APP: BerthWatch Real-Time Berth Condition Monitoring

Konrad Mech Aug 2022

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MARITIME | DEFENCE | DIGITAL | SENSORS & ROBOTICS

11 000
EMPLOYEES

40
COUNTRIES

31.8 BNOK
80% EXPORT

The Kongsberg Group
FROM DEEP SEA TO OUTER SPACE

OUTER SPACE

AIRBORNE

SEABORNE

DIGITAL FRONTIER

LAND-BASED

DEEP SEA

Key Questions

- Do you own or contract hydrographic survey assets?
- Do you dredge your berths?
- Do you know the actual depth of your berths at this specific time?
- Is your berth dredging coordinated with channel dredging?
- Have you had any vessel groundings? What was the root cause?
- Can you contract a dredge when you need it?
- Are you forgoing revenues due to berth depth restrictions?
- Do you have awareness of thruster or propeller scour and shoaling in your berths?

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Characteristics – Global Ports and Waterways

- Infrastructure upgrades
- Cycling droughts and floods
- Workforce demographics
- Environmental stewardship

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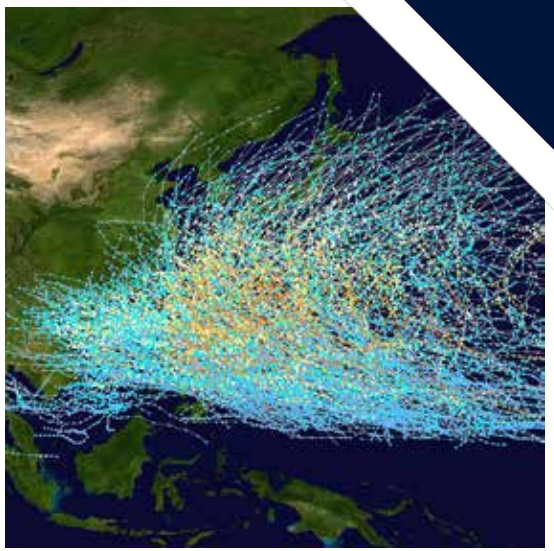
Characteristics of Pacific Ports

