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Texas Technology Task Force

2024 Spring Meeting

February 27, 2024

Today's Agenda

9:00 AM | Welcome & Introductions

9:15 AM | TxDOT and a Vision for Texas' Seaports

9:30 AM | Meet the Texas Seaports: Anchors of the Supply Chain

10:15 AM | Data as a Driver of Port Innovation

10:30 AM | Alternative Energy and the Future of Ports

11:15 AM | Data and Digitization Driving Solutions

11:30 AM | Multimodality and Data Exchange, a Vision for the Future of Ports

12:30 PM | Closing Remarks & Adjourn

TxDOT and a Vision for Texas' Seaports





TxDOT Maritime Division

Geir Eilif Kalhagen

Maritime Division, Director



MRD Goals

Partner to support economic vitality and impact.

Collaborate with stakeholders to identify opportunities and develop solutions system-wide.

Communicate the essential need for investment in Texas ports.





Members

Chris Fisher – Upper Coast Representative, Chairman

Phyllis Saathoff – Upper Coast Representative

Rodger Rees- Upper Coast Representative

Roger Guenther – Port Houston Representative

Walker Smith – Lower Coast Representative

Charles Hausmann - Lower Coast Representative

Sean Stibich – Lower Coast Representative, Vice Chairman

Zach Johnson – Speaker of the House Appointee

Aaron Kocian – Lt. Governor Appointee

Mission

Elevate ports as a vital component of the Texas transportation system and advise the Texas Transportation Commission and Department on matters relating to Texas port needs.

Goals

- Develop the biennial Maritime Port Mission Plan
- Incorporate maritime interests in TxDOT planning activities and documents
- Promote Texas ports for economic development opportunities
- Identify federal, state, or other funding opportunities for maritime investment



Texas ports handle more tonnage than any other state.

629 million total tons



TEXAS PORTS:

Globally Engaging
Our Economy



TEXAS ECONOMY

\$449.6 billion

UNITED STATES ECONOMY

\$1.3 trillion

TEXAS PORTS CREATE JOBS, INCOME AND WAGES



128,000 direct jobs
1.8 million total jobs



\$8.7 billion direct income
\$285.7 billion total income

The Economic Impacts of the Texas Ports on the State of Texas, Texas Ports Association, 2018



PORT AUTHORITY ADVISORY COMMITTEE

2024-2025 TEXAS PORT MISSION PLAN

88TH LEGISLATIVE SESSION



Seaport Connectivity
Port Connectivity Report

**\$40M investment in
2024-2025 biennium**

**\$180 million
provided since 2015**



Maritime Infrastructure
Port Capital Investment Report

\$200M appropriated

**Historic first-time
funding from 88th
Legislature**



Ship Channel Improvement
Ship Channel Report

**\$400M allocated by
the legislature**

**Historic first-time
funding from 88th
Legislature**

Seaport Connectivity Program (SCP)



Formerly: Port Access Improvement (Rider) Program



Port of Victoria
Weaver Rd. & FM 1432



Port of West Calhoun
Long Mott Road



Port of Corpus Christi
Rincon Road

Goals: Improve Connectivity, Enhance Safety, Relieve Congestion

Growth: Requests have grown from \$25 million in 2015 to nearly \$91 million in 2023.

- Widen “last mile” roads leading to ports
- Improve safety at intersections
- Add truck queuing lanes in high-traffic areas

- Replace structurally-deficient bridges
- Create multimodal queuing areas
- Improve signage and gates at rail crossings



Formerly: Port Capital Investment Program

News And Media

HOME >> NEWS AND MEDIA >> PORT OF VICTORIAS RAIL PROJECT TO SUPERCHARGE ECONOMIC GROWTH

Port of Victoria's Rail Project to Supercharge Economic Growth

6 NOV 2023 News

The Port is on the verge of receiving over \$27.9 million in grants, with 610 acres under option and advanced negotiations for an additional 175 acres. The timeline for Phase 1 of the project is set: it will kick off in the first quarter of 2024 and is expected to wrap up within a year. Over 42,000 feet of track will be added during this phase, including construction of three 10,000-foot drop and pull tracks.

Port of Brownsville secures \$11.5 million TxDOT grant to reconstruct Cargo Dock 3

Funding comes from TxDOT's new Maritime Infrastructure Program, which the Legislature funded with a \$200 million appropriation during the 88th legislative session.

Goals: Enhance international trade and security, promote cargo flow, increase passenger movements, increase port revenues, and provide economic benefit to the state

Growth: Historic 1st time funding of \$200 million.

\$1.7 billion of projects submitted for consideration of funding

- Equipment purchases
- Dock improvements
- Warehouse construction

- Wharf upgrades
- Railyard flyovers
- Bulkhead improvements

Ship Channel Improvement Revolving Fund (SCIRF)



The Ship Channel Improvement Revolving Fund (SCIRF) was established by the Legislature in 2017.



It provides low-interest loans to local sponsors of congressionally authorized ship channel improvement projects to deepen or widen the channel.



SCIRF Eligible Ship Channel Improvement Projects

Ship Channel	Project Cost (\$M)	Local Share (\$M)
Sabine-Neches Waterway	\$1,400	\$550
Cedar Bayou Navigation Channel	\$52.8	\$5.3
Houston Ship Channel	\$669.4	\$314.6
Galveston Harbor Channel	\$13.4	\$2.6
Freeport Harbor Channel	\$324.6	\$152.6
Matagorda Ship Channel	\$218.3	\$54.6
Corpus Christi Ship Channel	\$681.6	\$265.8
Brazos Island Harbor Deepening	\$302	\$114.7

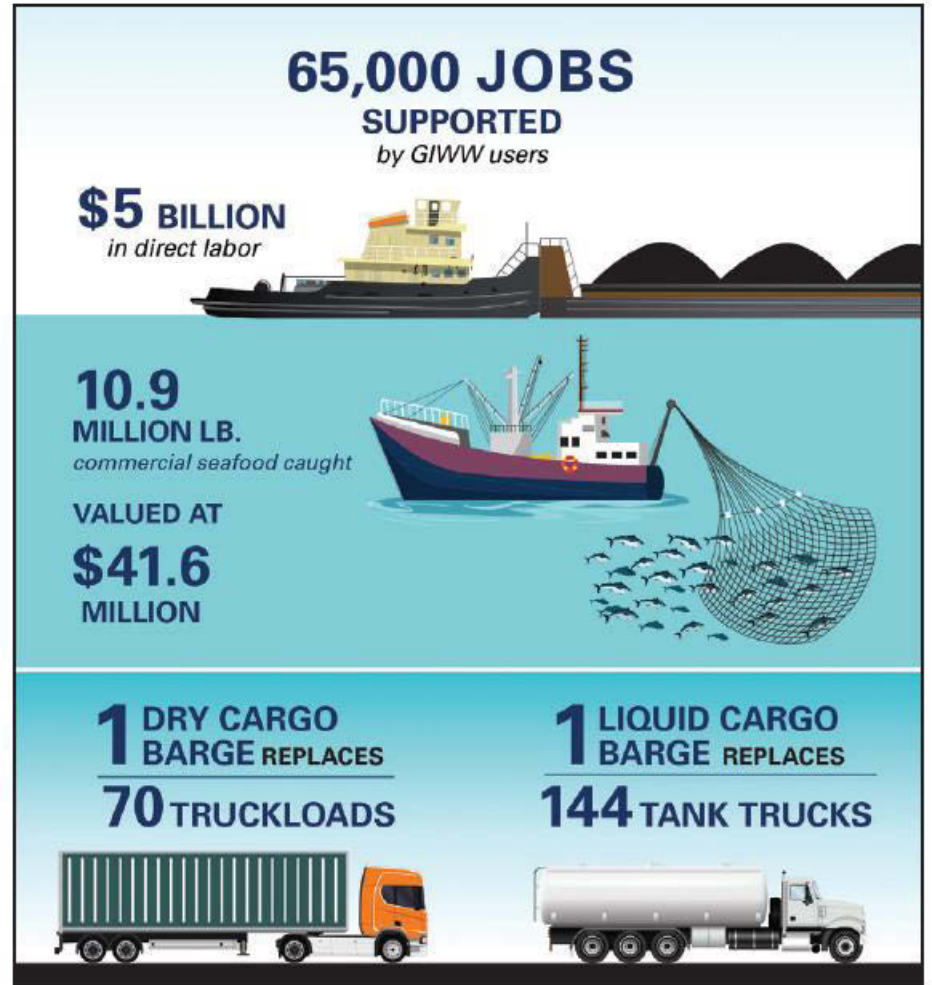
Gulf Intracoastal Waterway in Texas (GIWW-T)



