

## **THE INDIAN NAVY-A PERSPECTIVE VISION UPTO 2020**

**LtCdr JM Gosalves**

### **GEO- ECONOMIC SITUATION**

1. The closing decades of the twentieth century witnessed sweeping changes in the security perceptions of most nations. There have also been major changes in the security environment in the Indian Ocean. Albeit, India has made great strides towards economic progress and is continuing to do so. The momentum achieved cannot be sustained unless a certain measure of internal and external security is ensured.
2. Traditional state-centred geopolitics of the past was too narrow and parochial in conceptualising, both, geography and politics, and, appreciating the impact of the oceans on politico-economic forces. As politics becomes more civil society oriented, transcending state-centric concerns and as geography becomes more humanised and eco-centric, the interaction between the two would result in geo-economic and geo-strategic factors replacing geopolitics. More than ninety five percent of India's trade is sea borne, in addition to which, the country has a huge EEZ with enormous reserves of minerals, energy and food. Protection of India's maritime interests, which form a major chunk of the country's economic interests, is therefore vital.
3. It is necessary to plan ahead and prepare for this inevitable metamorphosis, in which the maritime element will become more and more important. Potential threats interfering with our maritime interests will have to be overcome, firmly and resolutely and efforts made to coax regional players into maritime co-operation for mutual protection of economic interests.

4. In view of the above there is a need to take stock of the situation and formulate a perspective vision of the Indian Navy during the period up to 2020. India's intended nuclear stance and technological developments enveloping defence forces worldwide would have to be judiciously catered for.

### AIM

5. The aim of this paper is to examine the role of the Indian Navy during the next two decades vis-à-vis India's maritime interests, and suggest, a viable force structure and outline plan of action for attainment of the same.

### INDIA'S MARITIME POWER POTENTIAL

6. **Continental Outlook.** During the last fifty-one years, India's attention has been deliberately diverted to its land frontiers. The attempt is to prevent its strategic gaze from focussing on the maritime surge enveloping the country from the East and West. India cannot be a great power unless it is willing to shift to the doctrine of sea-air-land battles with primacy in the Indian Ocean, Bay of Bengal and the Arabian Sea. Historical evidence indicates that a nation, without a commitment to build a world class Navy, cannot be a world class player.

## **7. Influences in the Indian Ocean.**

(a) India deserves to aspire to play the role of a regional power in South Asia and a facilitator for regional cooperation. Since independence, India has made substantial progress in establishing its pre-eminence in the Indian Ocean region.

Its involvement in the liberation of Bangladesh, peacekeeping operations in Sri Lanka and suppression of the coup in Maldives are some examples of its superior power status in the region. Although, not at the receiving end of the dictates of other powerful nations of the world, it also does not have the leverage to influence international affairs substantially.

(b) India's potential lies in its geo-strategic location, size and distribution of its island territories in the Indian Ocean. It has vast natural maritime resources, both, living and nonliving of which, only a limited amount have been exploited. It has a large reserve of human resource in terms of professionals and technically trained persons. Its economy is growing, specially with liberalisation and relaxation of governmental controls. Though the response from the developed countries is that of caution, the potential of the Indian and other ASEAN markets would continue to lure foreign investors. India has achieved a high degree of self-reliance in the field of science and technology, however, has yet to exploit its complete potential.

(c) Considering its power potential, its relationship with its neighbours and its pre-eminence in the region, India is likely to establish itself as a regional power in the Indian Ocean in the coming decades. This would be in consonance with India's anthem for the future, professed by Dr APJ Abdul Kalam, which reads, "A developed and strong India by 2020, or even earlier, is not a dream. It may not even be a mere inspiration in the minds of many Indians. It is a mission we can all take up and accomplish".

8. **Indian Parliamentary Maritime Group.** Although the political class has continually cast a blind eye towards the sea, a step in the right direction was taken on 12 Nov 1999, when the Indian Parliamentary Maritime Group, was launched. The group comprises an all party forum of members from the Lok Sabha, Rajya Sabha and maritime organisation representing naval, merchant naval shipping, shipbuilding and marine environmental interests of India. The group is expected to raise issues of maritime interest, which will enlighten and force our politicians to look towards the sea. The presence of such a group in parliament is bound to give much wanted impetus to the harnessing of our maritime potential and is expected to formulate a maritime policy for the nation.