Ring of Fire

Typhoons

Tsunami

Big vs Small Ports



MARAD Town Hall 2023

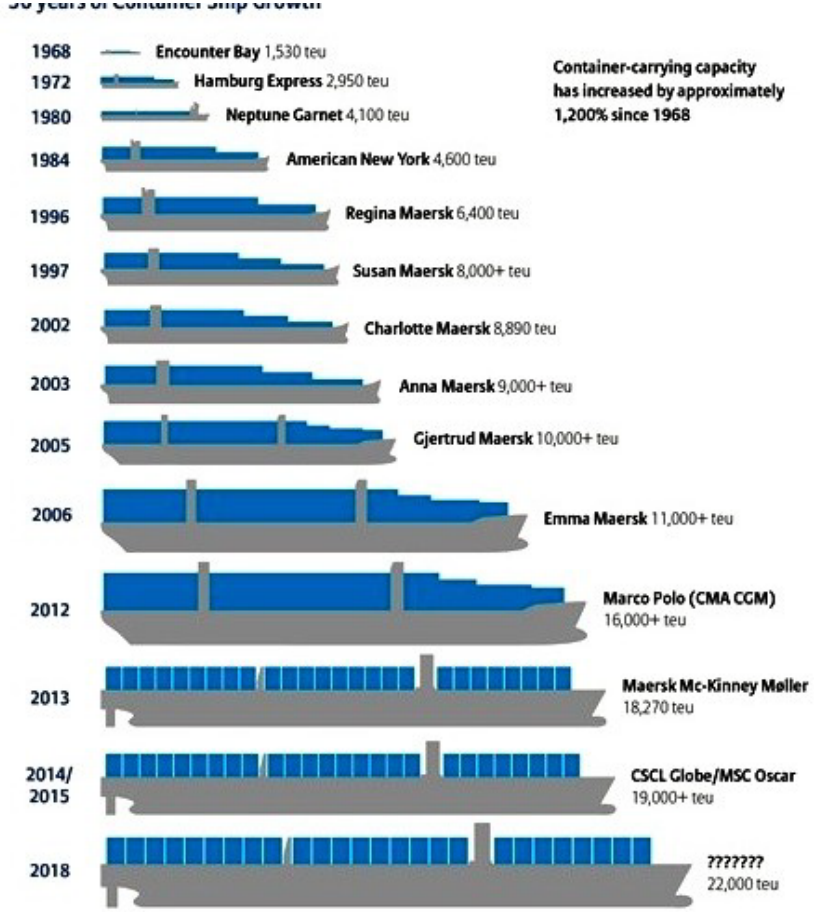
Congestion

Data Sharing Portals

Work force development

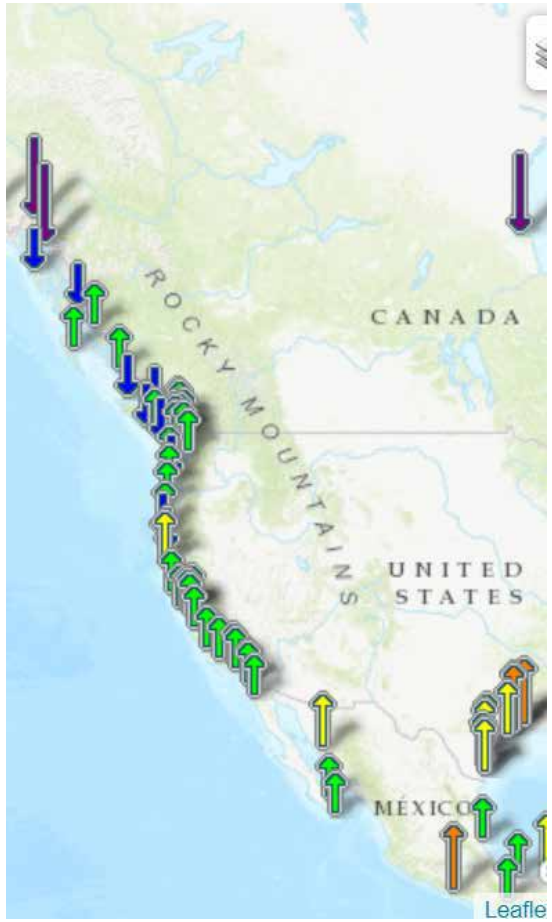
Sustainability

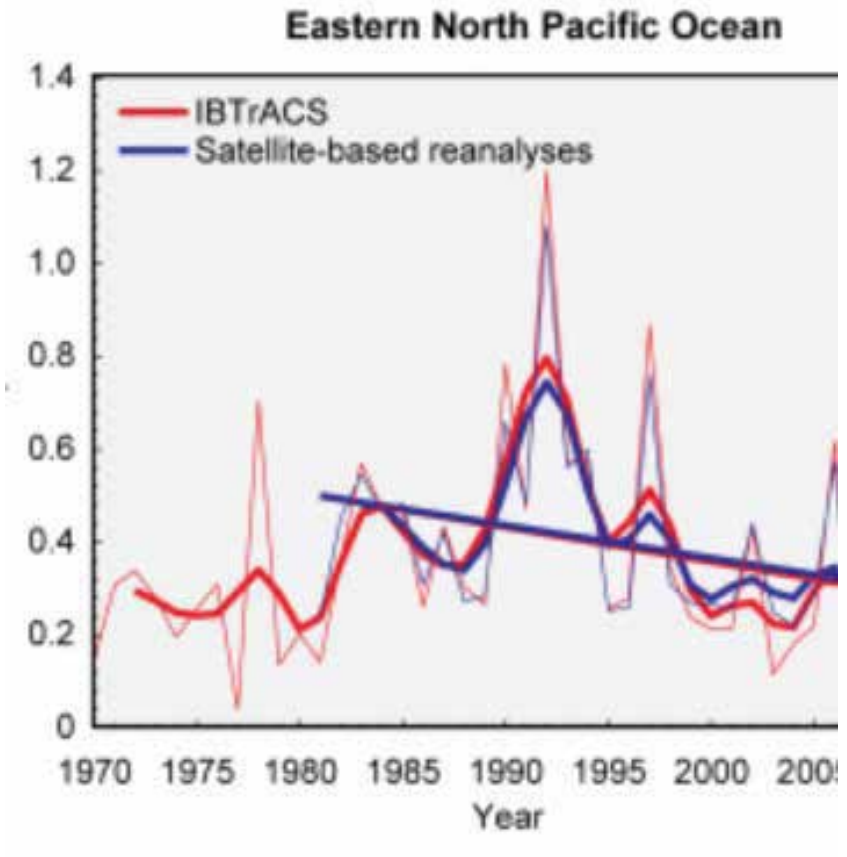
Trends Impacting Port Investment Decisions



Climate Change Impacts?

https://tidesandcurrents.noaa.gov/sltrends/





Big Ships, Big Challenges:

The Impact of Mega Container vessels on U.S. Port Authorities (Noel Hacegaba, POLB)

- Access channels width and depth
- Air draft
- Depth alongside
- Quay length
- STS height, outreach and width
- Increased exchanges of containers from each ship
- Landside capacity
- Yard equipment and TOS
- Road, rail and barge access
- Hinterland connections
- Capacity to expand

