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Aircraft Carriers: The Pivot in Maritime Power Equations

….to provide the very unity of its objectives directed upon the sea[1]

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The Design of a Thesis

If we are to form an opinion on the current state of reality and to act upon it with any impact, some sort of a thesis is necessary. The end of the Cold War and the paradigm that it represented brought in its wake scholarly works that sought to prognosticate what future international relations and order held. Wide ranging theories were advanced from the emergence of one world in which harmony, democracy and an end to conflict were prophesized, and with it an end to a turbulent history of man's ideological evolution with the grand terminal formulation that western liberal democracy had prevailed.[2] Some saw the emergence of a multi polar order and the arrival of China not withstanding the warts of Tiananmen. Yet others saw in the First Iraq War, the continuing war in the Levant, the admission of former Soviet satellite nations into NATO and the splintering of Yugoslavia an emerging clash of civilisations marked by violent discord shaped by cultural, religious and civilisational similitude.[3] However, these illusions were, within a decade, dispelled and found little use in understanding and coming to grips with the realities of the post Cold War world as each of them represented a candour of its own. Some of the symptoms that have emerged are an increased and vicious securing of spheres of power and economic influence as exemplified by China in Africa and her claims of the South China Sea; the competition between autocracy and liberalism; an older religious struggle between radical Islam and secular cultures; and the inability to regulate the anarchic flow of technologies and information. As these struggles are played out the first casualty in the post Cold War era is the still born hope of a benign and enlightened world order.

Endemic instability world wide is characterized by the number of armed conflicts that erupted between the periods 1989 to 2010 which total forty nine.[4] The nature of these wars, more than anything else, reflected what I term the 'Uncertainty Paradigm' for they ranged from wars of liberation and freedom to insurgencies, civil wars, racial-ethnic-religious wars, proxy wars, interventions and wars motivated by the urge to corner economic resources. In all cases it was either the perpetuation of a dispensation, political ambitions, or the fear of economic deprivation that was at work below the surface. If that were not enough to underscore the fragility, gravity and self-centeredness of the international system, in the same period the United States of America alone has militarily intervened in foreign countries on 11 occasions; more often than at any time in history.[5]

So too when thinking of maritime affairs a touchstone only places in perspective the events that we are confronted with, provides a pattern and a context within which a strategy may be devised and force structures put in place to come to terms with an uncertain future. China's quest to secure efficiently rights of passage on the sea to fuel her thirst for markets, energy, primary produce and commodities has led her to the 'Northern Passage'[6] as a trade corridor. The distance from China to

markets in Europe has been cut down to less than 8000 miles from 14,700 miles. Significantly the route avoids two sensitive 'choke points' the Malacca Strait and the Suez Canal. Today the Arctic passage is a near reality, yet her resource and energy jugular that runs across the Indian Ocean continues to bulge and throb. China therefore theorises that the road to securing these sea lines of communication is through a strategy of 'Access Denial.'[7] The denial paradigm was founded on lessons of the 1991 Gulf War and security concern in relation to Taiwan. It saw in the Gulf War a reason for pre-emption against build up in-region of inimical combat potential. Logistic preparation was perceived as the first salvo of a conflict. During the 1995–1996 Taiwan Strait crisis, U.S. deployment of two carrier groups to the region remains in Chinese memory as an embarrassing infringement of sovereignty.[8] The value and logic of an access denial strategy is obvious in reference to Taiwan. But enabling such a strategy when the intent of logistic preparations may be ambiguous and scope and space are enlarged must clearly tax strategists' world wide and suggest the uncertainty of stability. It is these circumstances that impel the quest for a strategic posture that not only seeks to balance but also shape the future. Given the correlation of forces, for India it is the Ocean that holds the key.

Oceans and Economic Power: China as the Strategic Competitor

Among the multifarious factors that characterize and influence the development of nations an ever increasing role is being played by its maritime power. The realization of such power is at the heart of making effective use of the world's oceans. Higher the level of development of the economy greater will be the consequences assumed by the world oceans as an inexhaustible source of energy, raw materials, food and most critically as a medium for the movement of trade, materials, petroleum products and indeed of personnel; so also the portents for discord. Close to 90 per cent of global trade is borne by hulls at sea. It is no secret that to this very day, maritime power is a key catalyst of economic growth.