- Runs along the coast from the Louisiana border to Mexico
- Provides a waterborne connection between ports along the coast
- Texas Marine Highways:
 - Relieves landside congestion
 - Reduces wear & tear
 - Reduces air emissions
 - Improves safety
 - Mitigates trucker shortage



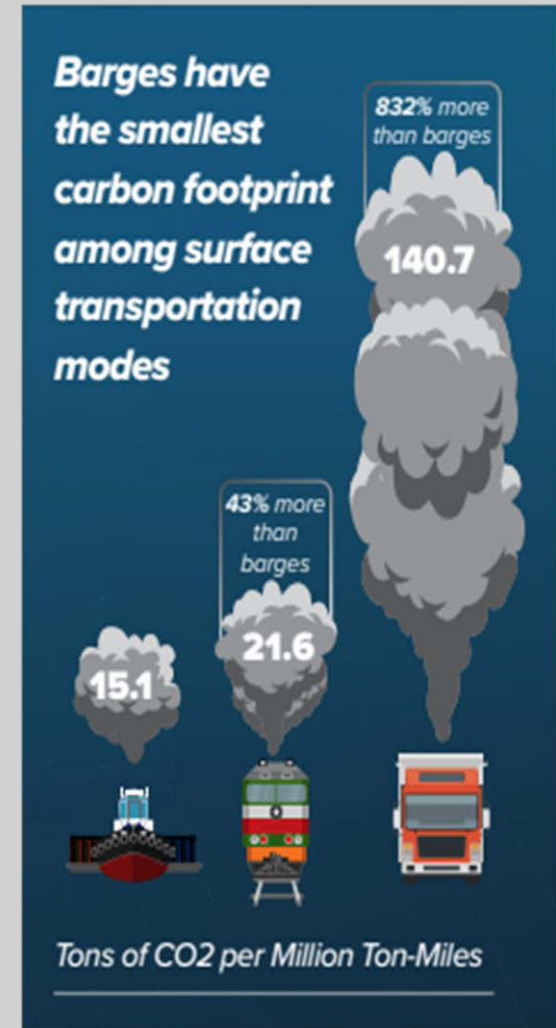
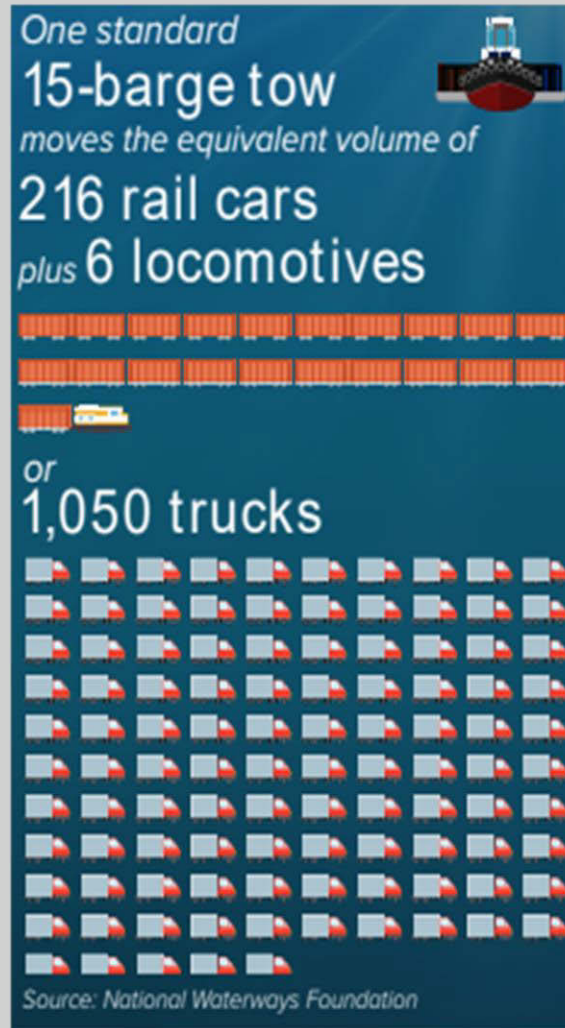
GIWW-T Benefits to Texas



Source: Texas A&M Transportation Institute and Texas Parks and Wildlife Coastal Fisheries Division



- Feasibility study underway to determine potential for container-on-barge service in Texas
- Will determine:
 - Which ports are interested in acquiring or providing infrastructure
 - Competitiveness with other freight transit modes
 - Optimal locations for C-O-B service





Pierce Marsh Restoration



Causeway Bird Island





Questions?

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**Meet the Texas Seaports:
Anchors of the Supply Chain**



Data as a Driver of Port Innovation



U.S. Department
of Transportation

Office of Multimodal Freight Infrastructure and Policy

Texas Technology Task Force

February 27, 2024

Allison Dane Camden

Deputy Asst. Secretary for

Multimodal Freight Infrastructure and Policy

Chandra Bondzie

Deputy Director, Infrastructure

Operations

Biden Administration's Supply Chain Initiatives in Response to Pandemic's Disruptions

Executive Order 14017 on America's Supply Chains (Feb. 2021)

Launch of Freight Logistics Optimization Works (FLOW) (March 2022)

Implementing the BIL's generational investments in ports, highways, and other transportation infrastructure



USDOT Office of Multimodal Freight Infrastructure and Policy

Purposes:

Carry out national multimodal freight policy

Develop and manage the National Freight Strategic Plan and the National Multimodal Freight Network

Administer and oversee certain multimodal freight grant programs

Conduct research on improving multimodal freight mobility and oversee the freight research within the Department

Provide input to the Bureau of Transportation Statistics regarding freight data and planning tools

Promote and facilitate the sharing of freight information between the private and public sectors

Oversee the development and updates of State freight plans

Assist cities and States in developing freight mobility and supply chain expertise

Assist States in the establishment of freight advisory committees and multi-State freight mobility compacts



National Multimodal Freight Network

- Network of the most strategic highways, railways, waterways, ports and airports to support goods movement.
- Foundation for ensuring the US can compete in the global economy.
- Support states and locals in strategically directing resources toward an improved multimodal freight system.
- Inform freight transportation planning.
- Assist in the prioritization of federal freight investments.
- RFI in the Federal Register soon. Goal to designate network by end of 2024.





Industry and government are building a forward-looking, integrated view of supply chain conditions in the United States, together.

TAKE A CLOSER LOOK AT FLOW

The Freight Logistics Optimization Works (FLOW) program is a community of supply chain stakeholders that share individual logistics data with the U.S. Department of Transportation and in return receive an aggregate, anonymous, and holistic view of the relationship between incoming containers (demand) and the available assets to move containers (supply) at a given supply chain node.

The program is voluntary, and data shared with FLOW is secure, subject to the Confidential Information Protection and Statistical Efficiency Act (CIPSEA), and analyzed by the Bureau of Transportation Statistics.



FLOW

What Data Are Available



Future incoming
container demand
up to 3 months
in advance



Total capacity and
daily available
terminal slots
at ports



Daily chassis
and tractors
available to
transfer containers



Total capacity and
daily available
warehouse space



Q & A

Thank you!

