

# CIVIL MILITARY FUSION: A MODEL FOR INDIA

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## Background

The scientific and technological developments of the Industrial Revolution<sup>1</sup> in the 18th century transformed the rural agrarian societies of Europe and North America into industrialized and urban ones. The concept of civil military fusion goes back to this time. Discoveries in pure sciences like physics, and chemistry and innovations in engineering and technology were adapted to warfare. This led to vast improvements in weapons and their performance which made warfare deadly and sophisticated. As discoveries advanced, they were continuously oriented and purposed to produce military hardware - guns, rifles, ships, tanks, aircraft and other weapons to make armies more capable. This organic process is actually civil military fusion. From then to now nothing much has changed. The story of European continental empires and colonialism is one of civil-military fusion. Inventiveness in science and technology made respective colonial militaries better equipped, lethal and more efficient. Each colonial power wanted a military machine which could dominate the others in order to expand their empires<sup>2</sup>. All great nations have gone through a process of Civil- Military fusion.

In the last century, USA went through a process of intense civil- military fusion during the second world war. At its height, USA was producing military aircraft by the hour, tanks by the day and warships by the week or even less. The entire American industry focussed on churning out military equipment which could beat the Germans and Japanese qualitatively and quantitatively. They did it successfully. The mighty

military - industrial complex<sup>3</sup> of USA, which drives its economy, is all about a military- civil system, fused together seamlessly. Hence, civil-military fusion is not just about making militaries strong but also about boosting economies to make nations great. China has embarked on this process in the 21<sup>st</sup> Century and is seeking its way to greatness<sup>4</sup>.

In case India wants to make the transition into being a power of consequence it has to undergo a focussed Civil-Military fusion process. The path to greatness lies in shedding our image of being a soft, slow moving, big talking, status quoist nation. The latent potential, untapped in perpetuity, must be unleashed. However, Civil-Military fusion is a complex process which needs understanding. Every nation has to adopt a fusion strategy suiting its culture, political and industrial climate.

### **Military Technology : From Revolution to Disruption**

The last quarter of the 20<sup>th</sup> century saw the onset of a Revolution in Military Affairs (RMA). It was the synergistic outcome of technological developments and doctrinal innovations, suitably adapted to battlefield environment through modified military organisations<sup>5</sup>. The RMA was most visible during the Gulf Wars. It was based on information, communication and electronic technologies which had burst on to the scene then. They contributed to better navigation, command, control, sensing, and precision on the battle field. However, since the beginning of this century, technologies have started emerging which are commonly known and termed as disruptors<sup>6</sup>. These super technologies are a combination of core technologies fused together. We know them as Internet of Things (IOT), Cyber, Artificial Intelligence (AI), Space Colonization, 3D Printing, High Speed Travel, Robotics, Block Chain, Autonomous Vehicles, Advanced Virtual Reality and Renewable Energy. These technologies are now being super fused with traditional brick and mortar technologies which have an enduring relevance and impact on the battlefield. These include Propulsion Technology, Sensor Technology, Digital Revolution, Directed Energy, Space Platforms, Navigational aids and new Material Technology to name a few. The fusion of these technologies is a disruptive revolution which is going to shape future militaries and the way wars will be fought. Hence it would be fair to say the Revolution in

Military affairs is giving way to a Disruption in Military affairs as depicted in the graphic below.



The thing to note about this disruption is that many of the technologies are still aspirational and under varied stages of development. While many of their contours are hazy, they have extensive and seamless dual application in civil and military domains. These are now being fast-tracked into battlefields in parallel. The duality of application is where civil military fusion is really taking place. The scale, level and approach to civil military fusion depends upon the technological base of the nation. The USA which was an already developed nation with cutting edge technologies, has a disaggregated approach to civil military fusion. The disaggregation is also guided by its democratic nature and largely predicated on its commercially driven civilian research. As against this, China began its process with a low technological base. It has a centralised statist approach. Its path to civil military fusion is vastly different. In this vein, India must chart out its own course and evolve a suitable model to achieve civil military fusion. Against this backdrop it is relevant that the US model and the Chinese models be understood to evolve an Indian model.

