SYNERGIST
Mobility Accelerator

## Synergist Mobility Accelerator

# Next Generation Ferry Project
# Executive Summary

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BEAVER ISLAND

## Table of Contents



## Exhibit Listing

# Summary Highlights

The following summary presents the key highlights of the Next Generation Ferry Project. A comprehensive analysis of ferry design, architecture, manufacturing processes, and associated costs has established the business rationale for selecting the proposed Next Generation Ferry. The decision is supported by factors such as enhanced public safety and accessibility, projected long-term reductions in operating costs, lifecycle return on investment (ROI), and the essential support services and workforce development initiatives critical for successful modernization and potential economic opportunities to build long-term fiscal resilience.

# Proposed Next Generation Ferry

## Beaver Island Transportation Modernization Background

Beaver Island operates as a Multi-Modal Transportation Center out of necessity, with transportation to and from the mainland available solely by ferry and air. The island's isolation is influenced by weather conditions in northern Michigan, which can disrupt both ferry and airline services during the winter months. This situation results in challenges for the daily transport of people and goods, as well as public safety, including difficulties in transporting essential supplies such as food and medical provisions to the island, providing medical transport to the mainland, and conducting emergency response operations, such as firefighting support and search and rescue missions, when necessary.

The ferry system, along with air service, has long been fundamental to the economic and cultural foundation of the island. The need to replace the Beaver Islander Ferry signifies a critical juncture for the island and its residents. It is widely recognized that the overall well-being of the island and its inhabitants depends on the modernization of both ferry and air services to meet the evolving needs of the island and local residents. Modernization entails more than merely acquiring a new ferry, it requires ensuring the sustainability of both transportation systems, which are vital to island life. The proposed **Shared Services Operations Center** and **Workforce Development Program** offer essential resources required to integrate and sustain transportation services into the future.

## Beaver Island Transportation Authority Next Generation Ferry Project

The Beaver Island Transportation Authority (BITA) engaged Synergist Mobility Accelerator (Synergist), a non-profit organization based in Holland, Michigan, to perform detailed due diligence on a non-traditional ferry alternative to their current steel hull ferry designs. The project's objectives included evaluating alternative materials, propulsion system options, operational efficiencies, and lifecycle costs that could enhance ferry profitability. Additionally, the BITA aimed to improve safety features, accessibility for individuals with mobility challenges, modernize operations, and support the acquisition of a contemporary ferry with a comprehensive workforce development program and a model to generate revenue, thereby increasing the island's fiscal self-reliance.

The Next Generation Ferry Project was developed and executed in three phases:

- **Phase 1** focused on Discovery, Due Diligence, and Assessment.
- **Phase 2** concentrated on the development, execution, and evaluation of models, study outputs, and capabilities that provided validated data and operational evidence to inform potential courses of action (COAs) for Beaver Island leadership decision making regarding the design and costs of a new ferry.
- **Phase 3** summarized the design and requirements, including the Business Case Analysis to inform ferry manufacturing and cost selection, options for a modernized Shared Services Operations Center, and the introduction of a Work Force Development Program to support marine technical skills, recruitment, and retention of workforce for a Next Generation ferry.

All phases of the work were conducted concurrently with an agile, iterative approach that enabled integration of the work, testing and evaluating options, and building a data-based analysis of key profitability and operating factors.

## Summary Highlights

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## The Next Generation Ferry Project Outreach to Ghostworks Marine

Ghostworks Marine, Inc. (Ghostworks) was asked to evaluate the feasibility of implementing a Next Generation Ferry for BITA by Synergist, a non-profit organization in Holland, Michigan, with which Ghostworks has previously worked on marine mobility and testing projects.

BITA provided data, information, and analysis to support a Business Case for selecting a Next Generation Ferry, designed and manufactured in Michigan, with a modern carbon-fiber M-hull and a bio-diesel propulsion system (carbon-free footprint) that offers enhanced fuel efficiency cost reductions; multi-use mission support for medical, emergency response, and cargo logistics support; as well as advanced safety and accessibility (compatible with the requirements of the Americans with Disabilities Act (ADA)) features for Beaver Island residents and visitors.

Synergist and Ghostworks representatives traveled to Charlevoix and Beaver Island, on multiple occasions, to meet with BITA, Beaver Island Boat Company (BIBCO), local government stakeholders, commercial interests, and the broader Beaver Island community to gain a deeper understanding of the needs of the entire community that utilizes the ferries. The team had extremely productive meetings, including touring the current vessels, meeting with the operations teams, key freight users, and residential users. Stakeholder inputs included passenger safety and accessibility, ADA compliance, passenger comforts, rural health and safety support, freight and logistics considerations, and historical ferry design features. The input received

during the open community events, as well as discussions with the current operators of the ferry, were incorporated into the design plan for the proposed Next Generation Ferry. Ghostworks attempted to address all public concerns within the necessary trade-offs of the vessel's parameters and project costs.