### **PERCEIVED CONFLICT AREAS**

9. **Exploitation of Undersea Resources.** The conflicts over the use of ocean space arise principally from two developments. The first, an explosion of technological advances in exploiting mineral resources in the sea bed, and second, the rising influence of developing countries in asserting their claims to the benefits of such exploitation.

10. **Delimitation of Maritime Boundaries.** Indian is yet to settle its maritime boundaries with Pakistan and Bangladesh.

11. **Ownership of Islands.** The increasingly broad coastal state jurisdiction would lead to disputes over islands which can increase the area coming under a states control by acting as an anchor point from which to draw base lines. The discovery of resources in nearby ocean space would act to exacerbate the situation. Dispute over the Sprately islands, New Moore Island or Rockall etc, typify this potential.

12. **Environmental Concerns.** The environmental concerns of coastal states have been strenuously opposed by states with shipping interests who fear that pollution regulation by coastal states may meddle with freedom of navigation.

13. **Oil Flow from the Gulf.** In the context of oil and energy dependency, the Persian Gulf-Arabian Sea is becoming increasingly critical to India's vital interests. Pakistan in recent years has been expanding its naval forces. It has developed ports Gawadar, Pasni, etc, which are abeam of our oil flow from the Persian Gulf and very close to the choke point of Hormuz. At the same time India's offshore installations in the Arabian Sea face a potential threat from the expanding Pakistani naval forces.

14. **Chinese Presence in the Indian Ocean.** China did not hesitate to occupy the Paracel Islands in 1971 and declared her intention to recover the Spratleys as well as the Senkaku islands which are presently under Japanese control. Beijing intends to further improve the Karakoram highway to Pakistan, which will eventually connect China to seaports in the northern Arabian Sea. Her interest in Myanmar is similarly to revive the famous Burma Road. Beijing appears keen to modernise ports at Sittwe near the Bangladesh border and Mergil on the Thai border as also Haingyi Island in the Bay of Bengal for facilitating Chinese trade and commerce. In addition, radar installations have been upgraded in the Great Coco Island. Reports have emanated from China wherein a General of the PLA navy stated that they would extend operations into the Indian Ocean to prevent India from dominating these waters. The Indian Ocean becoming India's ocean is something they aren't prepared to accept.

## **ROLE OF THE INDIAN NAVY**

15. **Fallout of India's Draft Nuclear Doctrine.** With an overt nuclear capability and intent of building up a 'credible minimum nuclear deterrence', India is on the probable and logical path of weaponisation and of achieving nuclear stability with a mutuality of deterrence against potential adversaries.

16. India has voluntarily imposed upon itself a principled and moral 'no-first-use' clause. However, the ability to rapidly retaliate would be necessary. India's nuclear forces would have to be organised and deployed, to ensure survival and the ability to endure repetitive attrition attempts with adequate retaliatory capability.<sup>6</sup>

17. **Safeguarding National Interests.** With the country's economic reform programme gathering momentum, protection of trade, defence of our territory, islands and offshore maritime interests would no longer be sufficient, however, would perforce have to include defence of national interests. India would, therefore, be forced to re-look at the role of the Indian Navy, keeping in mind factors associated with its changing nuclear status. Important aspects to be paid attention to, would be as follows: -

- (a) Capability to protect overall economic development, interests in our EEZ and our sea trade.
- (b) Non-allowance of any outside interference.
- (c) Maintenance of adequate influence over regional competitors.
- (d) Development of adequate influence to deter outside states from lending support to regional competitors.

- (e) Shift to view the islands in the Indian Ocean, as platforms, to dominate the region and exercise influence over the neighbourhood.
- (f) Ability to create a massive intervention from the sea, as part of the naval contribution to the overall war effort to terminate a continental war.
- (g) Capability to adapt to littoral warfare.
- (h) Capability of executing the nations eventual second strike. However, this is still seen as a deterrent and would not be usable in the strategic sense.

