



INS Arihant and Credible Nuclear Deterrence

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Rather expectedly, the occasion of the launch of INS Arihant, India's first nuclear powered submarine, was hailed across the media as the realization of India's quest for a triad of nuclear delivery capabilities. The ability to deliver nuclear warheads from aircraft had existed even prior to the nuclear tests in 1998, and since then land-based missiles of varying ranges have also been operationalised. It was the sea-based leg of nuclear triad that had been pending, and on July 25, 2009, when Prime Minister Manmohan Singh oversaw the flooding of the dry dock at the Ship Building Centre at Vizag, that too was hailed to have been completed.

The occasion drew attention to the scale of the achievement of all the organisations that have been stakeholders in the development of the vessel. For the Department of Atomic Energy, it was a watershed in terms of demonstration of its ability to indigenously master Pressurized Water Reactor (PWR) technology to develop a reactor capable of generating requisite power and equipped with modern safety mechanisms but which could be fitted into the limited space of the submarine and be able to withstand high pressure conditions. The reactor is likely to go critical in a year's time. The DRDO deserves credit for the indigenous K-15 class of ballistic missiles that the SSBN would eventually be fitted with. Presently tested up to the range of 700-750 kms, the conventional and nuclear capable missiles with a carrying capacity of a 1000 kg warhead will of course, have to acquire far greater ranges of not less than 6,000 to 8,000 kms for them to be meaningfully deployed. The Navy has demonstrated its capacity to coordinate a project of this size as well as

its own ability to design and build a complex machine with hardened and fused electronic, fire fighting and electrical systems. Last but not the least, INS Arihant showcases the strength of the indigenous private sector such as Larsen and Toubro and Walchand to build and weld submarine hull sections, and produce pipes, cables, pumps, gearboxes, generators compressors and air conditioning machinery, etc., which can withstand pressures at great depths.

While excitement is certainly called for given the remarkable triumph of Indian science and technology in overcoming years of denials and sanctions to master a technology available with literally a handful of nations, the journey to an operational SSBN fleet is only yet begun. The submarine is yet to undergo harbour, sea and weapon trials. But the event demonstrates that slowly and steadily India is moving towards credible nuclear deterrence.

This paper examines the launch of INS Arihant in the larger context of the pre-requisites of credible nuclear deterrence. Briefly examining the global trends on the triadic delivery capabilities, the paper specifically focuses on the role that SSBNs would play in India's nuclear strategy premised as it is on a counter-strike doctrine. The paper also highlights some of

the challenges that will have to be grappled with at the domestic and regional levels as and when the SSBN fleet becomes fully operational.

Pre-requisites of Credible Nuclear Deterrence

Existential nuclear deterrence emanates from the basic reality of the existence of nuclear weapons – irrespective of their yield or numbers¹. The mere fact that there

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is some sort of nuclear capability that can impose a punishment that would be higher than the value of the benefit sought is normally enough to deter. Deterrence practiced by North Korea against the USA is an example of this. Through the conduct of nuclear tests in October 2006 and April 2009, however imperfect or unreliable, Pyongyang has managed to inject a seed of doubt and uncertainty in the mind of Washington, thereby complicating US calculations and constraining its actions. From the American perspective, the stakes in any conflict with DPRK are unlikely to ever be high enough to justify any loss, however limited, that America could suffer from DPRK's nuclear use. Therefore, for Pyongyang, the power of mere suggestion of presence of nuclear weapons is good enough to impose deterrence.

Credible nuclear deterrence may be visualized as a three-legged stool in which the legs symbolize capability, resolve to use that capability, and the communication of both—the capability and the resolve—to the adversary.

Few other nuclear deterrence relationships, however, are satisfied with existential deterrence, except in the very early years after the acquisition of their nuclear capability. Instead, they build, or at least aspire to make deterrence more *credible and stable* by developing capabilities, establishing systems, adopting procedures, and evolving organizations that are capable of mounting *convincing* threats of *assured* nuclear use *of the kind that would inflict unacceptable costs on the adversary*. Credible nuclear deterrence, therefore, demands the availability and meaningful integration of a set of elements that collectively constitute the nuclear arsenal.

