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India's New Space Policy: Strengthening the Space Innovation System through Military Civil Fusion

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Military-Civil Fusion has recently become a focus point, with the Chinese actively pursuing the same by tapping its civilian technology to advance its military capabilities. The increasing space capabilities of China along with the Chinese footprint in the Indo-Pacific region has been a concern for India and through several acts of balancing India tries to counterweigh China. Strengthening its MCF strategy is imperative for India given the volatile environment of the Indo-Pacific. In this article, the author argues that through India's new Space Policy, 2023, the Government of India is attempting to strengthen India's space innovation system using Military-Civil Fusion as the strategy, which is carried out through three strategies – changes in the institutional architecture, more private sector participation and a liberal foreign technological collaboration. The article is divided into three sections – the first section will discuss the context of the space race in the Indo-Pacific region that sets the background for military-civil integration by nations; the second section analyses the MCF developmental strategy of China, and the third section looks into the present institutional structure of India's space programme, and the changes brought in by the new Space Policy, 2023 towards military-civil fusion.

Keywords: Space Policy, Military-Civil Fusion, Indo-Pacific, China, India, USA

The creators of the Indian space programme, since its inception, recognised the potential for the enormous benefits of space technology. Even in the early 1960s, when humanity was only beginning to usher in the space era, the two pioneers of the Indian space programme, Vikram Sarabhai and Homi J Bhabha, identified the potential space applications relevant to India. Sarabhai believed that India's space programme would facilitate India to leapfrog ahead to bridge the developmental gap it had with the developed countries. The launch of the first rocket on 21 November 1963 from Thumba Equatorial Rocket Launching Station (TERLS), near Thiruvananthapuram, Kerala, marked the beginning of the Indian Space Programme. Today India has demonstrated its space capabilities in rocket launching, interplanetary missions, anti-satellite weapons, indigenous navigation system etc. Its space programmes have expanded over the past decades with a change in thrust from human security to space commercialisation and the use of space for national security purposes. ISRO's bold and ambitious project, the Gaganyaan Project for Human Spaceflight demonstrates its technological prowess and ensures India's entry into the era of Human Space Flight. A close perusal of the evolution of India's space

programmes indicates that the focus of India's space programme has shifted from human security in the beginning stage to economic security in the 1980s and later to military security after the Chinese Anti-Satellite Test (ASAT) in 2007.[1] The new Space Policy 2023 needs to be evaluated in the context of growing competition between the United States and China and the volatile situation in the Indo-Pacific region.

The Indo-Pacific Region: The Global Context

The present world witnesses the emergence of outer space as a theatre of international strategic competition. The Pentagon established the Space Force with the Integrated Space Command (Spacecom) in 2019, followed by other nations like France, Japan, the UK and Germany[2] (NATO, 2021). Asia is also experiencing an 'Asian Space Race'[3] (Moltz, 2012). China's quest for global power status is inextricably linked to the development of its space programmes. The US apprehensions about China complicate the situation further. The National Security Strategy of the United States, December 2017, explicitly states that China seeks to displace the United States in the Indo–Pacific region and 'reorder the region' in China's favour with a capable and well-funded military in the world (The White House, 2017).

Consequently, the Indo-Pacific region witnesses a proliferation of bilateral and 'minilateral' outer space collaborations. These involve the United States as an ally and are also driven by China's development of a militarised space program to attain 'space great power status.'[4] For instance, in the last six months, the US signed the Framework Agreement on Space Cooperation with Japan, the Technology Safeguards Agreement (TSA) with Australia and intensified space cooperation with Indonesia, Thailand, Philippines, Singapore, Malaysia, Vietnam, and so on. The Joint Statement by Biden and Modi emphasises India-United States cooperation in outer space and bolsters the Quadrilateral Security Dialogue (QSD or Quad), a security group that includes Australia, India, Japan and the United States that is maintained through strategic security dialogue amid a 'rising' China. India also agreed to join the Artemis Accords[5] and to work with NASA on a joint mission to the International Space Station in 2024.