Contact information:

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Alternative Energy and the Future of Ports

Data and Digitization Driving Solutions



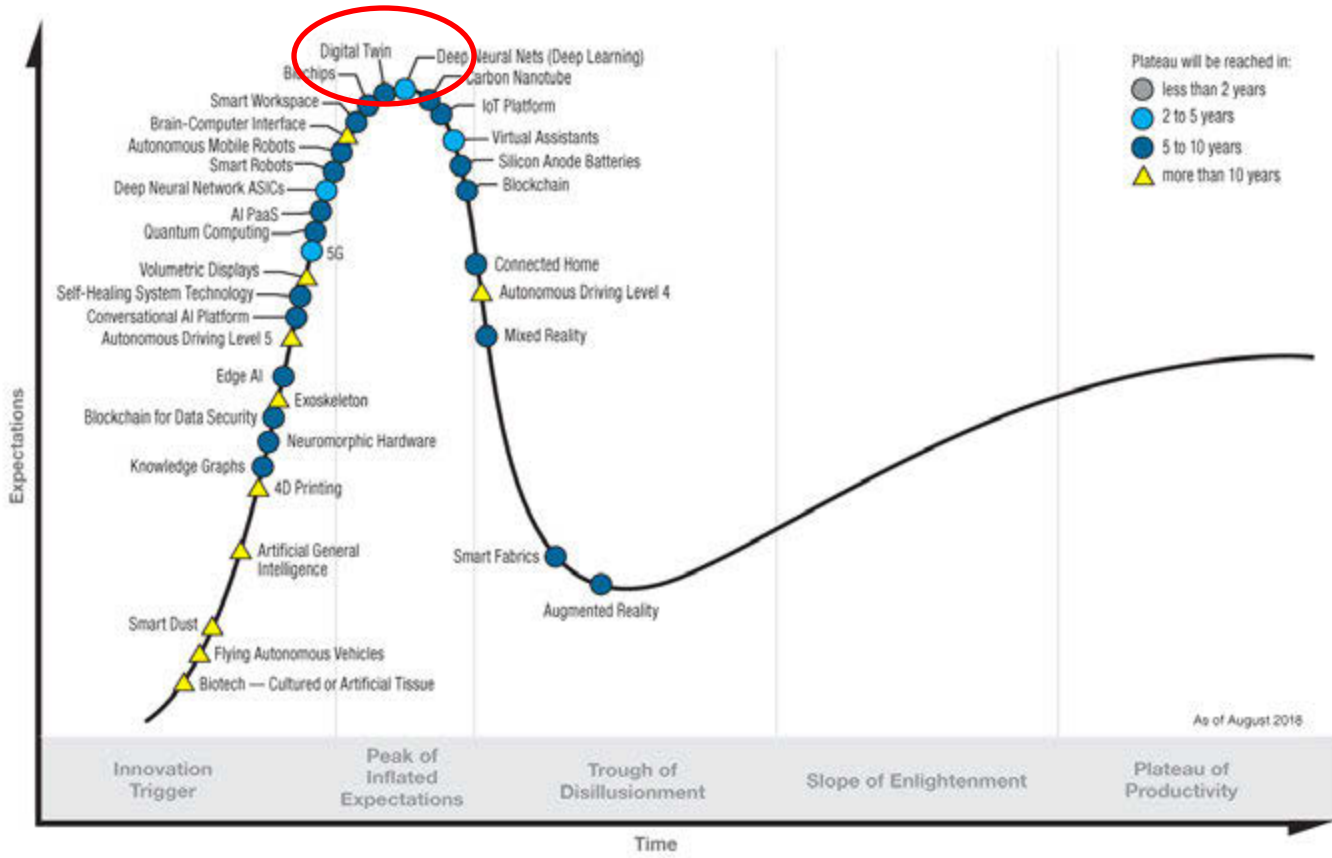
Applications of Digital Twins for Ports


Terry Bills
Global Transportation Director



Gartner Hype Cycle for Digital Twins

Hype Cycle for Emerging Technologies, 2018





“...to truly drive value from digital twins, CIOs will need to work with business leaders to develop economic and business models that consider the benefits in light of the development costs, as well as ongoing digital twin maintenance requirements.”

Alfonso Velosa, Research Vice President at Gartner

Rules for Successful Digital Twins

- Be Clear on Business Requirement
- Start Small and Expand Over Time
- Plan for End to End (Comprehensive) Business System Integration
- Incorporate Data Governance From the Beginning

Problems that Digital Twins solve



Historical record or baseline



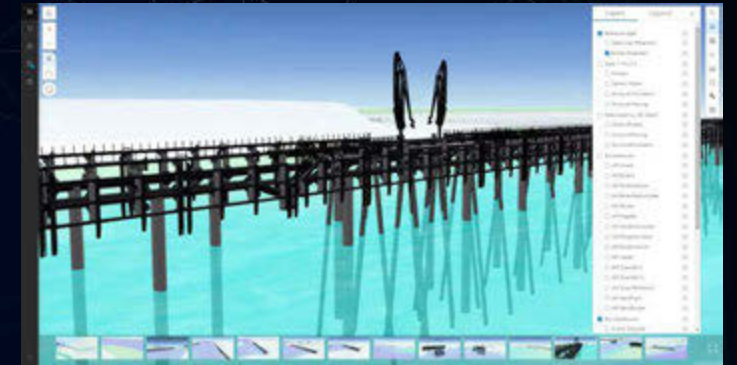
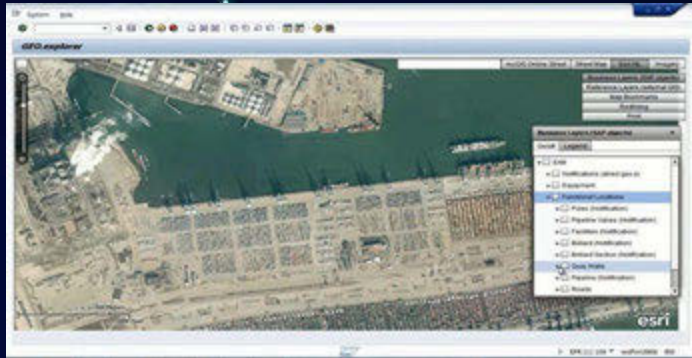
Operational performance monitoring



Testing or predicting future outcomes



Data Capture / Integration





Reality Mapping & Data Integration

Managing, Integrating & Applying All Types of
3D Content Creating Accurate 3D Representations

Reality Mapping

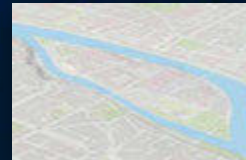
- Drone, Aerial & Satellite
- DSM & DTM
- True Ortho
- 3D Mesh & Point Cloud



Any Scale & Extent

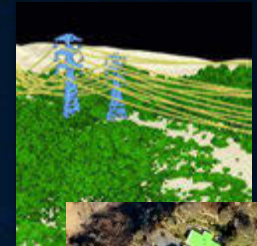
Data Management

- All Formats & Types
- Cached, Tiled & Dynamic
- Open Standards (STAC)
- Massively Scalable
- Highly Performant



Capabilities

- Point Cloud Classification
- Feature Extraction
- Object Classification
- 3D Meshes
- Change Detection
- Simulations
- Game Engine Integration



Elevate 2D schematic data to 3D with Reality Capture - in real time

build 3D interaction from 2D data

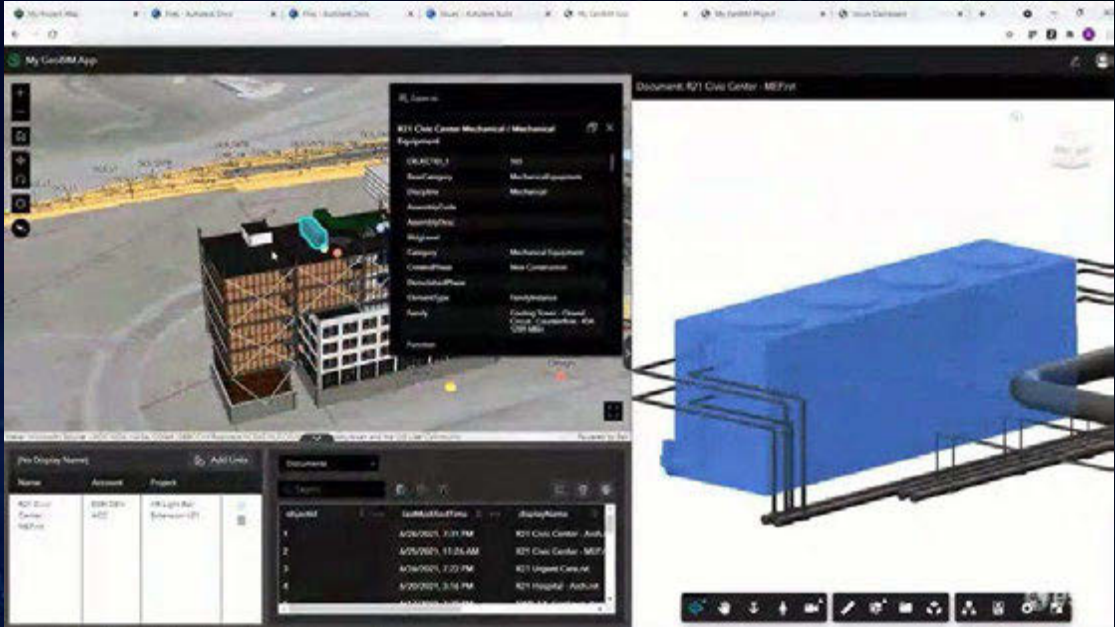


Layers Legend X

- FFM_Public Transport
- FFM_POIs
- FFM_BuildingFootprints
- Frankfurt 3DMesh SURES-0 - Mesh
- FFM_Specified_Trees
- FFM_Buildings_incl_ZAttribute
- TrueOrtho_Frankfurt_SURES-0_TOP ...
- Frankfurt_DSM



Data Visualization / Analysis



VIRTUAL PORT USE CASES

Virtual Port is a digital transition project that's key objective is to provide a single digital point of entry to cross-platform business information and facilitate digital ways of working. Virtual Port will be available on any Southern Ports desktop and mobile device and to every staff member.

