# Online Version
# Underwater Domain Awareness (UDA) Internship Program

***We seek a future for the Indian Ocean that lives up to the name of "SAGAR-Security And Growth for All in the Region."***
**Shri Narendra Modi. Mar 2015**

## Background

The young India is a very critical asset that we all talk about today and globally India is being recognized as an emerging nation that cannot be ignored on any front. The young India also poses a big challenge to channelize the abundance of energy in the right direction for nation building. The employability of the graduate students with appropriate skills and understanding of the contemporary issues facing the nation is an important aspect that merits attention.

Science and technology will remain a critical driver of national interest and the young India needs to get exposed to finer aspects beyond the theoretical knowledge to make a difference. Focused and application oriented, project-based learning has always been recognized to make deep impact in the process of learning. Student internship programmes are the right instruments to realize this mission.

The government today has taken multiple steps to build maritime infrastructure and integrate the maritime domain with economic growth engines. The entire government machinery has shown significant intent and action in driving projects to realize the SAGAR vision. However, it needs to be recognized that such massive projects require human resources on an equally big scale. The high-end technology aspects need focused and sustained efforts.

Underwater Domain Awareness (UDA) is a framework that addresses the aspects of ***Safe, Secure, and Sustainable Growth*** in the maritime region, particularly in the Indian Ocean Region (IOR). UDA is very well aligned with the SAGAR vision of the honourable PM. It encompasses the ideas of a smart digital India with high end technology integration to overcome the specific challenges of the IOR. The effective UDA framework being a new initiative will require efforts in all the dimensions namely - Policy Support, Infrastructure Creation, Know-how Build-up and Human Resource Development. ***Pooling of Resources*** and ***Synergy of Efforts*** are the only way forward is to come together to evolve a nuanced strategic vision. Details on UDA are attached at the end of the document. It will be relevant to stakeholders like:

- **National Security Apparatus** – Indian Navy, Indian Coast Guard, Marine Police, Ministry of Defence, NTRO, Intelligence Agencies and Think Tanks.
- **Blue Economic Entities** – Oil and Gas Sector, Undersea Mining, Ports and Shipyards, Shipping Industry, Fishing Industry, Associated Ministries and more.
- **Environmental Regulators and Disaster Management Authorities** – Government bodies and NGOs.

- **Science and Technology Providers**- DRDO, NIO, NIOT, NCAOR, INCOIS, DST, Academic Institutes, Associated Ministries and more.

## Proposal

The Maritime Research Centre (MRC), Pune and M/S NirDhwani Technology Pvt Ltd, announces multiple internship programmes throughout the year. The internships could be for eight weeks, six monthsand upto one year for multi-disciplinary students and also for professionals and faculties who would like toupgrade their career opportunities. The students could be under/post graduate students undergoing multi-disciplinary programmes and also PhD aspirants who would like to identify their research problem. It will be a multi-disciplinary project-based programme to expose the participants to multiple issues and aspects based on real world problem solving. It will be driven by the UDA framework in thetropical littoral waters of the IOR. It will be relevant to disciplines like:

- All disciplines of Engineering & Technology,
- Marine Science and other Basic Science disciplines,
- Social Engineering and Social Sciences,
- Political Science and Economics,
- Law and Management,
- Geopolitics and International Relations, - Environmental Sciences and Regulations,

The participants will get exposure to the relevant stakeholders including industries, research organizations, strategic think tanks, users and more as part of the internship programme to be able to understand the requirements and also facilitate their skilling to make them employable. Domain experts will interact with the participants and also guide them in the course of their projects. Experts from academia and research institutes will engage the participants during the knowledge based theoretical components.

The online version will allow Work From Home (WFH) entirely for the participants and it will comprise of weekly webinars, video interactions and online project progress sessions. Separate interaction sessions will be encouraged on specific project based queries on a weekly basis. Interactions with industry leaders, domain experts and researchers will be organized to facilitate adequate exposure for the participants.

