



UNDERWATER DOMAIN AWARENESS

ANNUAL REPORT 2023



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A Letter from the Founder



The Maritime Research Center (MRC) continued to thrive in 2023. We delivered outstanding research articles, publications, notes, and various other outreach and engagement programs to promote the underwater domain awareness (UDA) concept. MRC, Pune commenced its operations on 02 February 2017 as a not-for-profit, Research and Policy Center to progress the UDA Framework. Since then, the organization has made strides to help our people and community by enhancing programs and benefits to support them personally and professionally. As great as last year was for MRC, in many ways 2024 is shaping up even better. In January 2024, MRC formally announced its collaboration with the Capacity Building Commission of India, an entity that is directly associated with the Prime Minister's Office. We believe this association will create substantial long-term value for our stakeholders.

Parallel to the establishment of MRC, M/S NirDhwani Technology Pvt Ltd (NDT) was also started in 2017 to manage innovation, consultancy, and field experimental validation. The UDA framework supports, policy & technology interventions along with acoustic capacity & capability building. In March 2019, the Foundation for Underwater Domain Awareness was registered as a Section 8 company, under the Registrar of Companies. The UDA framework in the tropical waters of the Indo-Pacific strategic space needs to be driven across five pillars, namely research, academia, skilling, innovation, and policy. It serves all four stakeholders, namely strategic security, blue economy, sustainability & climate change, and digital transformation. The UDA being a new concept, MRC has approached it in a structured manner, namely outreach, engagement, and sustainability.

To fulfill our purpose, we must make a major impact on the ground. We have connected to people belonging to the fisheries community, students community, researchers, academicians, journalists, influencers in addition to policymakers. Not just that, our e-magazine which we call UDA Digest has turned out to be a platform that not just caters to the experts from the domain but also to people who belong to a non-technical background. The whole idea of this platform is to keep our narrative simple and easy to comprehend.

Institution building is about people, process, and purpose. Without hesitation, we can say that MRC's team is its greatest accomplishment. We also strive hard to maintain, add, simplify, and improve processes, in line with our growing footprint.

With an extraordinary 2023 behind us and the rapid progress that we are making early this year, I feel incredibly optimistic about MRC. We have the talent, technology, and research insights to support the critical decision-making needed at the highest policy-making levels. And we have a unifying purpose, strategy, and culture. All these things make me very hopeful about the future of MRC and NDT.

1. Introduction

1.1 About Us:

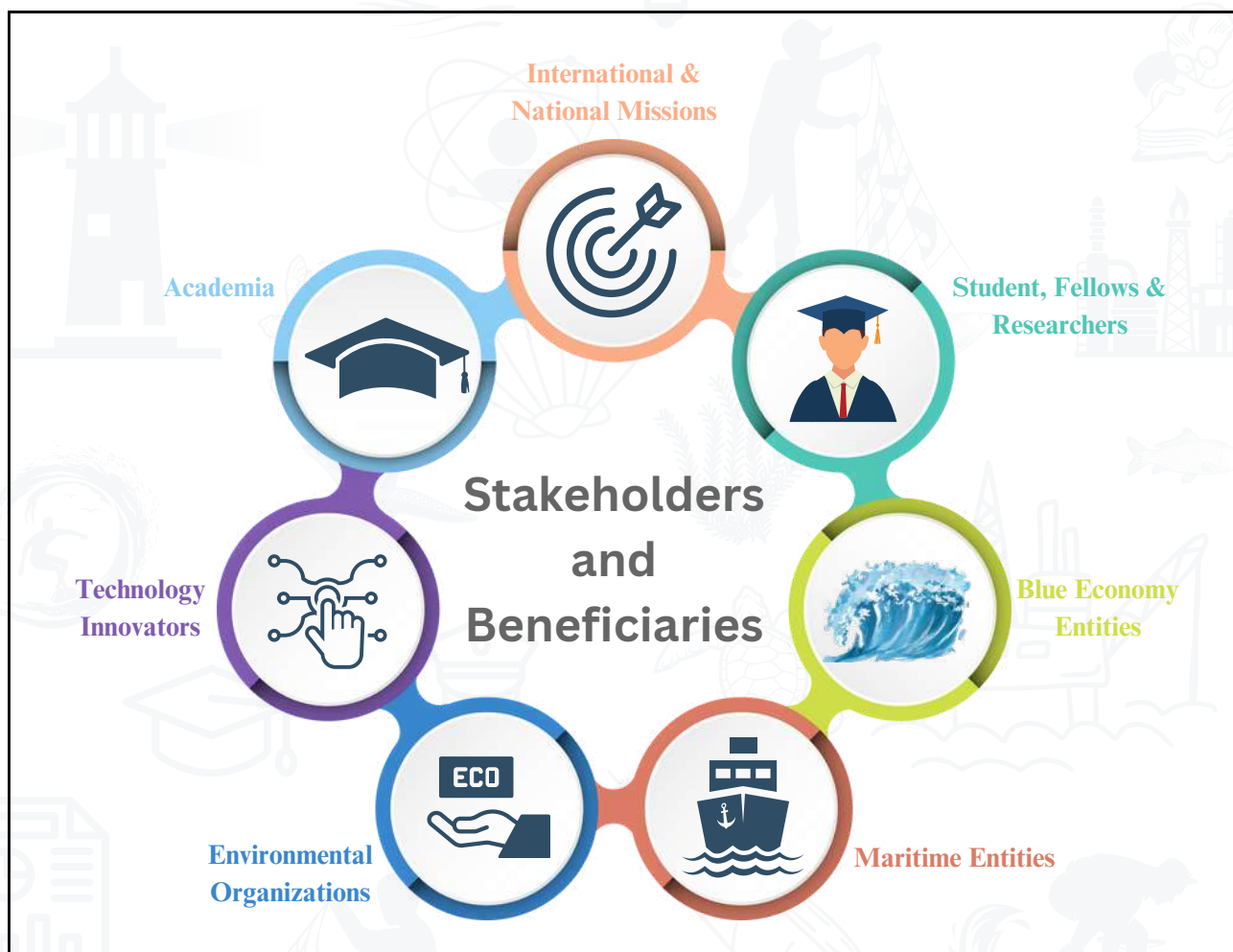
On 2 February 2017, the Maritime Research Center (MRC) began its journey in Pune as a not-for-profit research and policy centre with an aim to progress the Underwater Domain Awareness framework, which involves a concerted effort engaging diverse stakeholders, fostering collaborations, and driving policy interventions. Parallely, we also launched NirDhwani Technologies Pvt. Ltd. in 2017 to spearhead and manage innovation, consultancy and field experimental validation. In March 2019, the Foundation for Underwater Domain Awareness was registered as a Section 8 company under the Registrar of Companies, India. Ever since, both organisations have been a pioneering force in progressing the **Underwater Domain Awareness** framework with an aim to bolster policy, technology, and capacity building in the underwater domain.

Our oceans and riverine systems play a fundamental role in supporting life on Earth, guiding commerce, ensuring security, and fostering maritime prospects. Despite this, our understanding of these oceans is limited at best, with a significant amount of global research and strategic initiatives often gravitating towards addressing the challenges of Arctic, deep-sea, coastal and high-latitude waters, leaving tropical waters relatively underexplored. The concept of Underwater Domain Awareness (UDA) as progressed by the Maritime Research Center, India, refers to a structured framework that aims to comprehensively understand, monitor, and strategically manage the diverse aspects of tropical littoral waters. Shifting our attention to these comparatively understudied tropical domains is imperative to develop more tailored strategies for sustainable management and security across our underwater bodies.

In this annual report, our focus centres on our mission to advance Underwater Domain Awareness, highlighting its crucial role in fostering sustainable growth across strategic security, environmental, economic, policy, technology, geopolitics, and social development goals. From outlining the pressing Need for UDA to exploring our Strategic Pillars and Initiatives aimed at sustainable development, each section provides a comprehensive overview as we work to transform groundbreaking ideas into actionable insights. Additionally, the Year in Review report highlights impactful engagements, key milestones, and valuable partnerships that have helped shape our steady progress throughout this year. Looking ahead, our Partnerships and CSR sections aim to explore exciting future endeavours and partnerships for the years to come. These chapters collectively work to underscore our commitment to empower and inform a diverse network of stakeholders and beneficiaries across industries through unique UDA-driven solutions. We hope you will join us in this exploration of our exciting initiatives, achievements, and aspirations in shaping a safer, more informed underwater world.

1.2 Mission and Vision:

In a world grappling with overpopulation, resource depletion, and steadily escalating climate change concerns, our attention must shift to the largely uncharted depths of the oceans – a vast expanse covering 70% of our planet, yet explored and understood only up to a mere 5%. This disparity in understanding demands the need for a structured, highly specialised research and application framework. Recognising the crucial role of the underwater realm in national security, food, and environmental conservation, our efforts concentrate on understanding these ecosystems through the Underwater Domain Awareness concept. This is motivated by a desire to expand knowledge, skill, innovation and policy, fueled by an unrelenting curiosity about the underwater world. Our vision is thus to drive the UDA framework across stakeholders and policymakers in order to facilitate a safe, secure, and sustainable growth model for the tropical littoral waters of the Indo-Pacific region and beyond.



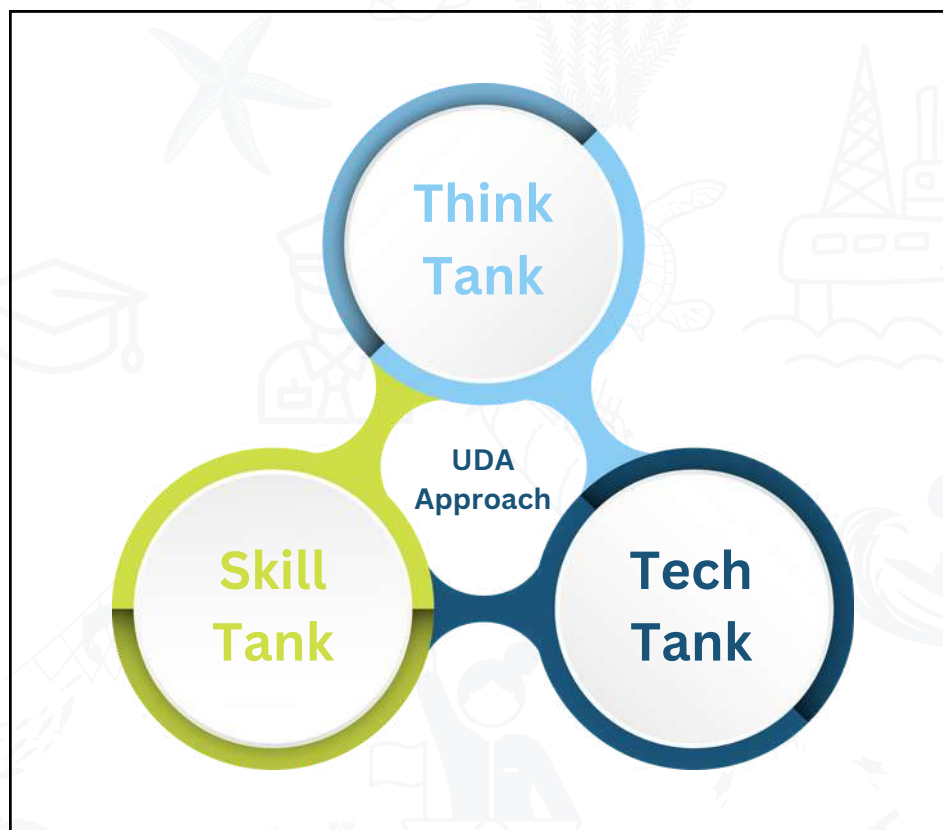
Over the years, we have consistently adhered to our mission and vision: facilitating and ensuring synergies amongst a diverse range of stakeholders to leverage the immense potential of the underwater domain. Our UDA framework has since become the accepted benchmark for national discourse pertaining to acoustic capability building for tropical waters and riverine systems.

1.3 Our Approach:

In order to continue fostering informed collaboration amongst all underwater domain stakeholders in the Indian Ocean Region (IOR), we operate as a think tank, tech tank, and skill tank, with the involvement of a specialised network of distinguished advisors, subject matter experts, and industry leaders to guide and support our mission.

- **Think Tank:** The UDA framework as proposed by MRC emphasises the necessity for a conducive policy environment, urging stakeholders and associated entities to harmonise efforts seamlessly to facilitate success.
- **Tech Tank:** Technology intervention in the unique challenges of the tropical littoral waters of the Indo-Pacific region requires a balanced mix of traditional knowledge and state-of-the-art innovation and technology, which our organisation strives to provide.
- **Skill Tank:** The UDA framework's many challenges and opportunities demand a substantial human resource pool capable of managing a safe, secure, and sustainable growth model. This necessitates the involvement of multi-disciplinary, experienced individuals to handle these responsibilities effectively.

At the heart of our organisation's DNA lies a dynamic fusion of expertise and experience, drawing upon the collective wisdom of industry experts, distinguished academics, and domain authorities. Our identity as a think tank, tech tank, and skill tank therefore thrives on the collaborative synergy of this network of associations, forming the backbone of our initiatives in advancing Underwater Domain Awareness within the Indo-Pacific strategic space.