A series of operational use cases were conducted onboard the Ghostworks Minerva testbed in the waters between Beaver Island and Charlevoix, Michigan. These use cases included medical transport, firefighting support, and emergency operations, such as mass evacuation. Relevant Beaver Island stakeholders participated and provided feedback, offering valuable insights to the Ghostworks design team. This allowed for real-time operational demonstration of the M-hull and validation of the additional capabilities of the modern vessel configuration to BI leadership and local vessel experts.

## Why Ghostworks?

Synergist selected Ghostworks for the BITA Ferry Project due to their extensive experience in naval architecture, engineering, and their use of high-performance composite materials. These qualities offer several life-cycle advantages within the evolving modernization of the US maritime sector. Additionally, being located in Michigan and employing a comprehensive design and manufacturing approach, Synergist anticipated that Ghostworks would facilitate close collaboration with BITA authorities, as well as ferry owners and operators. This partnership aims to design and manufacture a vessel that meets the needs of the Island community while respecting its history, culture, timelines, and resources.

Ghostworks cultivates a skilled marine technical workforce tailored to its unique technologies, materials, and processes. To support this initiative, Ghostworks has established a partnership with Synergist to enhance a marine apprenticeship program. This program is conducted in collaboration with the local community college, providing certificates in essential boat manufacturing skill sets.

As part of this effort, Ghostworks has created a next generation workforce and, within the proposed project, plans to expand the program further. They will collaborate with Synergist to establish the Great Lakes and Inland Maritime Training Center at Beaver Island. This center aims to support workforce development, recruitment, and retention initiatives related to the construction and operation of a Next Generation Ferry for Beaver Island.

The plan includes identifying recruits from Beaver Island to integrate into Ghostworks' design and manufacturing team in Holland, Michigan, as full-time interns dedicated to building the proposed ferry for the island. Currently, the intern program costs are supported by a grant from West Michigan Works, provided by the State of Michigan.

## Modern Design, Technology and Materials for the Proposed Ferry

While there are detailed architectural considerations in the design and manufacture of the Next Generation Ferry for Beaver Island, for the purposes of this executive summary we have

provided the highlights of the design considerations and details about the project work and operational business case in the following pages.

### Hull Form and Design -The M-Hull Advantage

The proposed ferry will benefit from the M-hull's air encapsulation technology to reduce drag, improve stability, and increase speed. This unique design captures bow wave energy within its tunnels, creating hydrodynamic lift, and enhancing performance and efficiency. The M-hull reduces accelerations and wave slap by up to 60% compared to traditional V-hulls of similar size, lowering injury and crew fatigue rates.

### Stability

The Central Displacement Section (CDS) is the backbone of the vessel and provides most of the lift. It has a fine entry with a deep bow and a broad, shallow exit. Planing Tunnels (PTs) on each side of the CDS provide the hydrodynamic and aerodynamic lift. They are high above the static waterline in the bow to capture air, and the bow wave gradually sloping down to the waterline. Finally, the Rigid Skirts on the outside of the vessel recaptures the bow wave. They are designed to reflect the bow wave energy and control the inboard pressure gradient.

### Speed

M-hull vessels achieve higher speeds through reduced drag. This reduced drag is achieved by creating hydrodynamic lift as the innovative M-shaped design captures the energy derived from bow waves. This energy is converted into lift, which aids in reducing the overall drag of the vessel.

### Comfort

The M-hull has several inherent damping factors that improve ride quality. Its geometry reduces the hull's excitation response when encountering undulating sea conditions. The CDS "teeth" bite through the water, minimizing pitch accelerations and the high volume of the afterbody sections' damped oscillations. The unique tunnel design of the M-hull uses the increasing bow wave as a self-adjusting damping factor to reduce slamming accelerations. Finally, the high-pressure vapor in the PT acts as a cushion.

### Low-Wake

The M-hull was initially designed as a low-wash solution for passenger ferryboats to address the problem of wave damage in sensitive areas. M-hulls convert wave energy into a useful form, increasing lift and reducing drag. The vapor/fluid flow field passively dampens the ship's visible and acoustic signature by capturing the bow wave. The stern wake is a direct result of the energy left behind in the water. The recapture of energy that goes on in the tunnels helps to reduce energy put into the water, leaving behind a smaller wake.

