# AAPA 2019

# VIRGINIA

REVOLUTIONIZING AMERICA'S FIRST PORT

# Revolutionizing the Working Waterfront
## (Communications)

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AAPA 2019
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# An introduction to Rajant

| | |
|---|---|
| **What We Do** | Exclusive provider of peer-to-peer, private Kinetic Mesh® networks consisting of BreadCrumb® wireless nodes powered by Rajant's patented InstaMesh® networking software. |
| **Founded** | Established in October 2001 in Wayne, Pennsylvania, USA by co-founders Robert Schena and Paul Hellhake |
| **Type** | Privately held |
| **Headquarters** | Malvern, Pennsylvania, USA; additional offices in Alabama, Arizona and Kentucky. |
| **Patents** | Multiple patents including InstaMesh® (U.S. Patent 8,341,289 B2). |
| **Industries** | Mining, ports, oil and gas, petrochemical, transportation, manufacturing, agriculture, utilities, municipalities, public safety, service providers, military, federal and state government. |
| **Area Served** | Worldwide. |
| **Installations** | Thousands of satisfied customers. |

## Who Is Rajant?

**Private, secure wireless network technology** for **mission critical** industries and government.

**BANDWIDTH**
**High Speed** & Low Latency

**MOBILITY / RESILIENCY**
**Seamless and Instantaneous** Joining, Leaving & Moving of Network Assets

**SMART**
**Higher Performance from Greater Scale.** Mitigate the affects of range, Non-Line-of-Sight and Network Traffic.

## OPERATIONAL REALITIES:

# Port Communications Challenges

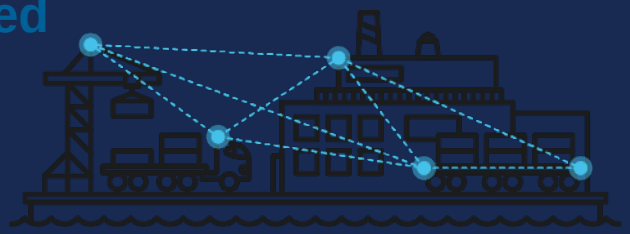
- Complex, massive, **aging infrastructure**.
- **Multiple, disparate networks** meeting different security and operational needs.
- Enormous volume of large, **constantly moving containers that create obstructions** and restrict signal range.
- **Security concerns,** with terrorists knowing that striking a port facility can significantly impair a nation's economy.
- **Port environments are often exposed** to extreme weather and temperature fluctuation.
- Need for **real-time information to direct the flow** of goods, personnel, and vehicles.
- **Outgrown wired infrastructure** – wired build-outs and laying cable are not feasible in commissioned ports.
- **Meeting tenants' varied needs** to safely and efficiently move cargo on and off ships, repair vessels, and adequately supply ship.
- **Diverse community of users** involved in operations require secure, anytime-anywhere access to data, voice, and video.

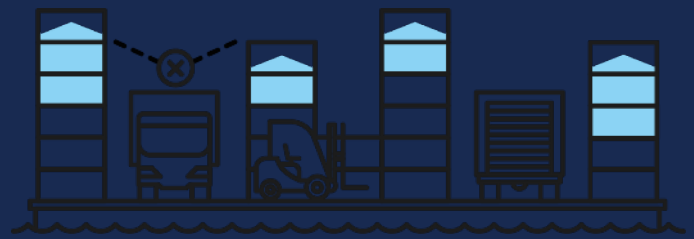
**OPERATIONAL REALITIES:**

# Top 5 Challenges in Achieving Mobile Port Connectivity

## 1 Aging Mobile-Limited Infrastructure

Over time, static networks are expanded beyond capacity, especially with increased data volume demands.



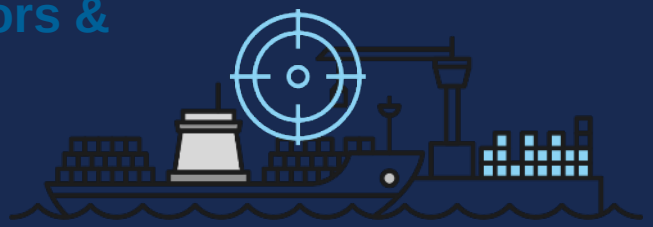


## 2 Signal Interference

An increasing number of ground vehicles, quay cranes, forklifts, and people.

## 3 Security Factors & Concerns

Ports have become high risk targets for terrorism and other malicious breaches.

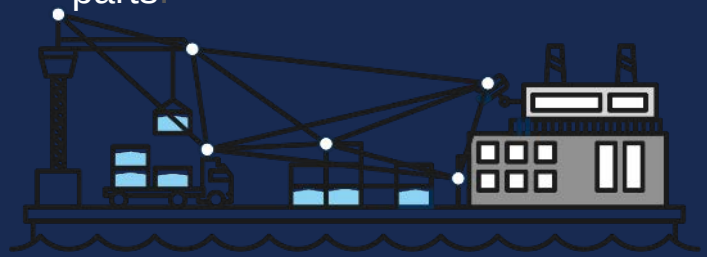


## 4 Lack of Redundancy

Wireless equipment more likely to fail when exposed to harsh coastal environments.

## 5 Real Time Data Disruptions

Customers, tenants, international agencies, and numerous moving parts.



# Mitigating Signal and Range Obstructions

Large mental containers and their subsequent movement can **impede signal range** for many wireless communication systems.

**Using a multi-transceiver, multi-frequency , mesh network can dynamically redirect information packets around this interference providing the fastest possible throughput.**

# ADVANCING PORT OPERATIONS:

## Video Surveillance
High bandwidth to stream video from remote cameras to dispatchers, first responders, etc.

## Remote Access
Enable first responders and security officials to retrieve critical information while on the move.

## Improved Situational Awareness
Allow dispatchers to instantly view incident details, analyze alerts, and get responders on-scene fast.

## Enhanced Evidence Gathering
Capture and disseminate IP-based video evidence for investigation and prosecution

## Drone Communications
Our drone BreadCrumb module can be supported on the mesh for surveying and other monitoring functions

## ADVANCING PORT OPERATIONS:
# Fleet Management

**Globally,** seaports must manage **thousands of quay cranes, trucks, and other fleets of automotive vehicles.**

- With mesh wireless nodes deployed on a variety of vehicles, a mesh network can help you **maintain communications with and control of UGVs, and AGVs (Automated Guided Vehicles), forklifts, and trucks** as they roam among cranes and containers.

- **A mesh network supports next-gen applications for:**
  - Asset management / tracking
  - Vehicle / truck health monitoring
  - GPS location tracking
  - Automatic truck identification
  - Vehicle automation

**ADVANCING PORT OPERATIONS:**

# The Real ROI.

What can a Kinetic Mesh® network **help your port achieve?**

## Improved Productivity

Maximize efficiency through mobile access to data, decision-making information, etc.

At peak efficiency, a single crane can move about **40 shipping containers per hour.**

## Decreased Downtime

Access real-time maintenance information to proactively address issues, especially for 24/7 equipment.

A condition-based monitoring system can save as much as **20% in decreased spare parts.**

## Strengthened Security

Reduce losses and damage with better situational awareness and first responder collaboration.

When ports on the west coast closed, it **cost the U.S. $1 billion dollars a day.**

## Increased Revenue

Increase capacity to support new service offerings and handle larger volumes.

Adoption of automation is expected to **increase productivity in ports by about 30%.**

# Thank you!

# PORT OF ANTWERP

# Innovation, Digital Transformation & Global Port Connectivity

Revolutionizing the Working Waterfront

AAPA Conference – Norfolk, Virginia – October 15, 2019

AAPA 2019
VIRGINIA
REVOLUTIONIZING AMERICA'S FIRST PORT

# Agenda

- Intro – the new Vision & Mission statement from Port of Antwerp
- Digital Transition & Innovation strategy
  …building the “Port of the Future”
- Data Sharing platform: NxtPort
  …building the Highway for the Digital Supply Chain
- Global Port Connectivity through IPCSA’s Network of Trusted Networks

