CIVIL-MILITARY FUSION IN MARITIME SECURITY: A STATUS-CHECK

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Abstract

The Indian Navy, as a relatively smaller service, and characterised by the nature of its technologically-driven operational profile, has naturally internalised comprehensive Civil-Military Fusion (CMF) in its various facets. Some of these attributes also apply to the other maritime security agency – the Indian Coast Guard. This article elaborates upon the various nuances of 'Civil-Military Fusion' in the maritime security domain under three inter-connected strands viz, CMF in materials and infrastructure, CMF in organisational structures, and CMF for operational effectiveness. Certain pitfalls of organisational and cognitive nature that may hinder the very spirit of effective CMF, and which must be guarded against at all costs, have also been identified. The usefulness of the naval veteran community as highly skilled and talented 'human resource' pool to engender effective CMF in maritime security domain has been specifically highlighted.

Introduction

India has always had a grand vision of achieving self-sufficiency in technology-intensive defence sector. The country has sought to infuse indigenously developed technologies into the sensors, weapons, ammunition, communication networks and associated systems in all three domains of land, sea and air. The Indian Government accordingly established the Ordnance Factory Board (OFB), Defence Public Sector Undertakings (DPSUs), and the Defence Research & Development Organisation (DRDO), to meet its 'self-sufficiency through indigenisation'

vision. The OFB was dissolved in October 2021; and its 41 factories producing, testing and marketing weapon systems, ammunition stores and related components for the Armed Forces were reorganised into seven new corporations, making a total of 16 DPSUs under the Department of Defence Production (DDP) of the Ministry of Defence.[2] The DRDO oversees more than 50 laboratories researching on a broad spectrum of technologies for defence forces and developing applications for use in all three domains.[3]

This technological infrastructure – created quite early-on post Indian independence – was envisioned to serve the interests of the Indian Armed Forces in a comprehensive manner. Over the last half-century, it has progressively contributed towards meeting varied technological needs associated with the modernisation of Indian defence forces, particularly in the face of technology denial regime – declared or unstated – enforced on India under one pretext or the other. Under such challenging circumstances, it is indeed creditable that the Indian technological set-up has made major progress in high technology domains like the unmanned aerial systems (UAS) and unmanned submersibles; conducted technology demonstration of hypersonic glide vehicles and scramjets; and carried out 'proof of concept' experiments on electromagnetic rail gun. Defence sector shipyards have also started constructing special purpose ships like intelligence collection vessel and mother ships for manned submarine rescue submersibles – in addition to regular shipbuilding for the Indian Navy and the Coast Guard. The Indian Ministry of Defence has initiated a detailed roadmap for incorporating artificial intelligence into all its operating domains – overseen at the highest level by a Defence AI Council – so as to improve the operational efficiency and effectiveness of its Armed Forces.

However, despite all this technological effort – driven mainly by the public sector scientific community – India has not been able to keep the desired pace with the global growth in certain technological domains, and even faster rate of obsolescence in many cases. A major reason for this 'less than desired' progress in the Armed Forces' high-technology assets-based war-fighting capacities is the lack of sufficient integration of the users – the military personnel responsible to fight with those assets

– with the designers, developers and manufacturers of such assets and capacities (hereinafter collectively referred to as the 'civil technologists').

This spans various levels of outlook and understanding – ranging from the strategic requirement of the desired technology, its operational leverage to achieve the desired strategic objective, and the tactical usage to gain immediate upper hand over the adversary on the ground. The success of this reasoning entails that there must be a seamless integration between the users and the 'civil technologists' at all these levels – the very crux of 'Civil-Military Fusion' (CMF). There have been various initiatives to ensure better integration between the asset creators and asset users over the years, with an aim of engendering better understanding of the users' requirements vis-à-vis manufacturers' limitations.

The situation of CMF can be said to be comparatively better in the maritime domain. This is mainly due to the Indian Navy being quite a small service – and hence easier to integrate with its civilian technology counterparts. Further the maritime security forces – by the nature of their work profile – largely use high technology platforms, equipment and other assets which per-force require them to be heavily dependent on the 'civil technologists' outputs, be it in designing, developing or manufacturing such platforms/equipment. In this backdrop, this article seeks to look at the issue of 'Civil-Military Fusion' in the maritime security domain from the three inter-connected strands viz, CMF in Material and infrastructure, CMF in organisational Structures, and CMF for Operational Effectiveness. This in turn, would ensure that the optimum capabilities of the maritime forces can be brought to bear on the adversary by leveraging the most suitable capacities provided to them by the fully integrated 'civil technologists'.