### Payload Capacity

The M-hull design inherently creates a large amount of payload-carrying space, relevant to the safe transport of passengers and cargo from Beaver Island to the Michigan mainland. The wide beam allows for a much larger working deck area compared to a traditional monohull vessel.

Additionally, the two center displacement sections help to distribute the load and provide ample displacement to support the loads on the working deck. At cruising speeds, the M-hull's design provides the extra lift necessary to maintain cruising speed while carrying a heavy load.

### Modularity

Given the ample space in the working deck and the reduced number of load-carrying bulkheads, the M-hull is well suited to a myriad of missions. The working deck space can be reconfigured quickly and easily to accommodate different mission sets, allowing for rapid and ready refit. The boat's top mast can also be easily swapped out for testing unique sensor configurations. This modularity provides significant benefit to Beaver Island by enabling the use of the ferry for additional needs relating to emergency medical transport, firefighting support, emergency rescue and response operations, mass evacuation capabilities and more. Throughout the business case analysis conducted for the BITA, this became a critical success factor in considerations for the Next Generation Ferry on Beaver Island. The isolated environment of the island demands resolution to remote environment challenges that cannot be addressed by a traditional, steel, monohull ferry design.

### US Coast Guard Regulations and Compliance

The foremost considerations in ferry design are the safety and comfort of both public passengers and crew members, including those with disabilities. To address these priorities effectively, Synergist and Ghostworks engaged in multiple meetings with island residents to gain a comprehensive understanding of their needs. Based on these insights, the team developed an initial plan for the ferry that adheres to anticipated US Coast Guard (USCG) regulations.

To facilitate this process, Ghostworks has enlisted the Argosea Group, a consulting firm based in Annapolis, MD, specializing in guiding new vessel designs through the USCG approval process. By working directly with USCG headquarters in Washington, DC, they aim to prevent any potential delays throughout the project's duration.

Moreover, the introduction of new cyber security regulatory requirements by the USCG has been anticipated. As part of the Due Diligence Project for BITA, Synergist conducted a cyber security assessment of BIBCO. They provided a roadmap to address immediate security gaps and ensure compliance with the new regulations.

### Beaver Island Ferry Concept Design

The Ghostworks' Engineering team has developed a proposed design for a Next Generation Ferry that incorporates feedback from stakeholders, the results of computational fluid dynamics modeling, and the findings from studies conducted as part of the consulting project.

This design serves as a starting point for the Engineering and Design phase of the proposed Next Generation Ferry Project. During the Engineering and Design phase, the team will finalize the design based on selections made by BITA and the results of additional modeling and testing.

### Exterior Design

The goal of the exterior design exercise was to maximize the vessel's efficiencies while meeting as many of the key stakeholders' requests as possible and preserving the historical design elements of the current fleet of vessels. The forward section of the vessel is designed to maximize the aerodynamics of the ferry while maintaining the look of the current ferries and maintaining the safety of rides with the expected increase in wind due to the high speed of the vessel. In the above render, the blue areas represent windows designed to maximize the view for passengers and allow the forward passenger compartments to be climate-controlled. The rear area of the second deck is open, offering passengers and pets the opportunity to enjoy the outdoors.

### Interior Design (General Arrangement)

The general arrangement drawings serve as a starting point and account for the space required for all the passengers, cars, cargo, and other services that the vessel will need to carry.

Below deck the vessel, as shown in the drawing below (lower picture), features two crewless engine rooms that house the marine diesel/biodiesel 1600 horsepower engines, generators, reduction gears, drivelines, and waterjet inlets. The fuel tanks, freshwater tanks, and black/grey water tanks are represented as the boxes forward of the engine rooms.

The main deck of the vessel, shows the main cargo hold with the center line loading ramp, increased headroom to accommodate a box truck or three larger pick-up trucks, the side spaces for two additional cars and cargo. The forward seating area features ADA-compliant seating, two bathrooms, a reconfigurable multipurpose space, the main passenger entrances for embarkation and disembarkation, and ladder wells for access to the second deck.

The second deck houses the majority of the seating, with the forward compartment being enclosed, allowing it to be climate-controlled. It also has additional restrooms and an access stairwell for the crew to enter the pilot house, eliminating the need to walk outside. The rear compartments are the open-air seating, providing covered areas to enjoy the passage outdoors

The final details, ranging from seat selection and flooring type to vending machine placement and other finishing touches, will be selected by the transit authority during the project's design phase, allowing the vessel to be tailored to the needs and preferences of the Island.

### Operational Business Case

Synergist and Ghostworks were provided with limited use, cost, and operational data about the current ferries by BIBCO as part of this consulting project. The review of the current demand for transport and the cost of operating the current ferries heavily influenced the proposed Next Generation Ferry design.