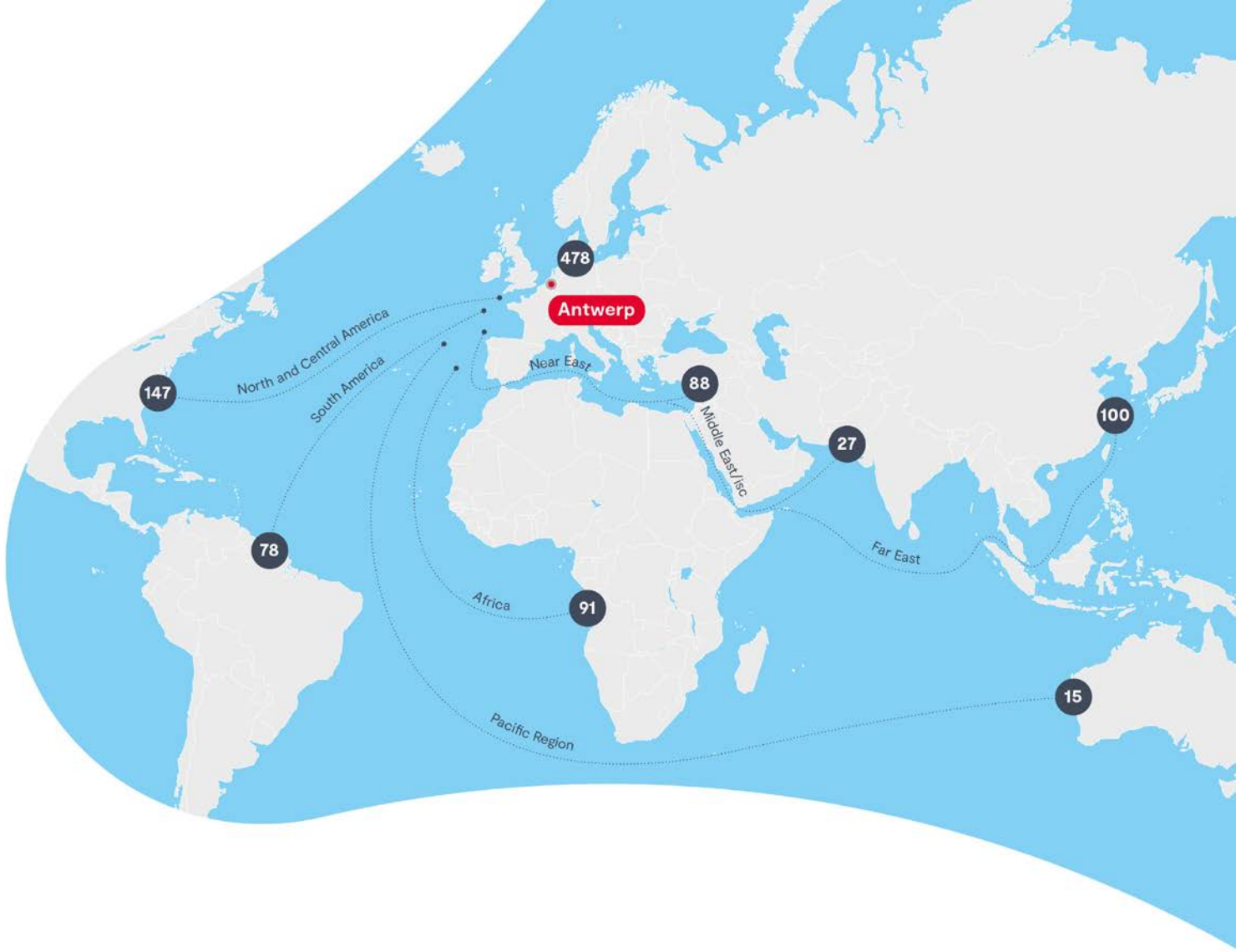
# A lever for a sustainable future

## Europe’s second largest port

# Reliable supply chain

## Unique maritime connectivity

Direct services to
**1024 ports** worldwide




Port of Antwerp

# *a home port vital for a sustainable future*

The port of the future is smart, sustainable, innovative, accessible and safe.