The change in China from a closed centrally planned system to a market oriented one from the late 1970s to the present must be seen as having been enabled, in good measure, by vigorous promotion of maritime power. So much so that by 2010 it became the world's largest exporter, its economy at $9.8 trillion is only second to the USA and with an oil consumption of 8.2 million bbl/day she is the third largest consumer in the world (2009 estimates). When we look at the growth pattern of India since liberalization, (which can be pegged to have started on 24th July 1991 with the Narsimha Rao government's package of industrial reforms along with a new open door policy on inward investment) we note a similar trend with respect to consumption patterns, energy demands, exports and trade. Indeed with one third of this growth being powered by trade to the East (in 2012 trade with ASEAN nations was pegged at $80 billion), the requirement to secure these interests become all the more vital. Already the 2011 figures make China our largest trading partner ($ 70 billion). Security of this trend will be a key to development of India. At the same instant, in the race to garner limited resources for the development of two very large economies the scope for friction looms large.

The reasons many countries view China with trepidation today are similar on the surface to their reaction to the rise of Japan in the 1970s and 80s and yet rooted in very different forces. China, too, uses a competing economic model, albeit with a difference (the very phrase used is an oxymoron)

– "state capitalism" – that challenges conventional economic ideologies. In many ways, China also behaves in a mercantilist fashion. It keeps its currency controlled so its exports can out-compete those from other countries, and it corners natural resources for its insatiable growth by methods that are reminiscent of colonial dealings, not that the West did not in the past indulge in more vicious practices. China is succeeding based on ideas that are anathema to those of the likes of the father of modern economics, Adam Smith, and his theories of the 'invisible hand' and the self regulating nature of the ideal economy.[9] The concerns with China is provoked by its manifest urge to use comprehensive national power to challenge and change the existing global political, economic and security structures without bringing about a change within her own biological morphology. It is not as if these structures are not due for an overhaul but it is the knuckle duster methods that she has chosen to employ and the reluctance to participate in cooperative security and economic arrangements that provide the potential for discord.

China's claims on the South China Sea as a territorial sea; her handling of dissent within in Tibet and Tiananmen; her proliferatory carousing with rogue states such as North Korea and Pakistan are cases, amongst others, that do not inspire confidence in change occurring within that nation without turbulence. We also note with some foreboding, the emergence of China from out of its, largely, defensive maritime perimeters as defined by the first and second island chain strategies into the Indian Ocean region as a major stakeholder. To this end, it has through diplomacy and economic inducements established bases in Sittwe, Hambantota, Gwadar and Marao in the Maldives. The geographic and strategic significance of these posts were apparent in the past and are equally vital today, whether for purposes of control, regulating, providing havens or assuring security to energy and resource lines. Sittwe and Gwadar also provide the front end for piping energy into China. These long term strategic investments by China maybe seen as the coming of the 'Third Island Chain'.

Articulating its strategic objectives in order of precedence China has unambiguously identified three canons, the first of which is internal and external stability to its own gauge; the second is to sustain the current levels of its economic growth and lastly to achieve regional pre-eminence. Gone is the 'power bashfulness' that marked the Deng era, in its place is a cockiness that is discernible in the contemporary conviction that "the world needs China more than China the world". This frame of reference gives form to the 'Access Denial Strategy'. When projected in consonance with the Third Island Chain, one cannot but note that denial would apply not just to the region of purpose, but also to the points of origin and to the Sea Lines of Communication (SLOC) along which energy, trade and resources are moved. The waters and littorals of the Indian Ocean and specifically the West Pacific Ocean and the Bay of Bengal (together here after termed as the Eastern Ocean) will now become the region where this strategy will be played out. The Dilemma for planners is in the absence of a security oriented cooperative impulse, such sweeping strategies (specifically the coming 'Third Island Chain' superimposed on a long range Access Denial Strategy), is it's blindness to recognize that, as historically never before, we are in fact dealing with a sea space that, in Mahan's words, is the busiest of all the "vast commons." The reluctance for collaboration makes the potential for friction high.

