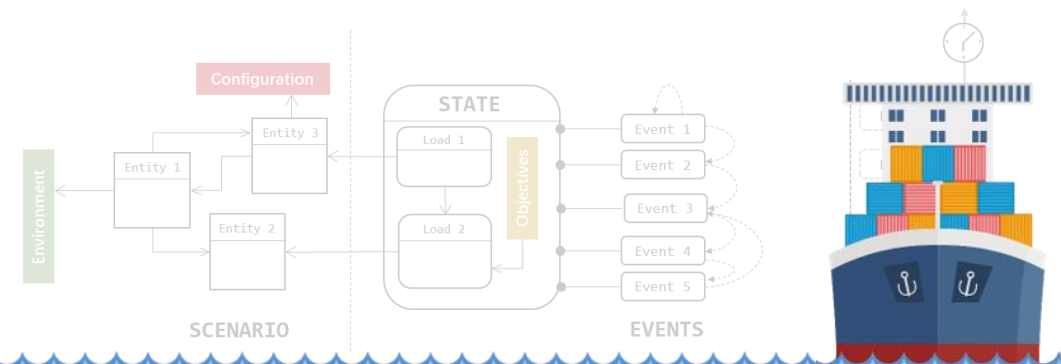
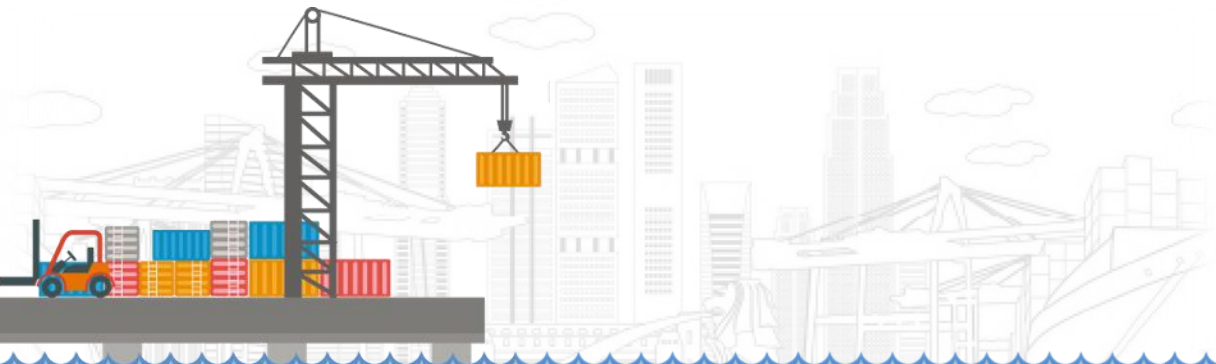
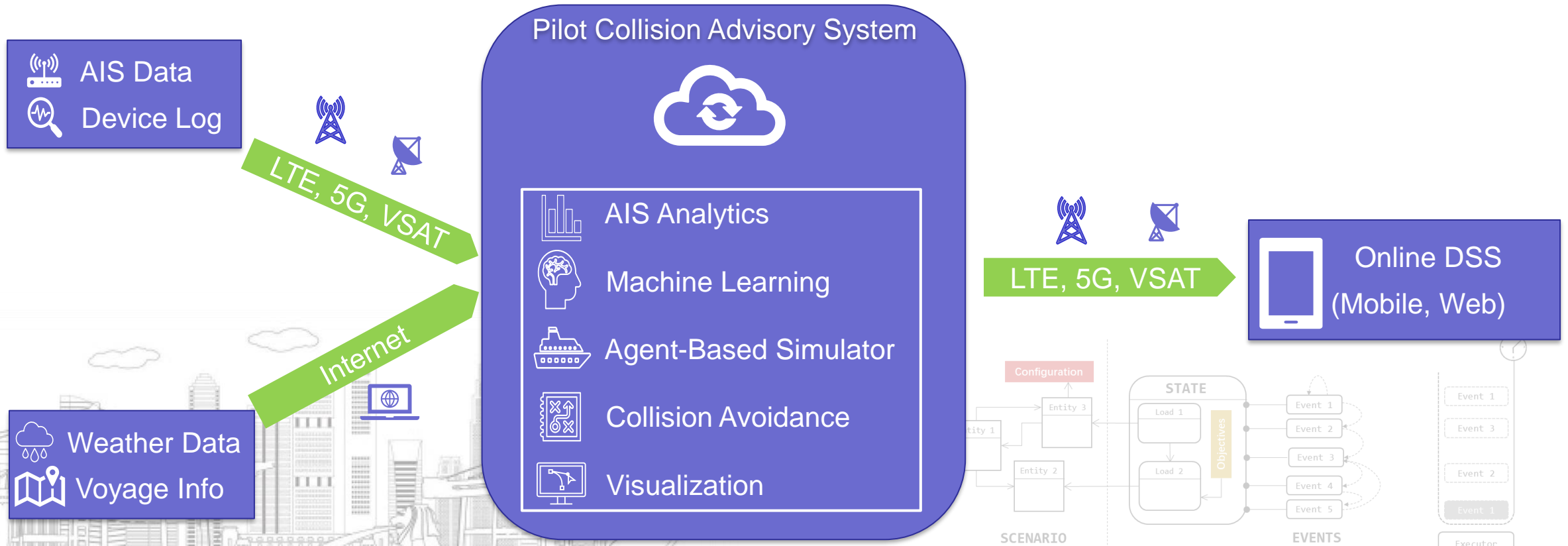


