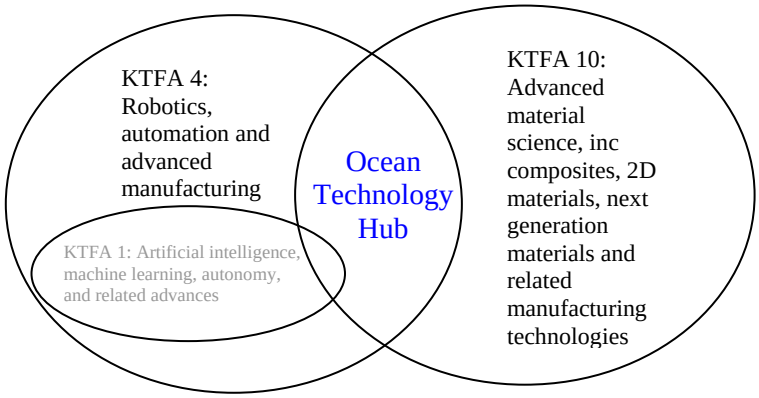
Ocean Tech Hub of Southeastern New England | Designation Application

Ocean Tech Hub (OTH) Designation will coalesce the decades-long investment[i], research and innovation in undersea robotics, automation, advanced materials, and composites and catalyze rapid tech transfer and commercialization in the ocean technology field in Southeastern New England (SENE). Targeting **robotics and sensors with AI/ML embedded** (KTFA 4, 1) and the **advanced material science needed for them** (KTFA 10), OTH focuses the region's assets and burgeoning technology into market-rich global opportunities by accelerating commercialization of tech-ready innovation (TRL +6), scaling workforce programs to create new, good-paying jobs, and ensuring barriers to technology deployment are removed. Deepening work previously funded by the EDA through the Build Back Better Regional Challenge, OTH positions SENE as a global ocean tech powerhouse.



SENE's strengths in undersea technology, manufacturing, composites, and ocean engineering is an outgrowth of our location, strong defense industry, and history of marine science exploration. OTH will leverage the area's growing expertise in computer simulation, data collection, and machine learning. It will support national security and focus on dual-use opportunities for commercialization. OTH is a formidable candidate for rapidly scaling and growing a world-leading hub for undersea robotics and sensors –which are relevant for industries ranging from aquaculture to shipping to climate mitigation to telecommunications.

Technology-based potential of the region for global competitiveness

The ocean is the next frontier in global exploration with the ocean economy positioned to grow by over $295B in the next 5-10 years (see chart). The OTH's technology areas have a competitive advantage within the ocean economy with a Compound Annual Growth Rate (CAGR) of 7-15%. In this time, the region's core ocean tech sector will grow 9%. Estimating a market capture of 2% of this, we will benefit from an economic impact of $5.9B in sales and an expected creation of 15.7K jobs, a 27.7% increase.[ii] The additional investment from the U.S. EDA into an OTH will exponentially add to these estimations.

Expected Growth in Ocean Technology		
Sub-Sector	**$ in Billions**	**By Year**
Maritime Safety	33.4	2026
Ocean Composites	4.8	2028
Estuary Management	76	2028
Marine Sensors	46	2029
Aquaculture and Seafood	60	2030
Carbon Capture	30	2030
Boating Decarbonization	16.6	2031
Undersea Defense Products	24.8	2031
Ocean Robotics	4.3	2033
Total	**295.9**	

CHART 1

To tap into this market potential, we must align our research and technology development with market demand. With designation, we'll capitalize on our assets: 1) The seven ports[iii] within our MSA which contribute to the land, sea, air advantage for the growing ocean technology sector, have ready access to deep water (ranging from 25-133 ft) and near-by manufacturing and research facilities; 2) an ocean workforce of over 54K strong[iv]; and (3) an interstate commitment for commercializing ocean technology which will unlock the acceleration mechanism to grow

