DATIFEX™

MADE IN CANADA

ONEHARBOUR™

Enhanced Marine Domain Awareness

ClearSeas – Beyond the Horizon Webinar

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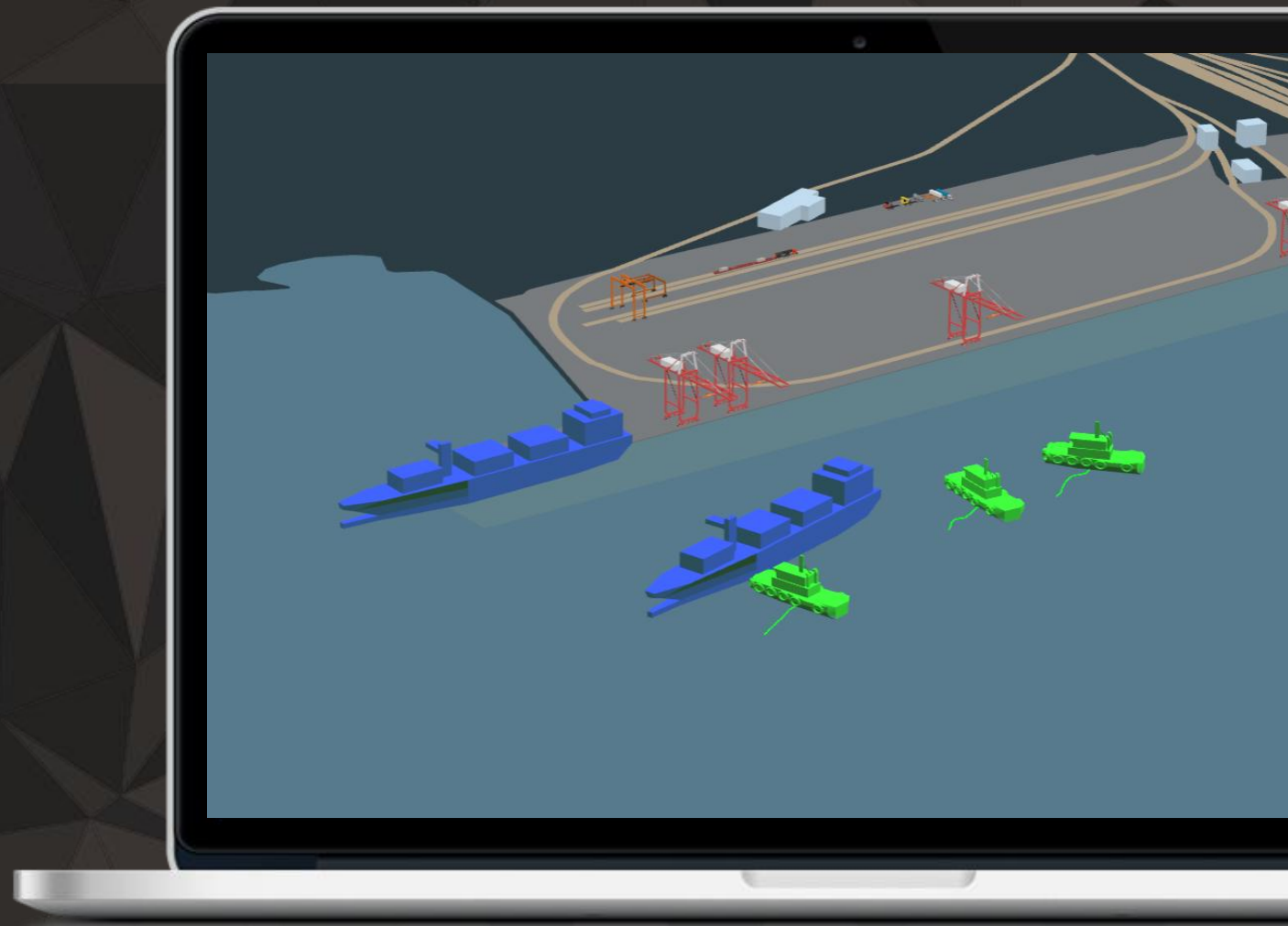


Today's Agenda

- Welcome by Clear Seas
- Genesis of the Port Halifax Operations Centre
- About Datifex
- Demonstration of OneHarbour
- Overview of the process, challenges, and lessons learned
- Q&A

DATIFEX™

“Datifex will revolutionize our safety practices while improving our operational output”