Three basic elements are critical to credible nuclear deterrence. To explain it with a simple analogy, credible nuclear deterrence may be visualized as a three-legged stool in which the legs symbolize *capability, resolve to use that capability, and the communication of both - the capability and the resolve - to the adversary*. Each of the three props is equally important and their being in harmony makes nuclear deterrence secure and credible. The requirement then boils down to adequately buttressing the three components of deterrence through measures such as:

- conceiving a clear role for the nuclear weapon and delineation of circumstances of its employment (crafting a doctrine);
- evolving a targeting plan and building the necessary stockpile of warheads and the delivery vehicles of required range and reliability (build up of capability);

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- instituting adequate command, control and communication systems to ensure that the weapon is launched when authorized, and only when authorized (show of resolve and responsibility).

The presence of the above can be expected to deter a rational and reasonable adversary from initiating action that runs the risk of bringing nuclear weapons into use. The Indian SSBN encapsulates the three above-mentioned aspects. It emerges out of the philosophy enshrined in the Indian nuclear doctrine prepared by the National Security Advisory Board in August 1999 which clearly indicated that the national nuclear force “will be based on a triad of aircraft, mobile land based missiles and sea-based assets” in order to ensure that the force is “effective, enduring, diverse, flexible, and responsive”.² The nuclear submarine indicates the build up of capability, and once operational with requisite command and control procedures in place, it will be a potent instrument for projection of show of resolve.

SSBNs in India’s Nuclear Strategy

India has been engaged in the process of operationalizing its nuclear deterrent over the last decade, with varying degrees of speed of activity, levels of transparency and measures of success. Some steps of the exercise such as the development, testing and induction of delivery vehicles (missiles) have been far more visible than others such as the development of plans, procedures and organizations necessary for the conduct of effective nuclear operations. The basic purpose of these moves has been not only to sow the seed of deterrence in the mind of the adversary but more importantly to remove the seed of doubt from his mind that he could escape punishing nuclear retaliation after inflicting nuclear damage on India.

For this to happen, an essential pre-requisite is the existence of sufficient amount of retaliatory capability after suffering a nuclear attack. Therefore, the nuclear arsenal has to be capable of avoiding, repelling, or withstanding attack in order to be available for a counter strike.

The Superpowers basically adopted three approaches to achieve survivability of their nuclear arsenal to ensure retaliation. One, they went into an overdrive of vertical proliferation, believing that more the numbers in the nuclear arsenal, the greater the chances of their survival.

Secondly, greater priority was accorded to the technical systems necessary for launch on warning (LOW) postures so that in case of detection of a nuclear attack, the response would be nearly automatic ensuring thereby that the arsenal would not be destroyed before it launches itself. The third approach was to harden the storage sites and make the launch platforms mobile. This led to the shift to silos and mobile delivery vehicles, including submarines capable of launching nuclear missiles.

There are two ways of exercising dispersion of nuclear assets in order to ensure their survival. One of these is to geographically distribute capabilities/systems over several locations in such a way that no complete strategic systems exist as transparent targets. In fact, that is the state in which the Indian nuclear doctrine mandates the forces normally be maintained. Weapon cores, weapon assemblies, missiles, and their launch vehicles are all located at different sites, to be brought together as “fully employable forces” only in case of a crisis. This proffers the obvious advantage of multiplying targets to complicate adversary calculations. As was explained by Gen Sundarji, “It is not just a question of [finding] ‘needles in haystacks’ but parts of many needles in many haystacks which might be brought together when required within hours to days, to form full needles in yet many more different haystacks”.³ Of course, this kind of dispersion does pose the challenge of timely and effective reconstitution of the nuclear force during a crisis, but sufficient planning and coordination among different agencies to remain networked and rigorous training during peacetime can help overcome the problem to an extent.

The second mode of dispersion is to spread the nuclear assets over a range of delivery platforms. Historically, every state with nuclear weapons has used air delivery as the first option because of its ready availability. However, given the restricted range of aircraft and their limited penetration capabilities in a dense air defence environment, missiles – land based and sea based – have evolved as the preferred option.

While mobility is an important aspect of land-based missiles⁴, the highest level of survivability is, nevertheless, believed to lie in placing nuclear tipped missiles with sufficient ranges on nuclear powered submarines. From the time the SLBM first became available after 1955, it has been considered the most

survivable delivery system. A US nuclear submarine captain described the American Polaris submarine as, “an extremely survivable assured capability that the Soviets knew they could not destroy and knew if they conducted a first strike, that system would some day be available to retaliate. It might take some time to get the message to them from a destroyed national headquarters, but at some day the missile warheads would come raining in and they would pay the price.”⁵

Indeed, every NWS has aimed for a triad of nuclear forces and in countries that have over the years, in accordance with their changing threat perceptions, given up some nuclear delivery platforms have still maintained SLBMs for their high survivability quotient. For instance, the UK presently maintains its nuclear forces only on its four submarines and France too maintains a dyad in the SLBM and air delivery platforms.

