

-AI 기반 해운 · 항만 운영 최적화 -

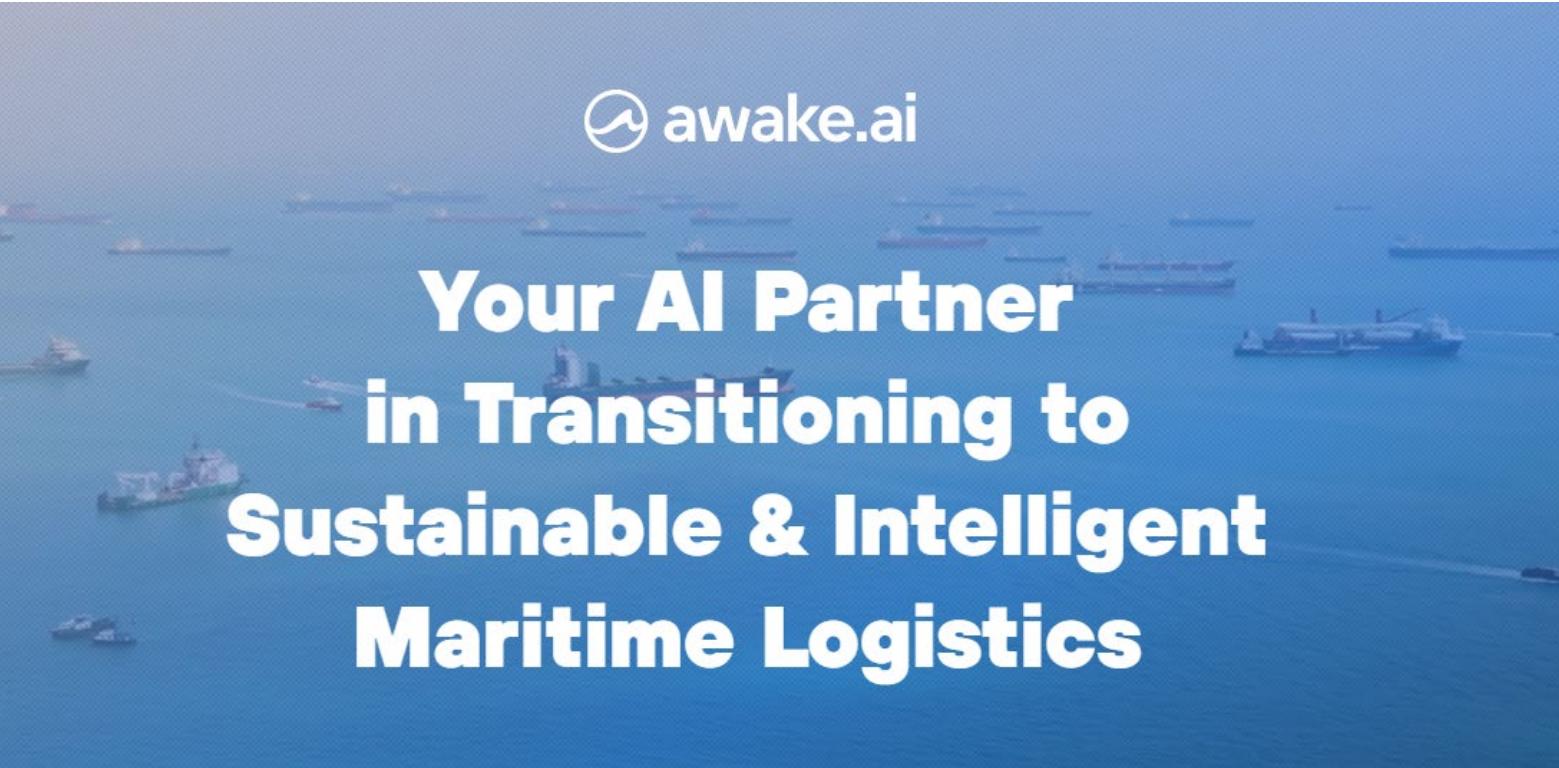
어웨이크 AI가 만드는 해운·항만의 미래

세종대학교 AI로봇학과

김세원



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



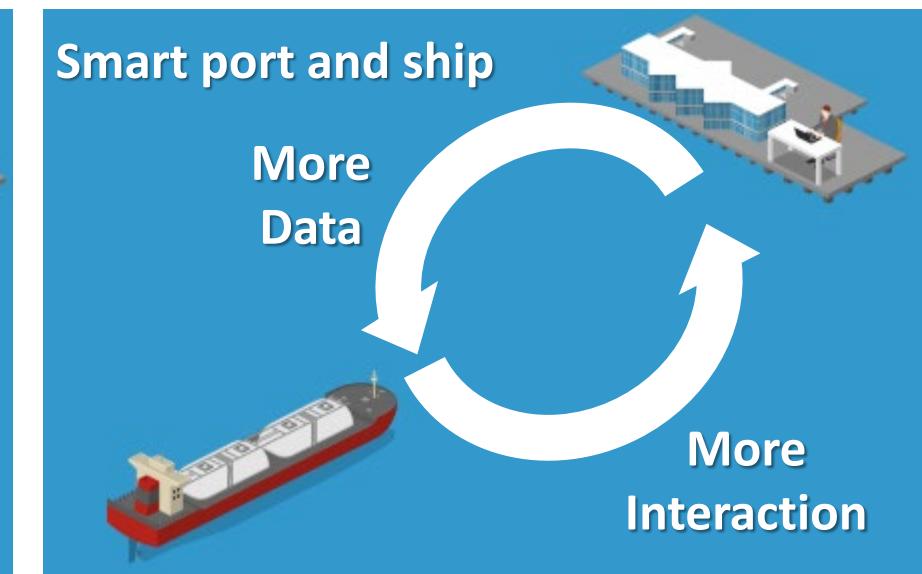
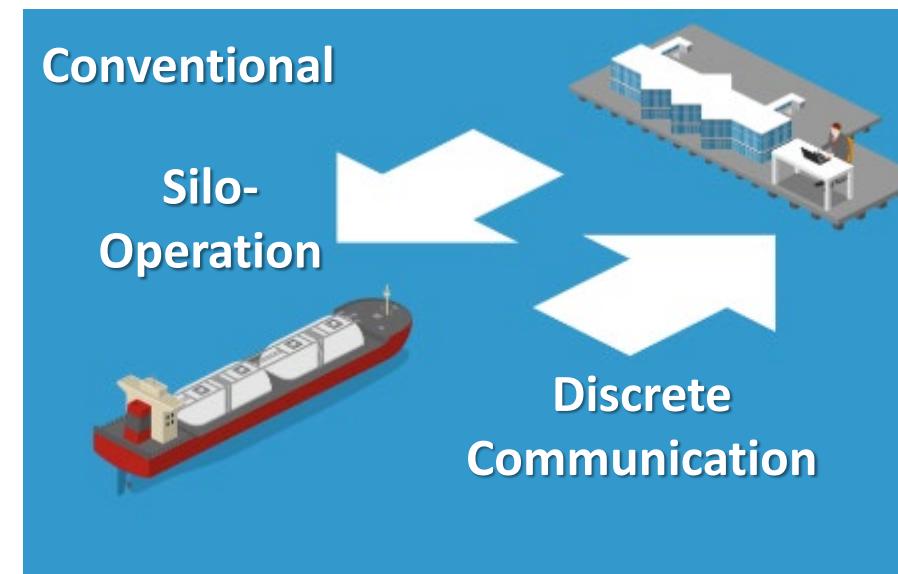
- Awake AI 는 2018년 롤스로이스 자율운항선박 팀 중 Ship-Port 연계 데이터 분석을 하던 팀을 주축으로 창업한 인공지능 기업이다.
- 현CEO (Karno Tenovuo)와 AI 팀을 이끌던 부사장 (Jussi Poikonen)이 주축으로 회사를 설립했으며, 주 서비스는 선박의 예상도착시간(ETA)예측, 항만 연계 최적 운항 속도 제안, 항만 서비스 운영 상황 예측을 제공한다.

