
# INTERMODAL TRANSPORTATION CRISIS SIMULATION

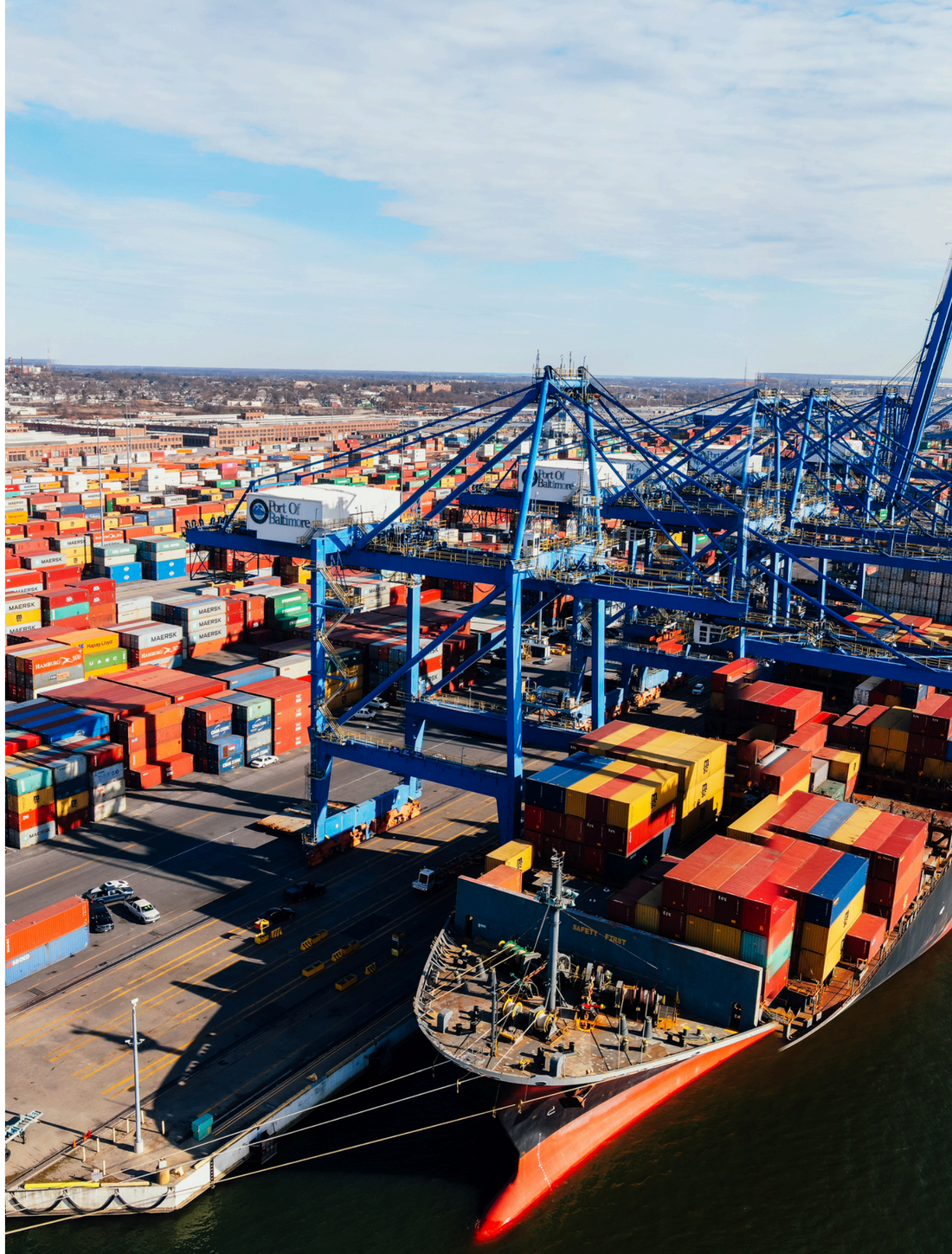
Presented by CantCodeDenSleep

# ABOUT OUR PROJECT

## *Introduction*

In today's fast-paced yet turbulent global supply chains, unpredictable disruptions—whether due to political reasons, extreme weather, epidemic or many unforeseen events—can cause major delays and losses to the transportation industry. Thus, our solution steps in at critical moments to automatically recommend the most cost and time efficient and sustainable rerouting strategies, ensuring the smooth continuation of operations.

Our project leverages cutting-edge AI tools to provide an intelligent, automated solution for identifying the best intermodal transportation methods for regional Crisis. By considering key factors such as cost, transportation time, and stability impact, our AI-powered platform ensures that businesses like PSA can make optimal logistical decisions in real-time, minimising delays and operational costs while adhering to sustainability goals.