China, in the 18th century under the Qing dynasty enjoyed a golden age. It was a period of *shengshi,* an age of prosperity. Currently some Chinese nationalists say that, thanks to the Communist

Party and its economic prowess, another *shengshi* has arrived.[10] In 2010 China became the world's biggest manufacturer, a position that the US had held for most of the 20th century. By 2020, it has been forecast, that China could become the world's largest economy. Significant to political influence is its matching economic and military growth. Power, changes the very character of nations and its people and of their standing in the comity of nations. It places primacy to their beliefs and interests in the international milieu giving it new drive to shape global affairs in a manner that is self promoting. This search for geopolitical space that the emergence of a new cognizable revisionist power precipitates, historically, global instability and tensions. Add to this that the principle of nationalism is inextricably linked, both in theory and practice, with the concept of war,[11] then, we are faced with a situation when the military dimension of power will potentially throw up conflictual circumstances that will have to be contended with. Against this backdrop, when the politics of competitive resource access is put into the same pot as survival and development of State, to which is added the blunt character of military power, we have before us the recipe for conflict. It is against this canvas of competitive resource access and strategic uncertainty that the development and structuring of Indian maritime power must be gauged.

China: Translation of Maritime Power to a Strategic Posture

China published its Eighth Defense White Paper in April 2013. Its contours were that of a self-confident China recognizing its own growing economic and military prowess. At the same time, the paramountcy of containment of the various social fissures that their development has precipitated was top of their agenda. Their appreciation of the security situation underscored the belief that the risk of world wide all-out war was relatively low in the foreseeable future, yet, the absence of such risk did not automatically imply a conviction that stability and peace pervades international relations. The paper critically points out that struggles for cornering strategic resources, dominating geographically vital areas and tenanting strategic locations have, in fact, intensified. Power as a natural currency for politics remains the preferred instrument. Under these circumstances the portents for friction are ever present and would therefore demand preparedness, modernization and orientation of a nature that would serve to neutralize the fall out of such friction.[12]

One of the clauses that is central to the White Paper is that "the influence of military-security factors on international relations is mounting." Examining the nature of the geopolitical scenario, the paper reiterates the defensive posture of China's national defence policy. But typical of their nuanced approach to such issues, they in the same breath, highlight the fact that they are in the process of implementing a military strategy of 'active defence', in which, material as well as doctrinal tenets would combine offensive operations with defensive manoeuvres. This would demand that the Peoples Liberation Army Navy (PLAN) develop advanced assault capabilities. Of significance is the enhancement of mobility and strike capabilities in all three dimensions. Doctrines to back such capabilities involving sea-air-land integrated operations would be central to military strategy. Long range assault, regional reach and the development of 'Access Denial' and control strategies are central to military operations.[13]

China's military modernization programmes along with their investments in cyber warfare, anti-air, anti-ship weaponry and anti-carrier hardware in addition to the thrust on nuclear submarine,

both strategic and nuclear powered attack submarines, a carrier group centred on the Liaoning (ex Varyag) aircraft carrier with its suite of SU30s all make for a force that is increasingly lethal in effectiveness and enhanced in reach. Operating from infrastructure that they have cultivated from Sittwe and Aan in Myanmar to Hambantotta in Sri Lanka, Maroa in the Maldives and Gwadar in Pakistan (collectively the so called 'string of pearls') would gives teeth to the long range access denial.

Strategic posture and specific operational deployments may include one carrier group operating in the Eastern Ocean; a Jin class Ballistic Missile Nuclear Submarine (SSBN) on deterrent patrol; two Nuclear powered Submarines (SSN) on SLOC patrol with cooperating Carrier Battle Group and maritime patrol aircrafts; long range maritime strike air crafts operating from Aan or Gwadar; one amphibious brigade standby with transports on hand at one of the 'string of pearls.' Also one regiment of ASAT missiles along with cyber warfare teams to manipulate, black out, control and wage information warfare that will seek to paralyze operations in the Indian Ocean or Eastern Ocean.

India: A Theory of Maritime Warfare and a Basis for Structuring the Fleet

A fourfold classification of maritime forces has dominated naval thought since the Second World War. The grouping is largely functional and task oriented. The differentiation comprises of aircraft carriers, strike units and denial forces, escorts and scouts, and auxiliaries (the last include logistic and other support ships such as landing ships, mine layers, sweepers, tenders etc). In addition contemporary thought has given strategic nuclear forces a restraining role to define and demarcate the limits within which conventional forces operate.