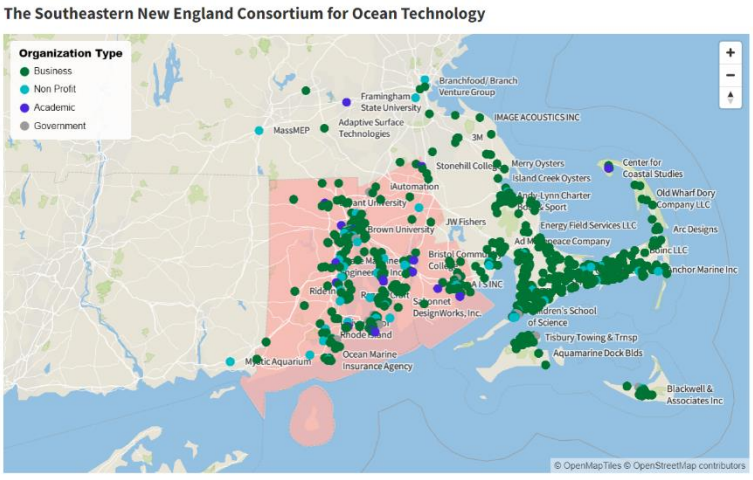
this region and the U.S.'s position in the ocean economy.

Specific projects for the OTH and their economic impact include:

- The development of a digital twin of the Narragansett Bay and adjacent waters to enhance lab-to-market pipelines by providing a virtual, faster, and less expensive test environment for commercial R&D. Digital twins of the ocean are global priorities for the U.N.[v] and EU[vi] and the OTH presents an opportunity for the U.S. to gain traction.
- The creation and/or expansion of an incubator, light manufacturing, fabrication, and assembly space at the water edge with multi-domain access (air, land, sea), adding physical capacity and commercial fabrication facilities in the Port of Davisville/Quonset, Port of Providence, and Port of New Bedford.
- The development of testing facilities in Narragansett and Buzzards Bay: A challenge noted by ocean technology companies and researchers is the lack of access to testing facilities. OTH will provide unique resources for testing and evaluating various technology devices and applications through coastal resources ideal for rapid testing of prototypes.

Role of the Private Sector

The OTH region has hundreds of companies in the marine science, robotics, and composites sectors[vii]. The broader ocean technology supply chain has 8,294 companies[viii]. SENE is home to large ocean technology leaders including General Dynamics Electric Boat, Raytheon, the Naval Undersea Warfare Center (NUWC) Newport Division, Woods Hole Oceanographic Institution and Lockheed Martin. Beyond these larger employers, the sector consists of mostly small/medium-sized enterprises (SMEs)[ix], many in the start-up phase. SENE's preeminent institutions of higher education, which have departments focused on the ocean[x], have produced viable company spin-offs from their ocean engineering and research innovations, including, among others, Jaia Robotics, Juice Robotics, Deep Blue Composites, Nautilus Defense, Far Sounder. Southeastern MA has traditional maritime industries including fishing, seafood processing, port services, and boat building and design. The region's composite companies (80+ companies in RI alone) have pivoted from ocean vessels to underwater vehicles, based on demand. The asset map below shows the broad ocean tech industry supply chain in SENE[xi].



Ocean tech companies express their opportunity to grow and how the OTH can help them through facility and equipment support, simulation environments to test and validate products, access to the ocean, cutting costs and getting products to market faster, additional funds for R&D, and strengthening the critical supply chain (larger companies need innovations; SMEs need access). Companies will utilize and strengthen the OTH: Jaia Robotics' innovation in micro-sized aquatic drones that extract ocean current data and other important information will benefit from OTH data-rich resources, helping them open new water-based markets and build additional partnerships. New Bedford Port Authority, a partner with the New Bedford Ocean Cluster, is exploring use of digital twin technology to support port operations, as

will Quonset Port Authority and the Port of Providence. IBM is committed to leading technical developments with companies through prototyping and creation of minimally viable products, and Infused Innovations' Lab for Applied AI will be added to OTH assets.

Regional Coordination and Partnerships

The OTH is a regional partnership, located in the Providence-Warwick, RI-MA Metropolitan Statistical Area, which includes the entire State of Rhode Island (an EPSCoR eligible state) as well as Southeastern Massachusetts (Bristol County). The MSA is home to an estimated 1.67M residents and includes diverse cities such as Providence, Fall River and New Bedford. The OTH capitalizes on SENE's unique geographic assets: Seven commercial ports, shallow coastal areas, close access to full ocean depths off the Northeastern U.S. Continental Shelf, and easy access to Boston and New York. This unique blend presents an opportune locale for innovations in ocean technology, demonstrated by world-leading institutional establishments[xii] and the countless tests carried out by the NUWC[xiii] and others.