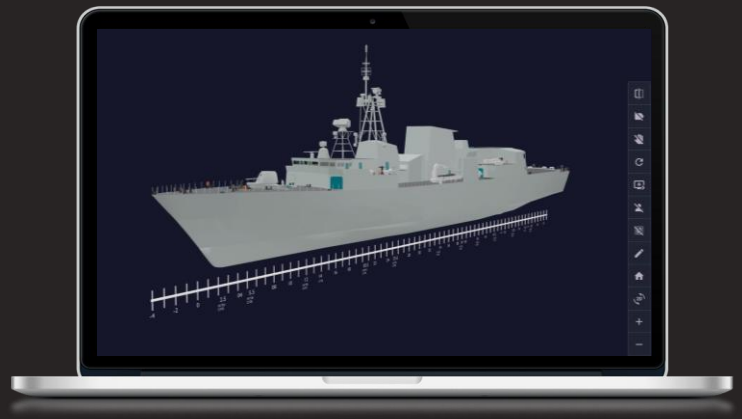
Commander Meredith
FMF Cape Breton
Royal Canadian Navy

DATIFEX™

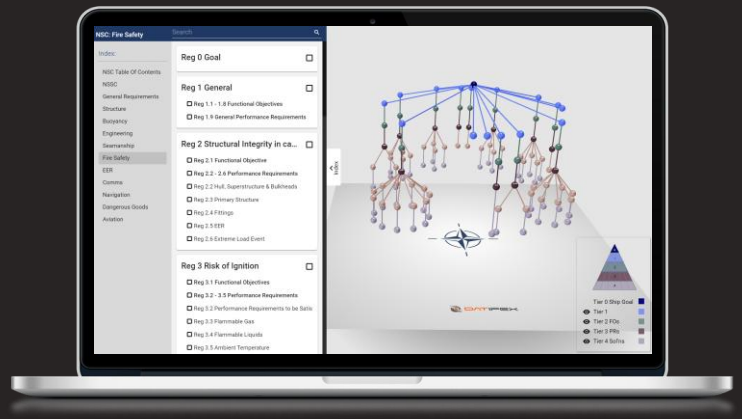
DATIVERSE™

A platform for digital twins and industrial metaverse solutions.

Harbour &
Dockyard Operations



Complex Asset
Management



Training, Certification, &
Classification

Port Halifax

Objective:

HPA is focused to be postured to sustain 24/7 monitored Port Operations

LINES OF EFFORT

PMIS "Port Control" installation

Develop HR Job Description for POC Operator

Develop POC Operator Procedures, Battle Rhythm & Establish Delegation of Authorities

Access to current active and passive sensors thru Non-HPA Partners ie; radar, Web based & VHF AIS, e-Chart Display, bridge sensors, e-tides and currents etc;

SAAB PMIS training and Port Operations Indoctrination Training to new Staff

Determine level of Technical Support for 24/7 Operations

Centre of Gravity

- **Port Control SAAB PMIS Operational**
- **DHM POC Directives & Procedures**
- **Data Fusion**
- **Trained Staff**

End State:

Optimized 24/7 Port Operations Centre

Port Halifax | Integration Hub

Homepage

Report updated at
9/23/2025 12:47:36

Use the buttons below to link to the dashboards

- Activities
- Movements
- In Port
- Dangerous Goods
- Tidal Predictions
- PSA Vessel Schedule

0 Special Weather Warning in Effect

Check Weather Warning

Current Weather: Halifax Updated at: 9/23/2025 12:00:00 PM

Mostly Cloudy

Temperature (°C): 19.6

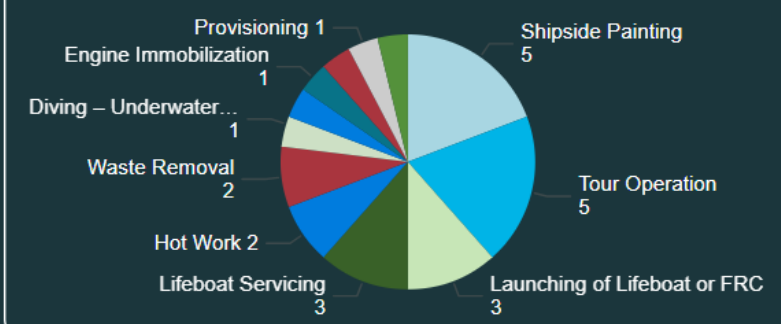
Visibility (km): 24.1

Wind Speed (km/h)	Wind Gust (km/h)	Wind Direction	Pressure (kPa)
19	--	W	101.6

Vessel Movements (next 96hrs)

46

Activities (next 96hrs)