# 5 strategic priorities for 2020

**Sustainable growth**

**Mobility**

**Transition**

**Safety and Security**

**Operational efficiency**

Port of Antwerp

# Sustainable growth

## 2018-2019 : 5 billion euro New Investments strengthen our Chemical Cluster

# Port of the Future:
## An insight on the innovation strategy and pilot projects


Port of Antwerp


# *Build a digital nervous system across the port*

**Landlord**

**Regulator**

**Operator**

**Community builder**

# *Enable innovation in and around the port*

Port of Antwerp

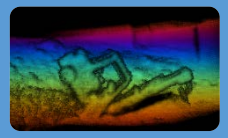
# Our innovation strategy

TECNOLOGY

OUTSIDE IN

## POC/POV new tech





INNOVATIE PLATFORMs

## The port as an open innovation platform

drones

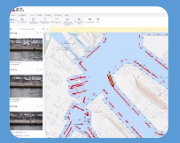
Autonomous vessels

Air quality

OPERATOR — INTERNAL — EXTERNAL — FACILITATOR

STIMULATE INTERNAL INNOVATION

## Experiment Culture


CULTUURE

COMMUNITY BUILDING

## Accelerate innovation

NxtPort

THE BEACON

CHAINPORT

PORTXL


DRONES


INTERNET
OF THINGS


Port of
Antwerp


Port of Antwerp
SMART SHIPS

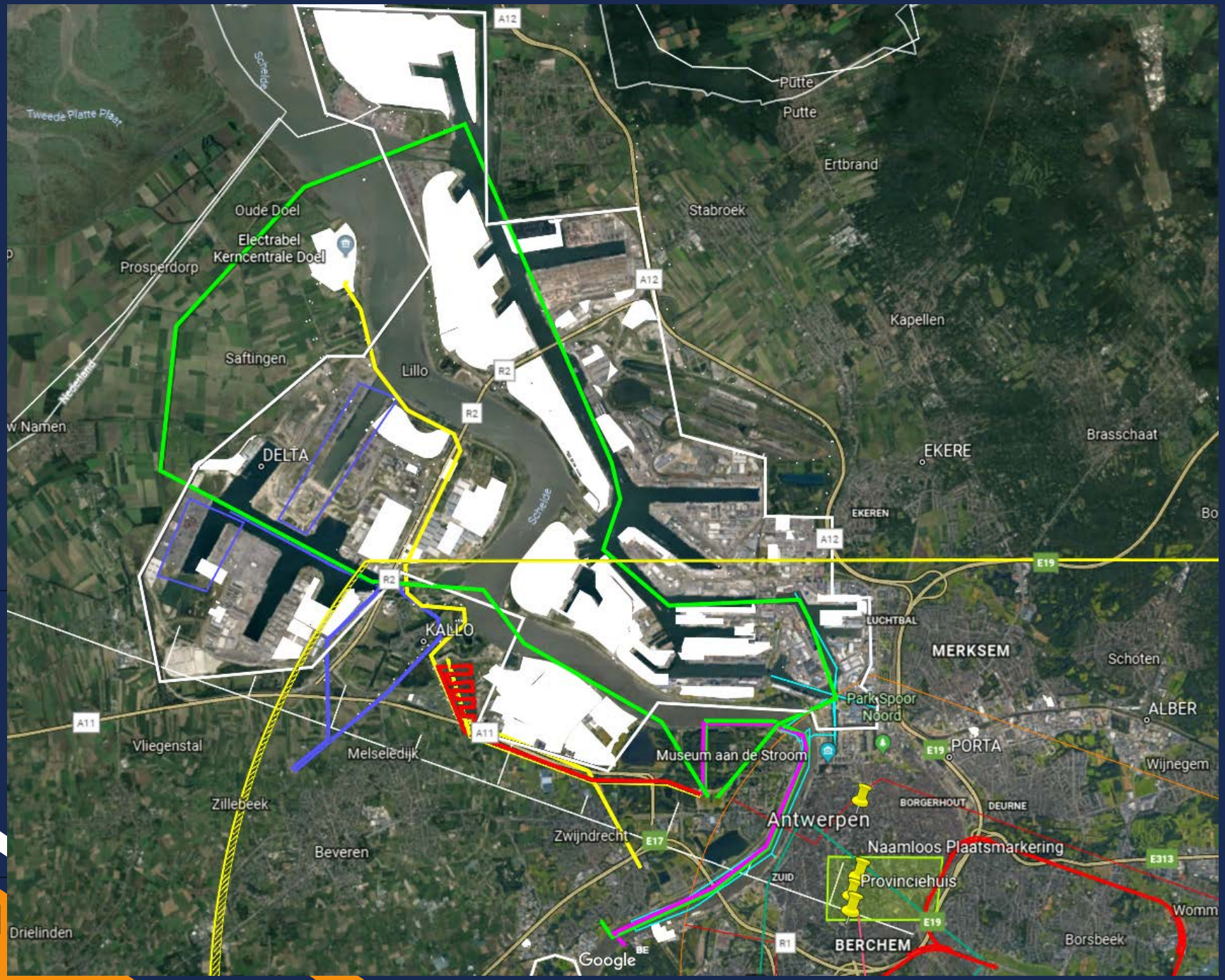

SEAFAR


Port of Antwerp
Tuimelaar

# Echodrone

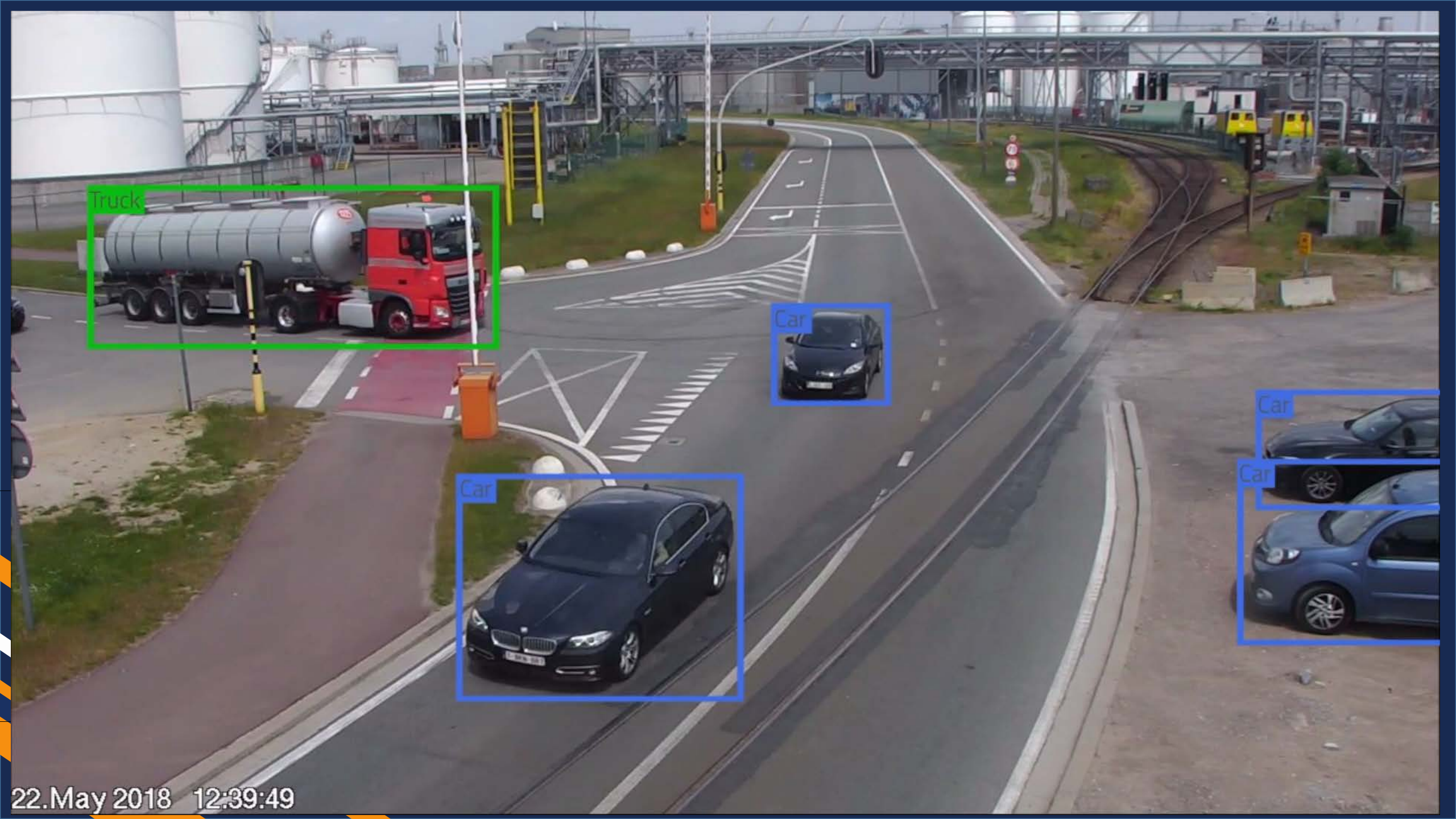
## Autonomous monitoring sedimentation


Port of Antwerp
DRONES

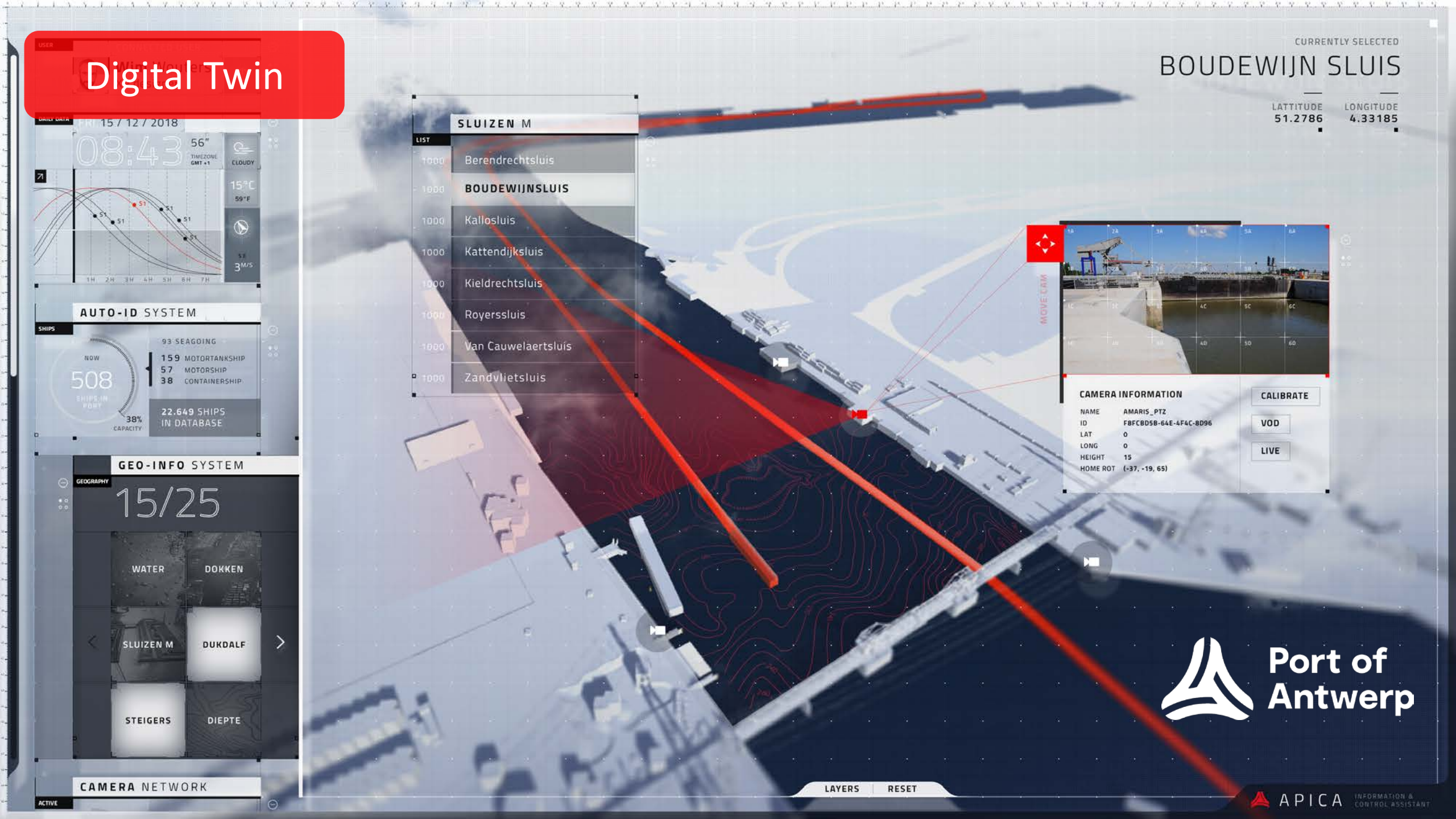



- **BVLOS Oil spill detection Antwerp Port Area**
- Parcel delivery from Wijnegem Shopping Mall
- **Simulated parcel delivery Antwerp Port Border**
- Medical parcel delivery
- **High tension line inspection/mapping**
- Overhead line incident intervention and pylon inspection
- **Port inspection of criminal offenses**
- **Inspection container terminal for Port Authorities**
- Monitoring cooperative and non-cooperative drones

# Machine Vision
## (Image object recognition)


Truck
Car
Car
Car
Car
22.May 2018 12:39:49

# Digital Twin




Data connected devices
Operational data
Geo data
3D Visualisation
Digital Twin
Digital Situational Awareness
CURRENTLY SELECTED
BOUDEWIJN SLUIS
LATTITUDE 51.2786
LONGITUDE 4.33185
SLUIZEN M
LIST
1000 Berendrechtsluis
1000 BOUDEWIJNSLUIS
1000 Kallosluis
1000 Kattendijksluis
1000 Kieldrechtsluis
1000 Royerssluis
1000 Van Cauwelaertsluis
1000 Zandvlietsluis
MOVE CAM
CAMERA INFORMATION
NAME AMARIS_PTZ
ID F8FCBD5B-64E-4F4C-8D96
LAT 0
LONG 0
HEIGHT 15
HOME ROT (-37, -19, 65)
CALIBRATE
VOD
LIVE
LAYERS
RESET
Port of Antwerp
APICA
INFORMATION & CONTROL ASSISTANT


# *Build a digital nervous system across the port*

**Landlord**

**Regulator**

**Operator**

**Community builder**

# *Enable innovation in and around the port*

Port of Antwerp

# **Nxt**Port's Mission

Make our ports and the related transport & logistics chain **better**, **safer**, more **efficient** and more **profitable**

NxtPort




# Public and private sector hand in hand. Together !

# Trust

To overcome this challenge requires

Collaboration.

A coalition of the willing.

