Port Detroit

Market and Industry Assessment

Final Report – September 18, 2026

RAMBOLL

Bright ideas.
Sustainable change.

Overview of Market and Industry Assessment Scope

Objective

Assess the market, industry, and workforce conditions that could support the Port's Innovation Terminal. Test and validate the Port's existing hypotheses about market needs, ensuring alignment with the most promising opportunities for the selected terminal site.

Key Activities

- Assess Metro Detroit's maritime-enabling conditions, including manufacturing capacity, workforce trends, defense-sector activity, policy support, and research/institutional assets.
- Validate and, where needed, update Port's existing hypotheses on viable market segment opportunities relevant to the Terminal (e.g., alternative fuels, digitalization, etc.).
- Qualitatively assess the scale and nature of demand that could be anchored at the Port's selected terminal.
- Conduct stakeholder interviews to pressure-test market assumptions, validate opportunities, and identify potential partner needs.
- Identify 3-4 priority technology and innovation partners that are well-positioned to engage with the Terminal.
- Identify programmatic use cases for the Terminal that directly support the Port's strategic objectives.

Deliverables

- Market and Industry Assessment report summarizing Metro Detroit ecosystem conditions, workforce trends, demand drivers, priority market segments, recommended Terminal use cases, and potential partners.

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Executive Summary

Summary | Key Takeaways Across the Assessment

Key Takeaway: Metro Detroit has the enabling conditions to support maritime innovation. Early investments should be focused on targeted use cases and shaped by committed industry partners / anchor users, allowing the Port to build demand before scaling infrastructure.

Detroit has a strong foundation for maritime innovation	Metro Detroit's manufacturing base, defense activity, research institutions, and policy momentum create favorable conditions for maritime innovation and commercialization.
Workforce trends support long-term growth	The region has a maritime-supportive workforce base across maritime operations, components manufacturing, and tech and innovation.
Near-term demand is concentrated in three segments	The strongest near-term programming fit for the Terminal is in advanced components/materials, digitalization, and automation. Alternative fuels and broader logistics are better positioned as secondary or opportunistic areas unless specific partner demand emerges.
The demo vessel should be treated as a validation platform	Demand for a shared demonstration vessel exists, but it is uneven and conditional; its greatest value is as a modular testing and validation asset supporting repeatable industry use cases.
Long-term success depends on industry partnerships	Anchor partners should help define priorities, shape programming, and drive sustained utilization of Terminal lab and demo vessel assets.

Summary | Detroit is Positioned to Support Maritime Innovation

Key Takeaway: The metro Detroit region is uniquely positioned to support innovation in and production of advanced maritime technology and components. The region's unique mix of assets create an environment that can enable the Innovation Terminal to serve as a key component of catalyzing maritime activity.

1. Strong manufacturing capacity
2. Established presence in the Naval shipbuilding supply chain
3. Supportive policy environment
4. Broad research and institutional network

Summary | Where the Terminal Can Create the Most Value

Key Takeaway: Testing and validation in advanced components / materials, digitalization, and automation (including autonomous vessels and cargo management) segments are among the clearest near-term anchors for demand.

Name	Hypothesis Tested	Findings	Recommendations
H1 - Strongest near-term demand is in digital and manufacturing segments	Near-term demand for a combined physical-digital maritime innovation lab in the Great Lakes region is strongest in digital and maritime manufacturing applications (especially in advanced materials, automation, and cargo management) with relatively weaker immediate demand for support in alternative fuels and intermodal logistics.	TRUE	The Port of Detroit should prioritize digital and maritime manufacturing (especially materials, automation, and cargo management) segments for initial lab design and development to support long-term lab utilization. Additional segments, such as alternative fuels and logistics, can be considered secondary or opportunistic areas for focus (in case of defined demand from specific partners).
H2 - Demand exists for a shared demonstration vessel	There is meaningful demand across segments for access to a shared demonstration vessel as part of a combined physical-digital lab. However, demand is uneven and conditional. Demo vessel can be highly valuable when it’s modular and designed around repeatable use cases.	TRUE	The Port of Detroit should proceed with the development of a modular shared demo vessel, anchoring design considerations around OEM, shipyard, and port use cases. Start-ups show the strongest interest in a demo vessel, but OEMs and shipyards are the ones that can provide durable, repeatable demand that justifies the scale and cost.
H3 - Demand concentrates around a small set of repeatable and execution-oriented use cases	Demand within each segment is concentrated around a limited number of execution-oriented use cases that can be realistically supported within a ~50,000 sq lab, rather than broad or exploratory innovation themes.	MOSTLY TRUE	The Port of Detroit should focus the first phase of lab design around testing / validation use cases, prioritizing monitoring and data collection capabilities and focusing on specialized equipment that aligns with industry standard testing.

Summary | Recommended Lab Focus and Use Cases

Key Takeaway: The lab's value lies in repeatable, real-world testing and validation that accelerates technology adoption across manufacturing, digital, and automation use cases.

Focus segments	Primary users	Secondary users	Use cases	Use of demo vessel	Competitive edge

Advanced components / materials	• Shipyards
	• Tier 1/2 suppliers (esp. those facing certification lead times)
		• Startups developing materials / components
		• Universities / research
		• Testing partners
			• Certification-ready testing and validation
			• Strength/fatigue, corrosion/environmental cycling
			• Validation of interfaces (bonded joints, metal-to-composite transitions)
				• Instrumented trials of components under vibration, maneuvering, docking cycles
				• Generate traceable datasets that support qualification packages
					• Faster time-to-market and unique testing environment
					  • Reduce testing and certification bottlenecks by pairing on-water validation with local lab testing
					  • Great Lakes-specific test environment

Digitalization	• Operators • Integrators • Maritime software vendors • OEMs modernizing systems	• Startups building analytics/AI solutions	• Digital twin calibration with real sensor data • Predictive maintenance / condition monitoring • Port call / berth optimization pilots	• Demo vessel is a data generator & integration sandbox - validate sensors, comms, etc. • Test data flows to the land-based modeling environment	• Faster innovation and adoption of technology • Pairing an on-water platform with a modeling environment creates credibility and faster adoption vs "paper" digitalization alone

Automation	• Autonomy developers and automation OEMs
	• End users defining scenarios (ports / operators)
		• Startups developing autonomy solutions	• Collision avoidance, near-port maneuvering, port operations
			• Remote ops workflows
			• Sensor validation
			• Standardized integration
				• Scenario replication, instrumentation, plug-and-play swaps
				• Ability to operate remotely / semi-autonomously
					• Faster validation times
					  • Real water access & rapid iteration
					  • Standardized, low-friction testbed reduces barriers

Summary | Partnership and Ecosystem Strategy

Key Takeaway: To be sustainable in the long-term, the lab needs to secure local industry participation and anchor partners among local shipyards, OEMs, suppliers and operators. These players can help drive a long-term programmatic agenda for the lab that supports sustained startup activity and economic development.

Port Detroit's **advantage lies in the combination of water access and affordable scale-up space**, enabling real-world validation for maritime and maritime-adjacent technologies.

To be successful, the Innovation Terminal must sit within a **broader, coordinated ecosystem** strategy that links infrastructure, programs, partners, and local economic development goals.

What this means for the design:

- Focus on **repeatable testing and validation use cases** driven by market demand
- Engage industry through **intentional programming** rather than simply providing infrastructure
    - "If you build it, they will come" is unlikely to drive sufficient demand
    - Instead, end-users (OEMs, ports, operators) should define the problem statements and pull innovation through the system
- Create **support for all stages of the commercialization** journey, including
    - Transitional and flexible manufacturing spaces
    - Incremental investment and scale-up support
    - A connected network of step-up facilities as technologies mature
    - Testing / validation spaces to streamline design and manufacturing

This model is most likely to drive utilization, support a sustainable operating model and avoid over-investing

Summary | Immediate Next Steps

1. Secure industry partnerships to shape the Lab's program (Port-led)

A durable Lab concept will likely be shaped over time by 1-2 committed industry execution partners. Port Detroit should continue direct conversations with OEMs, suppliers, and shipyards to:

- Identify potential anchor industry partners
- Inform the programmatic focus of the Lab and the role of the demo vessel

2. Advance site and infrastructure feasibility (Ramboll-led)

- Test feasibility within the selected terminal's physical, utility, and operational constraints
- Develop conceptual site layouts and phasing options that:
    - Avoid over-designing too early
    - Preserve flexibility as the program continues to take shape
- Provide early insights on what is feasible, costly, or constraining

3. Build the economic, governance, and implementation case (Ramboll-led)

- Advance economic and workforce analysis based on a range of credible Lab scenarios
- Develop governance and funding pathways
- Integrate findings into a phased implementation roadmap that:
    - Supports near-term grant and funding conversations
    - Positions the Port to move quickly once anchor partnerships solidify
- Deliver decision-ready materials for Port leadership and external stakeholders

Next steps | Priority Industry Partners for Further Engagement

Shipyards and vessel builders	Marine component OEMs and Tier 1/2 suppliers	Automation and industrial robotics firms	Digital maritime and smart port startups
Great Lakes Shipyard Ship repair and conversion focus aligns with repeatable retrofit and integration validation.	**Sharrow Marine** Metro Detroit manufacturer with clear component validation and performance testing needs.	**ABB** Regional automation footprint and relevance to controls, robotics, and systems validation.	**Mythos AI** Active Great Lakes port pilots and strong fit for smart port data and automation validation.
Fraser Shipyards Great Lakes ship repair and conversion shipyard with applicability to repeatable integration, retrofit, and validation.	**Deep Trekker** Underwater inspection and robotics systems aligned with repeatable port and infrastructure testing.	**Konecranes** Port equipment and automation provider aligned with terminal handling and modernization use cases.	
Lake Assault Boats Regular on-water testing and validation needs with shared demo vessel use.			

- Includes a set of user archetypes relevant to the lab concept, including execution owners, suppliers, and early-stage technology developers.
- Represent companies with active or near-term testing, validation, or deployment needs, rather than conceptual interest.
- Focuses primarily on firms with less developed in-house testing and validation capabilities, where shared infrastructure can add the most value.
- Covers the lab's priority segments (manufacturing, digitalization, and automation), ensuring feedback directly informes lab design and demo vessel requirements.

Background on Initial Innovation Terminal Concept

The project started with an initial hypothesis around what type of assets should be included in its Innovation Terminal

Background on Terminal Site

- The Port of Detroit is still exploring uses for its site but is considering assets such as:
  - A storage warehouse (Water Authority)
  - A designated spot for Great Lakes Towing
  - A facility that supports pilot exchange
  - **A Tech Commercialization Lab**
- Ramboll's Maritime Innovation Terminal feasibility study will help to inform the final scoping of the site

Details on the Tech Commercialization Lab

A lab has already been proposed to anchor the future innovation terminal

- Goal: Accelerate maritime commercialization and de-risk frontier technologies by providing development, testing, and demonstration infrastructure
- This lab will concentrate resources in a single location to provide foundational support for innovation that individual projects cannot efficiently provide

- To support this goal, the Maritime Commercial Lab is planning to include the following:
  - Advanced data and modeling environment for early exploration and validation of concepts
  - Large-scale demonstration vessel for innovation testing
  - Dedicated spaces for collaboration and ideation

Throughout this project, Ramboll explored the validity of this lab concept by:

- Identifying / validating the **market demand** for this type of maritime facility in Michigan
- Validating / updating the hypotheses around **what segments of the market should be prioritized** and what **assets should be included** to support innovation (e.g., what capabilities does the Maritime Commercial Lab need to have)
- Exploring **potential tenants** for the space

The initial concept envisioned the Lab to focus on alternative fuels, manufacturing, digitalization, and intermodal innovation

Alternative fuels

Sub-segments:

- Bunkering systems & fuel handling
- Fuel production, storage, and logistics

Example tenants

- Fuel producers
- Engine or bunkering system OEMs
- Safety, testing, and certification labs

Shipbuilding and maritime manufacturing

Sub-segments:

- Newbuilds and modular construction
- Advanced components, materials, and composites
- MRO, repowering, retrofits and conversion services

Example tenants

- Component OEMs / tier 1-2 suppliers
- Retrofit solution providers
- Robotics and advanced manufacturing firms

Digitalization, automation & smart port systems

Sub-segments:

- Digitalization, including vessel traffic systems, digital twins
- Automation, robotics, AI, and autonomy
- Cybersecurity and data infrastructure

Example tenants

- Maritime software startups
- Autonomous vessel / equipment developers
- Data analytics and AI companies

Logistics, intermodal & supply chain innovation

Sub-segments:

- Cargo management
- Supply chain and intermodal optimization (rail, truck, inland waterways)

Example tenants

- Logistics tech companies
- Logistics providers testing new operating models
- Hardware/software pilots tied to cargo flows

The Port has already explored some potential partners for the Innovation Terminal and the Lab

The Port of Detroit has already explored several potential partnerships for its Maritime Commercial Lab:

UNIVERSITY OF MICHIGAN

What they bring: Strong expertise in maritime research and engineering, extensive partnerships with maritime leaders domestically and globally
Why this matters: Academic research capacity and industry connections can help vet and de-risk emerging technologies and build a local talent pipeline aligned with port and industry needs

Newlab

What they bring: Established local (Detroit) platform supporting startups, real-world experience with venture-oriented programming, prototyping support, and connections to capital and customers
Why this matters: An existing innovation platform can accelerate commercialization and anchor early-stage maritime innovation activity in Detroit

Argonne NATIONAL LABORATORY

What they bring: Deep technical knowledge in energy systems, grid integration, fuels, materials, technology supply chains, and data / modeling tools
Why this matters: Existing technical expertise and tools can be applied to maritime applications to support faster and more data-driven innovation

Other groups were identified[1] as relevant to the development of an innovation terminal:

Government Entities
• The Maritime Administration (MARAD) • The Department of Transportation (DOT) • The Department of Energy (DOE) • The Navy • The U.S. Coast Guard • Department of Natural Resources (DNR) • Michigan Department of Environment, Great Lakes, and Energy (EGLE)

Research Institutions / Collaborations
• Great Lakes Maritime Academy • Michigan Technological University's Marine Autonomy Research Site • Northern Michigan's BlueTech Innovation Hub • Smart Ships Coalition • Freshwater Research and Innovation Center • We Work the Waterways • M3 Initiative

1 – These groups were identified as relevant for efforts to develop an innovation hub in Michigan and grow the maritime industry in Michigan in Michigan's Maritime Strategy (released January 2026) and / or proposal documents related to the proposed Maritime Commercial Lab in Detroit

Methodology

Ramboll developed and tested 3 hypotheses to help the Port refine its lab concept and focus efforts and resources

Name	Hypothesis summary	Rationale for inclusion	What decision hinges on whether H is true or false?
H1 - Strongest near-term demand is in digital and manufacturing segments	Near-term demand for a combined physical-digital maritime innovation lab in the Great Lakes region is strongest in digital and maritime manufacturing applications, with relatively weaker immediate demand for alternative fuels and intermodal logistics.	• Digital and manufacturing use cases align well with a ~50,000 sq ft shared facility, benefiting from iterative testing, integration, and validation rather than large-scale pilots • While alternative fuel demand exists, it is often capital-intensive, less iterative, and better suited to bespoke or large-scale pilots, limiting near-term fit with a shared lab model • Identifying where demand is strongest today prevents over-investment in low-pull segments and enables clearer positioning, sequencing, and earlier commercial traction	**If true**: Prioritize digital and manufacturing; position alternative fuels as secondary or future. **If false**: Re-balance focus and design capabilities around alternative fuel-led use cases.
H2 - Demand exists for a shared demonstration vessel	There is meaningful demand across segments for access to a shared demonstration vessel as part of a combined physical-digital lab, but its role, specifications, and utilization must be validated, given its cost and space intensity.	• The demonstration vessel is the most capital- and space-intensive element of the lab concept • Clear evidence of demand is required to justify inclusion and right-size scope (e.g., modular vs. full vessel) • Testing this hypothesis will clarify which capabilities must be built first vs. deferred	**If true:** Proceed with a shared demo vessel (or modular equivalent). **If false:** Defer, down-scope, or replace with alternative testing approaches.
H3 - Demand concentrates around a small set of repeatable and execution-oriented use cases	Demand within each segment is concentrated around a limited number of execution-oriented use cases that can be realistically supported within a ~50,000 sq lab, rather than broad or exploratory innovation themes.	• Validating the demand for and anchoring around repeatable use cases drives efficiency, utilization, and clearer operating and revenue models in a constrained facility • Understanding / identifying key repeatable, scalable use cases for design will directly inform facility layout, equipment needs, and early pilots	**If true:** Design facility, equipment, and staffing around anchor use cases. **If false:** Design for higher modularity and bespoke project support, with different cost and utilization expectations.