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[1] For a detailed discussion, see Kumar G.R. (2014) India's Space Programme: Remapping contours of 'Security' South Asian Journal of Diplomacy Vol(5).

[2] The 2021 NATO summit considers an attack on a member country's outer space assets as an attack on all NATO members and it will defend itself collectively under Article 5 of the North Atlantic Treaty Organization.

[3] Asian space powers display tremendous divergences in perspectives and focus on national solutions. Hostile dyads such as India-China, China-Japan, India-Pakistan, Japan-South Korea, and North Korea-South Korea indicate that regional rivals attempt to match or check their capabilities, influence and power.

[4] 'Collaboration' and 'alliance' are sometimes interchangeably used. While collaboration is subject-specific or area-related, alliance is better defined as 'a formal or informal relationship of security cooperation between two or more sovereign states' involving 'some level of commitment and an exchange of benefits for both parties'. '[Severing] the relationship or failing to honour the agreement would presumably cost something...' (Walt, 1990, p.1). It is a process for manipulating equilibrium and a means to the end of maintaining equilibrium (Morgenthau, 1960).

[5] The US promotes the Artemis Accords, a non-binding multilateral arrangement between the US government and other governments announced by NASA. It is the first ad-hoc coalition for space governance and joined only by allies of the United States.

The signing of the Initiative on Critical and Emerging Technology (iCET) in January 2023, the joint collaboration on the satellite NASA-ISRO Synthetic Aperture Radar (NISAR), initiative for a NASA-ISRO Human Spaceflight cooperation are also some milestones in India-US alliance (The White House, 2023).

For balancing against a rising power, a nation needs to resort to 'external' and 'internal' balancing (Waltz, 1979; Walt, 1987; Devi, Mammen& Kumar, 2023). India sought to address its asymmetrical distribution of space capabilities via-a-vis China through balancing. For external balancing against rising external threats in outer space, India is allying with the US; and for internal balancing to develop its space capabilities, India adopted the new Space Policy. The Space Policy places Military-Civil Fusion as the development strategy to address the national space security needs.

Strengthening the Space Sector-The Military-Civil Fusion (MCF) Development Strategy of China

Advanced commercial technologies or the fourth industrial revolution (4IR) technologies (that include Artificial Intelligence and machine learning, blockchains, new man-machine interfaces, automation and robotics, and quantum computing) offer new opportunities for defence applications. This could substantially alter the military power and metrics of military advantage prompting governments to focus on advanced commercial technologies, innovations, and breakthroughs and potentially create new capacities for military power, advantage, and leverage. This process of exploiting civilian-based advanced technologies for enhancing military capability is called 'military–civil fusion' (MCF)[6] (Evron & Bitzinger, 2023). In the new cold war between the US and China, each tries to strengthen military-technological capabilities in precision-strike weaponry and C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) (Mahnken, 2018). These efforts have been dubbed 'anti-access/area denial (A2/AD)'. A2/AD capabilities include 'ballistic and cruise missile strikes (both land-attack and anti-ship), artillery and rocket barrages, submarine operations (anti-ship and antisubmarine), long-range air strikes, cyberattacks, and anti-satellite warfare' (Bitzinger, 2021). Following the rapid success of China in developing the next-generation military-technological innovation and development, especially in the space sector, the Military-Civil Fusion (MCF) is rapidly becoming a critical strategy. MCF seeks to exploit emerging fourth industrial revolution (4IR) technologies to remain 'militarily competitive with likely adversaries and rivals'. 4IR technologies promise to create challenges in identifying new and significant military technologies and provide a military advantage that imposes costs upon a competitor and affects its strategic behaviour[7]. This is required to provide political leverage to maintain or regain the old glory in future (Bitzinger, 2021).

[6] In this work, the authors address MCF from a conceptual and practical sense and explore the MCF strategies of the United States, China, India, and Israel from a comparative perspective.