CMF in Material and Infrastructure

It is a given that warships/submarines and their weapons and systems, engines, machinery and repair facilities – considering the scale of heavy engineering and ship construction competencies involved – require comprehensive all-level interaction between the military users/maintainers and the specialised 'civilian technologists'. The naval dockyards – co-located with the naval fleets in Mumbai and Visakhapatnam – which

provide ship/submarine repair, refit and renovation support including dry-docking, as also equipment maintenance, mainly comprise civilian workforce, supervisors and junior level officers. The very profile of these industrial units which requires them to deliver results to the satisfaction of the Indian Navy as users, calls for the naval technical officials to closely associate with this civilian workforce at all levels to ensure quality outputs in time-bound manner. Therefore, starting from the Admiral Superintendents; the General Managers, planners, Centre Managers, right down to deputy managers on the shop floor; a hierarchy of naval officers are appointed in the dockyards to guide all the technology processes, monitor the progress and ensure seamless connectivity of the manufacturing supply chain.

However, even this time-tested and well-oiled CMF does not meet all the naval hardware requirements. As the older platforms get phased out, the new ones have to be built or acquired as replacement. While the Indian Navy used to acquire a large number of platforms till the 1990s in 'ready to use' state from foreign countries; that quantum has progressively been reducing, with the indigenously built ships by the Defence public sector shipyards, taking their place. These government owned shipyards – Mazagaon Docks Limited (MDL) at Mumbai, Hindustan Shipyard Limited (HSL) at Visakhapatnam, Garden Reach Shipbuilders and Engineers (GRSE) at Kolkata and Goa shipyard Limited (GSL) – building ships for the Indian Navy and the Indian Coast Guard are civilian enterprises and are fully staffed by the 'civil technologists'. However, the naval maritime security expectations from their products – to meet the technical specifications, maintain the requisite quality and fulfill their operational roles; all within the assigned budgets and stipulated timeframe – still remain unchanged. Since it is not organisationally feasible to appoint naval personnel at all levels – as earlier explained in case of the naval dockyards – It requires far greater CMF to ensure that the eventual deliverables meet the naval expectations. In this scenario, complete onus of matching the expectation-delivery matrix rests on a small overseeing team of naval technical personnel, who are deputed to the said shipyards for this mammoth task.

The indigenisation endeavour in warship building which has particularly picked up pace over last decade – after *Atmanirbhar Bharat* initiative becoming a national mission – has raised the bar manifold for the CMF in both, scope and intensity. The indigenisation mindset in the Navy though, is not a recent phenomenon. The Indian Navy has always been an early proponent of indigenisation; with the first set of six '*Nilgiri'* class frigates being indigenously designed and built in the 1970s. The 'Directorate of Indigenisation' at Naval Headquarters is spearheading this movement. It promulgated the first '15 Year Indigenous Development Plan' in 2003; and followed it up with a more detailed and refined 'Indian Naval Indigenisation Plan (2015-2030)'.[4] As of mid-2022, Indian shipyards were in the process of building 39 indigenously designed warships and submarines, out of a proposed induction schedule of 41 platforms.[5] If this be the scope of naval indigenous shipbuilding, one can easily fathom the extent of CMF required to bring it to credible fruition.

As though the scope of naval shipbuilding and repair/refitting within the government enterprises was not enough, the field has also been thrown open to the private sector. Major players in the domain include the Larsen & Toubro (L&T) shipyard[6] at Katupalli near Chennai in Tamil Nadu and the Reliance Naval and Engineering Limited[7] at Pipavav in Gujarat. The L&T shipyard is also undertaking repairs and refit of Indian and foreign naval ships. For instance, a US naval ship, USNS Charles Drew (T-AKE-10) came for a 2-week scheduled repair to the L&T shipyard in Aug 2022 – first time ever in for the US to award such a task to India.[8] Since private enterprises are intrinsically profit-oriented – and bottom line can be improved either by selling at high prices or by reducing input costs – the task for naval overseeing teams deputed to such enterprises to ensure that the quality and reliability of delivered products conform to the stipulated standards without cost or time overruns; is clearly cut out. This requirement to achieve the best results for the service while dealing with work-ethos specific to the private industry; broadens the spectrum of CMF even more.

