

-AI 기반 해운 · 항만 운영 최적화 -

어웨이크 AI가 만드는 해운·항만의 미래

세종대학교 AI로봇학과

김세원

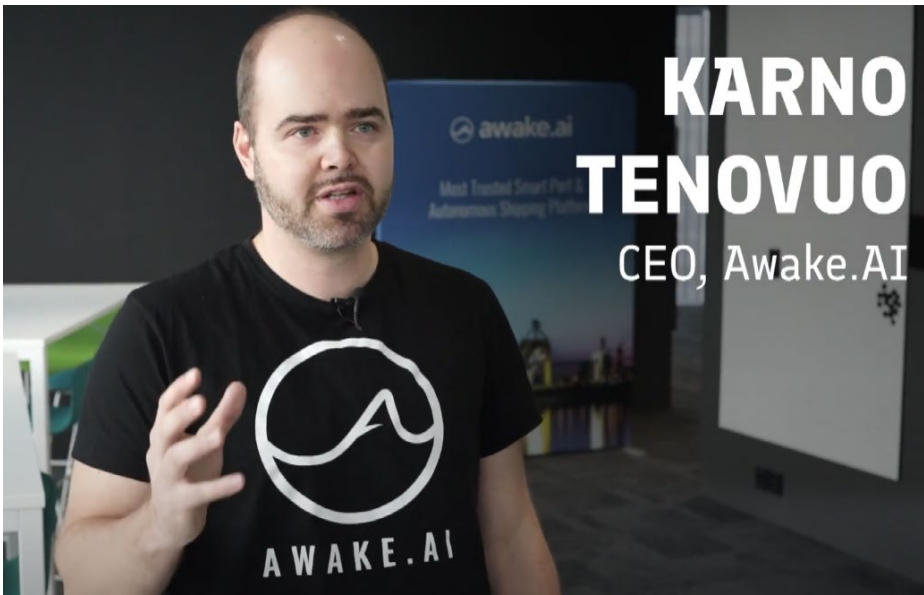


1. AI 기반 해운·항만 최적화
2. Awake AI가 만드는 해운 · 항만의 미래
3. 국내 동향
4. 결론

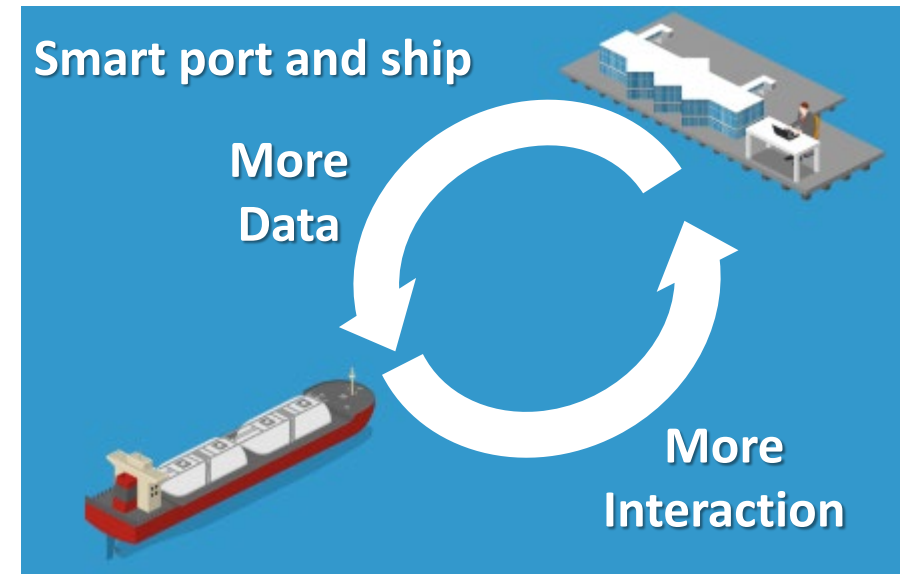
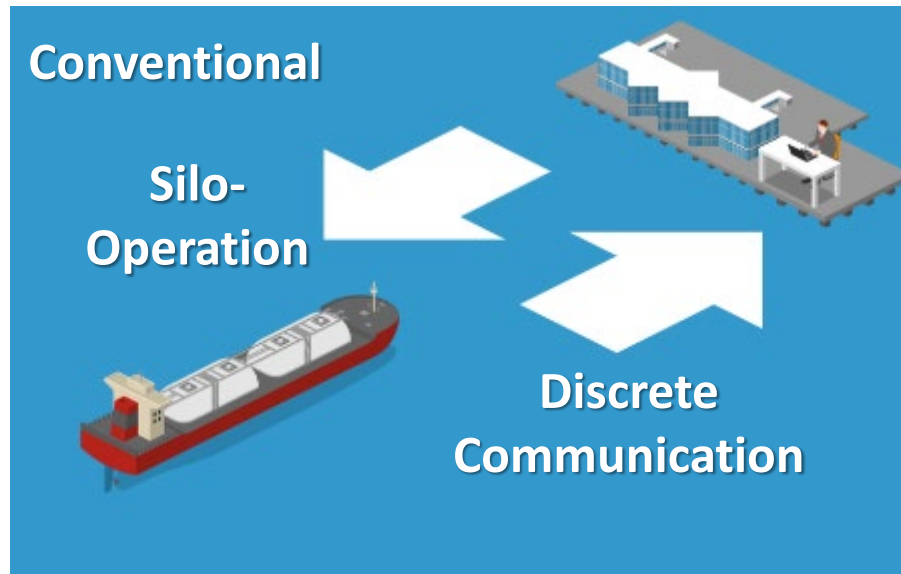


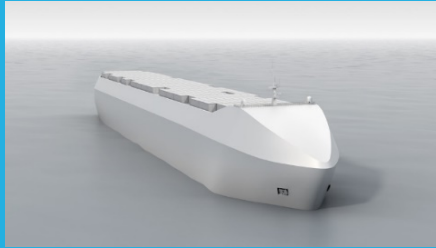
- Awake AI 는 2018년 롤스로이스 자율운항선박 팀 중 Ship-Port 연계 데이터 분석을 하던 팀을 주축으로 창업한 인공지능 기업이다.
- 현CEO (Karno Tenovuo)와 AI 팀을 이끌던 부사장 (Jussi Poikonen)이 주축으로 회사를 설립했으며, 주 서비스는 선박의 예상도착시간(ETA)예측, 항만 연계 최적 운항 속도 제안, 항만 서비스 운영 상황 예측을 제공한다.