The OTH Consortium is an outgrowth of the Grow Blue[xiv] initiative and informed by UMass Dartmouth's (UMassD) study of the blue economy sector[xv] in SENE. Over 250 businesses, organizations, and ecosystem partners have been involved in the development of a strategy to continue to invest in the ocean economy. This application is a result of over 125 actively engaged people, proving the strong demand in our area. Industry, nonprofit, and research often collaborate on projects: For 15 years, nine RI institutions have received EPSCoR research funding; Jaia works with UMassD, URI, Brown, SeaAhead, NUWC, and others to advance undersea robotics innovations; UMassD's Center for Innovation and Entrepreneurship in Fall River has provided regional entrepreneurs with office space, prototyping services, laboratory resources, interns, and a community of mutual support since 2001.

The OTH Consortium is being convened by Commerce, RI's economic development agency. As lead convener, Commerce will hire a Regional Innovation Officer to lead the OTH. While this process is underway, Commerce's VP of Innovation Initiatives will coordinate and lead the activities of the OTH Consortium, and Commerce will be responsible for fiscal stewardship, reporting, and other compliance requirements.

Equity and diversity

SENE includes the cities of Providence, Fall River, and New Bedford, each identified by the Justice 40 Initiative[xvi] as overburdened by pollution and underinvestment, fueling our goal to ensure equitable outcomes. The OTH is committed to the Good Jobs Principles outlined by the U.S. Departments of Commerce and Labor. Efforts will work to directly connect disadvantaged communities with career pathways that equip them with skills to access family-sustaining jobs. They will also include wrap-around services for job training participants in foundational career-readiness classes, registered apprenticeships, and the workforce. As this workforce grows, the Consortium will ensure this isn't a race to the bottom for people joining the workforce.

The OTH Consortium includes members whose efforts, outlined below, bring constituency guided initiatives. We will further catalyze these efforts through a networked governance model to ensure equitable access especially by those historically disadvantaged, including an Advisory Committee structure with pathways to influence and direct the way the OTH is designed. The Consortium is committed to leaning into this for the benefit of all our residents. OTH will exponentially leverage these workforce assets and initiatives focused on equity and diversity with OTH Designation and investment, including:

- Nine Primarily Undergrad Institutions and two Community Colleges, each having stackable certification programs either developed or under development to service the ocean

technology field; three Minority-Serving Institutions in the SENE region, including RI College (HSI), College Unbound (HSI) and Johnson & Wales (PBI)[xvii]. UMassD serves 38% students of color and 57% first-generation college goers, and URI has local chapters of the National Societies of Black, Hispanic and Women Engineers plus a 48yr-old program which recruits and supports RI high school students from historically disadvantaged backgrounds.

- Apprenticeship RI, run by Building Futures (an AFL-CIO member and RI Department of Labor and Training (DLT) partner), works to help employers build new apprenticeship programs in industries including marine trades and manufacturing. Their "Earn While You Learn" program serves 75% people of color, most from low-income neighborhoods[xviii].
- In the 2023 legislative session, RI passed law to allow non-traditional pathways to earning a bachelor's degree at the state's public higher education institutions; this bill will allow for apprenticeships to count as college credits[xix].
- The State's Division of Diversity, Equity, and Inclusion, a core consortium partner, focuses on ensuring state procurements are appropriately won by M/WBEs.
- Over $12 million of DLT's Real Jobs RI program, a large-scale, sector-based workforce program, was invested in activities that train Rhode Islanders with significant barriers to employment including refugees; multilingual learners; veterans; and individuals with disabilities, experiencing homelessness, and with prior criminal convictions.
- Climate Jobs Rhode Island, a coalition of labor/AFL-CIO, environmental justice, and community, formed in response to RI's 2021 Act on Climate's[xx] push for just transition: "to address inequity in the state by creating quality and family-sustaining clean energy jobs." AFL-CIO and their partners in Climate Jobs RI have developed recommendations that will influence the development of OTH[xxi].
- The City of Providence is introducing policies that will enable more childcare facilities and transit-oriented changes that will increase access to American Job Centers. Providence is coordinating with other urban centers throughout the MSA to develop a comprehensive workforce strategy with non-traditional support including GED and translation services. A new training facility at the Port of Providence will focus on blue economy jobs.