At the topmost aspirational level of indigenisation effort lies the 'Strategic Partnership Model' (SPM) prescribed in the Defence Acquisition Procedure-2020 (DAP-2020). It provides opportunities to the

Indian private sector to collaborate with the foreign original equipment manufacturers (OEMs) to build helicopters, fighter aircraft, submarines and main battle tanks as whole platforms for the Indian defence forces – the first three definitely being relevant to the Indian Navy.[9] If the private industry indeed chooses to explore this option, the scope of CMF between the naval users, Indian Industry and foreign OEMs – right from the time of design, development, manufacture till the very end of operational life-cycle of such platforms – could not grow higher in terms of complexity and time duration.

There is also a huge push towards manufacturing ship propulsion systems in India, so as to increase the share of indigenous content in the 'move' component of the shipbuilding process from the current share of 60 percent.[10] The Indian Ministry of Defence, in April 2022, accorded 'approval in principle' for the private industry to manufacture medium speed marine diesel engines for the Navy under 'Make-1[11] category of DAP-2020.[12] Consequently, there are unconfirmed reports that M/S L&T are bidding for a contract to design and manufacture 6 MW Marine Diesel Engines in India. A 5 MW electric propulsion system has also, reportedly been installed at the Indian Navy's Electrical Training School in Jamnagar, Gujarat in collaboration with the German firm Siemens, to train the crew of future ships that are to be fitted with this system.[13]

CMF in Organisational Structures

It is however posited that none of the above endeavours can be effectively implemented if there is no synergy between the human element involved in conceptualising, designing, developing, and eventually using the product so produced. For such deep-ingrained civil-military fusion to occur towards a win-win outcome, it is essential that the organisational structures which undergird these processes be suitably reformed, transformed or tweaked suitably.

Since uniformed and non-uniformed personnel largely have different outlook towards life, profession and personal commitment; the group dynamics when they are constrained to work together for a common cause, can best be handled by suitably empowered coordinators. For instance, Government of India cleared the much delayed appointment

of National Maritime Security Coordinator (NMSC) in February 2022,[14] despite the same being recommended by the 2001 Report of the Group of Ministers on National Security; and the Mumbai terror attack of 26 November 2008 rudely bringing home its absolute necessity. The complexity and extent of the CMF which the NMSC will have to engage in – to bring a large number of ministries and departments responsible for administering various facets of the maritime domain on same page as the implementors of holistic maritime security on the ground – is indeed considered to be quite humongous. This has been explained in some detail by Captain Himadri Das, a specialist maritime analyst in his article of August 2022.[15]

While the NMSC, working from the National Security Council Secretariat (NSCS) establishes himself to fulfil his assigned role and charter;[16] other armed Forces Officers – including from the Indian Navy – have been appointed to the Military Advisor (MA) and Technology wings at the NSCS, as also to the Joint Intelligence Committee. Similarly, naval Officers are also embedded as Directors and Joint Directors in the Ministry of External Affairs – Disarmament & International Security Affairs and Southern Divisions respectively. A naval Officer is also appointed as the Joint Director in the International Cooperation department of the Ministry of Defence. These naval Officers – in addition to their desk specific jobs – are the principal points of contact between the uniformed and non-uniformed personnel, thus acting as key cogs in the CMF wheel, in the assigned ministries.

As for the defence hardware and related technology infrastructure realm, the Indian Navy has evolved a comprehensive policy to engender effective multi-level CMF. Senior naval personnel are deputed/seconded to DRDO Headquarters to ensure seamless macro-level planning, carry out apex-level liaison with the naval Headquarters, monitor budgetary allocation of naval projects and oversee their progress. The DRDO in fact, established a Naval Research Board (NRB) in 1996 to "… strengthen and deepen the knowledge-base related to the naval science and technologies". Its charter follows flexible approach towards research, funding and project execution. The Board collaborates with higher institutions of technology like the IITs, Universities and Research

Centres to harness scientific talent by way of grant-in-aid financial support.[17] A Rear Admiral from the Navy's technical branch, namely the Assistant Chief of Material (Information Technology and Systems) from the Naval Headquarters is a standing member of the NRB.[18] The constitution of NRB is placed at Table 1 below. The mere fact that the Directors of all maritime research organisations like the Naval Science & Technological Laboratory (NSTL), Naval Physical and Oceanographic Laboratory (NPOL), Naval Materials Research Laboratory (NMRL), Defence Metallurgical Research Laboratory (DMRL), NIO and NIOT are represented, is quite instructive about the seriousness with which the Indian Navy views the CMF in technological Research & Development.