1.4 Organisational Overview:

Governing Council	Cmde Rajan Vir (Retd)
	Dr. (Col) Aswini Kr. Das
	Dr. (Cdr) Arnab Das
	Shri Praful Talera
Advisory Council	Shri Shekhar Dutt Former Governor of Chhattisgarh, Former Deputy NSA and Former Defence Secretary, Government of India
	Lt Gen (Dr.) D B Shekatkar (Retd) PVSM, AVSM, VSM Chairman, Shekatkar Committee and Strategic Defence Analyst
	Amb Anup Mudgal (Retd) Former Indian High Commissioner to Mauritius
	Vice Admiral AR Karve (Retd) PVSM, AVSM Former Flag Officer Commanding-in-Chief Southern Naval Command
	Vice Admiral DSP Varma (Retd) PVSM, AVSM, VSM, Former DG ATVP (Technology)
	Surg Vice Admiral Ravi Kalra (Retd.) Former Director and Commandant of the Armed Forces Medical College (AFMC) (Public Health & Safety)
Research & Advisory Board	Dr. Satheesh Shenoi Former Director INCOIS Hyderabad
	Prof. Radhika Seshan Former HOD, Department of History, SPPU
	Dr. (Cmde) Somen Banerjee Former Senior Research Fellow at Vivekanand International Foundation
	Dr. (Cdr) Arnab Das Founder, Director at MRC and NDT
	Dr. R Vijay Kumar Department of Ocean Engineering, IIT Chennai
	Prof. Varsha Kelkar Mane Professor and Head, University Department of Biotechnology, University of Mumbai

Our Team

Core Team

Dr. (Cdr) Arnab Das
Founder and Director

Shridhar Prabhuraman
Deputy Director

Cathrine J
Research and Publications Head

Nishtha Vishwakarma
Communications and Advocacy Lead

Divya Nagarajan
Admin Lead

Research Fellows

Divya Rai

Romit Kanwar

Aradhya Kapoor

Shlok Nemani

Akshita

Aadi

Engineering and Others

Pranil Deshmukh
Developer

Jay Pinjarkar
Developer

Ayush Sawadh
Research Engineer

Shreya Waghmare
Research Engineer

Rushikesh Wanjare
Research Engineer

Rohith
Deputy Admin

Wide Eyes Team
Outreach Support

2. The Foundational Cornerstones of Underwater Domain Awareness

2.1 UDA: The Need of the Hour:

In India, the Blue Economy has gained major significance since the introduction of the SAGAR (Security and Growth in the Region for All) initiative in 2015, representing a crucial aspect of the country's developmental vision ahead. Aligned with the 'New India' vision for 2030, it signifies the sixth dimension set to drive forward our nation's progress.

With India's extensive coastline spanning over 7,500 kilometres and a vast network of ports, the blue economy holds immense potential for economic advancement, positioned to contribute significantly to the nation's ambitious target of becoming a US\$ 10 trillion economy by 2030. Forecasts suggest an annual contribution of approximately US\$ 1 trillion, along with job creation and substantial investment opportunities across sectors including fisheries, aquaculture, renewable energy, and mineral resources. However, realising these aspirations necessitates robust infrastructural development tailored to the needs and potential of underwater resources. This infrastructure, ranging from port facilities to renewable energy projects, demands comprehensive understanding and meticulous planning. In addition to supporting the holistic benefits of a blue economy, the need for UDA also extends to address critical gaps in policy, technology, research, and strategic security.

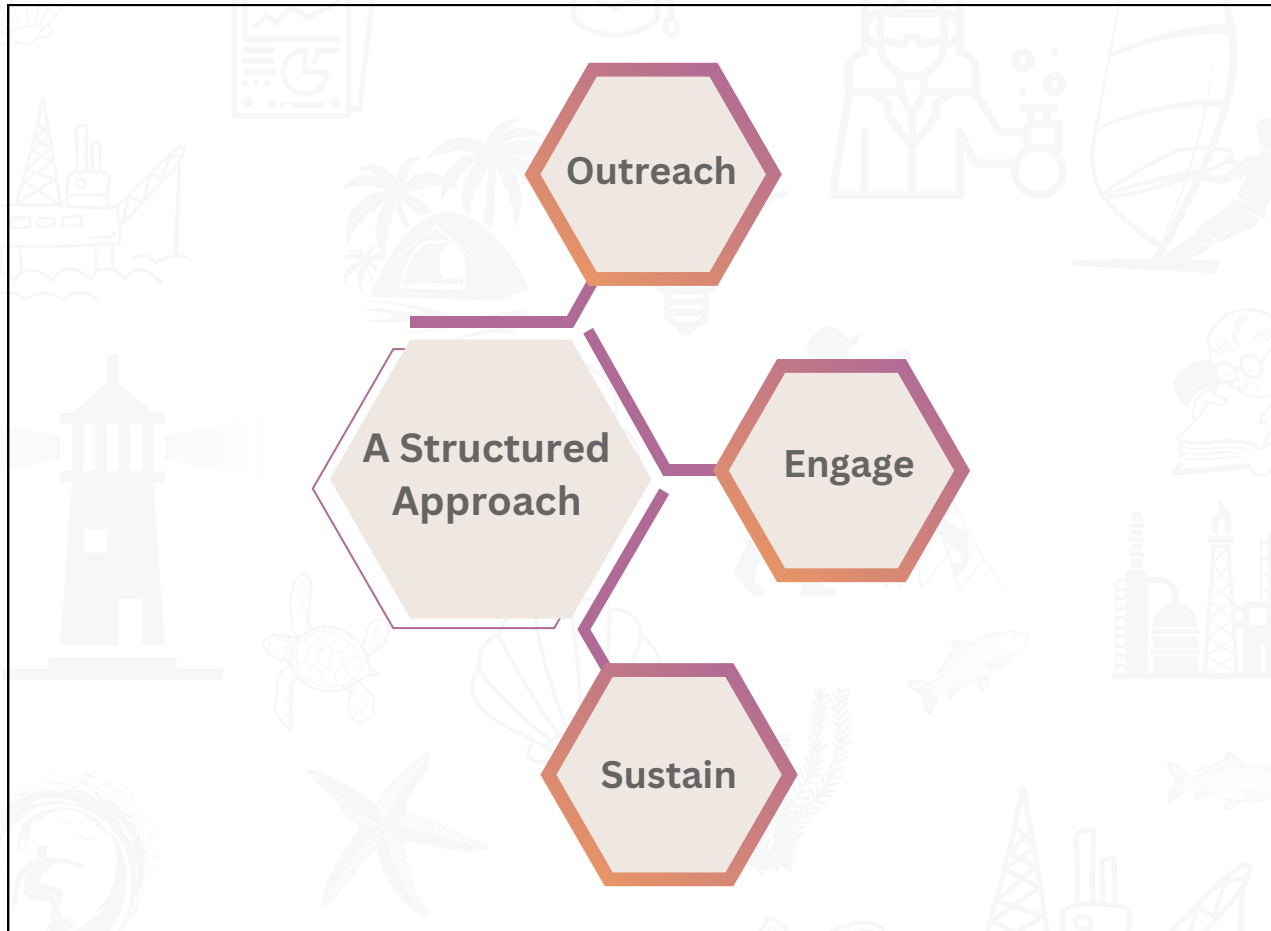
The UDA framework addresses a number of pressing challenges, such as:

- **Resource Mapping:** Valuable underwater resources such as fisheries and mineral deposits necessitate detailed mapping, essential for informed utilisation.
- **Environmental Impact Assessment:** Construction and operation within the ocean's depths significantly affect ecosystems, demanding thorough assessments to help ensure sustainable practices.
- **Navigation and Safety:** Safe navigation through ports and offshore areas requires comprehensive underwater knowledge to mitigate risks and hazards.
- **Strategic Security Measures:** Protecting critical underwater assets demands a detailed understanding of underwater infrastructures to safeguard against potential threats.
- **Regulatory Frameworks:** Crafting effective regulations requires a structured framework, which is currently lacking across policy and governance due to a largely limited understanding of our underwater domains. The UDA framework as progressed by MRC hopes to rectify this gap in understanding.

As economic forecasts advocate for integrating the blue economy into national agendas, UDA stands as the fundamental groundwork necessary to achieve ocean-based economic, technological and conservation goals. It underpins critical aspects such as resource mapping, environmental assessments, navigation safety, infrastructure security, and regulatory frameworks. At MRC, our meticulously developed UDA framework focuses on an efficient pooling of resources and aligning multi-stakeholder efforts to realise the SAGAR vision. This framework serves as the blueprint to a structured pathway towards sustainable progress rooted in knowledge and conservation, with global applicability beyond India's shores.

2.2 Outreach, Engage, Sustain: A Structured Approach:

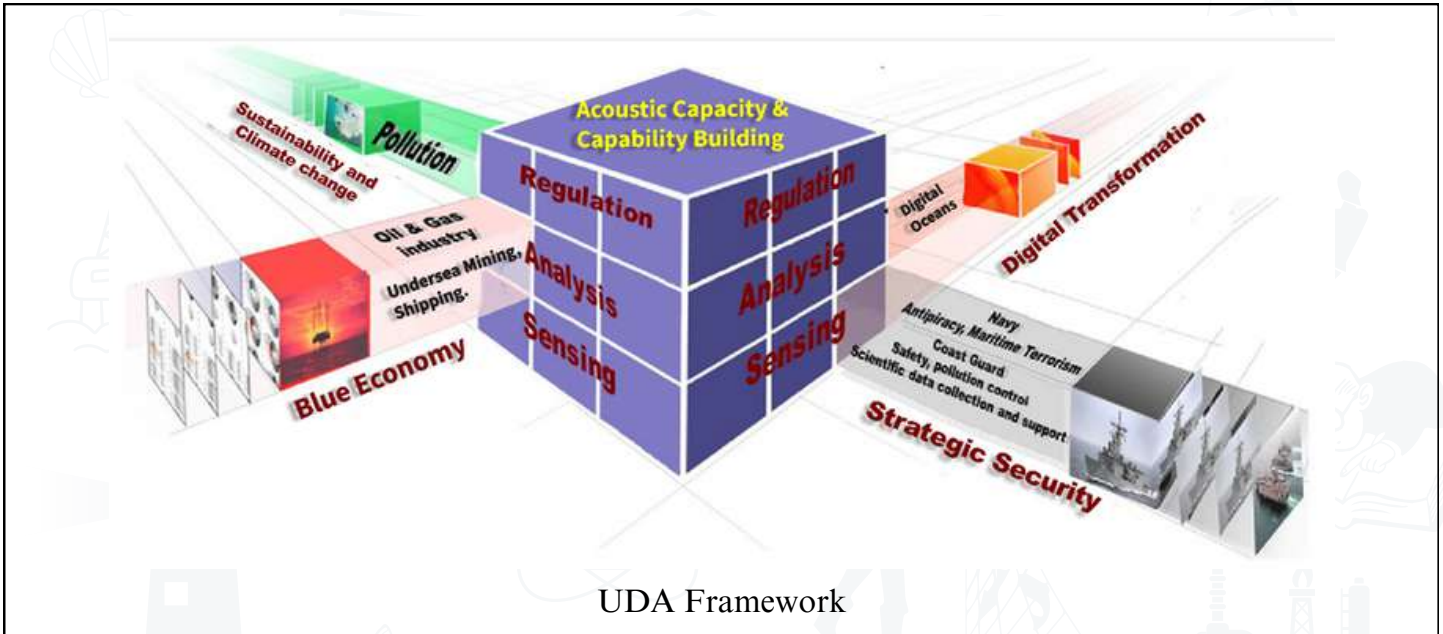
The enormity of the UDA initiative and its vast potential requires a highly structured approach in order to build the most optimal way forward. Therefore, we approach the UDA framework in a nuanced manner by adopting the following structure:



The UDA framework is being progressed via a three-step formulation. **Outreach** translates to the sensitisation of students, stakeholders, policyholders and practitioners through webinars, seminars, workshops, conferences, and more. Exclusive UDA events are being regularly organised in an effort to reach out to a larger audience and provide more focused exposure. This systematic outreach is then followed by **Engagement** at multiple levels. Promising individuals have been offered internships and fellowships to equip them with the tools they need to explore this exciting new career opportunity. Concurrently, stakeholders are being engaged with concerted Memorandums of Understanding (MoU) and collaborative programmes. Similarly, policymakers have found value and partnered with us in the pursuit of larger maritime objectives. To help **Sustain** our various initiatives, research projects and policy studies have been awarded to MRC in order to build these vital policy and technology interventions. Academic and skilling programmes, along with innovation, have also been initiated in order to sustain the tremendous potential of our acoustic capacity and capability building efforts.

2.3 The Five Pillars of UDA:

Being a relatively niche concept, the UDA framework requires a comprehensive foundation that caters specifically to the unique requirements, opportunities and challenges presented by tropical littoral waters.



Our five core pillars form the foundation of this holistic framework, aligning with scientific exploration, cutting-edge innovation, national security, marine environment conservation, and a sustainable blue economy for all. Here's how:

(i) Research:

We emphasise multi-disciplinary research as a cornerstone for effective UDA development. A diverse range of scholars from esteemed institutes including IITs (Indian Institute of Technology), The Energy and Resources Institute (TERI), and the Defence Institute of Advanced Technology (DIAT) have contributed groundbreaking research in underwater studies. Our organisation facilitates and conducts multidisciplinary studies focused on tropical waters, including underwater noise mapping, modelling for aquatic environments, AIS data analytics, and freshwater management. These endeavours foster a comprehensive understanding of crucial underwater aspects, contributing to the science and research potential of the UDA framework.