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

 **BILLION**
CO₂





자율운항선

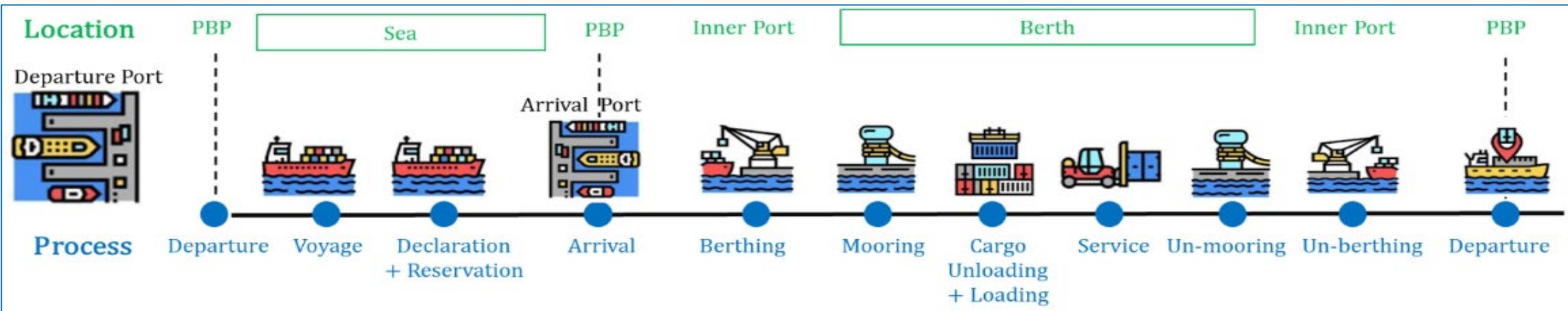


Smart Port

자율 해상 운송 물류 체계 ← 디지털화 선행



자율주행트럭

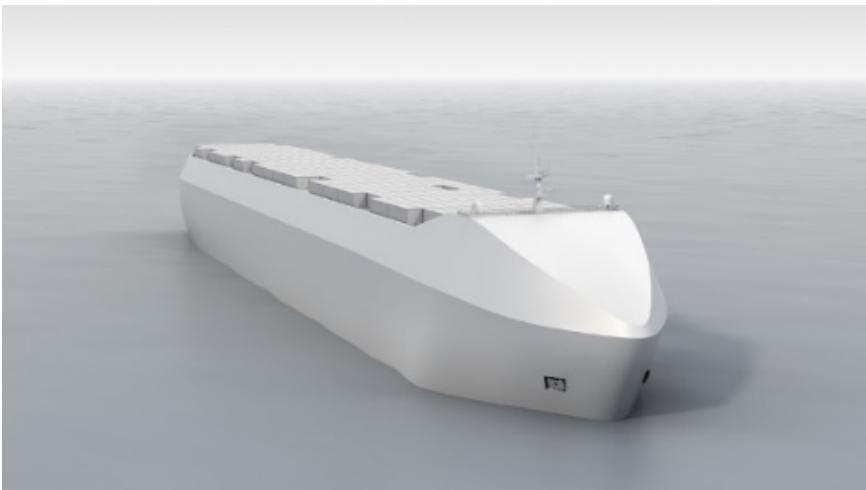


- AI 기반 해상 물류 구현을 위해서는 항만 및 해운 데이터 기반 운영이 필요하며 Awake AI 는 해운물류 데이터 디지털화 및 운영 최적화를 서비스로 제공