[7] The 4IR is generating technologies that will interlink the surface, subsurface, and air domains more strongly with the outer space and cyber domains- the key enablers of naval capabilities such as navigation, ISR, communication, and targeting. It requires immense computing power to interpret large amounts of sensor and other input data, with secure data links that are needed to provide connectivity between disparate units to allow a shared situational awareness. 4IR-related technology also enables the commercialisation and militarization of cyber and information operations and

China's MCF Development Strategy fuses its economic and social development policies with its security strategies to 'build an integrated national strategic system and capabilities' to supplement its national rejuvenation goals. The US Department of Defense summarises that China's MCF encompasses six interrelated efforts as follows:

> (1) fusing China's defence industrial base and its civilian technology and industrial base; (2) integrating and leveraging science and technology innovations across military and civilian sectors; (3) cultivating talent and blending military and civilian expertise and knowledge; (4) building military requirements into civilian infrastructure and leveraging civilian construction for military purposes; (5) leveraging civilian service and logistics capabilities for military purposes; and, (6) expanding and deepening China's national defence mobilisation system to include all relevant aspects of its society and economy for use in competition and war (US Department of Defence, 2020).

China considers MCF as a core 'military-technological innovation strategy', following the People's Liberation Army's (PLA) shift to "intelligentised warfare" (Takagi, 2022).[8] The operational concept of 'intelligentised warfare' is to directly 'control the enemy's will'. The idea originated because China thinks that invading Taiwan through conventional warfare is practically not feasible and may produce havoc for the Chinese economy in the post-war scenario. "Intelligence dominance" or "control of the brain" will become new areas of the struggle for control in intelligentised warfare, putting AI to a very different use. The idea is to use AI to directly control the will of the highest decision-makers, including the president, members of Congress, and combatant commanders, as well as citizens (Takagi, 2022). It should be differentiated from the previous PLA concepts of "informationised warfare," which mainly emphasised the use of information systems (e.g., improved systems for intelligence, reconnaissance, and surveillance; advanced command, control, and communications infrastructures) as a force multiplier (US Department of Defence, 2020).

China's Military Civil Fusion in Space Technology and Space

The rapid advancement of space-based technologies has undeniably become an inseparable and indispensable part of modern human life, revolutionising various aspects of daily routines. This transformative influence is due to the multifaceted potential of space-based technologies, which can serve both civilian and military purposes. China's significant progress in the realm of space exploration is characterised by the dual-use nature of its space-related technologies, a crucial dimension that can be magnified as the MCF strategy, which officially became a national strategy in 2015 (Wu & Long, 2022). The formulation of a comprehensive

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space power strategy necessitates careful consideration of diverse interests, ranging from economic and political security concerns to military aspirations. The scope of space-related activities extends across various domains, encompassing commercial ventures, civil applications, international collaborations, scientific research, intelligence operations, and specialised military undertakings. Reflecting back to 1978, the sentiments of China's former leader, Deng Xiaoping, provide valuable insights into the nation's early perspective on space technology. Deng's assertion that China was not engaging in a space race and instead prioritising practical and urgently needed satellite functionalities underscored a pragmatic approach to space exploration. Subsequently, China's successful forays into space led to the introduction of Long March launchers to international partners, signifying a notable shift in the orientation of its space program from a primarily defence-focused endeavour to a more civilian and commercially oriented venture (Johnson, Pace&Gabbard, 1998).

China's trajectory in space-based technologies is uniquely characterised by the dual-use nature of its advancements, facilitated and intensified by the military-civil fusion strategy. This approach has not only fuelled the growth of the commercial space sector but has also positioned China as a significant player in the global space industry. As the nation continues to forge ahead, it must navigate a complex interplay of technological, strategic, and geopolitical factors to further solidify its status as a space power with far-reaching implications for both its domestic development and its standing on the international stage.