As the proposal for the Next Generation Ferry was initially focused on replacement for the retiring Beaver Islander, the proposed Next Generation Ferry focused on the comparisons of the costs and demand, primarily of the Beaver Islander. As operational data and in-depth analysis

were conducted over Synergist's six-month due diligence project, what emerged was a stronger operational profitability business case.

Specifically, when analyzing ridership, cargo and fuel cost factors, what emerged was a case for the proposed Next Generation Ferry to take over daily operations from the Emerald Isle (not the Beaver Islander, the larger of the two currently operational ferries), especially the low capacity runs, and use of the Emerald Isle as the reserve vessel for high demand weekends and holidays. The route and profitability margins with this approach suggest that the ideal next vessel to service Beaver Island is a smaller, high-speed vessel that offers more trips to the island per day. This is based on the average capacity usage of the current vessels, even during the busy season, which is notably well below capacity.

This plan aligns with the current BITA project plan for the Emerald Isle, which will remain in service for the next several years and aims to extend the life of the Emerald Isle by relocating it to the auxiliary position within the fleet. This would involve using the Next Generation Ferry daily, providing up to three (3) but as few as one (1) round trip per day, as demand requires, with the Emerald Isle being utilized during peak times to maximize the route's capacity while minimizing the number of hours the Emerald Isle is in operation each year, reducing its engine hours, elongating its useful life and potentially reducing maintenance costs.

The smaller vessel, which operates at higher speeds, provides the operators with key flexibility to vary the number of crossings to better match demand, thereby preventing costly crossings with little to no passengers. A small ferry also mitigates some of the impact on downtown Charlevoix and reduces turnaround time.

By adding additional daily crossings, this analysis anticipates increased passenger demand, as the new route will enable tourists to make day trips to the island. At the same time, maintaining the ability to service the current demand for cars and freight through maintaining the Emerald Isle. Reducing the number of crossings for the Emerald Isle from 700 to 50-100 per year would drastically reduce its current maintenance costs and extend the life of the vessel, delaying a significant capital outlay for its replacement.

### Design, Engineer, Build Process and Schedule Estimate

Ghostworks' vessel design and engineering philosophy is to work hand-in-hand with BITA authorities throughout the process, making the process more akin to designing a custom home than buying a car off the lot.

The initial design and engineering phase is expected to last six months. It will require the board to make final selections on key design elements that will enable the start of production and the ordering of long-lead items, such as engines, water jets, and power distribution systems.

The production phases of the project will be staggered to start after the corresponding engineering phase is completed. Therefore, Phase A of production begins at the conclusion of Phase A of engineering. This allows the design team always to be ahead of the production floor and purchasing departments.

The estimated manufacturing timeline is 24-30 months.

Starting production while the vessel is still being designed allows Ghostworks to deliver on a faster timeline. Still, it also introduces some risk, especially if BITA changes a significant design decision made in a previous phase, which would result in a change order and a related adjustment of the delivery schedule.

### Good Faith Target Cost Estimate

The price of the vessel cannot be firmly agreed upon until it is fully designed, as the choices made by BITA will determine the final cost. The current target estimate, to complete the design and manufacture for the proposed ferry is $31-35M. It should be noted that while the acquisition cost of the ferry is important, the cost of running the ferry, i.e. daily operations, maintenance, fuel, etc. over the long-term, should be heavily weighted in the final new vessel decision making.

The estimate is a good-faith effort to price options that Ghostworks expects BITA to select. Change orders will be issued at the end of each design milestone, to adjust the cost up or down, if necessary, to account for price changes resulting from selections made during each phase.

# Shared Services Operations Center

The replacement of the Beaver Island Ferry is a significant step for both the island and its Transportation Authority, aimed at modernizing transportation for residents over the coming decades. The ferry, alongside air service, is a foundational element for the island's economy and culture. There is widespread agreement on the need for modernization, which goes beyond acquiring new vessels—it involves ongoing integration, coordination, and skilled personnel development.

As part of the Next Generation Ferry initiative, centralizing and upgrading transportation support services is critical. The proposed Shared Services Operations Center (SSOC) will provide an integrated framework for managing multiple transport modes, supporting logistics, emergency response, and public safety through improved information sharing and decision-making capabilities.

The SSOC is designed to equip leadership with adaptive tools for real-time situational awareness in daily operations and emergencies. Key features include dynamic weather forecasts, early alerts, predictive planning, and cybersecurity monitoring. Operating 24/7, the SSOC will replace fragmented responses with a unified hub coordinating land, air, and marine resources. Data from health centers, transportation manifests, vessel tracking, and local weather will be synthesized to enable rapid, coordinated responses across agencies.