Dr. V. G. Idichandy	Chairman
Director General (TM)	Co-Chairman
Director General (NS&M)	Member
Integrated Financial Adviser (IFA) R&D, Delhi	Member
Asst. Chief of Materials (IT&S) – Indian Navy	Member
Directors of NSTL, NPOL, NMRL and DMRL	Member
Director, National Institute of Oceanography (NIO), Goa	Member
Director, National Institute of Ocean Technology (NIOT), Chennai	Member
Member Secretary, SERC, DST, New Delhi	Member
Prof. Vikram Kumar, Faculty IIT, Delhi	From academia
Prof. Nirendra Dev Delhi Technical University, Delhi	From academia
Member Secretary, NRB	Member

Table 1 - constitution of the DRDO's Naval Research Board
Source: https://www.drdo.gov.in/naval-research-board/board-constitution

NRB's scientific rigour is coordinated through the following domain-specific panels, with the detailed sub-disciplines covered under each panel also provided in its website:-[19]

- Materials (MAT)

- Hydrodynamics (HYDRO)
- Sonar and Signal Behavior(SSB)
- Ocean Environment(OE)
- Scientific Computing(SC)
- Marine systems(MAR)
- Hydro-Vibro- Acoustics (HVA)

Naval Officers are also appointed to maritime-relevant laboratories of DRDO like the NSTL, Visakhapatnam, NPOL, Kochi and NMRL, Ambernath. The ordnance factories – like Jabalpur, Itarsi and Pune – producing ammunition for naval guns and other explosives for different maritime roles, also have representatives of the Indian Navy to monitor the process of production and quality assurance. The Indian Navy also maintains naval liaison cells (NLC) in following locations for smooth project-related CMF:-

- Bengaluru – Aviation [like Hindustan Aeronautics Limited (HAL), Aircraft Development Agency (ADA) and other strategic systems PSUs and private industry/ start-ups (like Honeywell)]
- Hyderabad – Missile systems establishments [like Missile Systems Quality Assurance Agency (MSQAA)], DRDO laboratories [like Defence Electronics Research Laboratory (DLRL) and Research Centre Imarat (RCI)] and private industry/ start-ups
- Chandigarh – Strategic systems applications centre [Terminal Ballistics Research Laboratory (TBRL)]

The Weapons and Electronic Systems Equipment Establishment (WESEE), organisationally functioning under the Ministry of Defence, is another highly successful CMF model. The Establishment which is the core designer of the Indian Navy's combat information systems, datalinks and crypto products – and fully funded by the Navy – is manned by naval technical Officers and civilian scientists in the ratio of 80:20. A Rear Admiral of the Indian Navy heads WESEE, with the

senior most civilian technologist being of 'Scientist-F' Grade (notionally equivalent to a Navy Commodore). The effectiveness of CMF in WESEE towards "… *its focused resolve of translating the needed capabilities into engineering solutions by delivering state-of-the-art contemporary systems …*" was widely recognised; when it became the first defence entity to achieve 'Capability Maturity Model Integration CMMI V2.0 level 3 rating' certification for Development and Supplier Agreement Management.[20]

CMF for Operational Effectiveness

Comprehensive CMF in defence – including in the maritime domain – is only a 'means' to the ultimate 'end'; wherein the best possible force must be brought to bear effectively on the adversary in a 'whole of Nation' approach by synergistic leveraging of defence hardware so produced, by equally efficient human resource. An apt case of CMF as a 'means' to the maritime operational effectiveness 'end' relates to Chinese Navy, where ships for commercial use as merchantsmen are institutionally built to military specifications. The Chinese government, in 2015, approved the '*Technical Standards for New Civilian Ships to Implement National Defense Requirements*' prepared jointly by China Classification Society's Shanghai Specifications Institute and PLA's Nanjing Military Command. These technical guidelines which are applicable to five types of ships – container, roll on–roll off (RO-RO), multipurpose, bulk carriers and tankers – have been ratified as a 'national military standard'.[21]

The PLA has concurrently created formal organisational structures within its 'military transportation department (MTD) to absorb these commercial ships when they are called upon to join the PLA Navy for military missions. To facilitate easier command and control, such ships are assigned numbered 'Military Formation' numbers. For instance, the commercial RO-RO vessels from Bohai Ferry Group and Hainan Strait Shipping Company are assigned as the 'Eighth and Ninth Transport *Dadui*'[22] respectively. Similarly, a large vehicle ferry ship *Changlong,* capable of transporting heavy military equipment – including tanks, infantry fighting vehicles, armoured personnel carriers, trucks and trailers – is assigned as the 'Fifth Transport *Dadui',* when working with the PLA's

MTD.[23] This measure has had a huge 'force multiplier' effect, wherein such merchantsmen are readily available to augment the PLA Navy's logistics transportation capacity at very short notice, either in emergency situations or in deliberate 'strategic power projection' endeavour.