7 interviews were conducted with OEMs and startups to validate demand and test the 3 hypotheses

Company	Company profile	Rationale for inclusion
Diversified Marine Construction	Great Lakes workboat builder serving inland waterways	Provided perspective from a practical vessel builder focused on repeatable designs, electrification, and schedule risk. Helped test whether shared testing infrastructure and demo vessels could reduce build and integration timelines.
GhostWorks Marine	Advanced vessel designer and manufacturer	Represented high-end manufacturing and integration profile with emphasis on materials testing, fire safety, and certification bottlenecks. Offered insight into on pre-certification testing and shared demo vessels could reduce cost, risk, and lead times.
BorgWarner	Tier-1 component OEM (propulsion, electrification)	Provided a component supplier perspective, helping assess how much value the lab offers to OEMs versus integrators. Clarified where testing, certification, and data needs sit within the marine supply chain.
Dirac Labs	Early-stage digital and autonomy startup	Tested demand for navigation, autonomy, and GPS-denied system validation, highlighting the need for instrumented test environments, real-world data, and shared demo vessels. Supported the digital-physical integration case.
Wave Lumina	Early-stage water quality sensing and monitoring startup	Represented a non-vessel, water-focused startup, highlighting demand for chemistry labs, analytical equipment, accredited testing, and access to real-world water rather than demo vessels or advanced modeling.
Fincantieri	Global shipbuilder serving government and commercial customers	Provided input from a highly capable, vertically integrated shipbuilder, helping validate where shared lab infrastructure adds limited value and where manufacturing efficiency improvements may be more relevant.
Bosch	Global industrial technology supplier active in energy systems.	Provided a component supplier perspective on alternative fuels, clarifying demand for repeatable system-level testing and validation rather than bespoke vessel integration.

Sample Interview Questions

- **What lab focus areas are most relevant** to your work and why?
- **How would you use the lab,** and **would it be valuable** to your industry?
- **Which capabilities matter most** (data and modeling, demo vessels, collaboration space) and **are they critical?**
- **Are required capabilities specialized** and **could assets could be shared** across companies?
- **Ability and willingness to pay** for priority capabilities
- **Additional sector and company specific questions** to capture unique industry needs

17 additional interviews were conducted to validate demand and assess workforce and ecosystem considerations

Company
Centre for Innovation and Technology, University of Michigan-Flint
Downriver Community Conference
Global Epicenter of Mobility
Great Lakes Freshwater Research and Innovation Center
Great Lakes St. Lawrence Governors & Premiers
Macomb Community College
Martin Defense Group
Michigan Department of Labor and Economic Opportunity
Michigan Maritime Strategy Implementation Working Group
Michigan Department of Transportation
ODU Maritime Autonomous Systems Test Site
Path Robotics
Persona AI
SEMCA Michigan Works!
University of Michigan
Washington Maritime Blue Innovation Center
AltaSea at the Port of Los Angeles

Sample Interview Questions

- How does your organization think about workforce development and the talent needed to support maritime growth?
- What would Port Detroit need to do to position the Innovation Terminal as a recognized anchor for maritime innovation and workforce development?
- Which employers, companies, or industry partners are most worth Port Detroit engaging as it builds its partner base?
- What assets, programs, facilities, or capabilities does a successful maritime innovation ecosystem need that do not exist today?

Detroit's Maritime Innovation Ecosystem

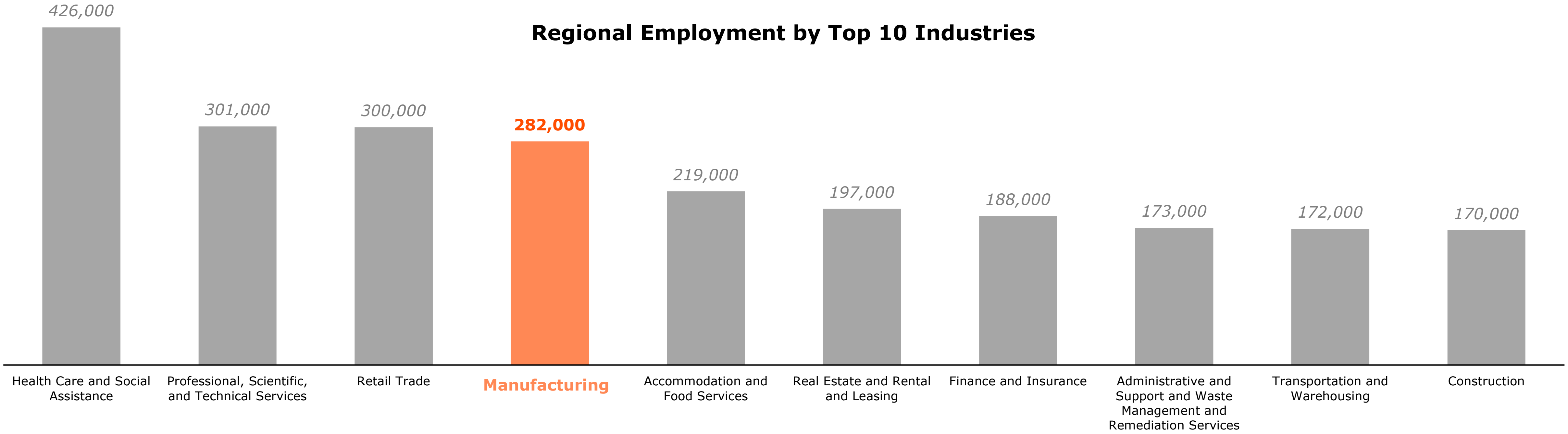
The metro Detroit region contains a unique mix of strengths and assets that position the Innovation Terminal to support maritime activity.

1. **Strong advanced manufacturing supply chain and workforce with direct transferability to maritime applications**
2. **Regional established defense cluster with significant Navy investment**
3. **A state policy ecosystem actively organizing around maritime as a growth sector**
4. **Strong research and institutional capacity in maritime innovation**

The region's strong advanced manufacturing supply chain is already positioned to support maritime advancement.

The region's manufacturing capacity (OEM supply chains, CNC precision manufacturing, robotics operators) is the most distinct competitive advantage that can support development of maritime technology. The manufacturing sector employs over **282,000 workers** and is the **4th largest sector** in the region. 8 out of 10 of the region's highest location quotient industries are in the manufacturing sector and the **concentration of manufacturing employment in the Detroit region is over double the national rate at 7%, compared to 3%.** This established industrial capacity positions the Detroit region to support robust production of advanced maritime technology.

The region's robust **mobility sector – which includes auto manufacturing and wholesale –employs over 354,000 people in 2026.** Maritime innovation can build on the sector's momentum to continue repurposing traditionally automotive activity into overall sustainability in mobility.



Source: HR&A Analysis of Lightcast Data. Detroit Region is defined by 11 counties: Genesee, Lapeer, Lenawee, Livingston, Macomb, Monroe, Oakland, St. Clair, Shiawassee, Washtenaw, Wayne Detroit Regional Chamber defines mobility by three segments: Core Mobility (e.g., motor vehicle manufacturing, motor vehicle parts manufacturing). Upstream industries - suppliers (e.g., machine shops, navigational instrument manufacturing). Downstream industries (e.g., automobile repair and maintenance, automotive parts stores)

Regional established defense cluster with significant Navy investment.

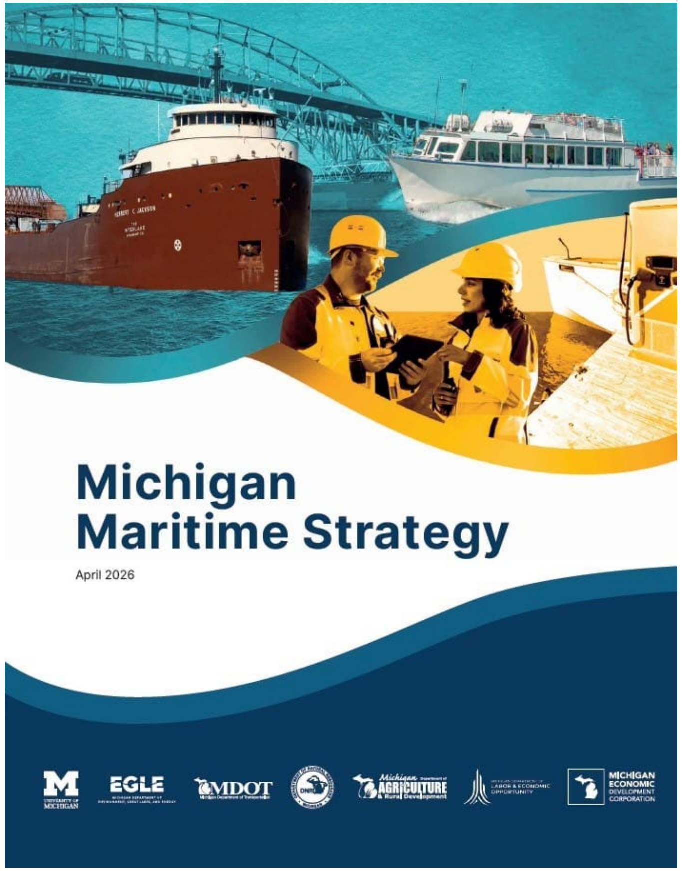
In 2024, the Navy selected Michigan as one of the first sites for replication of its maritime manufacturing training program because of its **supply-chain capacity and concentration of defense-sector employers.** Modeled after the Accelerated Training in Defense Manufacturing (ATDM) program located in Danville, Virginia, Macomb’s Michigan Maritime Manufacturing (M3) program is the state’s leading producer of a maritime-ready labor pool. The program is tracking toward 200+ graduates per year against a Navy-funded ceiling of 384 individuals.

The region's manufacturers already operate as a critical maritime components-supply base, fabricating precision parts that ship to East Coast yards to relieve the Navy's shipbuilding backlog.

Macomb County is a hub for the defense industry with **more than $3.2 billion contracts awarded** in 2020 and over $50.26 billion worth of Department of Defense contracts awarded to resident companies from 2000 to 2020. 65% of all federal defense contract dollars in Michigan came to Macomb County in 2024.

Source: Detroit Regional Chamber, Macomb County

Michigan’s state policy ecosystem is actively organizing around maritime as a growth sector.



Released in spring 2026, the **Michigan Maritime Strategy is a 10-year roadmap** to catalyze the state’s maritime sector built around six goals, including:

1. Modernizing ports and intermodal infrastructure
2. Growing maritime manufacturing
3. Accelerating clean/zero-emission vessel technology
4. Building the maritime workforce
5. Spurring innovation, and
6. Strengthening recreational harbors

Maritime Prosperity Zones are federally designated regions which are top priority for federal support and private investment in shipbuilding, maritime manufacturing, and port infrastructure. **Michigan's strategy calls for pursuing this designation**, with a coalition backing Washtenaw, Monroe, Wayne, and Macomb counties as a strong candidate zone given the region's manufacturing, R&D, and port assets.

The state is establishing new political advisory groups such as the Office of Future Mobility and Electrification’s new Maritime Policy and Innovation Action Team (which held its first meeting on July 16, 2026) to ensure progressive implementation of the strategy’s goals.

The state department of Labor and Economic Opportunity announced a **$40 million Department of Labor expansion grant** which is expanding the employer-led maritime training model from defense into commercial and recreational maritime, with 11 employers currently committed to the Mid-Step Employer-Led Collaborative

Source: HR&A Analysis of Lightcast Data.

Metro has a strong base of research and academic assets in maritime innovation and workforce development.

University	Maritime Innovation Focus	Location
University of Michigan, Ann Arbor	Naval Engineering Program, original partner in the Southeast Michigan Maritime Strategy and Prosperity Zone coalition. Downriver economic-development partnership through Economic Growth Institute (EGI)	Ann Arbor
Macomb Community College	Michigan Maritime Manufacturing (M3) Program	Macomb County
Northwestern Michigan College	Great Lakes Maritime Academy	Traverse City
Michigan Technological University	MARS autonomy testbed, partner in Freshwater Innovation Center	Houghton
University of Michigan, Flint	College of Innovation & Technology	Flint
Maritime Organization	**Maritime Innovation Focus**	**Location**
Freshwater Research & Innovation Center	Protect freshwater resources, advance BlueTech, and drive economic growth through education, research, and business incubation	Traverse City
Great Lakes St. Lawrence Governors & Premiers	Multi-state, binational convener across eight Great Lakes states and two provinces	Great Lakes Region
Macomb Community College	M3 program sits in Macomb County and is squarely focused on the defense submarine supply chain	Macomb County

Institutional Assets

There is a **strong base of regional research and academic capacity in maritime innovation.** This base can provide the ideas and the workforce to underpin the growth of a Michigan maritime innovation ecosystem.