Source: Rothberg, 2013

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Savannah, GA


Norfolk, VA


Fraser Surrey Docks, BC
Google


Port Arthur, TX


Port of Rotterdam


Barbours Cut, Houston TX
Google

Recap – Boskalis study

Figure 11

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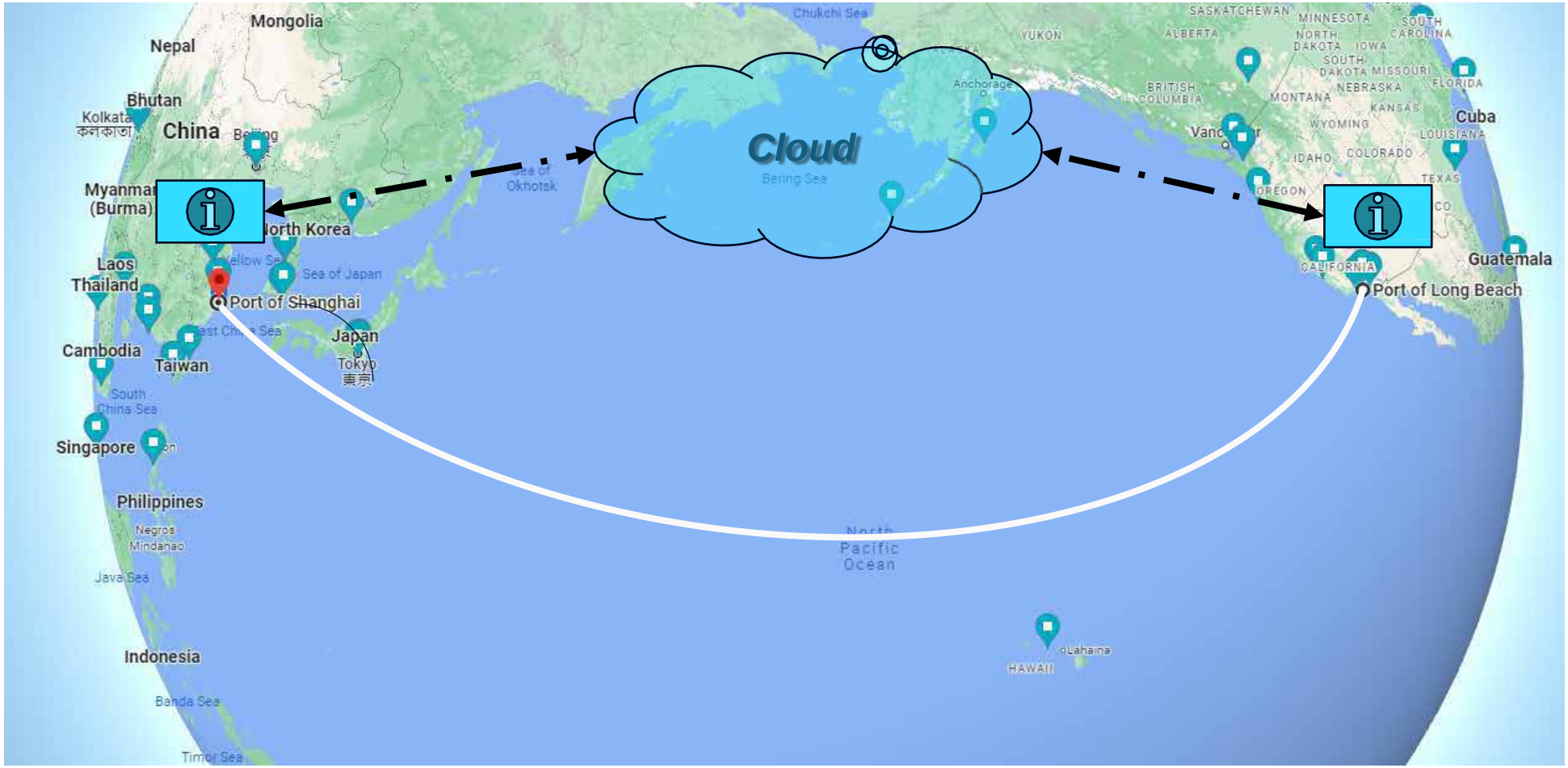
Opportunity: Green Shipping Corridors

Multiple Stakeholders – How to turn concept to reality?