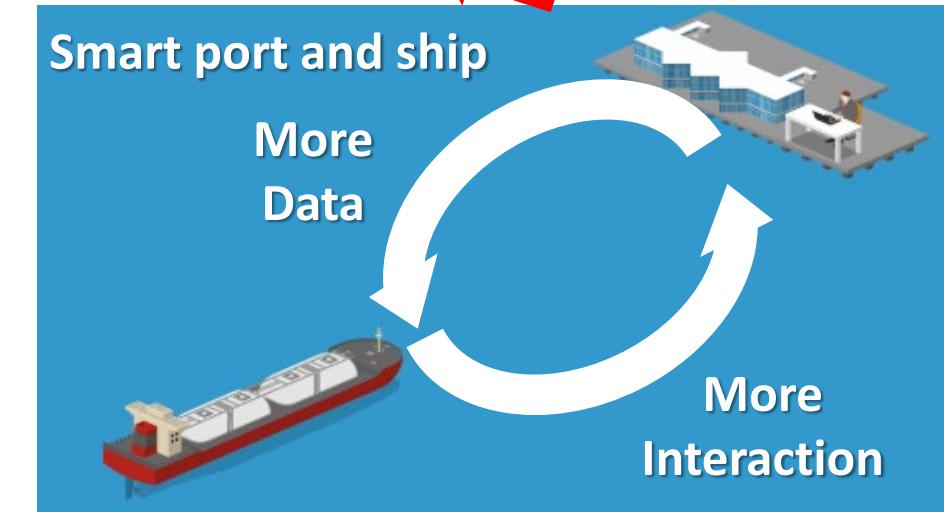
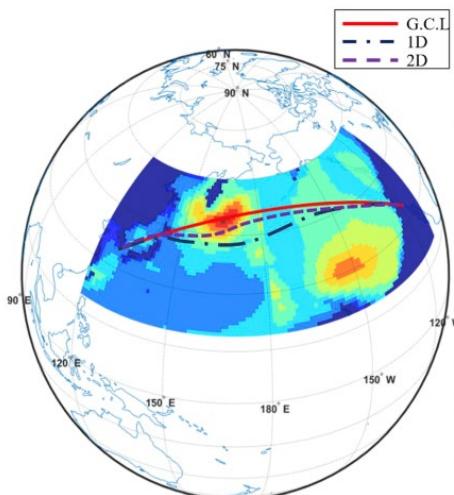
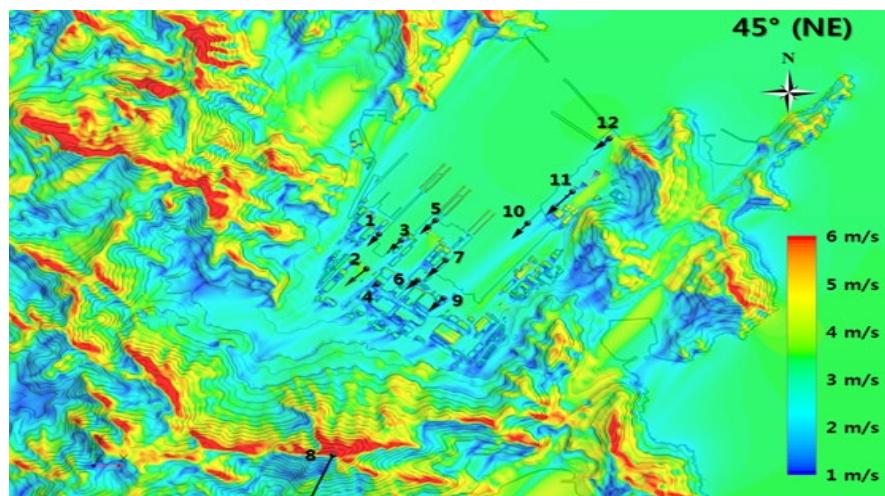


Autonomous Ship Route Planning – Autonomous Navigation

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



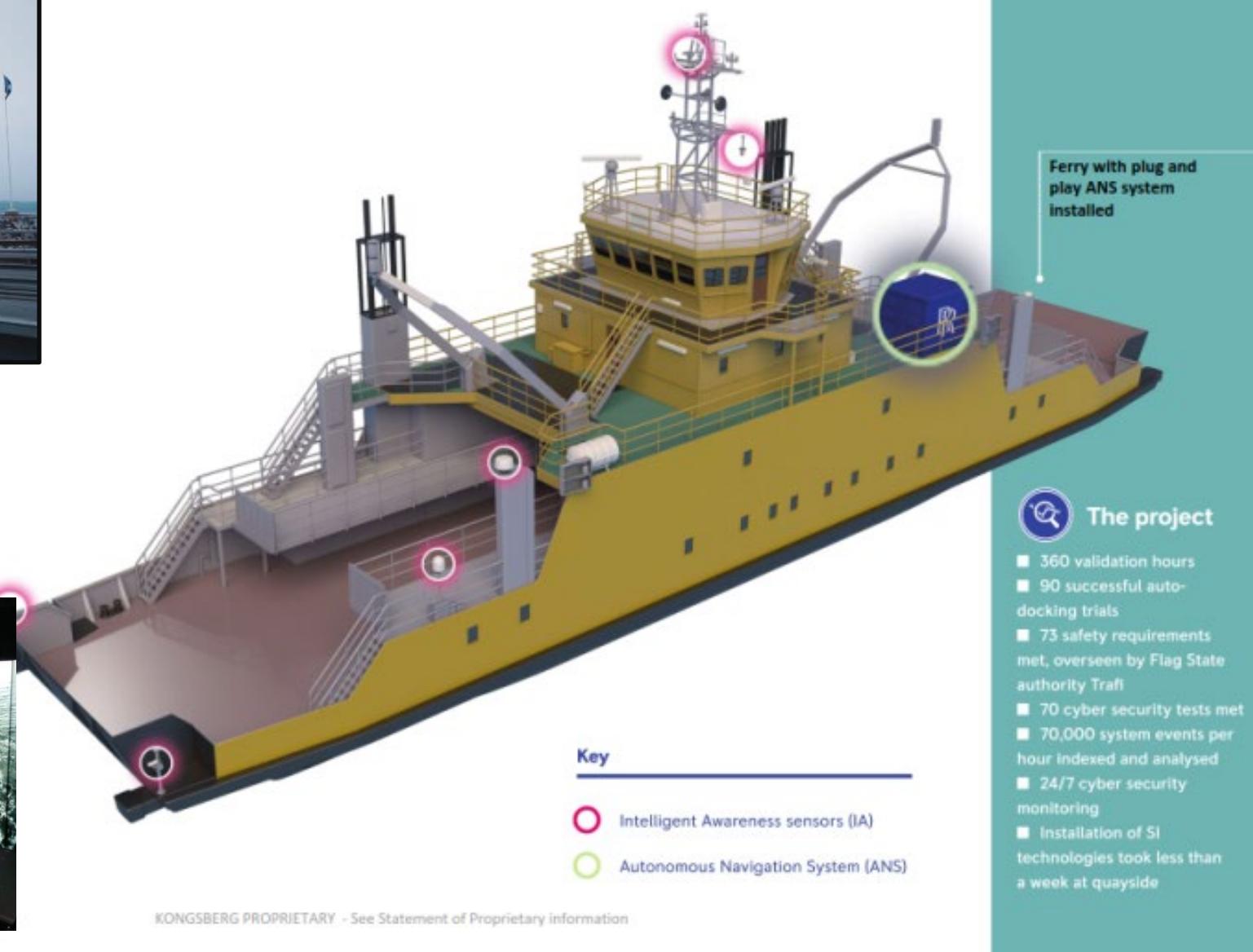
: find optimal speed and heading command of route that satisfy **voyage constraints(voyage period)** with considering weather (wind, wave, current, swell) and ship responses