Stakeholders have cited the importance of a convening ground where **industry, research, capital, and government can collaborate.** With its physical port presence, existing partnerships, and integral presence in the Michigan Maritime Strategy, the Port Detroit and the Innovation Terminal is well positioned to convene these and more organizations to **anchor Metro Detroit's maritime ecosystem.**

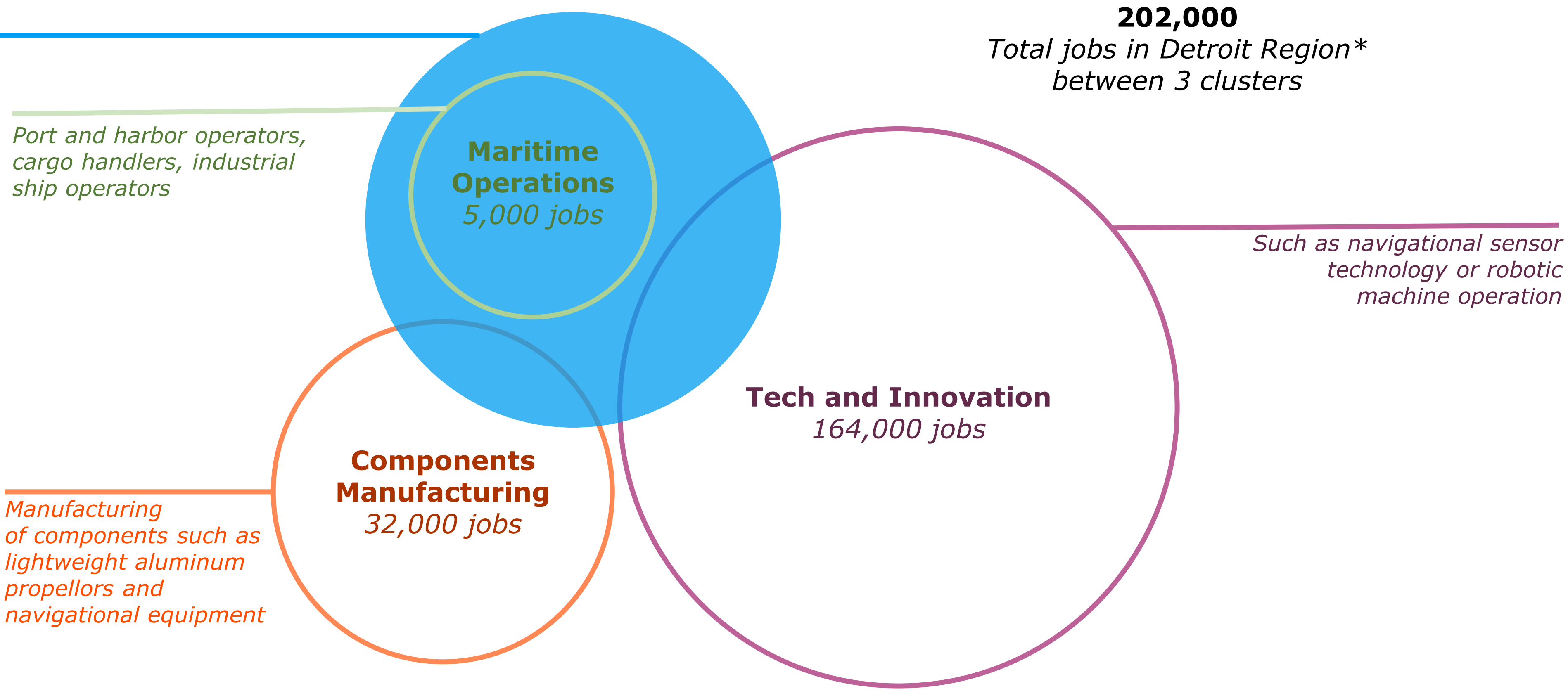
Workforce Trends Supporting Maritime Growth

Building a maritime-supportive ecosystem requires drawing from supply chains and talent in 3 existing economic clusters.

The Maritime Ecosystem

Building a maritime ecosystem requires drawing talent and supply chain resources from three existing economic clusters in the region: (1) maritime operations, (2) manufacturing of components (for ships, automobiles, and other industrial uses), and (3) a tech and innovation economy.

In the latter two clusters, only a subset of companies currently support maritime uses. Available NAICS data does not provide this distinction, so the ecosystem is defined as maritime-supportive to capture potential to increase these shares.



* Detroit Region is defined by 11 counties: Genesee, Lapeer, Lenawee, Livingston, Macomb, Monroe, Oakland, St. Clair, Shiawassee, Washtenaw, Wayne

Source: HR&A Analysis of Lightcast Data. Segment definitions are as follow: Maritime-supportive manufacturing - Common industries supplying naval shipbuilding from U.S. Navy Maritime Industrial Base. Tech and Innovation- derived from HR&A definition of tech and innovation sector. Maritime Operations – From shipbuilding industry mapping from University of Michigan.

The maritime-supportive ecosystem’s 201k jobs comprise 6% of the region’s total employment.

Example Companies:

SOS Specialized Overseas Shipping

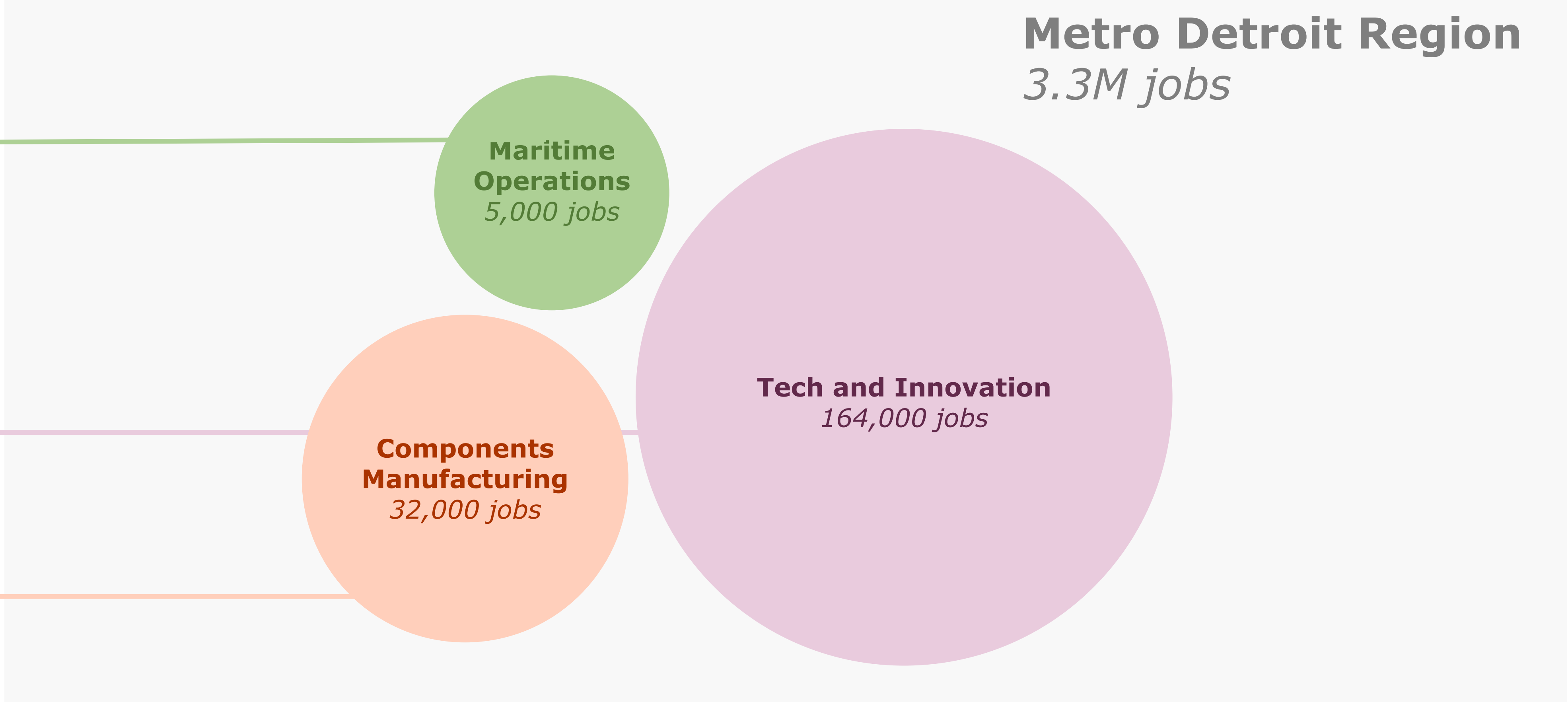
Freight logistics service

motmot

Robotics and smart infrastructure startup

Sharrow Marine – The Future of Propulsion

Nautical and aeronautical engineering



Source: HR&A Analysis of Lightcast Data. Segment definitions are as follow: Maritime-supportive manufacturing - Common industries supplying naval shipbuilding. Tech and Innovation-derived from HR&A definition of tech and innovation. Maritime Operations – Academic definition of shipbuilding industry mapping from University of Michigan.

Maritime Operations

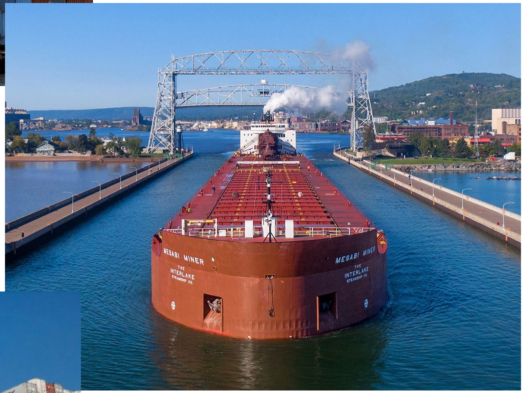
Maritime operations firms handle the movement, loading, and storage of cargo once it reaches the water — stevedoring, terminal operation, bulk/liquid storage, drayage, and harbor management. They are the working core of the maritime ecosystem, converting port infrastructure into actual trade throughput, moving goods between ships, trucks, and rail, and keeping regional manufacturers supplied with raw materials like steel and ore.

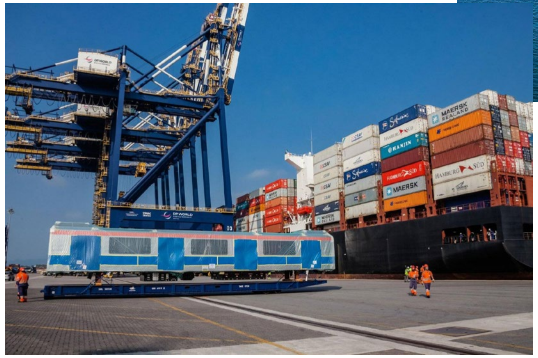
Example companies include:

NICHOLSON TERMINAL & DOCK COMPANY

SOS SPECIALIZED OVERSEAS SHIPPING

Evans Distribution Systems





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Components Manufacturing

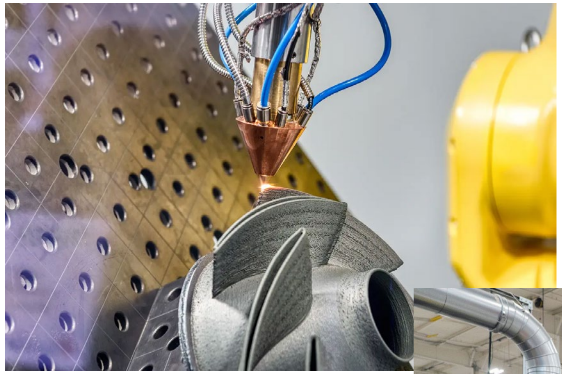
Component manufacturers make the specialized parts — engines, shafting, hulls, electrical and hydraulic systems — that shipbuilders assemble into vessels, strengthening the maritime supply chain's resilience and domestic manufacturing capacity. In southeastern Michigan, this ties closely to the region's automotive and precision-manufacturing legacy. The region already has over 300 suppliers used for naval shipbuilding, with institutions like LIFT and Newlab Detroit helping scale that base for commercial maritime work. Definitions of shipbuilding components manufacturing used in this analysis are derived from the U.S. Navy Maritime Industrial Base.

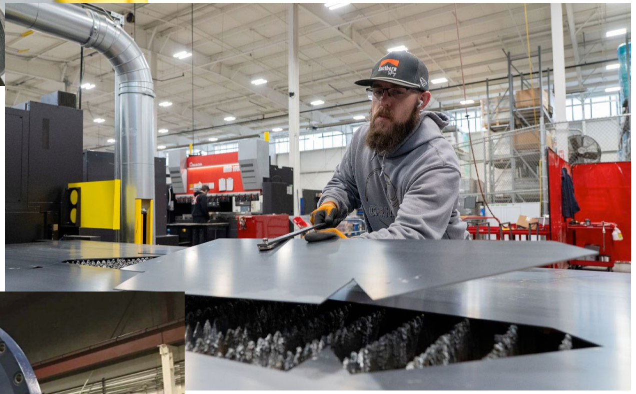
Example companies include:

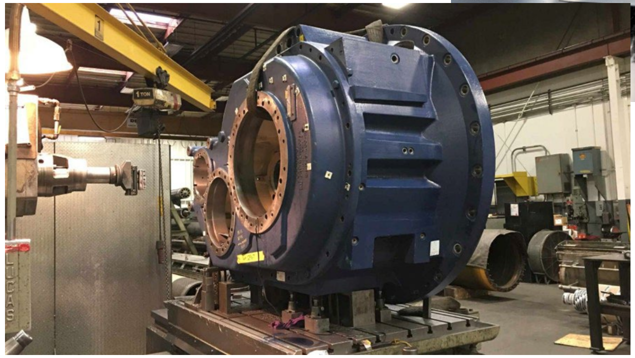
SHARROW MARINE
THE FUTURE OF PROPULSION

MARINE MACHINING AND MANUFACTURING

NATIONAL
MANUFACTURING GROUP







Segment definitions are as follow: Maritime-supportive manufacturing - Common industries supplying naval shipbuilding U.S. Navy Maritime Industrial Base. Tech and Innovation- derived from HR&A definition of tech and innovation. Maritime Operations – Academic definition of shipbuilding industry mapping from University of Michigan.

Tech and Innovation

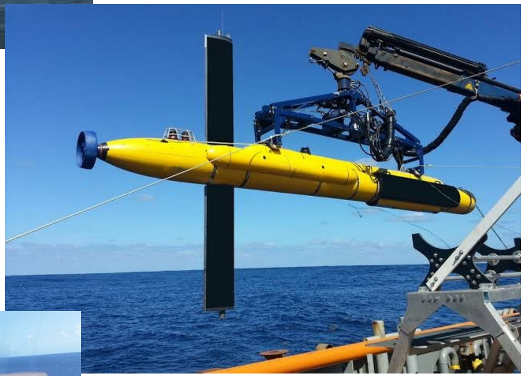
The tech and innovation sector develops and commercializes new technologies — spanning software, hardware, AI, and R&D — to create products, improve processes, and drive economic growth across industries.