Through the years there have been other concepts governing the constitution of the Fleet and its development, often driven by well reasoned logic and at other times motivated by nothing beyond the instantaneous intimidation. That being as it may, clearly the make up of fleets must logically be a material articulation of the strategic concepts and ideas that prevail. The principal demand of the theory of naval war is to attain a strategic posture that would permit control of oceanic spaces in order to progress and influence the course of conflict. Against this frame of reference the fundamental obligation is therefore to provide the means to seize and exercise that control (it therefore comes as no surprise that China develops forces necessary to realize 'access denial'). Pursuing this line of argument, the rational formulation that remains consistent with our theory of naval warfare is that upon the escorts and scouts depends our ability to exercise control over the objective maritime space or of Sea Lines of Communication; while on the Aircraft Carrier group and its intrinsic air power assisted by strike and denial forces depends the security of control. It is here that the true impact of the Aircraft Carrier is felt. Control and Security of Control is the relationship that operationally links all maritime forces with the Aircraft Carrier.

It may be argued that the best means of achieving control is to incapacitate the adversary's ability to interfere. It would then appear that even in the maritime environment the doctrine of destroying the enemy's armed forces reasserts itself as the paramount objective. This is what must concern the planner to the extreme; that is, should we not concentrate our maritime exertions with the singular aim of dealing that knock out punch. But the maritime environment and the vastness of the hydrosphere that we choose to influence is of a nature that force compromises will have to be made

that depletes the escort forces in order to pull away the carrier group to seek out and destroy the adversary's denial and strike elements. At the same time the antagonist may hardly be expected to be so accommodating as to expose his main forces in unfavorable circumstances. As Corbett so eloquently put it "the more closely he induces us to concentrate in the face of his fleet, the more he frees the sea for the circulation of his own trade, and the more he exposes ours to cruiser raids."[14]

Indeed, there is no correct solution to this dilemma of how best in time, space and most economically, can sea control be established as this would often be dictated by the relative strength, structure and constitution of the fleet, intentions and the geographic character of the theatre of operations which favors one or the other protagonist. However, we may draw a general conclusion that the object of maritime power is to establish control over a predesignated area for a desired period of time. The process may be preceded by strikes against the foe and actions to deny that sea space. The consequence of control may either be operations to secure the object on land or an assurance of passage on that sea area in order to further the war effort. To achieve this state efficiently it is necessary that maritime power be equipped with the appropriate mix of vessels specially adapted for the purpose. We have thus far noted that our theory of maritime warfare is governed by the ability to control maritime space and put it to use that furthers the national effort. However it is the conditions of use of sea power and the nature of twenty first century conflicts that is now of significance.

Why the Aircraft Carrier

We have thus far seen how geostrategic uncertainty, growth of China as a strategic competitor and its military posture have together precipitated a theory of military maritime preparedness that suggests the building of a capability that could deny and then control maritime spaces. But what is the real world answer to the question why the Aircraft Carrier? What value does a hundred year old operational concept have in an age of ballistic missiles, satellite surveillance, global drones and cyber warfare? How does the Carrier support a strategy that aims at wresting the initiative in the Indian Ocean in a competitive face-off? And how do a few squadrons of aircraft based on sea mobile platforms impact regional events disproportionately?

Maritime combat air operations in a century has transited from the first hesitant heavier than air flight to wide area domain transparency and control but this evolution was bumpy and far from convincing. The main stumbling block in the minds of strategists was, had gunnery, that had been the gauge of naval power for nearly five centuries, reached a state of decline that it could be unseated and supplanted by air power? At start the latter's vulnerability, fragility and inefficiency did not inspire the same certainty that technology prophesised. The rise of airpower at the turn of the twentieth century was therefore neither obvious nor was it readily accepted as anything more than an insignificant power tool. While much of this line of thinking was driven by the traditional gunnery biases and the investments already made in the 'Dreadnought' programmes;[15] there remained the undeniable capability that the seaborne aircraft brought to the theatre of operations: they could deliver payloads further than naval guns could with greater mobility, rapidity and flexibility; at the same time the parent platform could more readily keep pace with combat technologies as represented by its suite of aircrafts

and tailor them for designated tasks. In the shipbuilder's lexicon, the Aircraft Carrier is an open architecture weapon system with well-understood interfaces and parameters.[16]