(ii) Academia:

In alignment with the scarcity of underwater studies in academic curricula, we have initiated a range of collaborations to integrate acoustic-related courses into technical education. Advocating steadfastly for curriculum enhancement has resulted in the approval of ten courses by the All India Council for Technical Education (AICTE) thus far. This significant achievement has enabled us to facilitate the incorporation of underwater studies across educational institutions, bridging the gap between academia and practical UDA requirements. Additionally, through partnerships with academic organisations around the world and expertise across academia extending to our UDA Digest magazine, our organisation has been at the forefront of bridging crucial gaps through knowledge dissemination.

(iii) Skilling:

Recognising the need for specialised skills in managing tropical aquatic challenges, we initiate and engage in strategic partnerships to help address gaps in skilled resources across a wide range of industries. Collaborations with sector skill councils and the Indo-Swiss Centre of Excellence, for instance, have led to the establishment of dedicated centres for underwater studies. These centres provide a wide spectrum of flexible skilling programmes ranging from corporate training to postgraduate courses, integrating practical learning with theoretical foundations. In addition, we have also prepared appropriate handbooks for skilling.

(iv) Innovation:

The intricate dynamics of the UDA domain demand innovative solutions. Our digital tools for underwater noise monitoring and submarine deployment have garnered global acclaim, showcasing the UDA framework's relevance across diverse sectors internationally. In order to promote collaborative innovation and incubation, we have also introduced initiatives such as an Innovation Challenge, inviting active participation and public-private collaboration to explore the multifaceted potential of our tropical waters.

(v) Policy:

Institutionalising technological advancements through nuanced policy interventions remains crucial in the underwater domain. Our numerous engagements with governmental bodies have consistently showcased UDA's broad-scale significance, translating thoughts into action through a series of workshops bringing together various stakeholders to bridge the gap between policy and technology. By drafting interim reports and policy papers, as well as 3 crucial chapters for the FICCI taskforce report, we have also begun propelling India's pioneering role in managing underwater noise and shaping national capacity-building through effective Underwater Domain Awareness.

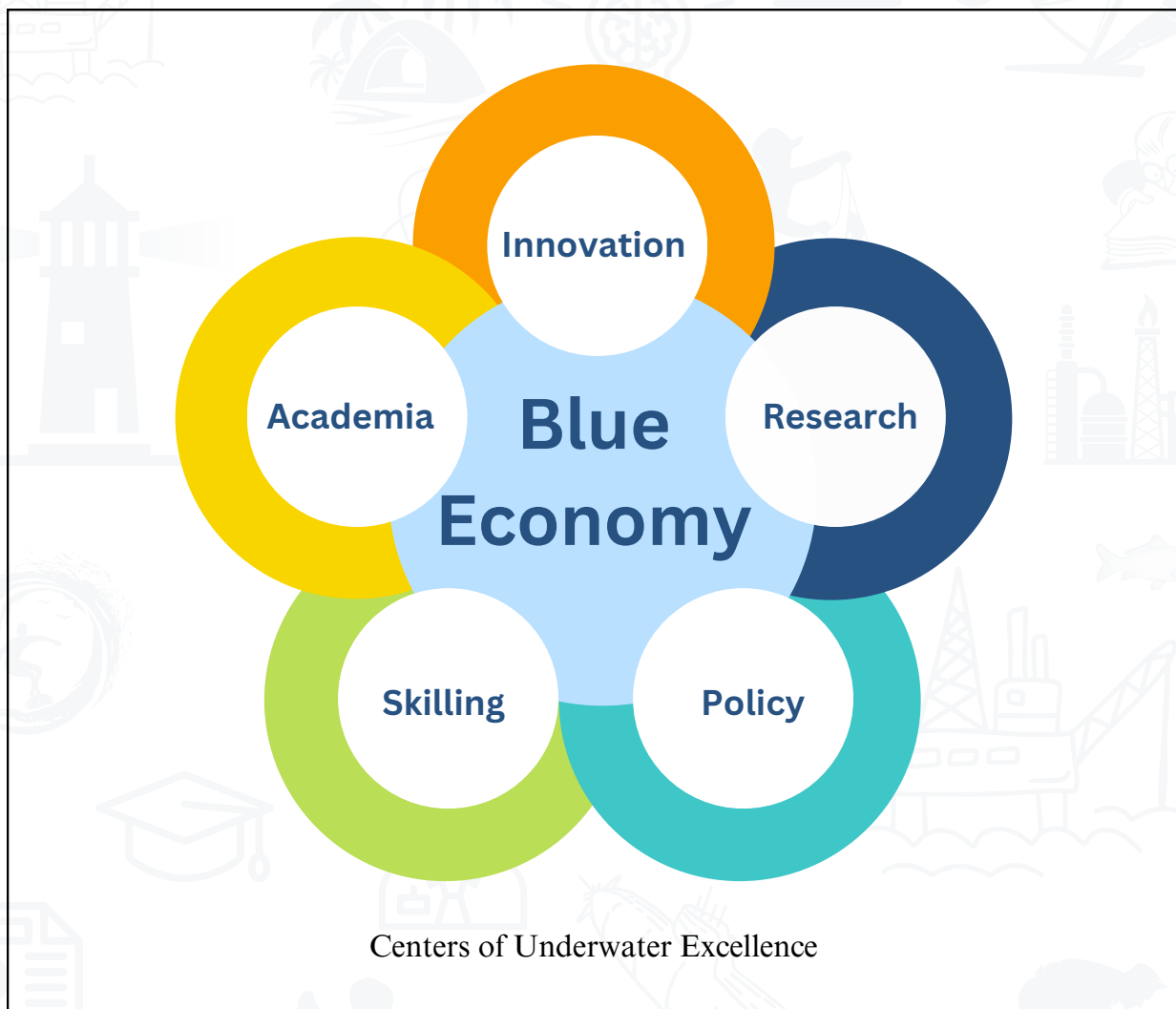
The five pillars converge to fortify the UDA framework, establishing a robust foundation for strategic growth, innovation, and policy interventions essential for harnessing the expansive potential of our underwater domains. This in turn serves as a guiding compass as we work to incorporate our ambitious aims and mission statement across a structured range of exciting new programmes and initiatives.

3. Programmes and Initiatives

3.1 The Centers of Underwater Excellence:

3.1.1 Translating Insights into Action:

Our Centers of Underwater Excellence aim to mould practical strategies, policies, products, and skills to help promote a safer, more sustainable understanding of our blue planet and its vast resources. We have collaborated with some of the brightest minds from the maritime science, underwater research and technology industries in an effort to translate insights into actionable results.



We operate five distinct and mutually synergistic sub-centers in alignment with the five core pillars of the Underwater Domain Awareness framework, namely Research, Academia, Skilling, Innovation, and Policy. Each sub-center functions independently, yet synergises with the other to optimise overall output.

The **Strategy Center** actively monitors research and development progress and industry needs to help shape robust policy frameworks, identifying gaps in domestic and regional policies. The **Research Center** focuses on multi-disciplinary efforts, providing unique insights into tropical waters, promoting indigenous innovation, and working to minimise strategic risks in maritime projects. The **Incubation Center** facilitates the translation of research outcomes into actionable plans for startups and growing industries, promoting self-reliance and innovative technological advancements within the UDA framework. Our **Skilling Center** empowers young minds and working professionals with UDA insights for enhanced operational proficiency, contributing to national infrastructure and fostering seamless stakeholder collaboration. The **Academic Center** works to shape the next generation of UDA professionals, fostering regional cooperation and innovation across all decision-making levels. We also actively encourage student presentations reviewed by industry experts and policymakers, bridging the gap between technology, science and policy through synergistic efforts.

These multi-level efforts culminate to support the **Blue Economy** model, which focuses on leveraging marine resources for sustainable growth, emphasising transparent policies to boost India's GDP and provide viable livelihood opportunities through sustainable and more inclusive economic growth.

Our synergistic Centers of Excellence enable us to collaboratively translate insights into tangible action, nurturing innovation, enhancing strategic capabilities, and driving real-world applications within the Underwater Domain Awareness framework.

3.2 Acoustic Capacity and Capability-Building:

Since our inception in 2017, we have been committed to acoustic capacity-building efforts that aim to deliver transparency and the ability to monitor every development pertaining to the underwater domain for correlation and prediction of associated events. Acoustic capacity and capability-building is thus performed at all the five levels of Research, Academia, Skilling, Innovation, and Policy.

3.2.1 To See, Understand, and Share:

The three categories of acoustic capacity and capability-building for real-world problem solving can be understood as follows:

- **To See:** This translates to the sensors and platform that carries the sensor to the desired location for data collection.
- **To Understand:** This refers to the manner in which collected data needs to be pre-processed and processed based on the application.
- **To Share:** This refers to our efforts to share processed information with users in real-time through displays and portable devices.

Acoustic capacity and capability-building is a major requirement supported by skill and knowledge-based learning. We envision a nuanced pathway forward by cultivating a multi-disciplinary and multi-functional workforce equipped with the requisite experience and expertise.

3.3 The UDA Digest:

An essential element of our Research and Academia pillars, the UDA Digest aims to disseminate information through multiple thematic verticals, covering crucial topics including geopolitics, blue economy, ESG, and more.

Being a relatively new concept, in order to progress the UDA initiative forward, it is imperative to build a substantial amount of literature in order to sensitise individuals and stakeholders to the concept's varied dimensions and dynamics. The UDA Digest has thus been developed as a one-stop destination for expert knowledge on Underwater Domain Awareness. It functions as an easily accessible digital platform that appeals to both domain experts and a general audience alike, with an aim to disseminate new insights on a quarterly basis.

The screenshot displays the UDA Digest website. At the top, there is a navigation bar with the UDA Digest logo, an 'About Us' link, and a 'Format' dropdown menu. The 'Format' menu is open, showing options: Issue Briefs, Commentaries, Experts' Articles, Short Report, and a 'Type' dropdown. The main content area is divided into three sections: 'Latest Articles', 'Editor's Pick', and a central featured article. The 'Latest Articles' section lists categories like Blue Economy, Experts' Articles, Geopolitics and IR, Maritime Security, Commentaries, ESG and Climate Risk, and Geopolitics and IR, with corresponding article titles. The 'Editor's Pick' section features articles from Science and Technology and Skilling India. The central featured article is titled 'Bharat @100 – A New Perspective Based on the Underwater', dated January 6, 2024, and includes a key highlight about the Bharat@100 dream.

Currently, the UDA Digest has four sections under which publications are organised to appeal to a wide range of readers interested in the various aspects of monitoring and managing activities in the underwater region: each submission is carefully reviewed and organised across a range of four accessible formats including commentaries, issue briefs, expert articles, and short reports. This is then further sectioned across specialised thematic verticals.

3.3.1 Thematic Verticals:

Our thematic verticals span diverse domains and dimensions across the UDA framework. At the moment, they cover:

- Geopolitics and International Relations
- Blue Economy
- ESG and Climate Risk
- Marine Spatial Planning and Digital Transformation
- Maritime Security
- Skilling India
- Science and Technology
- Underwater Heritage

Since its inception in 2022, we have published over 100 articles on the UDA Digest. These meticulously reviewed pieces cater not only to domain experts but also students, researchers, corporate professionals, policymakers, and individuals interested in topics spanning from climate change to sustainable economic growth.

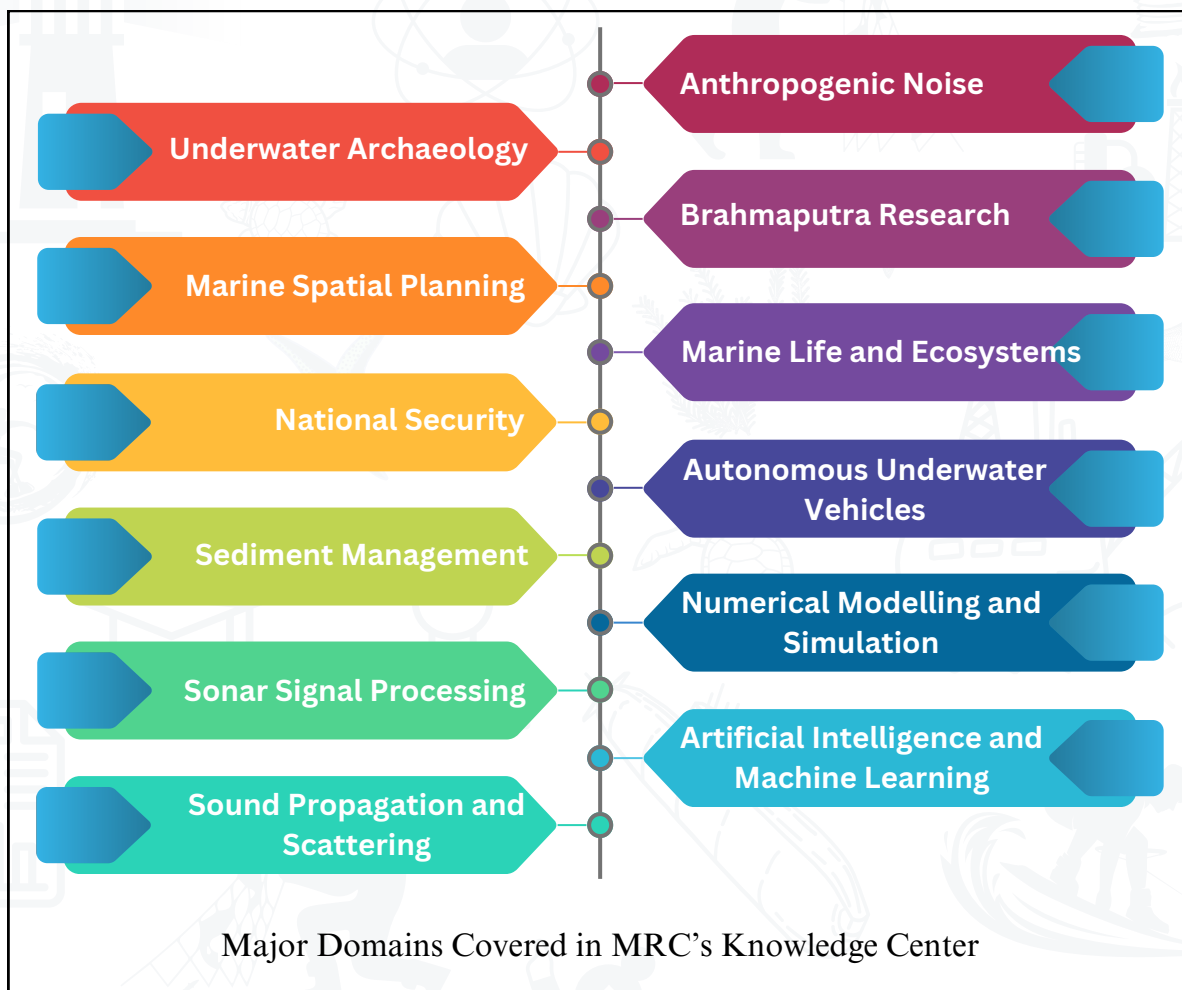


Impact of UDA Digest Over The Years

3.4 The UDA Knowledge Center:

A significant body of work has been generated to help support the objective of knowledge creation for the niche subject of Underwater Domain Awareness. Our Knowledge Center showcases extensive research notes, nurturing talent via internship/fellowship programmes as we publish works across multidisciplinary topics that cover various dimensions of the UDA framework. Our research papers address critical issues such as acoustic habitat degradation, underwater search and recovery, and the effective deployment of passive sonar systems, showcasing our commitment to advancing UDA technology and strategies. We have also generated several UDA-related Videos on various presentations by research fellows, webinars, and research activities, creating a rich source of constant knowledge dissemination.