# Pilot Collision Advisory System



# Pilot Collision Advisory System

**Pilot Collision Advisory System is an early warning system to enhance the situational awareness of vessel pilots and masters in heavy traffic regions and coastal waters.**



# AIS Analytics



**AIS data preprocessing and preparation for machine learning.**



**Vessel movement features extraction**

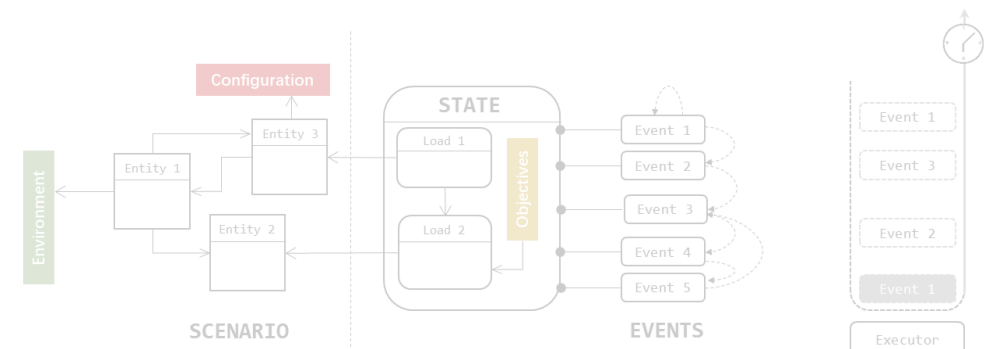
Locations  
Journeys  
Passageways & waypoints



**Conducting statistical analysis on the movement features**



**Vessel movement planning based on real-time traffic forecast in port neighbourhood.**



# AIS Analytics



AIS data preprocessing and preparation for machine learning.