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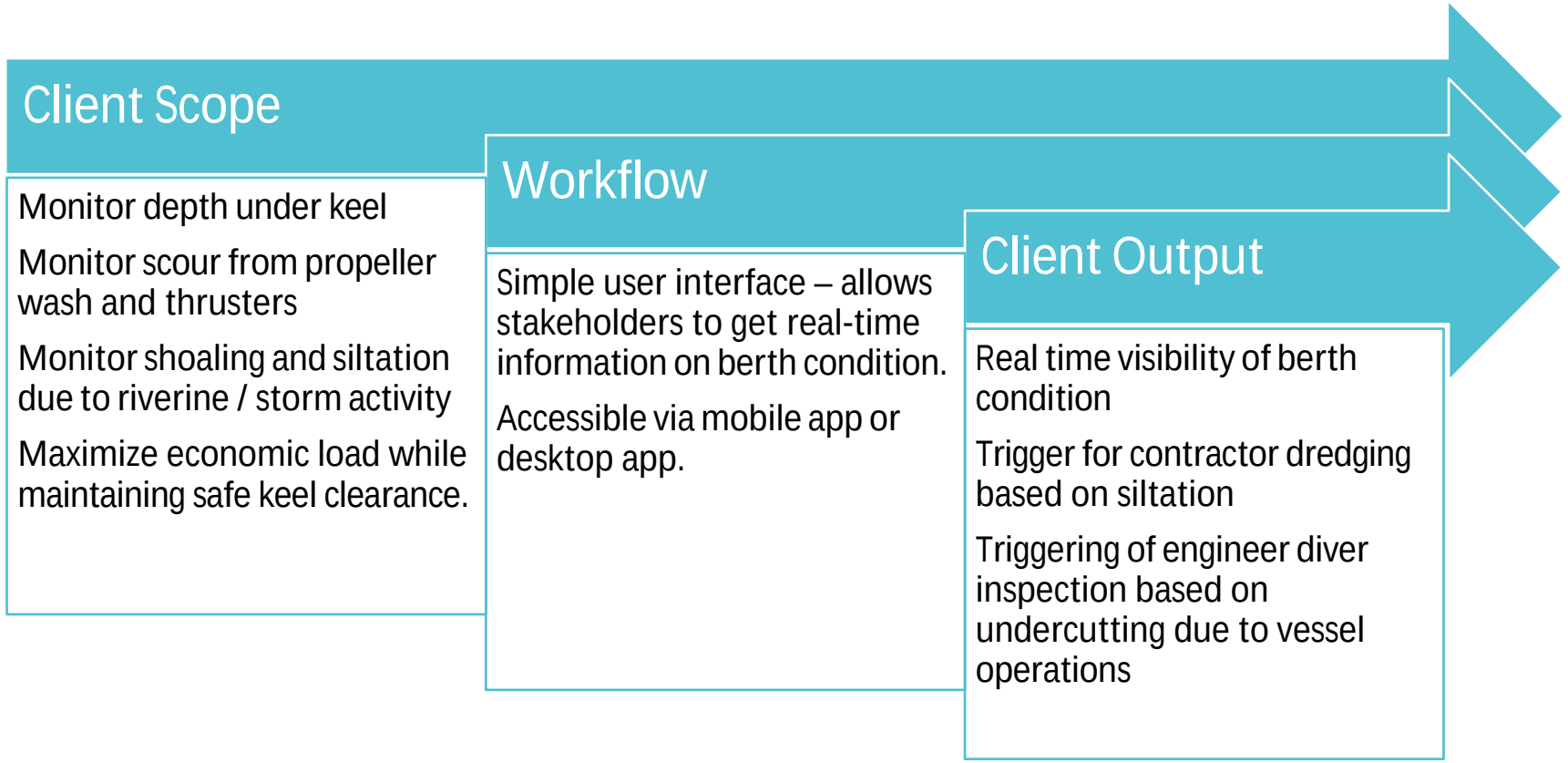
BerthWatch Value Proposition