Maritime technology and innovation firms develop the next generation of tools for the sector — autonomous vessels, propulsion efficiency, port digitization, and low-carbon logistics — often through startup incubators and R&D partnerships rather than traditional manufacturing. They push the maritime ecosystem forward by testing new technology in real-world pilot conditions and connecting emerging companies to established shipping and port infrastructure.

Example companies include:

motmot

lift®

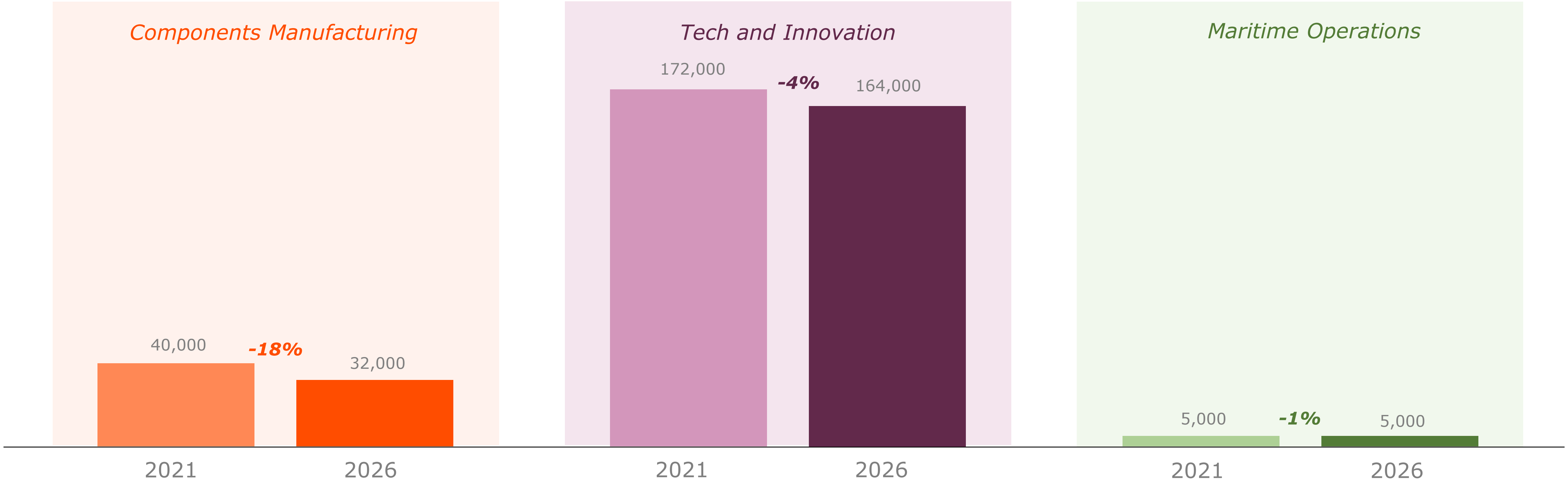


Segment definitions are as follow: Maritime-supportive manufacturing - Common industries supplying naval shipbuilding U.S. Navy Maritime Industrial Base. Tech and Innovation- derived from HR&A definition of tech and innovation. Maritime Operations – Academic definition of shipbuilding industry mapping from University of Michigan.

Employment in maritime-supportive industries has declined – but investments and policy can help to grow industrial capacity.

Employment in the Detroit region has grown 8% over the past 5 years. While employment in each of the maritime ecosystem's key sectors has declined, many of these sectors overlap with those targeted for investment through sustainable mobility.

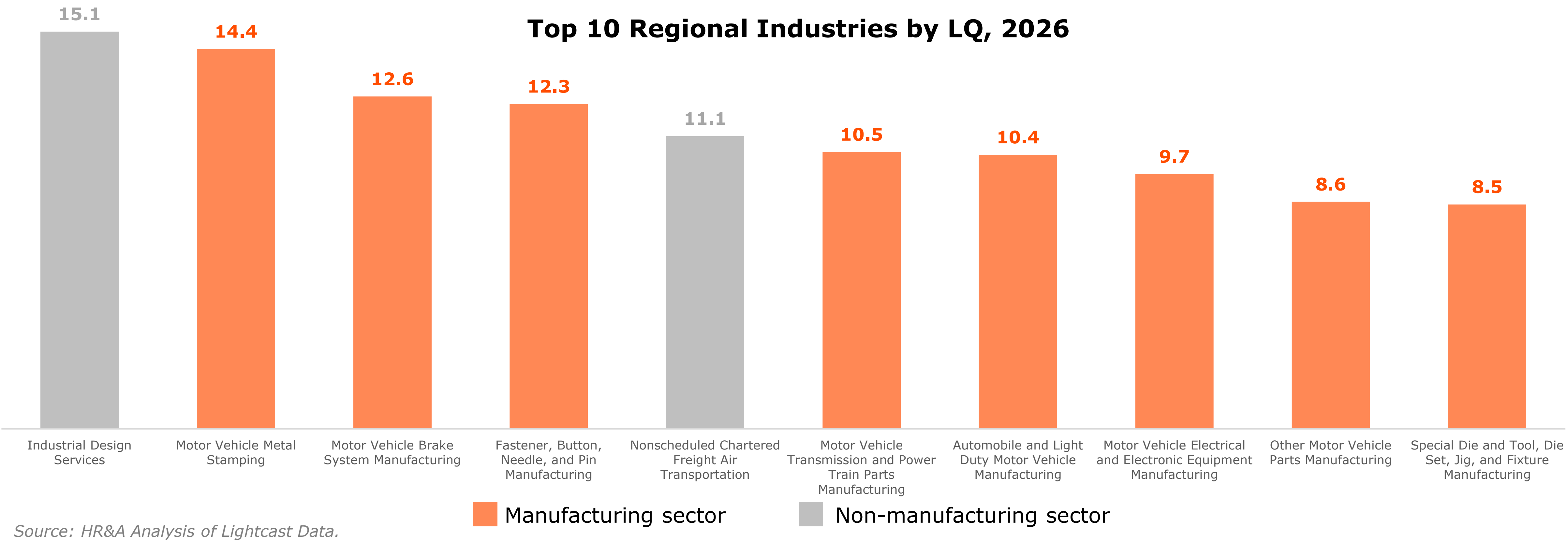
Maritime-Supportive Ecosystem Employment Change by Segment, 2021-2026



Source: HR&A Analysis of Lightcast Data. Segment definitions are as follow: Maritime-supportive manufacturing - Common industries supplying naval shipbuilding. Tech and Innovation-derived from HR&A definition of tech and innovation. Maritime Operations – Academic definition of shipbuilding industry mapping from University of Michigan.

80% of the region's strongest industries are in the manufacturing sector, and 20% are closely related.

Location Quotient measures how focused an industry is in a local area compared to the national average. An LQ greater than 1 indicates the industry is more common or specialized locally than it is nationwide. A high number (usually above 1.25) means the place makes extra goods or services to export outside the region.

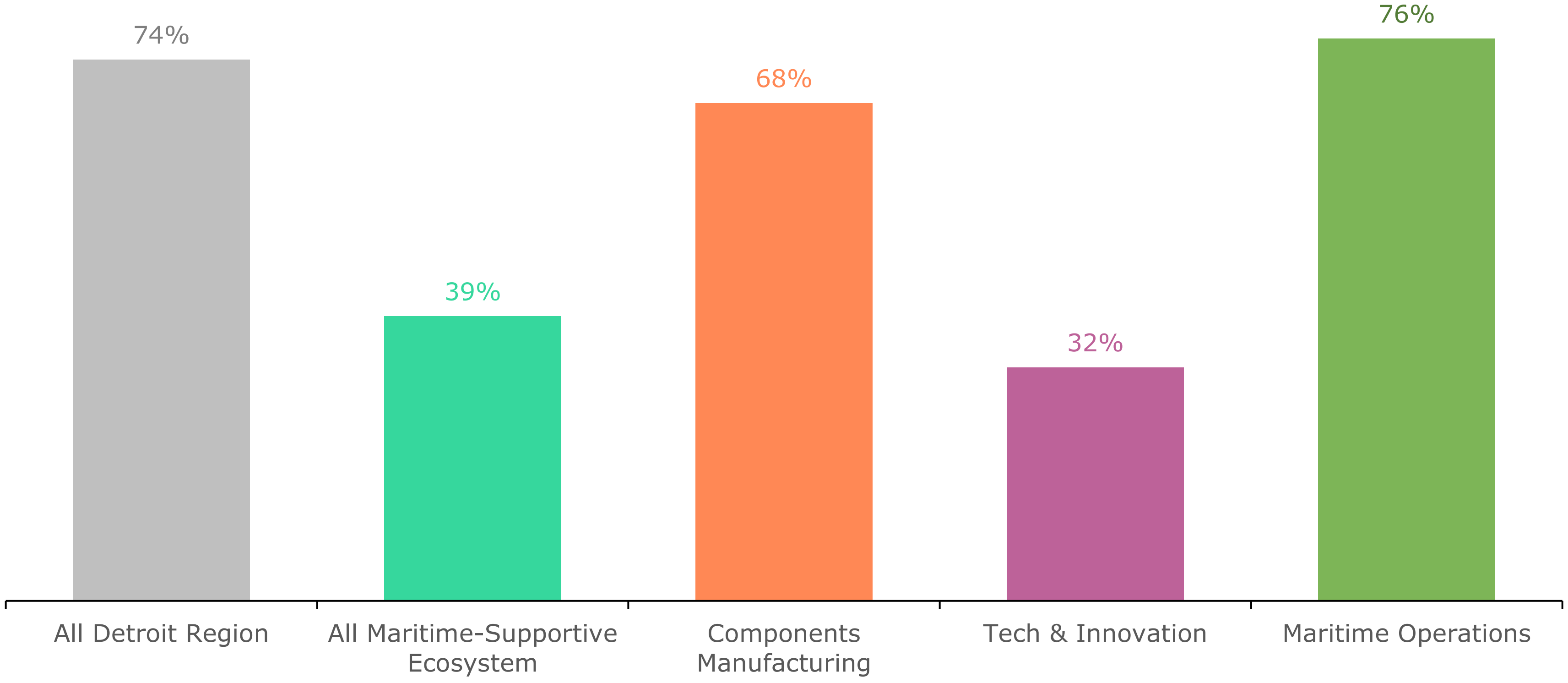


Source: HR&A Analysis of Lightcast Data.
** Bureau of Labor Statistics*

The maritime-supportive ecosystem contains and can create more low-barrier to entry jobs.

76% of jobs in maritime-operations and **68%** of jobs in maritime-related manufacturing **do not require a four-year degree**, offering opportunities for low-barrier to entry jobs.

Share of Low-Barrier-to-Entry Jobs by Sector, 2026

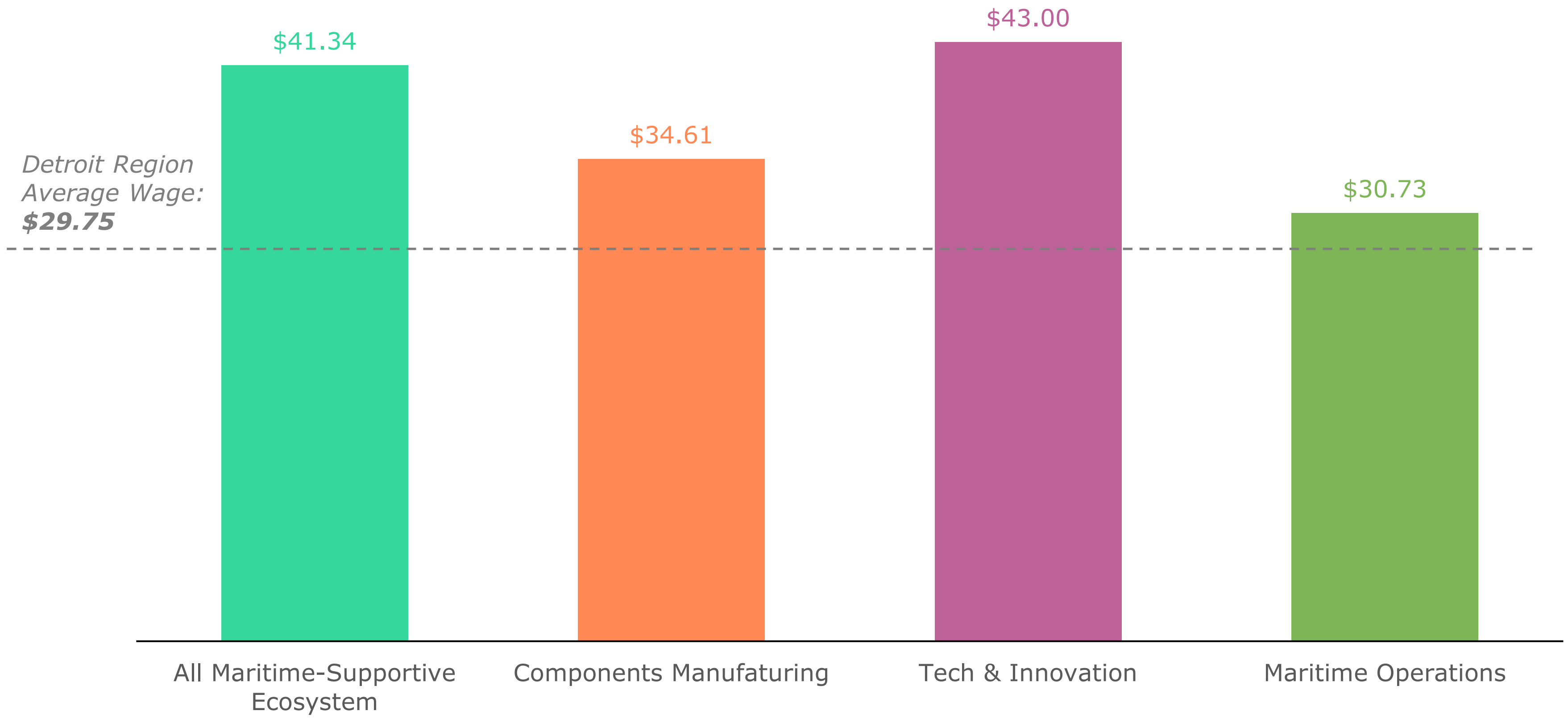


Source: HR&A Analysis of Lightcast Data.

The maritime-supportive ecosystem contains and can create more well-paying jobs.

Occupations in all segments of the maritime-supportive industry **pay a higher average wage than the region overall**, though tech and innovation is the only individual segment that pays above the region's living wage ($36.95).