**Vessel movement features extraction**

**Locations**

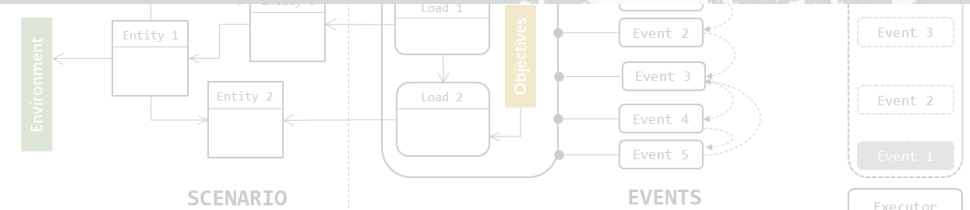
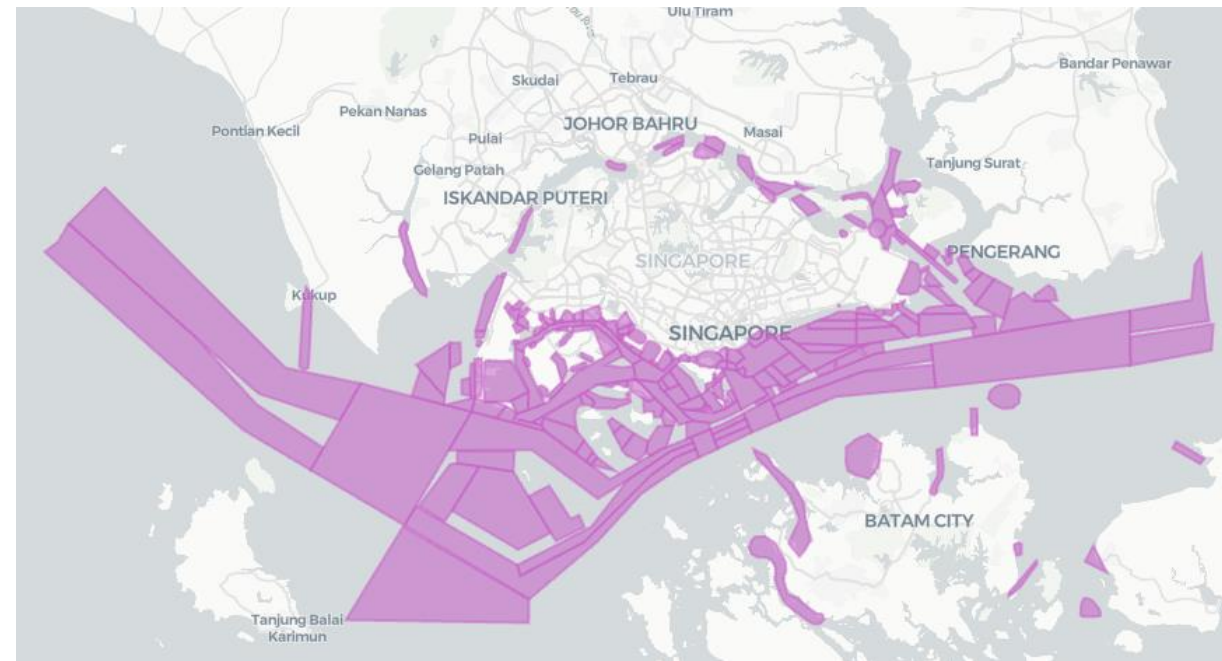
Journeys  
Passageways & waypoints



Conducting statistical analysis on the movement features



Vessel movement planning based on real-time traffic forecast in port neighbourhood.



# AIS Analytics



AIS data preprocessing and preparation for machine learning.



**Vessel movement features extraction**

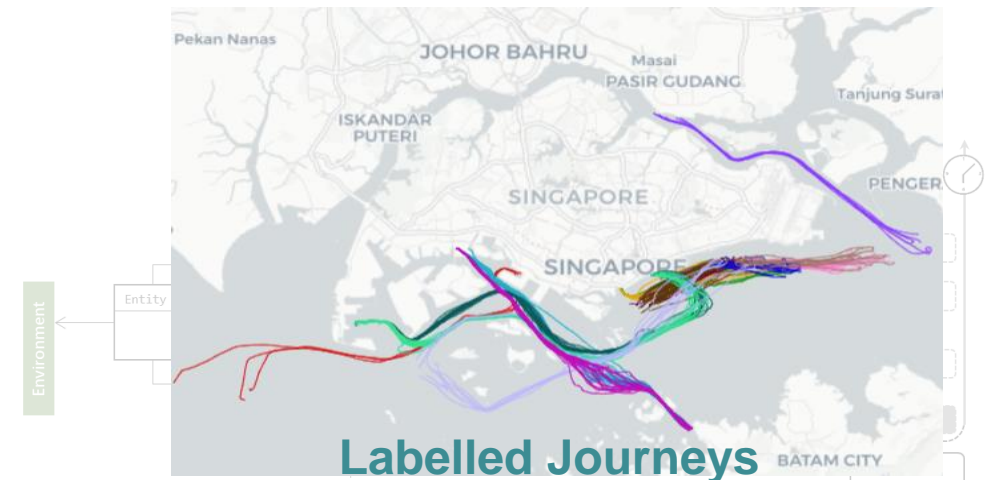
Locations  
Journeys  
Passageways & waypoints



