Underwater Domain Awareness (UDA) Framework

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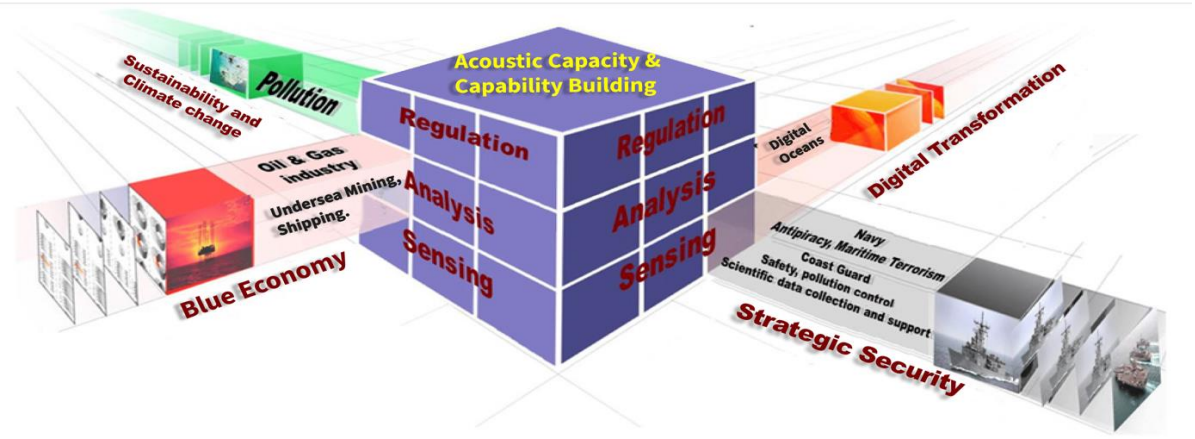
The concept of Underwater Domain Awareness (UDA) in a more specific sense will translate to our eagerness to know what is happening in the underwater realm of our maritime areas and the freshwater systems. This keenness for underwater awareness from the security perspective, means defending our Sea Lines of Communication (SLOC), coastal waters and varied maritime assets against the proliferation of submarines and mine capabilities intended to limit the access to the seas and littoral waters. The freshwater systems particularly the transboundary Rivers, are not defended by the Navy & the Coast Guard, but these waters are equally vulnerable and more complex to manage. However, just the military requirement may not be the only motivation to generate underwater domain awareness. The earth's underwater geophysical activities have a lot of relevance to the wellbeing of the human kind and monitoring of such activities could provide vital clues to minimize the impact of devastating natural calamities. The commercial activities in the underwater realm need precise inputs on the availability of resources to be able to effectively and efficiently explore and exploit them for economic gains. Underwater resources include fisheries, aquaculture, seaweeds, pharma ingredients, minerals and more, that have significant market value. The regulators on the other hand need to know the pattern of exploitation to manage a sustainable plan. The connectivity through the water bodies has been recognized as the most effective and efficient mode of transportation, however ensuring navigability in these water bodies requires massive amount of UDA. With so many activities, commercial as well as military, there is significant impact on the environment. Any conservation initiative needs to precisely estimate the habitat degradation and species vulnerability caused by these activities and assess the ecosystem status and climate change risk. The scientific and the research community need to engage and continuously update our knowledge and access of the multiple aspects of the underwater domain. The figure below, presents a comprehensive perspective of the UDA. The underlying requirement for all the stakeholders is to know the developments in the underwater domain, make sense out of these developments and then respond effectively and efficiently to them before they take shape of an event.



Comprehensive Perspective of the UDA Framework

The UDA on a comprehensive scale, needs to be understood in its horizontal and vertical construct. The horizontal construct would be the resource availability in terms of technology, infrastructure, capability and capacity specific to the stakeholders or otherwise. The stakeholders represented by the four faces of the cube will have their specific requirements, however the core will remain the acoustic capacity and capability. The vertical construct is the hierarchy of establishing a comprehensive UDA. The first level or the ground level would be the sensing of the underwater domain for threats, resources and activities. The second level would be making sense of the data generated to plan security strategies, conservation plans and resource utilization plans. The next level would be to formulate and monitor regulatory framework at the local, national and global level.

The figure above gives a comprehensive way forward for the stakeholders to engage and interact. There is significant fragmentation among all the four stakeholders, namely the Strategic Security, Blue Economy, Sustainability & Climate Change Risk Management and Science & Technology (Digital Transformation). The individual cubes represent specific aspects that need to be addressed. The User-Academia-Industry partnership can be seamlessly formulated based on the user requirement, academic inputs and the industry interface represented by the specific cube. It will enable a more focused approach and a well-defined interactive framework. Given the appropriate impetus, the UDA framework can address multiple challenges being faced by the global community today. Meaningful engagement of Young and Aspirational population, probably is the most critical aspect that deserves attention. Multi-disciplinary and multi-functional entities can interact and contribute to seamlessly synergize their efforts towards a larger goal.

The global community is looking at the Indo-Pacific strategic space for their power play. The Indo-Pacific region by definition is the tropical waters of the Indian and the Pacific Ocean. The tropical waters present unique challenges and opportunities in terms of rich biodiversity and resource availability. However, the biggest issue is the sub-optimal sonar performance, limiting the UDA in these regions. It may be noted that the sonars that were designed for the temperate & polar waters of the Greenland, Iceland, United Kingdom (GIUK) gap, during the Cold War era, suffer 60% degradation when deployed in the tropical waters. The developing nations in the tropical waters need to customize these technologies to suit their conditions. The western nations, who are pushing these hardware, do not have the manpower to deploy, whereas the tropical nations, lack the appreciation of the technology and the knowhow. The proposed UDA framework can optimize resource deployment and provide nuanced policy and technology intervention, along with acoustic capacity & capability building to manage the tropical challenges and opportunities.

The UDA Framework as proposed above has been formulated by the author, Dr(Cdr) Arnab Das, who is the founder of the Maritime Research Centre (MRC), Pune and M/S NirDhwani Technology Pvt Ltd (NDT).