Given the security scenario in India’s neighbourhood, the induction of the SSBN indeed promises higher guarantee of survivability of nuclear retaliatory capability. In fact, for a peninsular nation like India, the vast seas around it do provide large areas where SSBNs could remain hidden with a significant nuclear arsenal for long periods of time to mount retaliation if and when necessary.

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In fact, credibility of a counterstrike is enhanced once an adversary *knows* that a fully armed SSBN is out at sea. This reinforces the certainty of retaliation by making counter-strike almost automatic. INS Arihant, as well its other sisters that will make themselves available over the next few decades will, therefore, enhance the credibility of India’s deterrence.

Challenges of Sea-based Deterrence

Sea based deterrence, however, suffers from its own share of challenges. The first, of course, relates to the acquisition/development of the vessel itself given that it is a complex set of systems that must operate safely in extreme conditions. For India, the construction of the submarine has not been easy given that the country has had to indigenously develop the complete vessel, having been denied import of nuclear and even dual use materials and technology. Also, since the country’s nuclear energy programme has been based on pressurized heavy water reactors (PHWRs) instead of PWR technology, which is better suited for nuclear submarines, the country had to develop a parallel track of technology for the nuclear submarine.

The second challenge emanates from the weapon system or missiles that the SSBN must be armed with. An underwater vertical launch system is among the most sophisticated and complex weapons since it demands stability, speed and accuracy in a twin medium – water and atmosphere. Moreover, unless the SLBMs have a range that can help deploy the submarine out of harm’s way, the vessel would not only be constrained for deployment but also become more a liability than an asset. India is yet to develop missiles with adequate ranges.

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The third challenge arises in the form of establishing secure and reliable channels of communication with nuclear submarines. Normally underwater communication is possible through extremely low frequency (VLF) bands of electromagnetic spectrum. These channels, however, have a restricted traffic bearing capacity and hence are slow. Also their transmitting stations are large, fixed and difficult to harden, making them vulnerable to a first strike. The US resolved this problem by having an airborne VLF system coupled with satellite communications or by developing ELF communications. India too will have to find its own answers to this problem.

Besides operational issues, once an SSBN force is ready, India will have to take the critical decision of graduating from the present posture where the civilian leadership exercises complete control over nuclear assets to one wherein custody of a number of nuclear weapons would reside with uniformed personnel.

The fourth challenge stems from the reality that anti submarine warfare (ASW) capabilities are fast improving. In such a situation, are SSBNs that would be carrying concentrated clusters of strategic capabilities (at least 12-16 missiles equaling 96 warheads) more or less risk prone? Of course, SSBNs are most vulnerable when in port. Moreover, given that there are not too many Indian ports that could host the SSBNs, their targeting by the adversary could be relatively simple. In order to overcome this challenge, not only would it be necessary to keep a minimum number of submarines on patrol, but also to develop adequate anti-ASW capabilities. Therefore, further research and development on making the submarine as silent as possible and equipping it with some stealth features is critical.

Strategic stability between India and Pakistan is more under threat from the offensive policy of sub conventional conflict that is pursued by Pakistan Army in an attempt to bleed India even as it hides behind the skirts of its own nuclear capability to deter a conventional response from a superior Indian military.

At the same time, particular attention needs to be paid towards hardening the shore-based communication centers of the SSBNs because these are points of vulnerability.

The fifth challenge directly implicates the Indian nuclear command and control system that is highly assertive in nature. Unlike land-based nuclear capabilities that can be maintained in a distributed form, a sea based deterrent presupposes complete systems on board at sea. Once this leg of the triad becomes meaningfully operational⁶, which should be sometime in 10-15 years, it would call for the development of technological and organizational arrangements to avert chances of an accidental or unauthorized launch. Besides operational issues, once an SSBN force is ready, India will have to take the critical decision of graduating from the present posture where the civilian leadership exercises complete control over nuclear assets to one wherein custody of a number of nuclear weapons would reside with uniformed personnel. This transition from what Ashley Tellis describes, as “force in being” to a “ready arsenal” would bring its

own sets of implications for India’s nuclear strategy and civil-military relations.