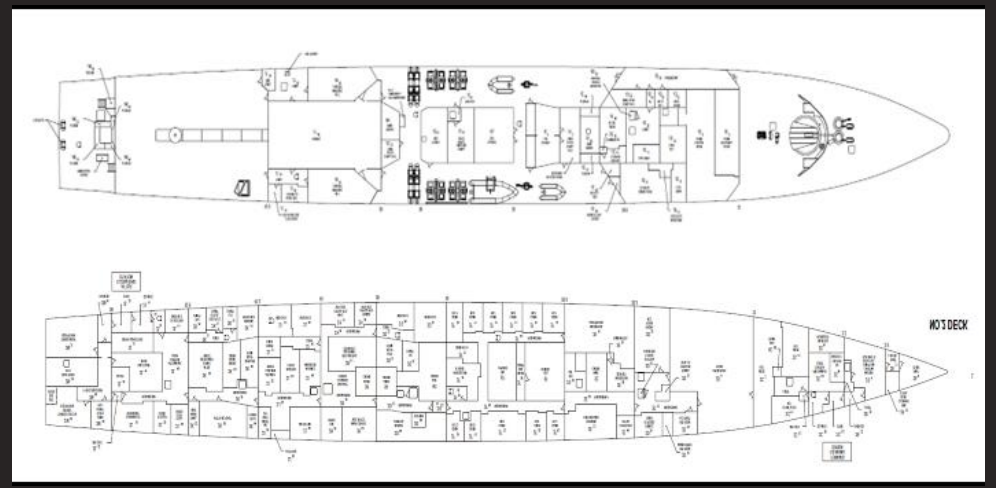
Vessels in Port

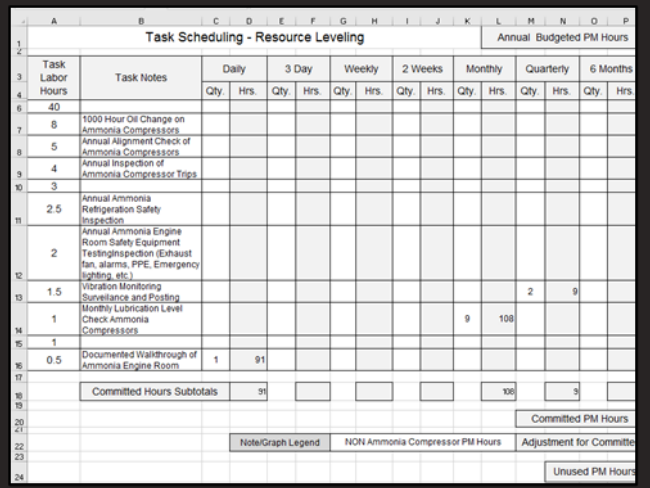
Ship	Berth	ETD
ALGOSCOTIA	OT-B27	9/22/2025 18:00:00
ALGOMA EAST COAST	IRVING OIL	9/22/2025 23:00:00
MSC BARCELONA	SECT-B41	9/23/2025 13:30:00
MAJESTIC PRINCESS	ST-B22	9/23/2025 17:00:00
VOLENDAM	ST-B20	9/23/2025 18:00:00
RONJA CARRIER	OT-B26	9/24/2025 12:00:00
MSC SANTHYA	OT-B31	9/25/2025 18:00:00
Derrick No. 4	WOODSIDE	10/15/2025 08:00:00
Mighty Edge	B29	11/11/2025 12:00:00
Poseidon Barge	B29	11/11/2025 12:00:00
Ocean Seeker	COVE	4/5/2026 00:00:00
J.G Burke	WOODSIDE	8/21/2026 00:00:00
McNally Flat Scow #1	WOODSIDE	8/21/2026 00:00:00
PITTS NO 2	WOODSIDE	8/24/2026 01:00:00
PITTS NO 1	WOODSIDE	8/28/2026 01:00:00