While the extent and scope of CMF in the Chinese PLA is a subject in itself, it suffices to say that similar model has been in usage in the US Navy for a long time. The Indian Navy does call in some merchant ships – particularly oil tankers and cargo ships – from time to time, to augment its logistics support capacity during major exercises under 'ships taken-up from trade (STUFT) arrangement. However, there is no formal edict for the Indian merchant ships to be built to military specifications.[24] Taking a cue from these two navies, the Indian Navy must seriously consider phased implementation of such a concept for enhanced operational effectiveness of its afloat operational logistics management, without having to make commensurate investment in related hardware.

The Indian Navy is working closely with the DRDO and other private industry – particularly start-ups – for finding hardware solutions to unmanned aerial warfare by getting involved in design and development process of UAVs and UCAVs. For instance, M/S Mahindra Defence is developing naval unmanned vehicles that can be operated from Indian Navy ships, in collaboration with M/S Aeronautics Ltd of Israel.[25] Active cooperation with NSTL and the Indian Navy for development and prototyping of UUVs is also underway, with reasonable success. The UUVs/AUVs being built, range from small slow-speed vehicles to military-class, free-flooding ones weighing up to 1.7 tons, customised for roles like surveillance and mine counter-measure (MCM) – in ports/ harbours, coastal waters, as well as in deep seas.[26]

There is also great scope for active CMF in generation of Maritime Domain Awareness (MDA) in India's areas of maritime interests, as an essential prerequisite for conducting effective naval operations during both, peace and war time. Active collaboration with Indian Space Research Organisation (ISRO) for ensuring Space-based ISR cannot be over-emphsised. The direct collaboration would involve the building and launch of Navy-specific communication – like the GSAT-7 (Rukmini)

– and remote-sensing satellites, construction of dedicated ground stations, and training of personnel for downloading and analysis of data. Indirect cooperation could take the shape of occasional requests for data from civil-use satellites of ISRO – say from AIS constellation – to support specific maritime security missions of national significance. The Information Fusion Centre-Indian Ocean Region (IFC-IOR), set up by the Indian Navy in 2020, is a live and successful example of such CMF with ISRO.

Indian government organisations, like the National Institute of Oceanography (NIO) at Goa, under the Council of Scientific & Industrial Research (CSIR), and the NIOT at Chennai, under the Ministry of Earth Sciences, are actively engaged in underwater hydrological conditions data collection, analysis and collation. Both these institutions, as their affiliation suggests, are primarily engaged in scientific tasks and experiments of civilian nature, with research towards maritime security not figuring in their vision statements and stated missions.[27] NIOT is also developing a manned submersible; and has also built an unmanned vehicle with robotic arms, capable of operating 6,000 m deep – having been tested up to 890 m depth.[28] Both these platforms and the associated knowledge-base can be of great use for under-water operations enablers like the AI-enabled ocean bed mapping, retrieval of submerged objects, and the like. Therefore, notwithstanding their overtly stated civilian roles, these organisations manned by specialised civilian scientists, can definitely be co-opted under the CMF rubric for furthering the maritime security requirements.

Possible Pitfalls to Effective CMF

The concept note for this thematic volume of 'Synergy' Journal, articulates the spirit of CMF as *"… an idealistic situation involving the convergence of military and civilian resources and systems for maximising a nation's ability to express its comprehensive national power, both during war and peacetime*". However, the 'group dynamics' predicated on the vagaries of basic human nature, attitude and sincerity, as also the nuances of organisational behaviour, culture and professionalism, tend to make it less than perfect.

A case in point is that of the Defence Institute of Advanced Technology, which was set up at Pune as the Institute of Armament Technology (IAT), under the aegis of DRDO in 1967. Its main objective was to train the defence technical Officers and civilian scientists together in niche military technologies. It was possibly envisioned that this combined intellectual stimulation of technological minds would engender lifelong CMF – individually and organisationally – between the participants, to the ultimate benefit of the Defence establishment. The IAT, after receiving the status of a 'Deemed University' in 2000, was renamed as DIAT in 2006.[29]

However, the training curriculum for military technical Officers was segregated from DIAT in January 2012, when a separate entity, namely, the Military Institute of Technology (MILIT) was carved out of DIAT. The residual connect with DIAT still remained as MILIT continued to function as the 52nd laboratory of DRDO. The decoupling was complete when MILIT was transferred from DRDO to the Headquarters, Integrated Defence Staff (HQIDS) in April 2015.[30] This put paid to the very essence of CMF, that could have been so handy for ensuring civil-military synergy in developing and innovating upon advanced defence technologies and solutions in future.