It is tactically true that contemporary missile armed ships, submarines and shore based long range missiles including Anti Ship Ballistic Missiles pose a threat to the Carrier, as they do to all vessels. However, superior surveillance, cooperative engagement capability, mobility (a Carrier Group can move nearly 1000 kms in a day), range and payload of its aircrafts give it the upper hand in any tactical scenario. The Carrier, through the devise of its aircrafts, can hold an enemy ship or target at safe distances and then neutralize it by "standing off" and delivering a lethal strike. It can, depending upon circumstances either degrade enemy surveillance and command and control or altogether inhibit the capability to counter attack. The impact of a Carrier Group on operations and the centrality that it assumes in control of maritime space may be summarised as follows:

- Control of maritime space and assuring its security for any length of time is impossible without a standoff capability and this is provided by the Carrier Group.
- Functional diversity that the Carrier Group can bring to bear include: deterrence, support of amphibious operations, land attack missions, wide area domain awareness, command and control of large forces and personnel evacuation.
- The Carrier Group can sustain the conditions for long term offensive presence and power projection. It can, during the adversary's preparation and build up phase deny free access to his bases.
- The operational agility, firepower and flexibility that the Carrier Group provides to the Commander is unmatched by any other maritime force.
- As opposed to land forces and ground based air forces, maritime power particularly the Carrier Group represents the most potent yet the least intrusive of military power because it operates in and from international waters.

The Making of Carrier Based Aviation & Building the Carrier: Essential Technologies

The critical technologies that make for potency in Carrier based aviation relate to carriage and maintenance of a credible suite of combat and surveillance aircrafts; high sustained speed that permits and aids launch and recovery of aircrafts mission-optimised in terms of payload and to give mobility to rapidly transit from one theatre to the other; long endurance of both platform and payload to ensure persistent presence; catapults or a ski-jump to power the launch of aircrafts and arrester wires for recovery and structural matching of aircraft with the platform to endure the stresses of launch and wire-caught recovery (sometimes called "controlled crashes").

The Aircraft Carrier incorporates all of these critical technologies using steam as the motive force which remains today the state-of-art. While the future, in the Indian context, may hold nuclear propulsion for platform, magnetic striction catapult and a mix of unmanned and manned combat aircrafts; the principles of launch and recovery which includes the vertical profile and long endurance remain unaltered. From the designer's perspective, any technology that serves to enhance payload or platform speed will be welcomed.

The Staff Requirements which define the Aircraft Carrier and its aviation facilities complex is an exercise in balancing platform combat effectiveness with value, economy and time. The planner is strained to the extreme to meet with competing demands and then arrive at a precise compromise between "the desirable and what is possible". While, to the designer the ship is first and foremost a hull form which provides the correlation between platform and its environment of operation. Dimensions are often limited by the availability of a building dock if ab nitio infrastructure is not being developed.

The challenge before the naval architect is to provide a mould that meets with the optimal conditions of stability, seaworthiness, safety, good lines and a high speed to power ratio while providing for a large volume hull to accommodate the aircraft hangar, machinery spaces, fuel tanks and a host of other command and combat posts along with domestic spaces. The hangar is topped by a wide flight deck for launch, recovery and ranging on deck of an array of aircrafts from high performance jets to airborne surveillance in all three dimensions, heavy lift helicopters and unmanned aircrafts. The angled flight deck not only optimises space but also ensures that between launch and recovery there is no interference, deck movements of aircrafts are fluid and the launch recovery tempo is high. Catapults or the ski jump forward, arresting gear aft and lifts must also be installed on the flight deck. These factors by themselves give the Aircraft Carrier an amplitude and volume that no other ship in the Navy can match. Adapting forty to sixty thousand tons to the sea in all weather conditions calls for a major architectural thrust to stabilise the platform which push the environmental envelope for aviation operations.

From the Engineering and stealth point of view the design and cavitation speed of the propellers is of vital importance for speed and underwater noise and wake effect generated. Speed also provides for mobility and eases the launch and recovery problem. Selection of power plants must factor coaptation of desired endurance and high economical and maximum speed. The choice of a nuclear power plant is a strategic one which must be weighed against cost and increased time to build while its advantages lie in platform endurance being limited more by crew fatigue than anything else and that it frees space which may be used for aviation fuel or ammunition stowage. Choice of ship borne weapons and sensors must harmonize with aviation facilities and must keep in perspective the presence and role of consorts. Typically a 40,000 ton Aircraft Carrier would have about 2500 to 2600 compartments distributed between eighteen to twenty watertight sections and about sixteen to twenty decks. The crew would comprise of 2000 to 2200 personnel and domestic spaces and hotel facilities would cater for extended periods at sea.