However, despite some vulnerabilities, sea based deterrence certainly has the greatest chance of being survivable and providing the most credible deterrence through potent power projection. And since deterrence is essentially a mind game, India’s venture into some level of sea-based nuclear capability as part of its credible minimum deterrence is an important investment.

Fears of Strategic Instability

News reports and editorial comment, particularly from Pakistan, describe the launch of INS Arihant as a blow to strategic stability between the two countries. Such writing, however misses two very crucial points: one, that strategic stability between India and Pakistan is more under threat from the offensive policy of sub conventional conflict that is pursued by Pakistan Army in an attempt to

bleed India even as it hides behind the skirts of its own nuclear capability to deter a conventional response from a superior Indian military.

Secondly, a study of nuclear strategy reveals that not every nuclear capability advances the risk of strategic instability. Some, in fact, like SSBNs, could even enhance strategic stability. They provide reassurance to self of being protected from an adversary's first strike. At the same time, the nature of the largely inaccurate missiles on board Indian SSBNs should reassure the adversary that they cannot be effectively used as counter force weapons. Therefore, the Indian SSBN reinforces India's commitment to its no first use doctrine. As was explained by Thomas Schelling, "A weapon that can hurt only people, and cannot possibly damage the other side's striking force, is profoundly defensive; it provides its possessor no incentive to strike first. It is the weapon that is designed or deployed to destroy 'military' targets... that can exploit the advantage of striking first and consequently provide a temptation to do so."

Conclusion

Establishing credible nuclear deterrence is "work in progress" and with the launch of INS Arihant, India has taken one more step in the direction. But a lot is still needed to achieve full operational capability. In fact, one can well argue whether it can ever be possible to achieve a state of 'perfect' credible nuclear deterrence, but a nation can, and must, certainly aspire for it by optimally developing the building blocks that are required. Given that the security of the nation and its citizens is the primary duty of the state, it must undertake this exercise since nuclear deterrence, pending universal elimination of nuclear weapons, is the only way of ensuring security in the face of an adversary's nuclear weapons. The stark reality is that there is no other defence against these weapons.

But in the game of nuclear weapons, threatening unacceptable damage by punishing strikes is, insanely enough, one sane route to follow. The other, of course, is to bring about universal elimination of these weapons – but unfortunately not everyone is convinced of the desirability or doability of this step.

Therefore, the only way to neutralise these weapons of mass destruction being used against oneself is to assure retaliation with the same – however distasteful that thought might be. But in the game of nuclear weapons, threatening unacceptable damage by punishing strikes is, insanely enough, one sane route to follow. The other, of course, is to bring about universal elimination of

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Notes

¹ There are several interpretations of the term "existential deterrence". Its first use is attributed to McGeorge Bundy who opined, "as long as each side has thermonuclear weapons that could be used against the opponent, even after the strongest possible pre-emptive attack, existential deterrence is strong..." But there are other versions of the term, such as by Marc Trachtenberg that premise it on "the mere existence of nuclear forces", which is enough to create a fear of escalation that must always be factored into political calculations. Still others like Devin T Hagerty suggest that existential deterrence works even in the absence of openly acknowledged nuclear forces, as long as the adversaries believe that the opponent has nuclear forces. The term as used in this book leans closer to Trachtenberg's definition of existential deterrence. Bundy's definition of the term, in the view of the author, corresponds better to credible nuclear deterrence as used in this chapter.

² Para 3.1 of Draft Report of National Security Advisory Board on Indian Nuclear Doctrine, August 17, 1999 available at <http://meaindia.nic.in>.

³ Gen Sundarji, "Indian Nuclear Doctrine –I: Notions of Deterrence", as cited in Ashley Tellis, *India's Emerging Nuclear Posture: Between Recessed Deterrent and Ready Arsenal* (Santa Monica: RAND, 2001), p. 426.

⁴ Interestingly, the USA, given the luxury provided by its geography and the nature of its threat perceptions, has traditionally not had any land-mobile missiles in its arsenal.

⁵ Gerard J DeGroot, *The Bomb: A History of Hell on Earth* (London: Pimlico, 2005), p. 267

⁶ The reference here is to a set of SSBNs and not just one of them.



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