Average Wage by Sector, 2026

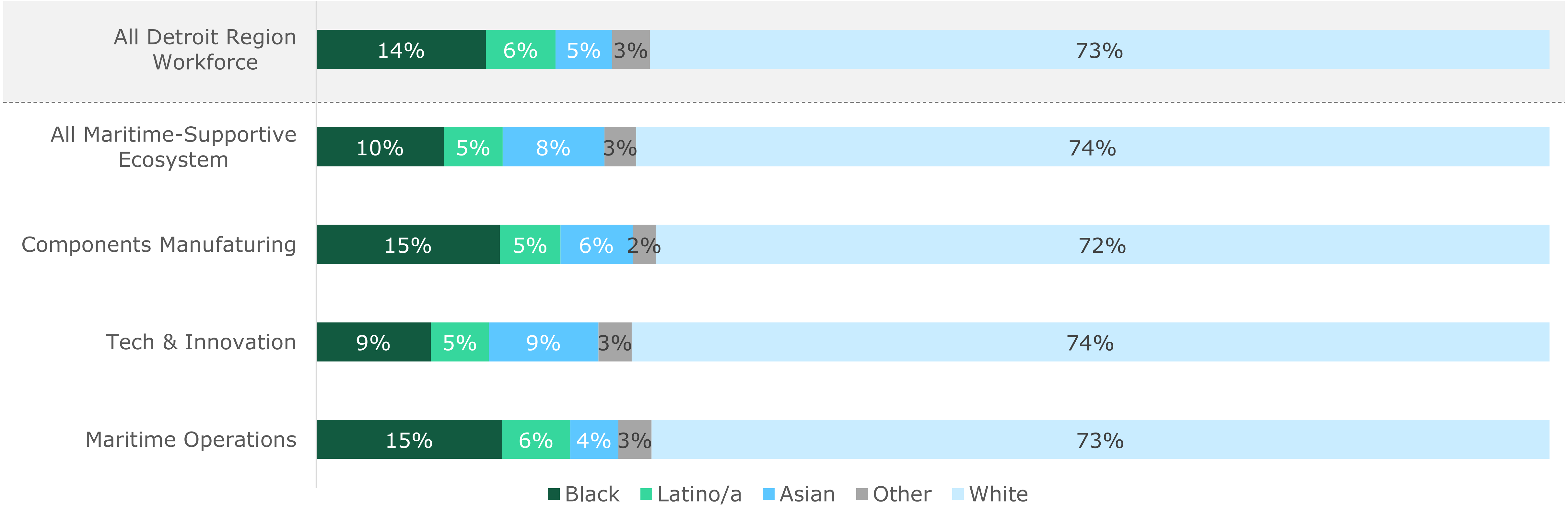


Source: HR&A Analysis of Lightcast Data. Living wage calculated using MIT Living Wage Calculator for Detroit-Warren-Dearborn area. Wage based on 2 adult, one working, one child household.

Racial representation in maritime-related manufacturing and maritime operations is similar to the region’s.

Maritime-related manufacturing and maritime operations more closely reflect the region’s racial diversity, while Black and Latino/a workers face a representation gap in tech and innovation.

Racial Representation by Cluster, 2026



Source: HR&A Analysis of Lightcast Data.

Demand for the Innovation Terminal by Market Segment

H1 Demand by Segment - Summary

H1	Near-term demand for a combined physical-digital maritime innovation lab in the Great Lakes region is **strongest in digital and maritime manufacturing applications**, with relatively weaker immediate demand for alternative fuels and logistics applications.	**TRUE**

Segment	Sub-segment	Market trends	Geographic trends	Commercialization Need	Fit with Lab model
Alternative fuels	Fuel handling	Less favorable	Less favorable	Less favorable	Favorable
	Fuel production	Less favorable	Not favorable	Less favorable	Not favorable
Shipbuilding and maritime manufacturing	Newbuild / modular	Less favorable	Less favorable	Not favorable	Not favorable
	Adv. components	Favorable	Favorable	Less favorable	Favorable
	MRO / retrofits	Favorable	Favorable	Less favorable	Less favorable
Digitalization, automation & smart port systems	Digitalization	Favorable	Favorable	Less favorable	Favorable
	Automation	Favorable	Favorable	Favorable	Favorable
	Cybersecurity	Favorable	Less favorable	Not favorable	Not favorable
Logistics, intermodal & supply chain innovation	Cargo management	Less favorable	Favorable	Less favorable	Less favorable
	Intermodal	Less favorable	Less favorable	Less favorable	Not favorable

Ramboll recommends that Port Detroit focuses on **advanced components / materials, digitalization, and automation** (including autonomous vessels and cargo management) segments in the near-term.

Retrofits, fuel handling, and broader cargo management use cases could be considered as secondary priorities after the Lab gets established.

Favorable · Less favorable · Not favorable

Alternative Fuels: Overview

Per data from the International Maritime Organization[1], over 90% of fuel used in large ships in 2023 was fuel oil or diesel / gas oil. However, despite low adoption rates so far, alternative fuels remain one of the most promising solutions to lower emissions related to maritime transportation.

Innovation in this space could occur in one of two areas:

1) Fuel production

- Projects focused on end-to-end supply chain requirement to make alternative fuels available at scale, including production processes, bulk storage, and logistics (how fuel moves from production sites to terminals/ports and ultimately to vessels)
- Bottlenecks at this stage include feedstocks, electricity supply, CO_2 sources (for e-fuels), liquefaction facilities, pipelines/rail/truck movements, and storage terminals

2) Fuel handling

- Everything involved in getting fuel from shore (or a bunker vessel) into a ship safely and then managing it onboard
- Includes:
    - Bunkering infrastructure and equipment (hoses/arms, pumps/compressors, meters, safety systems, monitoring, and procedures)
    - Transfer modes (truck-to-ship, shore-to-ship (terminal), or ship-to-ship (bunker barge/ship)
    - Onboard systems (fuel tanks, piping, ventilation, detection/monitoring
    - Treatment systems that deliver fuel to engines/fuel cells)

1 - "Energy Efficiency of Ships." IMO, July 2024.
2 – "Global Maritime Trends Barometer 2025: Assessing the progress of the maritime energy and digital transitions." Lloyd's Register. March 2025.

Alternative Fuels in the Market

E-Methanol

- Low-carbon methanol produced using renewable hydrogen plus biogenic CO_2 to achieve meaningful GHG reduction. Liquid at ambient conditions, which can simplify storage and bunkering relative to cryogenic fuels.

Ammonia

- Green ammonia produced using renewable hydrogen and nitrogen. Offers a route to deep decarbonization in principle, but adoption hinges on safety and systems maturity. Ammonia is toxic and corrosive, requiring specialized handling systems, monitoring, and crew procedures, especially during bunkering.

Liquified Biogas (LBG or bio-LNG)

- Biogas cooled to a liquid state for safe, non-pressurized transport (same process as LNG). Produced from renewable sources (e.g., waste streams) but it is chemically identical to LNG (a cryogenic fuel).

Biofuels

- Liquid fuels derived from biomass or waste streams. Can be blended with conventional fuels and used in many existing engines.

Hydrogen

- Hydrogen in the form of fuel cells. Direct use is considered less favorable to maritime transportation, thanks to its low energy density. E-Methanol and ammonia are more viable hydrogen derivatives.

Other notes:

- Liquified Natural Gas LNG is also considered a lower-carbon alternative to traditional fossil fuels and is currently the dominant alternative fuel of choice for vessels[2]. This wasn't specifically considered among the alternative fuels for the lab because it doesn't require any commercialization support.

Alternative Fuels: Analysis

Key Takeaway: Given limited federal interest and local demand for alternative fuels, moderate commercialization needs across alternative fuel segments, and poor space fit for fuel commercialization, this segment (especially fuel production) should be considered secondary priority for the Lab. However, the Lab can be successful as an accelerator and validation testbed for fuel handling specifically.

Market trends

Fuel handling: Less favorable | Fuel production: Less favorable

- Globally, the IMO developed a net-zero strategy that is being backed by new international regulations, including mandatory energy and fuel tracking, decreasing energy efficiency targets, and fuel standards[1]
- In the US, the Port Infrastructure Development Program (PIDP) increases funding on projects that reduce environmental and emissions impact[2]
- The federal maritime strategy does not mention alternative fuels and there's been a general pullback on language around decarbonization; the Michigan maritime strategy still specifically targets this area[3]

Geographic trends

Fuel handling: Less favorable | Fuel production: Not favorable

- Global GHG mandates focus more on international deep-sea shipping, not lake-locked/domestic US operations
- Initiatives in the Great Lakes region prioritize economic development / job creation; environmental concerns center on invasive species, not emissions
- Limited alternative fuel companies and potential partners exist in the region
- Port Detroit is less naturally positioned as a "deep-sea alternative fuel bunkering hub" although a focus on fuel handling rather than production may be beneficial in allowing the Great Lakes to service a variety of vessels

Commercialization need

Fuel handling: Less favorable | Fuel production: Less favorable

- Fuel handling: Less favorable commercialization need as handling is not the primary commercialization bottleneck. However, needs exist around port readiness and safe bunkering regimes, SOPs, training, emergency response, permitting, and validation data for all fuels, esp. ammonia
- Fuel production: Mixed, depending on the fuel, but less favorable overall. Favorable for green ammonia (more enabling support still needed), less favorable for e-methanol (pilot/early commercialization), and not favorable for LNG, bio-LNG, and biofuels (drop-in supply chain, therefore lower incremental commercialization need)

Fit with Lab model

Fuel handling: Favorable | Fuel production: Not favorable

- Lab is likely to be strongest in developing and testing technologies related to fuel-handling, as these can be pursued with limited space and are more likely to include vessel retrofits (where a demonstration vessel would be beneficial)
- Hosting full upstream fuel production will be challenging due to space constraints, capital, permitting, and other requirements

1 – "Initial IMO GHG Strategy." IMO, retrieved in Feb 2026. 2 – "Bipartisan Infrastructure Law: Maritime Administration." USDOT. Retrieved Feb 2026. 3 – "America's Maritime Action Plan.". February 2026. "Michigan Maritime Strategy Draft." January 27, 2026.

Favorable | Less favorable | Not favorable

Shipbuilding and Manufacturing: Overview

Great Lakes shipyards employ over 2,700[1] people each year to building commercial and military vessels for service globally and recent maritime strategies from both the US[2] and Michigan[3] focus on expanding shipbuilding and manufacturing capabilities.

Innovation in this space could occur in one of three areas:

1) Newbuilds and/or modular construction

- Projects focus on building brand new vessels and/or building vessel sections as modules
- Would require the most investment and effort - although the Great Lakes used to be home to some of the most productive shipyards in the US, the industry today primarily focuses on maintenance, repair, and smaller-scale construction and many shipyards have outdated equipment and infrastructure for construction[4]

2) Advanced components, materials, and composites

- Projects focus on designing and installing higher-performance parts and materials (including lightweight composites) to improve vessel strength, durability, efficiency, or functionality

3) MRO, repowering, retrofit, and conversion services

- Projects focus on maintenance, repair, and operations (MRO), replacing or upgrading engines and power systems, and large-scale retrofitting and/or converting vessels for new uses or new fuel/technology systems

1 - "Great Lakes Shipbuilding and Government Programs to Promote the Industry." Great Lakes Maritime Task Force. Retrieved February 2026. 2 – "The White House Releases its Long-Awaited Maritime Action Plan." National Law Review. February 20, 2026. 3 – "Michigan Maritime Strategy Draft." January 27, 2026. 4 – "The Comeback of American Shipyards." Great Lakes Seaway Review. August 5, 2025. 5 – "M/V Mark W. Barker." The Interlake Steamship Company. Retrieved February 2026. 6 – "MV Sunnanvik – First Cargo Ship with Sails on the Great Lakes." CSL, July 25, 2024. 7 – "Great Lakes bulker successfully retrofitted for automatic dock-to-dock operation." MarineLog, January 13, 2021.

<u>Example Recent Projects in the Great Lakes</u>

M/V Mark W. Barker (newbuild)[5]

- Built in Wisconsin and set sail in 2022
- First Great Lakes bulk carrier built on the Great Lakes in over 35 years
- Included key upgrades such as high efficiency engines (meeting EPA Tier 4 emission standards) and unique cargo arrangement hold that allows for more cargo flexibility and faster loading / unloading operations

MV Sunnanvik (advanced components)[6]

- Cement carrier trading on the Great Lakes since 2024
- Two flexible, vertical "Ventofoil" sails from Econowind were installed in 2023
- Sails can harness wind energy for additional thrust, boosting vessel speed and lowering emissions

MV American Courage (retrofit)[7]

- Great Lakes bulker, originally built in 1979 and owned by the American Steamship Company
- Retrofitted in 2020 with the Wärtsilä SmartMove solution, which includes semi-autonomous sailing features such as advanced sensors and high-accuracy ship control systems
- Allows the ship to perform automatic dock-to-dock operations, which allows the crew to focus on other operations and improves safety in congested waterways

Shipbuilding and Manufacturing: Analysis

Key Takeaway: Maritime manufacturing is an appealing segment for the lab given renewed federal focus on the industry, a strong network of potential partners in the region, and good fit with the proposed lab model. Advanced components and materials[1], as well as repowering and smaller retrofits / conversions require performance validation, pilots, integration support, and other services.

Market trends

Newbuilds (Less favorable) | Adv. components (Favorable) | MRO / Retrofits (Favorable)

- There is both a federal and local policy push[2] emphasizing shipbuilding capacity and workforce investment - the "America's Maritime Action Plan" was published in Feb 2026, with a focus on rebuilding U.S. Shipbuilding Capacity, and Michigan released its draft Maritime Strategy in Jan 2026, which included a goal to establish the state as a leader in marine component production, shipbuilding, and ship repair
- US shipbuilding output is historically low relative to global leaders; scaling requires workforce training, facility modernization, and digital tools

Geographic trends

Newbuilds (Less favorable) | Adv. components (Favorable) | MRO / Retrofits (Favorable)

- Great Lakes has a significant ship repair and conversion ecosystem, as well as some newbuild capability
- Shipyards with large-scale capability are in Sturgeon Bay, Marinette, Superior, Toledo, Erie. Small drydocks and ship repair facilities are in Ashtabula, Toledo, Milwaukee, Detroit, Rogers City, and Sault Ste. Marie
- Key barriers, particularly for newbuilds, include the need for significant investment required to modernize equipment and infrastructure, cost competitiveness with Chinese shipbuilding, and a shortage of skilled workers[3]

Comm. needs

Newbuilds (Not favorable) | Adv. components (Less favorable) | MRO / Retrofits (Less favorable)

- Newbuilds are a mature, established market. Constraints are mainly cost, capacity, policy, and procurement rather than commercialization
- Advanced components and materials are mid-commercialization. Adoption is uneven with some support needed to effectively validate and scale new concepts
- Routine repair is mature, but repowering / retrofits / conversions face execution friction, including capacity limitations, outdated infrastructure, and workforce shortages, and may benefit from innovation support

Fit with Lab model

Newbuilds (Not favorable) | Adv. components (Favorable) | MRO / Retrofits (Less favorable)

- Low fit for newbuilds: There is limited space for full-scale ship construction, although there may be more opportunities for modular construction and integration testing.
- High fit for adv. components: New concepts can be validated maritime conditions (vibration, corrosion, thermal cycling) and a smaller lab space can run manufacturing pilots (QA automation, robotics)
- Moderate fit for MRO / retrofits: Routine MRO is space-light and doesn't justify specialized lab space. Repowering, as well as some smaller retrofits and conversions are high-fit when the lab offers demo vessel access, integration/test bays, instrumentation, and trusted validation protocols

1 –Newlab also noted in interviews that they have seen demand for strength, durability, and environmental performance testing of materials and structures before and after fabrication and integration, supporting mechanical characterization (static strength and fatigue) alongside corrosion and environmental cycling (e.g., salt fog, humidity, thermal/UV). 2 - "America's Maritime Action Plan.". February 2026. "Michigan Maritime Strategy Draft." January 27, 2026. 3 – "The Comeback of American Shipyards." Great Lakes Seaway Review. August 5, 2025

Favorable | Less favorable | Not favorable

Digitalization and Automation: Overview

The maritime industry lags other transportation-related industries in the adoption of digital tools and automation, despite early pilots that demonstrate gains in both productivity and the well-being of workers[1]. Industry assessments[2] and maritime strategies (both federal and local[3]) emphasize the need to improve information sharing and data exchanges to improve the efficiency of maritime and ports systems.