자율운항선과 Awake AI



- Smart Port as Service
- Maritime Decarbonization - 1 Billion metric tons of CO₂
- 40% Problem - Ship spends 40% their life for the port waiting





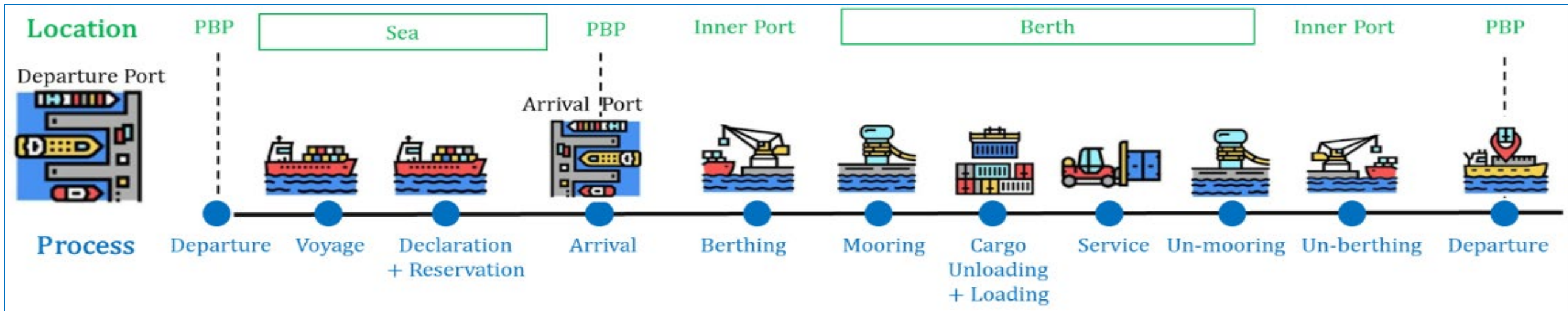
자율운항선



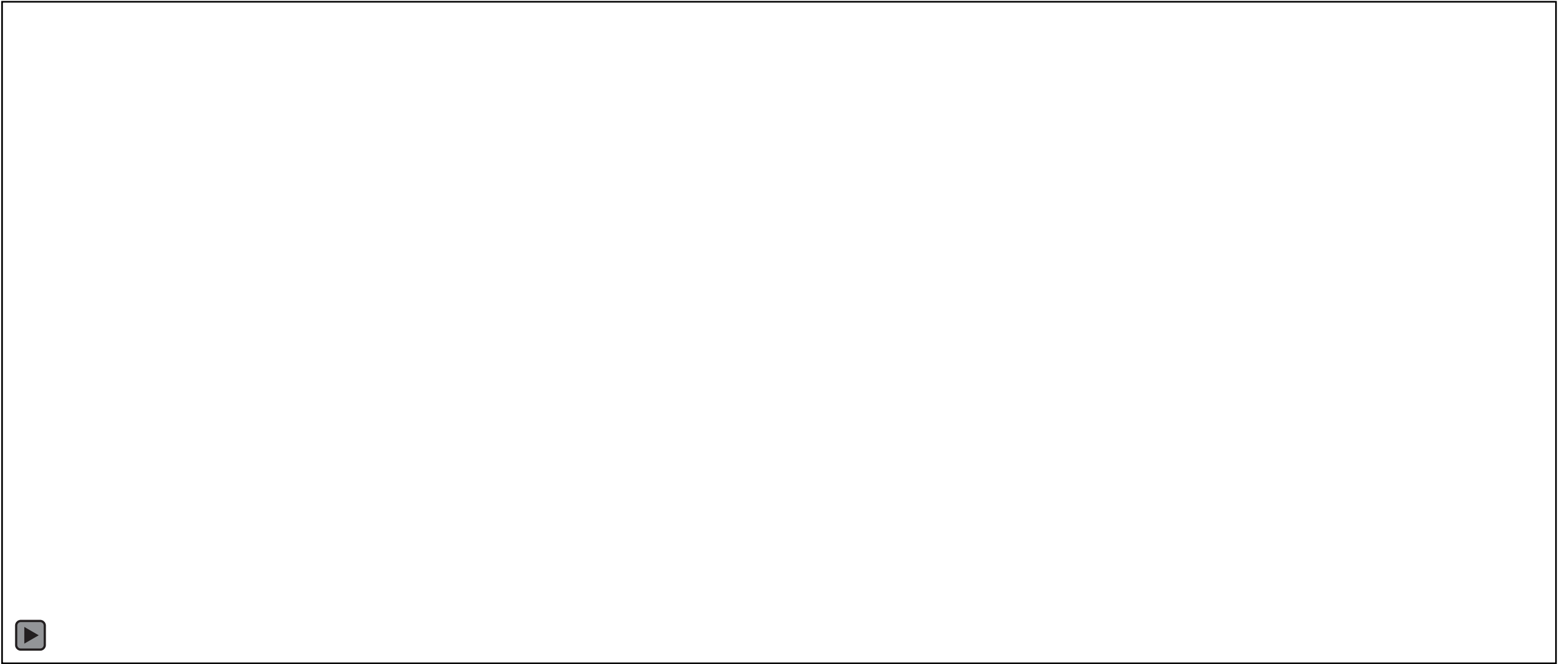
자율주행트럭

Smart Port

자율 해상 운송 물류 체계 ← 디지털화 선행

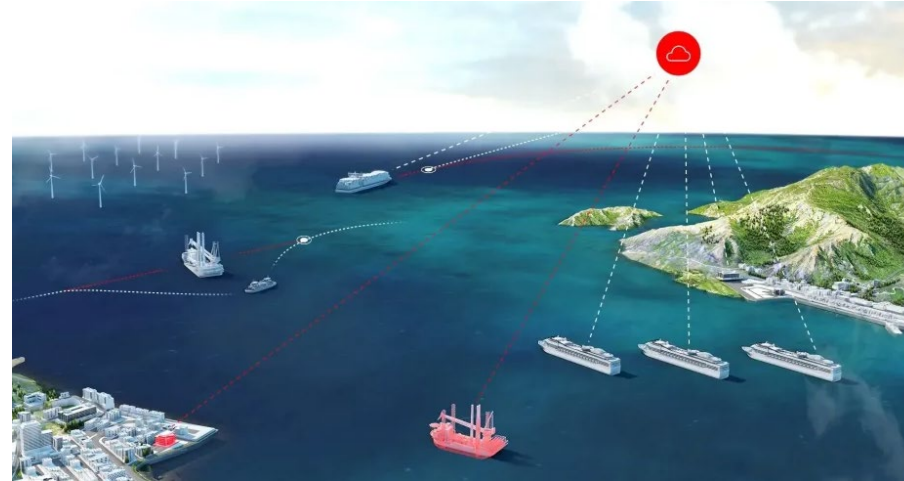
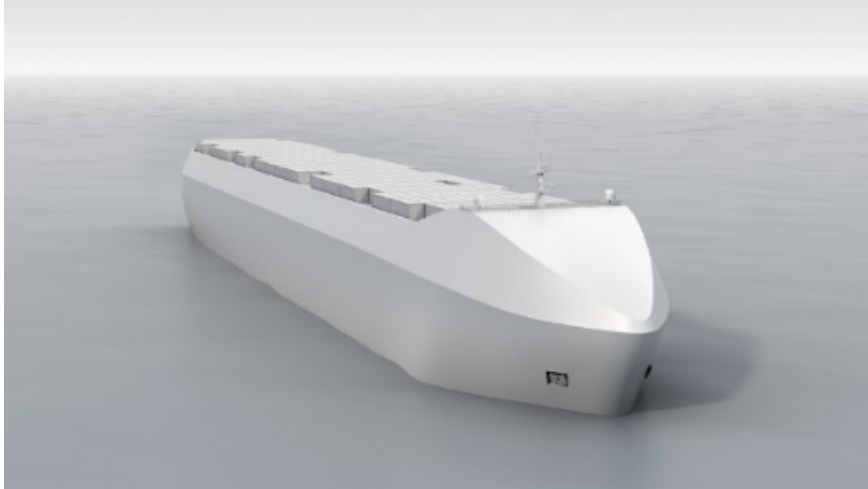


- AI 기반 해상 물류 구현을 위해서는 항만 및 해운 데이터 기반 운영이 필요하며 Awake AI 는 해운물류 데이터 디지털화 및 운영 최적화를 서비스로 제공

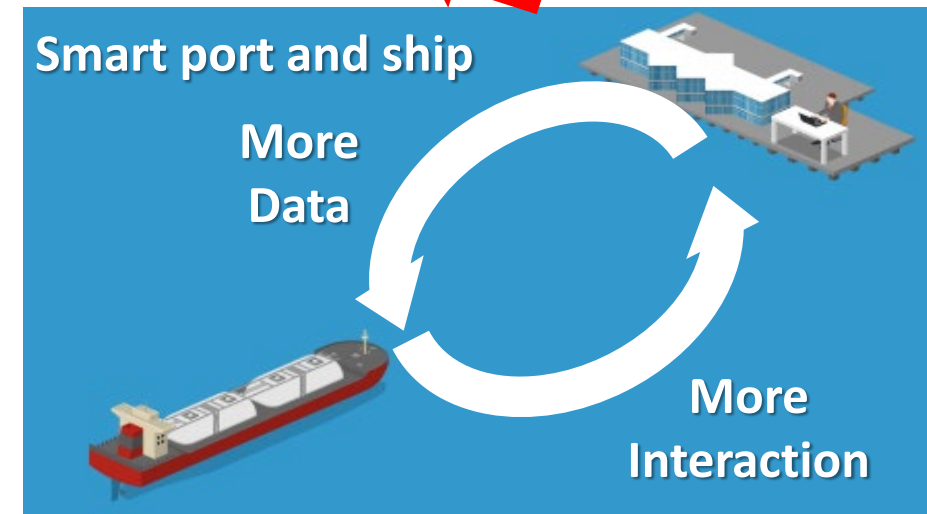
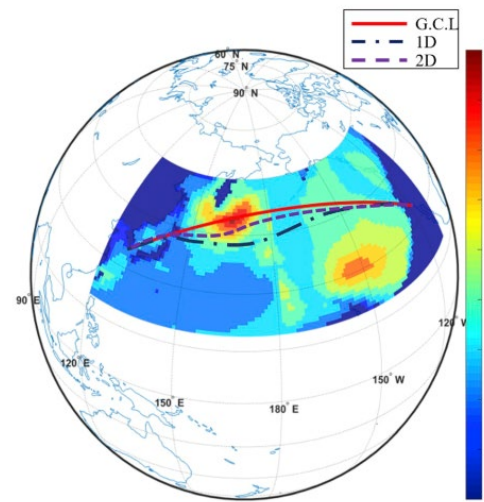