Our digital Knowledge Center has been developed to provide a comprehensive repository supporting our initiatives and fostering a more nuanced understanding of Underwater Domain Awareness, thereby serving as a dedicated gateway for professionals, researchers, and enthusiasts worldwide to explore, contribute, and learn within these crucial underwater domains.

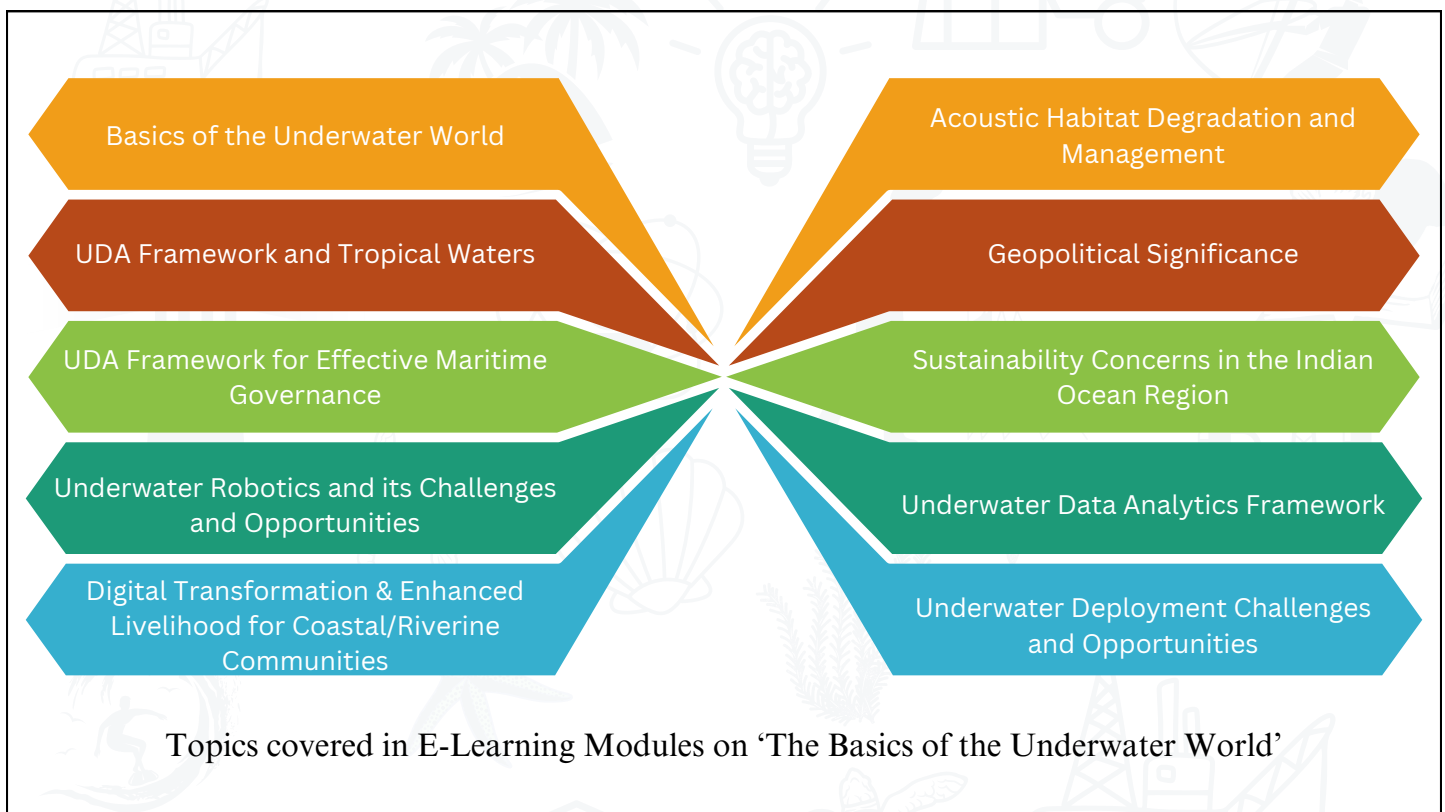


We are immensely proud of these initiatives and would like to extend our heartfelt gratitude to our esteemed partners, collaborators, and research associates whose support and dedication have been instrumental in the creation and continuation of these efforts.

3.5 E-Learning Modules:

3.5.1 Bridging Knowledge Gaps, Catalysing Professional Growth

Our commitment to democratising knowledge underlies our series of 10 comprehensive e-learning modules on Underwater Domain Awareness. Led by our founder, Dr. (Cdr) Arnab Das, these modules serve as a gateway to comprehensive UDA insights, from tackling geopolitical challenges and sustainability concerns to the broader-scale practicability of the UDA framework. Like our other initiatives, this programme has been designed to be accessible to enthusiasts, professionals, and aspiring maritime experts alike.



These meticulously curated modules span the vast spectrum of UDA-related subjects. From providing a foundational understanding of stakeholders and freshwater management, to delving into digital transformations for coastal communities, each module aims to deepen understanding across critical UDA dimensions. Students explore the vastly interconnected, multidisciplinary nature of this framework with India's SAGAR vision and beyond, examining challenges in tropical waters, sustainability concerns in the Indian Ocean, and the various nuances of maritime governance. These modules culminate in a holistic grasp of UDA, equipping learners with invaluable insights applicable to real-world challenges in the maritime domain. Completing these modules not only offers extensive knowledge but also provides our learners with a certified demonstration of their UDA proficiency, significantly enhancing employability within the maritime sector.

To learn more, please visit www.learn.foundationforuda.in

4. The Year in Review

4.1 Stakeholder Engagements and Impact Stories:

Since 2017, our collaborations have epitomised a collaborative approach, aligning academia, skill development, and policy formulation with underwater imperatives. Underwater Domain Awareness development at MRC is enriched by partnerships and impactful interactions with experts across various domains. These engagements, rooted in the five core pillars of UDA, reflect our commitment to engaging stakeholders, driving policy dialogues, and fostering collaborations necessary for comprehensive UDA implementation and governance.

4.1.1 Key Stakeholder Engagements Typically Involve:

(I) Events and Interactions: Our participation at various conferences and speaking engagements across India signifies our commitment to knowledge-sharing and fostering collaborations for UDA development. Additionally, our partnership with the Indo-Swiss Centre of Excellence (ISCE) has facilitated several events and interactions with influential speakers throughout this past year.



(II) Policymaking Partnerships: Our participation at various conferences and speaking engagements across India signifies our commitment to knowledge-sharing and fostering collaborations for UDA development. Additionally, our partnership with the Indo-Swiss Centre of Excellence (ISCE) has facilitated several events and interactions with influential speakers throughout this past year.



MRC has Collaborated with The Capacity Building Commission of India in January 2024

Over the past year, we have fostered significant dialogues with leaders from the Indian Chamber of Commerce, the Capacity Building Commission of India, as well as partnerships and interactions with leaders from UNESCO and internationally acclaimed universities. This chapter aims to outline some of these key highlights.

(a) Policymaking Collaborations with National Institutions:

- The Capacity Building Commission of India (CBC):



As part of the Union Ministry of Commerce and Industry (Government of India), the Capacity Building Commission of India works closely with the Prime Minister's Office through initiatives such as Mission Karmayogi, which strives to equip government officials with the necessary skills and knowledge required for effective public service delivery under the country's economic and educational development plans. We are proud to share that our organisation has successfully contributed an e-learning module that will soon be adopted as part of Mission Karmayogi's structured learning modules, thereby making a nationwide impact through competency-driven official training in the underwater domain.

- NITI Aayog:

The NITI Aayog, as a think-tank for the Government of India, recognised the crucial role of UDA in shaping national visions. We are pleased to report that our proposal for capacity and capability-building, aligned with the SAGAR vision, garnered positive attention this past year, with a directed study culminating in a comprehensive report currently under review by the relevant ministries and authorities. Collaborations in drafting policy reports for sustainable growth in the shipping sector highlight our active involvement in catalysing policy-level change.



- National Security Council Secretariat (NSCS):



Addressing critical underwater security concerns through policy proposals to the NSCS has resulted in our organisation being tasked with tackling various challenges in the Indo-Pacific strategic space, underscoring the national relevance of the UDA framework.

- National Skill Development Corporation (NSDC):

In collaboration with the Maharashtra Chamber of Commerce, Industries and Agriculture, MRC proposed setting up a dedicated Sector Skill Council for the advancement of UDA. The National Skill Development Corporation as well as the National Council of Vocational Education and Training are actively considering our implementation modalities, recognising the inclusive approach essential for optimising skilling efforts.



- Federation of Indian Chamber of Commerce and Industries (FICCI):



FICCI's Blue Economy Policy, underpinned by UDA's necessity at scale, resulted in our contribution to the report focusing on Marine Spatial Planning (MSP, Marine Energy Transition, and Marine Biotechnology. MSP, akin to GIS mapping on land, signifies the digital transformation crucial for governing marine and freshwater systems. With our organisation at the forefront of effective MSP application and strategies in the tropical littoral waters of the Indian Ocean region, we are confident that our contributions will resonate strongly across both technology and governance.

- The Directorate General of Shipping:

Recognising the significance of UDA in efficient shipping management, we collaborated on a paper that was presented at the International Maritime Organization (IMO) through the DG Shipping's endorsement. This tool, facilitating detailed underwater noise mapping due to shipping, has also helped position India's nomination as the lead nation for sustainable shipping policy-making in the Indian Ocean region.



(b) Skilling Partnerships for Sustainable Growth:

- Sector Skill Council on Capital Goods and Strategic Manufacturing:

The structured approach of the UDA framework – **Outreach, Engage, Sustain** – forms the foundation for developing robust policy frameworks whilst building acoustic capacity and capability. As such, we initiated an MoU aiming to align skilling enhancement efforts with the UDA framework, subsequently leading to the proposal for a dedicated Sector Skill Council exclusively for underwater domains.

- Distinguished Academics and Domain Expert Interactions:

Throughout the year, we successfully conducted a series of educational and outreach events at our dedicated centre for underwater studies with the Indo-Swiss Centre of Excellence, leveraging state-of-the-art infrastructure to facilitate hands-on learning and field experimental exposure. Key presenters at some of our events this year included Dr. Chaitanya Patil of the University of Strathclyde (Scotland, UK), and Dr. Mehul N. Sangekar, who is affiliated with the University of Tokyo and the Japan Agency for Marine-Earth and Science Technology, as well as keynote addresses from influential speakers including Dr. Ajay Kumar (former Defence Secretary to the Government of India) and His Excellency Jawed Ashraf (the Indian Ambassador to France), among several others.

In association with

UNDERWATER DOMAIN AWARENESS (UDA) FRAMEWORK AND THE SAGAR VISION

TUESDAY 07 NOV 2023 | 1530 HRS

 LEAD SPEAKER SHRI AJAY KUMAR Former Defence Secretary	 DISCUSSANT VICE ADMIRAL A R KARVE PVSM, AVSM (Retd)
 MODERATOR CMDE UDAY BHASKAR (RETD) General Secretary SPS, New Delhi	 HOST DR (CDR) ARNAB DAS Founder & Director Maritime Research Center, Pune

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Various Domain Experts and Industry Leaders Visited
MRC's Dedicated Center for Underwater Studies

- Comprehensive Skilling Workshops: Empowering Communities, Sensitising Stakeholders:

In March 2023, we conducted a series of transformative workshops focused on sensitising policymakers, stakeholders, practitioners, academics, researchers, and the youth toward institutionalising a robust skilling ecosystem. These workshops aligned with the country's SAGAR vision. Our in-depth sessions encompassed the following:

(i) Policy Intervention: We collaborated with experts and stakeholders from various fields such as policy makers, regional experts, traditional knowledge custodians, capacity building specialists, and institutional framework architects.