18. **Facilitating Regional Co-operation.** A multi purpose and resolute sea force could cost effectively deter, negotiate and persuade opposing parties to amicably settle their differences by sitting across the table. Nations in the Indian Ocean, in particular, are keen to develop their economies and enhance bilateral and multilateral co-operation, and further, to promote stability in the region. Hence the ocean could be transformed to be an area falling under the rubric of 'cooperation' rather than 'conflict' as maritime activities would tend to be located in a less emotive environment. Broadly, the specific areas of naval co-operation and initiatives are envisaged as under:-

- (a) Conduct of joint exercises and manoeuvres.
- (b) Striving for greater transparency and provision of advance information about exercises and manoeuvres above an agreed threshold.
- (c) Setting up of a joint task force to cater to natural calamities.
- (d) Initiating a dialogue to establish an Indian Ocean forum that could draw upon SAARC and ASEAN, for example, and such littorals not part of any association as also the extra-regional navies.

- (e) Pooling the expertise / experience of nations in specific areas, such as ship design, shipbuilding and hydrography.
- (f) Establishing of common training facilities where high capital expenditure is involved such as missile ranges, submarine training escape school and underwater ranges.
- (g) Making joint efforts to tackle maritime pollution, conservation of maritime environment, sea based traffic in narcotics, piracy, global smuggling, poaching (beyond the capability of Coast Guards) and rescue at sea.
- (h) Ensuring the safety of sea lanes in specific areas by establishing 'presence' in mutually acceptable manner.
- (i) In short, these proposals envisage the perfect cocktail of international relations, wherein Balance of Power, Balance of Interests and a Respect for Sensitivity for each nation state is maintained.

## **TRENDS IN NAVAL WARFARE**

### **Future Ship Design**

19. **Fleet Combat Ship.** The fleet combat ship, eventually replacing today's guided-missile cruisers and destroyers, would be designed to engage in anti surface, anti air and anti submarine warfare and it could carry out power projection missions. Its weapon suite design would emphasise the sensors needed for these missions, including surface radars, sonars, and aerial early warning systems. It would be able to operate

Helicopters for anti submarine and mine warfare, and unmanned aerial vehicles (UAVs) for reconnaissance and targeting. It would have all the necessary links and nodes for C4I2 within the overall naval force combat system. If missile technology advances meet expectations, such a ship may not need guns except for self-defense. Close-in defences using laser weapons for defense against antiship missiles, wherein the incoming targets could be illuminated from the side, would mature in time to be included in these ships' weapon suites.

20. **Ship Building**

(a) Naval ships take roughly ten years from the drawing board stage to commissioning and have a life expectancy of around 30 years. 'The rapid rate of obsolescence of naval weapon systems has to be catered for, by planning built in reserves. We have already experienced such situations and must be ready to accept that designing the 'silver bullet' may not meet up to future contemporary systems and would thus bely many an expectation. Advanced surface combatant designs would incorporate and extend many features currently in experimentation on today's ships. Indeed, once these features are developed to the application stage, many of them could be retrofitted to greater or lesser extent in today's ships at major maintenance and overhaul milestones during their service lives to increases survivability, system reliability, and ship service life.

(b) The philosophical approach to shipbuilding would have to change if the price ration of ship construction are to be taken care of. The hull accounts for about one third the cost of the ship, whilst weapons, sensors and navigational aids account for another 42 percent or so, leaving machinery and auxiliaries the balance 25 percent. A ship would become current if the 42 percent were to be replaced every 10 to 15 years for a mid life update. To make this worthwhile

the remaining 58 percent would have to be of quality to ensure the backup endurance. To illustrate this, a generator with a lesser horsepower to weight ratio may sound more advanced compared to that with a greater ratio, however, with a longer running hour limit between overhauls, the latter would be a more important factor in building a longer lasting platform.

21. **Instrumentation.** Instrumentation would be fully integrated and automated using distributed and networked sensors, actuators, and microprocessor controls to minimise crew size and maximise efficiency. This would include damage control, a very sensitive area that is currently a major determinant of crew size.

22. **Ship Signatures and Vulnerability.**

(a) The active and passive signatures of ships would be managed in all aspects, viz., wake reduction, noise reduction, hull and superstructure shaping, and electromagnetic and infrared emission control. This would help acoustic and electronic countermeasures function much more effectively to mask ships under combat conditions and to make detection and tracking difficult for opponents.