## The Chinese Model of Civil Military Fusion



*Image sourced from VIF<sup>7</sup>*

China's Civil Military Fusion process is fundamentally driven by its superpower ambition and to establish a Sino-centric world order. It is a top down national strategy in China to make PLA the most advanced military in the world by 2049<sup>8</sup>. The stress is on eliminating barriers between civilian, research, industrial, commercial, military and defence sectors. It is implementing this strategy, in order to achieve military dominance, not just through domestic R&D, but also by acquiring cutting-edge technologies through coercive business models and through theft of intellectual property. As per the US Government document on civil military fusion "China seeks accelerated military modernization through integration of new technologies with operational concepts, increased scientific research, and personnel reforms. The Civil Military Fusion infrastructure connects the military and civilian sectors to catalyse innovation, economic development, and advance dual-use technologies, especially those suited for informatised and 'intelligentized' warfare".

Civil Military Fusion, in China, took root at the beginning of the 21<sup>st</sup> century<sup>9</sup>. Initially China sought "*military-civilian integration*" by ensuring greater cooperation between the defence and civilian sectors. However "*integration*" did not make headway since centralized control was

weak and organizational barriers between the party and state and their various organisations. In 2007, China decided to replace 'integration' with 'fusion'. It started breaking barriers through a 'whole of the nation' approach. Civil Military Fusion expanded geometrically once as China adopted it to bridge economic/social development with security development. The net effect was national development. In 2015, Civil Military Fusion was elevated to a "*national-level strategy to build an integrated national strategic system and capabilities,*" to support the goal of national rejuvenation. At a macro level, the day to day implementation of the Civil Military Fusion strategy is "*monitored and managed by the Politburo, the State Council (including the National Development and Reform Commission), and the Central Military Commission. A Central Commission for Military Civilian Fusion Development (CCMCFD) was established in 2017, headed by Xi Jinping along with Premier Li Keqiang*" as per US Government sources. In effect, the most powerful people and organs of the state, own and implement Civil Military Fusion. This special arrangement lays down directives for Civil Military Fusion and overcomes impediments to implementation.

The Chinese model aims "*to strengthen all instruments of national power and to achieve a world class military. It includes development and acquisition of advanced dual-use technology for military and civilian applications. It also includes reform of the national defence, science and technology industries to meld them into a single entity*". The model has six facets.

- It fuses the defence and civil technology and industrial base.
- Science and technology innovations are integrated and leveraged across military and civilian sectors.
- Military and civilian expertise and knowledge are blended and talent is cultivated across the board.
- Civilian infrastructure and construction is leveraged for military purposes by building them to military requirements and standards.
- Civilian services and logistics are utilised for military purposes.

- All aspects of society and economy are utilised for mobilization of resources and capabilities for defence of the nation.

Each facet has redundancy and overlap with others. All facets have internal and external facets. Implementation begins at the top. It filters down from national establishments and organisations and goes down to provincial and city level units. There are “*financial structures and regulatory mechanisms to incentivize civilian and military stakeholders*”. These include local governments, academia, research institutions, private investors, and military organizations. It is a whole of the government approach. The focus is naturally on disruptive dual-use technologies and systems.

An overview of activities under various facets extracted from various documents are enumerated in point form below.

- “Improving efficiency, capacity, and flexibility of defence and civilian industrial and manufacturing processes. Simultaneously, increasing competitiveness within defence industrial base. It also includes achieving self-reliance and reducing dependence on imports, including those with dual-usage.
- Strengthening civilian and military R&D in advanced dual-use technologies and cross- pollinating military and civilian basic research.
- Factoring military requirements in dual use infrastructure such as airports, port facilities, railways, roads, and communications networks. It extends to space and undersea systems. The public and private sector resources to improve the PLA’s basic services and support functions including habitation and healthcare are being harnessed. Outsourcing of non-military services is being encouraged.
- Developing expertise through common education programs, personnel exchanges, and knowledge sharing to build a highly skilled workforce. This is extended to reform of military academies, national universities, and research institutes. It also

includes recruiting foreign experts to provide access to know-how, expertise, and foreign technology.

- Ensuring multiple funding sources and lean management structures that are more dynamic, efficient, and effective than state-owned research bodies. There is also effort to leverage the economy and society to support China's strategic needs for international competition.
- The military logistics system is being tuned to support and sustain the PLA in joint operations, overseas operations with a global reach and a coordinated military-civilian response during a crisis".