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Visualize real time change

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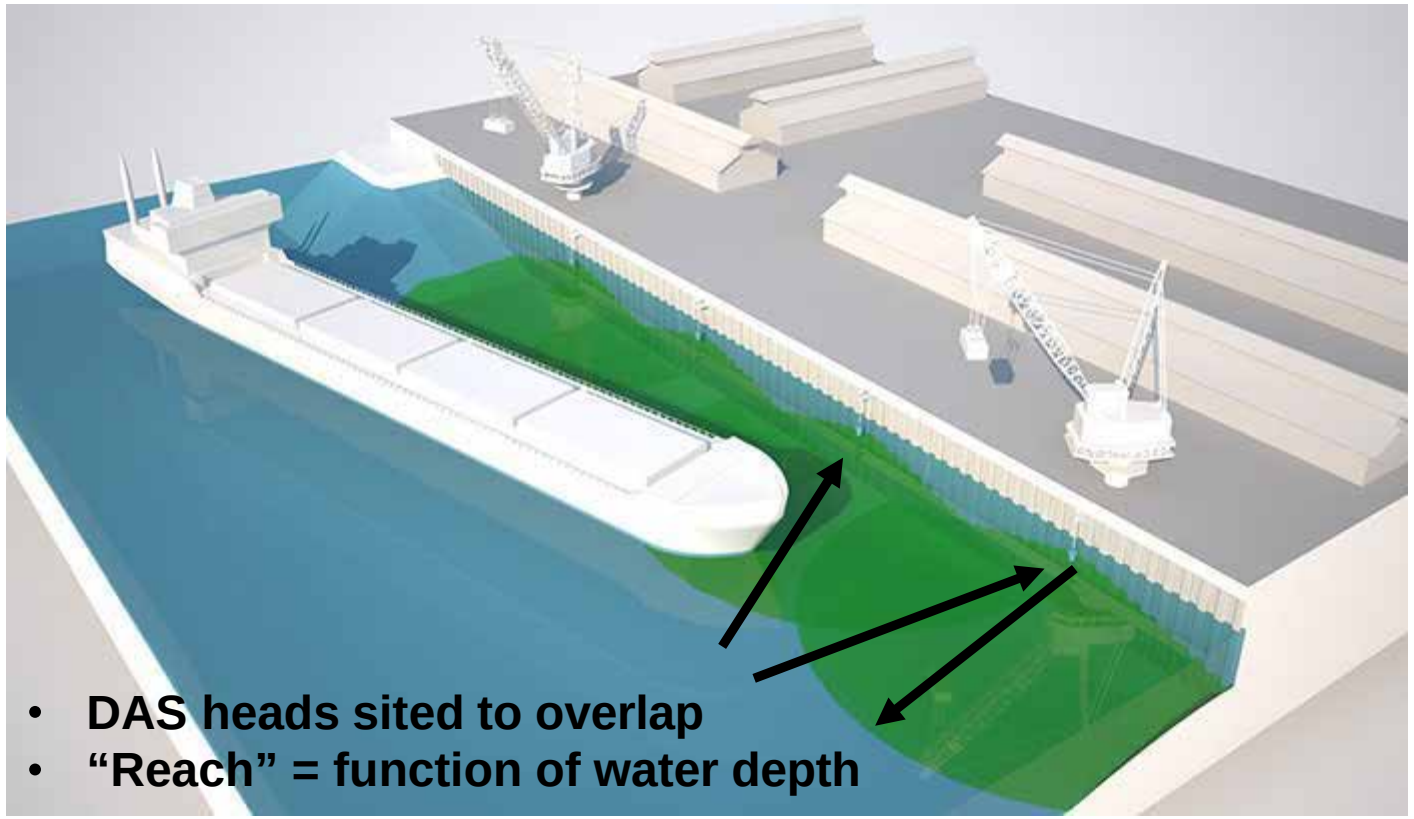
BerthWatch Real-Time Berth Condition Monitoring top-level concept