EXECUTIVE

- Summary reporting and dashboards
- Departmental statistics
- Operational awareness
- Stakeholder engagement



SAFETY

- Incident Response
- Live traffic management
- Inspection mapping
- Incident mapping and analysis
- Geo-fencing
- Virtual inductions



SECURITY

- Live monitoring & dashboards
- Automated change detection
- Robotics control



ENVIRONMENT

- Live monitoring and dashboards
- Plume modelling
- Spatial analysis
- Automated reporting
- Open data



ASSET MANAGEMENT

- State of the asset visualisation
- Historical maintenance records
- Live equipment health monitoring
- Digital and live condition assessment
- Integrated drawing management
- AI failure prediction



PROJECTS & PLANNING

- Spatial planning and scheduling
- Contractor management
- Progress reporting
- Trade forecasting



MARINE

- Real time weather and ocean
- Real time shipping
- Channel condition
- Nav aid monitoring



ENGINEERING

- Real time monitoring (eg strain)
- Tenders, estimating and scheduling
- Condition visualisation
- Consultant management



MAINTENANCE

- Equipment Tracking
- Task management
- Work order logging and completion
- Digital inventory
- Defect mapping



OPERATIONS

- Real time customer information delivery
- Real time shipping current and planned
- Shutdown planning
- Trade forecasting and simulation
- Mooring modelling



Asset Information – Asset Health

Virtual Port

- Albany 2D
- Albany 3D
- Bunbury 2D
- Bunbury 3D
- Esperance 2D
- Esperance 3D**



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Asset Information – Asset Health

Virtual Port

Albany 2D

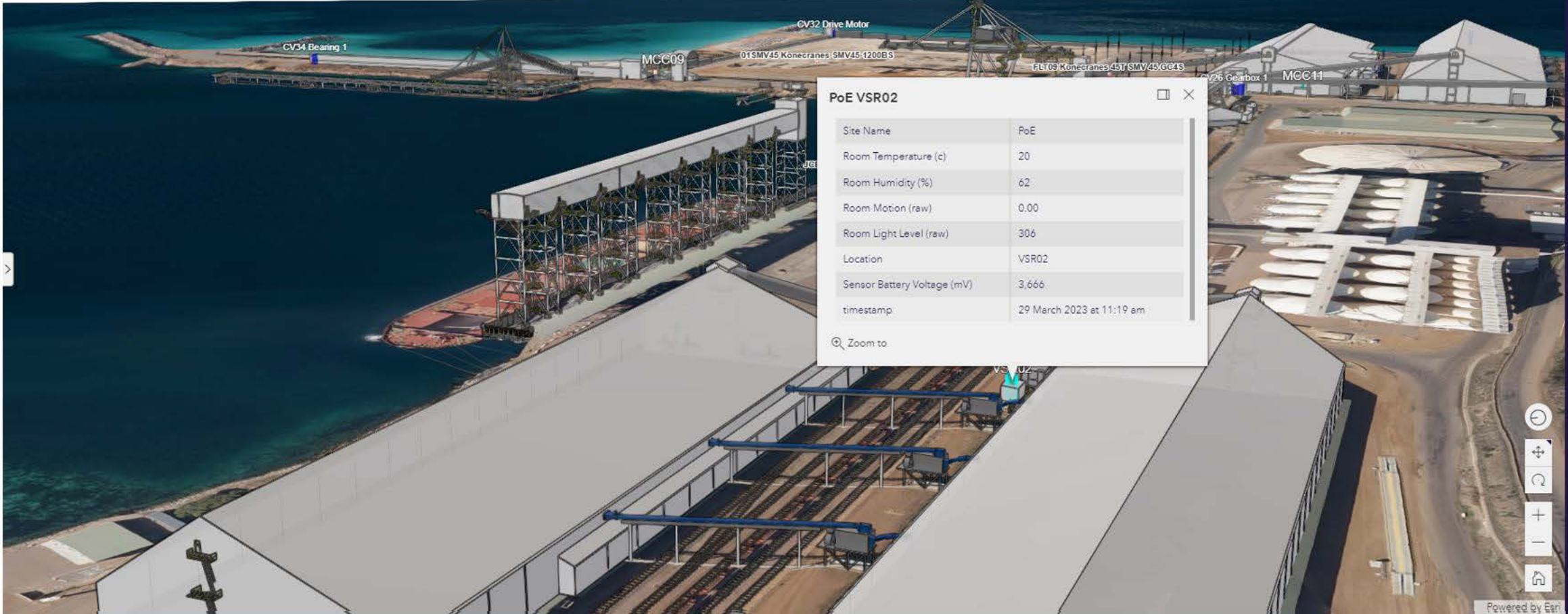
Albany 3D

Bunbury 2D

Bunbury 3D

Esperance 2D

Esperance 3D

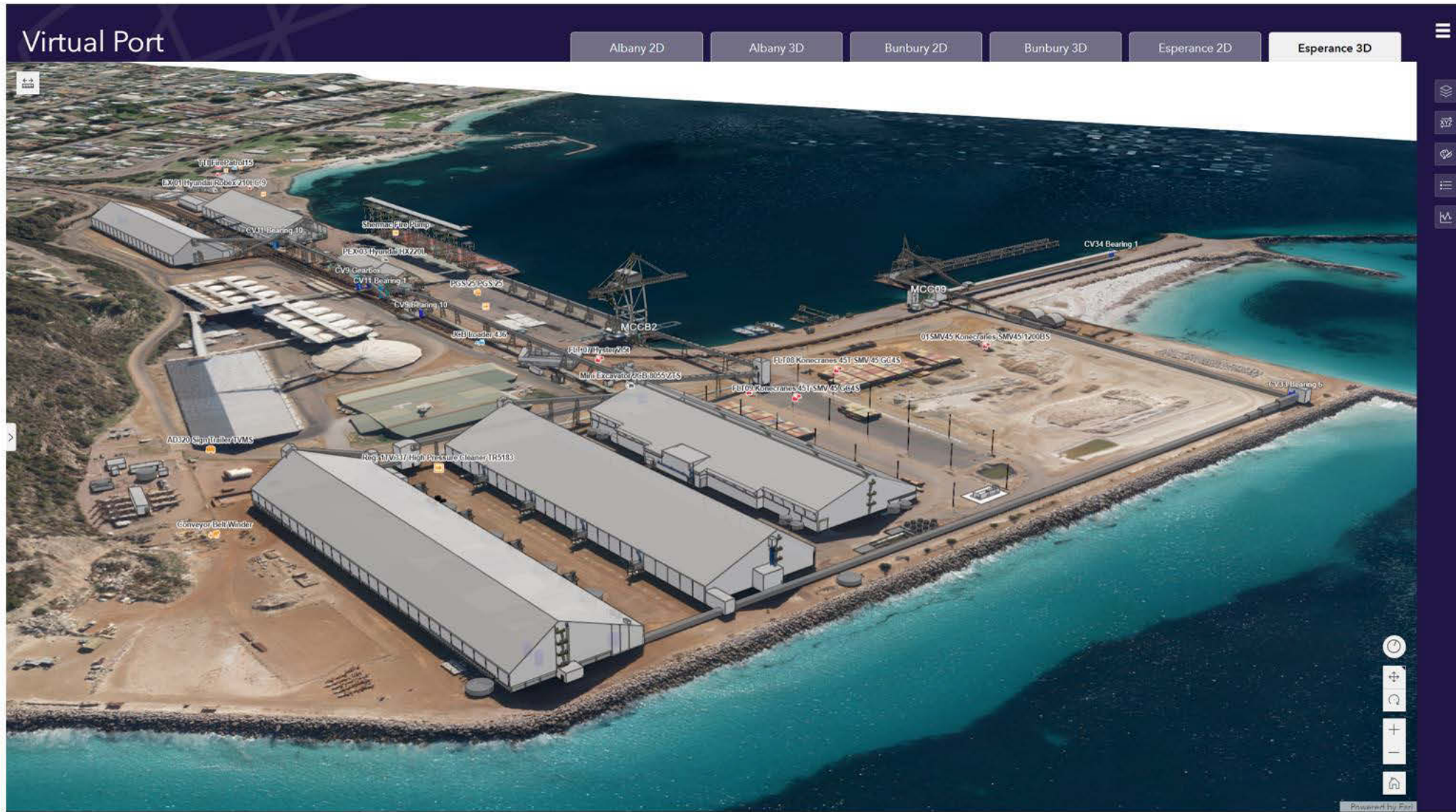


PoE VSR02

Site Name	PoE
Room Temperature (c)	20
Room Humidity (%)	62
Room Motion (raw)	0.00
Room Light Level (raw)	306
Location	VSR02
Sensor Battery Voltage (mV)	3.666
timestamp	29 March 2023 at 11:19 am