## Concept and Capabilities

The SSOC will centralize command and control for routine and emergency ops, supporting resource management and interagency coordination without replacing on-scene leadership. It integrates all essential agencies within one operational structure to ensure efficient prioritization and allocation of resources.

### *Key Capabilities*

1. **Situational Awareness Dashboards.** Real-time displays of incidents, vessel/flight locations, weather, and utilities, consolidating various data sources into a single view.
2. **Shared Service Coordination.** Oversight of all transit modes and collaboration with partners, ensuring effective scheduling, safety communications, and SAR (search and rescue).
3. **Communications Backbone.** Reliance on satellite internet (e.g., Starlink) and deployable cellular networks, supported by backup power and portable radios to maintain connectivity during outages.

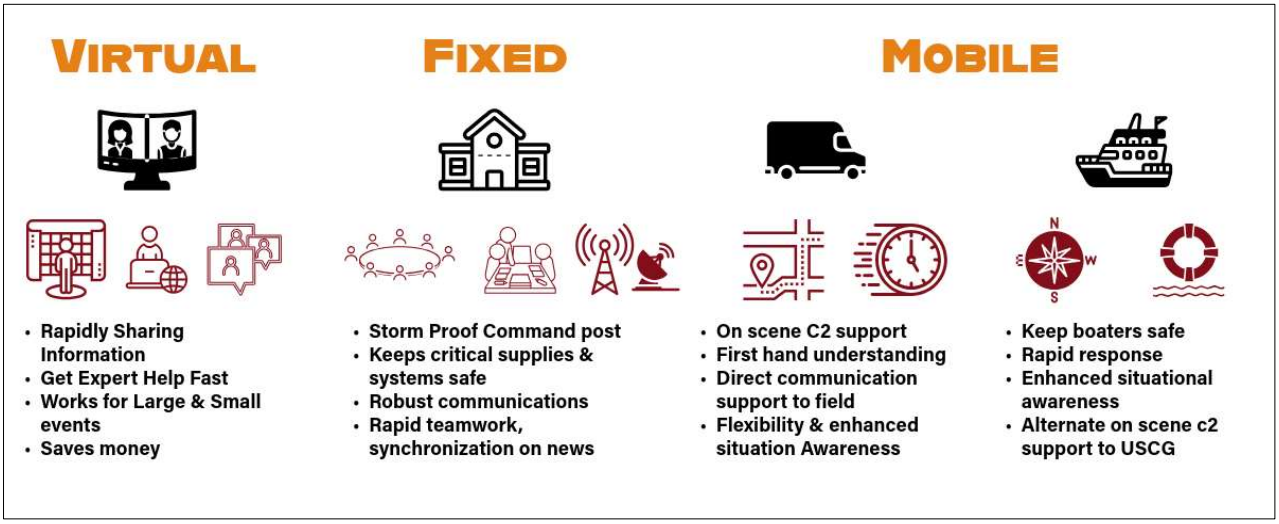


*Exhibit 1. Shared Services Operations Center*

### *Operations*

The SSOC will function around-the-clock, expanding in scope as staff are trained. Workforce development programs will prepare local professionals for SSOC responsibilities through targeted apprenticeships.

### *Communications Infrastructure*

1. **Satellite Connectivity.** Installation of primary and backup satellite internet terminals for broadband and secure data access.
2. **Deployable Cellular.** Acquisition of mobile cell sites for emergency LTE coverage.
3. **Radio Systems.** Mixed suites of VHF/UHF radios, weather receivers, and repeaters, all linked to the SSOC for agency communication.
4. **Network and Power.** All systems will have UPS and generator backup, secured networking, and cloud integrations where practical, using low-cost or open-source solutions when possible.

### Technology, Data, and Cybersecurity

The SSOC will use advanced, real-time data tools to bolster safety across Beaver Island's transport network. A deterministic security model protects systems at the kernel level, preventing unverified code from executing and proactively blocking threats.

### Operational Safety and Data Integration

The SSOC will address existing safety gaps by:

1. Providing real-time weather data for better ferry and flight decisions
2. Enhancing aviation safety with localized forecasts
3. Implementing early alerts for hazardous conditions
4. Improving planning and resource management
5. Enabling field crews to access vital information on mobile devices

### *Secure Data Feeds and Integration*

Critical data feeds—including weather, vessel/flight tracking, and public alerts—will be securely managed to support decision-making and coordinated responses. Alerts will be distributed through controlled channels to prevent misinformation.

### *Cybersecurity*

Acknowledging small communities' vulnerability to cyber threats, the SSOC adopts a rigorous security approach, enforcing kernel-level protections for full system visibility and proactive threat prevention.