(b) Ship vulnerability to hits will always be a problem. Signature reduction and active defence would help reduce the chances of hit. The chances of surviving a hit could be greatly improved by known design features such as separation of critical, redundant system elements (such as fiber-optic lines and instrument networks), and by automation in damage control that reduces response time and more accurately focuses damage control efforts. Finally, armour could be applied selectively to critical areas such as magazines and combat direction centers. All such measures are in the pipeline today, in the design of modern warships, with serious attention to automation in damage control being the newest addition to the list.

23. **Speeds.** As the speeds of ordnance delivery increases and with superior computational speeds as well as faster missiles, the significance of higher combat speeds will disappear. Speeds will be relevant to effect quick deployment and to maintain the high flexibility of naval forces. These speeds are not obsolete in number, but a figure on the basis of which naval forces are expected to re-deploy. This would be in the region of 23-24 knots, sustained. Higher combat speeds would be irrelevant to achieve tactical superiority.

### **Aviation Platforms**

24. Tactical naval aviation would grow, as indeed it must, if navies strive to increase ranges by taking sensors up into the sky. Aircraft are likely to be the biggest beneficiaries of miniaturisation; the effect of which has already been felt in the 'Sidetrack' concept where a pod carried by a Harrier provides an immense airborne early warning (AEW) picture from 45,000 feet, through data-link, albeit temporarily. Aircraft innovation, like the tilt rotor (already capable of 230 knots and a ceiling of 22,000 feet) and Advanced Compound Helicopter would enable large ship smaller than carriers to operate aircraft. Manned naval aviation would grow as the AEW and ELINT package becomes smaller. So would the Joint-STARS package come into the Indian navy in the same way that the smaller version has now been fitted into a commercial jet for the British forces?

25. **UAVs.** The function of AEW would be rapidly taken over by UAVs whose only limitation would be the antennae size. UAVs would be developed for general targeting, AEW, and providing communication relays.

### **Sub-surface Platforms**

26. As the surface of the ocean becomes more hazardous, the change to AIP and nuclear propulsion would become more urgent. The incorporation of submarines into the overall tactical picture by means of a satellite based system would remove the shortcoming the submarine currently suffers in being unable to see the big picture with own sensors. The entry of submarines into the field of tactically coordinated operations, special operations, reconnaissance and land attack would see this platform depart from its traditional role of sea-denial into finding its place as a capital ship of any navy. Besides, the submarine, without doubt would be the second strike capability of the future nuclear scenario. Submarines would have to undertake the entire spectrum of land-attack missions. It could be argued that surface ship vulnerability may favour the submarine as a forward-positioned missile launch platform for ballistic missile defense.

### **Revolution in Military Affairs**

27. The extraordinary technological advances currently taking place in satellites, sensors, communications and computers, coupled with new ideas about naval tactics and force structures, would lead to, what military planners regard as, one of the most sweeping revolutions in warfare. The world is entering into one of those rare historic periods, when new capabilities would combine with new doctrines and tactics to produce unprecedented revolution in military affairs, sparked by the exploitation of Information Technology. In future, military commanders would talk about, the need to obtain 'Information superiority', akin to Aerospace Superiority.<sup>14</sup>

28. **Communication Technology.** Today, naval communications are primarily accomplished via low-bandwidth voice, text and data. The operational use of technology such, as video teleconferencing is uncommon. Higher-bandwidth communication via satellite would enable video teleconferencing among ships and shore

assets. Operational effectiveness and personnel efficiency could come about with seamless communication at sea and ashore. This would imply compatibility of operational procedures and physical interfaces onboard and ashore for switching from satellite communications to PSTN and data networks. It should be kept in mind that communication technology is driven and would continue to be driven by the commercial sector, which is more advanced. With the growing use of optic fibre cables, increased channel rates and channel bandwidths would increase in much the same ways, the shift from HF to SATCOM in the past two decades.

29. **Command and Control.** Higher-bandwidth interaction would enable widely distributed Tactical Commanders to meet online, and understand time-critical information in a shared electronic environment that would provide an adequate illusion of shared presence. Future command centers would exploit a range of technologies that are now under development in both commercial and military sectors, including speech recognition and synthesis, high-resolution projection displays (two- and three-dimensional), shared information visualisation, resource and mission planning, simulation, etc. These technologies would be integrated in a cohesive system that would provide the means for groups of individuals to understand complex situations. Future system effectiveness would depend on human-centered-system approaches that would enable commanders to interact, using systems in more natural ways with three-dimensional vision, hearing, speech, gestures, and touch.