Historically, China's space endeavours were primarily dominated by state-owned entities such as the China Aerospace Science and Industry Corporation Limited (CASIC) and the China Aerospace Science and Technology Corporation (CASC). However, a significant turning point occurred in 2014 when the Chinese government decided to open the space sector to private investment. This momentous decision ignited a surge in private space enterprises, effectively reshaping the landscape of China's space industry. The commercial space sector witnessed remarkable growth, expanding by more than 20% and consequently exerting a substantial impact on the overall trajectory of China's space pursuits (Yatsuzuka, 2022). China's approach to space technology and its integration into broader strategic objectives contrasts with that of the United States. While China relies on state-driven efforts that tightly link civil advancements with overarching strategic goals, the United States places a greater emphasis on private-sector initiatives. These dynamic highlights the ongoing multi-domain competition in various areas of space technology and deployed programs, encompassing domains such as Global Navigation satellite systems (GNSS), communication systems, commercial imaging, data transmission, boosters, and even aspects of anti-satellite weapons.

MCF involved establishing a Strategic Support Force that is responsible for space, cyber and electronic warfare, building ties outside the military, signing cooperation agreements with research universities and involving the private sector (which may involve even 'stationing officers within an unnamed software development company'); development of local innovation clusters for defence enterprises to work with nearby research institutes and private companies (For instance, several municipalities and provinces, like Tianjin, Shanghai, Shanxi, and Guangdong, have joined the effort to create local innovation clusters) (Laskai, 2018). Central to China's MCF strategy is the ambitious endeavour to bolster the nation's self-reliance in

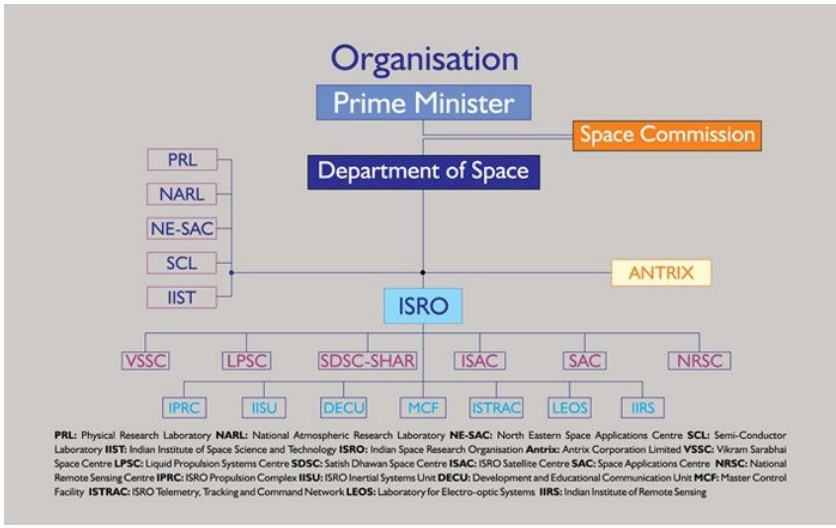
producing pivotal industrial technologies, equipment, and materials. This push for self-sufficiency is aimed at mitigating dependence on imports, particularly those that possess dual-use capabilities. An illustrative example of this approach is embodied in the "Made in China 2025" initiative, which establishes strategic targets for enhancing China's autonomy in critical industrial sectors like aerospace, communications, and transportation.

The immediate fallout of this policy was the rapid rise of China in space technology, leading to the commencement of the US-China space race and destabilising challenges in the space environment, especially in the Indo-Pacific region, prompting India to bring changes in its space policy. The next section will discuss the changes brought out by the new space policy of India.

India's Space Programme

Though the post-independent India embarked upon creating a scientific society reflecting 'European positivism via technological advance' and emphasised making advances in outer space too, it never outlined a coherent space policy;[9] nevertheless, the Space Commission framed policies and programmes by the requirements of the nation and oversaw their implementation for the socio-economic benefit of the country. Implementation of these programmes was done by the Department of Space (DoS), with the support of its specialised regimes like ISRO, National Atmospheric Research Laboratory (NARL), Physical Research Laboratory (PRL), North Eastern-Space Applications Centre (NE-SAC) and Semi-Conductor Laboratory (SCL). Antrix

FIGURE 1: The Institutional Architecture



Source: Department of Space, *Annual Report 2022-23*, Government of India, 2023.