The acquisition of a new Beaver Island ferry is the first in a series of key decisions on transportation modernization for the BITA Board. As modernization of processes and systems occur within BITA and all parties that interact with BITA on a regular basis, the threat of cyber security events will continue to grow. While many organizations and geographic regions believe they are too small to be impacted by a cyber threat, the reality is that it's the smallest organizations that face the biggest threats. Our adversaries understand that small organizations invest limited amounts of resources to protect their data and information and for this reason they are the easiest prey for hackers.

As part of the due diligence work looking toward modernization, the Synergist team conducted a cyber security assessment at the Beaver Island Boat Company. The findings are summarized below. Final detailed reports, following normal security assessment protocols will be provided to BITA and BIBCO only.

This assessment revealed a deficient cybersecurity posture, exposing the Beaver Island Boat Company (BIBCO) and their partners (and third-party vendors) to heightened operational, financial, safety, and regulatory risks. The analysis identified strategic risks. These risks stem from foundational weaknesses, including significant policy and program gaps, a lack of essential technical controls, and an over-reliance on basic IT support that is entirely insufficient for the complexity of modern threats and stringent regulatory demands, most notably the impending USCG July 2025 requirements.

#### The Strategic Roadmap to Resilience

To address these risks, we recommend a hybrid approach that balances strategic internal ownership with targeted outsourcing of specialized functions. This strategy will be executed via a phased, risk-based roadmap designed to deliver measurable improvements and build momentum over time.

This phased implementation (shown in the Exhibit below) prioritizes the most critical risks first while building a sustainable foundation for long-term security.

*Exhibit 2. The 3-State Approach: A Manageable Path to a Mature Posture*

| State and Timeline | Primary Goal & Key Activities |
|---|---|
| ***State 1: Foundational Setup & Immediate Triage (Months 0-6)*** | Goal: Establish governance and stabilize the environment to mitigate the most severe risks.<br>• Appoint an internal Cybersecurity Officer (CySO) supported by an external vCISO.<br>• Draft foundational policies (Incident Response, Asset Management, OT Security).<br>• Conduct emergency phishing and ransomware awareness training for all staff and crew.<br>• Implement technical "quick wins" like hardening administrative accounts. |
| ***State 2: Core Control Implementation & Compliance (Months 6-12)*** | Goal: Deploy essential security technologies and achieve critical compliance milestones.<br>• Achieve foundational USCG and PCI DSS compliance by submitting the Cybersecurity Plan and addressing critical payment system risks.<br>• Deploy universal Multi-Factor Authentication (MFA) and an Endpoint Detection & Response (EDR) solution.<br>• Implement critical network segmentation to isolate OT systems from the corporate network. |
| ***State 3: Capability Maturation & Advanced Defense (Months 12-24+)*** | Goal: Mature all security programs to align with the NIST Cybersecurity Framework and build a proactive, forward-looking defense.<br>• Implement 24/7 Security Operations Center (SOC) monitoring.<br>• Mature all programs, including Workforce Development (WFD) for cyber and operational needs.<br>• Begin development of a SSOC to unify security, safety, and ferry operations. |

### Investment and Next Steps

Achieving a defensible and compliant posture is a critical business investment, not an IT expense. This investment is essential to protect against catastrophic losses, ensure regulatory compliance, and safeguard the company's reputation and mission.

The proposed hybrid model represents the most effective balance of cost and capability, leveraging internal resources for oversight and external experts for specialized tasks.

- Preventing catastrophic operational shutdowns and safety incidents.
- Avoiding severe fines and legal action from the USCG, PCI DSS, and data privacy laws.
- Protecting invaluable reputation and the trust of the community it serves.
- Enabling secure and reliable business operations, from ticketing to financial management.

## *Data Analytics*

Advanced analytics will aggregate operational data, providing strategic insights for improved decision-making and proactive responses.

Synergist engaged Elder Research (Elder) to evaluate and offer recommendations to the Beaver Island Transportation Authority (BITA) concerning its data collection processes and analytic maturity. This initiative is grounded in the understanding that advancing these capabilities will strategically position BITA to better serve its constituents in the future.

Elder conducted a data assessment as part of the initial due diligence project underpinning transportation modernization, should the BITA Board select a next generation ferry for design and manufacturing. The assessment resulted in a score between 0 and 1 on Elder's data analysis maturity scale, which translates into small amounts of data being collected with manual reporting. The recommendation is to provide a foundation for building the data and analytic maturity of BITA, starting with the data on hand, in a modern environment that scales to the needs of BITA and houses the more advanced data collection and analytics capabilities over time in a cost-efficient fashion.