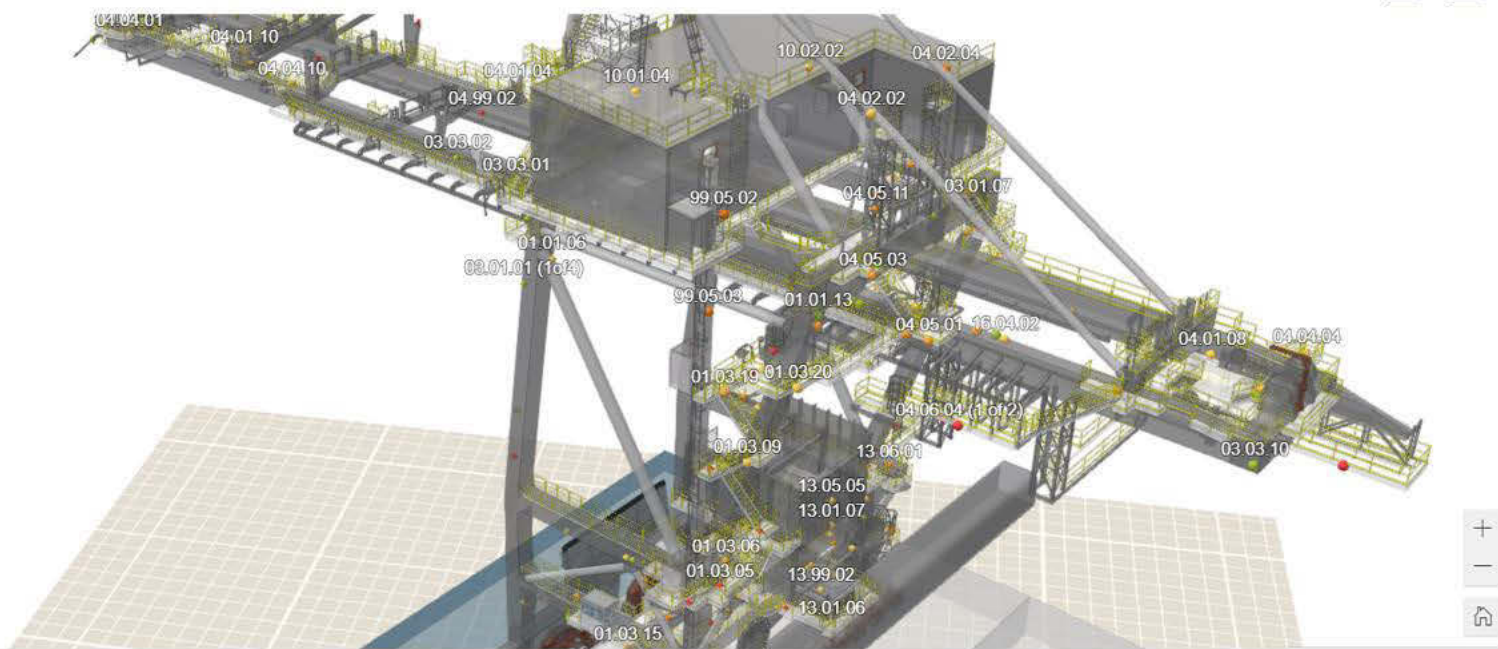
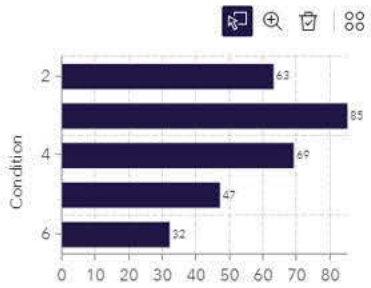
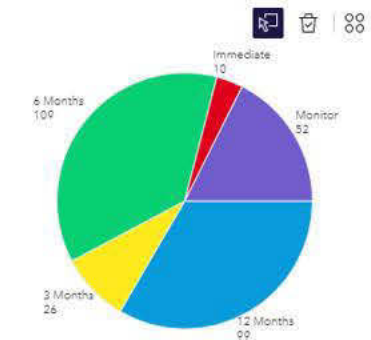
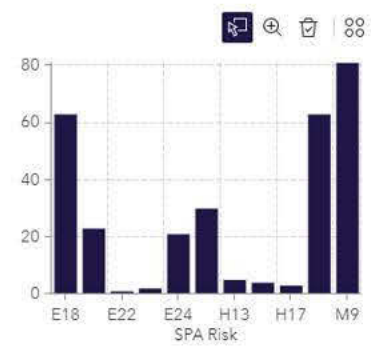
Zoom to

Asset Information – Asset Location



Defect Mapping

Virtual Port Defect Tracker



ESP_B2CraneDefects_ISI_2022_Report

FaultNo	Maint. Request#	Location	Description	Headings	Data	Classification	Risk
01.01.01	27,616	Main Frame - Structure Fra...	Corrosion - External. Porta...	01.01.01 - Portal, Rear Up...	Corrosion - External. Porta...	1 - Structural Integrity	Medium
01.01.02	27,618	Main Frame - Structure Fra...	Lower Structure. Sill beam...	01.01.02 - Lower Structure...	Lower Structure. Sill beam...	1 - Structural Integrity	Low
01.01.03	27,779	Main Frame - Structure Fra...	Corrosion - External. Land...	01.01.03 - Landside sill be...	Corrosion - External. Land...	1 - Structural Integrity	Medium
01.01.05	27,780	Main Frame - Structure Fra...	Corrosion - External. Land...	01.01.05 - Landside sill be...	Corrosion - External. Land...	1 - Structural Integrity	Medium
01.01.06	27,781	Main Frame - Structure Fra...	Corrosion - External. Porta...	01.01.06 - Portal, Forward ...	Corrosion - External. Porta...	1 - Structural Integrity	Low
01.01.07	27,783	Main Frame - Structure Fra...	Corrosion - External. Sill b...	01.01.07 - Sill beam acces...	Corrosion - External. Sill b...	1 - Structural Integrity	Medium

Asset Information – Metering

Virtual Port Water Overview

Total Water Network Flow

275kL

Last update: a few seconds ago

Water Network Flow Today

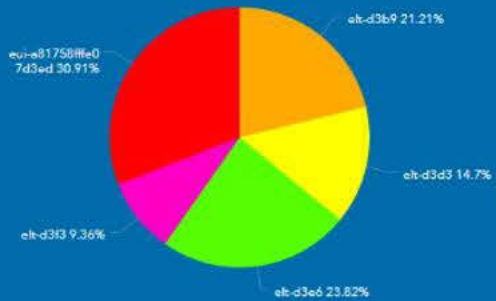
945L

Last update: a few seconds ago



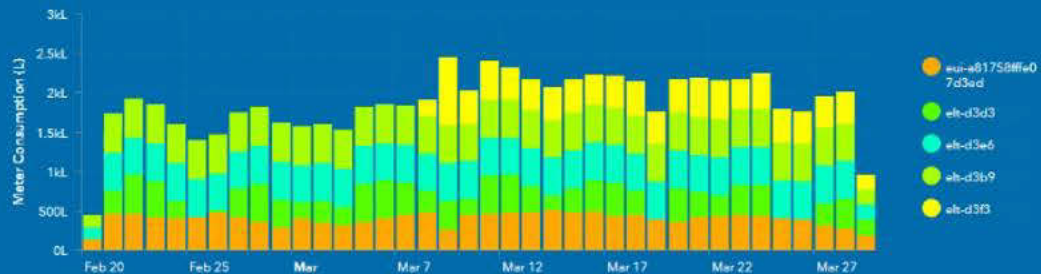
Powered by Esri

% of Total Consumption by Meter



Last update: a few seconds ago

Consumption Over Time



Sensor ID	Meter Reading	Volume Total (L)	Last Updated
elt-d3d3	8,077.65	40,388.25	29/03/2023, 11:06 am
elt-d3b9	11,649.85	58,249.25	29/03/2023, 10:58 am
elt-d3e6	13,083.86	65,419.30	29/03/2023, 11:03 am
eui-a81758fffe07d3ed	16,981.45	84,907.25	29/03/2023, 11:08 am
elt-d3f3	5,139.81	25,699.03	29/03/2023, 10:45 am