[9] Its institutional designs for the space program were devised in 1962, by establishing the Indian National Committee for Space Research (INCOSPAR) - an ad hoc institutional apparatus to formulate the Indian Space Programme by Jawaharlal Nehru created with Dr Vikram Sarabhai at the helm of affairs. In compliance with the decision of INCOPSAR, the Thumba Equatorial Rocket Launching Station (TERLS) with the formation of ISRO in 1969. Subsequently, the Space Commission was constituted, and in 1972, the Government established the Department of Space bringing ISRO under its fold.

Corporation, ISRO's commercial wing, which was established in 1992, markets space products and services as a government-owned company (ISRO Space India, 2017). It may further be noted that 'mandatory layers of bureaucracy' present in any government body are absent in India's space institutional architecture. Instead, "specialists in the field and technocrats – starting with Sarabhai himself – rather than mandarins have populated the upper echelons of the hierarchy" (Moltz 2012).

For developing Space Science in the nation, the DOS has evolved the following programmes (Space India 2017):

- Indian National Satellite (INSAT) programme for telecommunications, TV broadcasting, meteorology, developmental education, etc.
- Remote Sensing programme for the application of satellite imagery for various developmental purposes.
- Indigenous capability for design and development of spacecraft and associated technologies for communications, resources survey and space sciences.
- Design and development of launch vehicles with indigenous technology for access to space and orbiting INSAT, IRS spacecraft and space science missions.
- Research and development in space sciences and technologies as well as application programmes for national development.

The government introduced space sector reforms in 2020 by opening the sector for private participation. The sector was the monopoly of the government, but in 2020, the Indian National Space Promotion and Authorisation Centre (IN-SPACe) was created to open up the space sector and to enable and facilitate the participation of the Indian private sector in the entire gamut of space activities. The new Space Policy 2023, published on the Indian Space Research Organisation (ISRO) website, is an 'overarching, composite and dynamic framework to implement the reform vision' (The Economic Times, 2023a). The policy also states that Indian consumers of space technology or services such as communication, remote sensing, data services and launch services shall be free to procure them directly from the private or public sector.

Towards a Military-Civil Fusion

It was during the 1998 Kargil war that India realised the necessity of satellites for space situational awareness. Defence space capabilities in India did not stride initially due to its focus on the use of space for societal applications. However, with time, India called for a defence space integration and the development of military satellites. ISRO launched the GSAT-7, the first satellite dedicated to the military, in 2013 and GSAT-7A for the Indian Air Force in 2018, both emerged as potent tools for communication for the armed forces (Tripathi, 2022). As a response to the Chinese threat to space capabilities, India conducted its first anti-satellite (ASAT) test in 2019, launching the ballistic missile defence interceptor Prithvi Delivery Vehicle Mark-II (PDV MK-II) (Tellis, 2019).

On the institutional side, steps were taken towards military-space integration. The military and civilian activities of space in India have been coordinated by the ISRO since the beginning of space programmes. The Integrated Space Cell (ISC) was

constituted in 2010 under the Integrated Defence Staff. Two new defence space agencies, the Defence Space Agency (DSA) and the Defence Space Research Organisation (DSRO), were founded in 2019 to boost the defence space industry. The Defence Imagery Processing and Analysis Centre (DIPAC) and the Defence Satellite Control Centre (DSCC) are two military organisations under the Defence Space Agency (DSA). It establishes a defence space strategy and carries out the job of integrating space assets from the Indian Army, Navy, and Air Force. The Defence Space Research Agency (DSRA) conducts research to accelerate the development of civilian space technology for military applications (Mehta, 2023). Mission DefSpace, launched by Prime Minister Modi during DefExpo in October 2022 in order "to develop innovative solutions for the Defense Forces in the Space domain through industry & startups," is a step in the right direction towards the military-civil integration in India (Rajagopalan, 2022).

India conducted its first integrated space warfare exercise IndSpaceEx in July 2019, bringing together personnel from across the services. The exercise focused on using communications and reconnaissance satellites to integrate intelligence and fires across the range of Indian military assets, indicating a firm understanding of the necessity of access to space (Farley, 2021). The systems that provide the armed forces with high-quality Signal Intelligence (SIGINT), Communication Intelligence (COMINT) and Electronic Intelligence (ELINT) are also being developed in India.