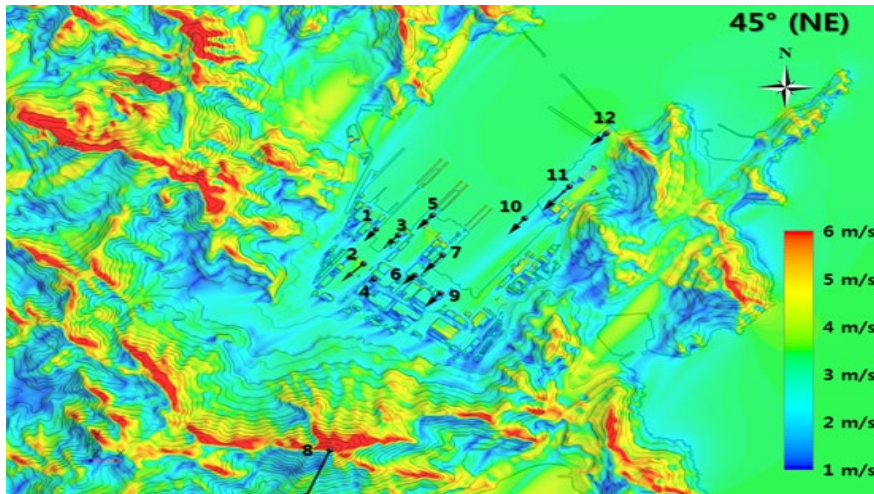


Autonomous Ship Route Planning – Autonomous Navigation

: Autonomous Ship plans their way by using AI and control by Physical AI



: find optimal speed and heading command of route that satisfy **voyage constraints(voyage period)** with considering weather (wind, wave, current, swell) and ship responses



자율운항선과 Awake AI : SVAN Project



- Rolls-Royce Intelligent Awareness sensors
- Rolls-Royce Autonomous Navigation system (In Plug & Play container)
- Rolls-Royce Remote Control Station