30. **Information Warfare.** Rapid access to appropriate knowledge at all levels would optimise war-fighting and crisis response capabilities. Instead of massive forces and fire power, we would have to rely, increasingly, on information technology. This would be necessary to outsmart adversaries by knowing enemy positions more precisely, attacking them more quickly and fighting more decisively, while having to put fewer lives to risk. Safeguarding of own and exploitation / disruption, of the enemy's information spectrum respectively, would constitute information warfare and would comprise the following major elements: -

- (a) Command and control warfare.
- (b) Electronic warfare.

(c) Psychological warfare.

(d) Cyber warfare.

31. **COTS and Dual Use Equipment.** So far warfare has always looked to technology to provide more 'bang for buck'. The rapid pace of advancement of technology would continue, if not increase, in the coming decades. In quantitative terms, it is accepted that more technological advancement took place in the last quarter century than in the previous seventy-five years. With the adoption of COTS and dual use technology, the navy would be forced to take advantage of and keep pace with technological developments in the commercial world.

32. **Software.** Software would be dominant in almost every type of system, from administrative software for payroll, inventory control to command and control, fire control and weapon imbedded software, etc. General use software would be governed by and would have to keep pace with commercial trends. Planning and decision-aids would be used for logistics, resource allocation, inventory planning, mission planning, force structures selection.

### **THE FORCE LEVEL MIX**

33. **Defining the Task.** Strategic deterrence would have to be based on a mix of nuclear weaponry, delivery means and strong conventional forces. The need to maintain a conventional edge to prevent subsequent conventional conflicts would form a key element of deterrence. The area of operation of the Indian Navy is about nine million square miles. Closer home India would need to exercise total sea control, however around the sea-lanes the level of dominance could be allowed to degrade a little. While routine surveillance of these areas could be carried out by satellite, investigative surveillance would require manned aircraft. Ships of around 3000 and 6000 tonnes,

aircraft carriers, submarines and long range patrol aircraft would be preferred to act in such a large area without any whistle stops. Small combatants packaged to deliver the largest punch in the smallest hull would have no place in our environment. Long legged ships, not requiring frequent fuelling and maintenance would be necessary. From the technical and maintenance point of view, also, it would it would make eminent sense if the machinery, equipment and main sensors were to be standardised between two kinds of ships, of around 3000 and 6000 tonnes with aircraft carriers built around the same propulsion and auxiliary machinery.

34. **Influence of Technology.** Technology advances in recent years have introduced new concepts in navel strategy. To the navy's primary role of sea control, they have added two new dimensions of strategic deterrence and projection of sea power ashore. India already has a base level in all the fields mentioned. The navy will have to move forward in all the areas talked about so far or, else, expose herself to serious degradation of her combat efficiency levels below that of some of the smaller but better funded navies.

35. **More 'Bang for Buck'** Owing to the enormous surge in costs of funding the naval strategic component of national nuclear deterrence as well as investing in the assets that create information dominance, the Indian Navy would have to give up all frills. Even if the naval budget were to increase dramatically to offset the cost of building nuclear submarines, the cost of individual platforms would require an economising of numbers to offset the spiralling costs of technology. Frills could be given up in the following manner: -

- (a) Transfer of all preventive duties of a patrol nature to the Coast Guard.
- (b) Activation of all minesweepers and maintaining a containerised mine hunting capability to be carried out onboard hired Off Shore Vessels. This would be possible owing to the change to mine hunting instead of minesweeping.

(c) Transfer of major sealifts and amphibious lifts to merchant ships of the SCI.

(d) Exit from all brown water operation.

36. Simultaneously, whilst affecting the above trimming, the Navy would have to cater for the following: -

(a) Judicious update of the punch of her existing fleet to match current technology in weapons, sensors and other equipment.

(b) Design of new ships to evolve from the Fleet Combat Ship concept, and capable of operating UAVs from onboard. Concentrate on two types of surface vessel of approximately 3000 and 6000 tonnes displacement, aiming to build 12 of each to stabilise at 24, and supported by large fleet tankers.

