



# HelmStream PRD – AI Coordination for US Maritime Ports

HelmStream is an AI-powered platform designed to streamline communication, improve situational awareness, and drive operational coordination across the US maritime port ecosystem. Targeted at terminal operations managers, terminal staff, shipping lines, and truckers, the platform delivers proactive, chat-first agent-driven updates and real-time guidance, tailored to the fast-changing, complex environment of major American ports.

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## Goals

### Business Goals

- Increase operational efficiency at pilot US ports by reducing average vessel and truck dwell times by 10% within six months.
- **KPI:**

10% reduction in vessel + truck dwell time → \$9M annualized savings at pilot port

#### Calculation:

Vessel delay cost (\$30k/day) × 0.17 days saved + Truck dwell (0.25h × \$80 × 2,000 trips)

= **\$9,100 per vessel call**

- Demonstrate PoC ROI by reducing avoidable communication delays (“phone tag”) by 75%.
- Collect actionable data in real time from 80%+ of major port events during the pilot period.
- Create a scalable model for deployment across additional US maritime hubs.

### User Goals

- Consolidate siloed communications into a single, agentic workspace for faster, clearer coordination, coming with chat workspace.
- Receive AI-powered, contextually relevant status updates and alerts tailored to each user role.
- Access structured, searchable event histories and recommendations that help reduce operational blind spots.
- Empower all logistics actors, including truckers and third-party vendors, with equitable, real-time visibility.



- Eliminate uncertainty and reduce unnecessary waiting or transit for all ecosystem participants.

## Non-Goals

- Replacing existing core port/TOS (Terminal Operating System) or ERP backends.
  - Managing cargo/bookings or billing beyond status notifications for PoC.
  - Providing direct integrations with every possible US port at launch (PoC = 1–2 ports).
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# User Stories

## Personas

### Port Operations Manager (Port Authority)

- As a Port Operations Manager, I want to monitor all port critical events from a single dashboard, so that I can quickly identify and resolve bottlenecks.
- As a Port Operations Manager, I want to automatically receive proactive alerts when vessel timings slip, so that I can notify stakeholders before disruptions spread.

### Terminal Supervisor

- As a Terminal Supervisor, I want to log incidents or changes directly via chat, so that upstream and downstream teams are instantly aware.
- As a Terminal Supervisor, I want to get AI-summarized updates every hour, so I don't miss operational shifts.

### Shipping Line Rep

- As a Shipping Line Rep, I want to chat with port and terminal teams in one place, so coordination during arrivals and departures is seamless.
- As a Shipping Line Rep, I want the system to flag potential delays to my vessels in advance, so I can adjust my schedules or alert my customers.

### Trucker/Freight Dispatcher

- As a Trucker, I want to receive real-time gate and berth status, so I can minimize wait time and keep my fleet moving.
- As a Dispatcher, I want to route my drivers based on the latest port information, so I can improve delivery efficiency and customer satisfaction.

### IT/Port System Analyst



- As a Port System Analyst, I want to track all in-app communication and status changes for auditing and reporting, so compliance and traceability are assured.
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## Functional Requirements

- **AI Agent-Driven Proactive Updates** (Priority: Highest)
    - Auto-Generated Updates: Copilot agent synthesizes inputs and broadcasts status changes.
    - Scheduled Summaries: Automatic digest of critical events every X hours, tailored by role.
    - Suggestions/Next Steps: Copilot proposes standardized resolutions or mitigations.
  - **Chat & Communication Hub** (Priority: High)
    - Chat-First Workspace: Real-time, role-sensitive chat interface (web-based).
    - Threaded Conversations: Structured by event (e.g., Vessel #, Gate #) and user group.
    - File and Image Sharing: Attach incident photos, PDFs, docs directly to threads.
  - **Data Ingestion & Visualization** (Priority: High)
    - Structured/Unstructured Data Parsing: Import event logs, emails, .txt, and photos for context.
    - Real-Time Event Feed: Unified, filterable timeline for all operational events.
    - Visual Alerts: Color-coded notifications and urgency tags.
  - **Permissioning & Role Management** (Priority: Medium)
    - Role-Based Access: Different information/controls for managers, terminal staff, truckers, etc.
    - Audit Log: Full, exportable record of interactions and changes.
  - **Admin & Setup** (Priority: Medium)
    - Simple Admin Portal: Invite users, manage permissions, configure notification preferences.
    - API Connectors: Lightweight, REST-based connectors for event data and IoT sensor feeds (if available).
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## User Experience

### Entry Point & First-Time User Experience (Not important for PoC)

- Users receive a personalized email or SMS invite to access the HelmStream web app.