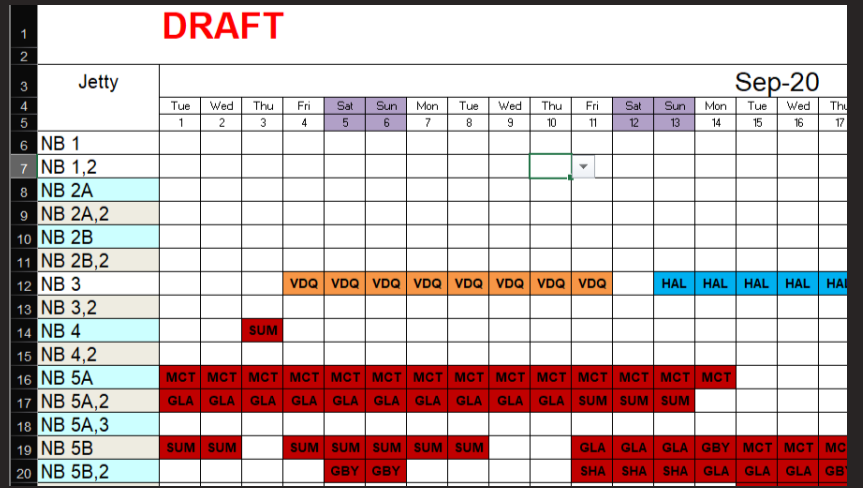
DATIFEX™

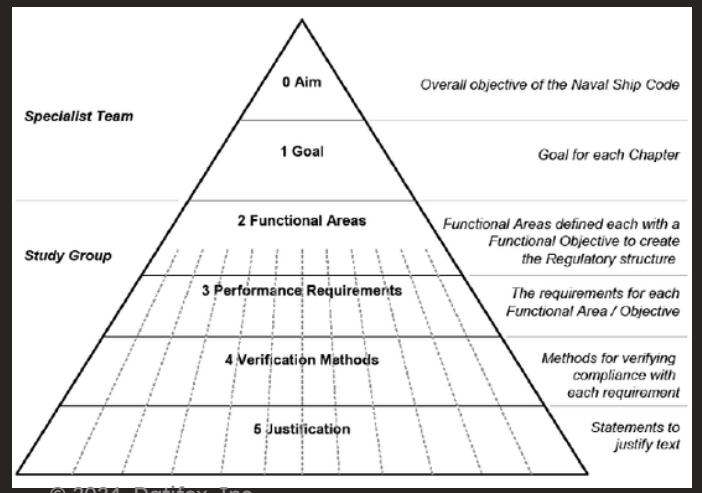
The next generation Engagement System

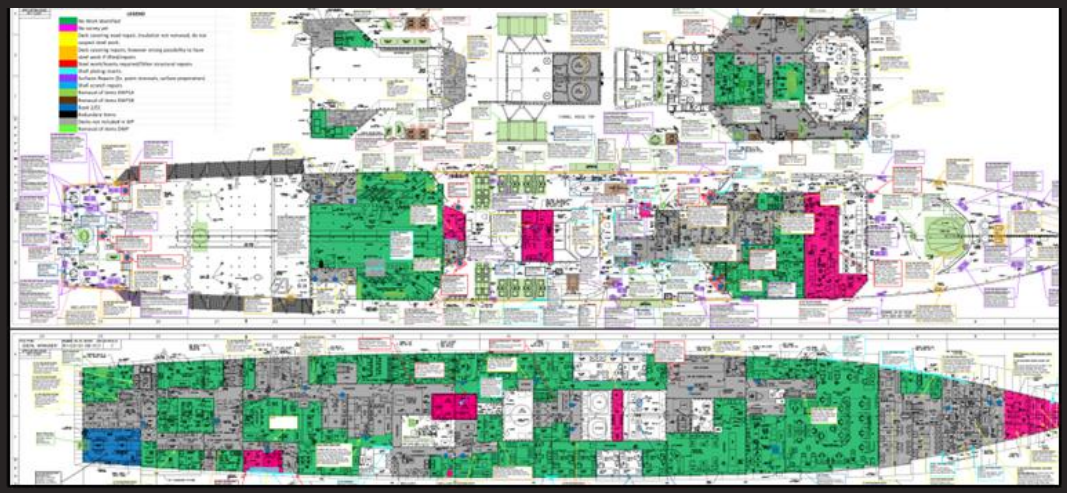
Taking data like this…





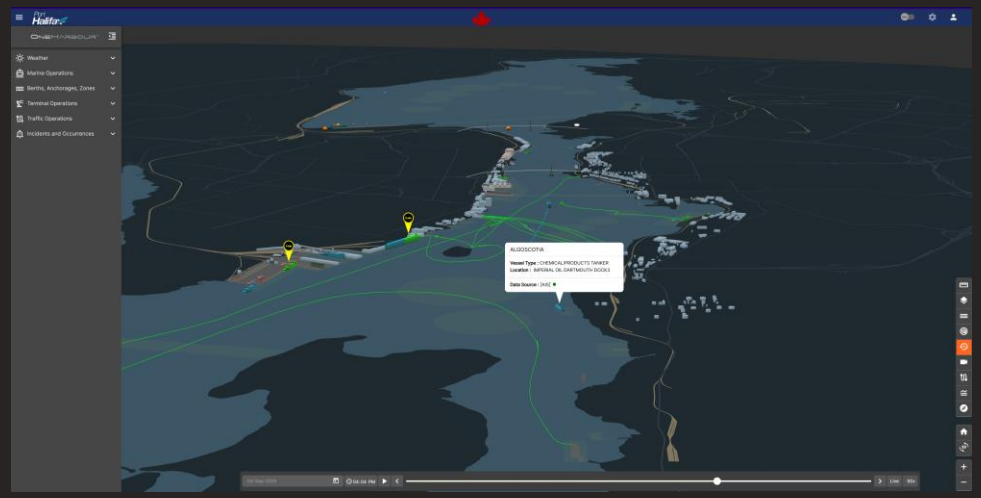






Creating the Venue: Halifax Harbour

- Developed an interactive 3D model of Halifax Harbour, covering terminals, berths, anchorages, and infrastructure for real-world operational accuracy.
- Provided intuitive navigation (zoom, pan, tumble, select) and saved camera views for efficient situational awareness.
- Integrated geospatial data (QGIS, NSHN, CHS) and satellite imagery to ensure precise terrain and coastline representation.
- Enabled users to upload KMZ files for custom operational zones, supporting dynamic evaluation and monitoring.
- Scalable platform design allows rapid deployment to additional ports (e.g., Port Saint John, Esquimalt Harbour).