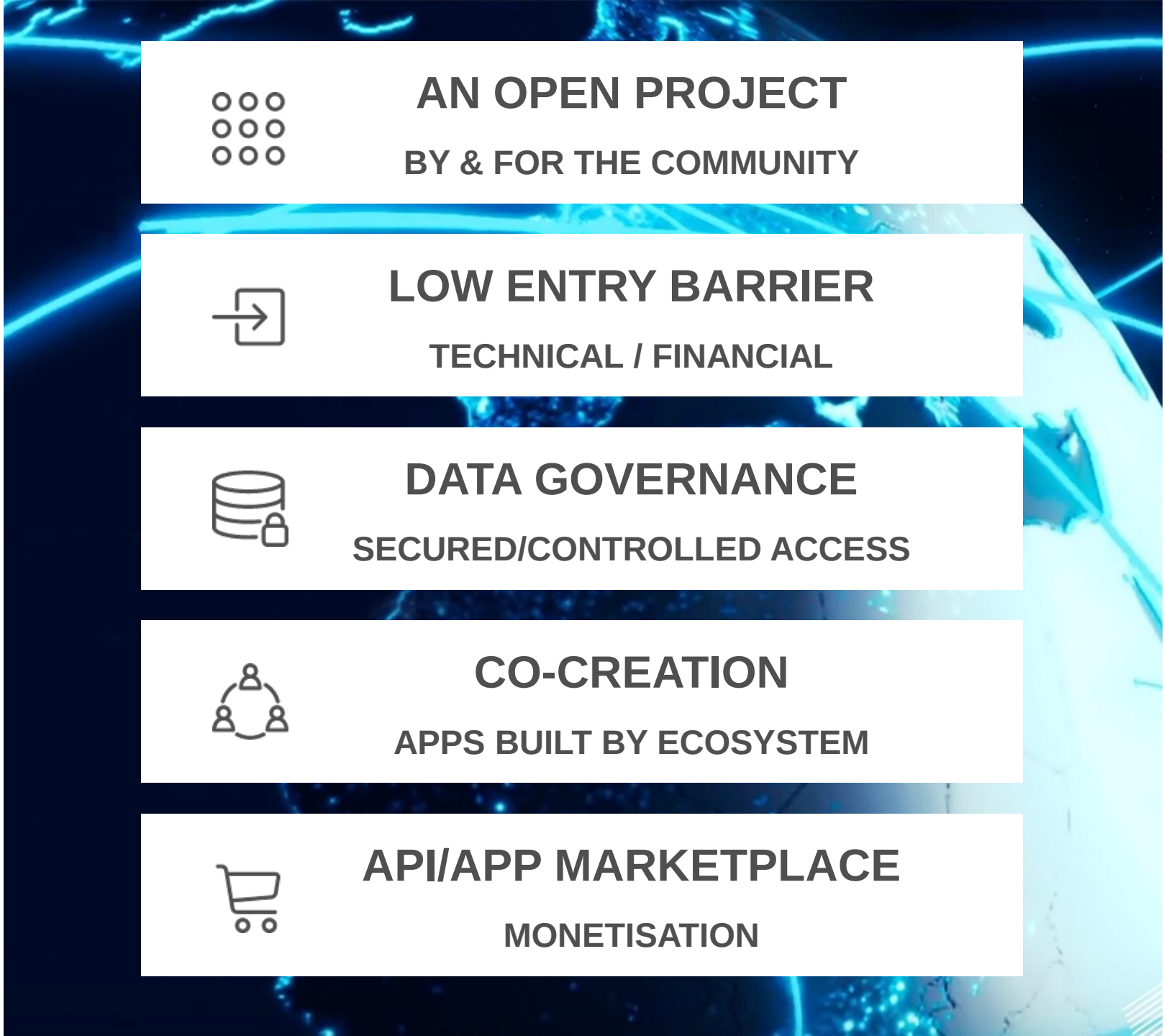
Community facilitator
through co-creation.

NxtPort

# With Golden Principles :

- Everybody is welcome as data provider or as data user.
- NxtPort platform is low entry barrier initiative (cost+) – benefits or “value at stake” falls within the industry.
- Data providers always stay owner of the data and decide in what context their data can be used.
- Strict divide between data layer and applications layer. NxtPort runs the data platform, app creation is left to “the market”.
- Data users “share” profit as and when added value is created on the data. Monetization of data.

NxtPort



# Visibility as an enabler to increase cargo handling capacity

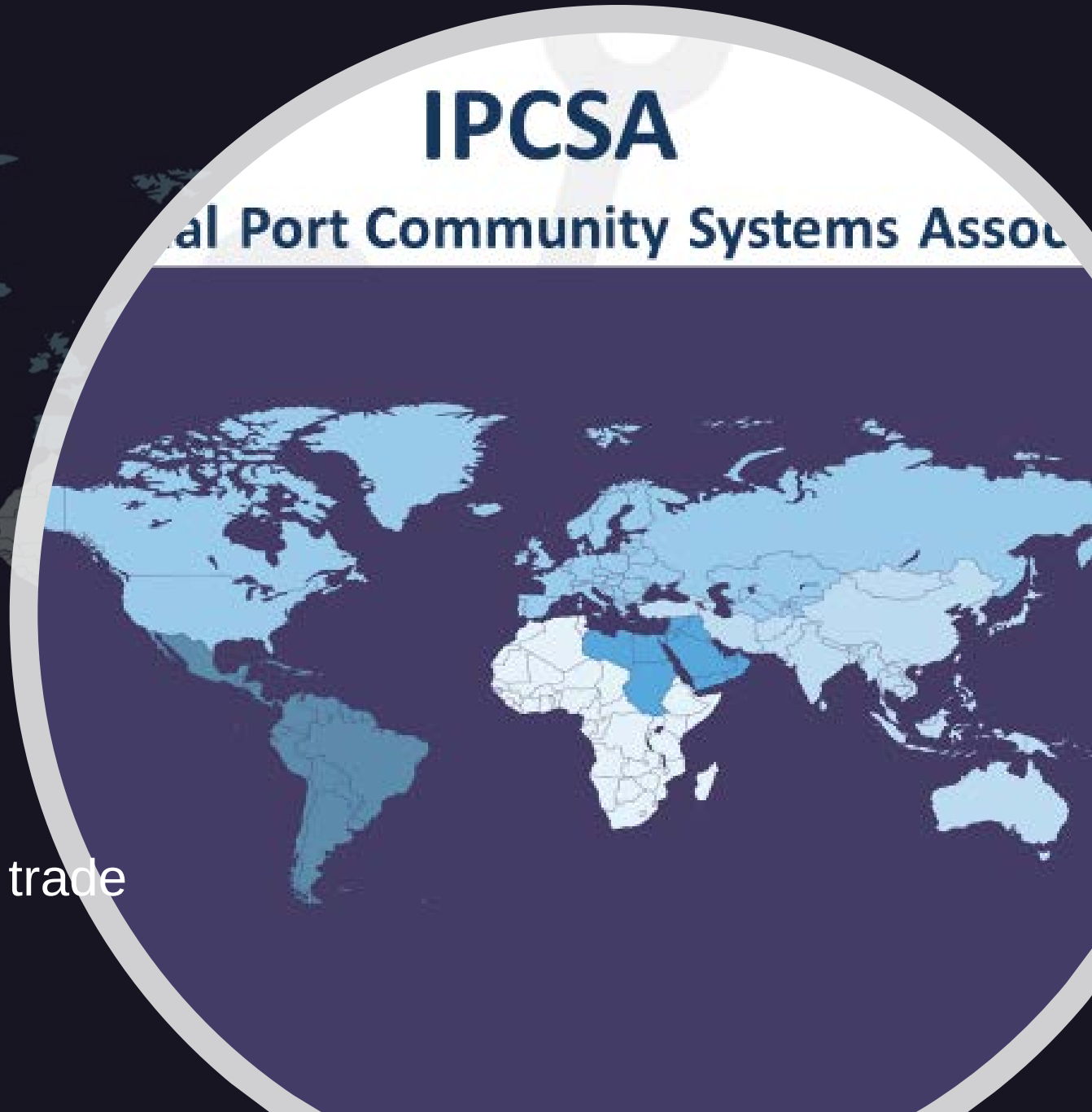
- E2E full visibility
- Planning and execution
- Shift from maritime only to freight payer (shipper/consignee) or community
- Import – Export flows / Re-use
- Water as a virtual warehouse/terminal




# Data users “share” efficiency gains when added value is created on the data



# International Port Community Systems Association




“to promote the electronic exchange of information to enable seamless, efficient trade logistics processes through a single submission of data connecting transport logistics”.