ISRO has also been acting as a facilitator by offering technological assistance and sharing of existing space infrastructure to several private enterprises in India. Some examples are the following.

- The Indian National Space Promotion and Authorization Centre (IN-SPACe) and Bangaluru-based deep tech startup QNu Labs have inked a memorandum of understanding (MoU) to develop Satellite QKD (Quantum Key Distribution) solutions.
- Contract for the commercial development of the following five polar satellite launch vehicles (PSLVs) has been given to the space conglomerate created by Hindustan Aeronautics Limited (HAL) and Larsen & Toubro (L&T)
- The successful maiden launch of India's first privately built suborbital rocket, the Vikram-S, in November 2022 was made possible by the signing of an agreement between ISRO and Skyroot Aerospace in 2021 (Bhalla, 2023).

The DSA's invitation of proposals for technological systems that can 'detect, identify and track enemy assets while also warning about any impending attacks' in space from private companies is another evidence of India's move towards MCF (The Economic Times, 2023b). Through the greater emphasis on non-governmental entities' role in space activities, the space policy seeks to overcome its reluctance towards private participation in space activities.

The Space Policy 2023

The Space Policy released in April 2023 is a breakthrough in India's space policy and programmes. The document details the aims, objectives and thrust areas of India's space programme. The Policy aims to augment space capabilities, pursue international relations for the nation's security and engage in exploration in space. A close perusal indicates India's quest for space security by receiving technology.

Amidst the construction of protectionist barriers in all other sectors in a realist world, the new space policy encourages 'greater private sector participation in the entire value chain of the Space Economy' that includes developing and commercialising technologies and applications in disseminating satellite-based remote sensing data in India and/or outside; augmenting the satellite navigation, communication and remote-sensing developed and provided by the Government; manufacturing and operating launch vehicles and infrastructure and developing space situational awareness capabilities (ISRO, 2023). From an International Relations (IR) perspective, the new policy primarily sought to address two pertinent issues - a national security policy response to the 'grand strategy' of its neighbour – China[10], which is working towards a 'Space Great Power Status'; and to ensure international co-operation with the space-haves for facilitating the transfer of technology (us, 2021).

Enhancing private participation in space is the highlight of the policy. It enables non-governmental entities (NGEs) to provide local, regional, and global space-based communication services using their own, acquired, or leased geostationary orbit (GSO) and non-geostationary satellite orbit (NGSO) systems (The Hindu, 2023). In short, the entire space arena of India is open to private participation from satellite launches to providing space-based services. With ISRO focusing on R&D of sophisticated space technologies, the policy is anticipated to institutionalise private sector participation in the space sector and expand India's share of the global space economy significantly from 2% to 10% shortly (Kapoor, 2023).

The policy authorised IN-SPACe as an autonomous government organisation mandated to promote, hand-hold, guide and authorise space activities in the country. For this purpose, IN-SPACe shall periodically issue guidelines and procedures that would promote ease of doing business. It will act as the 'single window agency' for authorising space activities by government and non-government entities subject to relevant government directives, national security, international obligations and/or foreign policy considerations. The policy broadly stipulates the powers that require IN-SPACe's authorisation for the following space activities:

a. the establishment and/or operations of space object(s);
b. the launch and operation of launch vehicles including sub-orbital launches;
c. the establishment and operation of launch pads which could be self-owned, leased or be a mobile platform.
d. the planned re-entry of Space Objects with or without recovery.
e. the establishment and operation of TT&C Earth Stations;
f. the establishment and operation of SCCs and/or satellite data reception station(s).
g. dissemination of high-resolution space-based earth observation data.
h. in-orbit sale/ purchase/ transfer of Space Objects
i. any other kinds of authorisations as required, which may be notified (ISRO, 2023).

[10] China's grand strategy is best labelled "national rejuvenation". It involves pursuing the 'Chinese Dream' of becoming a great power by 2050 through expanding the PRC's military and technological capabilities and economic influence. Its central goals are to produce a China that is 'well governed, socially stable, economically prosperous, technologically advanced, and militarily powerful'.