Conducting statistical analysis on the movement features



Vessel movement planning based on real-time traffic forecast in port neighbourhood.





# AIS Analytics



AIS data preprocessing and preparation for machine learning.



**Vessel movement features extraction**

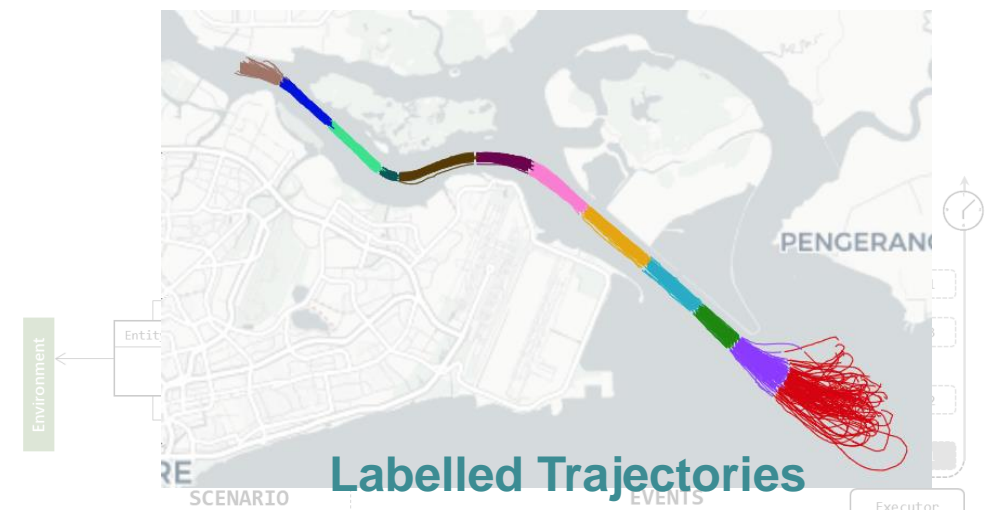
Locations  
Journeys  
Passageways & waypoints



Conducting statistical analysis on the movement features



Vessel movement planning based on real-time traffic forecast in port neighbourhood.



# AIS Analytics



AIS data preprocessing and preparation for machine learning.



Vessel movement features extraction

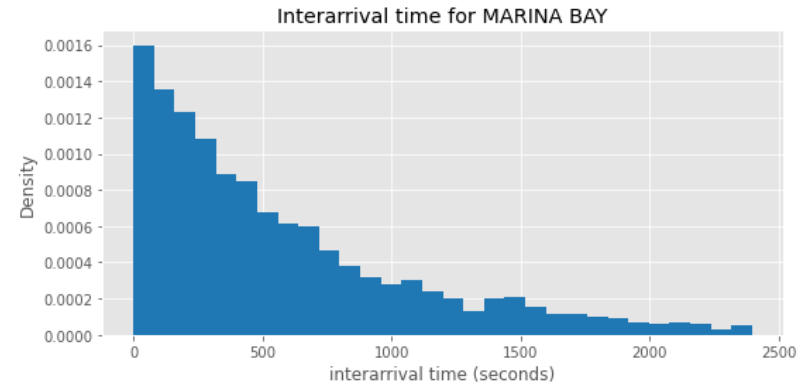
Locations  
Journeys  
Passageways & waypoints