## Ellis Island



- On first login, users are guided through a brief onboarding: role selection, notification preferences, and tips for chat/interactions.
- Walkthrough overlay highlights AI-generated updates and starting a new chat/thread.

## Core Experience

- **Step 1:** User lands on a unified dashboard displaying active conversations and recent operational events.
  - Clean, minimal UI; event urgency and unread chat summaries are visually prioritized.
- **Step 2:** User receives or sends messages (e.g., logs incident, asks status).
  - Chat validated for role permissions, key event tagging is suggested automatically.
  - Attachments are scanned for format and flagged for action.
- **Step 3:** Copilot agent proactively posts updates (e.g., “Berth 4 arrival delayed 30 minutes”) to relevant threads and direct messages.
  - AI posts suggested next steps (“Notify affected truckers,” “Re-route yard crew?”).
- **Step 4:** Users search/filter event and chat history; download summary reports.
  - Fast type-ahead search across structured/unstructured text, filterable by date/event.
- **Step 5:** Admins audit all activity, configure roles, extract event and comms logs.

## Advanced Features & Edge Cases

- Power-users can label recurring issues (“gate congestion”) for pattern detection.
- Notify users of failures in agent update delivery or issues parsing uploaded data.
- Support offline and low-connectivity workflows (auto-sync upon reconnect).
- Flag and escalate unusual system events or AI “low confidence” status.

## UI/UX Highlights

- High color contrast and large tap targets for port environment visibility/emergency use.
- Mobile-first, responsive layout for on-the-go users (truckers, yard staff).
- ADA accessibility: keyboard navigation, high-contrast mode, screen reader support.
- Tightly controlled notification/alert frequency to minimize noise without missing emergencies.

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## Narrative

In the heart of a busy US container port, Operations Manager Maria faces another day of high-stakes unpredictability: vessels delayed by weather, trucks backed up at gates, and terminal teams struggling to coordinate efforts across long email chains and phone calls. As



berthing schedules shift and fresh issues pop up, she opens the HelmStream dashboard, where Copilot's AI agent is already aggregating updates—flagging that Vessel Jupiter's ETA moved, alerting all relevant teams in seconds, and recommending next steps. In one thread, a terminal supervisor shares a photo of an equipment jam; in another, a dispatcher gets a real-time alert to reroute trucks, minimizing idle time.

Instead of fragmented updates or waiting for emails, every stakeholder—port authority, shipping lines, dispatcher, and trucker—converges in a shared, role-aware chat. Copilot's agent tracks changes, prompts users proactively (“Delay flagged, notify next shift?”), and keeps everyone's priorities aligned without anyone getting lost in the noise. Maria quickly audits the situation, sends an all-clear message, and knows that, for the first time, the port's major events and subtle issues are documented and actionable in one space.

By the end of the shift, the port authority sees not only a reduction in wasted time and confusion, but a real boost in teamwork and morale. HelmStream has brought clarity and composure into the American port's most chaotic hours—just in time for tomorrow's challenges.

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## Success Metrics

### User-Centric Metrics

- User activation/retention rates across roles (tracked via login and chat activity)
- User-reported satisfaction/NPS post-pilot
- Number of unique events/actions taken per user/session

### Business Metrics

- Operational savings (time, cost) validated by port authority data (the most important one)
- Number of communication handoffs reduced per shift (high priority)
- PoC expansion interest from additional US port customers

### Technical Metrics

- API/data ingestion success rate (>95%)
- Chat/agent message delivery accuracy
- Platform uptime and average event update latency

### Tracking Plan

- Chat messages sent/received by role and thread
- Number of agent-generated updates/actions



- Time from event ingestion to user notification
  - User engagement with recommendations (accept/dismissed/actioned)
  - New user invitations, activations, and role changes
  - File uploads and incident reports attached
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## Technical Considerations

### Technical Needs

- Python-based backend for agent logic, chat orchestration, and data ingestion.
- Simple, responsive web frontend (React(?)) optimized for chat and dashboards.
- LLM/API agent to process, summarize, and generate proactive updates.
- Lightweight REST APIs for event ingestion and third-party integrations.
- Modular data model supporting structured (event logs) and unstructured (chat, docs, images) data.