(ii) Technology Intervention: We partnered with technology innovators, sustainable development experts, governance specialists, infrastructure developers, and SDG advocates to bring diverse expertise into each workshop session.



(iii) Grassroots Community Engagement: We coordinated efforts with local government bodies, private sector entities involved in coastal activities (such as aquaculture, pisciculture, diving, shipbuilding, etc.), community leaders, and representatives from coastal communities.



(iv) Practical Implementation: We engaged with educational institutions, technology providers, acoustic specialists, and industry experts for both classroom interactions and field visits. Collaborations included universities, technology firms, acoustic research groups, and industry associations.



(c) Interactions Across Research and Academia:

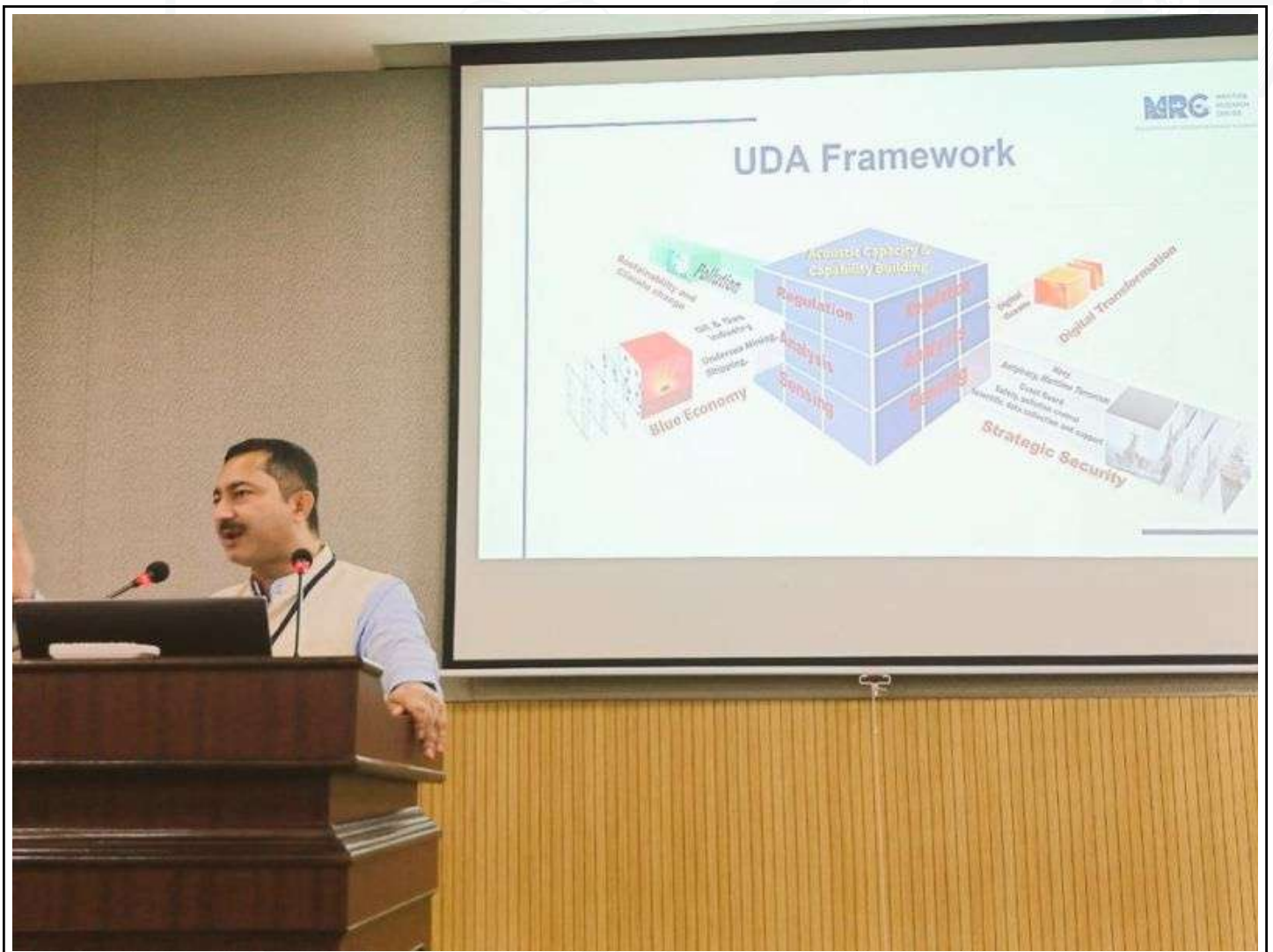
- Technical Partners and Panel Chair at the UNESCO 'Ridge to Reef' Event:

We were honoured to have served as technical partners at the UNESCO 'Ridge 2 Reef' event at the 10th South and Central Asian Biosphere Reserve Network Meeting (SACAM) in Chennai, India. The event aimed to bring together domain experts and key stakeholders across the globe, united under broadly-scoped subjects addressing biosphere reserves and conservation goals. In addition to our collaboration as technical partners, our founder, Dr. Arnab Das, also presented and chaired a session on the topic of 'Blue Carbon Ecosystems, Oceans and Underwater Issues', contributing to crucial dialogue on conservation efforts and scientific research on blue carbon ecosystems.



- At The Heart of Our Contribution, Dr. Das Presented this Declaration:

“Biosphere Reserves need to be established with a clear focus on digital transformation driven by the Underwater Domain Awareness (UDA) framework. With knowledge, cooperation, compassion, and shared understanding, we can restore the balance between humankind and nature. These reserves will serve as pilot projects for establishing Marine Spatial Planning across marine and freshwater systems towards the conservation and restoration of ecosystem services.”



- The All India Council for Technical Education (AICTE):

Our efforts to integrate acoustic survey modules into technical education curriculums found great success through the AICTE's approval of ten programmes. This integration marks a significant step forward in aligning academic learning with the UDA framework, in line with the New Education Policy (NEP) 2020 as we pave the way for integrating underwater studies into academic institutions.



- International Seabed Mining Conference (ISA): Roundtable Participation:

We were honoured to have been part of the 28th ISA conference in Kingston, Jamaica, during which we also engaged with Michael W. Lodge (Secretary General of the ISA) in exploring collaboration for global capacity-building in Sustainable Deep Ocean Mining.



- The 4th India International Seaweed Expo & Summit 2023: Participation and Keynote Speech:

At this summit organised by the Indian Chamber of Commerce, our organisation highlighted the vital role of UDA in digital transformation, emphasising its importance in the evolving global order. During his keynote address, our founder, Dr. Arnab Das presented a strategic approach focusing on ‘Digital Transformation driven by Underwater Domain Awareness Framework’, emphasising the critical role of UDA in revolutionising and modernising approaches to understanding and utilising underwater domains.



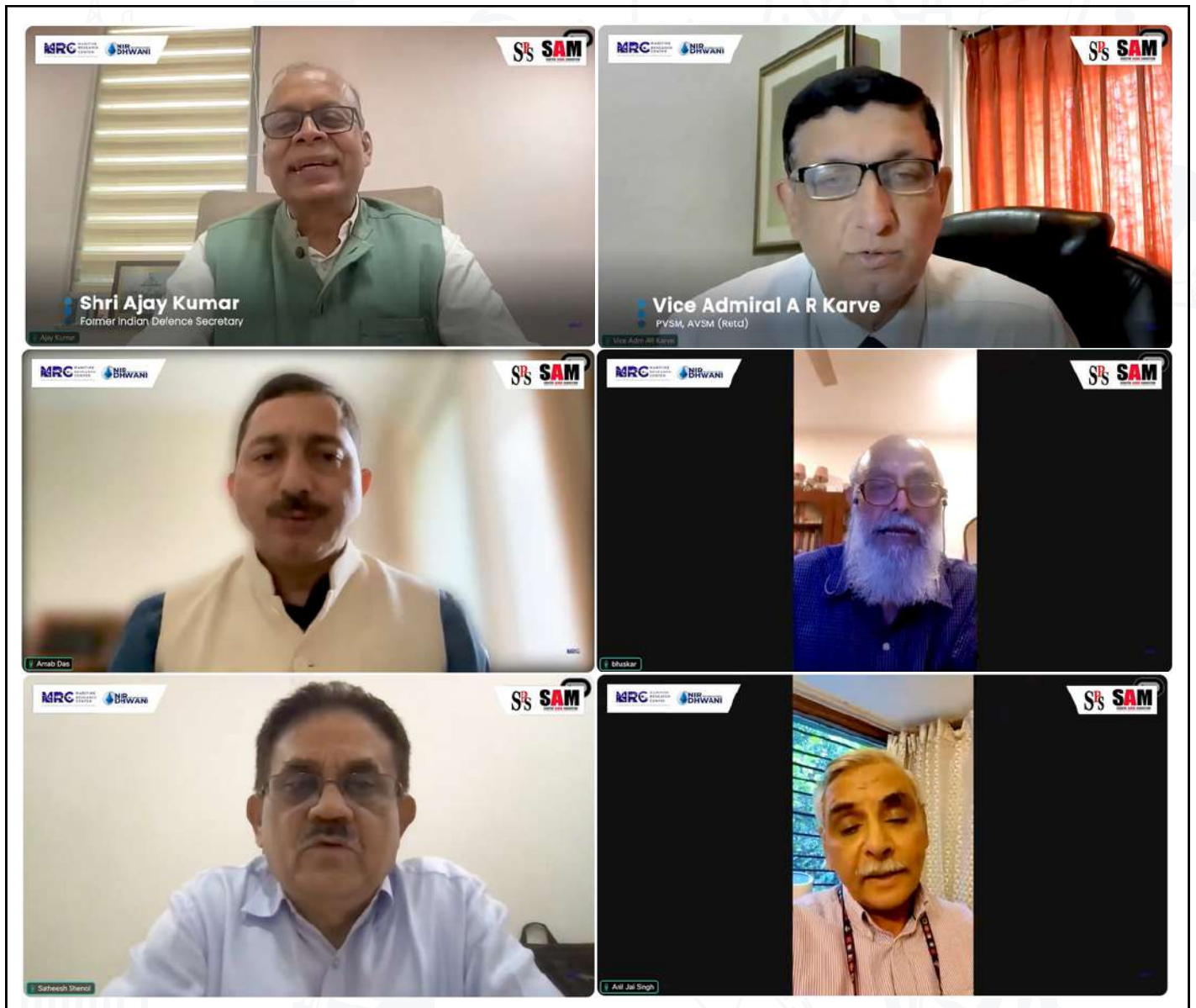
- The University of Strathclyde, Scotland UK:

We were honoured to host Dr. Chaitanya Patil, a distinguished academic and lecturer with the Department of Naval Architecture, Ocean and Marine Engineering at the University of Strathclyde, and facilitate his delivery of a comprehensive presentation on the subject of Underwater Domain Awareness. Dr. Patil emphasised the UDA framework’s geopolitical implications, exploring the intricate balance between policy, technology, and the necessity for integrated strategies that align environmental conservation, socio-economic growth, and technological innovation. Additionally, the event marked the signing of an MoU between the Maritime Research Center and the University of Strathclyde as we work to collaboratively enhance our research, education, policy and practice objectives pertaining to Underwater Domain Awareness.



- Key Discussions on Sustainable Growth in the Indo-Pacific:

As part of our regular webinar series, this year, we also collaborated with the South Asia Monitor, the Society for Policy Studies and the Indo-Swiss Centre of Excellence to host a discussion on the importance of Underwater Domain Awareness within India's SAGAR vision in the Indo-Pacific region. Leading experts including India's former Defence Secretary Dr. Ajay Kumar, Cmde Uday Bhaskar, and Vice Admiral AR Karve gathered to emphasise strategic policies, innovative technologies, and the need to considerably enhance capacities in marine and freshwater ecosystems through the UDA framework.



(d) Innovation and Impact:

- SIRO approval, Department of Scientific and Industrial Research:

In a significant milestone, we obtained approval under the Scientific and Industrial Research Organisations (SIRO) recognition scheme, standing as yet another testament to our commitment to pioneering research and innovation with integrity. SIRO recognition reaffirms our dedication to advancing knowledge and impact across various scientific, strategic, and practical domains. Additionally, being recognised by the Department of Scientific and Industrial Research (DSIR) not only validates our research-oriented goals, but also grants us access to essential benefits such as customs and excise duty exemptions, enabling us to further enhance our research infrastructure and facilitate more efficient operations in the coming years.

 सूचना का अधिकार RIGHT TO INFORMATION	दूरभाष/TEL : 26962819, 26567373 (EPABX) : 26565694, 26562133 : 26565687, 26562144 : 26562134, 26562122 फैक्स/FAX : 26960629, 26529745 Website : http://www.dsir.gov.in (आईएसओ 9001:2008 प्रमाणित विभाग) (AN ISO 9001:2008 CERTIFIED DEPARTMENT)	 सत्यमेव जयते	भारत सरकार विज्ञान और प्रौद्योगिकी मंत्रालय वैज्ञानिक और औद्योगिक अनुसंधान विभाग टेक्नोलॉजी भवन, नया महरौली मार्ग, नई दिल्ली - 110016 GOVERNMENT OF INDIA MINISTRY OF SCIENCE AND TECHNOLOGY Department of Scientific and Industrial Research Technology Bhavan, New Mehrauli Road, New Delhi - 110016
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F.No. 11/980/2023-TU-V Date: 13th September 2023

The Director
Foundation for Underwater Domain Awareness,
102 Cordia Nyati Estate,
Mohammadwadi,
Pune – 411060, Maharashtra

Subject: Recognition of Scientific and Industrial Research Organisations (SIROs).