자율운항선과 Awake AI : SVAN Project



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



Smart Port defined Ship Just in time arrival

Rush and Wait(As-is)



Anchoring



Previous Port

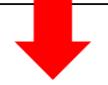
Original RTA of V_2 :
September 22nd
10AM

Changed RTA of V_2 :
September 23rd
8AM



voyage time

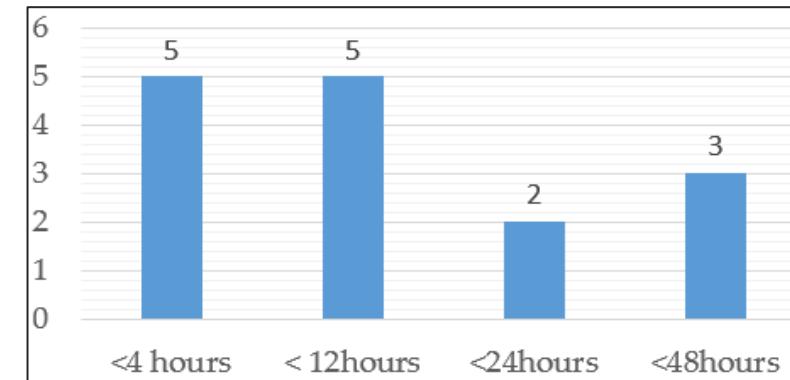
= distance / sailing speed



waiting time

= ATA – Original RTA

- Ship Delay Data - 22.09.21st to 09.30th



Just in time Arrival



Previous Port

Original RTA of V_2 :
September 23rd 8AM



voyage time

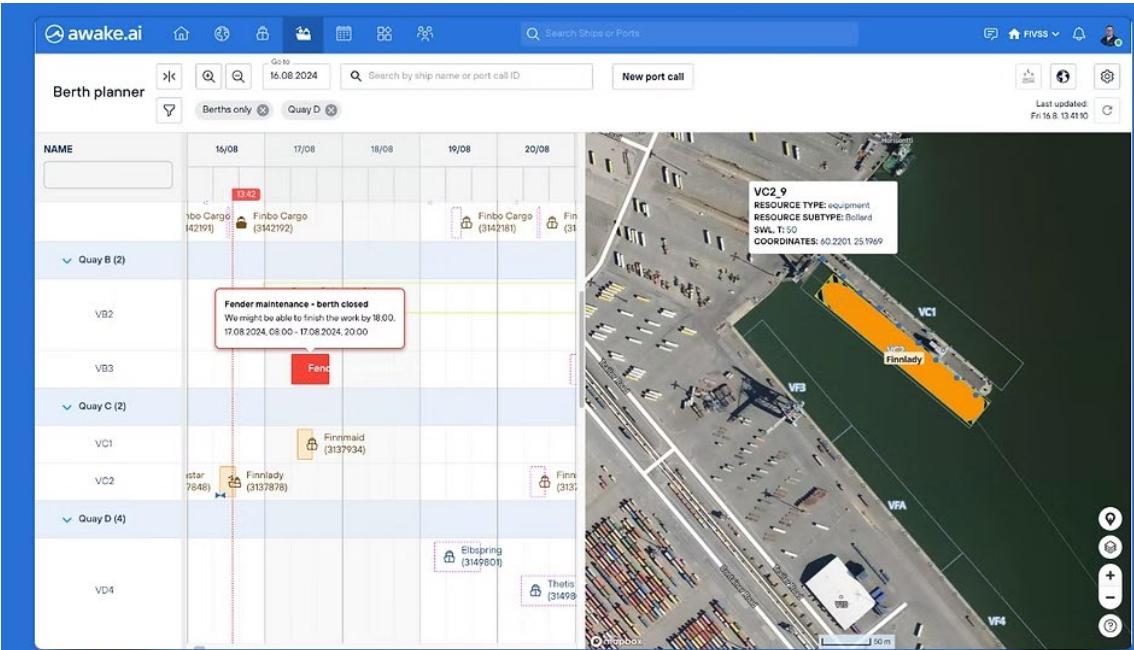