## Learning Modules

The entire programme have also been categorized in multiple learning modules. Based on learning objectives the three categories are as follows:

**Knowledge Enhancement** It will comprise of basic and advance topics with fundamental tools for knowledge enhancement. These topics are broad based to make them aware of the critical technology areas across multiple sectors and also update them with the state-of-the-art. The hands- on sessions will ensure familiarity with certain critical tools for simulation and analysis to better appreciate the topics learnt.

**Upskilling** This will comprise of upskilling and mapping of knowledge base to the industry requirements. This upskilling also aims at making the participants more employable to the industry requirement's. The participants will also get to know the career opportunities and skill requirements to enable them to make well informed choices and enable them to prepare themselves appropriately.

**Encourage Thinking** The entire internship will allow the participants to work on specific projects cutting across multiple stakeholders to facilitate thinking and application of the knowledge to bring out meaningful real world problem solving abilities relevant to the industry requirement. Research and analysis based projects will be guided and supported for the participants to carry forward back to their institutes along with field trials. Real data with field experimental validation will be encouraged as part of the project delivery for long term research and development initiative.

## Certificates and Recognition

Certificate and Letter of Appreciate will be awarded to the students on successful completion of the internship with satisfactory achievement of all objectives. Interns showcasing outstanding performance may be offered research associate position, post completion of their degree on specific projects being pursued by MRC.

## Underwater Domain Awareness

The **Underwater Domain Awareness (UDA)** framework is a proposal that can possibly facilitate realization of the SAGAR vision in the true sense. The concept of Underwater Domain Awareness (UDA) in a more specific sense will translate to our eagerness to know what is happening in the undersea realm of our maritime areas. The key aspect is transparency and ability to monitor every development for correlation and prediction of any associated event. Typically there are four broad stakeholders of UDA that have endeavoured to generate understanding of the undersea domain to further their interests.

**National Security Apparatus** The maritime nations with vast sea boundaries are vulnerable to subversive attempts by their adversaries. The underwater domain with its inaccessibility and opaqueness, makes it a complex problem for surveillance and identification of such elements. The involvement of non-state actors further vitiates and complicates matters. This keenness for undersea 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.

**Blue Economic Entities** Economic prosperity of nations even without vast coastlines, significantly depends on the global maritime commons. These include trade and connectivity to the world for ensuring energy and food security. The oceans are a vast reserve for living and non-living resources and can potentially contribute towards the economic wellbeing of the nation in a substantial manner. Precise exploration and exploitation will require effective UDA for efficiently planning their extraction.

**Environmental Regulators and Disaster Management Authorities** The oceans are also a place where multiple natural disasters originate that can create massive destruction and loss of human life. It may not be possible to prevent a natural disaster, however early warning can certainly minimize the loss of life and property. Human activities in the maritime domain are causing serious environmental degradation and is a threat to sustainable growth. Effective UDA could facilitate management of the underwater environment in a more effective manner.

**Science and Technology Providers** There is always a requirement for safe, secure, sustainable growth in the underwater domain. Safety pertains to effective disaster management, security refers to manmade threat from our adversaries and sustainable growth will not only mean ecological issues but on a comprehensive scale that will encourage universal prosperity. Science and technology will always be the main driver for such endeavours. Understanding of the ecosystem that exists undersea, the

interaction between the multiple components of the ecosystem and also the impact of various human interventions on the ecosystem will require research efforts. Field experimental research needs to be backed with science and technology tools to generate the precise inputs on the undersea domain.

The conventional approach of each of the stakeholders pursuing their own UDA efforts has serious limitations given the highly resource intensive field experimental research initiative required for a long period. This has ensured that UDA has remained an exclusive club of very few developed nations with access to such resources and know-how. Vested interest of these few, have further ensured unequitable distribution of the global resources leading to unrest and conflict. We have gone through a full circle and now it is time we build universal systems that can minimize the unequitable distribution of resources and bring peace and harmony on a global scale.

Figure 1, presents a comprehensive perspective of the UDA framework as proposed by the author. The underlying requirement for all the stakeholders is to know the developments in the undersea domain, make sense out of these developments and then respond effectively and efficiently to them before they take shape of an event.