# Where IPCSA is now

- Formed in 2011 by 6 leading European PCS
- 42 members operating in 41 Countries.
- 1 million + users within our members around the world
- Estimated 20 bn + electronic messages a year
- Members currently handle the exchange of information
  - over 250 air and sea ports,
  - over 500m TEU and 8bn tonnes of cargo.
  - Up to 50% world maritime trade going through members systems
- 5 Regions matching those of UN Regional Commissions
- IPCSA membership is open to:

✓ Air and Sea Port Community System Operators
✓ Air and Sea Port Authorities
✓ Single Window Operators
✓ International and Regional Organisations

# Network of Trusted Networks (NoTN)


UI - User Interface | MSG - Message | API - Application Programming Interface

# Thank you !


## Nico De Cauwer

*Business Architect Digitalisation &*
*Port Community Projects*
nico.decauwer@portofantwerp.com


AAPA Conference
Virginia – October 15, 2019

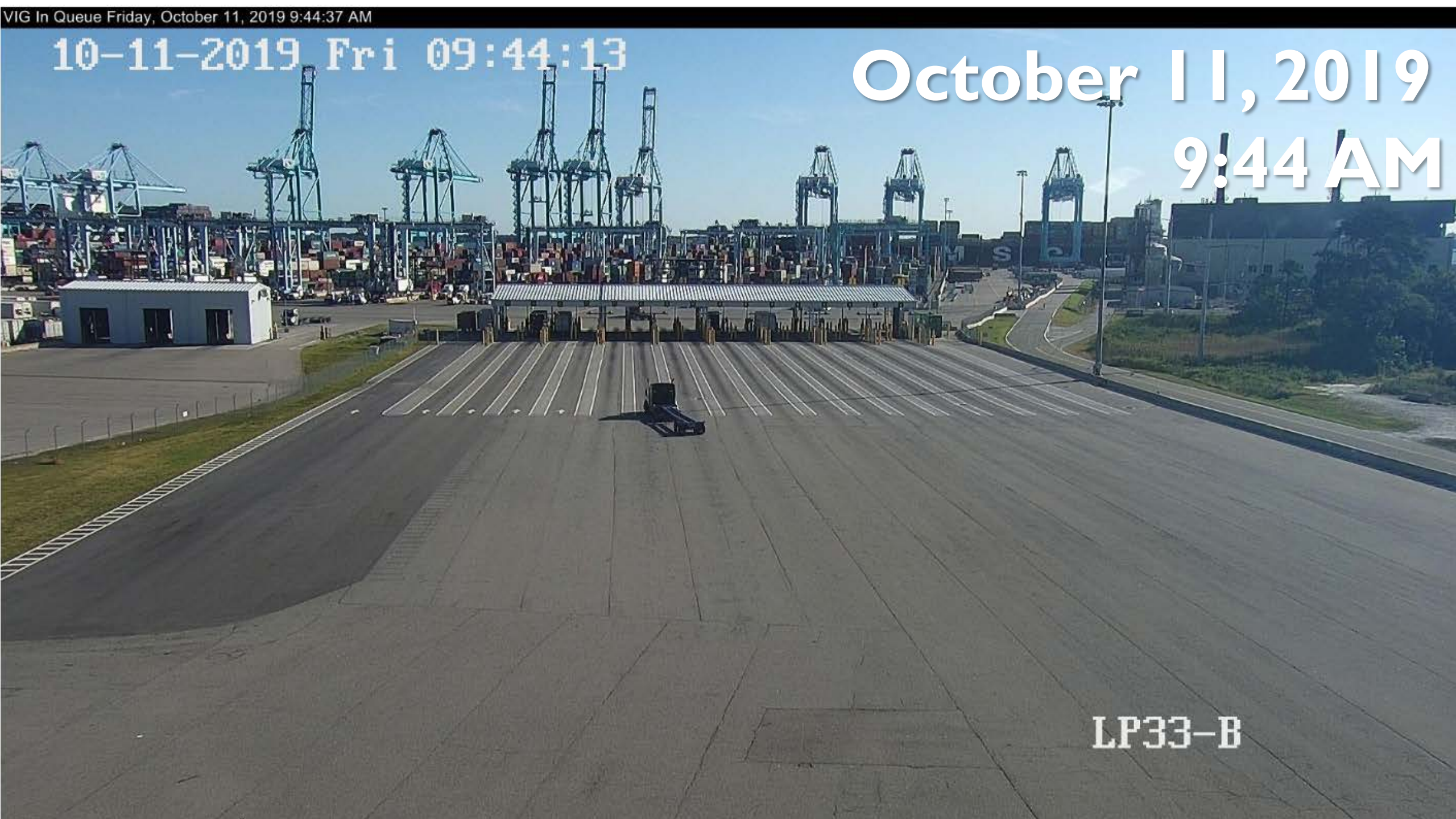
# Revolutionizing the Working Waterfront
## Driving Productivity, Efficiency, & Predictability through Truck Reservation Systems