The system entails extensive linkages between various government entities. At the apex there are linkages between ministries (Defence, Foreign Affairs, Education, Science and Technology, Industry and Information Technology et al) and their subordinate establishments. All military organisations are linked on the Civil Military Fusion platform. Provincial and local governments are also factored in. "*State-sponsored educational institutions, research centres, and key laboratories*" are part of Civil Military Fusion. Students studying abroad specially in disruptive technologies are leveraged in. Major defence SOEs and quasi-private companies like COSCO, China National Offshore Oil Company, and major construction companies that have roles in BRI projects and also in building artificial islands in the South China Sea are keyed into Civil Military Fusion. Private companies that specialize in unmanned systems, robotics, artificial intelligence, cybersecurity, and big data have been co-opted. These include Huawei and ZTE. Provincial and local governments have Civil Military Fusion industrial plans and have established 35 national-level industrial zones. Civil Military Fusion linked investment funds have been created by central and local governments and private investors.

The overall effort is focussed, intense and completely centralised in the best Communist Party traditions<sup>10</sup>. However there are also assessments that the "fusion" that China intends to create is aspirational and not a true reflection of on ground realities<sup>11</sup>. It is also being analysed that Civil Military Fusion is still in its early stages, and that it is China's attempt to

overcome serious and persistent deficiencies in its military procurement and research and development (R&D) ecosystem. The issue gets a little more complex and needs greater scrutiny since the political scenario in China has changed. There is a discernible shift towards statism in China. The original path to acquire cutting edge technologies was through the private sector and international connections. These two issues are at dissonance with each other. Hence, going ahead, the success of Civil Military Fusion needs monitoring and study to draw the right lessons.

### **The US Model**

The model of Civil Military Fusion in USA is far different than the all-encompassing top driven Chinese model. It is not designated or discussed as Civil Military Fusion in the first place. It is highly disaggregated and focussed, driven by the Services themselves. This is due to two reasons. The fundamentals of civil military fusion in USA were achieved long back whose outcome was the mighty military industrial complex<sup>12</sup>. The military industrial complex involves the armed forces and some of the largest corporations that have traditionally been designers, developers, producers and suppliers of cutting edge technology and weapons globally. This is an essential ingredient of the U.S. economy. The current wave of civil military fusion is only an extension of what happened earlier. The second reason is that cutting edge technologies are being researched and developed in the USA in the private sector at scale. The current efforts at fusion is only an upgrade on the ongoing dual use of new technologies. The nearest model to Civil Military Fusion in USA is that of the Army Futures Command and is therefore being examined.





The US Army established a new command called the Army Futures Command (AFC) in 2018 to modernise the Army<sup>13</sup>. It had six programs in order of priority - long range precision fire, next generation combat vehicle, future vertical lift platforms, a mobile and expeditionary Army network, air and missile defence capability and soldier lethality<sup>14</sup>. The US Army has undertaken this initiative in order to upgrade their existing systems as also induct next generation systems using all the emerging disruptive technologies. An outlay of 18 bn USD has been allocated for development of laid down future capabilities in this model. The AFC aims at transformative modernization of the Army in order to provide it with *“concepts, capabilities and organizational structures needed to dominate a future battlefield”*.

The AFC has integrated entrepreneurs, scientists, academia, and businesses to work on various programs so that its goals can be achieved. It is also tapping in house talent and using all those who have the capability and qualification to be integrated into the designated projects. The AFC has identified areas in which technology collaboration is necessary to take place. These include all disruptive technologies related to sensors, terminal effects (kinetic/non-kinetic), command and control (manoeuvre, fires, intelligence), protection (EW, Physical), communications (SATCOM, aerial, terrestrial), robotics, AI/ ML, medical, sustainment, autonomy, cloud computing and, planning. They have also created a number of mechanisms to advance the programs. These include cooperative research and development agreements, small business innovative research, technology transfers and other transactional agreements.

Each of these technologies are being progressed in parallel at different locations. For example the AI Task Force was kicked off in Feb 19 and is based at Carnegie Mellon University. It aims to harness breakthroughs in AI and apply them to a range of Army operations which include talent management in human Resources, predictive maintenance of equipment and extend to support in projects related to all six modernization programs<sup>15</sup>. The task force is two thirds uniformed and one thirds civilian with agile teams to rapidly develop prototypes, capabilities and create a talent pool for the future. The task interfaces with academia, start-ups,

business houses, established defence industry and others in the chain to create and absorb AI into the system.