# Implementation

## AI-driven solution

To tackle potential  crisies or disruptions, our simulation provides four possible solutions for users to choose from, including an optimal strategy.

## Find optimal alternative

Our simulation evaluates the cost ,time and environmental impacts to recommend the most efficient and sustainable routes in quick response to crisis.

## Multivariable simulation

We are able to run for multivariable simulations in response to the world with more complex supply chain insecurity.

## Response Evaluation

We utilise AI to evaluate the best strategy and offer insights to facilitate business decision making process.

# OUR INNOVATION

**AI decision making**

We leverage AI to streamline the decision-making process, providing immediate insights by analyzing both historical data and potential future crises.

**Port Resilience**

Our real-time data analysis and crisis simulation models enable us to estimate port resilience, which can be used to predict potential crisis and propose precautionary measures.

**Regional Resilience**

Our understanding of port resilience provides a foundation for estimating regional resilience, which is essential for proactive risk management and comprehensive planning

# DEMO 1: Intermodal Transportation Routes Simulation (gif)

## Interactive Regional Intermodal Transportation Map in response to Crisis Simulation


Shipping Controllers

Start | Stop | Restart | Crisis Simulation | Restore All

Sea Speed: 30 km/h

Air Speed: 800 km/h

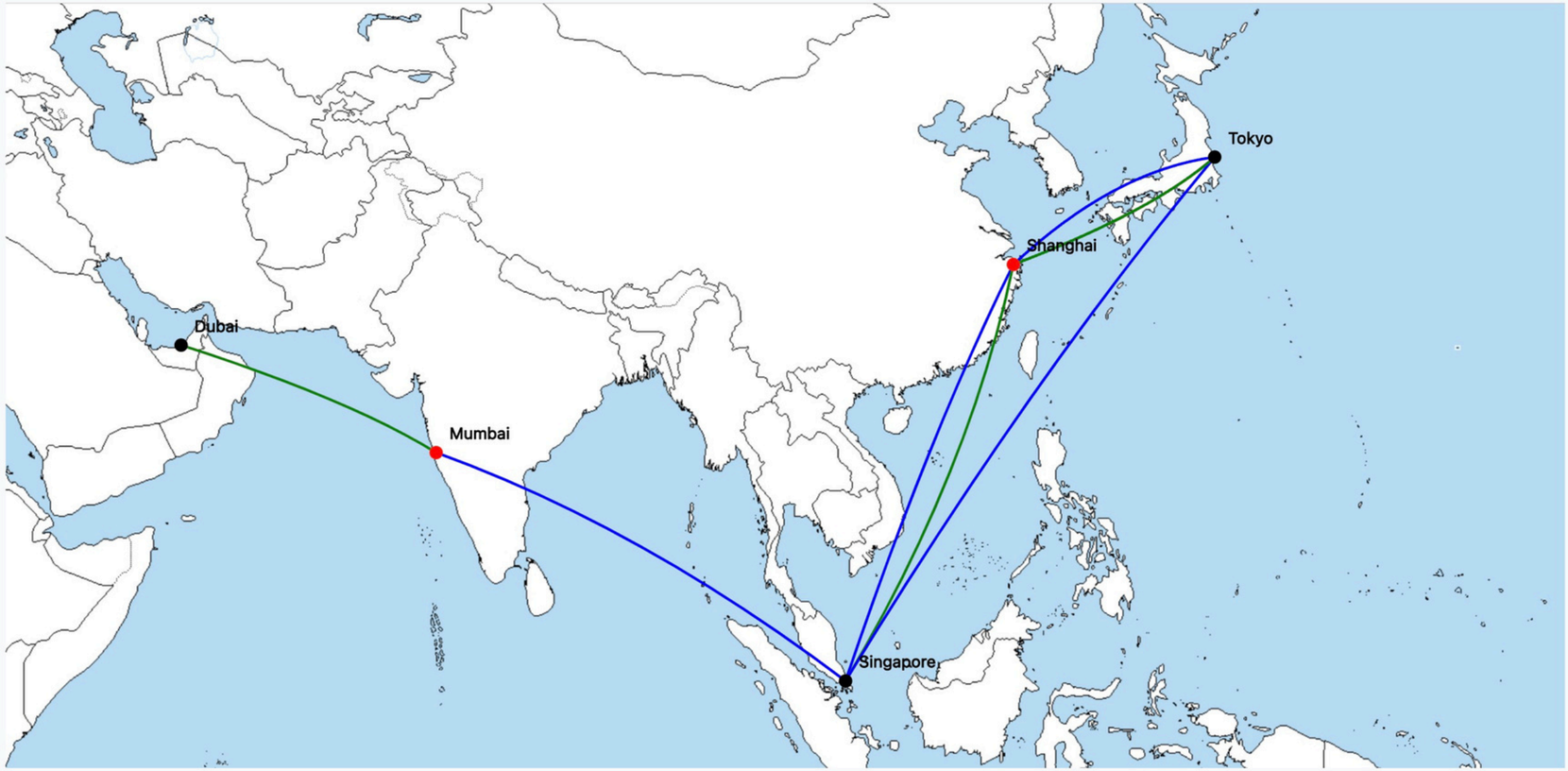
Land Speed: 60 km/h

**Shipping Times:**

Shanghai-Hong Kong-Sea: 4.3 hours