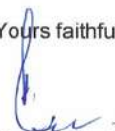
Dear Sir,

This has reference to your application for recognition of **Foundation for Underwater Domain Awareness, Pune, Maharashtra** as a Scientific and Industrial Research Organisation (SIRO) by the Department of Scientific and Industrial Research under the Scheme on Recognition of Scientific and Industrial Research Organisations (SIROs), 1988.

2. This is to inform you that it has been decided to accord recognition to **Foundation for Underwater Domain Awareness, Pune, Maharashtra** from **21.08.2023 to 31.03.2026**. The recognition is subject to terms and conditions mentioned overleaf.

3. Receipt of this letter may kindly be acknowledged.

Yours faithfully,


(Dr. P.K. Dutta)
Scientist - 'G'

- Awards and Recognition:

We have been recognised globally for our innovative digital tools in underwater noise monitoring and submarine deployment, showcasing the relevance and potential of UDA applications across sectors. Additionally, we have been privileged to collaborate with and facilitate impactful contributions by esteemed academics and researchers in the field throughout this year, and have also previously been the winners of the Global Maritime Innovation Challenge award (Narwhal Challenge, France).



- Pioneering Digital Transformation:

Innovation is at the very core of our DNA, and our pioneering efforts in the field of Marine Spatial Planning (MSP) and digital transformation exemplifies our commitment to exploration and excellence. This year, our efforts included pioneering projects including the Identification of Noise Hotspots for Marine Mammals in the Indian Ocean Region and introducing a Digital Tool for Seaweed Cultivation & Shrimp Farming. These initiatives represent our continuous commitment to exploring, innovating, and expanding our understanding of underwater domains as we highlight the many complexities and opportunities present within the Indian Ocean region.

Identification of the Noise Hotspots For Marine Mammals In The Indian Ocean Region.

Overview

This research project aims at identifying noise hotspots and areas of potential conflicts with vulnerable marine mammal habitats in the Indian Ocean Region. The global aim of this project is to gather baseline knowledge of noise producing shipping activities, assess accumulating noise-producing activities (noise hotspots) are pointed out, with a focus on zones overlapping with important marine mammal habitats. The results have revealed several noise hotspots overlapping important marine mammal habitats.

The research study states the two different noises that human environment experience- impulsive noise and continuous low-frequency noise. It further notes that marine mammals, especially cetaceans, are highly vocal and dependent on sound for almost all aspects of their lives, e.g. food finding, reproduction, communication, detection of predators/prey, and navigation. They are thus likely sensitive to anthropogenic noise. The work attempts to study and map variations in the ambient noise levels corresponding to the fluctuations in the surface parameters and shipping traffic.

Key highlights

- Vulnerable marine mammals (VMM): There are many marine mammals in the Indian Ocean region whose location, as stated by IUCN, is vulnerable or endangered.
- Marine Environment (important for mammals): One of the characteristics of low-frequency sounds is that it can travel relatively long distances without much attenuation (reduction in level).
- Spatial-temporal mapping (way of implementation): The work attempts to study and map variations in the ambient noise levels corresponding to the fluctuations in the surface parameters and shipping traffic.
- Noise and noise-mammals interaction/hotspots: The suitability maps were limited to the area that had previously been surveyed for marine mammals.

Key Challenges

- Data collection: Indian ocean Region: Indian-ocean region covers 201 lakh square kilometers, but only less than 20 % of the ocean have been studied. There is a lot to discover including data for many marine mammals that are not appropriate, their habitat, trends in the IOT, etc.
- Finding the audible acoustic energy: The audible acoustic energy in the audibility of the shipping on a marine mammal. While dividing the chosen area into small cells and finding the ship source spectra.
- Lack of precise data noise mapping at each point: Many sound sources are simply missing from the estimate of cumulative shipping energy. The most important of these missing sources is not noise mapping small boat traffic.

Conclusions drawn from the study

It is hoped that the efforts of the study could serve these important purposes:

- As a current best estimate of the occurrence of marine mammals and chronic noise noise levels in the Indian Ocean region, regions for conservation, management, and investigation.
- As a framework for making predictions about the consequences likely to result from increased noise levels as various parts of the coast are subject to industrial development applications, or conversely as places where ship-quieting technologies may be most useful.
- As a simple, meaningful method that could be used anywhere that a variety of marine mammal species may be at risk from chronic anthropogenic noise.

Identification of the Noise Hotspots For Marine Mammals In The Indian Ocean Region.

Authors

Praveen Mittal and Dr. (CSC) Anand Vohra

Wittekind Model In Indian Ocean

3D Ambient Noise Mapping Using Wittekind Model In Indian Ocean.

Mapping

3D Shipping Radiated Noise Mapping.

For Determining sound speed in Shallow Tropical Freshwater Systems, With Field Validation.

A Computationally Efficient Model For Determining Sound Speed In Shallow Tropical Freshwater Systems, With Field Validation.

4.2 Key Milestones and Achievements:

Since 2017, our journey has been marked by transformative milestones and exceptional achievements, highlighting our unwavering commitment to innovation, collaboration, and impact-driven contributions. Below is a summary of recent milestones and achievements across our five core pillars.

4.2.1 Research Milestones:

- Our pioneering research efforts continue to yield crucial insights for effective underwater system deployment.
- We received approval on projects by the Ministry of Earth Sciences focused on spatio-temporal underwater noise mapping for habitat preservation.
- We received recognition as a Scientific and Industrial Research Organization (SIRO) from the Government of India in September 2023, opening doors for research grants and import duty exemptions.
- Validation studies at Khadakwasla lake revealed critical insights into tropical water sediment management.
- We have collaborated with and facilitated pioneering research by scholars spanning across underwater noise mapping, sonar performance, underwater modelling, and AIS data analytics, significantly impacting freshwater and marine ecosystem management.





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सत्यमेव जयते

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वैज्ञानिक और औद्योगिक अनुसंधान विभाग
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4.2.2 Academia and Skilling:

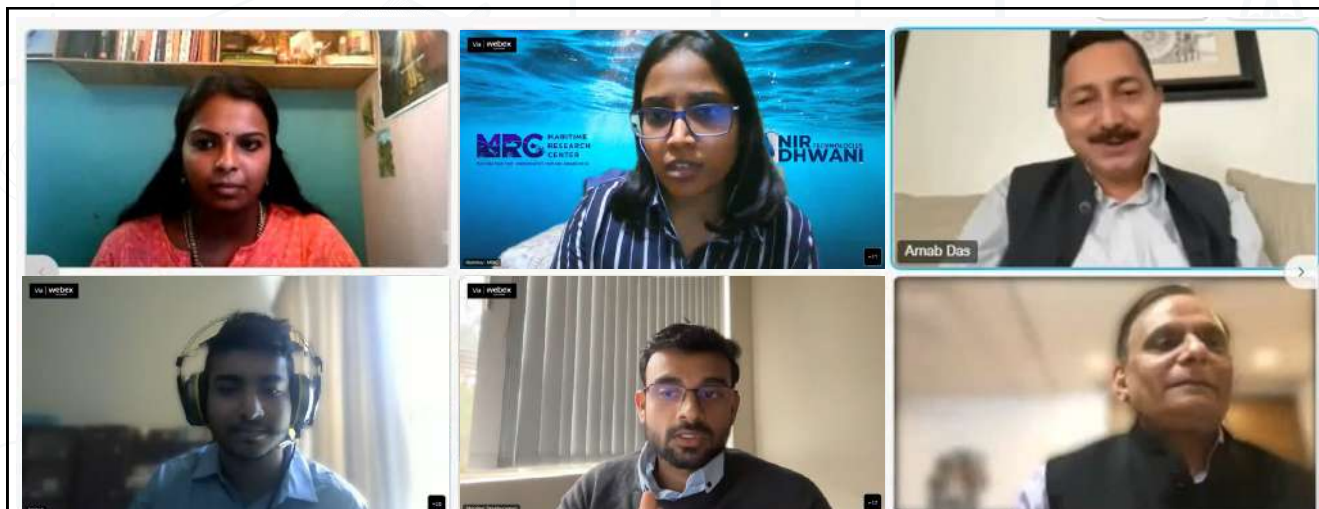
- The UDA Digest, a dynamic digital platform disseminating information across specialised thematic verticals, played a key role in promoting knowledge-sharing and awareness throughout this year.
- Collaborations with AICTE led to the inclusion of an acoustic-related curriculum in technical education across institutes. The AICTE's approval of ten courses serves to bridge academic gaps by integrating underwater studies into technical education nationwide.
- Partnerships with sector skill councils and the MCCIA and ISCE Pune facilitated exclusive skill development programs for UDA across varied stakeholders.
- The publication of a detailed handbook covering various skilling requirements and curriculums showcases our comprehensive skilling programs, from corporate training to postgraduate courses, offering practical exposure complementing theoretical learning.

4.2.3 Insightful Workshops: Building Skills, Forging Synergy:

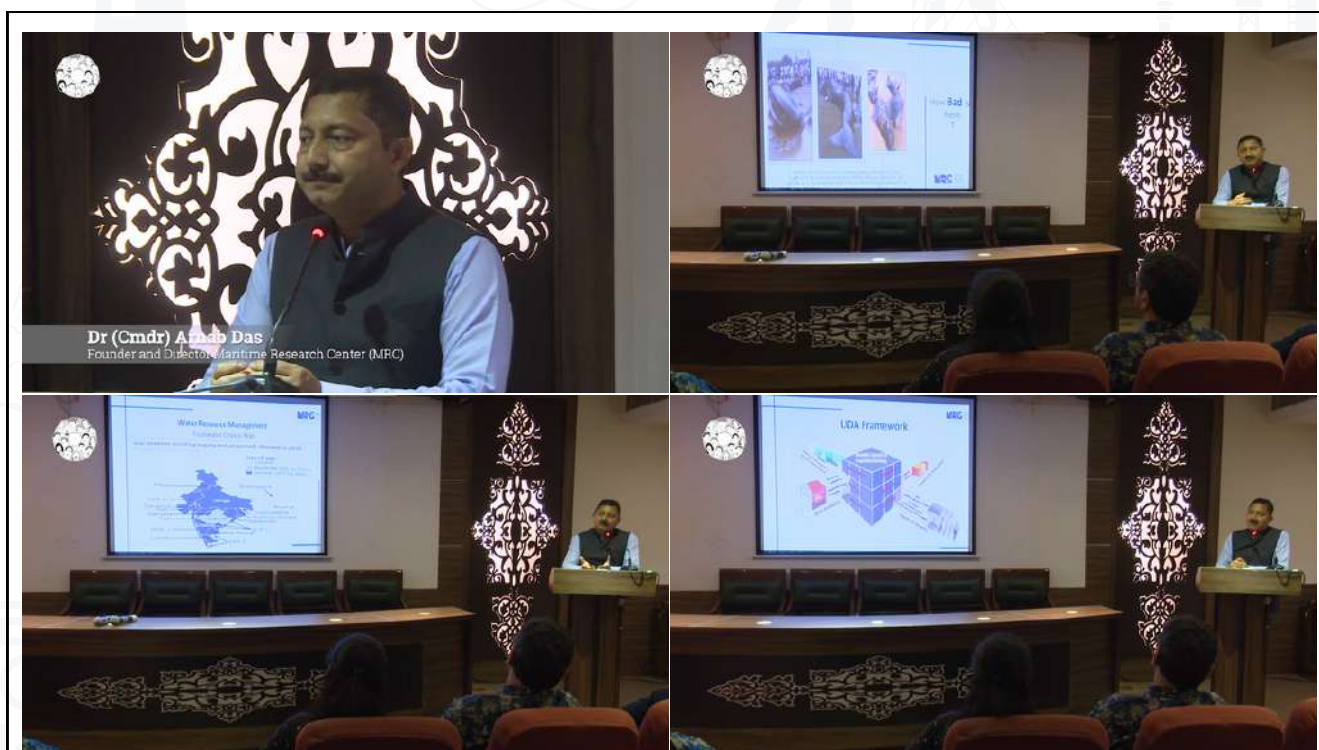
Under our three-pronged Outreach, Engage and Sustain approach, we organised a series of detailed workshop sessions throughout the year. These sessions were also attended by eminent speakers including HE Shri Jawed Ashraf (India's Ambassador to France), Ambassador Anup Mudgal (India's Ambassador to Mauritius, and FICCI Task Force member), Mr. Hemang Jani (Secretary, Capacity Building Commission), and Dr. Vladimir Ryabinin (Executive Secretary of IOC UNESCO), among various others.



Speaking Engagements at Various Workshops and Events



World Oceans Day special webinar, attended by esteemed guests including
Amb. Anup Mudgal



Presentation during O Trust's Foundation Day as part of our commitment
to inter-NGO collaboration across science and creative industries

4.3 Partnership Highlights:

4.3.1 The Indo-Swiss Centre of Excellence:

The Indo-Swiss Centre of Excellence, a not-for-profit entity, has partnered with both MRC and NDT to establish a Centre of Excellence for Skilling in support of the UDA framework. This underwater studies Center of Excellence works to accelerate UDA initiatives across research, academia, skilling, innovation, and policy concerns. The signing of this MoU marked a comprehensive new capacity-building initiative aimed at adapting participants to evolving workplace dynamics, providing vital skills for new job opportunities and continuous professional upgrades.