= distance / sailing speed



waiting time

= Changed RTA – Original RTA = 0

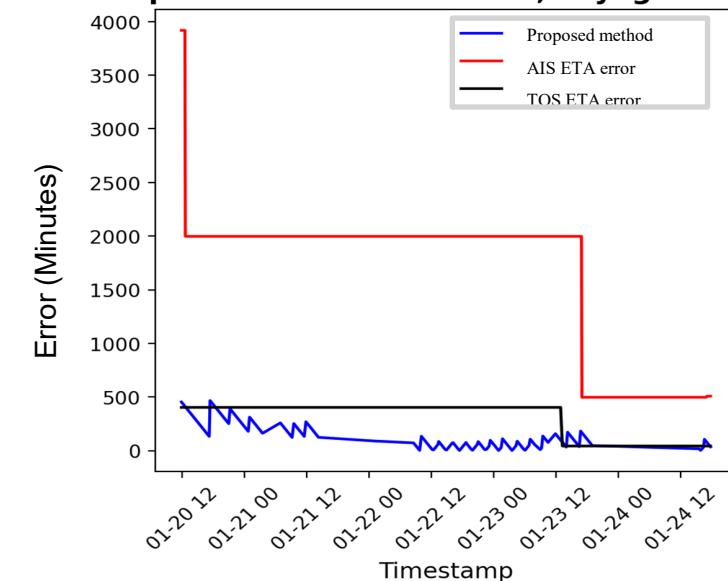
- 대표 솔루션 1: Port Vision



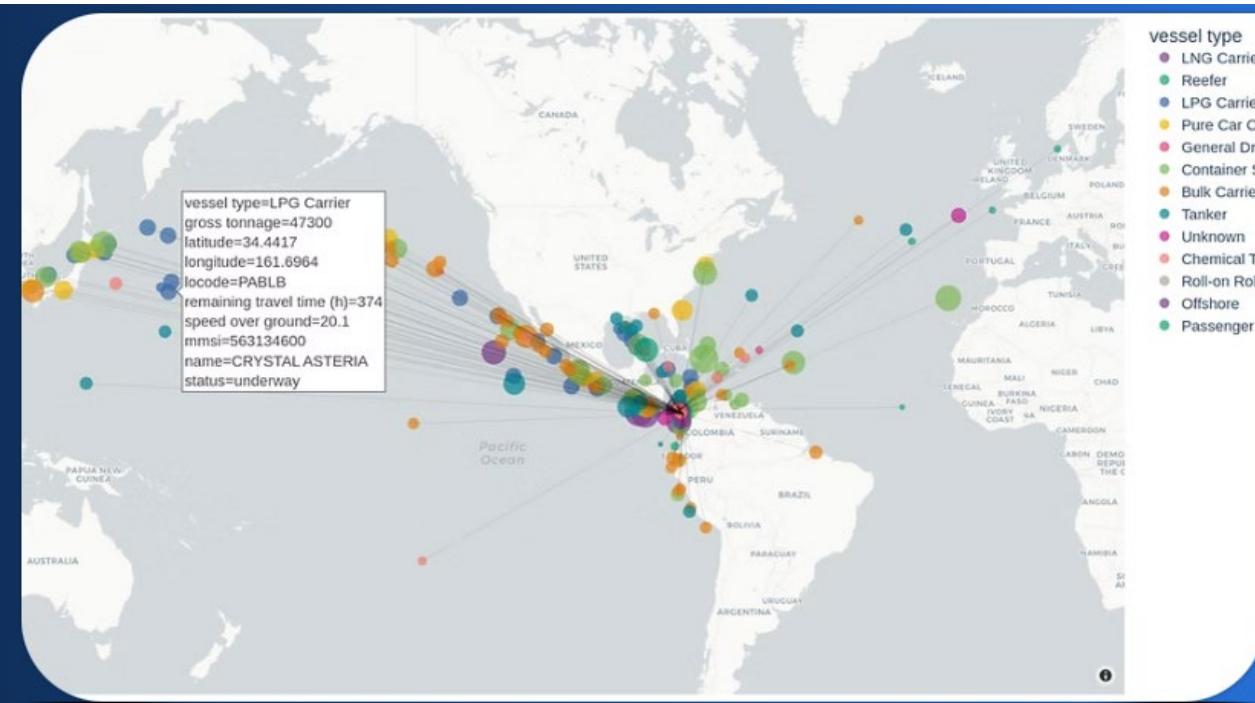
- ✓ Create a visual, safe, and optimized plan for entire port calls.
- ✓ Port call planning becomes faster, smarter, and safer with modern tools.
- ✓ Create a Just-in-Time (JIT) AI-powered port call to save costs, time, and emissions.
- ✓ Share berth plans with stakeholders and enable two-way communication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



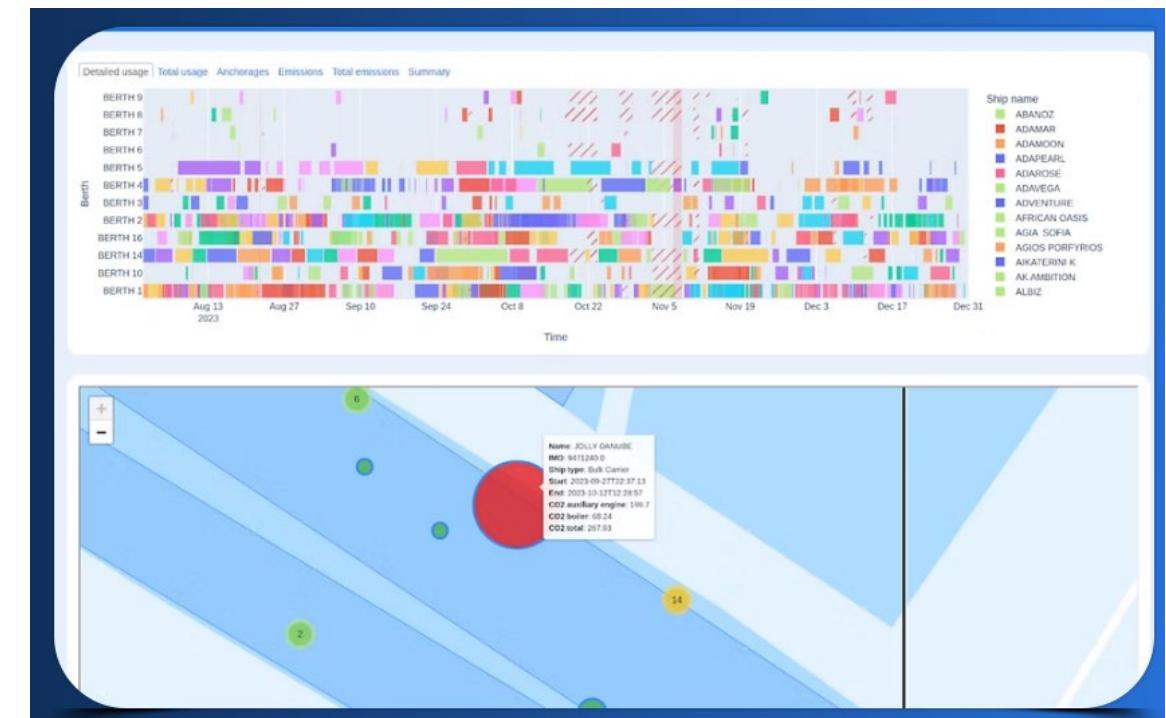
Comparison of MAEs of V010, voyage 2023_01