Organisationally, Army Futures Command has four subordinate/supporting commands, which operate through collaborative partnerships with industry and academia to realise the programs. These are broadly as under :-

- The “*Combat Capabilities Development Command*” is the US Army’s organic research and development agency which ensures creating, integrating, expediting and providing “*technology-enabled solutions*” to the Army.
- The Futures and Concepts Centre “*assesses threats and future operational environment, develops concepts, requirements and an integrated modernization path*”.
- The Medical Research and Development Command manages and executes research in areas related to medical technology.
- The Army Software Factory is an integrated software development initiative to teach, develop, and employ self-sustaining talent from all ranks within the military and non-military pathways in order to develop cutting-edge applications for current and future systems.
- At the field level, the AFC has established Cross-Functional Teams (CFTs) which are based on training establishments of major Arms. These teams develop capability documents, based on research, experimentation and technical demonstrations, to enable the Army Acquisition System to take over actual procurement once a capability is established.
- The graphic below gives an indication of the US establishments involved in the AFC



The Army Futures Command has been in existence for four years now. Based on experience gained, the US government is thinking of shifting it from the exclusive ambit of the Army and put in under the larger Department of Defense. They want to convert it into an advisory body focused more on emerging technology and less on near-term programs<sup>16</sup>. The reason for this change in policy is largely due to bureaucratic tangles. Resultantly, the Army Futures Command might not be as empowered as it was envisioned. This dilute the 'Fusion' concept considerably.

### **Civil Military Fusion for India – Pointers**

India has not had the benefit of either the Industrial revolution or the RMA. In case India has to modernise and rise as a power of consequence, the necessity of Civil Military Fusion for India is undisputed. The Chinese model is autocratic and top driven and will not suit our democracy or culture. The US model is too focussed, advanced and based on the existing Military Industrial complex edifice. However both models suitably adopted to Indian conditions can work in our environment. Resultantly the question at hand is what is the model to be adopted in India?

The initial issue which needs to be addressed for Civil Military Fusion to take place is the need for strong political will and inclination to do so. India must be prepared to walk the talk. The desire is evident and well-articulated in the 'Atmanirbharta' program and its predecessor 'Make in India'. However this desire must be driven by an unitary political leadership backed by a bipartisan consensus. It has to be a long term commitment. Accordingly, Civil Military Fusion needs a whole of the nation approach and the ability to stay the course for over a decade at least, so that the entire process becomes self-driven and irreversible as did our economic reforms of the 90s. This demands politico-military-bureaucratic fusion<sup>17</sup> of a high order as defined in an earlier article.

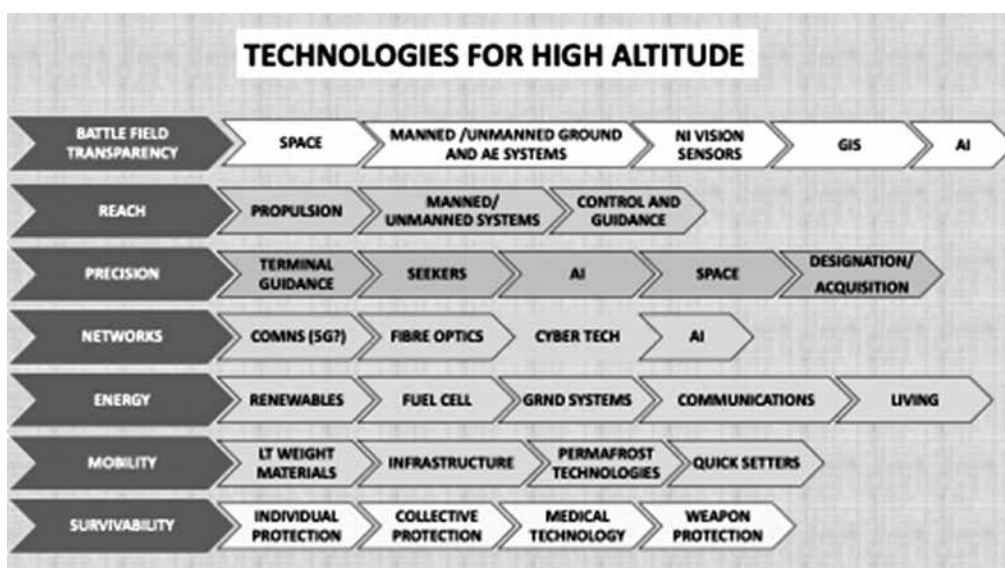
The most important factor in Civil Military Fusion is breaking barriers and establishing linkages with multiple channels of communication to promote dual use. Elimination of barriers to achieve fusion has to be the focus. In India the entire structure is siloed and disaggregated. People manning the structure indulge routinely in one upmanship and working to his/her concept of national interest. Further, Inter Service, Inter Department, Inter Ministry, Inter State, Inter Party and myriad other inter-se barriers are calcified and need to be permeated. Accordingly, Civil Military Fusion needs an empowered structure and a well-defined hierarchy to break these barriers. The structure has to be spearheaded by a clearheaded political leadership, an unshackled military and a cooperative bureaucracy. It has to be a top down approach. In fact the first step is politico military bureaucratic fusion as mentioned earlier <sup>18</sup>. If this can be achieved even partially, India will be on its way.