Without going into the 'what, why and how' of the above development – since the internal dynamics of the Institution are not in public domain – some or all of the factors mentioned below could have contributed to this state of affairs:-

- Lack of appreciation of each other's (military men and civilian scientists) perspectives and requirements
- Differing working styles, organisational culture and work ethos
- Tendency to protect information/ turf
- Possible clash of egos
- Absence of adequate organisational structures to support CMF
- Insufficient clarity on procedures to further the spirit of CMF

Suggested Remedy – Role of Veterans in improving Civil-Military Cohesion?

The above example is indicative of the fact that the Indian defence establishment is not able to implement the desired level of CMF towards achievement of optimum efficiency and effectiveness in terms of men, material and productivity management. By same logic, the maritime security domain too suffers from the same malaise. Herein, the possible role of retired defence-service Officers – who form a readily available pool of 'domain-trained human resource' – merits exploration. The veterans can act as the vital cogs in bridging the gaps – whether visible or perceived – in the civil-military equation.

Various public and private sector industries involved in designing, developing and producing naval hardware, as also providing technology-based solutions, are harnessing the knowledge-base and skill-sets of such veterans. Public sector enterprises like the Bharat Electronics Limited (BEL), HAL, MDL, HSL and high-technology Projects like the one handling Advance Technology Vehicle (nuclear submarines) are already employing retired naval Officers as consultants or full-time employees. Even joint ventures like BRAHMOS have retired defence Officers on their rolls. Private industries like L&T and Tata Consultancy Services (TCS) are also benefitting from the expertise of the naval veterans in all their divisions, providing technology solutions for the Indian Navy and the Coast Guard.

The good part is that this pool will continue to grow in future; as all naval Officers being inducted since at least 2010, are 'graduates in technology', with many having achieved higher educational and professional qualifications during their service. Needless to say, such veterans – having shed their uniform and the trappings therefrom – can easily form the natural linkages between the 'avowedly civilian technocrats' and the 'uniformed community'. Therefore, the overall value-proposition of utilising the skill-sets, domain-excellence and inter-personal skills of the veterans towards substantial enhancement of CMF in Defence domain, leaves little room for doubt about its viability.

Conclusion

There is no argument to the contrary that the level and scope of holistic civil-military integration as a 'means' to achieve optimum preparedness levels to deal with the security challenges posed by our adversaries as the ultimate 'end', needs to be institutionally enhanced. This article has cited various examples where reasonably well-functional civil-military fusion in the administrative, structural, technological and operational domains of the Indian Navy has yielded the desired results towards organisational efficiency and effectiveness. While there are some lessons for the other two services to learn from certain success stories of the naval CMF – like from the WESEE and DND models – there is still ample scope for improvement within. For instance, the indigenisation roadmap of the Indian Navy would certainly beget better results, if a concurrent human capital strategy (with comprehensive CMF in mind) to complement it, is formulated.

At the administrative structural level, there is an urgent need for the role and charter of the NMSC to be made public, so that the intent of the apex national leadership to enhance the CMF in maritime security domain becomes clear to all the stake-holders. Similarly, the grant of more responsibility and functional autonomy to the naval Officers deputed in various ministries, government departments, PSUs and research organisations – all civil personnel led organisations – will engender better outcomes. Though some issues raised in the article – like leveraging of the scientific prowess of NIOT and NIO scientists through CMF – are of aspirational nature; their relevance with regard to the operational benefits for maritime security of the nation cannot be understated. It is also begs introspection whether the time for integration of commercial shipping assets to benefit the supply chain management of the navy at sea – like the US and the Chinese Navy are gainfully doing – has come.

Finally, it is posited that the CMF involves 'thinking' human beings. So, its success is purely contingent upon identifying and addressing all such organisational behaviour' factors, which could possibly act as physical/ cognitive obstructions to its viable implementation. In that context,

the role of veterans in bringing the two components of CMF together is considered to be indispensable. The moot question is whether the defence policymakers see it that way; and how long they take to decide on this issue, keeping the security interests of the nation in mind.

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Endnotes

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