Shanghai-Hong Kong-Air: 0.9 hours
Shanghai-Hong Kong-Land: 4.3 hours
Shanghai-Singapore-Sea: 4.3 hours
Shanghai-Singapore-Air: 1.3 hours
Hong Kong-Singapore-Sea: 4.3 hours
Hong Kong-Singapore-Air: 4.3 hours
Shanghai-Tokyo-Sea: 4.3 hours
Shanghai-Tokyo-Air: 1.4 hours
Tokyo-Singapore-Sea: 4.3 hours
Tokyo-Shanghai-Air: 4.3 hours
Tokyo-Hong Kong-Sea: 4.3 hours
Tokyo-Hong Kong-Air: 2.5 hours
Singapore-Mumbai-Sea: 4.3 hours
Mumbai-Dubai-Air: 3.8 hours

# DEMO 2: Crisis Simulation(gif)

## Interactive Regional Intermodal Transportation Map in response to Crisis Simulation




Shipping Controllers

Start | Stop | Restart | Crisis Simulation | Restore All

Sea Speed: 30 km/h

Air Speed: 800 km/h

Land Speed: 60 km/h

**Shipping Times:**

Simulation of transport involving the city of Hong Kong is destroyed.

1. Consideration: Optimal solution

2. Route: [Shanghai -> Singapore -> Mumbai] by [Sea, Sea]

3. Cost: $3050

4. Time: 736 hours

5. Carbon Footprint: 1544.06 kg

6. Evaluation: This route provides a well-balanced solution considering cost, time, and environmental impact.

# SOLUTION PROVIDE:

## Simulation of the Air transport between Shanghai and Singapore is destroyed.

**Optimal Solution**

1. Consideration: Optimal solution
2. Route: [Shanghai -> Singapore] by [Sea]
3. Cost: $550
4. Time: 336 hours
5. Carbon Footprint: 650.2 kg
6. Evaluation: This solution offers the best balance of cost, time, and carbon footprint.

**Cost-effective**

1. Consideration: Cost-efficient
2. Route: [Shanghai -> Singapore] by [Sea]
3. Cost: $550
4. Time: 336 hours
5. Carbon Footprint: 650.2 kg
6. Evaluation: This is the most cost-effective option.