- 대표 솔루션 2: AI Sea



- Fleet ETA Prediction



- Berth Job Completion Prediction

- 대표 솔루션 2: AI Sea

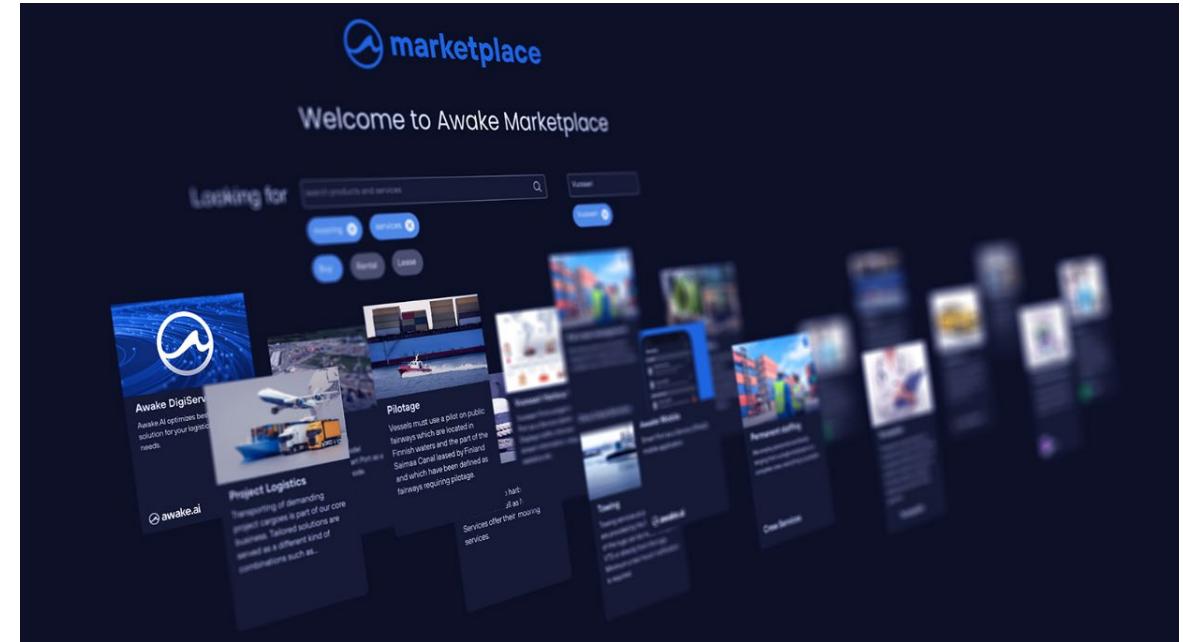


The screenshot shows a map of Europe with a vessel route highlighted by a blue line and red dots indicating port calls. A callout box displays a horizontal bar chart titled "Main Engine CO₂ (MT)" comparing four methods:

Method	Main Engine CO ₂ (MT)
meCo2(ML)	~60
meCo2(Avg,Analytic)	~80
meCo2(CurrentSpeed,Analytic)	~65
meCo2(ServiceSpeed,Analytic)	~95

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



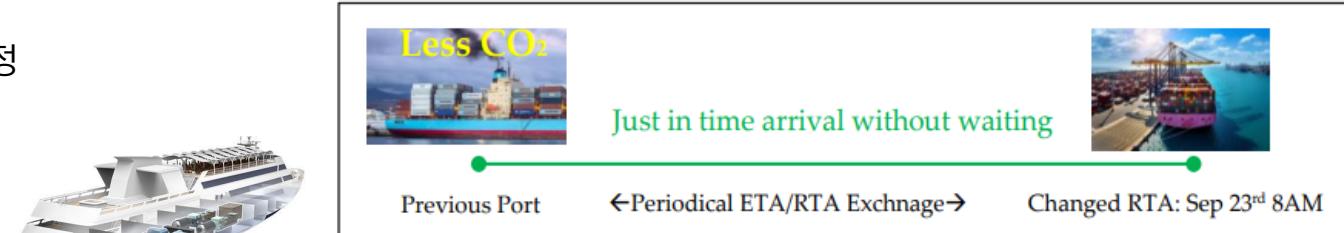
- Market Place is AI Drive Service Platform

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



Step3: 탄소 배출량 산정

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

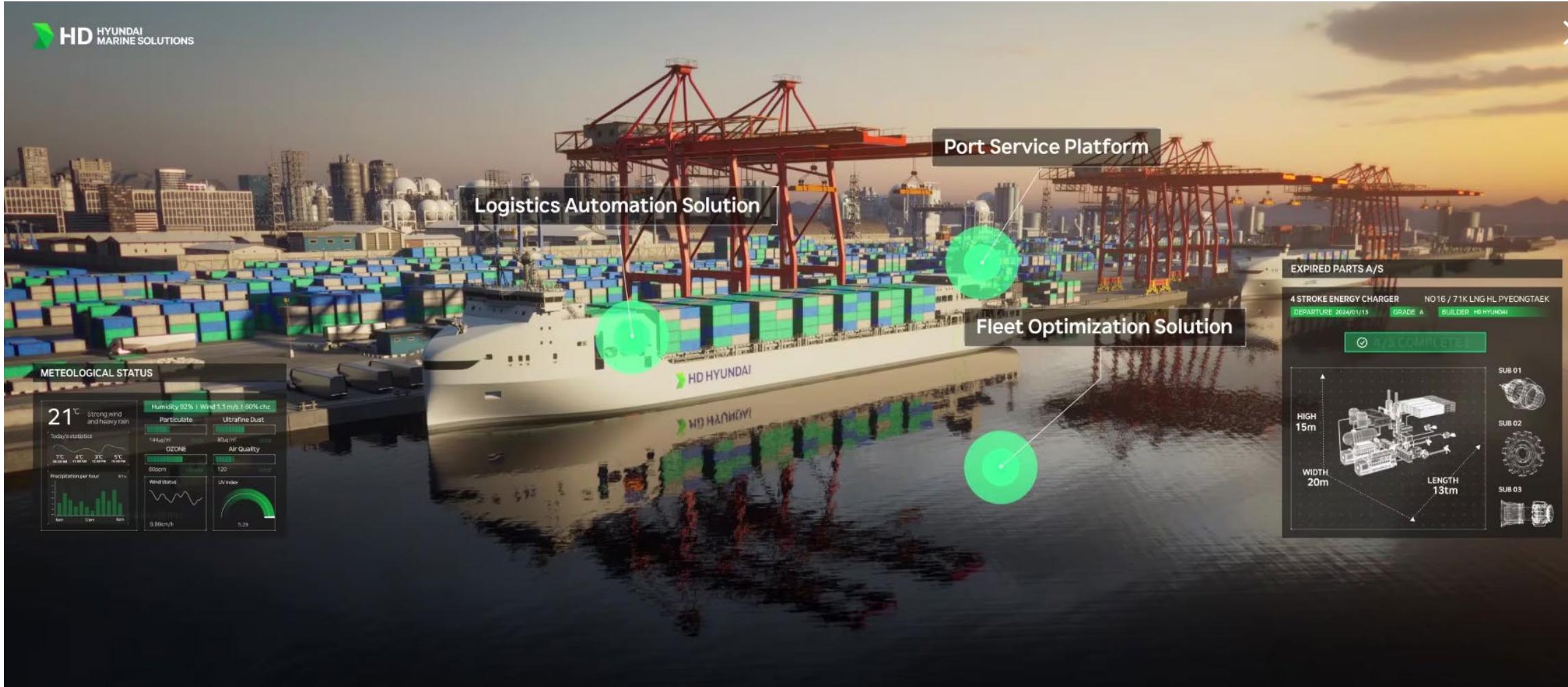
Z: IMO 연도별 저감 지수, Fuel Consumption: 운항 연료 소모