Innovation in this space could occur in one of three areas:

1) Digitalization

- Projects focus on increasing connectivity and leveraging / sharing data, such as:
  - Real time vessel performance monitoring using onboard sensors and satellite connectivity
  - AI-driven voyage optimization integrating weather, currents, congestion, and fuel prices
  - Predictive maintenance based on condition monitoring of engines and auxiliary systems
  - Digital twins of vessels to simulate retrofits, fuel switching, and operational changes
  - Automated monitoring and reporting to help meet regulatory and safety requirements

2) Automation / Smart Systems

- Projects focus on streamlining routine tasks, improving efficiency and safety for workers. Examples could include: adoption of robotics in both manufacturing and operations, smart port systems integrating berth scheduling, cargo handling, and vessel arrival data, automated cranes, yard vehicles, and container tracking systems, autonomous vessels, etc.

3) Cybersecurity

- Projects focus on cybersecurity systems that protect both vessels and ports, including enhancements to encryption, authentication, and other design features of IT systems

1 – "Global Maritime Trends Barometer 2025: Assessing the progress of the maritime energy and digital transitions." Lloyd's Register. March 2025. 2- "2025 Review of Maritime Transport." United National Conference on Trade and Development. 2025. 3 – "America's Maritime Action Plan.". February 2026. "Michigan Maritime Strategy Draft." January 27, 2026. 4- "Why Managed Consumption is Key to Providing Internet in the Maritime Industry." Digigone, November 2023.

Barriers to the Digital Transition

Limited connectivity[4]

- Data transfer is often limited to low-bandwidth applications, which restricts the amount of and speed at which data can be shared and used
- Higher bandwidth is typically more expensive at sea and it can be difficult to retrofit existing vessels with upgraded capabilities, so newer vessels are prioritized for connectivity
- Upgrades are currently driven by concerns for crew welfare and quality of life at sea, with some limited consideration for operational improvements

Lack of standardization

- Maritime supply chains use a variety of digital systems, many of which don't work well together, and upgrading can be costly
- In addition, there is often reluctance to share data due to competitive concerns
- Efforts are underway to address key interoperability issues (including regulations aimed at standardizing and digitalizing data and reports) but fragmented legacy systems and infrastructure persist

Workforce training needs

- The maritime industry has a shortage of skilled workers when it comes to digitalization and automation, and training on these advancements if often limited and inadequate
- Limited training leads to low adoption rates and, in some cases, greater risk of cybersecurity attacks (when technologies are used improperly)

Digitalization and Automation: Analysis

Key Takeaway: The digitalization and automation segment is also a good fit for the lab, given strong policy and funding focus in this space (both at a federal level and local level) and a good fit with the proposed lab model. Automation concepts represent the most promising sub-sector, thanks to strong demand from the industry (particularly naval) and early commercialization status, with digitalization as a additional strong contender for innovation and validation.

Market trends

Digitalization | Automation | Cybersecurity

- US strategy[1] focuses on digitalization, automation, and improvements in cybersecurity to enhance national security and improve efficiency/resiliency
- Naval / military demand for automation is particularly strong
- Both international and federal regulations[2] have expanded recently, including adoption of electronic credentials, electronic submissions of export manifests, and minimum cybersecurity requirements
- US maritime is lagging other sectors in this space, with some significant barriers to overcome to drive adoption

Geographic trends

Digitalization | Automation | Cybersecurity

- The Michigan maritime strategy includes goals around designing, building, and testing autonomous systems and the local industry has been incorporating digital tools to improve operational efficiency[3]
- In addition, initiatives in the Great Lakes region are focused on digitalization and automation specifically, including the Great Lakes Maritime Initiative and the Smart Ships Coalition
- Cybersecurity concerns remain more of a federal than local priority

Comm. needs

Digitalization | Automation | Cybersecurity

- Digitalization: Many digital tools are mature but have not been widely implemented due to a variety of constraints (including cost). Innovation can support scaling and accelerate adoption
- Automation: Unique maritime applications mean this cluster is early in commercialization and can benefit significantly from innovation support
- Cybersecurity: Mature, established market in other sectors that can be adopted somewhat easily to maritime applications. Constraints are mainly cost and connectivity rather than commercialization

Fit with Lab model

Digitalization | Automation | Cybersecurity

- High fit for digitalization / automation: Advanced data / modeling lab can support and streamline design and development of concepts and a demonstration vessel can help validate ideas under real maritime conditions. Equipment and demo vessel must be plug-and-play and highly adaptable to different use cases to be most beneficial
- Low fit for cybersecurity: Advanced modeling environment can help support design and testing of systems, but may not offer additional capabilities beyond other computing centers already available in the area. Demonstration vessel is not likely critical for design and validation

1 – "America's Maritime Action Plan.". February 2026. 2 – "New Maritime Regulations for 2025." Shlosman Law Firm. Retrieved Feb 2026. "New CBP vessel rule targets high-risk exports." FreightWaves, February 2026. "US Coast Guard releases final rule on maritime security and cybersecurity standards." Industrial Cyber, January 2025. 3- "Michigan Maritime Strategy Draft." January 27, 2026. "Marine Sector Embraces Digitalization to Put Data to Work for the Environment." Marine Delivers Magazine, 2022.

Favorable | Less favorable | Not favorable

Logistics and Intermodal: Analysis

Maritime transportation is a key player in the global freight trade and value creation depends on how efficiently cargo is planned, transferred, tracked, and delivered. Recent geopolitical tensions, economic uncertainty and weather disruptions have exposed vulnerabilities in the supply chain, increasing focus on reliability and resilience throughout all points of the cargo journey[1].

Innovation in this space could occur in one of two areas:

1) Cargo Management

- Projects in this space focus on the physical movement of cargo through specific nodes and optimizing the management of cargo within and between vessels, terminals, and storage facilities to maximize space utilization, minimize handling time, and reduce data and delay. Examples could include real time cargo tracking using RFID, GPS, and IoT sensors, automated documentation and customs processing, etc.

2) Intermodal Optimization

- Projects target improvements in supply chain reliability and resilience, specifically the coordination between stakeholders, transport modes, infrastructure and information to reduce transit time, cost, risk, and emissions. Examples could include end-to-end visibility platforms integrating data throughout a supply chain, intermodal integration aligning port operations with rail or truck capacity, demand forecasting and inventory optimization, etc.

Examples of Logistics Innovations in Maritime[2]

IoT and AI

- Internet of Things (IoT) is the system of physical devices integrated with sensors, software, and network connectivity, capable of transmitting and exchanging data
- Artificial Intelligence (AI) is a technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making and creativity
- Systems using IoT and AI can process and analyze large amounts of data in real-time, leading to faster and more informed decision making
- These technologies are being applied in maritime to support advanced package tracking, real-time schedule optimization, etc.

Drones

- Drones can support last-mile delivery at sea, particularly for high-value or time-sensitive cargo that may otherwise slow or costly docking procedures

Blockchain Technology

- Blockchain technology, typically used in cryptocurrency, also provides secure, transparent, and tamper-proof records
- This can help address persistent supply chain issues around traceability, documentation, fraud and cost

1 – "2025 Review of Maritime Transport." United National Conference on Trade and Development. 2025. 2 – "Smart Ports and Digital Shipping: The Future of Maritime Logistics." Global Trade Magazine, August 2025. "Top 6 Shipping Innovations Transforming Global Logistics." Transportation and Logistics International. Retrieved February 2026. "Blockchain in Shipping: Revolutionizing Global Supply Chains." MarineLink, February 2026.

Logistics and Intermodal: Analysis

Key Takeaway: Given minimal regulatory drivers and moderate fit of the lab for this segment, logistics and intermodal should be considered a lower priority for the Lab. However, given the federal and local strategy push, as well as a clear link between efficient cargo management and value creation in maritime, projects in this segment may still be beneficial to pursue.

Market trends

Cargo: Less favorable | Intermodal: Less favorable

- Both federal and local strategies[1] emphasize the reliability of supply chains – the US strategy focuses on minimizing disruptions and improving resilience while the MI strategy sets the goal of modernizing ports and intermodal infrastructure to improve the efficiency of goods movement
- Maritime regulations have not focused on supply chain requirements recently, although some efforts have focused on standardization to improve communications between supply chain players

Geographic trends

Cargo: Favorable | Intermodal: Less favorable

- Initiatives in the Great Lakes region prioritize economic development / job creation, and efficient movement of goods is directly linked to value creation
  - Michigan is responsible for moving about 57 million tons of cargo per year, with the Port of Detroit being the largest port in MI by volume of cargo[1]
- Greater intermodal innovation could benefit both maritime and other key Great Lakes industries (e.g. automotive) but fragmented and widespread supply chains may limit reach / influence from a regional innovation lab

Commercialization need

Cargo: Less favorable | Intermodal: Less favorable

- Cargo management: Mid-commercialization. Companies have begun to focus on and optimize cargo management but adoption rates of new technologies are low and help is needed to upgrade port infrastructure and scale solutions
- Intermodal: Mid-commercialization. Some advancements have been made, but maritime supply chains remain fragments and innovation support could accelerate adoption and commercialization

Fit with Lab model

Cargo: Less favorable | Intermodal: Not favorable

- The lab is suited to support both of these sub-sectors – cargo management concepts could benefit from the demonstration vessel to test under real maritime conditions, and the proximity of rail and road connections to the site allows for testing of intermodal innovations
- However, designing and testing of certain cargo management and intermodal ideas may be challenging due to space constraints, capital, and other requirements (e.g. movement of goods around a terminal or between vessels, last-mile delivery innovation, etc.)

Favorable | Less favorable | Not favorable

1 – "America's Maritime Action Plan.". February 2026. "Michigan Maritime Strategy Draft." January 27, 2026.

Demand for a Shared Demonstration Vessel

H2 Demonstration Vessel - Summary

H2	There is meaningful demand across segments for access to a shared demonstration vessel as part of a combined physical-digital lab	**TRUE**

- **Demand for a shared demonstration vessel exists, but it is uneven and conditional**. Demand for innovation testing space is strongest from startups, who lack access to vessels and need real-world testing to validate and commercialize technologies. Affordability is critical for this group.
- **Established OEMs and shipyards are less interested in "innovation demos," but value testing and certification capacity**. Many already have access to vessels; however, they expressed interest in the lab and vessel as supplemental infrastructure to reduce certification bottlenecks, shorten lead times, and support repeatable validation tied to customer delivery.
- **Successful demo vessels are designed as flexible testing platforms**. Across interviews and benchmarks, effective vessels share common traits:
  - Modular, plug-and-play design for components and systems
  - Extensive instrumentation and data capture
  - Ability to support multiple testing modes (component-level and system-level)
  - Strong land-based support (data processing, remote operations, fueling)
- **Most existing demo vessels focus on a limited set of use cases**. While modularity is important, benchmarking shows that many vessels specialize (e.g., autonomy or fuels). Broad multi-purpose platforms are feasible but more complex and costly.

While startups express the strongest interest in a shared demonstration vessel, interviews suggest that **OEMs and shipyards are better positioned to anchor sustained demand through repeatable testing and certification needs**, with startups most successful when aligned to these execution-driven use cases.

Therefore, Ramboll recommends that OEMs and shipyards should define the anchor use cases for the vessel. Startups should be positioned as enablers of OEM needs and users of the same testing, validation, and certification infrastructure.

Our interviews with maritime start-ups and corporations yielded three key insights for the demonstration vessel

Start-ups have the strongest demand for a demo vessel

Start-up companies had the **strongest demand** for a demonstration vessel, driven by two key factors:

- **Focused on innovation** and have the need to prove out technologies in real-world situations
- **Limited funding** and access to vessels for key prototyping and testing

These companies indicated that both the demonstration vessel and the accompanying modeling /datasets would help them **accelerate design, testing, and commercialization**.

Affordability was a concern – start-ups were interested in the demo vessel only if access to it did not present **a significant cost barrier**.

Corporations care more about increasing access to testing capabilities

Established maritime corporations (such as shipbuilders, integrators, and component manufacturers) expressed **limited interest** in a demonstration vessel. Many corporations **already had a vessel** for this purpose and saw limited need for access to another vessel or the data generated from it. In addition, **innovation wasn't the primary concern** for these corporations, who focused more on scaling manufacturing and meeting repeatable customer demands.

However, multiple corporations were interested in using the lab as an **additional facility for testing and validation**. Certification / testing in the industry only occurs at specific facilities and is associated with **long lead times**, delaying deliveries. Corporations felt that the demo vessel could be useful if it was aligned to industry certification needs and could be used **to reduce time to market**.

Flexibility and adaptability is key to designing a successful demo vessel

All user types noted that for a demonstration vessel to be successful, it needed to be specifically designed as a **flexible and adaptable testing platform** that could handle a variety of use cases. Key desired capabilities[1] included:

- Ability to replicate a **variety of real-world situations** (e.g. avoiding collisions, port maneuvering, etc.)
- **Monitoring** equipment (e.g. sensors, cameras linked to the land-based lab)
- **Plug-and-play** setup, including both a modular construction to allow for component testing and flexible software interfaces
- Ability to handle **different fuel / energy** inputs
- Ability to be managed **remotely or autonomously**
- Flexibility to be used for **whole vessel** system testing or **specific component** testing

1 – Not all capabilities may be feasible or practical on one vessel. The Port of Detroit may want to begin with core capabilities (ability to replicate real-world situations, minimum viable monitoring equipment, etc.) and build on to the demonstration vessel over time based on demand. However, the vessel should be designed with additional capabilities in mind to minimize cost and effort in upgrading later.