(c) Decommission progressively all patrol aircraft not capable of 15 hours flying time and raise the numbers of four engine aircraft to achieve a 1:1 ratio with surface vessels.

(d) Maintain a mix of diesel and nuclear submarines initially; however progress towards an all nuclear force of SSBNs and SSNs by 2030.

(e) Build a carrier group comprising two CVBGs capable of sustained operations of 100 days at a time with necessary auxiliaries.

(f) Build an amphibious group capable of landing one reinforced battalion in the first wave, including helicopters, landing ships and landing craft, retaining a brigade lift capability with STUFT.

## **Infrastructure**

37. **Research and Development.** The changes envisioned in this paper cannot be brought about, without, first and foremost, encouraging and supporting the research and development efforts by our DRDOs and other research organisation. In the light of sanction they would form the backbone for our continued and uninterrupted advancement in technology to keep abreast with, if not, to forge ahead in their respective fields. The navy must therefore, constantly identify and indicate technologies of interest, for research and development by these organisation.

38. **Space Applications.** Satellites would play a major role in future information systems, remote sensing, etc, and their potential would have to be tapped to the fullest.

The Indian Space Research Organisation is well accomplished and has carried out pioneering work in many areas. The navy must forward a white paper indicating its specific areas of interest, for developmental work by the organisation.

39. **Intellectual Resources.** The incessant brain drain from our Indian Institutes of Technology should be curbed with offers for more rewarding perks in our own country akin to what management graduates are receiving. Channelising this immense potential resource pool towards DRDO and ISRO efforts would give an invigorating boost to the research efforts.

40. **Shipbuilding Yards.** The backbone of the ship building industry is the public sector shipbuilding yards. Close liaison with these yards would ensure that our specific requirement for the future is met, including STUFT.

41. **Dockyards.** Personnel infrastructure in the Navy, today, consists of about 50,000 uniformed personnel and 50,000 civilians. The Major portion of the civilian strength is taken up by the two dockyards, whose personnel strengths were based on the absurd and irresponsible union rules of the sixties and seventies. With the shake out in all industries facilitated by clubbing jobs, it would be possible to reduce dockyard

strengths to about 6000 each from the present 12000. Heavy specialised works could be off-loaded to trade and private dockyards.

### **HUMAN RESOURCE MANAGEMENT AND DEVELOPEMNT**

42. **Operational Personnel.** The personnel and recruitment patterns would have to undergo major changes with the executive branch having to be downsized or taking on technical responsibilities that it is currently incapable of. New rates or new emphasis on qualification in electronic warfare, satellite photo interpretation, unclear engineering, airborne ASW operations will have to be freshly created and built up. The ND and communication branches will have to merge to become the operations branch in the first phase and later on to absorb the RC and UC rates with their sensor control functions. The hardware group will have to be built around a new rate similar to the now defunct QA rate. Many of these changes have already been attempted by other navies years ago and we shall not be pioneering any new steps in this regard.

43. **Specialised Personnel.** Rapid advancements in technology would leave a generalist groping in the dark. It would be necessary for technical personnel to be vertically specialised in a specific field; be it missiles, gunnery, anti submarine warfare, nav aids, communications, software or hardware development, system interfacing, action information systems, airborne ASW. Technically non-proficient sailors have no place and it is interesting to note the acrimony that arose recently in the pages of US Naval Institute Proceedings where an American author stated that the expertise of most European Petty Officers was below that of US junior rates.

44. **Harnessing Human Resources.** Human resource is an intangible factor, which, if harnessed, has the potential of a force multiplier, Careful thought must, therefore go into cultivating it, for optimum results.

(a) **Recruitment Philosophy.** By virtue of India's population, there would never be a shortage of volunteers to join the navy. However, the navy would have to compete with the civilian market for quality personnel. Among the many factors in this competition would be: -

(i) The need to provide working and living conditions that would encourage personnel to embark on a naval career ahead other careers in the civilian world.

(ii) In terms of both economics and force effectiveness, it would be important to keep personnel in the forces longer. There would be advantages in recruiting people who are, on an average, better qualified than today's recruits. Recruiting would have to be more aggressive and may have to tap people in the personnel pool, such as college graduates or individuals in mid-career, before they are usurped by the civilian market.