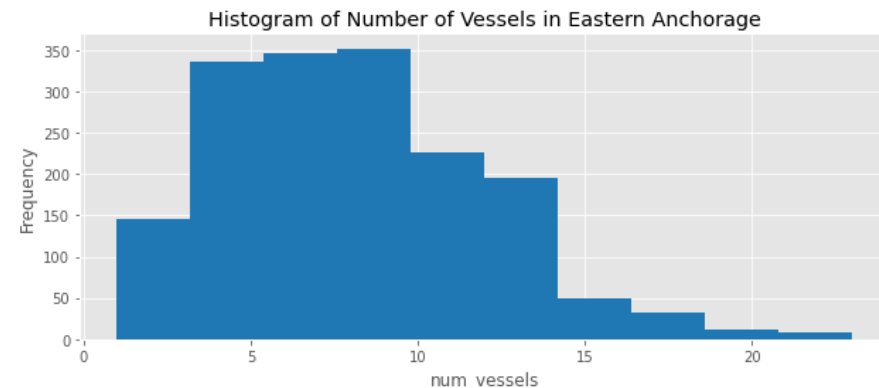
Conducting statistical analysis on the movement features



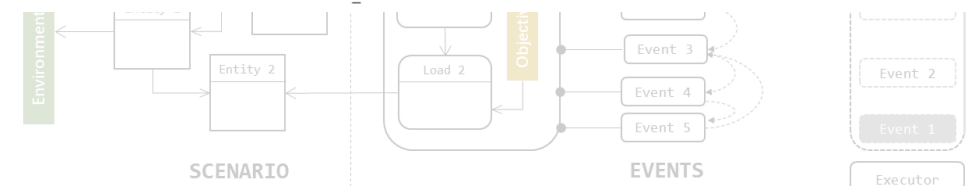
Vessel movement planning based on real-time traffic forecast in port neighbourhood.



	interarrival time (seconds)
count	3955.0
mean	676.615
std	803.936
min	0.0
25%	177.0
50%	425.0
75%	880.5
max	13290.0



	num_vessels
count	1702.0
mean	8.032
std	3.774
min	1.0
25%	5.0
50%	8.0
75%	10.0
max	23.0



# AIS Analytics



AIS data preprocessing and preparation for machine learning.



Vessel movement features extraction

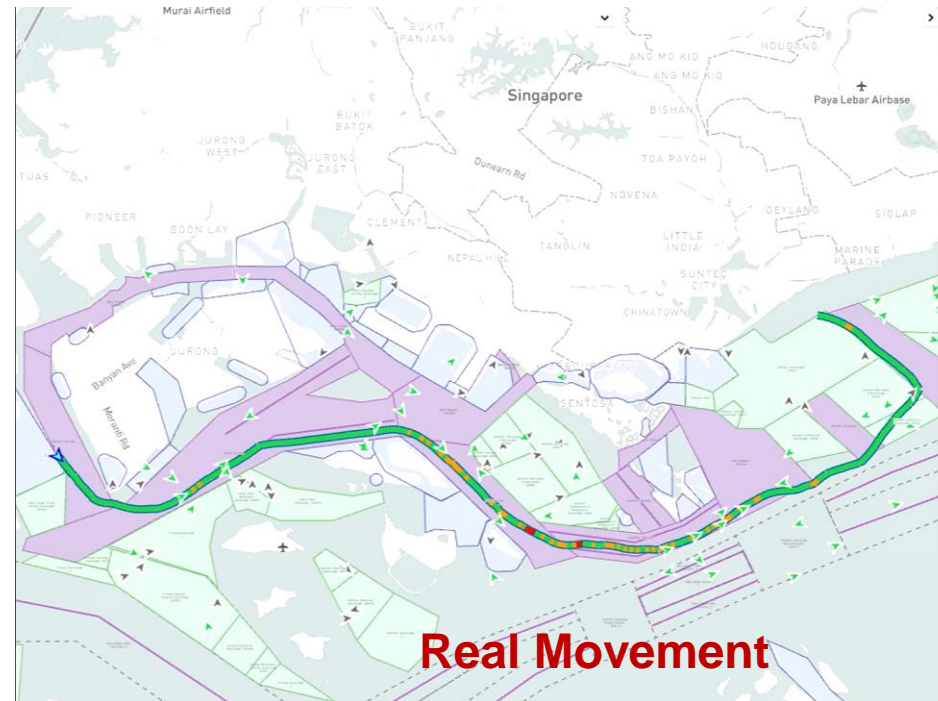
Locations  
Journeys  
Passageways & waypoints