Defect Mapping

Virtual Port Asset Overview

ALB B1/B2 ESP B2 Crane

Defect Count



Defect Type	Count
4	200
5	205
6	120
7	70
Damaged gra...	10
Exposed re...	60

Total Defect Area (m2)



Category	Area (m2)
4	253.465
5	213.593
6	250.902
7	601.823
Other	82.579



32

Duratec | Duratec/SPA

Powered by Esri

Data Capture / Integration

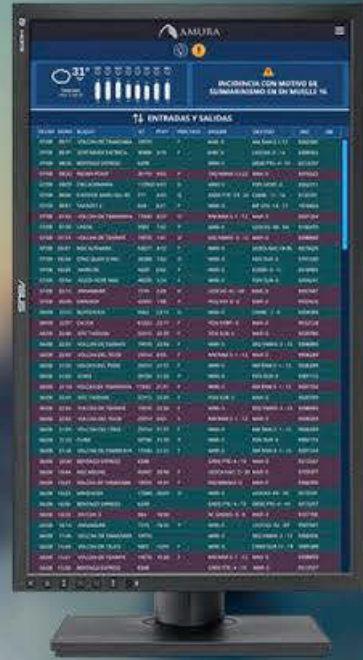


Digital Twin: Maintenance





Port scales



Smart Controlboard

- AIS & RADAR/VTS digital signal forwarding
- DCSA & S211 Realtime events compliant
- Vessel & Cranes realtime position and status
- GIS integration: esri
- Nautical services & Terminal Ops awareness
- Sustainability KPIs over GIS powered by AIS/RADAR/VTS



Day mode



Night mode

Shared Situational Awareness



Port Control

BOLUDA
CORPORACIÓN MARITIMA

 MSC CARLOTTA <small>IMO: 9756731</small> VB XALDC BOLLARD PULL: 85.0 ON DUTY ENGAGED 23:03	 MSC CARLOTTA <small>IMO: 9756731</small> VB KEREA BOLLARD PULL: 80 ON DUTY UNDERWAY TO SERVICE 23:03	 MSC CARLOTTA <small>IMO: 9756731</small> VB PODER BOLLARD PULL: 56 ON DUTY READY 23:03	 NOT ASSIGNED <small>IMO: -</small> VB PODER BOLLARD PULL: 70.1 STAND BY RETURN TO BASE 23:03	 NOT ASSIGNED <small>IMO: -</small> VB SOÑADOR BOLLARD PULL: 56 OUT OF SERVICE BASE 22:00
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Mooring

AMURA
A MARRADORES

 MSC CARLOTTA <small>IMO: 9756731</small> MOORING BOLLARD PULL: 85.0 ON DUTY ENGAGED 23:03	 MSC CARLOTTA <small>IMO: 9756731</small> MOORING BOLLARD PULL: 80 ON DUTY UNDERWAY TO SERVICE 23:03	 MSC CARLOTTA <small>IMO: 9756731</small> SHIFTING BOLLARD PULL: 56 ON DUTY READY 23:03	 NOT ASSIGNED <small>IMO: -</small> UNMOORING BOLLARD PULL: 70.1 STAND BY RETURN TO BASE 23:03	 NOT ASSIGNED <small>IMO: -</small> SHIFTING BOLLARD PULL: 56 OUT OF SERVICE BASE 22:00
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Tugs

LUNES, 25 DE MAYO
29°/14° C
12:00 H
Sensación Térmica 32°C / 16°C
Humedad 26%

MAR	ME	AIR	VE	SAB	DOM	HEM	TPO	NIVL AGUA	HEM	TPO	NIVL AGUA
24°C	24°C	26°C	22°C	20°C	22°C	05:16	0.89 m	17:52	0.85 m	11:29	2.02 m