Tracking the Objects: Unified Harbour Activity

- The goal is fused AIS, radar, and computer vision data for real-time and historical vessel tracking, enhancing visibility of both large and small vessels.
- Integrated Port Information Management System for live scheduling, berth assignments, and operational context.
- Visualized environmental data (wind, wave, tide, temperature) from multiple sources directly in the harbour scene.
- Incorporated live camera feeds and automated status updates for assets (cranes, vessels, sensors).
- Supported forensic review and incident analysis with historical playback and event logs.

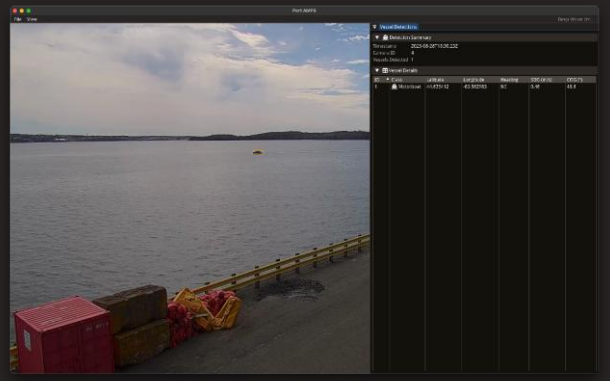
Tracking Vessels: Computer Vision

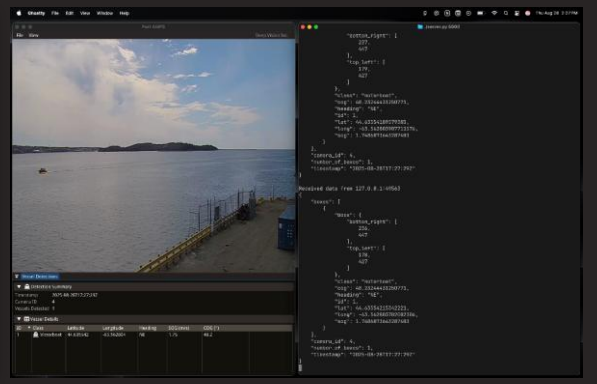
- Camera Deployment: Three Hanwa XNV-9082R cameras are currently installed—one at Shed 26 and two at NSCC Ivany Campus—with a fourth pending installation at the Halifax Ferry Terminal.
- Deep Vision's Autonomous Maritime Persistent Surveillance (AMPS) Capabilities: AMPS can run on edge devices or process data centrally if the video stream meets required frame rate and bitrate thresholds.
- Detection Output: Each frame generates a structured JSON payload containing vessel metadata including latitude/longitude, Speed over Ground (SoG), and Course over Ground (CoG).
- Confidence Visualization: Tracks visualized in OneHarbour and those with lower confidence (e.g., computer vision) are rendered in yellow, indicating uncertainty in classification or tracking continuity.
- Current Status: The system is in the footage recording and algorithm testing phase. Live testing is pending final network connectivity to enable real-time data flow and alerting.