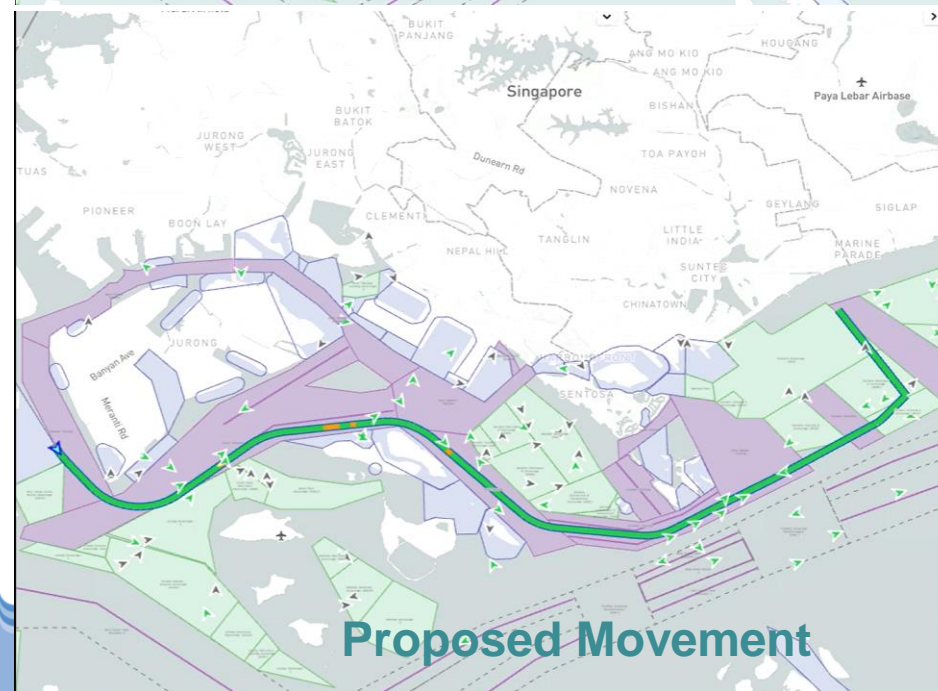
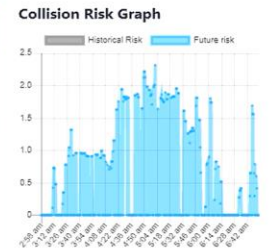
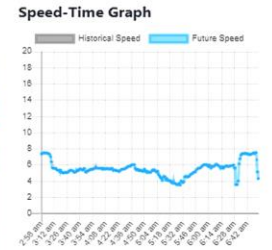
Conducting statistical analysis on the movement features



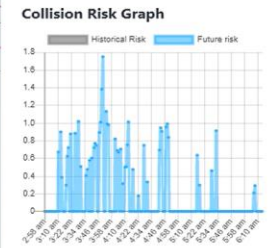
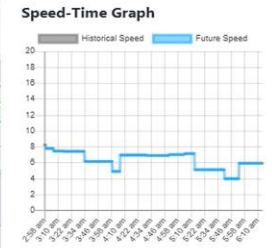
Vessel movement planning based on real-time traffic forecast in port neighbourhood.