(iii) Research confirms that people feel more satisfied with their lives if they are satisfied with their jobs, and that good matching of people to jobs leads to better job performance and greater job satisfaction. The well-known psychological tests and associated techniques for accomplishing such matching must be honed and adapted to changing environment.

(b) **Training Philosophy.** The future navy would comprise both, male and female personnel, who would hail from a variety of cultural and education backgrounds to which the training systems would have to be sensitive and adaptive.

(i) All major navies are being designed to operate with fewer people who have more technical capability at their disposal. Technology, in the form of elaborate, networked instrumentation, automated machinery controls, and integrated information and communication systems that can generate fast responses. The functions affected will vary from shipboard damage control and system maintenance to target acquisition and weapon firing, all of which will be performed with fewer personnel in future naval systems. Personnel would have to be considered as integral parts of the overall system, from its inception.

(ii) More emphasis would have to be laid on simulators to speed up training and improve job performance, thereby shortening the time required for more expensive training with actual systems and forces in their real environment.

(iii) It is close to impossible for an individual to keep pace with the proliferation in electronics and wide spectrum of evolving digital applications. Vertically specialised training would be essential to ensure in depth knowledge of systems for optimum exploitation, upto junior officer level.

(iv) Although much debate has been generated on a single operator maintainer concept, the same would not be feasible due the preceding argument.

(v) Computer and communication networks would allow distributed training, so that one expert instructor could train people simultaneously at widely dispersed locations, with a consequent reduction in travel costs and time away from assigned stations.

(vi) Training costs are never lost and it is extremely important that individuals be made to undergo regular training updates to keep abreast with the rapid changes in technology.

(vii) Well qualified and trained personnel are the wealth of any organisation and therefore would have to be retained for maximum period thereafter to enable obtain optimum returns.

(c) **Quality of Life.** Military careers would find it increasingly difficult to compete with civil careers in terms of pay packets. However, quality of life, which is the forte of the defence forces, would have to be maintained by way of improvements in services offered.

(i) Policies of the navy that value and support their personnel should be seriously and effectively implemented.

(ii) Special attention would have to be paid to promotion prospects to ensure that stagnation and consequent frustration does not take place.

(iii) Technology can also improve the work environment in many ways, from enhancing comfort to providing adequate and suitable tools and machinery to get jobs done.

(iv) Personnel at sea, perform better if the security of their families is ensured. Personalised attention would have to be given to the quality of housing, education, medical care, work opportunities for spouses and elder children, and all the other tangible and intangible factors that lead families to feel satisfied or dissatisfied with their daily lives.

(v) Personnel on deployment also wish to keep in touch with their families; a need that is possible to meet with today's worldwide

communications networks. Shipboard routines must provide for is, and must do so without compromising ship or base security. Technical means must be devised to support a policy of keeping in touch with families without jeopardizing the force or its operations.

(vi) There is also evidence that personnel feel benefited if they can use their spare time to advance their education and technical skills, leading either to better promotion prospects or better job prospect on leaving the navy.

## **OUTLINE PLAN**

### **Formulation of maritime Policy**

45. **National Security.** Protection of geo-strategic and geo-economic interests would present the navel forces with operational challenges that could best be met through the development of deterrent capabilities derived from the wide spectrum of rapidly advancing technologies.

46. **Regional Co-operation.** The situation in the Indian Ocean is undergoing positive changes with most of the regional hotspots turning in the direction of political solution. The focus would have to be on creating an environment of regional co-operation for mutual facilitation of economic development and thereby protection of own economic interests.

47. **Creating Political Awareness.** The Indian Parliamentary Maritime Group would have to take on the onus of educating and enlightening our politicians on maritime philosophy and developments, to enable framing of a visionary maritime policy based on national security and regional co-operation.

48. **Jointmanship.** A convergence of major financially, technically, and operationally driven trends would require that naval forces increasingly operate jointly with other services and national forces and resources. Extensive equipment and mission sharing are implied, as would be needs for multi-way compatibility and interoperability, task sharing, and information sharing among all the elements of the joint operating and war fighting systems.