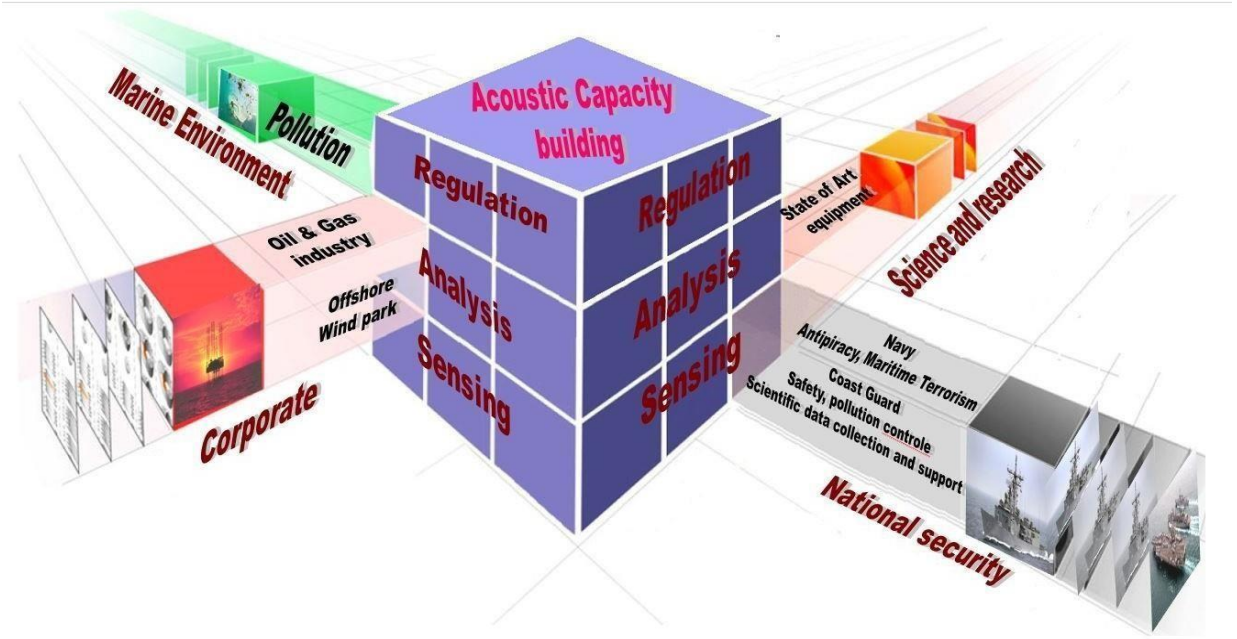


**Figure 1. Comprehensive Perspective of Undersea Domain Awareness**

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 building. The vertical construct is the hierarchy of establishing a comprehensive UDA. The first level or the ground level would be the sensing of the undersea 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 regulatory framework and the monitoring mechanism at the local, national and global level. The figure above gives a comprehensive way forward for the stakeholders to engage and interact. 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 more focused approach and well defined interactive framework. Given the appropriate impetus, the UDA framework can address multiple challenges being faced by the nation today. Meaningful engagement of Young India for NationBuilding, probably is the most critical aspect that deserves attention. Multi-disciplinary and multifunctional entities can interact and contribute, to seamlessly synergize their efforts towards a larger goal. The proposed UDA framework encourages ***pooling of resources and synergizing of efforts*** across the stakeholders towards safe, secure, sustainable growth for all.

The young India needs to be appropriately skilled in terms of policy, technology and also management aspects to be able to manage this massive UDA framework at the national, regional as well as the global level. The unique tropical littoral condition in the IOR has ensured that import of underwater technology has not helped in the past. Massive investments in import of hardware (both military and otherwise) has been futile in the absence of indigenous efforts to understand the local site-specific conditions. The field experimental work is required that will churn massive data for analysis and interpretation. Today with Artificial Intelligence and Data Science tools it is possible to handle such huge data bases and make sense in real time. Academia needs to participate in field experimental research and make use of massive data analytical tools.

A strategic approach is called for and the proposed UDA framework can possibly address all aspects for realization of the SAGAR vision. The young India has a role to play and the policy outlook needs to address the concerns in a more comprehensive manner. This will be able to engage them to their full potential and also make them contribute to nation building.

**Conveners**

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