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



국내 대응 상황 2 – HD 현대 마린 솔루션

- 항만 연계 탈탄소 운항 서비스 (오션와이즈)



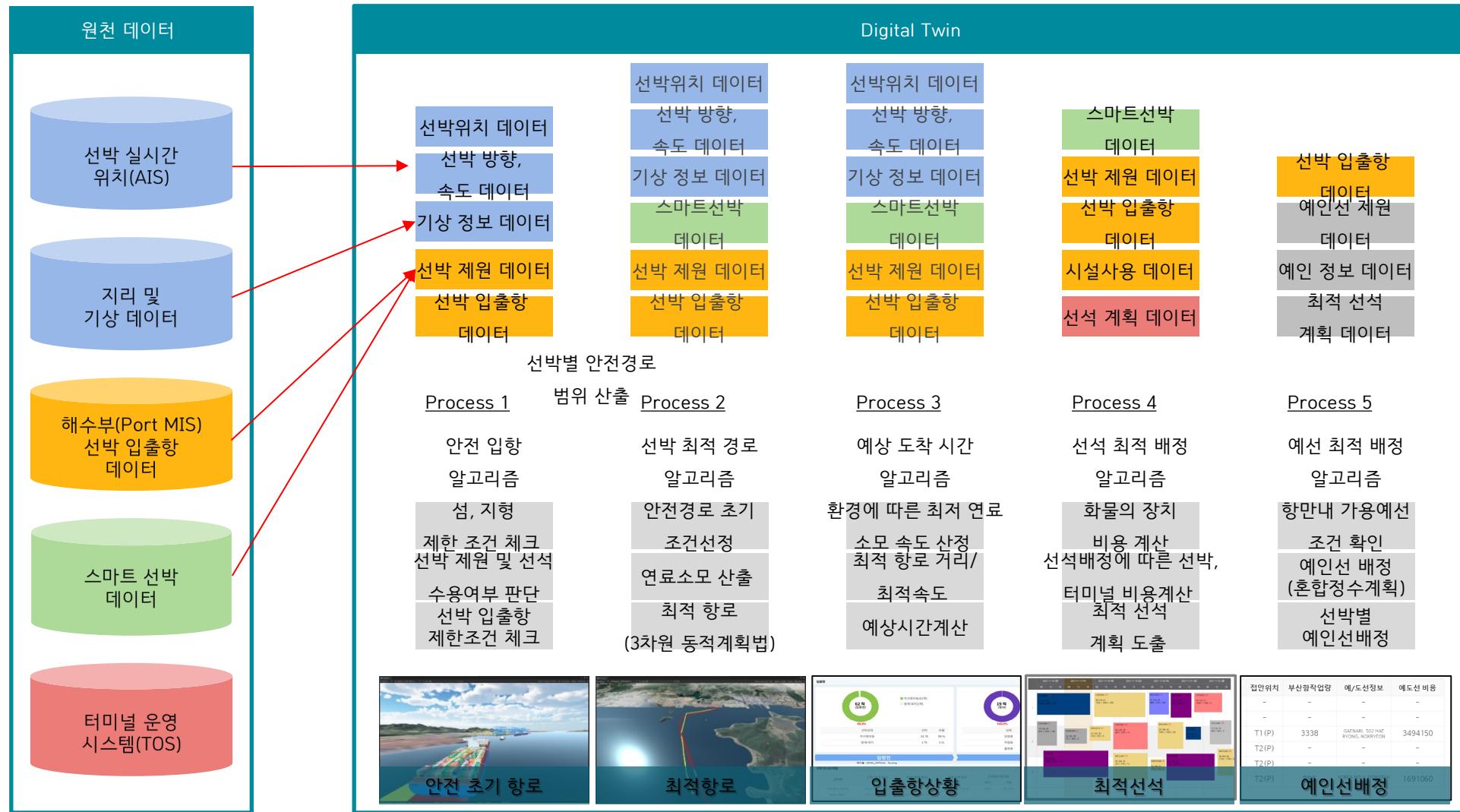
- 출처: 비즈조선 (<https://biz.chosun.com/industry/company/2025/03/31/NUYYSJOVOJCL5JPVHRBXDYI3C4/>)