Ferry with plug and play ANS system installed



The project

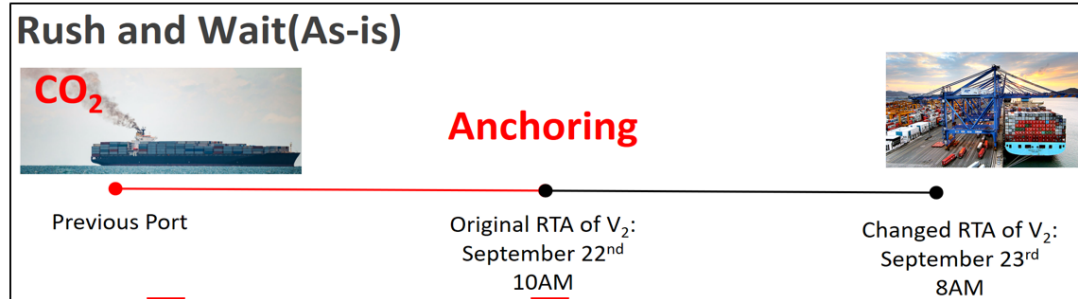
- 360 validation hours
- 90 successful auto-docking trials
- 73 safety requirements met, overseen by Flag State authority Trafti
- 70 cyber security tests met
- 70,000 system events per hour indexed and analysed
- 24/7 cyber security monitoring
- Installation of SI technologies took less than a week at quayside

Key

- Intelligent Awareness sensors (IA)
- Autonomous Navigation System (ANS)

KONGSBERG PROPRIETARY - See Statement of Proprietary information

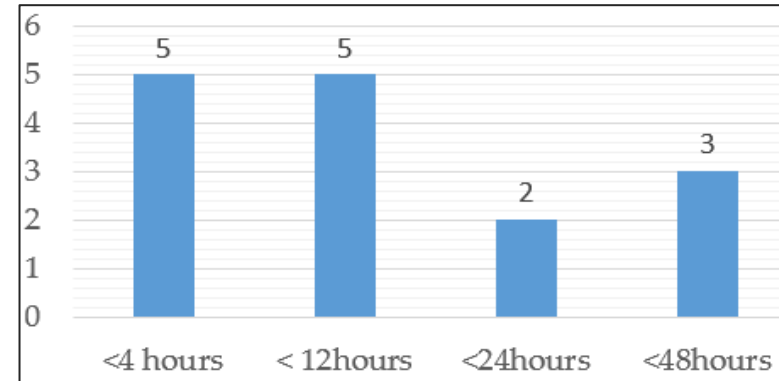
Smart Port defined Ship Just in time arrival



