

Hackathon Problem Statement

1 Title

AI-Driven Real-Time Maritime Voyage Risk Intelligence for Marine Insurance

2 Background / Context

Global maritime trade routes are becoming increasingly volatile due to **extreme weather, geopolitical conflicts, port congestion, and operational disruptions**. Marine insurers rely heavily on **static historical data and manual underwriting judgment** to price voyage risk and determine insurance premiums.

In major maritime hubs like Dubai — located near critical global shipping corridors such as the **Strait of Hormuz and Red Sea routes** — risk conditions can change rapidly during a voyage. However, insurers lack unified tools that combine real-time vessel movement, weather data, maritime incidents, and operational signals to dynamically assess risk.

As a result:

- Insurance premiums may not reflect actual voyage risk
- Underwriters make decisions with limited real-time visibility
- High-risk voyages may be underpriced
- Loss ratios increase
- Response to emerging threats is delayed

Marine insurers, shipping companies, and logistics operators need **real-time risk intelligence** to make informed underwriting and operational decisions.

3 Problem to Solve

Participants need to:

Build or design an AI-powered maritime risk intelligence system

That helps **marine insurers and maritime operators assess voyage risk dynamically**

By solving **the lack of real-time, data-driven risk assessment for vessel routes**

The system should be able to:

- Analyze vessel routes and movement data

- Integrate environmental and operational risk factors
- Generate a dynamic risk score for a voyage
- Identify key risk drivers
- Detect abnormal vessel behavior or route deviation
- Provide explainable insights for decision-making

Objectives

Participants should aim to:

- ✓ Improve real-time maritime risk visibility
- ✓ Reduce uncertainty in voyage risk assessment
- ✓ Enable data-driven underwriting and route monitoring
- ✓ Deliver actionable insights through AI-powered predictions and visualizations

5 Scope & Constraints

In Scope

Participants may build solutions that include:

- Voyage risk scoring models
- Geospatial risk visualization (maps / heatmaps)
- Time-series risk prediction
- Anomaly detection for vessel behavior
- Explainable AI insights
- Interactive dashboards

Technologies Allowed

Participants may use:

- Machine learning models
- Deep learning models
- Geospatial analytics
- Time-series forecasting

- Cloud platforms
- Data visualization tools
- APIs for real-time data integration

Any programming language or framework is allowed.

Data Sources Allowed

Participants may use publicly available maritime datasets such as:

Vessel Movement Data

- MarineCadastre AIS vessel tracking
<https://marinecadastre.gov/ais/>
Contains vessel positions, movement tracks, speed, and routes.

Weather & Ocean Conditions

- NOAA Marine Weather Data
<https://www.noaa.gov/>
Includes storms, wave height, wind, and marine forecasts.

Maritime Incident & Disaster Data

- EM-DAT International Disaster Database
<https://www.emdat.be/>
Historical maritime accidents and environmental events.

Port Traffic & Congestion Data

- UNCTAD maritime statistics
- Kaggle port operations datasets

Maritime Security / Piracy Events

- International Maritime Bureau piracy reports

Participants may combine additional open datasets if properly cited.

Out of Scope

Participants are NOT required to:

- Build production-grade infrastructure
- Integrate directly with insurance company systems

- Develop regulatory compliance solutions
- Provide financial pricing models
- Deploy real-time streaming pipelines

Constraints

- Hackathon duration: as specified by organizers
- Prototype-level solution acceptable
- Public datasets only (unless approved)
- Internet access as per event rules

Expected Deliverables

Teams should provide:

- ✓ Working prototype or functional demonstration
- ✓ Source code repository
- ✓ Architecture overview (system design)
- ✓ Short presentation or demo explaining solution
- ✓ Documentation describing data sources, models, and approach

Optional:

- Model performance evaluation
- Risk scoring methodology
- User interface walkthrough