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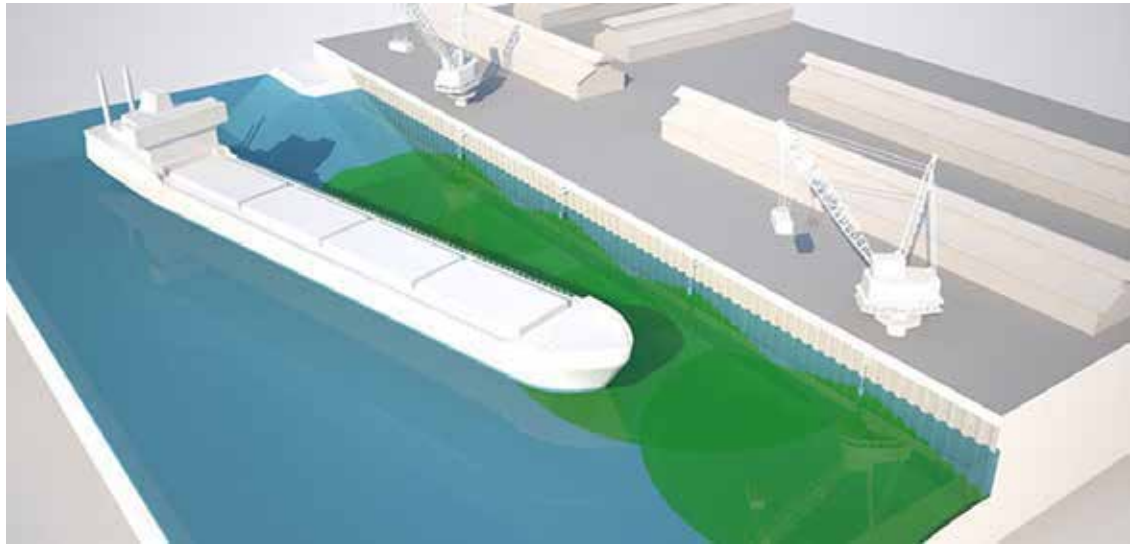
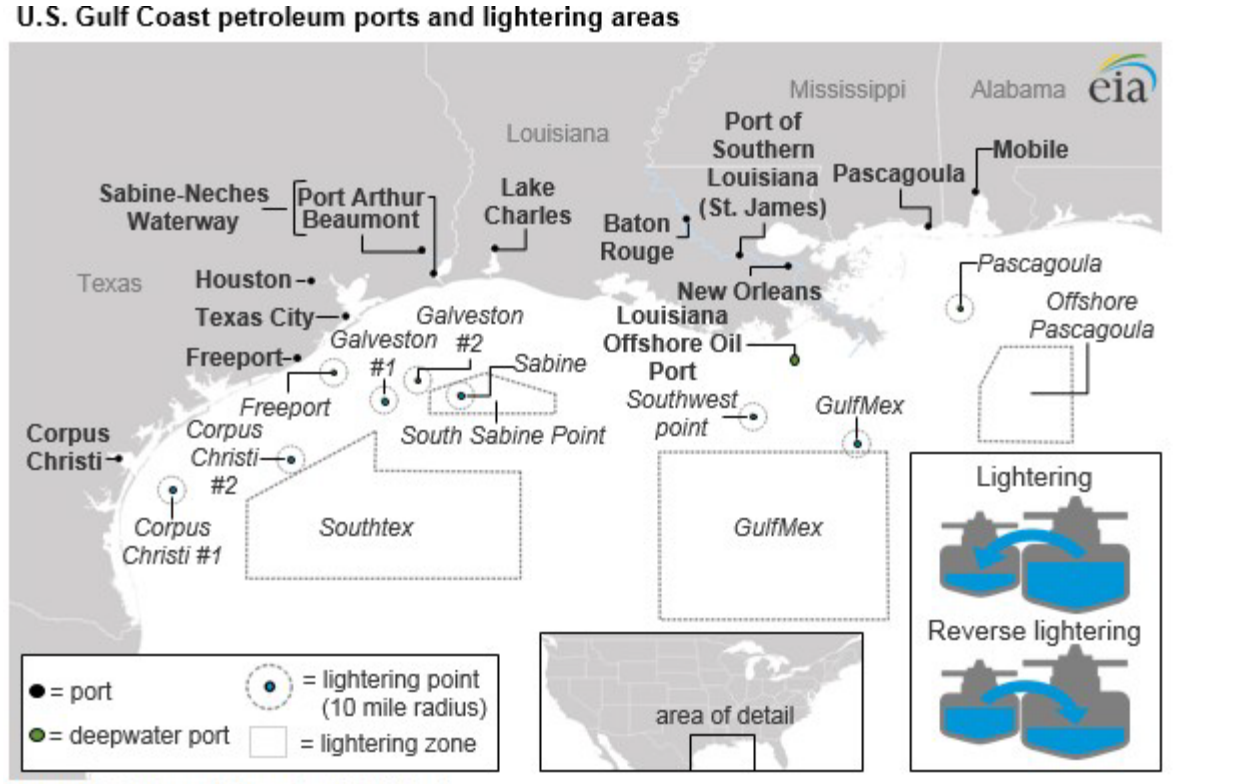
BerthWatch Real-Time Berth Condition Monitoring



- **Value Proposition**
  - **Maximize cargo based on true depth under keel**
  - **Minimize lightering / reverse lightering**
  - **Mitigate allision risk with sunken objects**
  - **Recover from storm events faster**
  - **Trigger dredging operations when needed**
- **User benefits:**
  - **Real time data adjusted for SV, wave, tide data**
  - **Easy mobile and desk-top interfaces for pilots and vessel masters**

Freight Optimization Logic:



Source: U.S. Energy Information Administration

Data from the U.S. Maritime Administration (MARAD) for 2015, the latest year for which data are available, indicate that the two largest ports of call for tankers carrying crude oil and petroleum products in the United States are lightering zones. The South Sabine Point and Southtex lightering zones each had nearly 250 million deadweight tons of tanker traffic volume in 2015. Deadweight tons are a measure of a vessel's capacity to carry cargo by weight. The number of barrels per ton varies based on the density of the petroleum product or crude oil cargo.

Source: https://www.eia.gov/todayinenergy/detail.php?id=36232

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Technical Offering

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Dual-Axis Sonar (DAS)

This *profiling* sonar is specifically designed for long-term immersion in the harshest of conditions