MMSL: 563036680	Cargo (70)	
Pilotage	<PILOT INFO>	
Speed	7.4	Collision Risk 0
Course	126	Heading 0



MMSL: 0	Other (99)	
Pilotage	<PILOT INFO>	
Speed	8.25	Collision Risk 0
Course	147.16	Heading 0



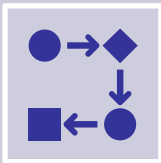


# Machine Learning



**Predictive modelling to obtain probabilistic measures on:**

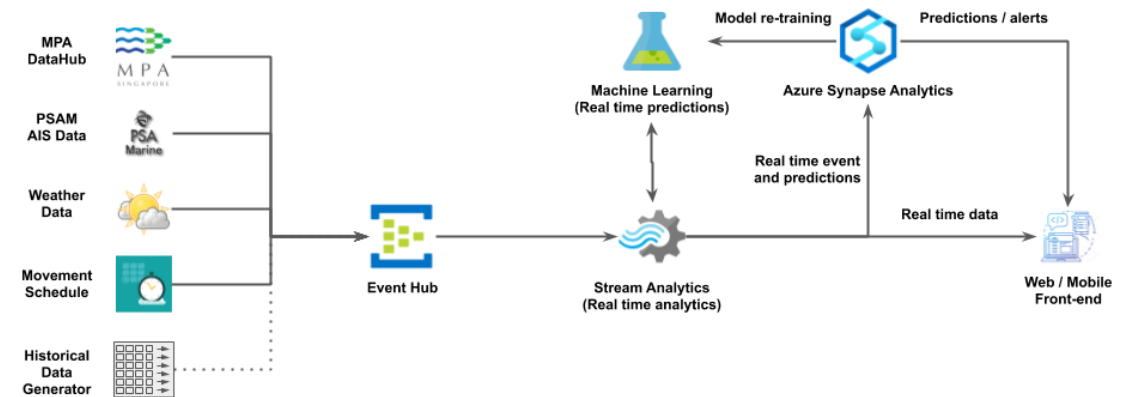
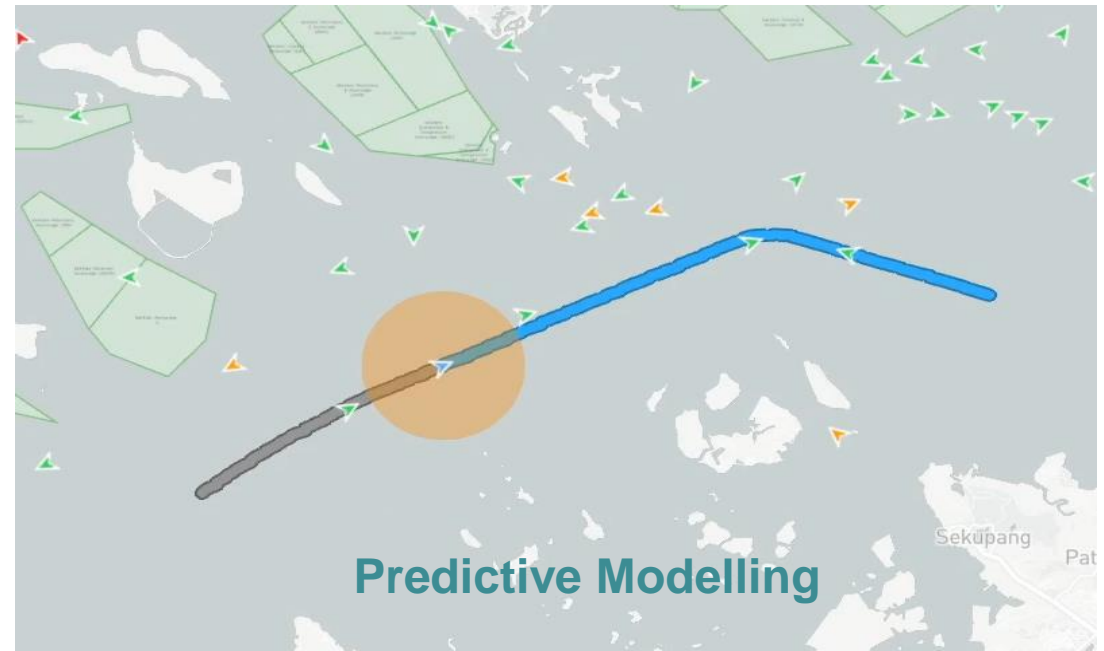
- Location identification
- Passageway and waypoints prediction
- Vessel movement prediction