In India, Civil Military Fusion has to be a clustered approach and incrementally achieved. The span in each cluster should include concerned ministries, military departments, academia, PSUs, public sector industry, DRDO, CSIR labs, Science and Technological institutes of repute, Industry icons and more. Focus must be on key technologies, key products and key personnel. Talent capture and retention will be a major challenge in our system. We must pay adequate attention to this aspect. The identified clusters are as under :-

- The first cluster could be of successful and key sectors of national importance. This cluster invariably should be of Defence, Space, Atomic Energy, Energy, and Communications. India has achieved a lot of results in these sectors. With a certain amount of tweaking and repurposing and better coordination, a lot more can be achieved.
- The second cluster should be based on disruptive and modern technologies like AI, Cyber, robotics, unmanned systems, new materials and so on. These topics are all emerging technologies. To achieve civil military fusion, a national program in mission mode must commence which includes academia, start-ups, venture capitalists, established private industry with international linkages duly facilitated by the government.
- The third cluster should be infrastructure and logistical in nature to include rail, roads, airports, ports, ware housing, freight services, transportation, housing, buildings and so on. These are all existing to a large degree. However, the focus needs to be on integrated development along our Himalayan borders. In order to do so, great amount of technology ingestion and leveraging is needed. One of the main focus areas in this sector is renewable energy in high altitudes.
- The fourth cluster should be financial fusion. The current government based financial models are archaic and linear in nature. Financing for civil military fusion should be based on venture capitalism and market principles which have a greater degree of risk taking ability especially in emerging technology.
- The fifth cluster should be related to conventional 'bread and butter' technology, goods and manufacturing where dual use can be exploited.

Civil Military Fusion must be operationally focussed. It must focus on areas and technologies which will ensure that our operational capabilities are directly enhanced. In this context it is important that we focus on capability development through Civil Military Fusion in our super high

altitudes. The reason for this is simple. Any technology or capability which succeeds in super high altitudes will succeed elsewhere. Most importantly, most requirements and endeavours in high altitudes are fundamentally dual use in nature and best suited to progress the Civil Military Fusion concept. In this connection, the importance of relevant and essential technologies and capabilities which are needed for high altitudes have been identified<sup>19</sup> and discussed in various fora. These technologies are shown in the graphic below. If these are to be focussed upon and if tangible results are to be realised, there is no way but civil military fusion.



## Conclusion

In conclusion there two facets which need to be understood in any attempt at Civil Military Fusion. Firstly, the time for Civil Military has arrived. If India must rise to greatness it must tread this path. The cost that the nation has to pay for not enhancing Civil Military Fusion, will that the gap with China will keep widening till such time our sovereignty starts eroding. Further, Atmanirbharta, demands a high degree of Civil Military Fusion. Though achieving Civil Military fusion is a difficult task, India has no choice but to step up the occasion. Further, to state the obvious, Civil Military Fusion in India can only succeed if there is

politico-military-fusion. The second aspect is that the US and Chinese experiences indicate that the Civil Military Fusion is not a panacea for all ills. It has its own problems. In any case it is not a short term fix. All these must be factored into our thought process when we attempt this Civil Military Fusion at scale. As and when we think on these lines we must be cognisant to evolve an Indian model of Civil Military Fusion to seek Indian solutions to Indian problems.

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