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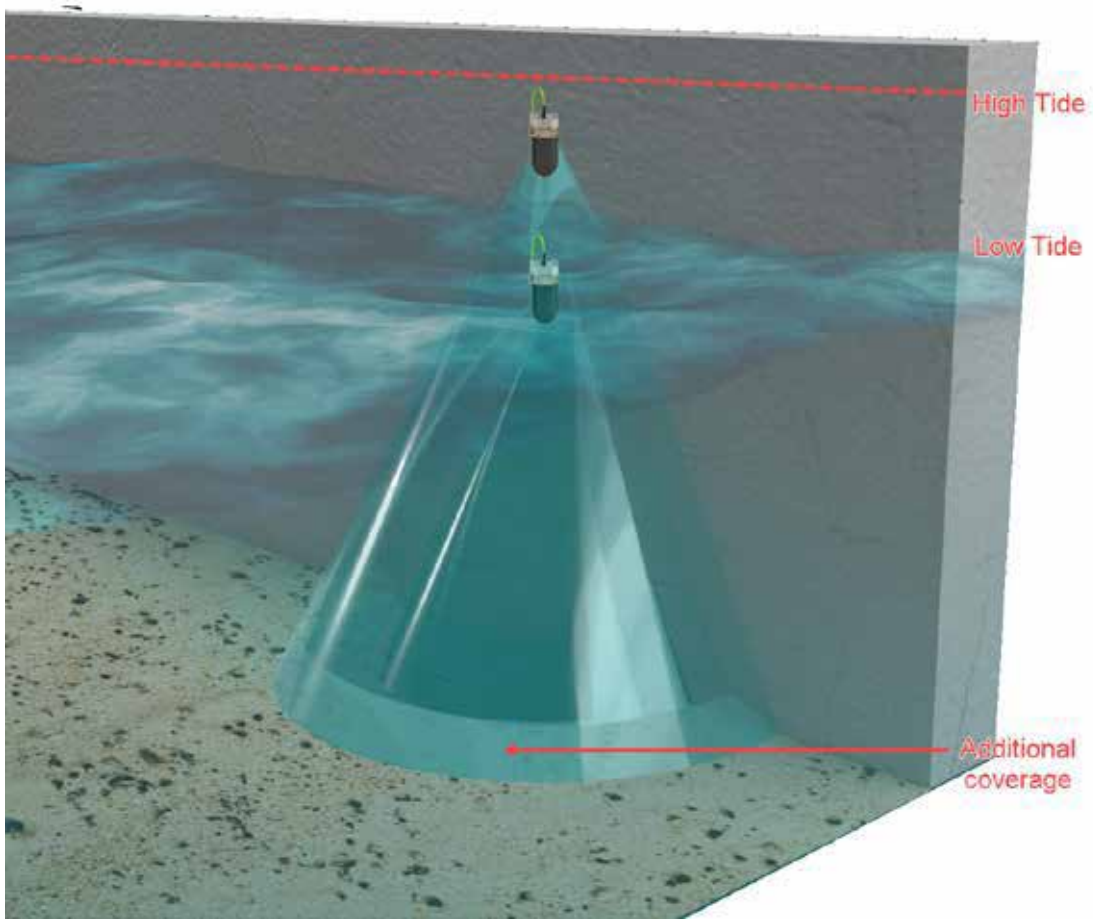
Head height above bottom



In areas of large tidal reach, positioning head for high tide will provide additional coverage on sea floor

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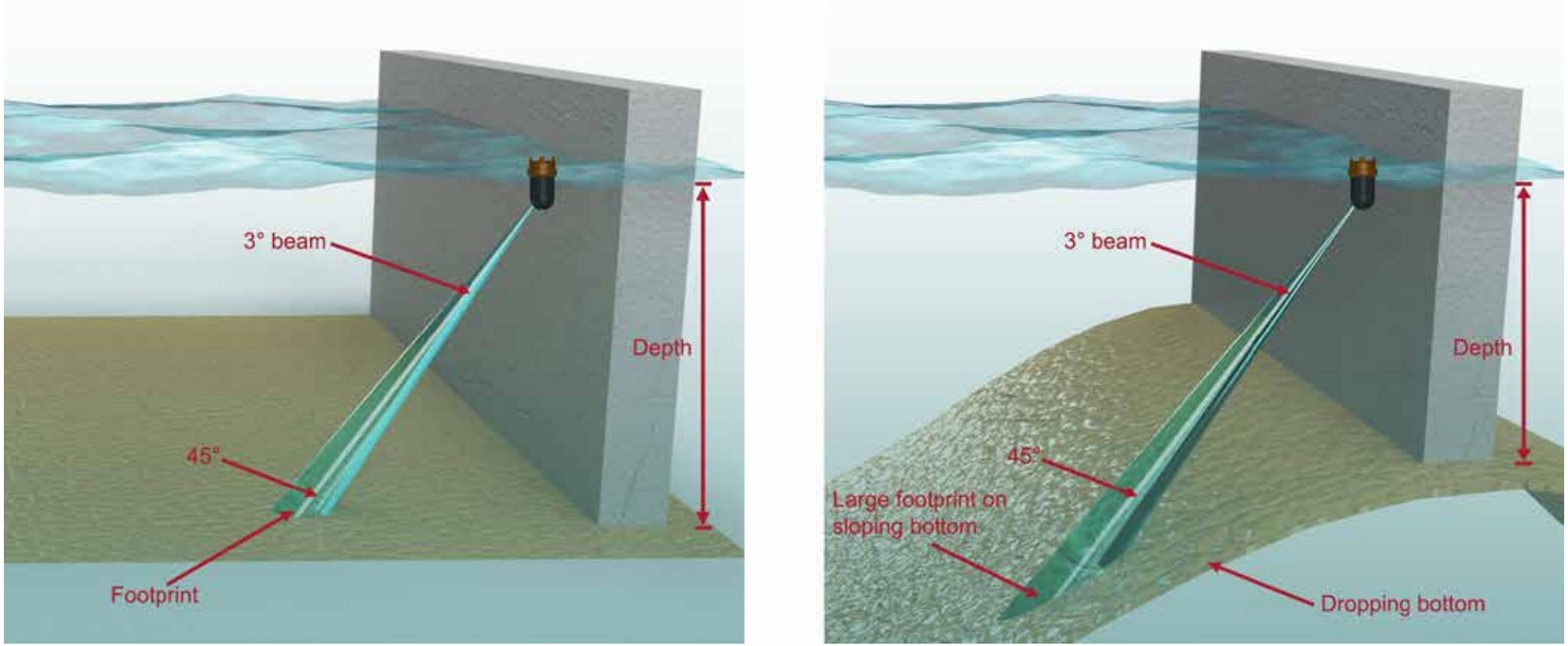
Beam footprint on bottom