Mark Higgins, Director Motor Carrier Experience

THE PORT OF VIRGINIA®

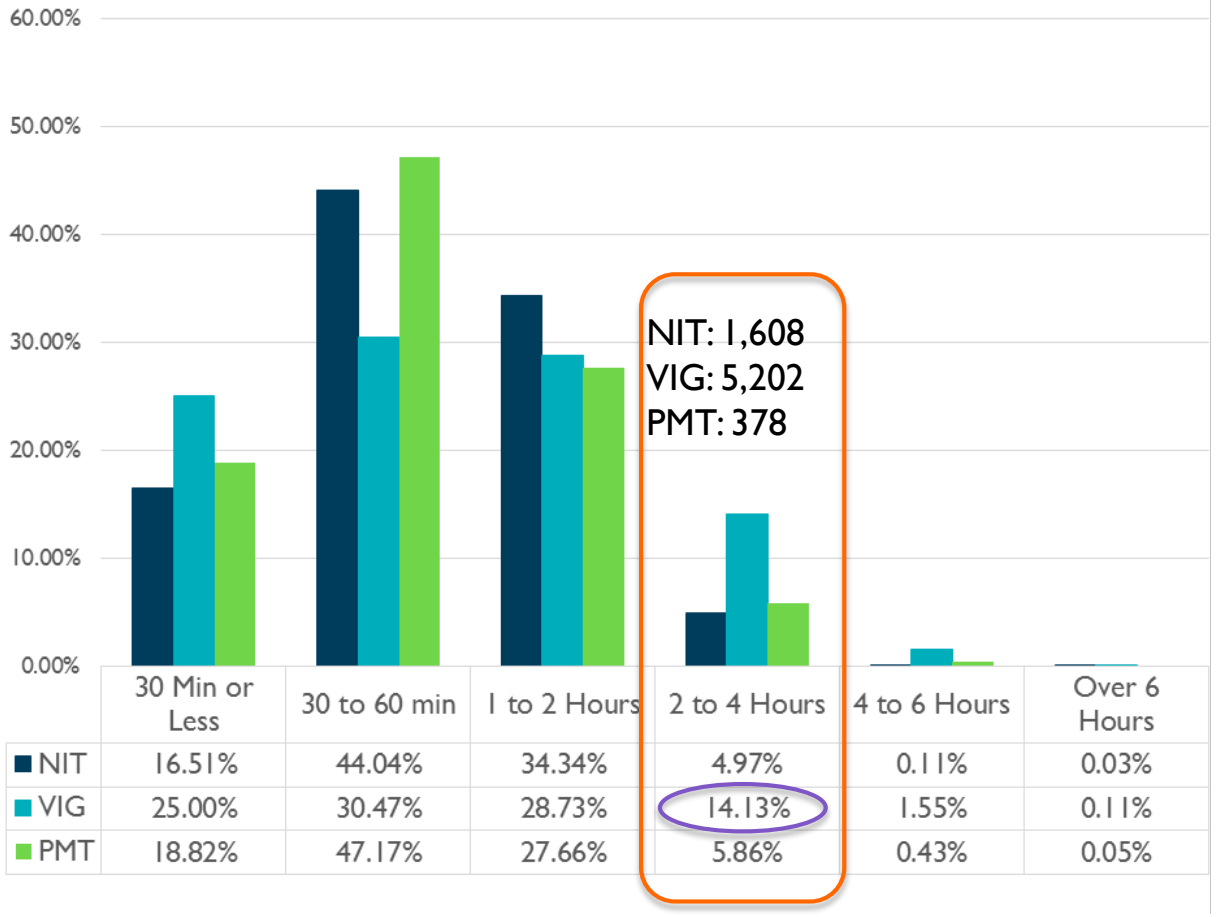
# Key Challenges


VIG In Queue Wednesday, October 17, 2018 9:44:23 AM
October 17, 2018
9:44 AM

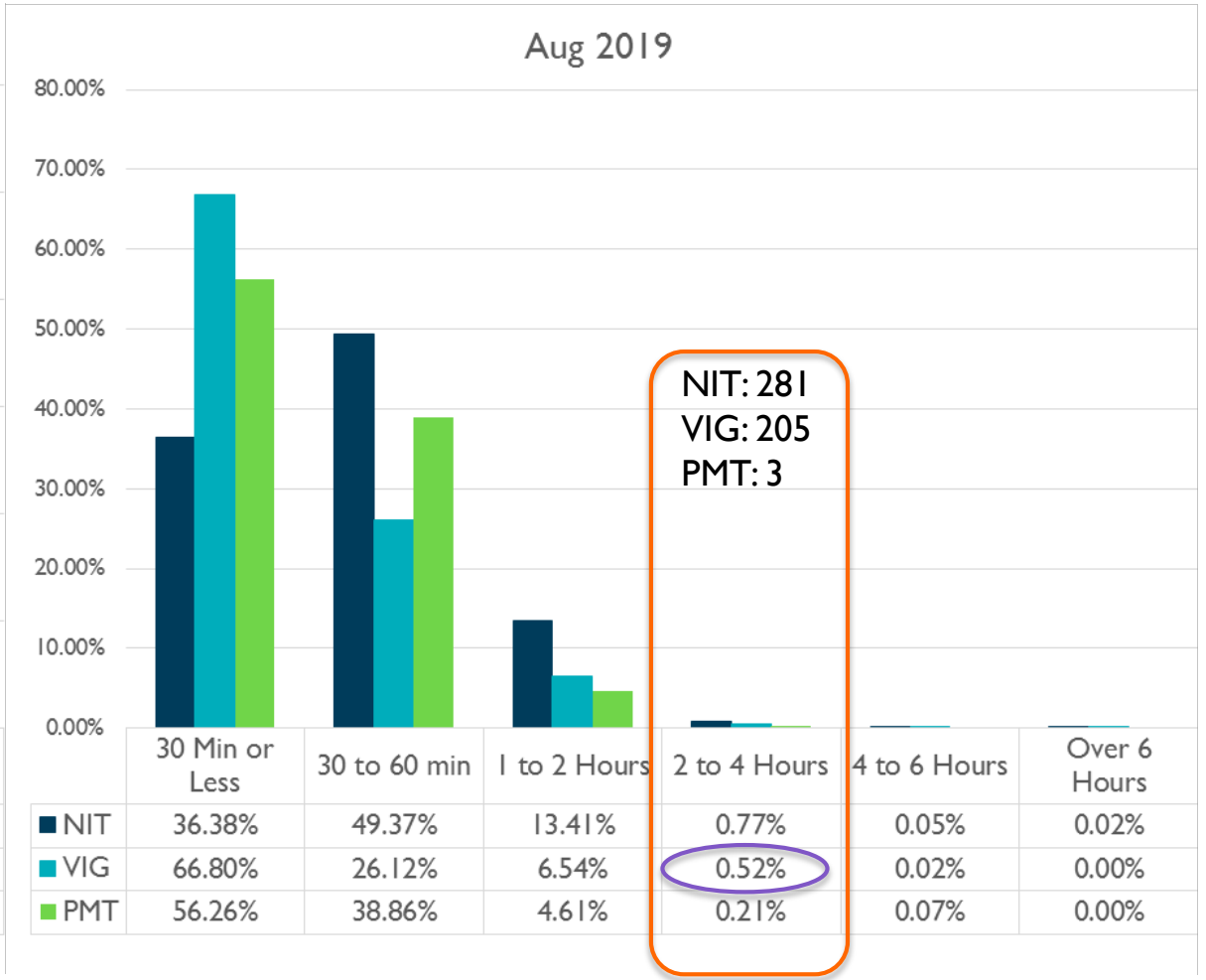

VIG In Queue Friday, October 11, 2019 9:44:37 AM
10-11-2019 Fri 09:44:13
October 11, 2019
9:44 AM
LP33-B

# Leveraging TRS Data

# Turn Time Breakdown – Oct 2018 vs Aug 2019




| | 30 Min or Less | 30 to 60 min | 1 to 2 Hours | 2 to 4 Hours | 4 to 6 Hours | Over 6 Hours |
|---|---|---|---|---|---|---|
| NIT | 16.51% | 44.04% | 34.34% | 4.97% | 0.11% | 0.03% |
| VIG | 25.00% | 30.47% | 28.73% | 14.13% | 1.55% | 0.11% |
| PMT | 18.82% | 47.17% | 27.66% | 5.86% | 0.43% | 0.05% |




| | 30 Min or Less | 30 to 60 min | 1 to 2 Hours | 2 to 4 Hours | 4 to 6 Hours | Over 6 Hours |
|---|---|---|---|---|---|---|
| NIT | 36.38% | 49.37% | 13.41% | 0.77% | 0.05% | 0.02% |
| VIG | 66.80% | 26.12% | 6.54% | 0.52% | 0.02% | 0.00% |
| PMT | 56.26% | 38.86% | 4.61% | 0.21% | 0.07% | 0.00% |


