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Smart Seas, Safe Harbours: A Digital Twin for the Port of Dover

Prathmesh Rane[1], Arijit De[1], Yu-Wang Chen[1], Ajay B Harish[1], Mahya Hoseini[1], Benedict Rogers[1],
Adan Lopez Santander[2], Pruthvi Devarinti[3], Tom Hyde[3]
[1] University of Manchester, [2] University of Plymouth, [3] Port of Dover

Abstract

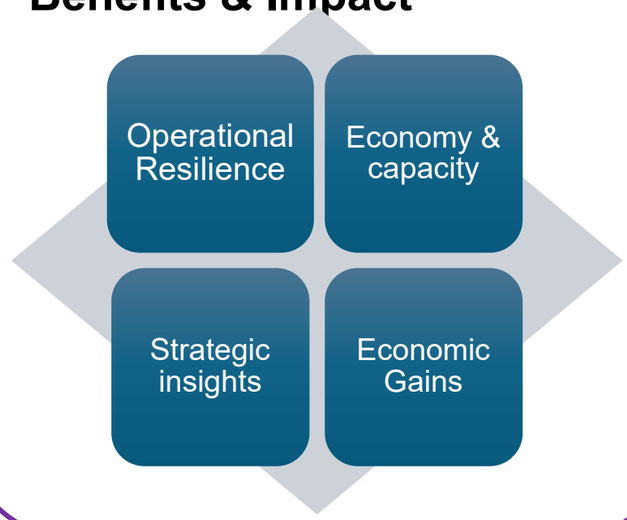
- An AI-augmented digital twin simulates the Port of Dover using tides, waves, wind, vessel logs, and bathymetric data.
- The system enables 24/7 all-weather forecasting to support safe navigation, operational resilience, and future readiness for larger vessel movements.
- Cloud-native infrastructure and surrogate AI models ensure efficient performance and rapid environmental forecasting.
- Designed in line with International Hydrographic Organization (IHO) Universal Hydrographic Data Model (S-100) standards, the platform contributes to port decarbonisation, digitalisation, and global maritime data interoperability.

Introduction

- **What is a Harbour-Side Digital Twin?**
  A virtual replica of physical systems at Dover Harbour, fed by real-time and historical data to simulate, analyse, and predict vessel movement within the port.
- **Project Overview**
  A 33 month Innovate UK funded Knowledge Transfer Partnership (KTP) led by University of Manchester with Port of Dover and University of Plymouth. Total project cost - £677,364.00.

Figure 1. A concept illustration of the Port of Dover's Digital Twin, generated using AI

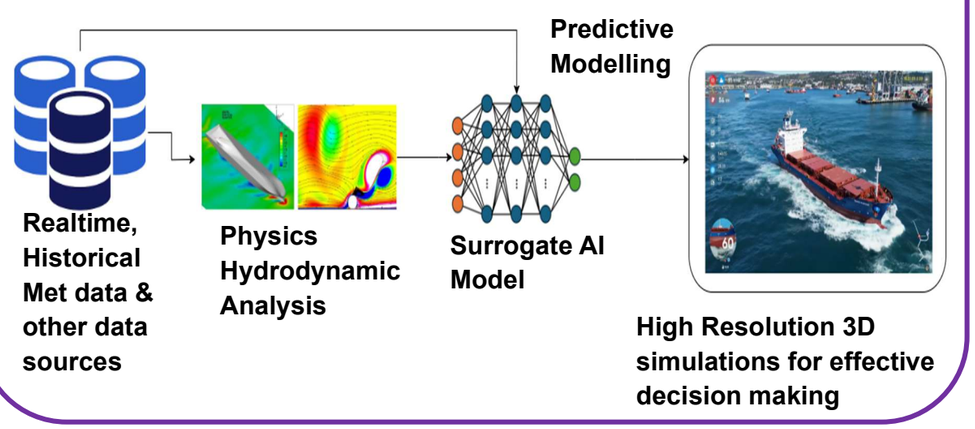
Benefits & Impact



Objectives

- Simulate 24/7, 365-day, all-weather harbour conditions
- Enable safe navigation during harsher weather & accommodate larger vessels
- Increase operational hours, throughput, and trade efficiency

Block Diagram



Contact

For Research Poster Author:
Mr.Prathmesh Rane, AI & ML Researcher (KTP Associate),University of Manchester and Port of Dover).

For Business Enquiries: Mr. Pruthvi Devarinti,IT Project Manager, Port of Dover

For KTP Academic Collaboration:
Dr. Yu-Wang Chen, Professor of Decision Sciences and Business Analytics at AMBS Manchester Business School