Details: Interview details on demonstration vessels

Interviewee	Type of company	Company description	Current testing / demo process	Key insights on demo vessel for the lab
Ghostworks	Shipbuilder	Specializes in high-performance composite materials for maritime	• Has own demonstration / prototype vessels • Includes sensors and other technologies for testing	• Anticipates strong demand for demo vessel - it can be extremely expensive for companies to test on-water by themselves and current university demo vessels lack ability to replicate all real-world situations • Would be helpful to use the demo vessel for certification, not just testing / demonstration • Important that the demo vessel is designed as a testing platform that allows for easy integration / swapping of components • Key to have lots of measurement capabilities (sensors, cameras, etc.)
BorgWarner	Component Manufacturer	Tier I supplier providing battery systems and drives to multiple industries, including marine	• Does not do full vessel testing (just component testing) • Provides components to integrator / customer, who does full vessel testing	• Does not see strong demand for this from their type of company - their products aren't typically specialized for marine and make up around 1% of sales, so they don't have a strong demand for a demo vessel • They use data from vessels on the water (i.e. load curves for the battery design) but can obtain this easily through other avenues
Dirac Labs	Start-up	Develops GPS-denied and GPS-independent quantum navigation systems for maritime	• No clear process today for testing / demonstration	• Anticipates strong demand for demo vessel and the datasets generated by it – they need to prove out their technology in real-world situations • Specific uses cases that could be tested include collision avoidance, port and near-port maneuvering, and autonomous testing • Important to have plug-and-plug integration of equipment, standardized interfaces, lots of measurement systems, support for different energy types / fuels, and capability to replicate large and small vessel use cases • Affordability is a critical concern for start-ups like them
Diversified Marine	Shipbuilder	Builder and repairer of tug/push boats, crew vessels, OSVs, houseboats, etc.	• Has own vessel for testing today • Does not do a lot of innovation and testing is often done by component manufacturer	• Indicated interest in testing electrification components specifically but saw this vessel as an additional testing facility in addition to what they already do (vs. a driver of innovation) • Saw a need for both component and whole system testing, so vessel would need to be flexible to accommodate testing for both • Did not see a lot of value in data modeling / analyzing capability except when testing brand new designs (which isn't their typical type of work)
Wave Lumina	Start-up	Chemistry company focused on water quality sensing and monitoring	• Does not operate its own lab • Deploys sensors from pontoons or partner-operated platforms	• Did not have a critical need for a demo vessel in the near-term, as their sensors can be deployed from other boats or through their partners • Could see a potential use case in the future in deploying sensors through remotely operated vehicles (ROVs) • Lab and analytical access is a more critical capability than demo vessel
Fincantieri	Shipbuilder	Global shipbuilder serving government and commercial customers	• Extensive in-house design, prototyping, and testing capabilities • Uses internal facilities and partners for validation and qualification	• Did not identify strong need for a shared demo vessel for product-level innovation • Sees greater potential value in platforms that support repeatable shipyard process validation • Indicated that vertically integrated firms are unlikely to drive sustained utilization of shared demo assets
Bosch	Component Manufacturer	Global industrial technology supplier	• Primarily conducts component-level and bench testing in-house • Maritime fuel-cell applications largely pursued through partners	• Sees value in a demo vessel as supplemental validation infrastructure, not as a primary development platform • Reinforced that utilization is strongest when demo vessels support standardized, execution-driven validation workflows

We also looked at the capabilities of existing demonstration vessels to understand what made them successful

We gathered data on existing demonstration vessels through two sources:

1) Interviews with maritime corporations (vessels being used by private companies)
2) Benchmarking lab demonstration vessels globally (vessels being used by universities, governments, or groups of companies etc.)

Insights from these sources include:

1 **The best designs are modular, providing flexibility and adaptability**

The most successful demo vessels allow for testing of multiple use cases and feature "plug-and-play" interfaces make it easier to validate specific components from various users

2 **Most demo vessels focus on one segment of maritime innovation**

Although flexibility and adaptability is key, most demo vessels found focused on a particular segment of innovation, such as alternative fuel usage or autonomous operation. This may be due to the high costs of developing flexible demo vessels – designing a vessel for a narrower range of use cases is easier. However, some vessels (such as the one used by the US Navy) do cover a wide range of innovation use cases

3 **Land-based capabilities are critical to supporting the demo vessel**

Beyond the vessel itself, it's critical to have land-based support that enables testing and analysis. Key support functions include fueling capabilities, data processing and computing power, remote operation capabilities, etc.

Details: Examples of other demonstration vessels

Facility / Company	Where	Vessel	Overview	Vessel characteristics
Autonomous & Intelligent Systems (AIS) Laboratory at Turku University of Applied Sciences[1]	Finland	eM/S Salama	• Unmanned surface vessel operating since 2022 • Supports research and development around autonomous maritime vessels • Collects and shares open access data	• Can be operated remotely and in semi-autonomous mode • Has a multi-modal sensing systems, including RGB cameras, thermal cameras, and LiDAR sensors
Norwegian University of Science and Technology (NTNU)[2]	Norway	R/V Gunnerus	• Research vessel put into operation in 2006 • Covers a wide range of research activities in biology, technology, geology, archeology, oceanography, and fisheries • Used for educational purposes / training	• Fitted with a dynamic positioning system and a HiPap 500 unit that supports remotely operated vehicle deployment • Includes a wet and dry lab as well as a computer lab, accommodations for scientists and crew and a large mess hall that doubles as a lecture hall
Wärtsilä Voyage[3]	Germany	Ahti	• Former fishery patrol vessel retrofitted for innovation and development • Allows customers to test Wärtsilä Voyage’s own technologies, as well as partner solutions, in real-life sea conditions	• Includes several technology products, including a position reference system, a smart movement system enabling semi-autonomous movement and remote control and satellite connectivity
Autonomous Ship Verification & Evaluation Research Center[4]	South Korea	Haeyangnuri	• Innovation lab primarily focused on autonomous ship testing / evaluation that includes a sea-trial testbed vessel	• 26.5m vessel of composite material with interlocking environments for autonomous ship systems, algorithms, or equipment • Supported by key lab capabilities such as a remote operation center, a big data platform, and a dedicated test area for the vessel
Durham Energy Institute[5]	United Kingdom	Converted Lochin 33 workboat	• Concept demonstration vessel to prove out the retrofit of a green hydrogen solution	• Installed with a free-piston engine generator to convert hydrogen to electric power • Supported by a hydrogen refueling station
Naval Surface Warfare Center Carderock Division[6]	Virginia, US	Stiletto	• Vessel is designed as a realistic military platform in a maritime environment	• Designed to be modular with a wide range of options for adaptability, integration, and data collection

1 – “Autonomous and Intelligent Systems (AIS) Laboratory.” Turku AMK, Retrieved Feb 2026. 2 – “Research vessel R/V Gunnerus.” NTNU, Retrieved Feb 2026. 3 – “SMM: Wärtsilä Voyage unveils new demonstrator vessel.” MarineLog, Sept 2022. 4 – “Autonomous Ship Verification & Evaluation Research Center.” Krisco, Retrieved Feb 2026. 5 – “UK’s first demonstration of zero-emission marine technology in the Tees Valley.” Durham Energy Institute, Retrieved Feb 2026. 6 – “Stiletto, A Platform for Maritime Innovation.” NavSea, Sept 2025.

Details: M80 Stiletto Demonstration Vessel

History:

- Prototype naval ship manufactured by the M Ship Company in 2006
- Was later used by the Naval Surface Warfare Center Carderock Division’s Joint Prototyping and Experimentation Maritime (JPEM) program as a demonstration vessel
- Purpose for the last decade is to provide a cost-effective and efficient way to deliver combat systems at an accelerated rate

Key Characteristics:

- Built with carbon fiber materials and was originally provisioned for unmanned vehicle support
- Modular construction makes all systems interchangeable and allows for easy maintenance
- Undergoes regular upgrades to ensure ship stays modern

Example Project: Sealartec (2025)

- Israeli start-up company designed an autonomous solution to locate, identify, and physically connect with returning unmanned vessels in challenging sea conditions
- Goal was to make the launch and recovery of small-scale vessels more efficient, cost-effective, and safer
- Naval team identified a need for this technology, greenlit agreements, completed installation and conducted successful demonstrations in months

Sources: “M80 Siletto.” Naval Technology, April 22, 2009. “Stiletto, A Platform for Maritime Innovation.” NavSea, Sept 2025. “US Navy tests autonomous Israeli tech with Stiletto program.” The Jerusalem Post, October 2025.

Next steps - Demo vessel needs to be thoughtfully designed to successfully serve multiple target segments and end users

Key takeaway: We recommend that the demo vessel is designed and marketed as a qualification-grade integration + validation platform built around repeatable use cases in automation, materials, and digital innovation.

Main goals of the vessel would be to:

- Validate behavior under real operating conditions
- Prove systems respond correctly/as expected
- Generate datasets that stand up to scrutiny

Demo vessel concept:

- One shared, instrumented demo vessel: modular/plug-and-play nature facilitates scenario replication, remote ops, and data collection.
- Vessel supports integration/qualification trials and generates trusted datasets that can augment land-based certification testing

Demo vessel design:

- 2–3 packages aligned to the priority segments:
  - autonomy package
  - component/integration package
  - data/digital package

Anchor Use Cases for the Innovation Terminal

H3 Anchor Use Case vs. Flexibility - Summary

H3	Demand within each segment is concentrated around a limited number of execution-oriented use cases that can be realistically supported within a ~50,000 sq lab.	**Mostly true**

Testing and validation offer the most repeatable use cases

Multiple companies expressed interest in using the lab as an **additional facility for testing and validation**. Certification of components / vessels in the industry only occurs at specific facilities; while we do not recommend Port Detroit becomes an official certification facility, the Lab can support validation and testing processes, as it can be difficult for both start-ups and established corporations to gain access to the equipment needed to test and get products certification-ready.

Although specific products being tested may vary, the following core lab capabilities could support these types of use cases:

- **Monitoring** equipment (e.g. sensors, cameras) on both the demo vessel and in the lab
- **Testing** equipment aligned to industry testing (such as Coast Guard certifications) to allow for quicker / more cost-effective validation

More focus on specialized equipment needs over advanced modeling

Companies expressed interest in **having access to specialized equipment** for design, testing, and validation, which is often too expensive for companies to purchase alone. This was seen as **more important than having an advanced modeling environment** – most interviewees did not see a strong use case for advanced AI or premium data infrastructures.

However, the type of specialized equipment needed **varied widely by company**, making it difficult to stock the lab with standard equipment. For example, key equipment needs included fire-resistant testing equipment, underwater radar and communications systems and high-end spectrometers. Equipment that **aligns to broader industry testing / certification needs should be prioritized** during the first phase of the lab to appeal to the most users, and specialized equipment could be brought in later based on demand.

Having multiple types of spaces within the lab is key, especially for start-ups

In addition to the demonstration vessel, companies expressed interest in having different types of spaces available to them in the lab, such as:

- Office space
- Maker / prototyping space
- Testing / laboratory space

Start-ups in particular were interested in having a range of spaces, as many had limited space of their own for operations. Established corporations, on the other hand, were more interested in testing spaces and the demonstration vessel, as they had their own offices and spaces for design. Having collaborative spaces was not a priority for the companies interviewed – some had concerns about intellectual property.

Ramboll recommends that Port Detroit focus the first phase of lab design around **testing / validation use cases**, prioritizing **monitoring and data collection capabilities** and focusing on specialized equipment that aligns with industry standard testing.

In addition, the lab should be designed with **multiple types of spaces** to support more use cases without a significant amount of additional expense. More customized design elements (such as the inclusion of specific specialized equipment) should be prioritized for later phases of the lab and be based on market demand.

Details: Interview details on use cases

Interviewee	Type of company	Company description	Key insights on use cases for the lab
Ghostworks	Shipbuilder	Specializes in high-performance composite materials for maritime	• Strongest interest: Testing certification • Specific needs: Materials testing, fire-resistance testing and component-specific testing (such as testing for shock, drops, etc.) • Use cases: Standardized and aligned with certification testing
BorgWarner	Component Manufacturer	Tier I supplier providing battery systems and drives to multiple industries, including marine	• Did not see a strong use case for the lab for their specific business – their battery design isn't customized for marine applications, and they already have plenty of real-world data
Dirac Labs	Start-up	Develops GPS-denied and GPS-independent quantum navigation systems for maritime	• Strongest interest: Surface and underwater navigation testing in and around port environments • Specific needs: Modeling and replicating collision avoidance, port and near port maneuvering, and validation of autonomous navigation behavior (e.g., "Is the ship going where it needs to go?") • Use cases: Anticipated uses varied widely – there was interest for small and large vessel testing, a range of propulsion options, above and below water applications, etc.
Diversified Marine	Shipbuilder	Builder and repairer of tug/push boats, crew vessels, OSVs, houseboats, etc.	• Strongest interest: Electrification validation • Specific needs: Ability to test a hybrid or fully electric vessel with all components assembled (most testing occurs with components manufacturers, and they want the ability to make sure everything is working as expected at the component and vessel level) • Use cases: Saw limited use beyond electrification but felt that this use case could be standardized, as customers were asking for similar types of electrified vessels
Wave Lumina	Start-up	Chemistry company focused on water quality sensing and monitoring	• Strongest interest: Pollutant detection • Specific needs: Chemistry lab infrastructure, including fume hoods, eyewash stations, safe storage for chemicals and specialized analytical equipment (e.g. high-end spectrometers) • Use cases: Repeatable, as they would primarily be deploying sensors in different types of water – most interested in ability to bring in real-world water for testing and access to specialized lab equipment that is too expensive for them to afford
Fincantieri	Shipbuilder	Large, vertically integrated global shipbuilder serving government and commercial customers, including Great Lakes vessels	• Limited need for shared innovation space due to strong in-house design, prototyping, and testing capabilities • Primary interest: Shipyard process and industrial efficiency improvements rather than product-level R&D • Use cases: Validation of repeatable automation and manufacturing workflows (e.g., welding, fitting, outfitting) applicable across shipyards
Bosch	Component Manufacturer	Global industrial technology company supplying fuel cells, powertrain components, and alternative-fuel-related systems across multiple sectors	• Primary interest: Testing and validation support related to alternative fuels and powertrain systems • Operates primarily as a component and systems supplier, not a vessel integrator • Sees value in the lab as a supplemental testing and validation environment, not a replacement for in-house capability • Use cases: Repeatable component and system-level validation aligned with deployment and certification pathways

Partnerships and Ecosystem Strategy

Industry partnerships are required to drive repeatable utilization at the Lab, rather than one-off innovation demos

Key takeaway: Port Detroit should use a small set of companies to drive repeatable testing and validation activity that sustains utilization of the Lab and demonstration vessel.