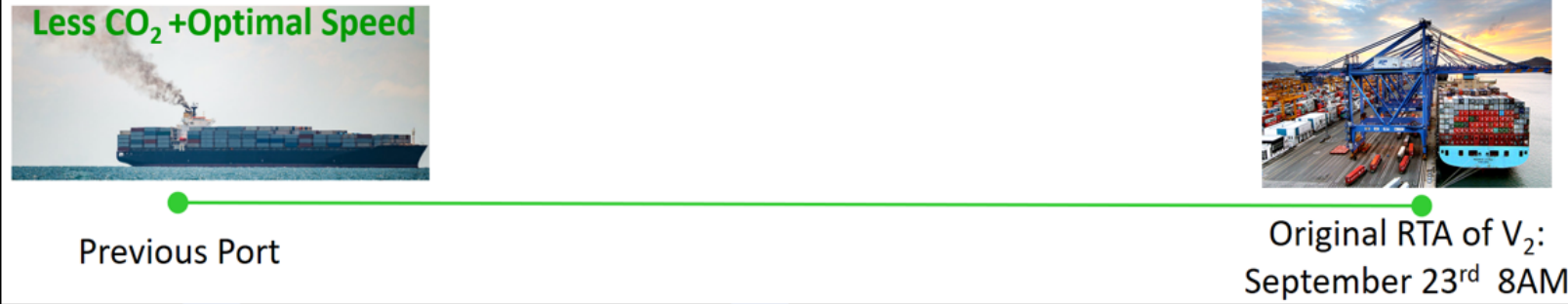
voyage time
= distance / sailing speed

waiting time
= ATA – Original RTA

- Ship Delay Data - 22.09.21st to 09.30th



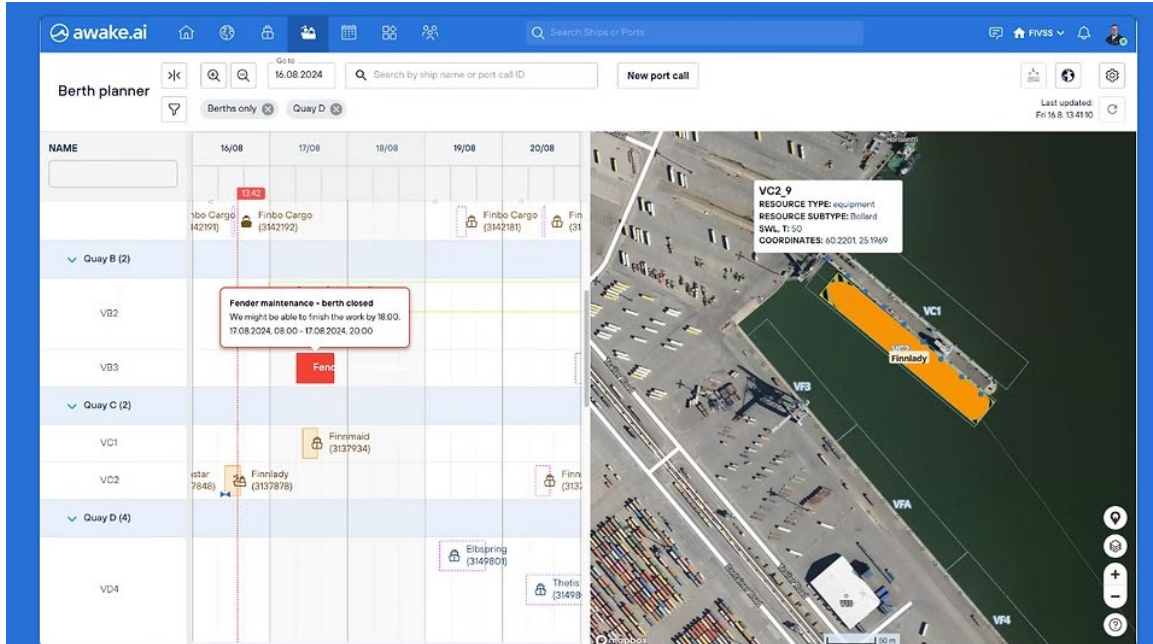
Just in time Arrival



voyage time
= distance / sailing speed

waiting time
= Changed RTA – Original RTA = 0

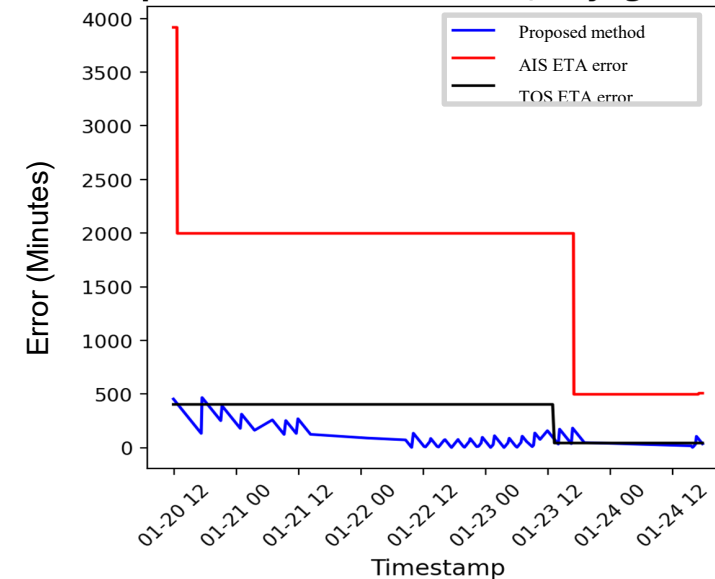
대표 솔루션 1: Port Vision



- ✓ Create a visual, safe, and optimized plan for entire port calls.
- ✓ Port call planning becomes faster, smarter, and safer with modern tools.
- ✓ Create a Just-in-Time (JIT) AI-powered port call to save costs, time, and emissions.
- ✓ Share berth plans with stakeholders and enable two-way communication for real-time collaboration.
- ✓ The berth planner warns of unsafe plans disrupted by dynamic conditions and assists in quick corrections.



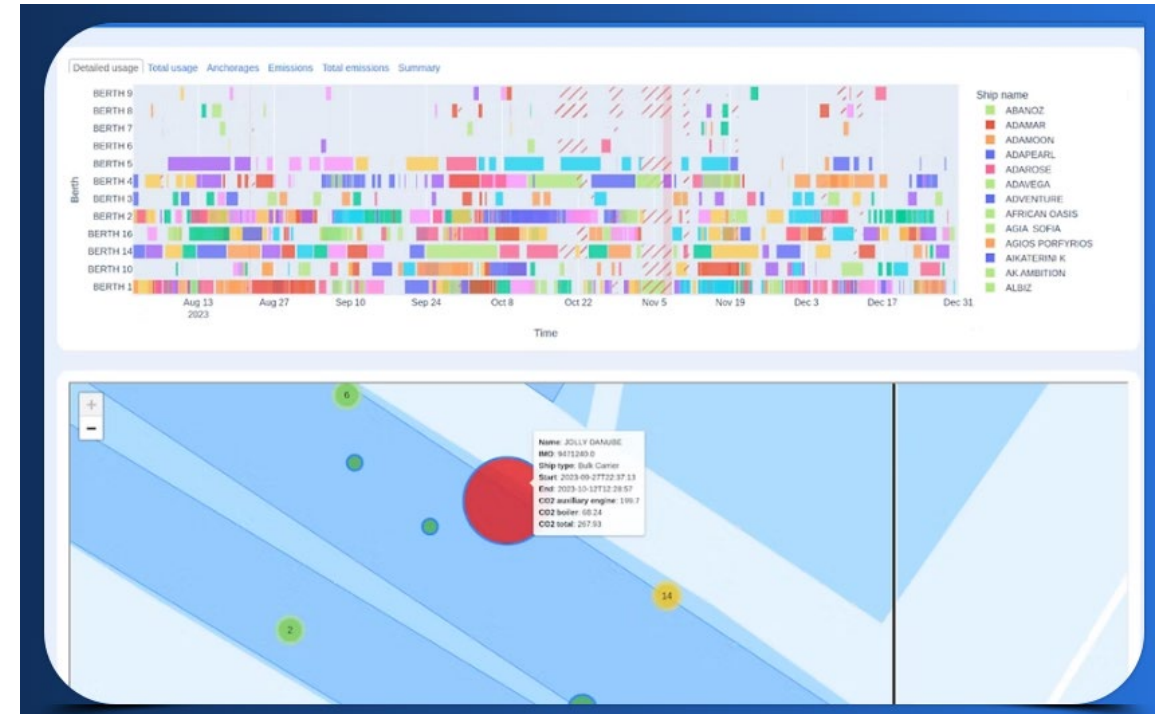
Comparison of MAEs of V010, voyage 2023_01