**ML Pipeline Hyperparameter Tuning**



**Deployment on the cloud**



## Proposed Cloud Architecture



# Agent-based Simulation



**Vessel motion simulation and trajectory prediction**



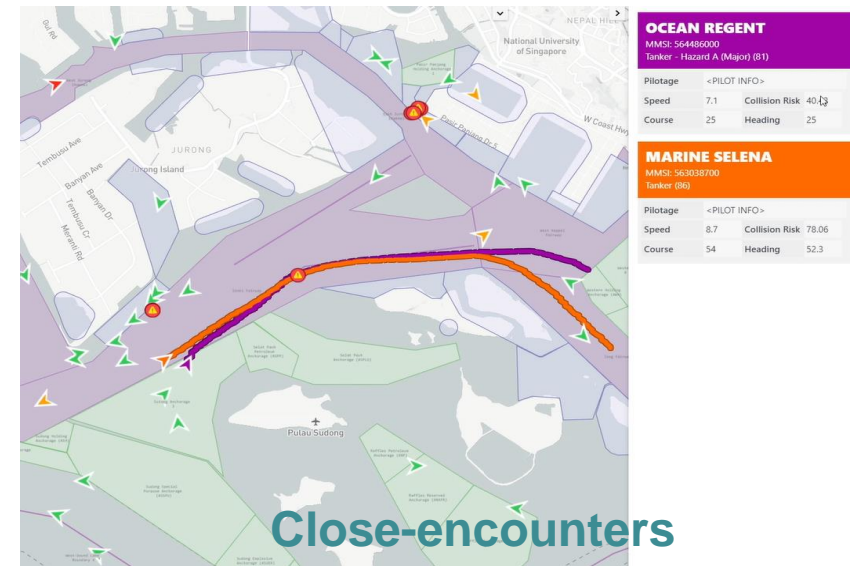
**Collision risk calculation**



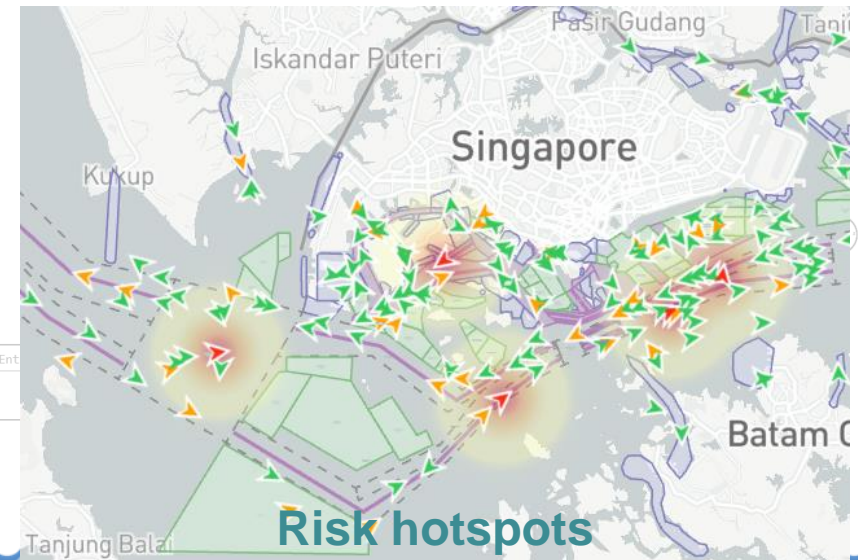
**Risk hotspots identification**



**Close-encounter identification**



Close-encounters



Risk hotspots

# Pilot Collision Advisory System



**Collision Avoidance**

**Model training and deployment**  
**Real-time collision avoidance**



**Visualization**

**Web platform featuring Locations, predicted and historic trajectories, ...**