Key interview insights

Large, vertically integrated companies often have extensive in-house capabilities and do not anticipate using shared infrastructure regularly.

Multiple suppliers indicated that system-level testing is owned by integrators or customers, meaning utilization is driven by execution owners rather than upstream suppliers.

Needs vary by user type: some prioritize instrumented test environments and real-world data, while others place more value on lab infrastructure, water access, and shared analytical tools than on demo vessel access alone.

Ideal industry company archetype

Execution owner

Responsible for delivery, integration, and performance risk, and runs repeat validation cycles.

Mid-sized capability profile

Has strong engineering and commercialization pull, but lacks full in-house test infrastructure.

Great Lakes activation path

Has near-term programs, customers, or deployments tied to Great Lakes vessels, ports, or terminals (not just exploratory R&D).

Repeatable use cases

Has 1–2 clear validation workflows that can be run as structured programs (defined scenarios, repeatable outputs, clear pass/fail criteria)

Four types of companies can become initial partners, enabling repeatable Lab asset utilization

Partner grouping	Reasoning	Repeatable use case	Lab assets used
Shipyards and vessel builders	• Own system-level integration and delivery risk • Drive repeat testing tied to customer delivery and retrofits	• Integration validation • Retrofit and conversion testing • Execution-driven testing tied to real vessels	• Demo vessel • Integration and test bays • Instrumentation and monitoring
Marine component OEMs and Tier 1/2 suppliers	• Face certification, validation, and performance proof requirements • Benefit from standardized, repeatable testing environments	• Component validation • Materials and durability testing • Interface and system compatibility testing	• Lab testing capability • Instrumented on-water trials • Shared analytical tools
Automation and industrial robotics firms	• Develop systems that require real-world validation near ports and vessels • Often lack maritime-specific test environments	• Sensor validation • Controls and safety testing • Remote operations workflows	• Demo vessel as test platform • Monitoring and data capture • Near-port / living-lab environment
Digital maritime and smart port startups	• Enable anchor use cases rather than drive utilization independently • Plug into partner-defined testing and data needs	• Data integration pilots • Smart port and situational awareness validation • Calibration using real-world datasets	• Demo vessel as data generator • Monitoring systems • Land-based modeling and analytics

We recommend targeting an initial set of priority firms outlined below to explore partnership appetite

	Shipyards and vessel builders	Marine component OEMs and Tier 1/2 suppliers	Automation and industrial robotics firms	Digital maritime and smart port startups
Tier 1	**Great Lakes Shipyard** Ship repair and conversion focus aligns with repeatable retrofit and integration validation.	**Sharrow Marine*** Metro Detroit manufacturer with clear component validation and performance testing needs.	**ABB*** Regional automation footprint and relevance to controls, robotics, and systems validation.	**Mythos AI*** Active Great Lakes port pilots and strong fit for smart port data and automation validation.
Tier 1	**Fraser Shipyards** Great Lakes ship repair and conversion shipyard with applicability to repeatable integration, retrofit, and validation.	**Deep Trekker*** Underwater inspection and robotics systems aligned with repeatable port and infrastructure testing.	**Konecranes** Port equipment and automation provider aligned with terminal handling and modernization use cases.	**Freeboard Technology*** Environmental sensing and modeling company, relevant to monitoring, data collection, and decision-making.
Tier 1	**Lake Assault Boats** Regular on-water testing and validation needs with shared demo vessel use.	**Michigan Wheel*** Propulsion component OEM with relevance to validation and integration workflows.	**FANUC America** Robotics OEM with strong regional presence, relevant to automation and manufacturing workflows.	**OceanComm*** Underwater communications developer with need for controlled validation environments.
Tier 2	**Ghostworks Marine***** Advanced materials and certification-driven testing needs.	**Geislinger*** Drivetrain components aligned with performance and durability testing.	**Dematic** Warehouse and material-handling automation provider for terminal or yard automation use cases.	
Tier 2	**Diversified Marine Construction***** Electrification and integration validation needs tied to repeat vessel builds.	**ABS**** Classification and certification partner aligned with standardized testing and validation pathways		

Tier 1: Top priority for partnership dialogue. Execution owners with repeatable needs and near-term Great Lakes deployment.
Tier 2: Strong potential fit but might be weaker in some areas (need for repeatability, company scale, timing alignment, etc.).

Note: * indicates outreach was attempted (11/17 of the companies listed above); ** indicates response was received but interview was unable to be scheduled; *** indicates interview was held with company.

Bright ideas. Sustainable change.

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Appendix

Appendix: Sector definition NAICS codes

NAICS Code	Title	Sector
513210	Software Publishers	Tech & Innovation
517410	Satellite Telecommunications	Tech & Innovation
517810	All Other Telecommunications	Tech & Innovation
518210	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	Tech & Innovation
541330	Engineering Services	Tech & Innovation
541380	Testing Laboratories and Services	Tech & Innovation
541511	Custom Computer Programming Services	Tech & Innovation
541512	Computer Systems Design Services	Tech & Innovation
541513	Computer Facilities Management Services	Tech & Innovation
541519	Other Computer Related Services	Tech & Innovation
541690	Other Scientific and Technical Consulting Services	Tech & Innovation
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	Tech & Innovation
541990	All Other Professional, Scientific, and Technical Services	Tech & Innovation
483111	Deep Sea Freight Transportation	Maritime Operations
483113	Coastal and Great Lakes Freight Transportation	Maritime Operations
483211	Inland Water Freight Transportation	Maritime Operations
488310	Port and Harbor Operations	Maritime Operations
488320	Marine Cargo Handling	Maritime Operations
488330	Navigational Services to Shipping	Maritime Operations
488390	Other Support Activities for Water Transportation	Maritime Operations
488510	Freight Transportation Arrangement	Maritime Operations

Segment definitions are as follow: Maritime-supportive manufacturing - Common industries supplying naval shipbuilding. Tech and Innovation- derived from HR&A definition of tech and innovation. Maritime Operations – Academic definition of shipbuilding industry mapping from University of Michigan.

Appendix: Sector definition NAICS codes

NAICS Code	Title	Sector
325211	Plastics Material and Resin Manufacturing	Maritime-Related Manufacturing
325220	Artificial and Synthetic Fibers and Filaments Manufacturing	
325510	Paint and Coating Manufacturing	
325520	Adhesive Manufacturing	
326291	Rubber Product Manufacturing for Mechanical Use	
331110	Iron and Steel Mills and Ferroalloy Manufacturing	
331529	Other Nonferrous Metal Foundries (except Die-Casting)	
332312	Fabricated Structural Metal Manufacturing	
332313	Plate Work Manufacturing	
332410	Power Boiler and Heat Exchanger Manufacturing	
332510	Hardware Manufacturing	
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing	
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing	
333613	Mechanical Power Transmission Equipment Manufacturing	
333618	Other Engine Equipment Manufacturing	
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	
333998	All Other Miscellaneous General Purpose Machinery Manufacturing	
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	
334290	Other Communications Equipment Manufacturing	
334417	Electronic Connector Manufacturing	
334419	Other Electronic Component Manufacturing	
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	
334514	Totalizing Fluid Meter and Counting Device Manufacturing	
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	
334519	Other Measuring and Controlling Device Manufacturing	
335312	Motor and Generator Manufacturing	
335314	Relay and Industrial Control Manufacturing	
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	
336310	Motor Vehicle Gasoline Engine and Engine Parts Manufacturing	
336412	Aircraft Engine and Engine Parts Manufacturing	
336611	Ship Building and Repairing	
336612	Boat Building	

Segment definitions are as follow: Maritime-supportive manufacturing - Common industries supplying naval shipbuilding U.S. Navy Maritime Industrial Base. Tech and Innovation- derived from HR&A definition of tech and innovation. Maritime Operations – Academic definition of shipbuilding industry mapping from University of Michigan.

Appendix: First wave of interview outreach

Company Name	Company Type	Location	First Email Sent	First Email Date	Follow up Email Sent	Follow up Email Date	Response Received	Response Date	Interview Set	Interview Date	Interview Completed
Diversified Marine Construction	Workboat builder	Holland, MI	Yes	20-Feb			Yes	20-Feb	Yes	4-Mar	Yes
Ghostworks Marine	Shipbuilder and design firm	Holland, MI	Yes	20-Feb			Yes	23-Feb	Yes	25-Feb	Yes
BorgWarner	Tier 1 component OEM	Auburn Hills, MI	Yes	20-Feb			Yes	25-Feb	Yes	3-Mar	Yes
Dirac Labs	Start-up / Navigation	Madison, WI	Yes	27-Feb			Yes	27-Feb	Yes	3-Mar	Yes
Wave Lumina	Start-up / Water Quality	Traverse City, MI	Yes	27-Feb			Yes	27-Feb	Yes	9-Mar	Yes
Fincantieri Bay Shipbuilding	Shipyard	Sturgeon Bay, WI	Yes	20-Feb	Yes	25-Mar	Yes	26-Mar	Yes	1-Apr	Yes
Bosch	Tier 1 OEM	Detroit, MI	Yes	25-Mar	Yes	25-Mar	Yes	26-Mar	Yes	7-Apr	Yes
American Bureau of Shipping (ABS)	Classification society	Chicago, IL	Yes	20-Feb	Yes	23-Feb	Yes	23-Feb			
Michigan Wheel	Marine propulsion OEM	Grand Rapids, MI	Yes	20-Feb	Yes	4-Mar					
Sharrow Marine LLC	Marine propulsion technology OEM	Harper Woods, MI	Yes	20-Feb	Yes	4-Mar					
Connor Industries	Vessel manufacturer	Parry Sound, ON	Yes	20-Feb	Yes	4-Mar					
Voltari Marine Electric Inc.	Electric vessel developer / manufacturer	Merrickville, ON	Yes	20-Feb	Yes	4-Mar					
project44	Start up, Supply chain visibility software	Chicago, IL	Yes	27-Feb							
FourKites	Start up, Supply chain visibility software	Chicago, IL	Yes	27-Feb							
Voltaic Marine	Start-up / early growth boat builder	Southfield, MI	Yes	27-Feb							
Hybrid Robotics	Start-up	Traverse City, MI	Yes	27-Feb							
Lacuum	Start-up	Ann Arbor, MI	Yes	27-Feb							
Mythos AI	Start-up	Detroit, MI	Yes	27-Feb							
Deep Trekker	Start-up / growth manufacturer	Kitchener, ON	Yes	27-Feb							
OceanComm	Start-up	Chicago, IL	Yes	27-Feb							
Freeboard Technology	Start-up	Cleveland, OH & Ann Arbor, MI	Yes	27-Feb							
ABB	Industrial automation & robotics OEM	Auburn Hills, MI	Yes	20-Feb							
ZF	Tier 1 OEM with marine division	Livonia, MI	Yes	20-Feb							
Geislinger	Drivetrain component OEM	Battle Creek, MI	Yes	20-Feb							
Crowley	Logistics and shipping provider	Cincinnati, OH	Yes	20-Feb							
AVEVA	Industrial software company	Chicago, IL	Yes	20-Feb							

Appendix: Second wave of interview outreach

Company Name	Company Type	Location	First Email Sent	First Email Date	Follow Up Email Sent	Follow Up Email Date	Response Received	Response Date	Interview Set	Interview Date	Interview Completed
Centre for Innovation and Technology, University of Michigan-Flint	University	Flint, MI	Yes	25-Jun			Yes	26-Jun	Yes	1-Jul	Yes
Downriver Community Conference	Workforce Development	Wyandotte, MI	Yes	12-May			Yes	12-May	Yes	15-May	Yes
Global Epicenter of Mobility	Industry Consortium	Southeast, MI	Yes	12-Jun			Yes	12-Jun	Yes	24-Jun	Yes
Great Lakes Freshwater Research and Innovation Center	Innovation Hub	Traverse City, MI	Yes	19-Jun			Yes	22-Jun	Yes	1-Jul	Yes
Great Lakes St. Lawrence Governors & Premiers	Industry Consortium	Great Lakes Region	Yes	19-Jun			Yes	22-Jun	Yes	1-Jul	Yes
Macomb Community College	University	Warren, MI	Yes	16-Jun			Yes	1-Jul	Yes	10-Jul	Yes
Martin Defense Group	Start Up	Honolulu, HI	Yes	19-Jun			Yes	23-Jun	Yes	29-Jun	Yes
Michigan Department of Labor and Economic Opportunity	State Department	Michigan	Yes	30-Jun			Yes	6-Jul	Yes	8-Jul	Yes
Michigan Maritime Strategy Implementation Working Group	State Department	Michigan	Yes	30-Jun			Yes	30-Jun	Yes	20-Jul	Yes
Michigan Department of Transportation	State Department	Michigan	Yes	10-June			Yes	15-June	Yes	25-Jun	Yes
ODU Maritime Autonomous Systems Test Site	University Innovation Hub	Norfolk, VA	Yes	24-Jun	Yes	24-Jun	Yes	11-Jul	Yes	17-Jul	Yes
Path Robotics	Start Up	Columbus, OH	Yes	29-Jun			Yes	30-Jun	Yes	7-Jul	Yes
Persona AI	Start Up	Houston, TX	Yes	29-Jun			Yes	30-Jun	Yes	2-Jul	Yes
SEMCA Michigan Works!	Workforce Development	Southeast, MI	Yes	18-May			Yes	27-May	Yes	29-May	Yes
University of Michigan	University	Ann Arbor, MI	Yes	16-Jun			Yes	16-Jun	Yes	18-Jun	Yes
Washington Maritime Blue Innovation Center	Industry Consortium + Innovation Hub	Seattle, WA	Yes	19-Jun			Yes	29-Jun	Yes	8-Jul	Yes
AltaSea at the Port of Los Angeles	Innovation Hub	Los Angeles, CA	Yes	1-Jul	Yes	7-July	Yes	7-23			
AquaAction	Non-Profit Ecosystem Builder	Quebec, Canada	Yes	19-Jun							
Centre for Ocean Ventures and Entrepreneurship	Innovation Hub	Nova Scotia, Canada	Yes	24-Jun	Yes	7-July					
IACMI – The Composites Institute	Industry Consortium	Knoxville, TN	Yes	29-Jun	Yes	7-July					
Lightweight Innovations for Tomorrow	Innovation Hub + Workforce Development	Detroit, MI	Yes	19-Jun							
Motmot AI	Start Up	Detroit, MI	Yes	24-Jun	Yes	7-July					
Roger F. Wicker Center for Ocean Enterprise	Innovation Hub	Gulfport, MS	Yes	24-Jun	Yes	7-July					
Sharrow Marine	Tier 1 OEM	Harper Woods, MI	Yes	19-Jun							
Wayne County Community College	University	Detroit, MI	Yes	19-Jun	Yes	29-June					