- 대표 솔루션 2: AI Sea

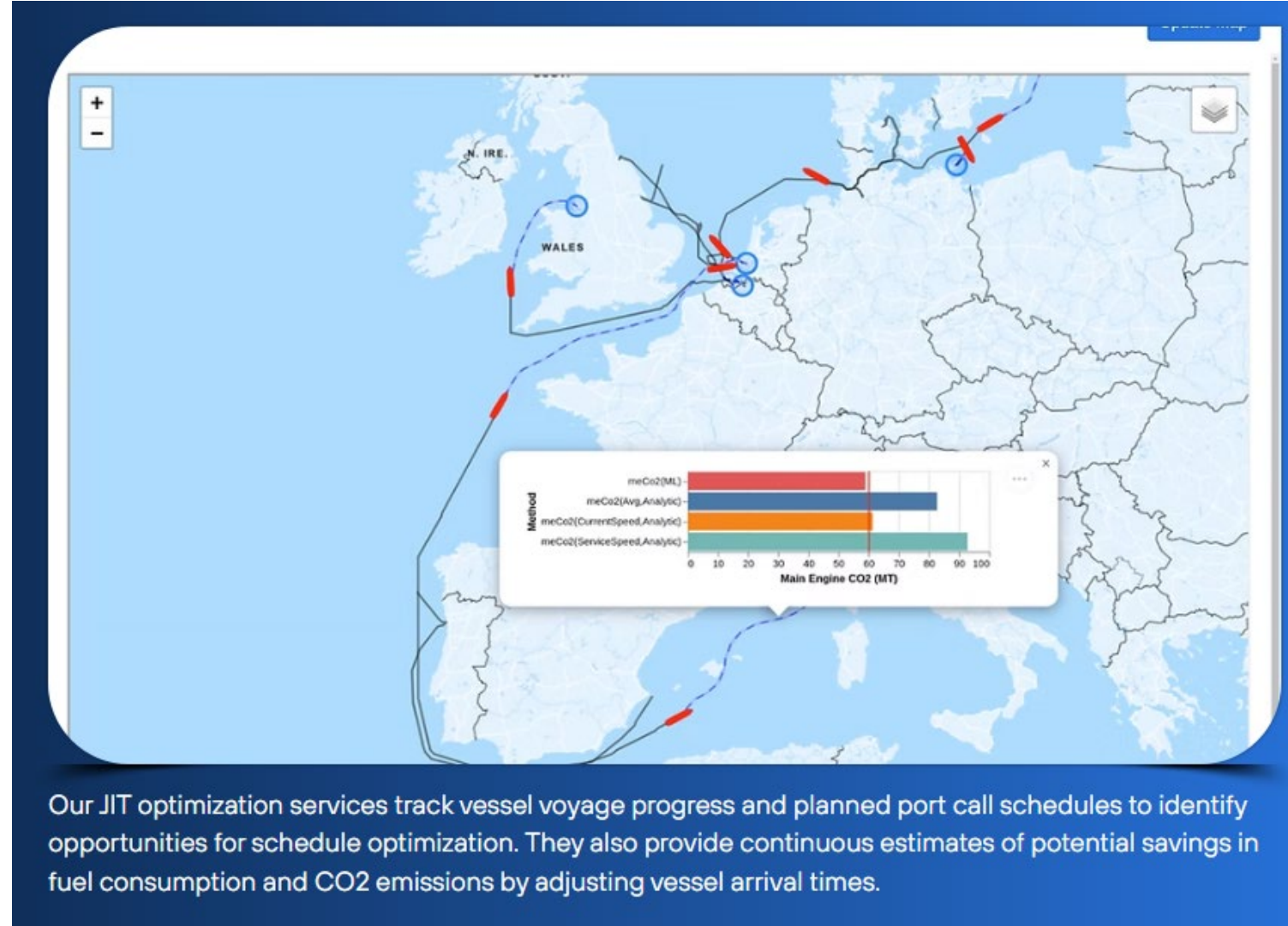


- Fleet ETA Prediction



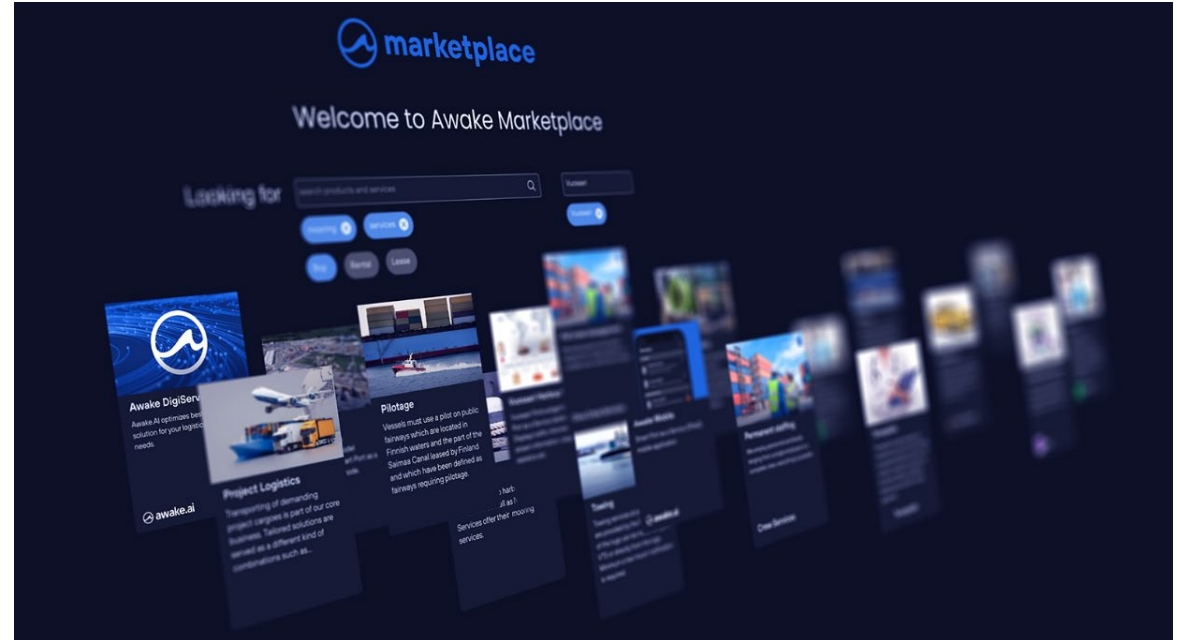
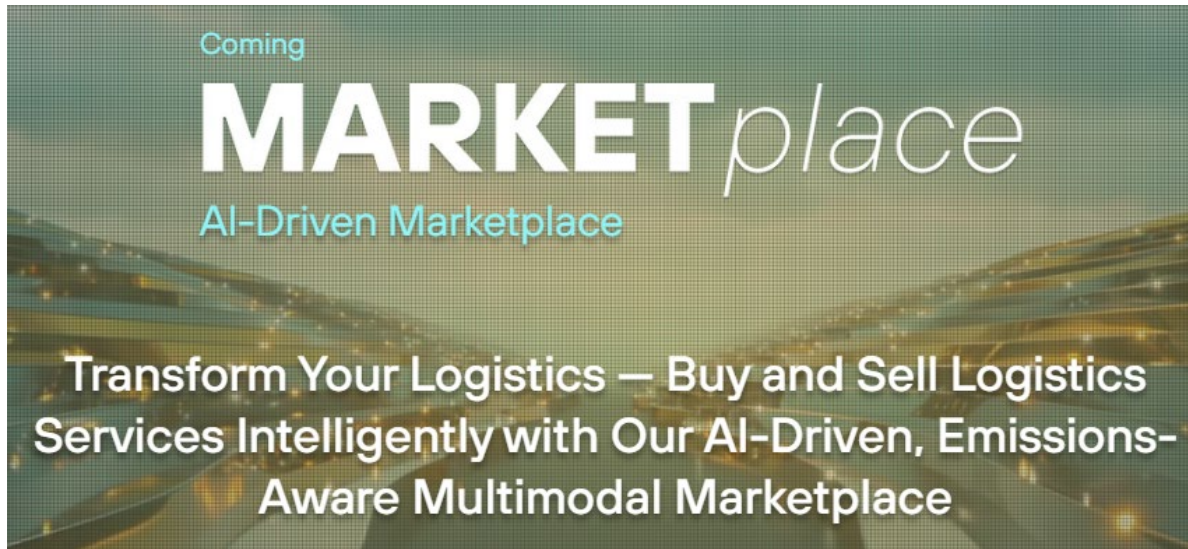
- Berth Job Completion Prediction

- 대표 솔루션 2: AI Sea



Our JIT optimization services track vessel voyage progress and planned port call schedules to identify opportunities for schedule optimization. They also provide continuous estimates of potential savings in fuel consumption and CO2 emissions by adjusting vessel arrival times.