### Integration Points

- Event/incident feeds from existing US port and TOS systems via REST or CSV drop (for PoC).
- Potential IoT sensor or GPS tracking feeds (if available at pilot port - for the future iteration).
- Email/document ingestion for unstructured updates.
- Third-party chat or workflow (optional for PoC, designed as future extensibility).

### Data Storage & Privacy

- AWS-native managed database for structured event and chat storage (PoC scale).
- S3 for file/image uploads; role-based permissions for sensitive docs.
- Basic user and message encryption in transit and at rest.
- US-based data residency and compliance with applicable CISA/NIST standards for public infrastructure and privacy.

### Scalability & Performance

- Designed for 100–200 concurrent users and hundreds of events/day for PoC.
- Low-latency delivery of AI-generated updates (<2 min target).
- Modular infrastructure for easy scaling in post-PoC deployments.

### Potential Challenges

- Integration friction with diverse/legacy port data systems.
- Incomplete or inconsistent data for structured AI updates.



- User access issues due to restrictive port IT/network policies.
  - Ensuring accessibility/mobile performance in variable field conditions.
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## Milestones & Sequencing

### Project Estimate

- **Medium:** 2–4 weeks for robust proof-of-concept

### Team Size & Composition

- **Small Team:** 2–3 people moving fast (Product Lead, Full-Stack Engineer, part-time UX)

### Suggested Phases

#### Phase 1: Discovery & Scoping (2–3 days)

- Key Deliverables: User interviews, requirements validation, data feed mapping (Product Lead)
- Dependencies: Stakeholder access, sample port event data

#### Phase 2: Rapid Prototype (1 week)

- Key Deliverables: Live web app (basic chat UI), agent update handler, first demo with mock data (Engineer)
- Dependencies: Initial user feedback, dummy data feeds, AWS sandbox

#### Phase 3: Data Integration & Live Pilot (1 week)

- Key Deliverables: Connect to real port event data, role-based access enabled, AI agent generating updates in live setting (Engineer, Product)
- Dependencies: Access to pilot port's data feeds/systems

#### Phase 4: User Testing & Feedback (3–5 days)

- Key Deliverables: User feedback synthesis, issue fixes, PoC review session (Product, UX)
- Dependencies: Pilot users engaged and trained

#### Phase 5: Wrap-up & Success Criteria Review (2 days)

- Key Deliverables: Summary report (usage, metrics), expansion recommendations (Team)



- Dependencies: Analytics, final interviews
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To Build:

#### Front End

1. Dashboard to view concurrent and forthcoming activities
2. AI chat agent interface/chatbot
3. Historical log of ship activities
4. Display documents related to ship activities
5. Alerting and financial/operational implication

#### Back End

1. Agentic AI which triggers workflows (Abhishek)
2. RAG Chat API which gathers info from gmail (Abhishek)
3. File storage
4. Check lang graph integration to customize agent workflows (Abhishek)

#### Others:

1. Pitch Deck (Yuta and Anand)
2. Narrative (Scenarios for the email communications with the relevant actors)
3. Hosting
4. GitHub

#### Judging Criteria:

1. Technical Innovation & Implementation (40%)
  - Effective use of Amazon Bedrock's capabilities and foundational models
  - Solution architecture quality and scalability
  - Integration of AWS best practices and security considerations
  - Technical complexity and completeness of implementation
2. Business Impact & Market Viability (30%)
  - Clear problem-solution fit within chosen industry track
  - Potential market impact and scalability
  - ROI and cost-effectiveness of the solution
  - Alignment with real-world enterprise needs
3. User Experience & Production Readiness (30%)
  - Interface design and user journey clarity
  - Solution reliability and performance
  - Documentation quality and deployment readiness



- Presentation and demo effectiveness

Flow:

- Cargo value:  $\$50,000 / \text{TEU} \times 12,000 - 24,000 \text{ TEU} = \$600M - 1200M$  (TEU = 1 container)
- Ship B:  $\$10,000 - 30,000$  (fuel + human cost + etc)
- Time: 24 - 36hrs

Engine trouble on ship A -> ship A needs to change their voyage schedule -> our software captures ship A delay -> uses this information to trigger new arrival information to ship B + new operational duties to crane operator

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## Business strategy

### Stakeholder Analysis

HelmStream's stakeholder engagement strategy follows a tiered approach based on revenue potential and operational criticality:

#### Manage Most Thoroughly (\$\$\$)

- **Local Agent:** Primary revenue driver and key operational coordinator. Agents benefit most from unified communication and real-time visibility across all port activities. They are willing to pay premium pricing for tools that reduce coordination overhead and improve client satisfaction.
- **Terminal Operator:** Critical infrastructure partner with direct control over berth allocation and cargo handling. Terminal operators see immediate ROI through improved asset utilization and reduced dwell times. Strong relationship management required for data integration and operational buy-in.

#### Anticipate and Meet Needs (\$\$)

- **Ship Operator/Owner:** Significant revenue opportunity but typically operate through agents. Focus on demonstrating value through reduced delays and improved schedule reliability. These stakeholders require proactive updates and clear visibility into port operations affecting their vessels.

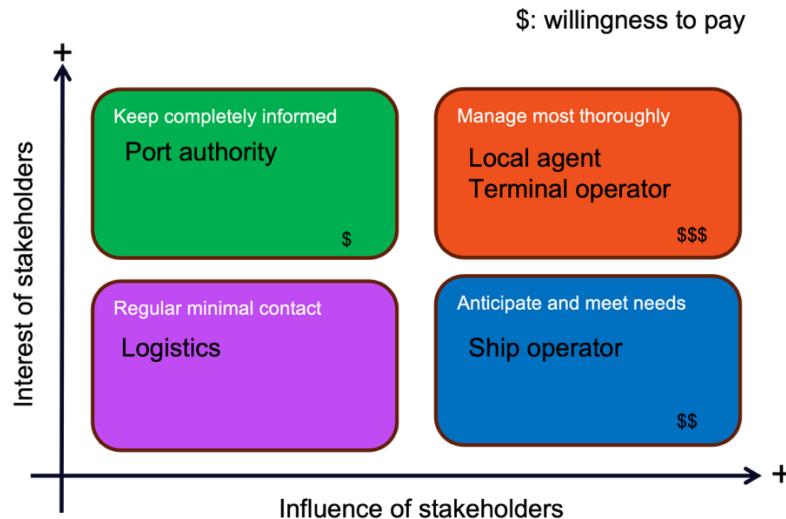
#### Keep Completely Informed (\$)

- **Port Authority:** Regulatory oversight and coordination role. While not direct revenue generators, port authorities influence adoption decisions and can mandate platform usage across their ports. Maintain transparent communication and provide comprehensive reporting capabilities.

#### Regular Minimal Contact (N/A)



- **Logistics Partners/Truckers:** End users who benefit from the platform but typically don't pay directly. Ensure their needs are met through the paying stakeholders. Focus on ease of use and clear value delivery to maintain ecosystem health.



## Value Proposition

HelmStream delivers compelling ROI across different deployment scales:

Items	PoC	10 ports
<b>Cost</b>		
OPEX	\$50k	\$500k
CAPEX	\$100k	\$500k
<b>Revenue</b>		
Agent / Ship owner	\$175k	\$1.75M
Terminal operator	\$100k	\$1M
Port authority	\$50k	\$0.5M
<b>Total</b>	<b>\$500k</b>	<b>\$5M</b>
<b>ROI</b>	<b>233%</b>	<b>400%</b>

### Key Value Drivers:

- **For Agents/Ship Owners:** Reduce communication overhead by 75%, eliminate phone tag, improve client satisfaction through proactive updates



- **For Terminal Operators:** Reduce vessel dwell time by 10%, optimize berth utilization, improve crane and yard equipment scheduling
- **For Port Authorities:** Enhanced situational awareness, improved safety through better coordination, data-driven decision making
- **Platform-wide:** Real-time operational visibility, reduced delays, improved stakeholder coordination, comprehensive audit trails