### **Adoption of Technologies.**

49. **Commercial Technologies.** The world of technology is advancing at a blistering pace. Many advanced technologies are now available globally and to future adversaries. To maintain technological superiority and dominance of the battlefield, the naval forces would have to be agile users and adapt these 'commercial-of-the-shelf' technologies, rapidly, for military use.

50. **Sustained Research and Development.** Sustained and focussed indigenous research and development would be necessary for self-reliance. The nation may tend to dilute the thrust in this area due to budgetary strains post globalisation. Budgetary constraints would continue in the future as well, however, resources would have to be efficiently and effectively allocated to R & D, unique to the navy, army and air force, and in a timely manner.

51. **Fusion of Military and Commercial Technologies.** The navy would have to inter-operate evolving commercial technologies in knowledge extraction, data management, and data presentation, conjointly with unique military technologies in data linking and target acquisition to deal with the increased complexity and tempo of warfare.

### **Countering the Digital Battle**

52. **Computers.** Computer technology would be a major enabler of future naval operation. Computers would enable enhanced situational awareness, realistic modelling and simulation, faster war fighting decisions, more effective weapons, lower-cost platforms, and more efficient and effective use of people. The navy should exploit the continual evolution of commercial computer technologies into robust computational systems.

53. **Communications.** The navy would have to engage in early exploitation of the rapid growth in commercial communications capabilities, including satellites and fiber-optic communications, to acquire the necessary increased bandwidth and diverse routing for future networking needs. The navy should also prepare for graceful degradation of these systems in times of warfare.

54. **Information Warfare.** The naval information systems would have to be protected against increased software and electromagnetic information warfare attacks and other vulnerabilities. The navy should develop offensive information and electronic warfare technologies to find, identify, and attack adversary systems and to strengthen own systems.

### **Arriving at the Right Force Level Mix**

55. **Force Structure.** After trimming the tasks of the navy, the force structure should look at platforms that convey combat power to the location where it is needed and weapons that deliver the requisite combat power against opposition targets. The weapons would strongly influence the design of the platforms. It should then examine the design of ships, aircraft, and submarines that would use those and other weapons. Mid life updates of existing ships and judicious design of new ships, should be planned,

so that the navy is able to protect the country's maritime interests despite budgetary constraints which would remain a nagging factor.

56. **Infrastructure.** It would be necessary to encourage and tap the country's immense research, development and intellectual potential, along with expertise in shipbuilding in order to meet our future requirements, without having to get bogged down by external pressures.

### **Human Resource Management**

57. **Recruitment and Training.** Recruiting would have to be more aggressive as well as selective. The overall intellectual capability of personnel would have to be of a higher order from the inception stage itself and would later have to be honed with superior and efficient training methodologies, to handle advanced and complicated systems.

58. **Quality of Life.** Constraints with offering lucrative pay packets would have to be made up for by improvements in the quality of services provided to personnel, in order to attract quality personnel and keep them satisfied.

59. **Specialisation.** All persons would have to be technically trained and vertically specialised in a particular field for maximisation of the force multiplication effect.

### **Planning**

60. Adept planning and a sound amalgamation of the above factors would enable the Indian Navy to build the right force level mix, intrinsic to protection of the geo-economic and geo-strategic factors that would affect the country's national security policies.

## **CONCLUSION**

61. Geo economic and geo-strategic factors would soon gain significance in our national security environment. Protection of maritime interests, which forms a major part of the country's economic interests, would therefore be necessary. Potential threats that would tend to impinge upon our maritime interests would therefore have to be deterred. A strong and resolute naval force would not only ensure this but would also facilitate co-operation in the region, thereby promoting overall stability.

62. With the revolution in military affairs and advancements in technology, the navy would have, but no option, than to constantly keep abreast with these trends. In order to overcome budgetary constraints, some of the superfluous tasks undertaken by the navy would have to be trimmed and all frills cut whilst carefully planning mid-life-updates of its existing fleet and judiciously designing new incumbents to arrive at the best force level mix. Infrastructure existing and the intangible human resource element would have to be harnessed and exploited to the fullest.

63. Framing of a suitable maritime policy, on the initiative of the Indian Parliamentary Maritime Group would offer a framework for the Indian Navy, to work towards building the right force level mix capable of protecting the country's maritime interests.

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