ISCE has partnered with MRC and NDT to establish a Centre of Excellence for Skilling to drive the UDA Framework

4.3.2 An Extensive European Tour:

In December 2022, our founder embarked on an extensive diplomatic and strategic engagement initiative across multiple European countries. The trip aimed to engage with UNESCO and the European Union (EU) in terms of leveraging the UDA framework's potential in managing security and growth in the Indo-Pacific strategic space and beyond.

In our effort to explore collaborative opportunities at the UNESCO Headquarters in Paris as well as the EU Headquarters in Brussels, Dr. Arnab Das visited and engaged with a number of stakeholders and dignitaries including HE Santosh Jha (India's Ambassador to Belgium and the EU), HE Vishal Sharma (India's Permanent Representative at UNESCO), HE Amb. Raj Kumar Srivastava (India's Ambassador to Croatia), Dr. Ralf Heckner (India's Ambassador to Switzerland), HE Didier Vanderhasselt (India's Ambassador to Belgium), Charlina Vitcheva (Director-General, MARE, EU), and more. As a result, MRC was widely acknowledged as the nodal agency for the UDA framework in the region, with governments such as Sri Lanka, Bangladesh, Mauritius, and beyond recognising our organisation's UDA capacity-building potential and reinforcing our role in advancing the UDA framework on a global scale.



Dr. (Cdr) Arnab Das held an important meeting with Director General Maritime Affairs and Fisheries (DG MARE) officials at the EU



Dr Das visited the UNESCO Headquarters in Paris, France to hold meetings with their representatives

4.3.3 UNESCO Headquarters Visit:

Dr. Das' visit to the UNESCO Headquarters in Paris aimed to strengthen collaborations and discussions initiated by MRC with UNESCO India. These interactions sought to enhance our ongoing collaborations and align them with UNESCO's proposal to establish a Category II Center of Excellence focused on the UDA framework.

Our visit to the UNESCO Headquarters was a strategic step forward in fostering inter-organisational partnerships within UNESCO's established framework, specifically the Intergovernmental Oceanographic Commission (IOC). These engagements underscored our commitment to driving innovation and capacity-building in alignment with UNESCO's overarching objectives, particularly in terms of fostering sustainable practices and bolstering the UDA framework's significance.

These collaborations reflect our commitment to fostering cross-disciplinary partnerships, driving innovation, policy formulation, and skilling initiatives essential for comprehensive UDA development as we look to a future bright with possibility.



The Sunday Guardian
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Sustainability and Climate change

World comes closer to Venezuela's humanitarian truce as Russia warbles

Pollution

What next for China and Taiwan?

Digital Transformation

UDA framework can be a catalyst for Indo-Pacific growth post G20

Editor's Choice - UDA Framework can be a catalyst for Indo-Pacific growth post G20

By Arnab Das
October 8, 2023

The UDA framework aligns with the objectives of the IORA charter, which has undergone multiple revisions over the years to foster cooperation and capacity building among member states.

The Indian EXPRESS
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News / Opinion / Columns / There is a pressing need for India to develop a comprehensive Underwater Domain Awareness strategy
Up Premium

There is a pressing need for India to develop a comprehensive Underwater Domain Awareness strategy

This will need coordination between our national security agencies, the navy, and the government departments responsible for the marine environment and disaster management, but also collaboration with like-minded countries who share our concerns.

Written by Viree Sobole
Updated: June 23, 2020 09:07 IST

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One recent survey done by the Asia Maritime Transparency Initiative (AMTI), shows that between April 2019 and March 2020, China deployed 25 maritime survey missions in the Indo-Pacific. (Illustration: C R Sankaranarayanan)

At a time when China's pre-meditated military moves along our northern boundary are drawing the nation's attention, it is important that we don't lose sight of our surrounding seas.

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[Maharashtra News](#) | [Maharashtra](#) | [Mumbai News](#) | Importance Of The Indian Maritime Economy Has Increased

In the post-Corona world, the maritime economy is extremely important

Facebooker User | Maharashtra Times | Updated 3 Nov 2020, 9:27 am

The importance of the Indian maritime economy has now increased in the new world after the Corona crisis. The role of Navy has become more important in it... ✓



m. Ts. Representative, Mumbai

In the Corona crisis and the subsequent new world, the importance of Indian maritime economy has increased. The role of Navy has become more important in it, the opinion was expressed in a webinar organized by the Western Command regarding maritime power.



SOUTH ASIA MONITOR

A PERSPECTIVE ON, FROM AND OF INTEREST TO THE REGION

Jan 23 2024

SPOTLIGHT

PERSPECTIVE

SOUTH ASIA/BROAD

INDO PACIFIC - CHINA WATCH

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Home / [Spotlight](#) / How Indian expertise and BIMSTEC's traditional knowledge can transform underwater domain awareness for the region

How Indian expertise and BIMSTEC's traditional knowledge can transform underwater domain awareness for the region

The talent pool that exists in the BIMSTEC - in countries like Bangladesh, Sri Lanka, and Thailand - can be channelized across areas of data analytics, underwater domain (acoustic signal processing) and for field deployment. Indian talent is known globally for its data analytics skills, and coupled with the underwater domain expertise, can work on the MSP-based digital transformation for the region.

By Dr (cdr) Arnab Das | Oct 11, 2023





BIMSTEC IN THE NEW GLOBAL ORDER: A NEW PERSPECTIVE BASED ON THE UDA FRAMEWORK

EVOLUTION OF BIMSTEC AS AN INFLUENTIAL CLASSROOM

1995 - 2000: BIMSTEC was established as a regional organization. It was the first time that South Asian countries came together to form a regional organization.

2000 - 2005: BIMSTEC expanded its membership to include Bangladesh, Sri Lanka, and Thailand. It also started to work on various projects in the fields of trade, transport, and tourism.

2005 - 2010: BIMSTEC started to work on various projects in the fields of trade, transport, and tourism. It also started to work on various projects in the fields of trade, transport, and tourism.

2010 - 2015: BIMSTEC started to work on various projects in the fields of trade, transport, and tourism. It also started to work on various projects in the fields of trade, transport, and tourism.

2015 - 2020: BIMSTEC started to work on various projects in the fields of trade, transport, and tourism. It also started to work on various projects in the fields of trade, transport, and tourism.

2020 - 2023: BIMSTEC started to work on various projects in the fields of trade, transport, and tourism. It also started to work on various projects in the fields of trade, transport, and tourism.

UDA FRAMEWORK

UDA Framework is a new perspective based on the UDA Framework. It is a new perspective based on the UDA Framework. It is a new perspective based on the UDA Framework.

UDA Framework Pillars

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- Religion
- Language
- Art
- Science
- Industry
- Service
- Government
- Non-Government
- Academic
- Media
- Public
- Private
- International
- Regional
- Local
- Community
- Individual

UDA Framework Pillars

- Trade
- Transport
- Tourism
- Technology
- Environment
- Health
- Education
- Culture
- Religion
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20 January, 2022

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Military & Aerospace

Sinking or Soaring: The Digital Dilemma of India's Maritime Future

Military & Aerospace

★★★★★

Sinking or Soaring: The Digital Dilemma of India's Maritime Future

By Dr. Arnab Das

Issue first Edition (Date : 19 Sep., 2022)

In the 21st century, as India's economy continues to evolve and develop, its digital prowess has emerged as a significant driver of growth. The Digital India initiative has emerged as a driving force behind this evolution, steering the nation towards a digital first future. However, amid this technological boom, a vast and largely untapped resource remains in the shadows – the

आत्मनिर्भरता

समुद्री क्षेत्र की ओर दिया जाए ध्यान

कलकत्ता, पश्चिम बंगाल

कलकत्ता, पश्चिम बंगाल राज्य सरकार के मुख्यमंत्री ममता बनर्जी ने कहा कि भारत को समुद्री क्षेत्र में आत्मनिर्भर बनना चाहिए। उन्होंने कहा कि समुद्री क्षेत्र में ध्यान देने से देश की आर्थिक स्थिति में सुधार आएगा।

‘अंडरवॉटर डोमेन अवेयरनेस’ पर आधारित एक कार्यक्रम में उन्होंने कहा कि समुद्री क्षेत्र में ध्यान देने से देश की आर्थिक स्थिति में सुधार आएगा।

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‘ब्लू इकॉनॉमी’ पर लक्ष्य द्यावे

सामरिक विषयों में लक्ष्य द्यावे

कलकत्ता, पश्चिम बंगाल राज्य सरकार के मुख्यमंत्री ममता बनर्जी ने कहा कि भारत को समुद्री क्षेत्र में आत्मनिर्भर बनना चाहिए। उन्होंने कहा कि समुद्री क्षेत्र में ध्यान देने से देश की आर्थिक स्थिति में सुधार आएगा।

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ब्लू इकॉनॉमी और सुखा हेतु समुद्री क्षेत्र पर ध्यान दिया जाए

नौदल विभाग के अध्यक्ष ने कहा कि समुद्री क्षेत्र में ध्यान देने से देश की आर्थिक स्थिति में सुधार आएगा।

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5. Looking Ahead: Turning Ideas Into Impact

5.1 Corporate Social Responsibility:

Within our diverse range of CSR initiatives is an overarching desire to turn ideas into impact. This is achieved through a structured approach, specialised collaborations and industry-backed expertise in the underwater domain, and meticulous assessment to ensure our efforts provide real-world insights and practical contributions. This chapter encapsulates our commitment to the exchange of expertise and actionable insights across a variety of partnership opportunities, from empowering a Young India through immersive upskilling programmes to fostering collaborative partnerships within academia and industry, all united in shaping a more informed and proactive approach in the shared pursuit of Underwater Domain Awareness.

While the scope and impact of our activities align seamlessly with the majority of the United Nations Sustainable Development Goals in particular, our mission and vision resonate strongly with:

Goal 4: Inclusive and Equitable Quality Education

Goal 9: Industry, Innovation and Infrastructure

Goal 13: Climate Action

Goal 14: Life Below Water



5.1.1 Approvals and Certifications:

Our focus remains steadfast as we progress the development and implementation of the Underwater Domain Awareness framework across SDGs, which work to ensure safe, secure, and sustainable growth within tropical waters. These endeavours have also been recognised by key stakeholders in Maritime Security, Blue Economy, Marine Environment and Disaster Management, and Research and Innovation, fostering cohesive action as we move forward with passion and purpose.



As a Section 8 company, the Maritime Research Center boasts a robust track record endorsed by approvals from competent authorities, including Section 80G, 12A, and CSR-1. Our dedication to research and CSR policy has also been recognised by governing bodies such as the Department of Scientific and Industrial Research, India, as well as approved registration on the National Stock Exchange of India Ltd.

5.1.2 CSR Initiatives Driving UDA Realisation:

Our commitment to collaborative CSR initiatives is grounded in creating tangible, meaningful impacts on communities and ecosystems whilst fostering shared progress. Within our research portfolio and ongoing projects, we identify a multitude of opportunities for impactful CSR engagement.

Currently, our CSR initiatives align with UDA realisation across numerous levels. Broadly, they can be summarised under the following:

- UDA Internships and Fellowships: Corporates supporting education, skilling, rural empowerment, and capacity-building initiatives can support our internship and fellowship programmes for talented individuals from underprivileged and/or underrepresented socio-economic backgrounds, thereby contributing towards developing skilled human resources whilst supporting affirmative action.

- Support of Existing Activities: Collaborating with industry partners and academic institutions alike, we work to channel financial contributions and specialised industry expertise to drive positive change within the underwater domain. This encompasses a multitude of industries and beneficiaries, from infrastructure-building via renewable energies and effective marine spatial planning, to developing climate resilience amongst coastal and riverine communities.

“Our activities focus on promoting education that enhances vocational skills, promoting environmental sustainability and conservation of natural resources, and promoting technology incubation via academic pursuits, each of which are aligned with the provisions of Schedule VII (ii, iv, ix), Section 135 of the Companies Act 2013 (CSR Policy).”

5.2 Opportunities for Collaboration:

Through the multi-pronged, multi-disciplinary projects and initiatives outlined in this report, our organisation continues to play a central role in supporting sustainable marine ecosystems and strategic policy in the IOR through research and informed action. As we look to the future, our focus remains unwavering on cultivating a dynamic learning and knowledge-sharing ecosystem underpinned by our foundational principles.

Our ongoing efforts present collaborative opportunities across the following areas:

- Policy Intervention for Good Governance

Addressing the limited understanding of our underwater world, Marine Spatial Planning (MSP) stands as an effective governance tool. MSP holds the potential to ensure sustainable management of marine and freshwater systems, mitigating risks associated with unregulated resource exploitation. Moreover, embracing the Underwater Domain Awareness framework can also facilitate pathways to empower youth hailing from underprivileged socioeconomic backgrounds and riverine/coastal communities, fostering employability at various levels.

- Technology Intervention

Embracing digital transformation through the UDA framework drives operational efficiency specific to tropical waters. Our emphasis on indigenous efforts, employing Modelling & Simulation (M&S) alongside field experimental validation, is pivotal to addressing various challenges as presented by tropical littoral waters. With an added focus on workshops, internships, and policy-level interventions, we aim to enhance technology access and operational efficiency for sustainable community development.

- Acoustic Capacity and Capability Building

Recognising the unique challenges of tropical waters, we prioritise indigenous efforts in enhancing acoustic capacity. Acknowledging the significance of acoustic signals in underwater domains, our organisation specialises in enhancing acoustic capacity and capability-building. Our collaborations intend to develop talent pools across a diverse range of fields, emphasising research projects and specialised skills that benefit industries and foster innovation within communities.