The Indian Aircraft Carrier Programme

The Indian Navy has half a century of experience in operating Aircraft Carriers. However the translation of experience into a construction program never really got underway. When it did, ill thought of schemes such as the reconstitution of a commercial bulk carrier, building to commercial specification or even cloning existing Second World War designs were mooted. These ideas though on the face of it promising (some a hail back to the First World War!) failed the litmus test of platform survivability, mobility, versatility and modernity particularly when marriage with a contemporary fighter aircraft was attempted. Also these options provided very low operational value. Given this very

real predicament there was no alternative but to design abnitio based on doable Staff Requirements. It was here that operating experience proved invaluable (the failure of the Chinese experiment to reverse engineer from derelict carriers is attributed to this shortcoming). The upshot of these labours is that the Indian Navy today envisions commissioning one refurbished carrier and two new indigenous ones by 2025. These three carriers will endow the Indian Navy with a stable force level of two carrier battle groups at all times.

The history of the Indian program is inseparable from two ships, the INS Vikrant and INS Viraat. Vikrant was the first Indian carrier, built in the UK in 1945 by two shipyards – Vickers-Armstrong and Harland and Wolff, it was sold to India in 1957 and commissioned into the Indian Navy as the INS Vikrant in 1961. This light 20,000-ton carrier could carry on board 20 aircrafts, including the Sea Hawk fighter, Breguet Alizé Anti Submarine Warfare (ASW) fixed wing aircraft , and the Sea King ASW and Alouette helicopters. During the early 1980s, the Vikrant's dated Sea Hawks were replaced by Vertical Take Off and Landing (VTOL) Sea Harrier jet fighters. In 1997, with 36 years of service under the Indian flag, the INS Vikrant was decommissioned and preserved as a museum in Mumbai. In 1987, the Indian Navy obtained its second aircraft carrier, the INS Viraat. Formerly the HMS Hermes sold to India and renamed the INS Viraat and commissioned into the Indian Navy in May 1988. At 28,700-ton displacement, it is larger than the INS Vikrant and can carry on board 30 aircrafts, a mix of Sea Harrier jet fighters and Sea King helicopters, both ASW and and Commando versions, as well as Russian helicopters - the Ka-28 anti-submarine and Ka-31 early warning helicopters.

By 2004, Viraat, the only existing Carrier was fast approaching obsolescence and its aircrafts reaching the end of their operational utility. With no replacement on the horizon the Government of India entered into a strategic inter governmental agreement with Russia which included the sale of the refurbished aircraft carrier Admiral Goroshkov along with its suite of deck-based aircraft, as well as crew training for a price of 1.5 billion USD. Repairs, upgrades and reconstitution were to mutually agreed specifications and the refit was undertaken at the Severodvinsk Machine-Building Enterprise. The Carrier was renamed Vikramaditya. Initially, the ship's handover was set for 2008, but soon it became clear that a combination of poor planning on the Yard's part, work expansion and the rapid pace of Russian financial recovery and the consequential flight of labour all led to a near catastrophic slow down in progressing the work package. As a result, the cost of the contract increased to 2.2 billion USD and the handover was postponed to the fall of 2013. Despite delays Vikramaditya with its suite of MIG-29K jets will add a much needed fillip to the operational capabilities of the Indian Navy particularly its ability to control maritime spaces, power projection, functional diversity and the capacity to deny access.

The indigenous aircraft carrier programme has also been marred by the vicissitudes of time financial crunches and significantly, poor decision making. As early as1989 India announced a plan to replace its aging British-built aircraft carriers with new 28,000 ton that would operate the Sea Harrier aircraft. The first vessel was to replace INS *Vikrant*, which was set to decommission in early 1997. Construction of the Air Defence Ships was to start at the Kochi Shipyard in 1993. However the economic crisis of the early nineties forced severe cuts in defence expenditure and the plans for