View from PTZ Camera at Shed 26

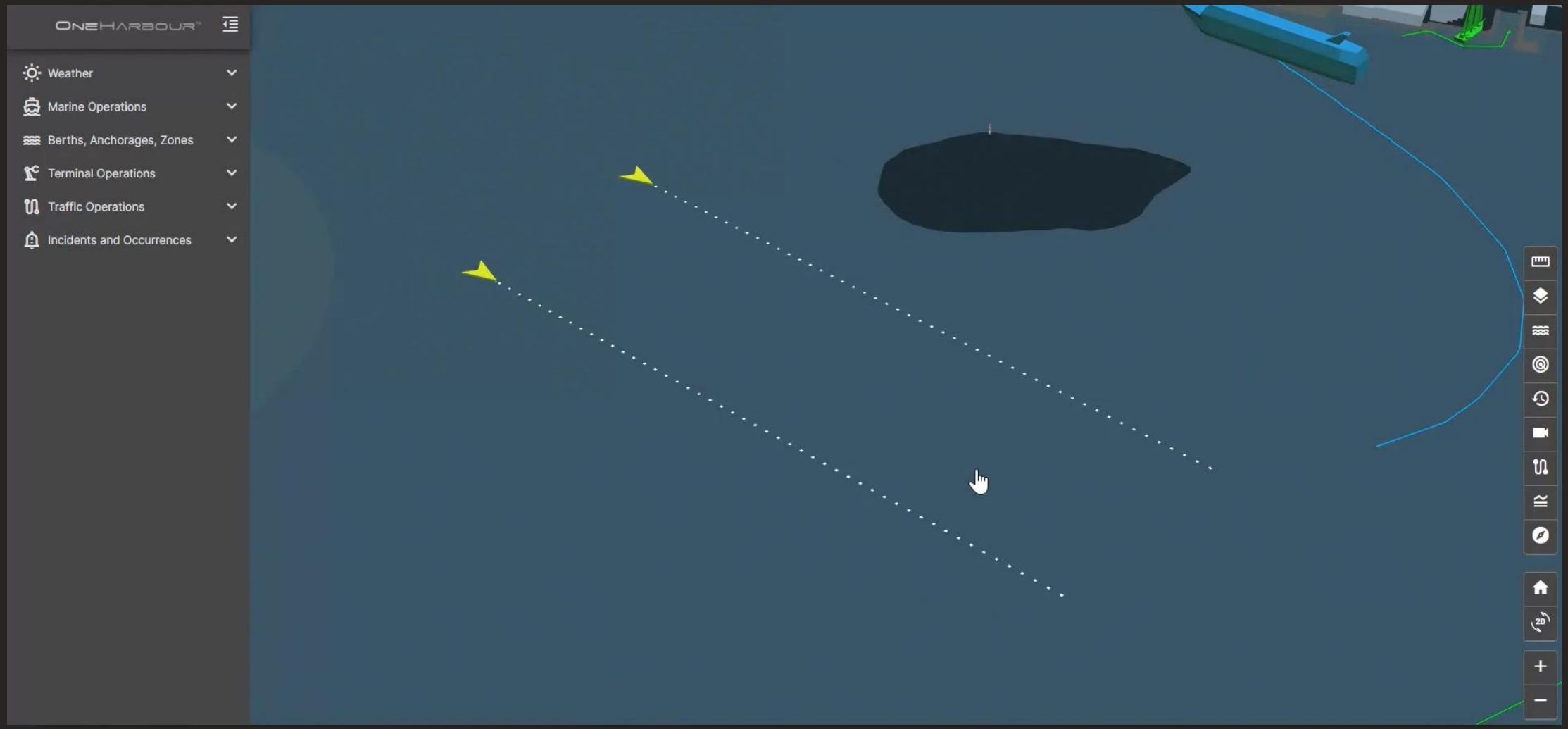
South Camera at NSCC

North Camera at NSCC



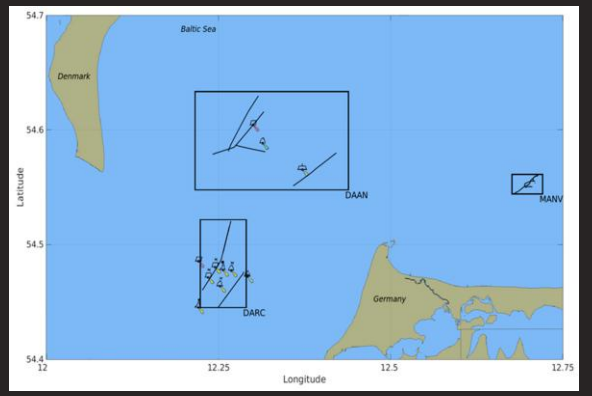


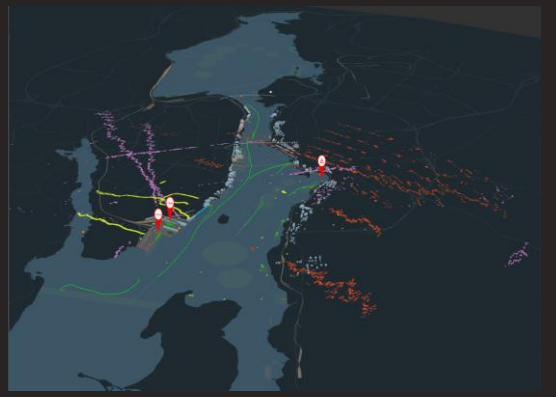
Tracking Vessels: Computer Vision

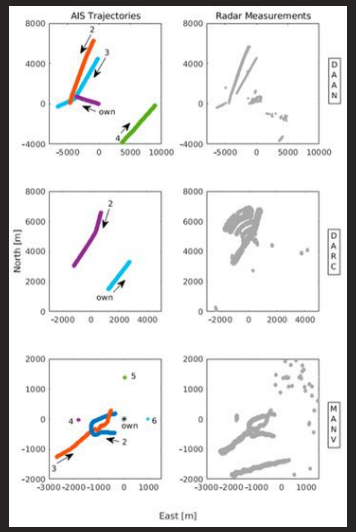


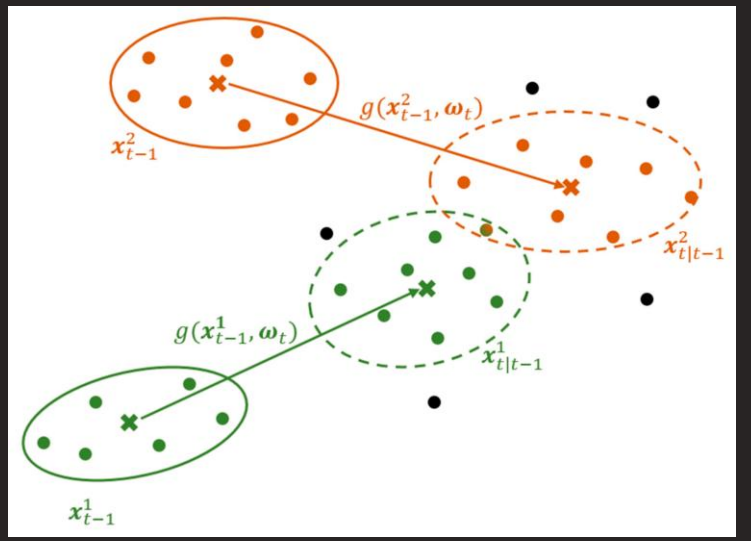
Tracking Vessels: Radar

- Raw radar detections were received in JSON format (polarMeas.json), containing range and azimuth values per time step.
- Datifex converted polar coordinates to Cartesian (East/North) to enable spatial clustering and visualization.
- Applied DBSCAN clustering to identify vessel-like blobs and filter out noise such as sea clutter.
- Calculated cluster metrics (centroid, radius, density) and matched clusters to AIS data from reference.csv to label known vs unknown targets.
- Final output was saved in processed_radar_data.json, ready for playback, visualization, and tracking analysis.