- Holistic Development for Human-Centric Growth

Aligned with a strong belief in an interconnected society, our UDA framework prioritises human-centric development. With this UDA framework as the foundation of our focus, we strive to empower individuals from underprivileged backgrounds by providing science and technology tools, UDA fellowships, and structured collaborations with local entities. In this manner, we aspire to holistically drive skilling, policy and technology interventions for inclusive growth across strategic security, blue economy, sustainability, and science and technology industries.

- Sustainable Livelihoods for Fisherfolk and Riverine Communities

As part of our overarching development goals, we also work to address challenges faced by coastal fisherfolk populations due to climate change-engendered environmental changes and associated economic vulnerabilities. By implementing tailored programmes focusing on skill development and access to sustainable fishing practices, we have identified key areas of improvement that may be bolstered through CSR partnerships. Through strategic collaborations with local stakeholders and targeted technology integrations, we aim to create sustainable models that empower fisherfolk and promote ecological conservation.

5.3 Existing Partnerships:

Some examples of our impact-driven past and existing activities include the following:

- Khadakwasla Lake Experiment

In collaboration with esteemed experts and partners, our organisation conducted a comprehensive freshwater management workshop at the Khadakwasla Lake. This workshop, funded by the Bajaj Group and the Government of Maharashtra, set new benchmarks in maritime research, showcasing the practical aspects of policy, technical intervention, and acoustic capacity development.

- UDA Summer School

Our annual six-week residential programme, supported by various government agencies and corporates such as Larsen & Toubro and Cochin Shipyard Limited, has trained over 100 participants thus far. This flagship event has since become a key recognition point for MRC.

- UDA Internships and Fellowships

Collaborating with renowned Indian universities such as IITs and TERI, the Maritime Research Center continues to host successful internships and fellowships that foster innovative projects and research publications. Excel Industries Ltd. has been a significant supporter of these initiatives.

- The Indo-Swiss Center of Excellence

MRC's partnership with the Indo-Swiss Center of Excellence for Skilling works to address skill gaps identified across various domains pertaining to Underwater Domain Awareness. Various hands-on programmes and academic courses aim to bridge these gaps.

- Center of Excellence for Blue Economy

In collaboration with Excel Industries Ltd., MRC is working to establish a unique Center of Excellence that is focused on research, innovation, and strategy to bolster coastal and riverine communities.

- UDA Workshop Series

Under the HT Parekh Foundation, a sequence of workshops aimed at policy, technology, and community interactions will provide a comprehensive report on further developments for government and corporate stakeholders.

5.4 Future Strategies and Pathways to Progress:

Our initiatives encompass various domains, extending from empowering the nation's youth to facilitating deeper engagement across corporate, academic, and individual stakeholders. As we forge ahead, we envision a landscape where knowledge dissemination, active engagement, and sustainable practices converge and synergise seamlessly.

5.4.1 Youth Connect:

Our UDA Summer School stands as a testament to our commitment to shaping future leaders across various fields. This dynamic 6-week program is held annually at our partner institute, the Indo-Swiss Center of Excellence for Skilling on Underwater Studies. Our chief focus is to champion the Underwater Domain Awareness framework and its role in ensuring safe, secure, and sustainable growth within the maritime sector. Through a comprehensive curriculum and immersive interactions with distinguished subject-matter experts, we aim to equip participants with the skills and insights crucial for employment in maritime and related sectors.

5.4.2 Internships and Fellowships:

Making the youth of India more employable and having a matured appreciation of real-world issues is a key focus at our organisation. This is why we go beyond the Summer School by providing multi-tiered internship and fellowship opportunities at our organisation. We receive over 500 internship applications from the top five IITs and leading Liberal Arts institutions across the country each year. Some of our interns-turned-research fellows have also received doctoral programme offers at top Ivy League schools abroad. Our Internship and Fellowship programmes embody our commitment to holistic learning and skill development. They provide a platform whereby young researchers can safely and confidently explore the many nuances of UDA, actively engage in shaping critical projects, and receive invaluable mentorship support across disciplines throughout their journey. Our programmes provide real-world problem-solving opportunities and hands-on exposure aimed at knowledge enrichment, skill development, and critical thinking, ultimately nurturing domain expertise.

5.4.3 Corporate Memberships:

In the burgeoning maritime sector, corporate institutions play a vital role in industry-relevant research and the development of competent human resources. Our Corporate Memberships are tailored to suit the needs of startups and think-tanks, not-for-profit organisations, and commercial entities alike, facilitating deeper engagement across multiple levels. Members gain access to a wealth of benefits including insight-sharing, regular interactions, access to research outcomes and publications, invitations to exclusive events, participation in various research activities, and hosting opportunities for stakeholder projects. The varying registration options for different entity types ensure a gateway to a spectrum of accessible, collaborative opportunities, contributing substantially to UDA and its practical applications.

5.4.4 Academia Memberships:

Our Academia Memberships are crafted to empower institutes with a robust platform for academic engagement and collaboration. Academic institutions opting for our institutional memberships can open doors to a myriad of benefits - interaction opportunities, research outcome-sharing, invitations to specialised events, access to our comprehensive Maritime Library, participation in various research activities, student project hosting, and potential joint research project proposals. Institutes aspiring to forge more focused collaborations can also opt for Memorandums of Understanding (MoUs) post-institutional membership. These MoUs delineate specific collaboration programmes, underscoring a joint commitment to fostering academic excellence in the underwater domain.

5.4.5 Individual Memberships:

Our individual membership programme caters to various levels of engagement, inviting enthusiasts and professionals alike to partake in the exciting journey of Underwater Domain Awareness. With five tiers ranging from Student Members to Patrons, this programme serves as a gateway to actively contribute to UDA-related activities and decision-making processes. Memberships spanning a three-year registration period offer opportunities for involvement in UDA initiatives at various levels, ensuring a diverse and inclusive participation framework.

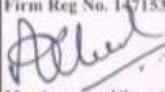
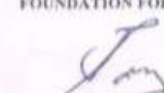
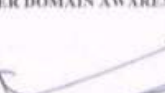
With these strategic pathways, we aim to forge cutting-edge explorations anchored in the pursuit of knowledge and shared understanding.

5.4.6 Sincere Gratitude to our Partners and Affiliates:



As we stride towards a bright future rooted in knowledge-sharing, holistic understanding, and collaborative action, our commitment to 'see, understand, and share' paves the way for a transformative journey nurturing young talents, fostering impactful partnerships, and igniting sustainable change in the underwater domain.

6. Financial Report

FOUNDATION FOR UNDERWATER DOMAIN AWARENESS Company Identification Number- U85300PN2019NPL182720 REGISTERED UNDER SECTION 8 OF THE COMPANIES ACT 2013 102, Cordia, Nyati Estate, Mohammadwadi, Hadapsar, Pune- 411060 BALANCE SHEET STATEMENT AS ON 31ST MARCH, 2023					
Rs. in '000					
PARTICULARS	Notes	As at 31st March 2023		As at 31st March 2022	
		Rs.	Rs.	Rs.	Rs.
LIABILITIES					
CORPUS FUNDS					
(a) Trust & Copus Fund	3	100.00		100.00	
(b) Reserves and Surplus	4	1,606.85		83.35	
(c) Money received against share warrants		-	1,706.85	-	183.35
NON-CURRENT LIABILITIES					
(a) Long-term borrowings		-	-	-	-
(b) Deferred Tax liabilities (Net)		-	-	-	-
(c) Other Long term liabilities		-	-	-	-
(d) Long-term Provisions		-	-	-	-
CURRENT LIABILITIES					
(a) Short term borrowings		-	-	-	-
(b) Trade payables		-	-	-	-
(i) Total outstanding dues of micro and small enterprises					
(ii) Total outstanding dues of creditors other than micro and small enterprises					
(c) Other current liabilities	5	7,610.00		678.43	
(d) Short term provisions					
			7,610.00		678.43
			9,316.85		861.78
ASSETS					
NON-CURRENT ASSETS					
(a) Property, Plant & Equipments and Intangible assets	6				
(i) Property, Plant and Equipment		48.66		54.07	
(ii) Intangible assets		-	-	-	-
(iii) Capital work-in-progress		-	-	-	-
(iv) Intangible assets under development		-	-	-	-
(b) Non-current investments		-	-	-	-
(c) Deferred tax assets (net)		-	-	-	-
(d) Long-term loans and advances		-	-	-	-
(e) Foreign Currency Monetary Item Translation Diff		-	-	-	-
			48.66		54.07
CURRENT ASSETS					
(a) Current investments					
(b) Inventories					
(c) Trade receivables		1,350.00			
(d) Cash and Bank Balances	7	6,920.77		670.28	
(e) Short-term loans and advances	8	100.00		100.00	
(f) Other current assets	9	897.42		37.42	
			9,268.19		807.70
			9,316.85		861.77
See accompanying notes forming part of the financial statements	1-35				
As per our report of even date attached.					
For Anupam Kharat & Company Chartered Accountants Firm Reg No. 147153W  Mr. Anupam Kharat Proprietor M.No.-183039 UDIN :23183039BGYIFM7018 Place : Pune Date : 31/08/2023		For and Behalf of the Board of Directors of FOUNDATION FOR UNDERWATER DOMAIN AWARENESS  Pralok Talera Director DIN : 00337983			
		 Arnab Das Director DIN : 07657449			

FOUNDATION FOR UNDERWATER DOMAIN AWARENESS Company Identification Number- U85300PN2019NPL182720 REGISTERED UNDER SECTION 8 OF THE COMPANIES ACT 2013 102,Cordia,Nyati Estate,Mohammadwadi,Hadapsar,Pune- 411060 STATEMENT OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH 2023 Rs. in '000					
PARTICULARS	Notes No	As at 31st March 2023		As at 31st March 2022	
		Rs.	Rs.	Rs.	Rs.
Revenue from operations:	10				
Course Fees			15.00		10.00
Donations			9,607.00		3,502.68
Other Income			35.00		
Total Income			9,657.00		3,512.68
Expenses					
Cost of Materials Consumed					
Changes in inventories of finished goods, work in progress and Stock-in-trade					
Other Manufacturing expenses					
Employee benefits expense	11	25.00		827.00	
Finance Costs	12	-		22.78	
Depreciation and amortization expense	6	5.41		6.01	
Other Administrative and Selling Expenses	13	8,103.10		2,683.69	
Total Expense			8,133.51		3,539.48
Profit before exceptional and extraordinary items and tax			1,523.49		(26.80)
Exceptional Items			-		-
Profit before extraordinary items and tax			1,523.49		(26.80)
Extraordinary items			-		-
Profit before tax			1,523.49		(26.80)
Tax expense:					
(1) Current tax					
MAT Payable					
MAT Receivable					
(2) Deferred tax			-		-
Profit/(Loss) for the period from continuing operations			1,523.49		(26.80)
Profit/(Loss) for the period from discontinuing operations			-		-
Tax expense of discontinuing operations			-		-
Profit/(Loss) from discontinuing operations (after tax)			-		-
Profit/(Loss) for the period			1,523.49		(26.80)
Earnings per equity share:					
(1) Basic					
(2) Diluted					
See accompanying notes forming part of the financial statements	1-35				
As per our report of even date attached. For Anupam Kharat & Company Chartered Accountants Firm Reg No. 147153W <i>Anupam Kharat</i> Mr. Anupam Kharat Proprietor M.No.-183039 UDIN :23183039BGYIF1407 Place : Pune Date : 31/08/2023 ANUPAM KHARAT & CO. M.No. 183039 FRN. 147153W Chartered Accountants For and Behalf of the Board of Directors of FOUNDATION FOR UNDERWATER DOMAIN AWARENESS <i>Pratibha Talera</i> Pratibha Talera Director DIN : 00337983 <i>Arvind Das</i> Arvind Das Director DIN : 07657449					

For a more detailed financial report, or in case of any specific questions or concerns, please contact us on (divya.mrc@foundationforuda.in)

7 Join Us:

Bearing in mind the scope, opportunities, and unique challenges presented by our underwater domains, it is essential for multiple stakeholders to come together and build upon the UDA framework for a meaningful outcome as we move forward. Fragmentation across stakeholders and policymakers continues to be the biggest drawback in realising the SAGAR vision, and we firmly believe that a leading maritime nation like India can achieve tremendous growth with increased efficiency through a more focused, structured approach. The UDA framework provides this much-needed structured approach, establishing the groundwork for numerous collaborative possibilities to ensure the beneficial pooling of resources and synergising of efforts. Additionally, the scope of its application extends beyond India alone as we look to the tropical littoral waters of the vast Indian Ocean Region, creating a wealth of possibilities across a vast spectrum of stakeholders and beneficiaries.

In a world where the depths of our oceans remain largely unexplored, our commitment to driving Underwater Domain Awareness stands resolute. At MRC and NDT, we navigate uncharted waters to help build a climate-resilient future, forging new paths, unlocking exciting new discoveries, and championing a sustainable, secure, and thriving maritime ecosystem. Our social impact objectives stand as a testament to this commitment, and we look forward to partnering with organisations and stakeholders who share our vision and passion.

Together, we can chart a course towards a better tomorrow: one where the unseen becomes understood, and the unknown becomes our legacy.

Learn more at www.mrc.foundationforuda.in / www.nirdhwani.in.

To request for our ongoing and future project plans or documentation for compliances, please contact us on director.mrc@foundationforuda.in

- Skilling Partner:





Let's Collaborate !!

For General Inquiry & CSR Collaborations

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