construction of the vessels were shelved indefinitely. By the time the project was revived in 1999 for delivery by 2009 the aircraft match (Sea Harrier fleet) would have shown signs of age. The fact of having decided to restrict the Carrier to the Sea Harrier came with its own penalty which called for retooling the entire planning process. Finally the project called for a carrier that would carry modern jet fighters. In 2001 the concept was for a 32,000-ton Short Take-Off but Arrested Recovery(STOBAR) design with a pronounced ski jump. The aircraft carrier project finally received formal government approval in January 2003. By then design updates called for a 37,500 ton carrier to operate the MiG-29K. Final revisions to the design increased the displacement of the carriers from 37,500 tons to 40,000 tons. The length of the ship also increased from 252 metres (827 ft) to over 260 metres (850 ft).
The design of the second carrier features significant changes from *Vikrant* (the second avatar), which includes an increase in displacement to over 65,000 tons and using a Catapult Assisted Take Off but Arrested Recovery (CATOBAR) system to launch heavier aircraft like larger fighters, airborne early-warning aircraft and mid-air refuelling tankers. Design stage for INS *Vishal* has begun, it will be a flat-top carrier with a displacement of 65,000 tons and will have a CATOBAR system, unlike the STOBAR system on Vikrant. Naval versions of Tejas, Sukhoi and the Rafale M fighter jets are likely to operate from the carrier. The Electro Magnetic Launch System (EMALS) would appear to be the preferred launch system. The Vishal is expected to enter service by 2025.

Force Planning and the Balanced Fleet: Providing the Soul to the Carrier Programme

"India's maritime military strategy as defined identifies the country's role in its areas of interest, and outlines the maritime objectives for clarity in execution of this role. Since most maritime activities take place outside the country's sovereign jurisdiction they often need to be supported militarily, either directly or indirectly. The strategy outlines the guiding principles to provide a protective framework for the use of the oceans for our national benefit".[17] This definition is extracted from the document entitled "Freedom to use the Seas" issued by the Integrated Defence Headquarters, MOD India (Navy). The problem with such a strategy is that it does not make any effort either to prognosticate the challenges that are likely to emerge or for that matter does not make assumptions of the resources that would be made available for contending with such challenges. While in a different section of the document the maritime military strategy recognizes that the major task of the Indian Navy in the 21st century would be to use warships to support national foreign policy,[18]it does not define even in the broadest of terms what this foreign policy is, nor does it make an assumption of what the salients of the policy could be. In the absence of these critical issues that have been identified above the document remains flawed and fails to distinguish and fill the strategic gap between "maintenance of forces" and "its use". In yet another section it highlights that the ends of the strategy is deterrence without defining what is to be deterred; and then very quickly degenerates to the operational level stating that the document "provides a foundation for the planning and conduct of operations".[19]

Force planning must be driven by three overarching considerations. In the first part clear understanding of what the articulated national policy is; in the second part what challenges may arise in the short and long term to this policy and the nature of conflicts which clashing interests may degenerate into; the

last part must include an estimate of potential loss/harm that may occur to our national interests if we do not develop forces such as the Carrier group. While this may not be the subject of our study, failing to factor this into our aircraft carrier programme is to deny it a soul. To re-emphasise the criticality of the Aircraft Carrier and its complimentary group none of the military maritime missions listed below are tenable in the formers absence:

- War fighting which includes sea control, sea denial, anti access denial and littoral warfare.
- Strategic deterrence which would be a feature that would be persistent and consistent with our nuclear doctrine.
- Coercive maritime deployments.
- Co operative missions including intervention, peace enforcement and peace keeping.
- Diplomatic missions, policing and benign role.

The advantage that geography bestows us in the Indian Ocean must fully be exploited such that Chinese operations from any of the 'string of pearls' bases are covered by our own carrier borne long range strike aircrafts.

Conclusion

The ultimate reality of the international system is the place that power enjoys in the scheme of assuring stability in relations between nations. Uncertainty in international relations queers the pitch, in view of the expanded space of possibles. China has unambiguously articulated three canons that make for its strategic objectives; stability, growth and regional pre eminence. In the absence of a security oriented cooperative impulse, the problem with such sweeping strategies specifically the coming 'Third Island Chain' superimposed on a long range power projection and access denial is its blindness to recognize that, we are in fact dealing with a sea space that is the busiest of all the "vast commons". The reluctance for collaboration makes the potential for friction high.

Contemporary challenges in our areas of interest is dominated by what direction China's rise will take, of significance is that the potential for a collision is a reality and the only consideration that could deter it, is the ability to attain a strategic posture that serves to stabilize. The ready availability of the Aircraft Carrier and its complimentary group is central to any power equation and in consequence to stability.