- 대표 솔루션 3: AI-Drive Market Place



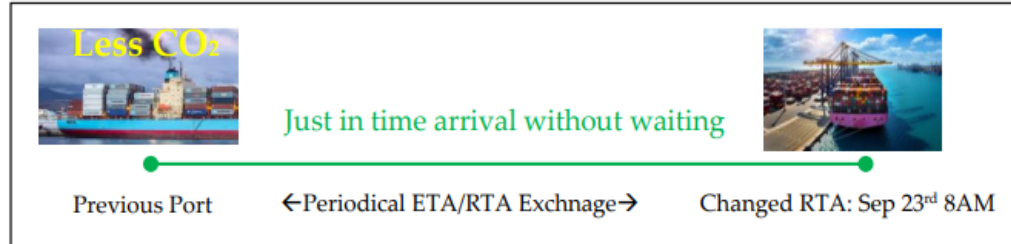
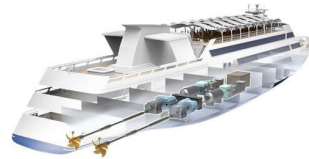
- Market Place is AI Drive Service Platform

국내 대응 상황 1 – 한화오션 항만-선박 연계 최적 운항 솔루션

• 항만 연계 탈탄소 최적 운항 서비스 (HS4)

지연시간 예측에 따른 최적 운항 계산 및 탄소 저감량 계산

Step1: 선박별 추가 운항 가능 시간 산정



Step2: 선박별 최적운항 시
연료소모 생성

$FOC = \sum$ 엔진운항 프로파일 + 대표항로

Step3: 탄소 배출량 산정

$$CII = \frac{100 - Z}{100} \left(\frac{Fuel\ Consumption \times Carbon\ Factor}{Capacity \times Distance} \right)$$

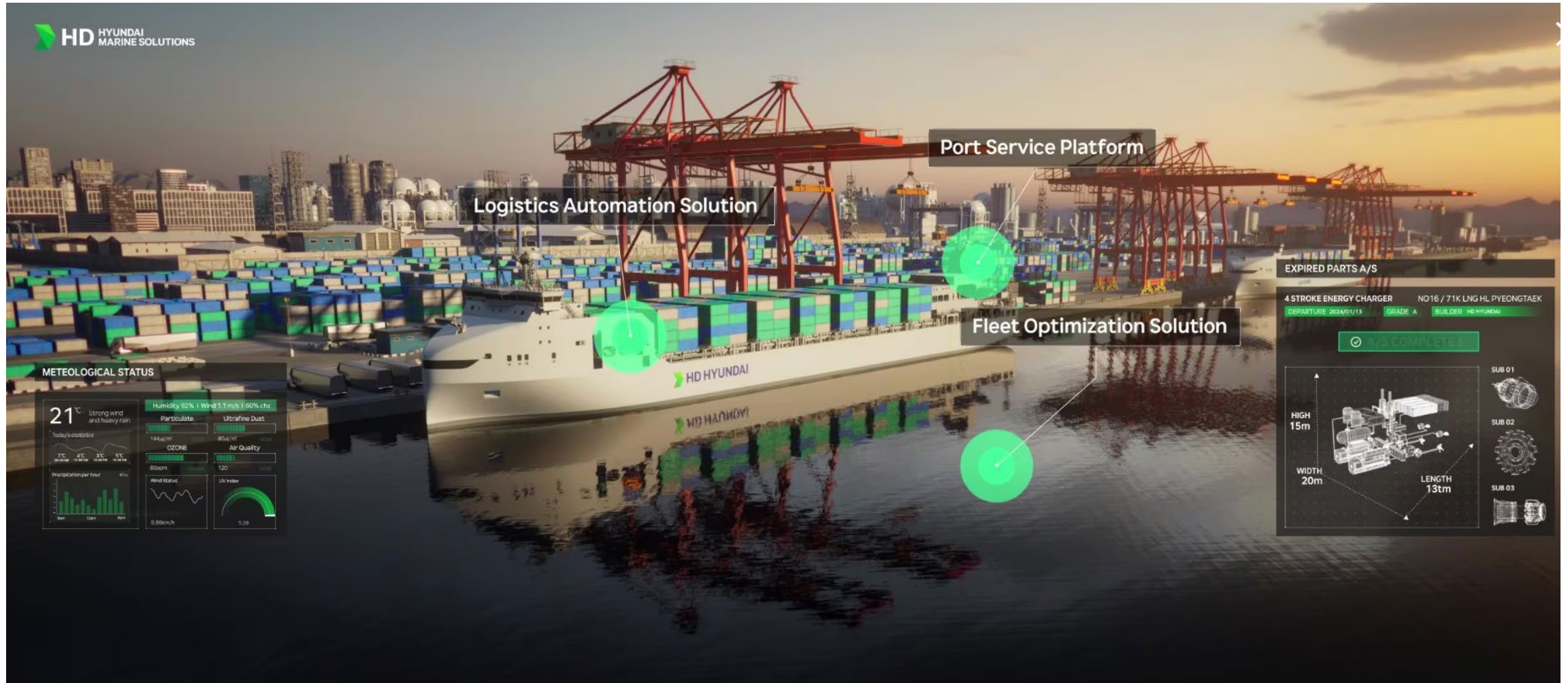
Z: IMO 연도별 저감 지수, *Fuel Consumption*: 운항 연료 소모

Carbon Factor: 연료유 탄소 함유량, *Capacity*: Deadweight, *Distance*: 운항 거리



국내 대응 상황 2 – HD 현대 마린 솔루션

- 항만 연계 탈탄소 운항 서비스 (오션와이즈)



- 출처: 비즈조선 (<https://biz.chosun.com/industry/company/2025/03/31/NUYYSJOVOJCL5JPVHRBXDYI3C4/>)