⚠ IDENCIA CON MOTIVO DE SUBMARINISMO EN LA Z



AIS & RADAR / VTS digital signal forwarding



Smart PortControl

Smart Berthing MODULE

EFFICIENCY

OPERATIONAL VESSEL SCHEDULES

PLANNED TIMES

REQUEST TIMES

ESTIMATED TIMES

ACTUAL TIMES

SAFETY

TERMINAL READY

CRANES & SHIPS POSITIONS & STATUS

ENVIRONMENT

SHIP DATA & PARTICULARS

ENGINES

SHPI / ESI

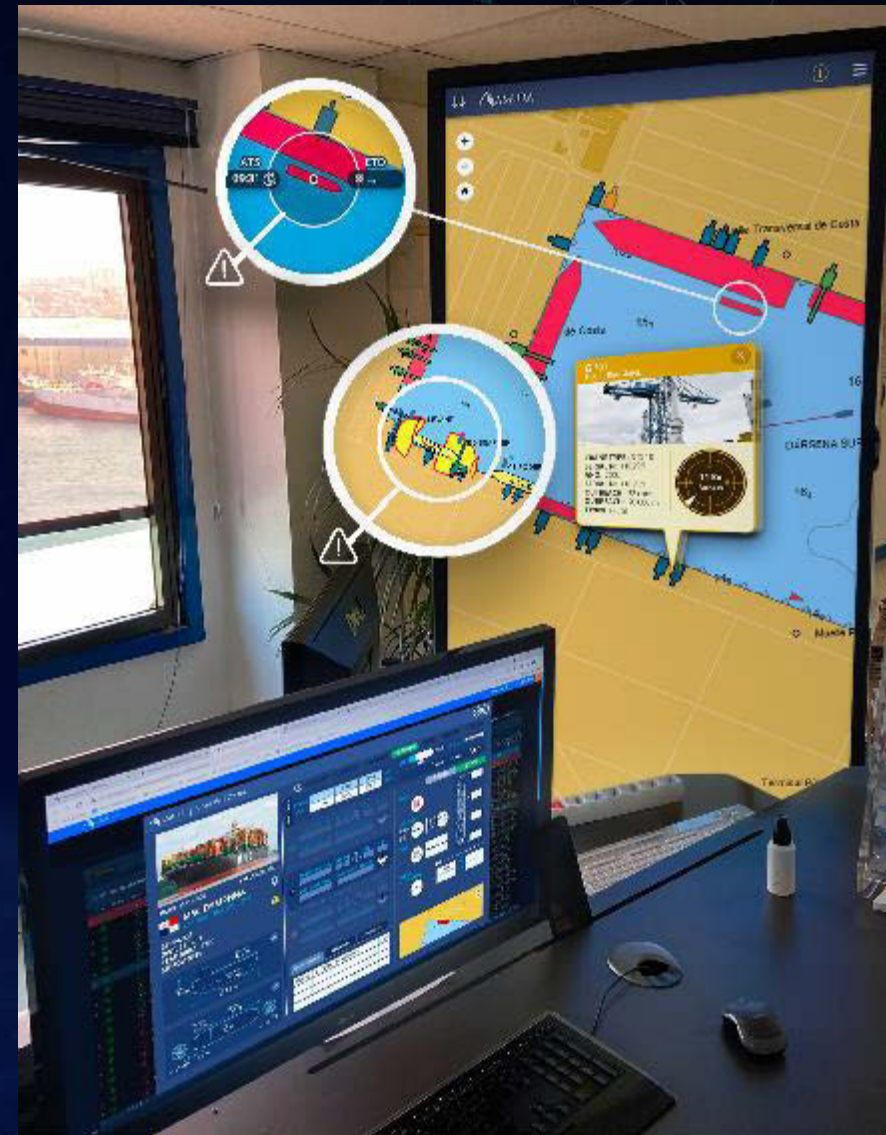
Smart Controlboard



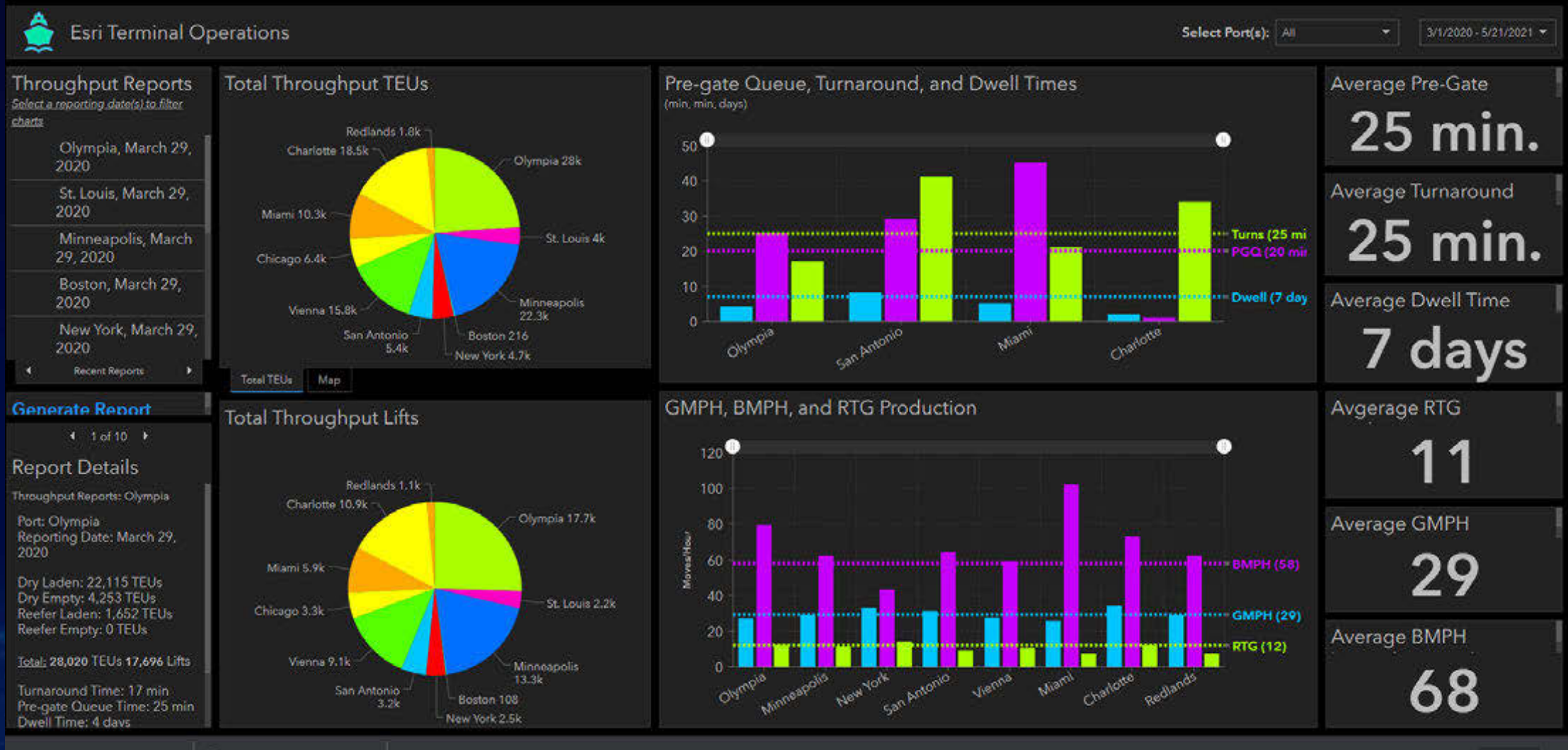
Smart Berthing



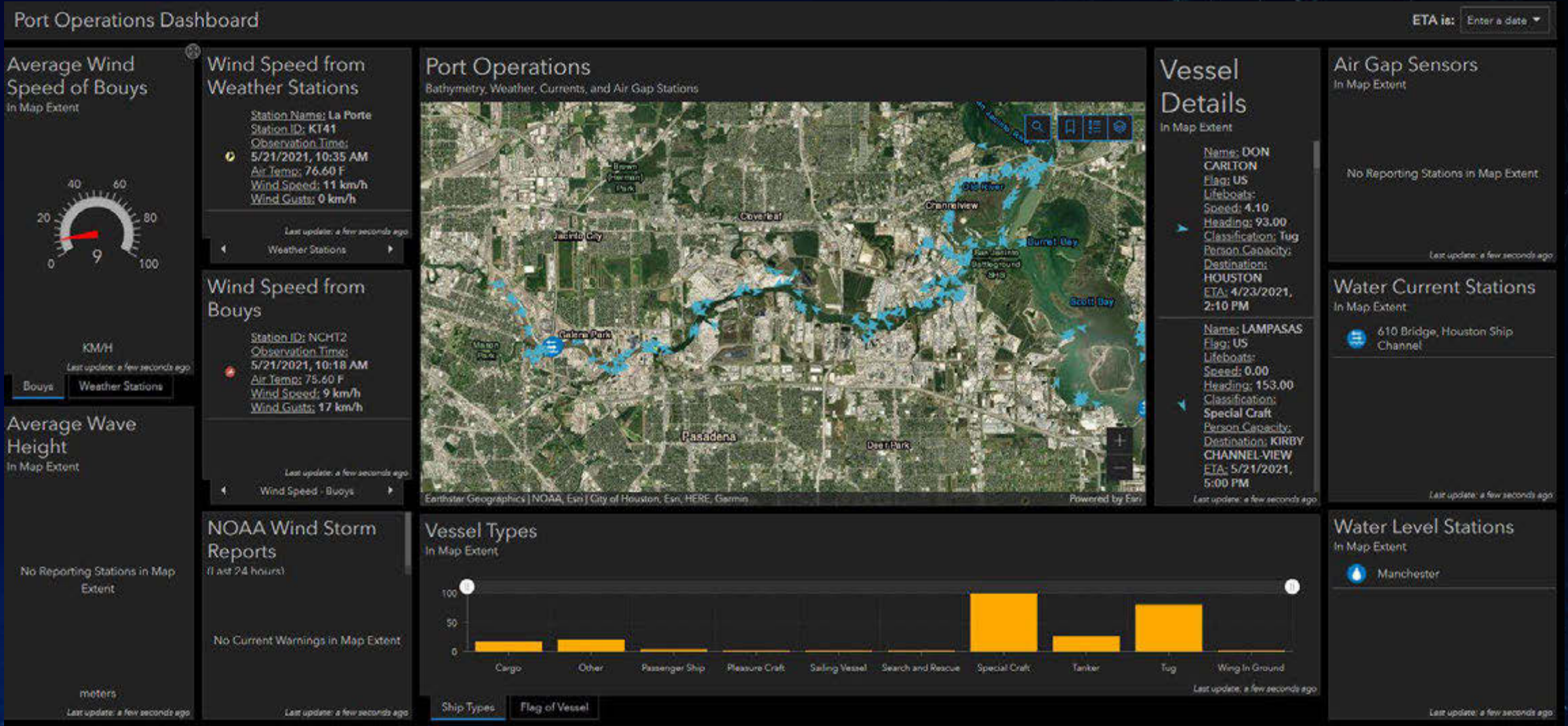
Common Operational Picture



Operational Performance Improvement



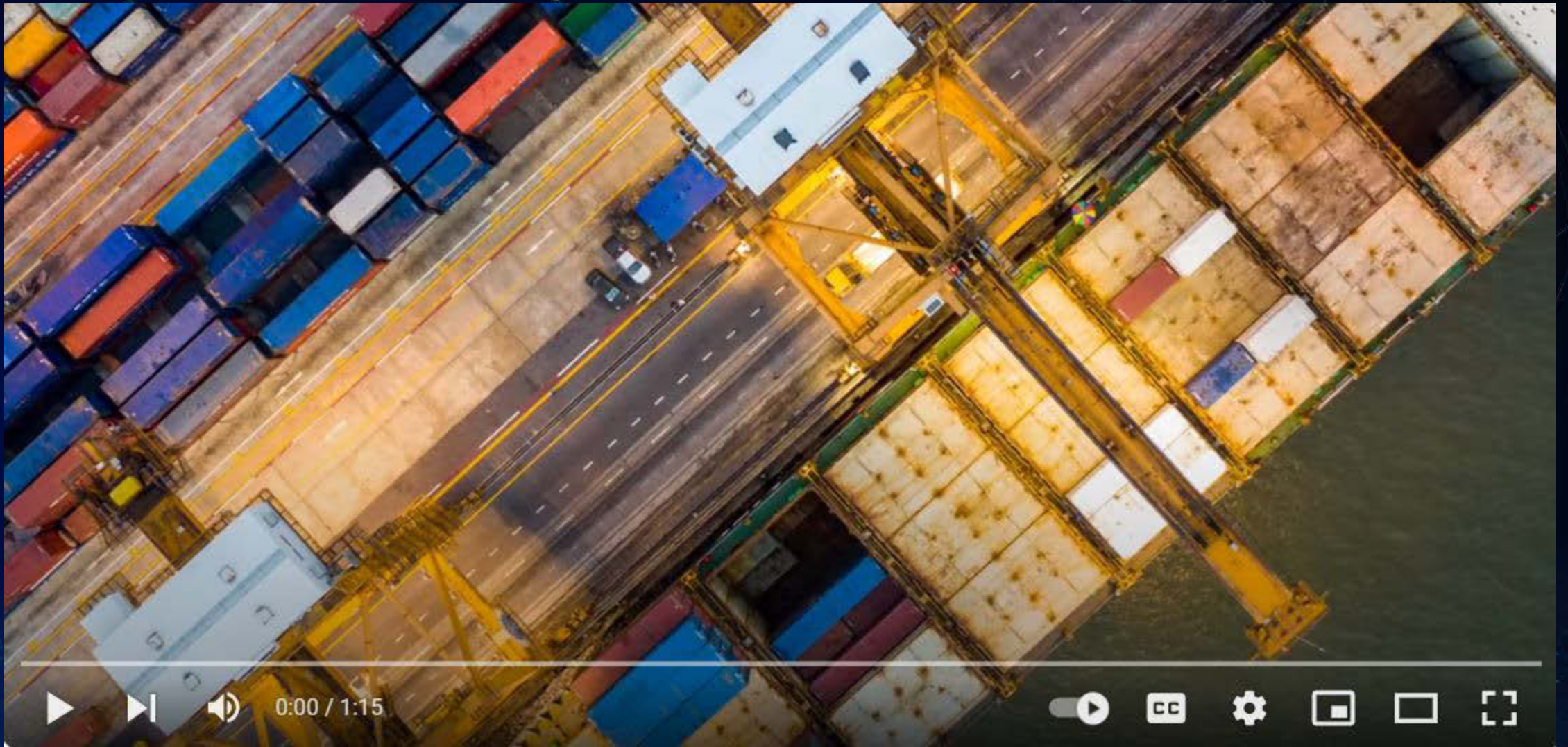
Operational Performance Improvement



Operational Performance Improvement



Fremantle Ports



An ArcGIS Digital Twin

Building on the digital twin data to simulate functional reality & improve business operations



Digital representation of the system. Location and attribute information of the pipes, valves, hydrants, manholes, etc. Provides visualization, overlaying of digital information, and spatial relationships



Use of digital data in a connected environment to view, collect and update information in the office or field. Provides awareness of new or changing information through apps and dashboards



Connecting with other systems such as AMS, SCADA, AVI, and IoT. Provides near or real time operational management of people and the system to support proactive and reactive activities



Integrating real time models and AI/ML, to simulate events. Provide decision support to optimize lifecycle costs, predict breaks, determine system attributes, and test response to change

