the subsequent paragraphs.

India’s Intelligence, Surveillance and Reconnaissance Capabilities

India continues to modernise both its nuclear and conventional forces. While the country is procuring both strategic and small arms, it is also rapidly undertaking steps towards the indigenisation of several weapon systems with the help of its ‘Make in India’ policy aimed at strengthening the defence-industrial base. Apart from force modernisation, India is also considering new war-fighting strategies. In 2018, the Indian Army issued its latest land warfare doctrine which identified requirements including ‘integrated battle groups’ and improved cyber, information warfare and electronic-warfare capabilities.\textsuperscript{45} Earlier in 2017, the country had issued a Joint Armed Forces Doctrine aimed at setting out a joint doctrine for Indian nuclear command and control, and envisaged an ‘emerging triad’ of space, cyber and special-operations capabilities complementing conventional land, sea and air capabilities.\textsuperscript{46} These doctrines clearly indicate how India is modernising its armed forces to allow them to fulfil roles and responsibilities of modern warfare.

Meanwhile, India is also heavily investing in information technology to allow its military to adapt to new realities of transformation in warfare, specially the IW and NCW concepts. This is because in the information age, countries can aspire to use information warfare as they are equipped with highly developed communication systems. India is in the process of developing sophisticated land, sea, air, space and
cyberspace based capabilities to deal with the necessities and challenges of the IW and NCW.

India’s Military Doctrines and Significance of ISR Capabilities for IW and NCW

Indian military doctrines have remained, generally, cognisant of new requirements of the information age. The country’s various military doctrines have been discussing new modes of warfare including IW, NCW, and psychological warfare for the last several years. Beginning with its 2001 official document, titled “Challenges for Managing National Security”, the Indian government recognised the predominance of the electromagnetic spectrum, digitalisation of the future battlefield and deployment of electronic equipment. The document, therefore, called for a modernisation of armed forces and contemplated emerging challenges of the information age, envisaged the Indian military embracing capabilities and infrastructure required for information operations.

Similarly, influenced by military transformations in the West, India’s 2004 military doctrine outlined its essential IW concepts. Its first part, which was also made public, examined IW thoroughly. Highlighting the significance of the superiority of information, the doctrine called on decision makers to take measures aimed at protecting their own information, processes, and networks, while acquiring an adversary’s information. The doctrine’s delineated goals included maintaining information on hostile capabilities; protecting decision making systems; depriving the adversary of information, using IW techniques to influence adversaries plans and will; and, influencing non-combatants.
India’s 2007 doctrine for sub-conventional operations has also recognised the necessity of IW and cyber warfare techniques. The doctrine considers IW as an emerging threat. The doctrine has discussed new threats linked to the use of cyber techniques. According to the doctrine, these threats could damage C4ISR systems and other critical infrastructure including industries, financial services, banking systems, the transport sector and energy distribution. To meet those challenges, the doctrine called upon the country to enhance its C4ISR capabilities in order to achieve information dominance through the synchronisation of land, air and sea forces.\(^{50}\)

In line with the above doctrines, the 2017 Joint Doctrine of the Indian Armed Force provides the foundational basis for integration and interdependence to achieve interoperability and compatibility within the armed forces. While drawing on past experiences, the doctrine aims at guiding the Indian armed forces on necessary concepts and principles. It recognises the changing characteristics of warfare. The doctrine defines the future of warfare as uncertain, swift, lethal, and hybrid owing to the introduction of stand-off precision munitions and information and communication technologies.\(^{51}\)

In order to counter various conflict situations, the doctrine has noted that India has moved to pro-active strategies. Thus, Indian response would be in the form of ‘surgical strikes’ subsumed in the sub-conventional portion of the spectrum of armed conflict. To do so, the doctrine noted, “Undertaking ‘Integrated Theatre Battle’ with an operationally adaptable force, to ensure decisive victory in a network centric environment across the entire spectrum of conflict in varied geographical domains, will be the guiding philosophy for evolution of force application and war fighting strategies”.\(^{52}\) The doctrines call on the Indian armed forces to acquire
sufficient cyber and space military power to deal with internal and external threats, and traditional and non-traditional challenges. While emphasising the need for joint operations, the doctrine has laid stress on the acquisition of battle-space awareness. According to the doctrine, the Indian armed forces would carry out Reconnaissance and Surveillance of land, maritime, air battle domains with the help of a broad spectrum of ground, sea, air and space based sensors, aerial platforms and satellites. The doctrine states, “Emphasis is to be placed on timely evaluation and dissemination of intelligence data to the concerned agencies with an intention of shortening the observation to engagement cycle”.