### Solution

For the initial effort, Elder establishes small portions of each layer to support the delivery of the data currently on hand at the time of the assessment with an emphasis on the lower layers to provide a foundation. The access to this system shall be credential-based utilizing two- factor authentication. Elder hosts and manages this solution for BITA on AWS's Gov Cloud, so BITA stakeholders can focus on operations and gain insight from the system over time.

The Exhibit below provides a Proof of Concept (POC) for data management, as proposed for BITA. Historical data is stored and updated via the interface and procedures outlined above, by partner Elder.

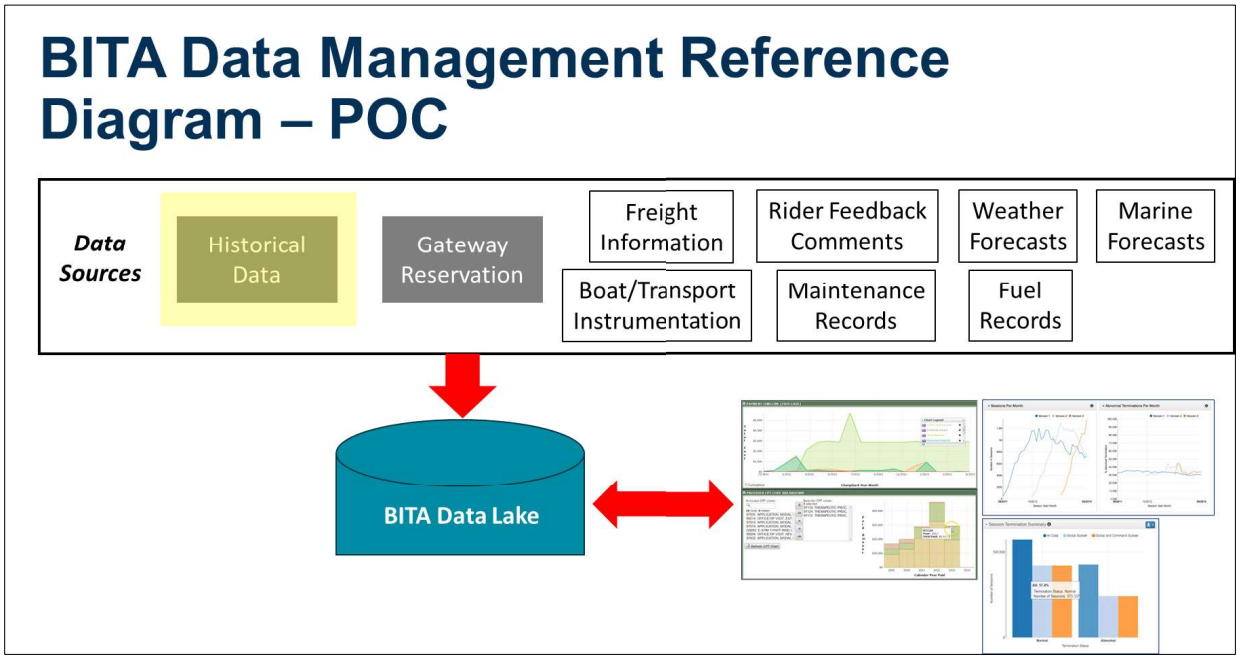


*Exhibit 3. Data Management Reference Diagram*

The solution's beginning utilizes yearly and monthly data to provide a series of dashboards for use and feedback. From this foundation, the potential use cases are driven by the needs and priorities of BITA, but below are a few use cases as examples that can be accommodated by the platform over time:

- Either manual or automatic ingest of ridership information moving forward, including passenger, cars, and cargo/freight. This can be automated via a ticket/reservation system that is utilized externally or internally to the platform. The benefits of this can be better forecasting and handling of emergencies via contingency plans developed based on the data received.
- Ferry maintenance monitoring can be handled by the platform by taking in data from instrumentation on current or future ferries. This can provide data driven insights into when and if a maintenance activity is required, plan for any downtime when maintenance is deemed necessary, and plan for fuel needs based on measured consumption.
- Weather forecast integration can be handled by the platform to incorporate this into schedule plans for the ferries and contingency planning as noted above.
- User experience enhancements can be handled by the platform to provide modern experiences around ferry schedules and trip preparation by wrapping chat tools around BITA material (travel schedules, park activities, etc.). User sentiment can be measured by ingesting social media feedback on the island.

Other potential use cases for further development follow in the Exhibit below.