The objective is to promote identified space activities and establish India as a 'preferred service provider' for global requirements of products/services in the space sector by establishing industry clusters, zones, manufacturing hubs, incubation centres, accelerators, technical centres etc. This will be done in association with domestic and international partners. Indian space innovation system cannot function in seclusion. ISRO has formal cooperative arrangements with space agencies of 61 countries (DOS Annual Report, 2022-23).[11] The policy also emphasises collaboration with academia to widen the space ecosystem and enable industry-academia linkages. The IN-SPACe will also share best practices with private entities for enabling the technology ecosystem, facilitating and incentivising private players to acquire new orbital resources through Indian International Telecommunication Union (ITU) filings (Mathew, 2023).

ISRO, as the National Space Agency, will be transitioning out from manufacturing operational space systems and focusing its energies on research and development in new space technologies and applications. "Hereafter, mature systems shall be transferred to industries for commercial exploitation. ISRO shall focus on R&D in advanced technology, proving newer systems and realising space objects for meeting national prerogatives". Thus, non-government entities will be undertaking end-to-end activities in the space sector through the establishment and operation of space objects, ground-based assets and related services such as communication, remote sensing and navigation. ISRO will also foster collaborations and partnerships with industry and academia –national and international – to pursue research and development in space science, technology and applications.[12] However, the policy clarified that New Space India Limited (NSIL), as the public sector undertaking under the Department of Space, shall be responsible for commercialising space technologies and platforms created through public expenditure. It will also manufacture, lease, or procure space components, technologies, platforms and other assets from the private or public sector on sound commercial principles.[13] The Department of Space is now bestowed to oversee the distribution of responsibilities outlined in this policy and ensure that the different stakeholders are suitably empowered to discharge their respective functions without overlapping into the others' domains.[14]

Conclusion

The Chinese MCF has been a concern for the US, given its swift technological advancement and sophisticated R&D capabilities which also increases India's

[11] They include Afghanistan, Algeria, Argentina, Armenia, Australia, Bahrain, Bangladesh, Bhutan, Bolivia, Brazil, Brunei Darussalam, Bulgaria, Canada, Chile, China, Colombia, Egypt, Finland, France, Germany, Hungary, Indonesia, Israel, Italy, Japan, Kazakhstan, Kuwait, Luxembourg, Maldives, Mauritius, Mexico, Mongolia, Morocco, Myanmar, Nepal, Nigeria, Norway, Peru, Portugal, Republic of Korea, Russia, Sao-Tome & Principe, Saudi Arabia, Singapore, South Africa, Spain, Sri Lanka, Sultanate of Oman, Sweden, Syria, Tajikistan, Thailand, The Netherlands, Tunisia, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uzbekistan, Venezuela and Viet Nam) and 5 multinational bodies (European Centre for Medium Range Weather Forecasts – ECMWF; European Commission – EC, European Organisation for the Exploitation of Meteorological Satellites - EUMETSAT, European Space Agency – ESA; and South Asian Association for Regional Cooperation – SAARC. The major areas of cooperation are Remote Sensing of Earth, Satellite Communication, Launch Services, Telemetry and Tracking Support, Space Exploration, Space Law and Capacity Building.

[12] Clause 6.8, Space Policy 2023

[13] Clause 7, Space Policy 2023

[14] Clause 8, Space Policy 2023

vulnerability. Given the increasingly volatile situation in the Indo-Pacific region and India's attempts to balance China, strengthening MCF is the need of the hour for India. The Chinese advancement in cutting-edge technologies and its long-term vision of MCF with its strong leadership that promotes MCF, visionary five-year plans, strong institutional structure and academia-industry collaboration increases its technological asymmetry with India. India lacks a well-defined MCF strategy like China. While the Indian military leaders gave attention to MCF only recently, China has been doing this for a long time. India lacks a strong ecosystem of innovation in advanced disruptive technologies like AI, cyber capabilities etc., for military applications due to lesser private participation, which the new Space Policy 2023 attempts to solve. The recent space policy testifies India's new drive for military civil fusion.

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