Furthermore, India’s 2018 Land Warfare Doctrine provides broad tenets for the prosecution of operations by the Indian Army, and the development of capabilities for the future. While recognising that future wars would be hybrid in nature, this recent doctrine accuses India’s adversaries of shrinking the space for conventional wars. According to the doctrine, it is the prime responsibility of the Indian Army to ensure “territorial integrity along the Line of Control (LoC), Actual Ground Position Line (AGPL) and Line of Actual Control (LAC)”. On the conventional level, the doctrine denotes that the Indian Army’s combat operations would be carried out as Integrated Battle Groups (IBGs), under the command of combined arms operational headquarters.

Referring to hybrid warfare, the doctrine authorises the Indian Army to enhance capabilities in the IW domain. It also calls on India to develop capacities to ensure rapid infusion of technology to upgrade Intelligence, Surveillance and Reconnaissance (ISR), firepower, mobility and precision weapon capabilities. The doctrine
indicates that India would develop ISR capabilities deemed critical for causing maximum degradation to the adversary.\textsuperscript{57}

The aforementioned Indian military doctrines clearly provide the country’s approach to the IW and NCW concepts, and required capabilities. The goals and required measures outlined in these doctrines also manifest Indian efforts for ISR capabilities and battle-space domination. These doctrines outline not only the significance of IW, NCW, Electronic warfare, Cyber and Space warfare but also provide a vivid image of the Indian military’s efforts to develop strategies and capabilities for contingencies throughout the expanding spectrum of conflict.

**India’s ISR Platforms**

Since the late 1990s, India has also been making concentrated efforts to develop and modernise its ISR capabilities to attain efficiency in IW and NCW. The country has already made considerable progress in acquiring and developing sophisticated platforms, with the help of both indigenous development and foreign acquisition. India is concentrating primarily on UAVs, aircrafts and helicopters for ISR roles. Though the country continues to develop Catapult launched UAVs, most of India’s UAV arsenal is procured from Israel Aerospace Industries. Currently, all three services of the Indian military are operating UAVs for ISR operations. The Indian Army operates indigenously developed 13 Nishant, and 12 Searcher Mark I/II UAVs\textsuperscript{58} procured from Israel.\textsuperscript{59} The Searcher Mark II UAVs have a range of 300 kilometres, and these drones are capable of operating at an altitude of 30,000ft.\textsuperscript{60} These UAVs are used for surveillance, reconnaissance, target acquisition, artillery adjustment and damage assessment operations.\textsuperscript{61}
(ADE), a branch of the Defence Research and Development Organisation (DRDO) develops the Nishant UAVs. These drones are capable of conducting intelligence gathering over enemy territory and are also used for reconnaissance, training, surveillance, target designation, artillery fire correction, damage assessment.  

Indian artillery is also equipping itself with NCW. As artillery is known for shaping the battle-field, India’s ground-base ISR capabilities comprises of various devices meant for Surveillance and Target Acquisition (SATA) systems.  

India is also working on the development of the battlefield surveillance system (BSS). The BSS is capable of carrying out ground surveillance of a large area, and is efficient in all weather conditions. However, India has not yet assembled its BSS system. India is also operating 12 AN-TPQ/37 radar systems. These radars are effective in detecting the point of origin of an artillery, mortar, rocket launchers and missiles to permit tracking and rapid engagement with counter-fire.  

Besides the Indian Army, the Indian Air Force also operates 4 Heron UAV and 6 Searcher Mk II UAVs, assigned with ISR tasks. With a flying range of 10.5 kilometres, the Heron UAV operate at an altitude of 35000ft and is capable of Medium Altitude Long Endurance (MALE) ISR operations. Meanwhile, the Air Force is currently operating Israeli A-50El Phalcon Airborne Warning and Control Systems (AWACS) fitted on Russian Ilyushin Il-76 heavy-lift aircraft. The Phalcon is essential for electronic support activities and such systems are capable of conducting both communications intelligence (COMINT) and electronic intelligence (ELINT). In January 2020, India’s Defence Acquisition Council (DAC) cleared a proposal of DRDO
and the Indian Air Force to purchase two Airbus 330s and convert them into 360-degree long-range capability AWACS. The AWACS helps in tracking the aerial targets and guides forces for a counter-response. Apart from UAVs and AWACS, the Air Force is also operating the Gulfstream IV SRA-4 jets. These aircraft are capable of conducting long-range maritime surveillance.