## Competition and Differentiation

### Competitive Landscape:

#### 1. Legacy Terminal Operating Systems (TOS)

- Strengths: Deep integration with existing infrastructure, established relationships
- Weaknesses: Siloed data, poor cross-stakeholder communication, limited AI capabilities
- Our Advantage: We complement rather than replace TOS, providing the coordination layer they lack

#### 2. Maritime Navigation Platforms

- Strengths: Vessel tracking, AIS data integration, global coverage
- Weaknesses: Limited port-side integration, no multi-stakeholder coordination, reactive rather than proactive
- Our Advantage: Focus on operational coordination and AI-driven insights, not just tracking

#### 3. Emerging AI Startups

- Strengths: Modern technology stack, AI-first approach
- Weaknesses: Limited maritime domain expertise, no established port relationships, immature products
- Our Advantage: Domain expertise combined with proven AWS infrastructure

### Why AWS/Why Us:

#### AWS Platform Advantage:

- **Ubiquitous Infrastructure:** Most US terminals indirectly use AWS platforms, including on-premises information systems. This reduces integration friction and accelerates deployment.
- **Amazon Connection:** AWS has a strong and direct connection with Amazon, the largest logistics company in the world. This provides both credibility and potential partnership opportunities for market expansion.
- **Proven Scalability:** AWS infrastructure can scale from a single port PoC to global deployment without architecture changes.
- **Security and Compliance:** Built-in compliance with NIST and CISA standards critical for port infrastructure.

#### Our Unique Position:

- Deep maritime industry expertise from team members with operational experience
- AI-first architecture built on proven AWS/Bedrock technology



- Focus on coordination and communication, not competing with existing systems
- Rapid deployment model (3-month PoC timeline vs. 12+ months for legacy vendors)

## Go-to-Market Strategy

HelmStream follows a deliberate, proof-driven expansion strategy:

### Phase 1: PoC - NY/NJ Port (3 months)

- **Why NY/NJ:** Largest port on the East Coast with complex stakeholder ecosystem. Fastest PoC potential with shortest stakeholder cycle. High visibility for success stories and press coverage. Strong AWS infrastructure presence.
- **Objectives:** Validate core value proposition, achieve 10% dwell time reduction, secure 3+ paying customers

### Phase 2: Boston Port (6 months from PoC completion)

- **Why Boston:** Second proving ground with innovation-friendly culture. Major terminal on East Coast with different operational characteristics. Strong academic and technology ecosystem.
- **Objectives:** Demonstrate repeatability of PoC success, refine product for different port types

### Phase 3: Long Beach Port (1 year from PoC completion)

- **Why Long Beach:** Largest container terminal in the US. Critical validation point for enterprise scalability. Gateway to Asian trade routes.
- **Objectives:** Prove enterprise-scale capability, achieve marquee customer status

### Phase 4: Japan & Korea Markets (2 years from PoC completion)

- **Why Japan/Korea:** Strong maritime countries with sophisticated port operations. AWS infrastructure already established and mature. Cultural emphasis on operational efficiency aligns with product value. Team has deep connections and language capabilities in these markets.
- **Objectives:** International market validation, establish APAC presence

### Phase 5: Singapore Hub (3 years from PoC completion)

- **Why Singapore:** Global lighthouse port with world-class operations. Export to global standard and credibility. Strategic gateway to Southeast Asia and global markets. Government support for digital innovation in maritime sector.
- **Objectives:** Establish as reference implementation for global deployment

**Revenue Model:**

- Initial deployment: Project-based pricing (\$100k-250k per port setup)
- Recurring revenue: SaaS subscription based on user seats and transaction volume
- Enterprise tier: Custom pricing for multi-port operators
- Target: 50% gross margins by Year 2, 65% by Year 3

1	NY/NJ	Fastest PoC / shortest stakeholder cycle	3M
2	Boston	Second proving ground / innovation friendly	6M
3	Long beach	Highest throughput container ops	1Y
4	Japan / Korea	Strong maritime country / AWS infra ☺	2Y
5	Singapore	Global lighthouse / export to global standard	3Y