국내 대응 상황 3 – 부산항 디지털 트윈

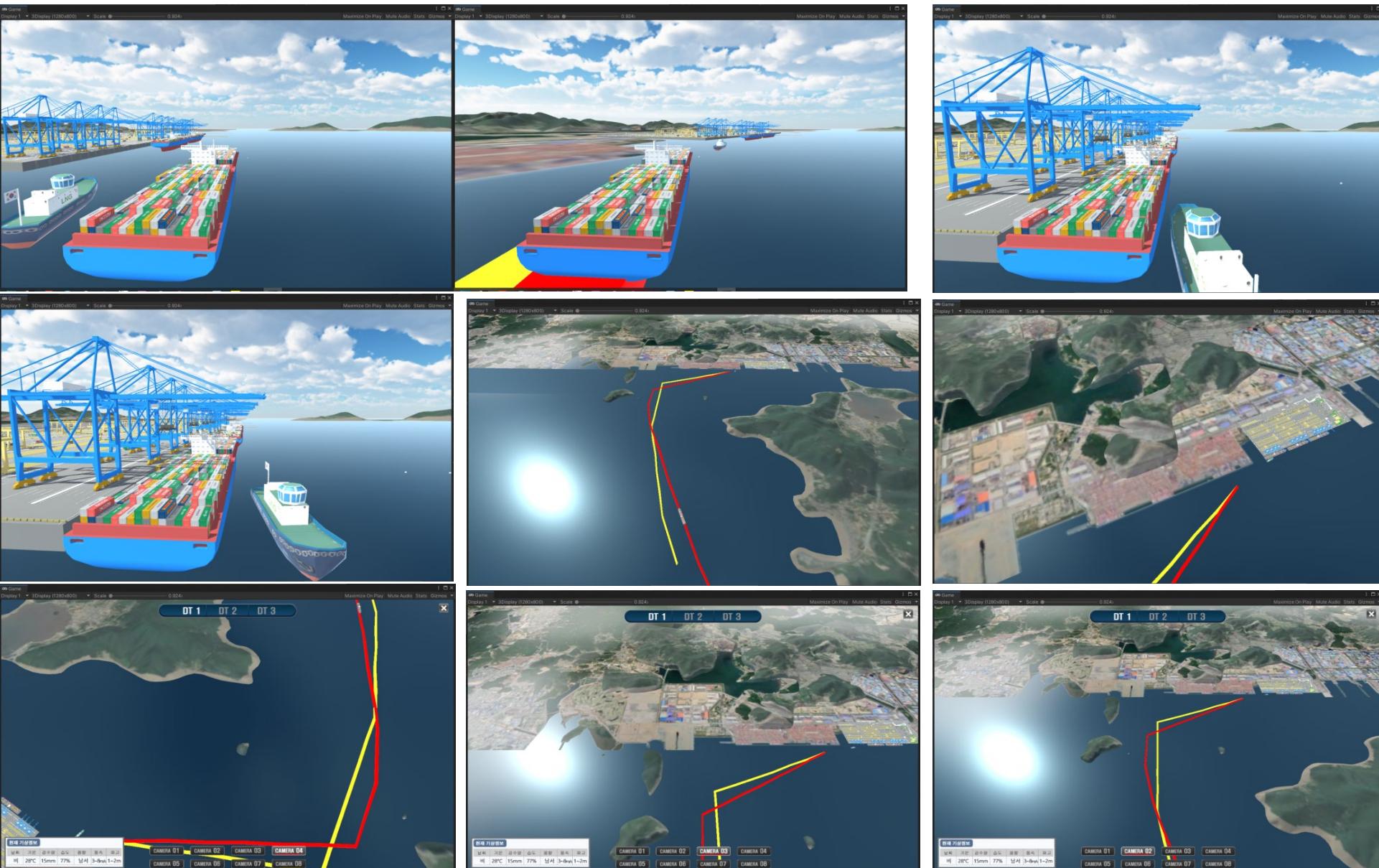
• 부산항 디지털 트윈 - 스마트 항만 플랫폼



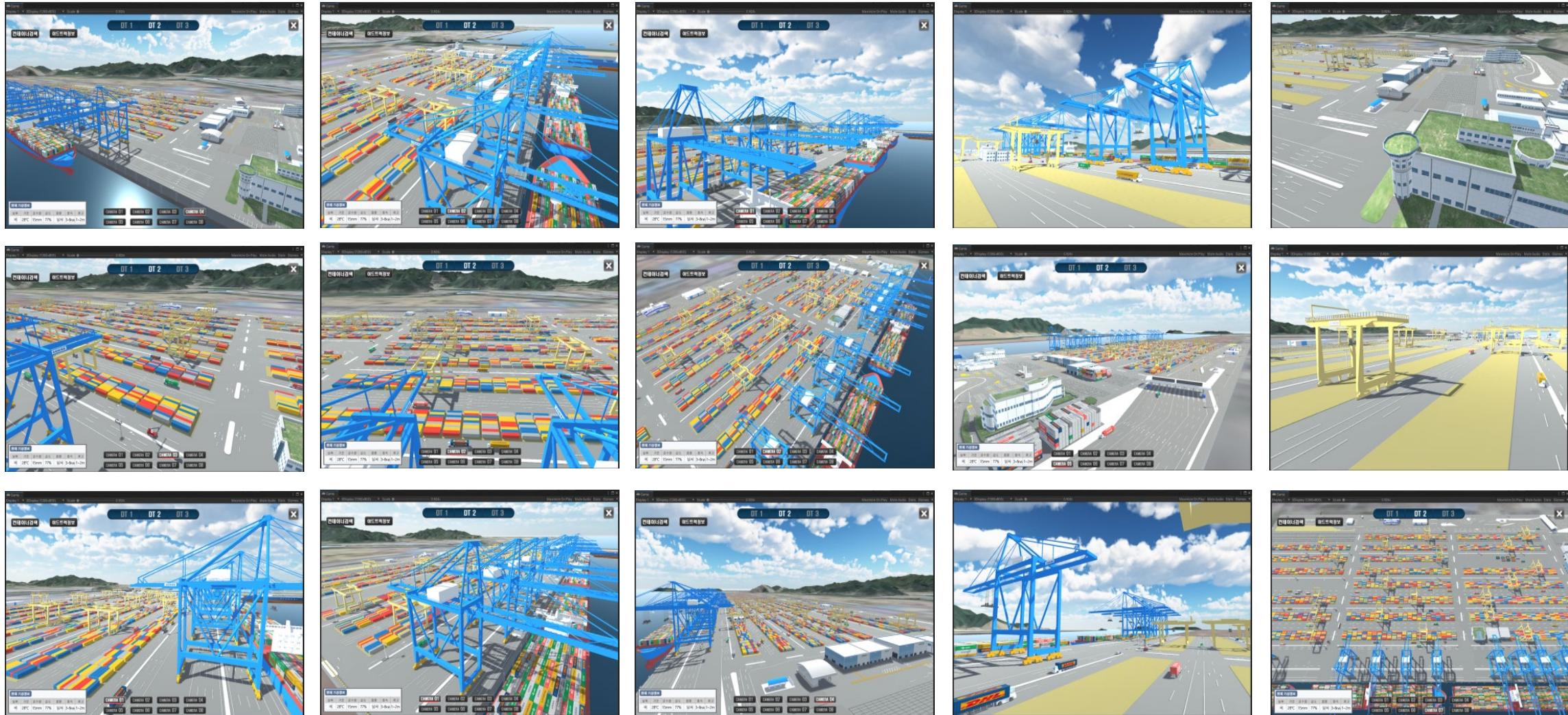
국내 대응 상황 -항만 연계 -부산항 디지털 트윈



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
- 어웨이크 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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