# **TURNING THE TIDE:**
# TRUCK RESERVATION SYSTEM IS **DRIVING EFFICIENCY**

# Digitizing the Working Waterfront: A waterside perspective

Matthew Prumm, CPEng: Global Lead – Business Development

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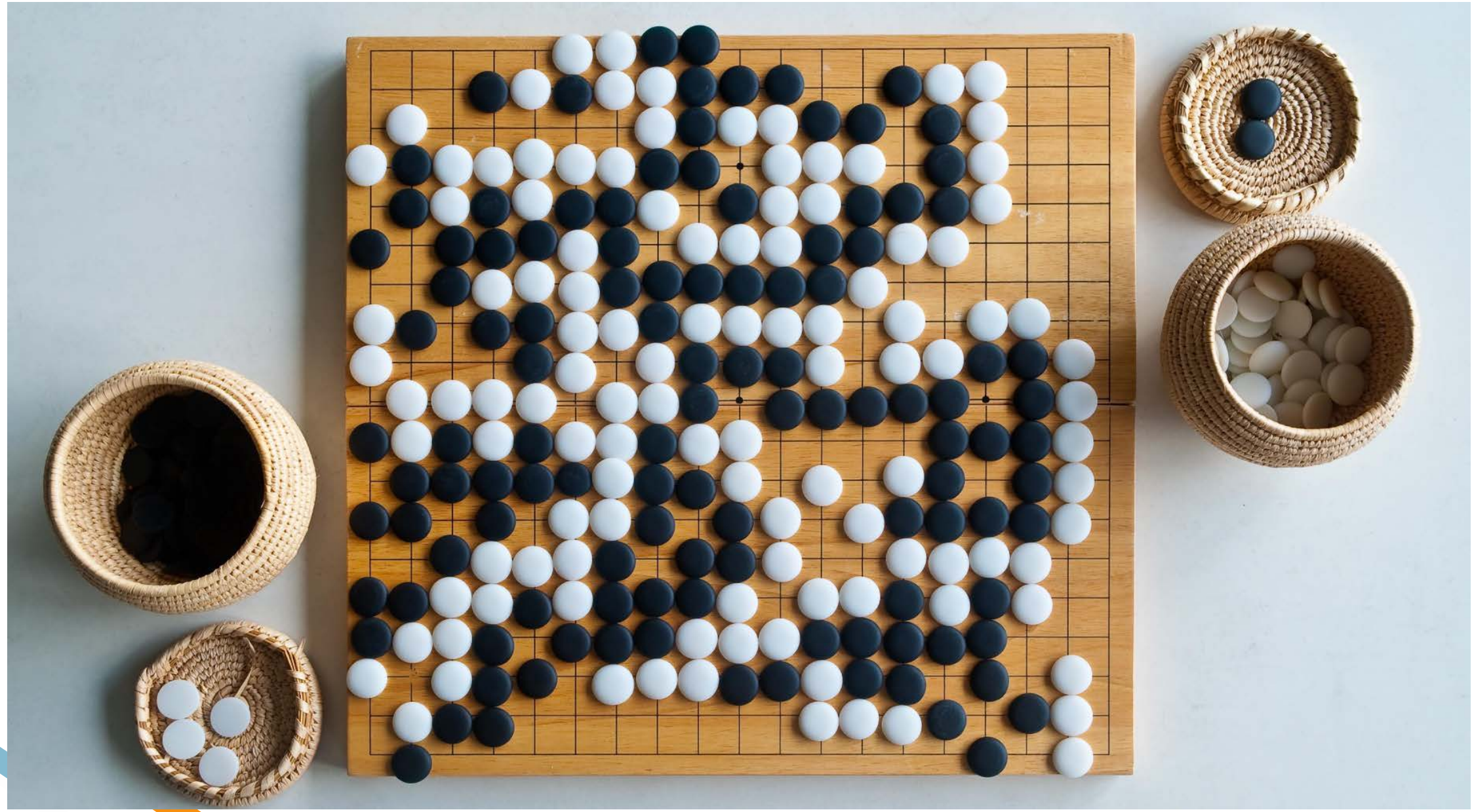
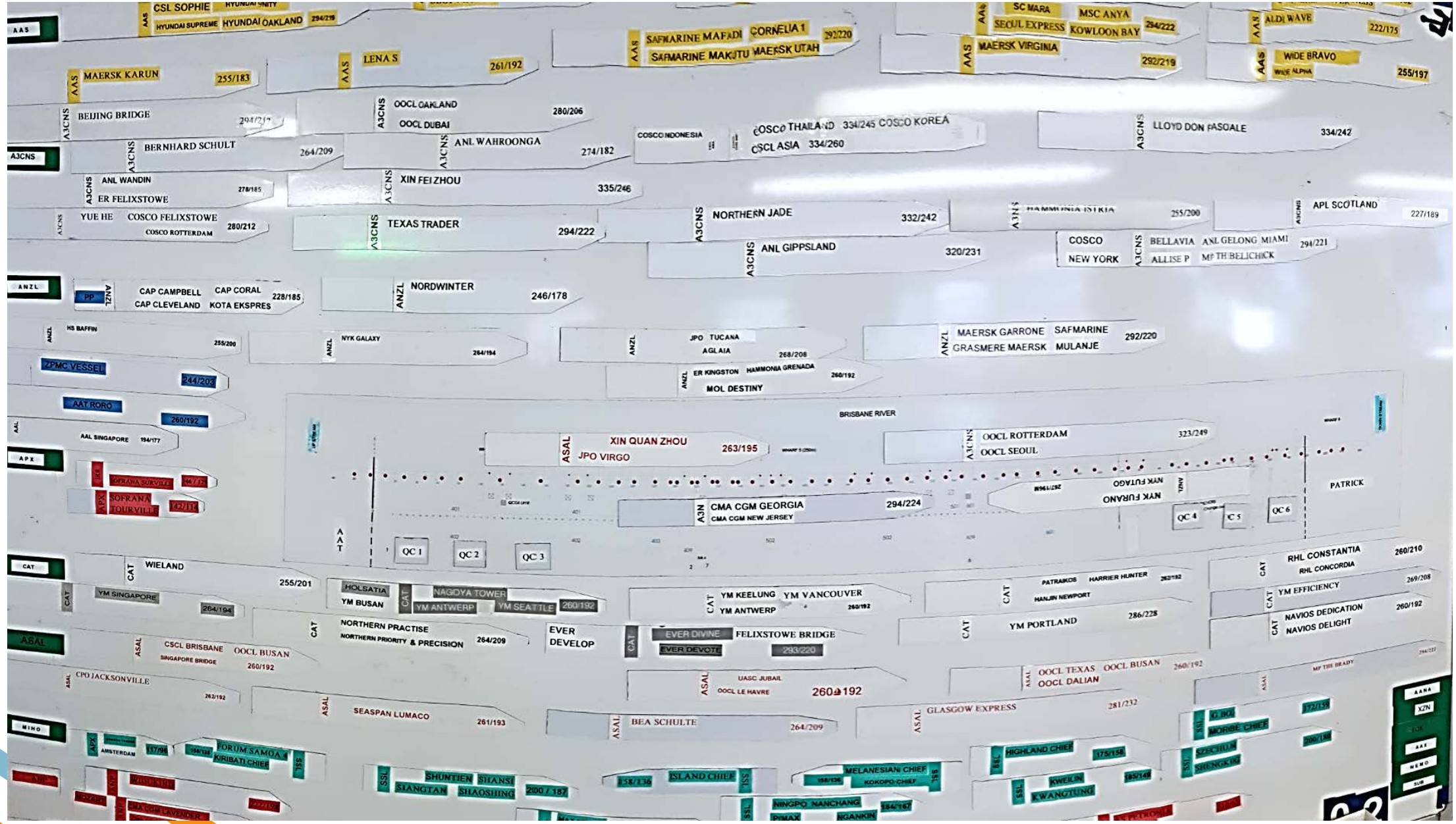
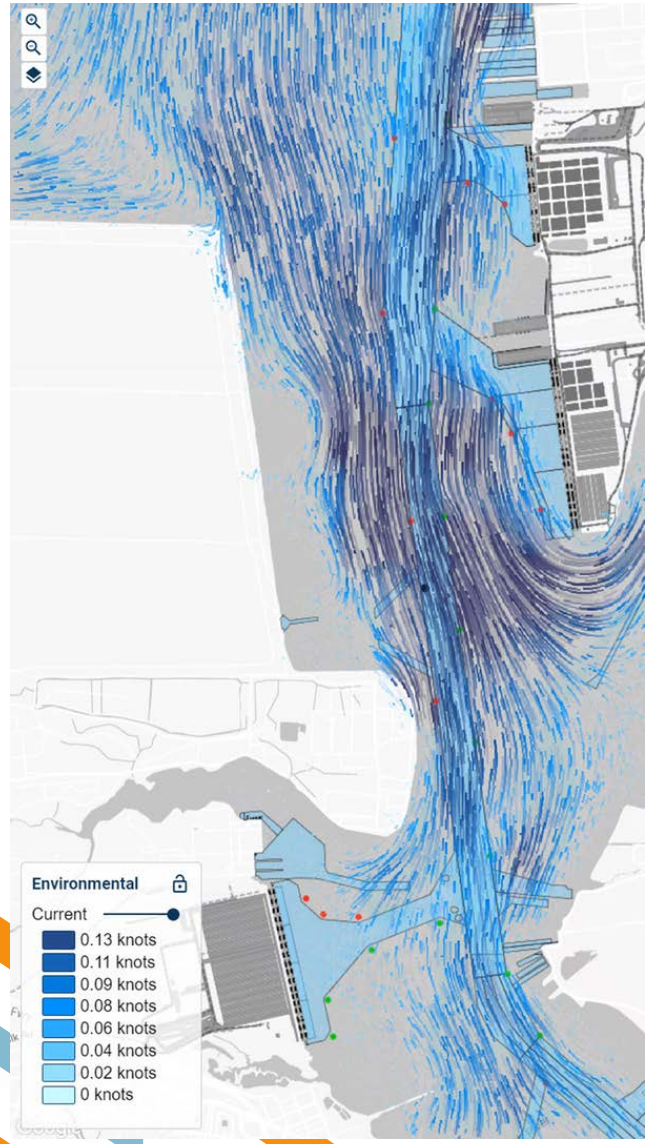
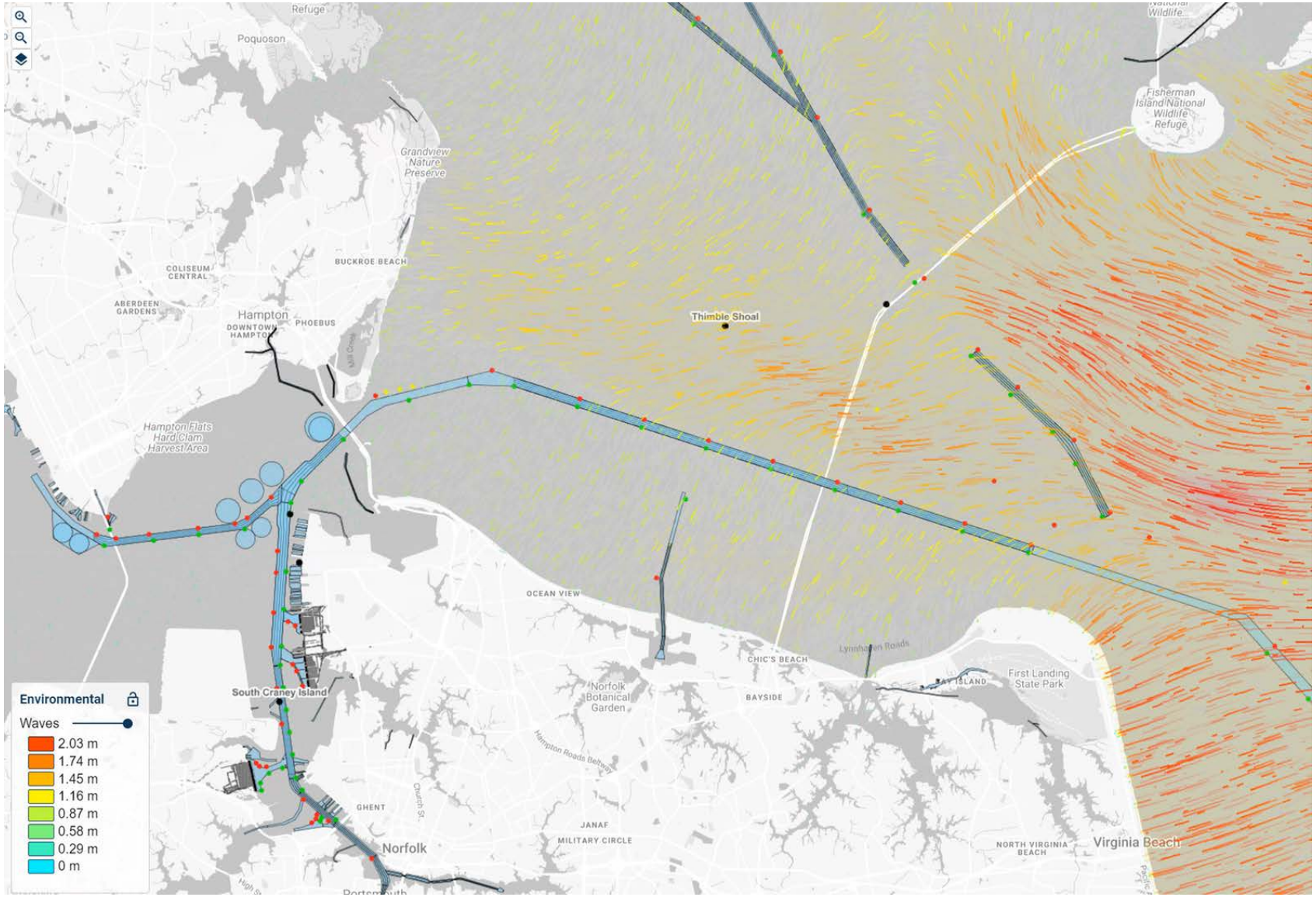
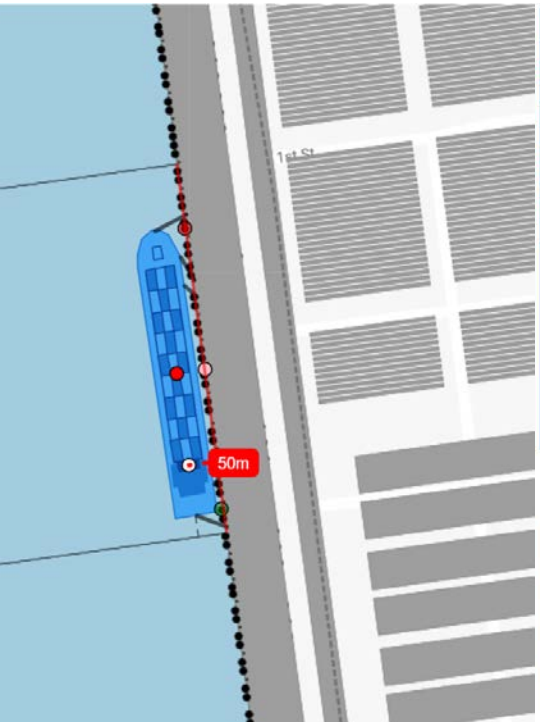
the rematch
GARRY
KASPAROV
DEEP
BLUE