Similarly, the Indian National Security Guards (NSG) operate the Black Hornet UAV for reconnaissance purposes. These UAVs have a length of only four inches and are fitted with small spy cameras. They are primarily used for scouting purposes during urban warfare or during battles. India is also working on autonomous unmanned research aircraft (AURA) for the air force. The DRDO is developing Rustom UAV which is a medium altitude long-endurance unmanned aerial vehicle developed for surveillance and reconnaissance purpose with an endurance of 24 hours.

For the last several years, India has also been working on enhancing its maritime ISR capabilities. The Indian Navy currently operates 4 Heron and 6 Searcher Mark II UAVs. The Navy also relies on Ka-31 Helix B AWACs. These helicopters are capable of detecting targets flying at the altitudes lower than the flight altitude, and are also used to transmit information to the ground and ship-based points of information reception. The Indian Navy has also inducted eight P8-I, Long-Range Maritime Reconnaissance and Antisubmarine Warfare-(LRMR/ASW) aircraft. It is currently working on gaining maritime domain awareness (MDA) with the help of ISR capabilities as well as improving its ocean surveillance capability. India is in talks with the US to acquire Orion Maritime aircraft. Under the Communication Compatibility and Security Agreement
(COMCASA) signed with the US in 2018, India also plans to procure the armed Sea Guardian Drones. These drones are a maritime variant of Predator-B drone for effective ISR activities. While these drones conduct high-altitude ISR activities, they can also carry hellfire air-to-surface missiles and laser guided bombs.

Regarding the space domain, India has also achieved significant progress in the development and deployment of space-based ISR capabilities. India’s ISR capabilities have improved with the launch of the IRS-TES (Indian Remote Sensing–Technology Experiment Satellite). Currently, India is operating 11 satellites for ISR activities: 8 Cartosat; 3 RISAT, ELINT/SIGINT 1. India’s investment in enhancing its space-based ISR platforms would enable its military to acquire information on disposition and deployment of hostile military forces and weapon systems.

**India’s Advantage in the Conduct of Modern Warfare**

India’s continued arms modernisation is proving to be a destabilising factor influencing strategic stability in South Asia. The country’s conventional and nuclear force build-up are a source of concern for its neighbours and also the potential cause for an arms race. India’s increasing focus on the development and upgradation of its ISR capabilities across multiple domains including land, sea, air and space would further undermine the balance of power and increase risks of war in the region. ISR capabilities would act as a force multiplier for India’s current conventional and nuclear arsenal, providing the country with the ability to conduct rapid operations. These capabilities would help enhance India’s military strength and operations in the realm of IW and NCW. With the help of improved IW
capabilities, India would be able to protect its own information, and exploit others’ information to its benefit, as the integrated ISR capabilities provide the ability to successfully detect enemy forces enabling it to engage its adversaries before they are able to invade the country.

India’s relative edge in ISR capabilities, IW and NCW over Pakistan would leave the latter in a considerable disadvantageous position. The country’s enhanced IW systems would allow it to execute its pro-active conventional / limited war fighting concepts and the realisation of its nuclear counterforce strategy. Keeping in view the 2004 Indian Army Doctrine, also known as the Cold Start doctrine (CSD), the Indian military is actively pursuing IW techniques to meet the requirements of limited warfare with Pakistan. Though, India officially denies the existence of CSD, in January 2017, former Chief of Army Staff General Bipin Rawat for the first time publicly acknowledged the doctrine. The CSD aims at waging a limited war with Pakistan under its nuclear threshold. Being premised on the concept of pre-emption, the CSD calls for the integration and rearrangement of the Indian military into smaller integrated battle groups (IBGs) for quick strikes and incursions into Pakistan. Interestingly, the execution of the strategy heavily relies on IW and NCW capabilities. The NCW capabilities help military forces to integrate, allowing them for swift mobilisation. However, until recently, India has not successfully progressed beyond taking sporadic initial steps. The Navy and Air Force have progressed with regard to intra-service NCW capabilities but it will take the Army a considerable amount of time to build the required capacity. Therefore, India is yet to fully develop its IBGs owing to the lack of progress in NCW. Recently, the country has managed to organise only one of the IBGs. In response to India’s
CSD, Pakistan has developed nuclear-capable short-range Nasr ballistic missiles aimed at deterring India from employment of its limited war strategies.\textsuperscript{83} Despite Pakistan having developed credible countermeasures against the CSD, India’s rapid modernisation of its IW and NCW capabilities may help the country in assembling IBGs. Therefore, under the false impression its ISR capabilities, the country may risk waging a limited war with Pakistan. India’s military adventurism for limited objectives and its misapprehension of escalation dominance could risk escalation of a limited conflict to a nuclear exchange.