**Enrionmental-friendly**

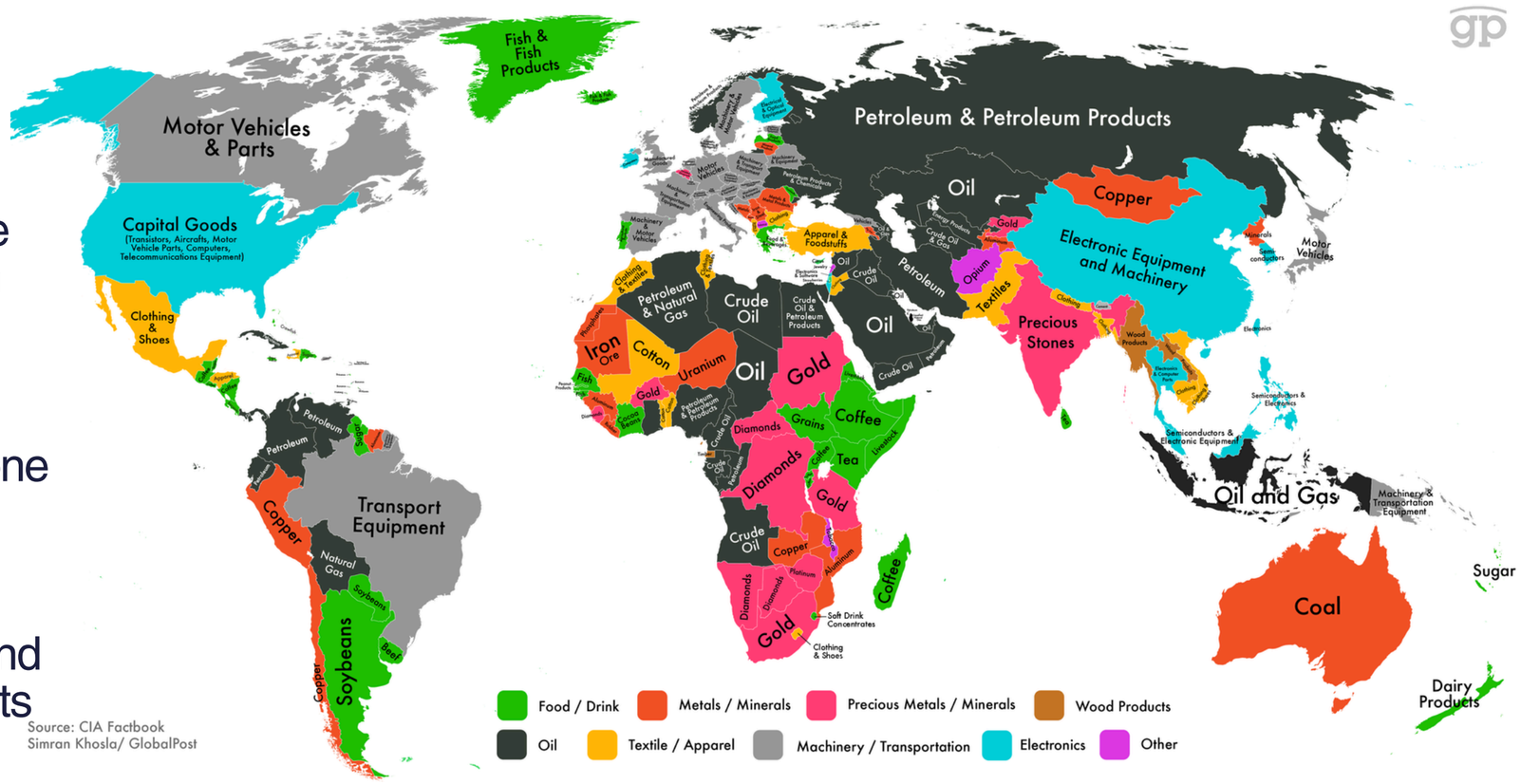
1. Consideration: Environmentally friendly
2. Route: [Shanghai -> Singapore] by [Sea]
3. Cost: $550
4. Time: 336 hours
5. Carbon Footprint: 650.2 kg
6. Evaluation: This option is the most environmentally friendly, with the lowest carbon footprint.

**Time-Saving**

1. Consideration: Time-saving
2. Route: [Shanghai -> Tokyo -> Hong Kong -> Singapore] by [Air, Air, Air]
3. Cost: $6769
4. Time: 37 hours
5. Carbon Footprint: 1607.46 kg
6. Evaluation: This option is the fastest, but it is also the most expensive and has the highest carbon footprint.

# OUR VISION

With the expansion of our regional simulation to a global scope, we hope to have access to more data and can identify additional factors that affect regional and global supply chain stability. We aim to identify cities, routes, and regions that are more prone and vulnerable to crises, evaluate regional stability index and propose precautionary measures, and predict dynamic changes such as weather and demand shifts, along with their impacts on the transportation industry.




Source: CIA Factbook
Simran Khosla/ GlobalPost


# SUMMARY & OUTLOOK

## Real-Time Shipment Tracking

Our project employs simulation to gather critical insights, optimizing the decision-making process of AI-driven tools for global operations. With future integration of more APIs, we will capture real-time data, such as port inventory and berth availability, enhancing our ability to respond swiftly to disruptions. By leveraging this real-time information, our solution will ensure efficient, resilient, and reliable performance across global supply chains. We hope this will help PSA to provide better and more specialised customer services.

## Automated Route Optimization

Our system utilizes Dijkstra's algorithm to determine the most efficient global shipment routes. By calculating the shortest and most cost-effective path from a given source node to every other node in the network, Dijkstra’s algorithm ensures that shipments are routed optimally. This approach enhances the reliability of supply chains by minimizing transit time and cost, while maintaining resilience in the face of disruptions. As a result, it enables a more efficient and globally scalable solution for automated route management.

## Various options that cater to different needs

The selected route can be optimized to minimize costs, reduce transit time, or prioritise environmental sustainability, depending on the specific goals of the operation." This revision emphasizes flexibility in route selection based on key priorities: cost-efficiency, speed, or eco-friendliness.

# REFERENCE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# THANK YOU