Composition and capacity of regional workforce

OTH considers both Core Ocean Tech and Ocean Tech Related jobs. Employment in the Core Ocean Tech totals over 54,038 workers, which in 2022 recorded $20.3 billion in sales and $6.7 billion in earnings. Of note: 52% of these jobs do not require education beyond High School; 85% pay a Living Wage for the Providence-Warwick, RI-MA metro[xxii]; 44% of jobs that pay a living wage are accessible to workers with no formal education or a high school diploma or equivalent[xxiii]; Employment is expected to grow by 9% in the next decade; and, the RI-MA MSA institutions graduate 5,000+ annually[xxiv], plus the robust ecosystem of skill and credential based training opportunities, including those targeted to the Ocean economy like FabX.

Our public-private workforce efforts are nimble and recent investments show the potential to scale rapidly to meet the demands for workforce development: Bristol Community College launched their National Offshore Wind Institute in 2020[xxv], a Global Wind Organization (GWO) training certificate program; a similar program is also at Community College of Rhode Island[xxvi] and the North Kingstown, RI Chamber of Commerce's WindWindRI initiative.[xxvii] Massachusetts Clean Energy Center awarded funds to offshore wind workforce training programs that target obstacles that prevent people of color and low-income people from pursuing jobs in the industry.[xxviii] These examples address workforce needs for a growing local industry while also working to equitably align this opportunity. A network of local trade schools and

workforce education centers, including IYRS School of Technology and Trades, Woonsocket Education Center, and Minorities in Aquaculture, are working to improve access to workforce training with an Ocean Economy-focused lens.

The MSA's workforce training supports are strong; still, the OTH will increase coordination of these efforts to limit resident confusion, engage in targeted expansion, fill pathway gaps, and ease access. OTH also aims to add internship capacity to the RI Science and Technology Council internship program (housed at Commerce), which has placed over 125 interns with 100+ companies since 2016, to prepare students for careers in ocean technology.[xxix]

Innovative "lab-to-market" approaches

The region has ongoing lab-to-market efforts; matchmaking innovators, providing access to capital, and removing barriers to technology acceleration. The full plan for the OTH will be developed during the planning period, but we envision core efforts to include: Research-to-implementation support: Build on current tech transfer efforts at research partners; Embed university researchers in companies, and business development experts into universities, to scale specific projects with high commercial potential; Co-locate industry and venture funders in the region with university partners. Entrepreneurial development: Formalize a partnership between the region's entrepreneurial supports through SeaAhead, RICC, EforA SouthCoast, New Bedford Ocean Cluster, RIHub, and others; Scale Commerce's Innovation Voucher program to ocean tech companies, providing grants to businesses for R&D; Develop a resource that supports regional businesses as they seek equity capital or grants to scale their development. Ecosystem support: Galvanize public and private funding to support the infrastructure needed-housing, childcare and transportation-to ensure that the sites at which ocean-technology-related jobs take place are accessible to a diverse range of workers. Subsidies, transportation networks and connecting available resources to individuals and families are ways OTH will work to resolve these hindrances. National and global awareness: Place SENE as the center of ocean technology development, capitalizing on efforts like SeaAhead, Blue Green Innovation Challenge, the Blue Innovation Symposium, Blue Venture Forum, and Chafee Center-led trade missions[xxx], as well as the Undersea Technology Innovation Consortium (UTIC).[xxxi]

Impact on economic and national security of the entire United States

"As a maritime nation, the United States relies heavily on healthy and resilient ocean, coastal and Great Lakes ecosystems."[xxxii] Globally, coastal regions serve as population centers and commerce and trade hubs, playing critical roles in national security and mitigating climate change. In 2018, the "American Blue Economy, including goods and services, contributed about $373 million to the nation's GDP, supported 2.3 million jobs and grew faster than the nation's economy in its entirety." For decades[xxxiii], strong defense industry investment in ocean technology has fueled this region's research focus on ocean science and engineering. Major investment from the U.S. Navy, NUWC, and other defense departments have helped create the diverse private and academic sector focused on undersea technology and advanced materials. Programs like the National Institute for Undersea Vehicle Technology[xxxiv] and 401 Tech Bridge helping the U.S. maintain a global-leading defense industry and support dual-use of key technologies to strengthen the private sector ecosystem. The OTH taps a diverse and dual-use market opportunity for growth.

Sensors and robots that extract ocean data present the next opportunity for technology use, the next frontier for national security, and the next key to predicting and mitigating climate change. OTH can lead in capturing an outsized global market share of these opportunities as our existing companies grow and new businesses are formed to meet these market demands.