Moreover, India is not only indigenously developing its anti-ballistic missile (ABM) systems, but is also procuring these systems from the US, Israel and Russia. India’s introduction of ABM systems in South Asia is undoubtedly a security concern for Pakistan. In response to India’s continued development of the ABM systems, Pakistan has been taking countermeasures to ensure successful penetration of its delivery systems. Besides maintaining short-range and medium-range ballistic missiles (SRBMs and MRBMs), Pakistan has developed land, air, and sea based cruise missiles, capable of delivering both conventional and nuclear warheads,\textsuperscript{84} aimed at evading hostile radars and air defence systems.\textsuperscript{85} To further augment its strike capabilities, Pakistan successfully test launched its nuclear-capable surface-to-surface MRBM, Ababeel, in January 2017. The missile, with a strike-range of 2200 kilometres, is capable of delivering multiple independently targetable re-entry vehicles (MIRVs). According to Pakistan’s Inter-Services Public Relations (ISPR), Pakistan’s development of Ababeel MRBM would help the country in ensuring survivability of its offensive capability against regional anti-ballistic missile architecture.\textsuperscript{86}
Thus, with a mix of its cruise and ballistic missiles, Pakistan is able to maintain regional strategic stability insofar as India’s current ABM architecture is concerned. However, India’s continued pursuit of sophisticated ISR capabilities may still raise problems to the regional balance of power. Since the ISR and C4I capabilities allow militaries to gain situational awareness and information dominance, they also help in improving the ABM systems. The ABM systems share the NCW principles because effective interception of missiles rely on linkages between sensors and weapons in self-synchronised integrated systems. Therefore, the better the networking of systems, the more effective the integration of the ABM systems with early warning sensors, satellites and weapon platforms to enable swift data processing and kinetic reaction against inbound aerial threats. Therefore, if India gains efficiency in IW and NCW, its missile defence capabilities would also improve considerably. In such a scenario, India’s sophisticated ABM systems would further undermine regional strategic stability plunging South Asia into a relentless arms race.

**Conclusion**

ISR capabilities are an inevitable part of the current RMA. Technological advancements in ISR platforms allow states to gain information dominance over their adversaries, both during peacetime and conflict. ISR works in a manner where intelligence, surveillance, and reconnaissance remain indivisible. As an activity, ISR synchronises and integrates wide range of systems including sensors, data and information, and C2 to allow decision makers obtain better situational awareness in order to promote national interests. In South Asia, India is increasingly working on ISR technologies which are being integrated in its military operations. India’s
acquisition of advanced ISR capabilities indicate that it is preparing itself for modern warfare. However, Indian military modernisation would inevitably alter the characteristics of warfare in the region. Indian military overhaul and envisaged edge in IW and NCW would trigger a competition in ISR capabilities in the region and lead to a greater arms race and instability.

References

2. Ibid, 82-85.
4. Ibid, 42.
8. The notion of war is defined as “a violent interactive contest between at least two groups of thinking human
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opponents acting simultaneously and in ignorance (to varying degrees) of the plans, actions, intentions, and even motives or goals of their opponent.” Elements of social and political objectives and legitimacy differs violence from murder to war. See, Bartholomees, “Continuity and Change in War,” 80.


12. Ibid.


24. Scholars have classified stages of RMA in different ways by focusing on discontinuities, various stages and characteristics. For example, Paul K. Davis, and Peter A. Wilson of the RAND Corporation conducted a detailed study on RMA for the Office of the US Secretary of Defence (OSD), and have classified it into four stages. This study asserts that the first generation of RMA emerged during 1914 to 1945 with the development of land air and sea combat vehicles. The second generation RMA is based on irregular warfare strategies. It finds its roots in the Sino-Japanese war whereby it emerged as the “Maoist Revolutionary Warfare,” it re-emerged during the Cold War period as strategy of insurgents and still continues to intensify. Meanwhile, the third generation RMA emerged with the advent of nuclear weapons and subsequent nuclear strategies during 1945 to 1972. The fourth or current generation of RMA is characterised by technological advancements in C4ISR. See, Paul K. Davis, and Peter A. Wilson, “Looming Discontinuities in


Davis and Wilson, “Looming Discontinuities in U.S. Military Strategy,”


Ibid.


Ibid, 7.

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