국내 대응 상황 3 – 부산항 디지털 트윈

- 부산항 디지털 트윈 - 스마트 항만 플랫폼

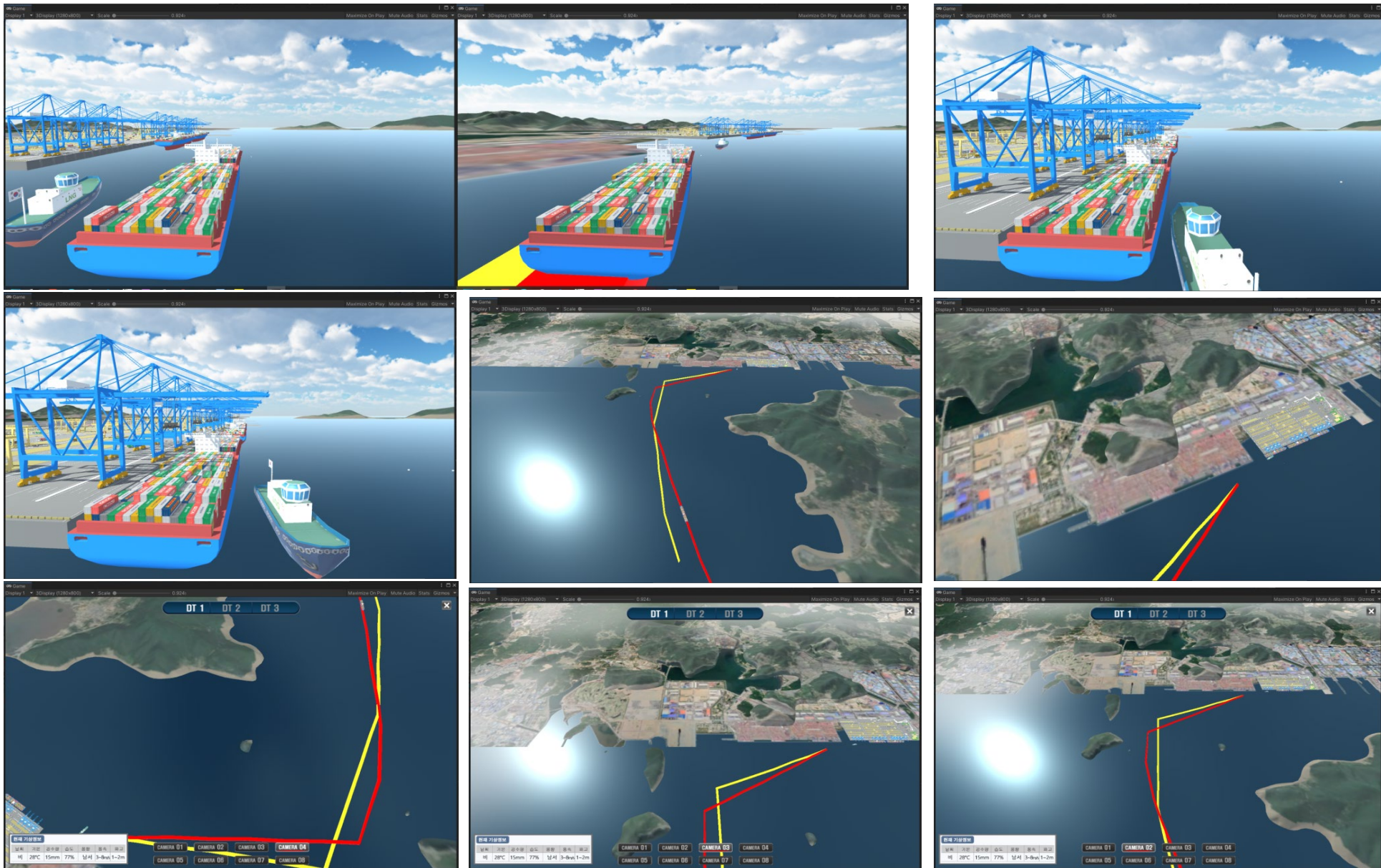


국내 대응 상황 -항만 연계 - 부산항 디지털 트윈

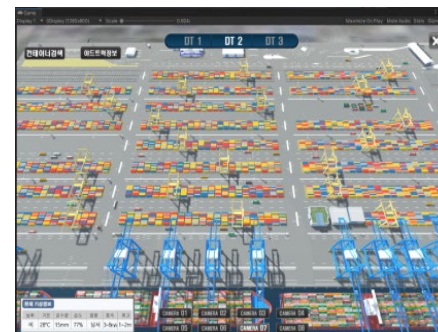
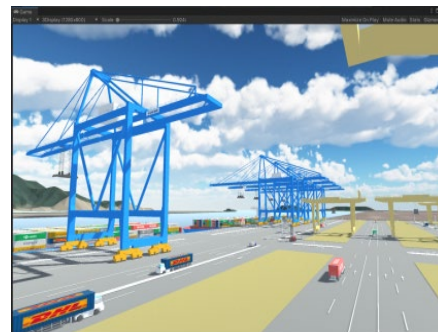
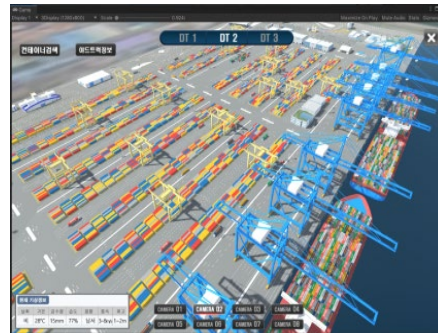
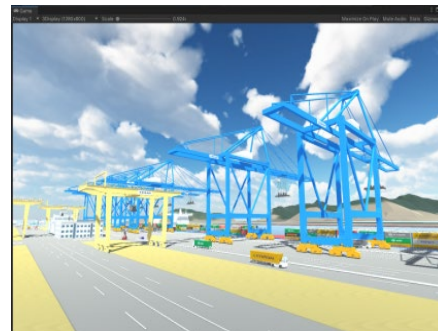


| 접안위치 | 부산항작업량 | 예/도선정보 | 예도선 비용 |
|-------|--------|--------------------------------|---------|
| T1(P) | 3338 | CATMAR, 502 HAT BYONG, 1000TON | 3494150 |
| T2(P) | - | - | - |
| T3(P) | - | - | - |
| T2(P) | - | - | - |
| 예인선배정 | | | 1691060 |

국내 대응 상황 -항만 연계 -부산항 디지털 트윈



국내 대응 상황 -항만 연계 - 부산항 디지털 트윈



- AI 기반 해운 물류 구현을 위해서는 선박-항만 연계 중요
- 어웨어크 AI는 데이터 기반으로 선박의 항만 대기 시간 감소를 통한 탄소 배출 감소 및 항만 운영 효율 향상
- 자율운항선 도입을 위해서는 AI기반 항만 데이터 플랫폼 및 서비스 구축 필요
- 무인/자율 해운 물류 구현을 위해서는 그 중심의 스마트 항만 구축 및 서비스 개발이 핵심 기술임

Thanks for your attention
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