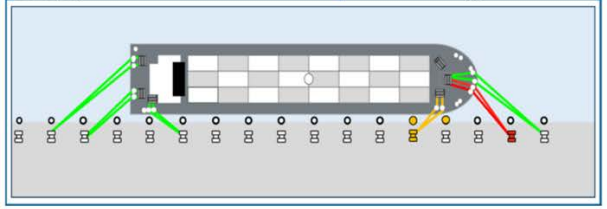

CSL SOPHIE
HYUNDAI SUPREME
HYUNDAI OAKLAND
MAERSK KARUN
255/183
LENA S
261/192
SAFMARINE MAFADI
CORNELIA 1
292/220
SAFMARINE MAKUTU
MAERSK UTAH
SC MARA
MSC ANYA
SEOUL EXPRESS
KOWLOON BAY
294/222
MAERSK VIRGINIA
292/219
ALDI WAVE
222/175
WIDE BRAVO
WIDE ALPHA
255/197
BEIJING BRIDGE
OOCL OAKLAND
OOCL DUBAI
280/206
BERNHARD SCHULT
264/209
ANL WAHROONGA
274/182
COSCO INDONESIA
COSCO THAILAND 334/245 COSCO KOREA
CSCL ASIA 334/260
LLOYD DON PASOALE
334/242
ANL WANDIN
ER FELIXSTOWE
278/185
XIN FEI ZHOU
335/246
YUE HE
COSCO FELIXSTOWE
COSCO ROTTERDAM
280/212
TEXAS TRADER
294/222
NORTHERN JADE
332/242
ANL GIPPSLAND
320/231
COSCO
NEW YORK
BELLAVIA
ANL GELONG
MIAMI
ALLISE P
MP THE BELICHICK
294/221
APL SCOTLAND
227/189
CAP CAMPBELL
CAP CORAL
CAP CLEVELAND
KOTA EKSPRES
228/185
NORDWINTER
246/178
HS BAFFIN
255/200
NYK GALAXY
264/194
JPO TUCANA
AGLAIA
268/208
ER KINGSTON
HAMMONIA GRENADA
MOL DESTINY
260/192
MAERSK GARRONE
SAFMARINE
GRASMERE MAERSK
MULANJE
292/220
ZPMC VESSEL
244/203
AAT RORO
260/192
AAL SINGAPORE
194/177
SOFRANA SURVILLE
SOFRANA TOURVILLE
142/114
BRISBANE RIVER
XIN QUAN ZHOU
JPO VIRGO
263/195
OOCL ROTTERDAM
OOCL SEOUL
323/249
CMA CGM GEORGIA
CMA CGM NEW JERSEY
294/224
NYK FURANO
NYK FUTAGO
PATRICK
QC 1
QC 2
QC 3
QC 4
QC 5
QC 6
WIELAND
255/201
YM SINGAPORE
264/194
HOLSATIA
YM BUSAN
NAGOYA TOWER
YM ANTWERP
YM SEATTLE
260/192
YM KEELUNG
YM VANCOUVER
YM ANTWERP
260/192
PATRAIKOS
HARRIER HUNTER
HANJIN NEWPORT
RHL CONSTANTIA
RHL CONCORDIA
260/210
YM EFFICIENCY
269/208
NAVIOS DEDICATION
NAVIOS DELIGHT
260/192
NORTHERN PRACTISE
NORTHERN PRIORITY & PRECISION
264/209
EVER DEVELOP
EVER DIVINE
EVER DEVOTE
FELIXSTOWE BRIDGE
293/220
YM PORTLAND
286/228
CSCL BRISBANE
SINGAPORE BRIDGE
OOCL BUSAN
260/192
UASC JUBAIL
OOCL LE HAVRE
260/192
OOCL TEXAS
OOCL BUSAN
OOCL DALIAN
260/192
CPO JACKSONVILLE
262/192
SEASPAN LUMACO
261/193
BEA SCHULTE
264/209
GLASGOW EXPRESS
281/232
FORUM SAMOA 4
KIRIBATI CHIEF
SHUNTIEN
SHANSI
SIANGTAN
SHAOSHING
200 / 187
ISLAND CHIEF
MELANESIAN CHIEF
KOKOPO CHIEF
NINGPO NANCHANG
PIMAX
NGANKIN
HIGHLAND CHIEF
175/158
KWEILIN
KWANGTUNG
185/149
SZECHUEN
SHENGKIANG
MORIBE CHIEF


Environmental
Current
0.13 knots
0.11 knots
0.09 knots
0.08 knots
0.06 knots
0.04 knots
0.02 knots
0 knots


Environmental
Waves
2.03 m
1.74 m
1.45 m
1.16 m
0.87 m
0.58 m
0.29 m
0 m
Refuge
Poquoson
Grandview Nature Preserve
Fisherman Island National Wildlife Refuge
COLISEUM CENTRAL
BUCKROE BEACH
ABERDEEN GARDENS
Hampton
DOWNTOWN HAMPTON
PHOEBUS
Thimble Shoal
Hampton Flats Hard Clam Harvest Area
OCEAN VIEW
CHIC'S BEACH
Lynnhaven Roads
South Craney Island
Norfolk Botanical Garden
BAYSIDE
First Landing State Park
Hampton Roads Beltway
GHENT
JANAF MILITARY CIRCLE
Norfolk
NORTH VIRGINIA BEACH
Virginia Beach




| Vessel | |
|---|---|
| Arrival/Departure | Arrival |
| Vessel Name | **Maersk Virginia** |
| Port | **Port of Virginia** |
| Terminal | **Example Berth** |
| DWT | **61609** |
| LOA (m) | **292.08** |
| Beam (m) | **32.95** |
| Longitudinal Windage Area ($m^2$) | **6500** |
| Lateral Windage Area ($m^2$) | **1000** |
| Draft (m) | **13** |

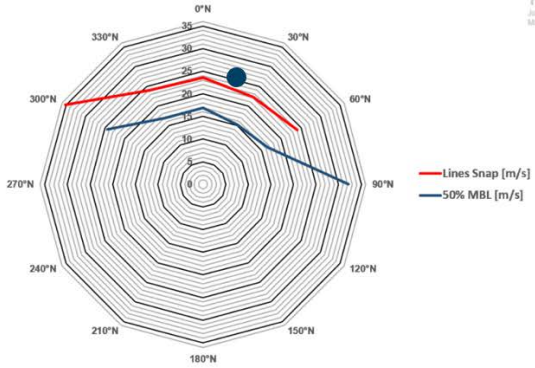


| Environmental Conditions | |
|---|---|
| Wind speed (kn) | 50 |
| Wind direction (deg) | 20 |
| Current speed (kn) | 0.1 |
| Current direction (deg) | 45 |
| Wave height (m) | 0.2 |
| Wave period (s) | 8 |
| Wave direction (deg) | 200 |

| Analysis Summary | | | |
|---|---|---|---|
| Mooring Lines | | Fender Failure | Bollard Failure |
| 50% MBL exceedance | Snapped | | |
| 5 | 3 | L | A |
| 6 | 4 | M | B |

| Maximum P2P Vessel Motions | | | | | |
|---|---|---|---|---|---|
| Surge (m) | Sway (m) | Roll (°) | Pitch (°) | Heave (m) | Yaw (°) |
| 0.5 | 0.2 | 0.2 | 0.1 | 0.2 | 0.3 |

DIRECTIONAL WIND ROSE




# Thank you