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The Admiral retired on 30 September 2009, after nearly 45 years in uniform. He is today settled with his wife in the Nilgiris and passes down his operational and strategic experience through articles and participation in seminars that deal with his primary areas of expertise. He has contributed to various professional journals and continues to support his Alma Mater in Kochi through his writings. He has lectured at the Staff College, Higher Command College, the United Services Institute and the National Maritime Foundation. He is a member of the adjunct faculty of the National Institute of Advanced Studies and has tenanted the Admiral Katari Chair of Excellence at the United Services Institute. Internationally, his participation in the Track II Ottawa

Dialogue, the Bellagio Carnegie Endowment discussions, the Indo-Sino-Pak trilateral dialogue, Chaophraya Dialogue and the papers he has presented there seek to provide a new paradigm for nuclear security on the sub-continent.

End Notes

[1] Mahan. Alfred T, *The Influence of Seapower on History*. Hill and Wang 1957. 'Unity of aim directed upon the sea' is a recurring theme that finds articulation in Chapters 1, 9 and 11.

[2]Fukuayama Francis. "The End of History." *The National Interest*, 16 (Summer 1989), pp 4, 18.
[3] Huntington. Samuel, P. *The Clash of Civilizations and the Remaking of World Order*, Penguin Books, India 1997, pp 30-39.
[4] The World at War http://www.globalsecurity.org/military/world/war/index.html.The United Nations defines "major wars" as military conflicts inflicting 1,000 battlefield deaths per year. In 1965, there were 10 major wars under way. The new millennium began with much of the world consumed in armed conflict or cultivating an uncertain peace. As of mid-2005, there were eight Major Wars under way [down from 15 at the end of 2003], with as many as two dozen "lesser" conflicts ongoing with varrying degrees of intensity.
[5] Occasions of US military intervention 1989 – 2010 :
1989 - Panama, 1991 – Iraq, 1992 - Somalia,1994 – Haiti, 1995-96 – Bosnia, 1998 - Iraq, 1999 - Kosovo, 2001 – Afghanistan, 2003 – Iraq, 2009 – Pakistan (Drones), 2010 – Libya .
[6] Article by author titled **"**The Gwadar-Karakoram-Xinjiang Corridor", published in the September 2012 issue of the DSA. The Northern Passage was a fabled sea route theorised by adventurers, merchants and money chandlers over the last six centuries to link the Pacific with the Atlantic Ocean. The Route lay through the Arctic archipelago the treacherous ice flows that frustrate passage across the Arctic Ocean.
[7] Security analysts have examined China's efforts to develop weapons systems that can retard or even stop a potential adversary from entering an area of interest. Dubbed "access-denial," the aim of such a strategy is to use weapons that deter and should the need arise challenge or indeed prevent inimical forces from operating in conlict zones or oceanic areas of interest . The teeth of this strategy is an anti-ship missile. Such a missile, fired from land, sea, underwater or air can cause tremendous damage to an enemy surface vessel. While such technology isn't new, the effective ranges of such weapons have increased tremendously, along with their accuracy, speed of delivery and precision. Defending against such systems is therefore a major problem for planners
[8] Lewis John Wilson and Litai Xue, "The Quest for a Modern Air Force" in *Imagined Enemies China Prepares for Uncertain War,* Stanford University Press 2006, p237. General Liu Jingsong, a member of the 15th CPC Central Committee, he was also the PLA Commander of the Shenyang and Lanzhou military regions and to him amongst others is attributed the opening of Equatorial Guinea 1995.
[9] Smith Adam , *The Wealth of Nations.*
[10] *The Economist*, June 25th – July 1st 2011, special report China.
[11] Howard, Michael. *The Lessons of History*, Yale University Press New Haven and London, p39.
[12] Ma Cheng-Kun, *PLA News Analysis,* "Significance of 2008 China's National Defense White Paper" no. 15, pp. 49-60
[13] Ibid
[14] Corbett, Julian. *Some Principles of Maritime Strategy*. Longmans, Green and CO, London 1911, p.115
[15] Friedman, Norman (1978). *Battleship Design and Development 1905–1945*. Conway Maritime Press p19-21.
[16] Clancy, Tom. *Carrier*, Berkeley Books New York 1999, p 4.
[17] Integrated Headquarters, Ministry of Defence, India (Navy). Freedom to Use the Seas: India's maritime military strategy p. 3.
[18] Ibid p.11
[19] Ibid pp. 9-10 and pp.76-81