## BITA Potential Use Cases

| Use Case | Why? | Status |
|---|---|---|
| Foundation infrastructure with static data | Starting point | Complete |
| Periodic updates on ridership/cars/cargo via manual or automatic process (latter preferred) | Get ahead of load needs to fit current or new route/vessel scheduling, forecast based on history | Open |
| Vessel data collection (fuel, sensors) via manual or automatic process (latter preferred) | Anomaly detection can inform maintenance needs and optimize costs | Open |
| Weather/marine forecast data collection | Automate route decisions | Open |
| Sentiment Analysis (Yelp, Facebook, other socials) | Automate or make more efficient responses to negatives or promote positives | Open |

*Exhibit 4. Additional Potential Use Cases*

### *Weather Intelligence*

Weather intelligence has become an essential component in supporting critical industries and infrastructure, including but not limited to transportation and logistics (both maritime and air), energy, and communications. Furthermore, weather intelligence significantly contributes to the effectiveness of a community's emergency response and public safety capabilities.

This intelligence offers vital information and situational awareness that is indispensable for both planning and daily operations within transportation and emergency response sectors. Meteomatics' (the weather intelligence partner of choice for Beaver Island needs) weather intelligence integrates current and historical meteorological data from global sources—such as weather models, satellite imagery, precipitation radar, oceanic data, and station-based observations—to support transportation and emergency response activities. For instance, when addressing transportation safety and operational efficiency, the insights provided by weather intelligence help enhance onboard safety for ships and aircraft, reduce fuel consumption, and optimize platform performance. Ultimately, this leads to improved productivity and a reduction in operational risk.

## Additional SSOC Use Cases

Potential applications include disaster debris management, real-time travel alerts, supply chain optimization, regional logistics, utility outage coordination, fire detection, evacuation guidance, community drills, and shelter management during crises.

By establishing the SSOC, Beaver Island will enhance its transportation and emergency response infrastructure, promoting sustainability, safety, and economic growth for future generations.

# Workforce Development Program

## Problem Statement

Beaver Island's ferry operations are increasingly strained by aging vessels, requiring higher technical maintenance; seasonal operation windows, which complicate staffing and retention; a lack of licensed mariners and service technicians based on the island; and limited local access to United States Coast Guard (USCG)-compliant training programs. These limitations impact both operational continuity and the long-term resilience of ferry logistics for Beaver Island.

## Apprenticeship Framework

Ghostworks has developed a scalable, paid, 18-month apprenticeship program in Holland, Michigan for Carbon Manufacturing Technicians, culminating in a Plastics-Polymer Engineering Technology certificate from Grand Rapids Community College. Expansion tracks include Marine Electricians, Diesel/Bio-Diesel Engine Mechanics, Advanced Carbon Fiber Manufacturing, and includes future areas of focus. The apprenticeship includes industry-aligned curriculum, which provides transferable skills for marine, construction, and aviation sectors. The program provides reserved slots for Beaver Island residents and provides a defined priority pathway for ferry system employment.

## Establishing a Training Center

A localized credentialing hub will provide USCG certification pathways to Master up to 100 Tons – Inland and Great Lakes, Near-Coastal Endorsements, and Able Seaman and Engine Room Ratings. Depending on the endorsement level, there will be between 360 and 720 days of sea-time. Practical experience aboard the Beaver Island ferry vessels will be provided. There will be an online curriculum provided by a variety of training entities, as well as an on-island classroom building.

## Operational Benefits

There are immediate benefits associated with this program, including a staffing pipeline for vessels, local job creation, and a reduced reliance on seasonal or transient labor. Mid-term benefits include captain-level certifications, improved vessel uptime due to local maintenance capabilities, and reduced transport interruptions of perishables and medical goods. Longer term benefits include an exportable workforce supporting warm-water routes in winter, year-round employment prospects for island youth, and strengthened island resilience.

## Funding Sources

Implementing a robust maritime training pipeline for Beaver Island will require multi-tiered financial support. Fortunately, there are several funding options, including Michigan Economic Development Corporation, Going Pro Talent Fund, Federal Shipbuilding and Maritime Training Programs, U.S. Coast Guard Training Grants, and National Guard Training Funds. This diverse funding ecosystem can dramatically reduce out-of-pocket costs for Beaver Island's maritime programs, enabling a scalable and sustainable approach to ferry staffing and regional resilience.

## Conclusion

The long-term sustainability of Beaver Island's maritime lifeline depends not only on modernizing its vessels, but also on investing in a homegrown, certified, and adaptable workforce. Aligning Ghostworks' shipbuilding technical expertise and training infrastructure with Synergist's understanding of advanced mobility creates a comprehensive maritime industry program and model specific to emerging commercial maritime industry needs, providing a scalable pathway to meeting both short-term staffing goals and long-term resilience objectives.