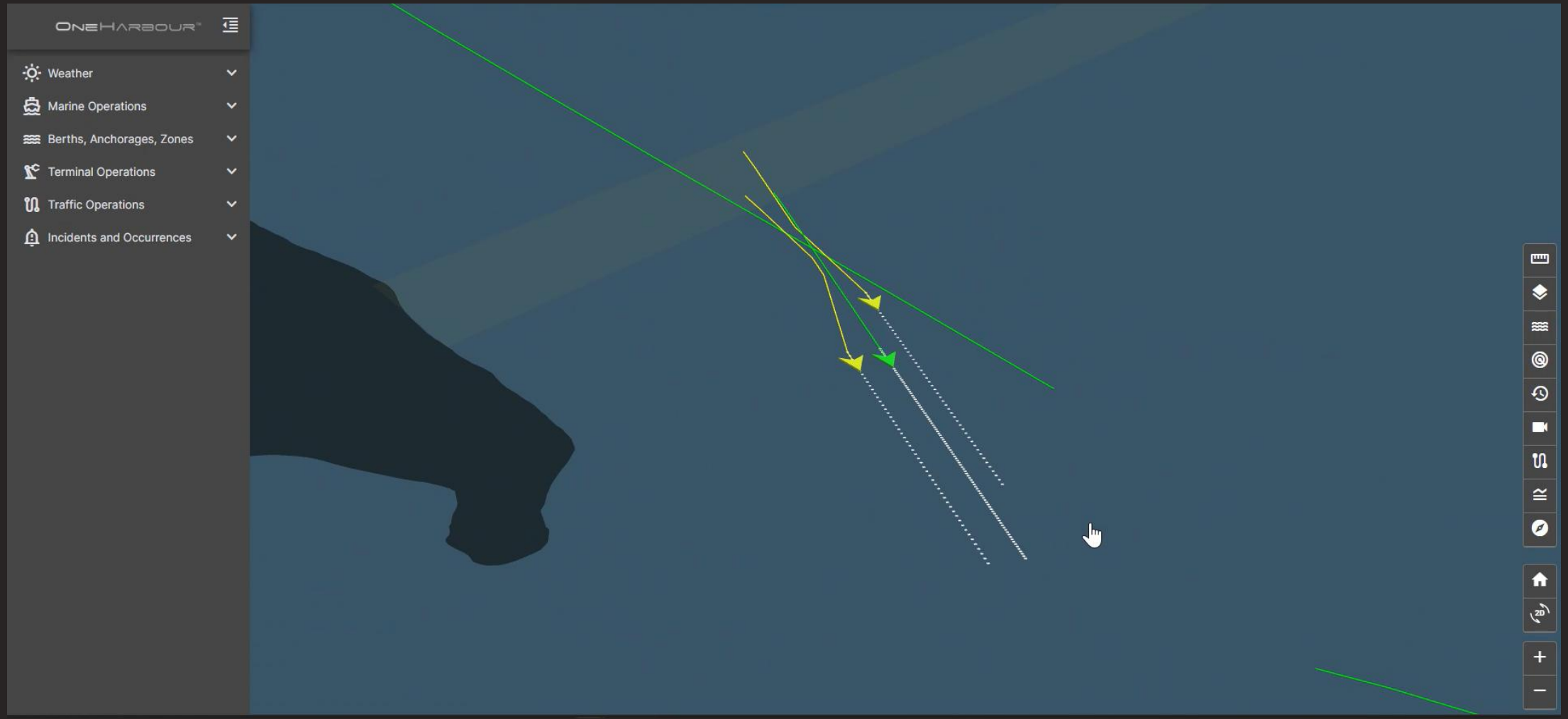








Synthesizing the Data: AIS, Computer Vision, and Radar

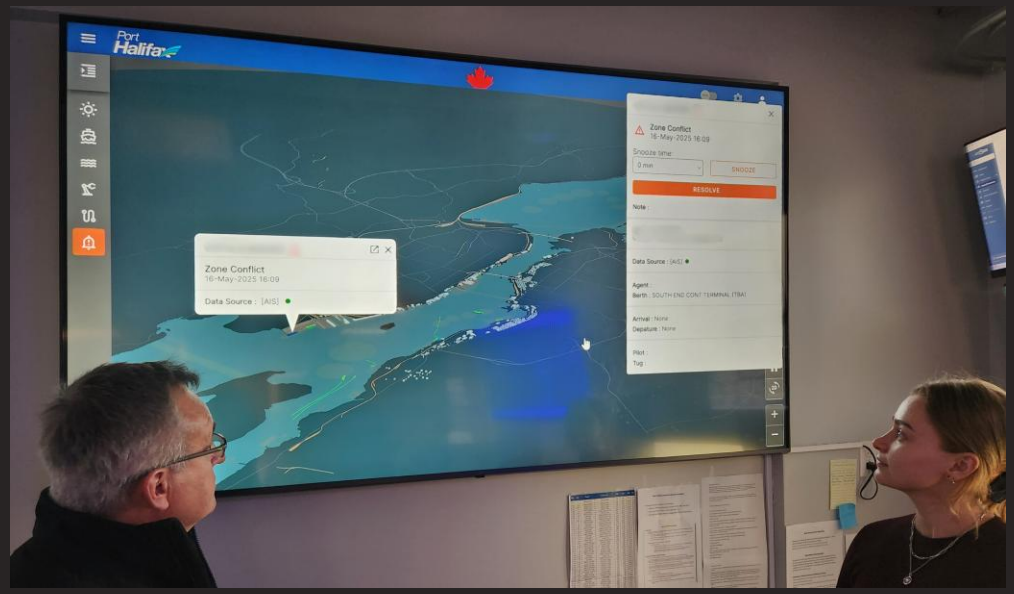


Applying the Logic: Automated Alerts

- Implemented event-driven logic for vessel location confidence, unauthorized movements, AIS signal loss, and restricted zone intrusions.
- Automated High Air Draft Vessel (HADV) bridge transit alerts using real-time calculations of air gap, tide, and vessel dimensions.
- Deployed predictive collision detection using real-time vessel data, spatial calculations, and dynamic safety zones.
- Real-time environmental condition alerts (wind >35 knots, wave >2m) linked to sensors and vessels for operational safety.
- All alerts and events are logged, searchable, and exportable for reporting and compliance.

Lessons Learned and Best Practices

- Spent extended time with OPCEN Officers and Coordinators to capture direct user feedback and benchmark against industry tools for continuous improvement.
- Built cross-agency data-sharing agreements with Government of Canada departments and security stakeholders to enable collaboration and broader adoption.
- Identified absence of unclassified radar data in Canada as a barrier to testing, innovation, and operational integration.
- Treated hardware deployment as both a technical and relationship-building process to ensure long-term access and reliability.
- Showcased how collaboration across companies and technologies creates a scalable model for real-time operational awareness.



Phase 2 & Further Development

- Providing increased visibility into operations while vessels are alongside
- Access to real-time radar data, partnering for multi-sensor fusion
- Minor capital project implementation with Royal Canadian Navy
- In discussion with PIMS providers, Port Nanaimo and Port Vancouver
- Expressed interest from Canadian Coast Guard and Parks Canada