Visual

Awareness

Operational

Predictive

Data Creation/Migration

Migrated from CAD, digitized from paper or collected in field, ArcGIS is the authoritative system of record for assets

\$\$

Base Platform Deployment

ArcGIS is a comprehensive location platform. It is a real time web based system that connects office and field with web and mobile

\$

Real-time Capabilities

ArcGIS provides advanced capabilities for real time and analytics including configurable connections to other enterprise systems

\$\$

Adv. Decision Support

Typically requires specialized software or custom integration to fit specific workflows and data requirements

\$\$-\$\$\$





esri

THE
SCIENCE
OF
WHERE

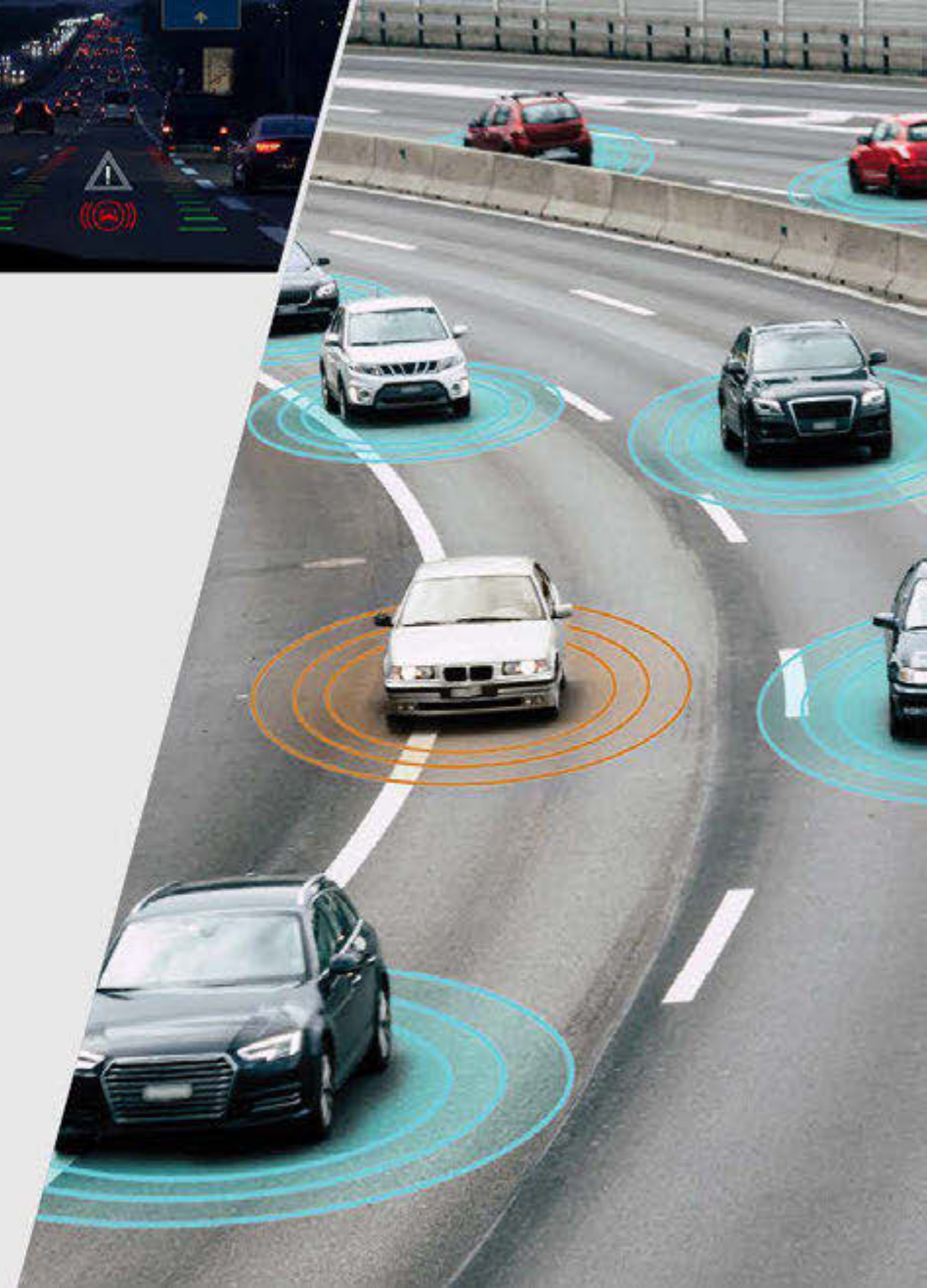
<https://bit.ly/2WLdhRD>

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GB02146

The background image shows a large industrial facility, likely a port or a rail yard, with numerous colorful shipping containers stacked in rows. In the foreground, a blue forklift with a crane attachment is positioned on a paved area. The scene is captured from an elevated perspective, showing the organized layout of the yard. A yellow banner with a white border is superimposed over the center of the image, containing the title text. The entire image is framed by a dark blue background with white geometric shapes.

Multimodality & Data Exchange: A Vision for the Future of Ports



THANK YOU!

2024 Spring Meeting

February 27, 2024