Sloping bottom will cause larger beam footprint

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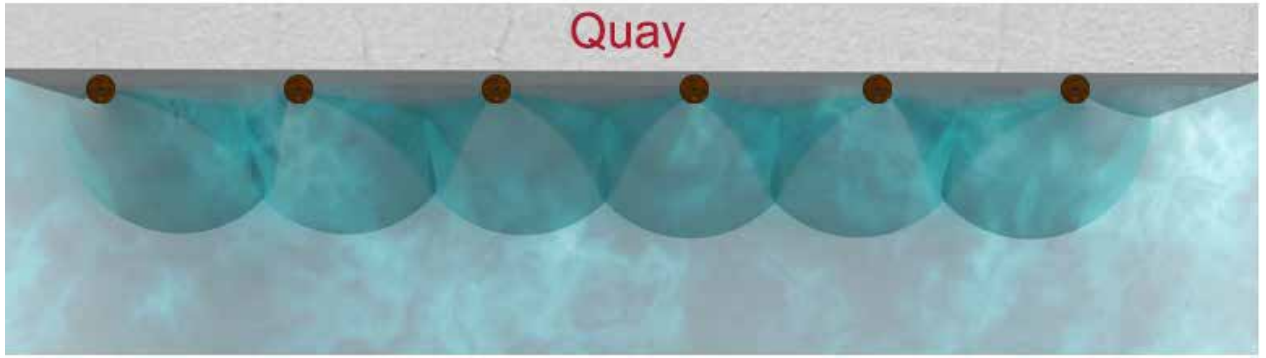
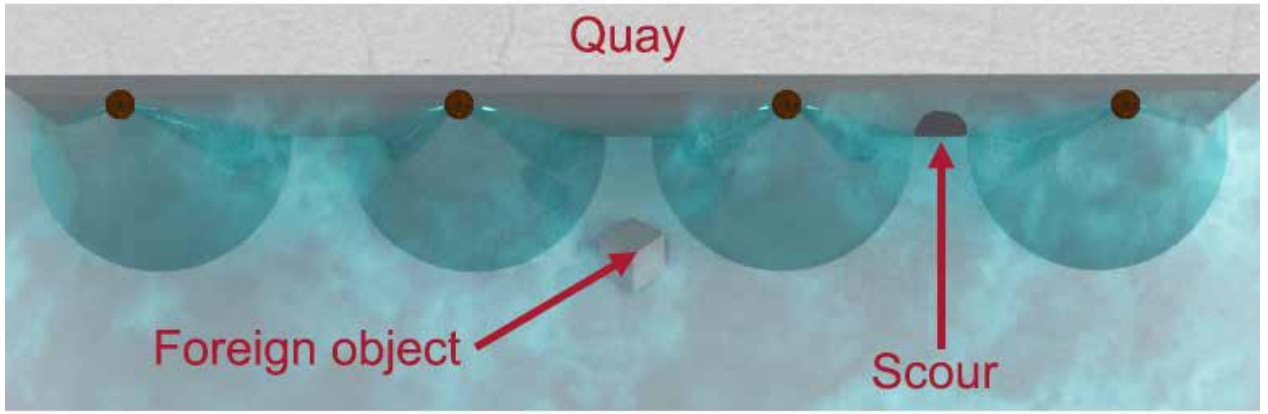
Pitch between sonar heads





Spacing heads with gaps reduces key information about what happens in those gaps

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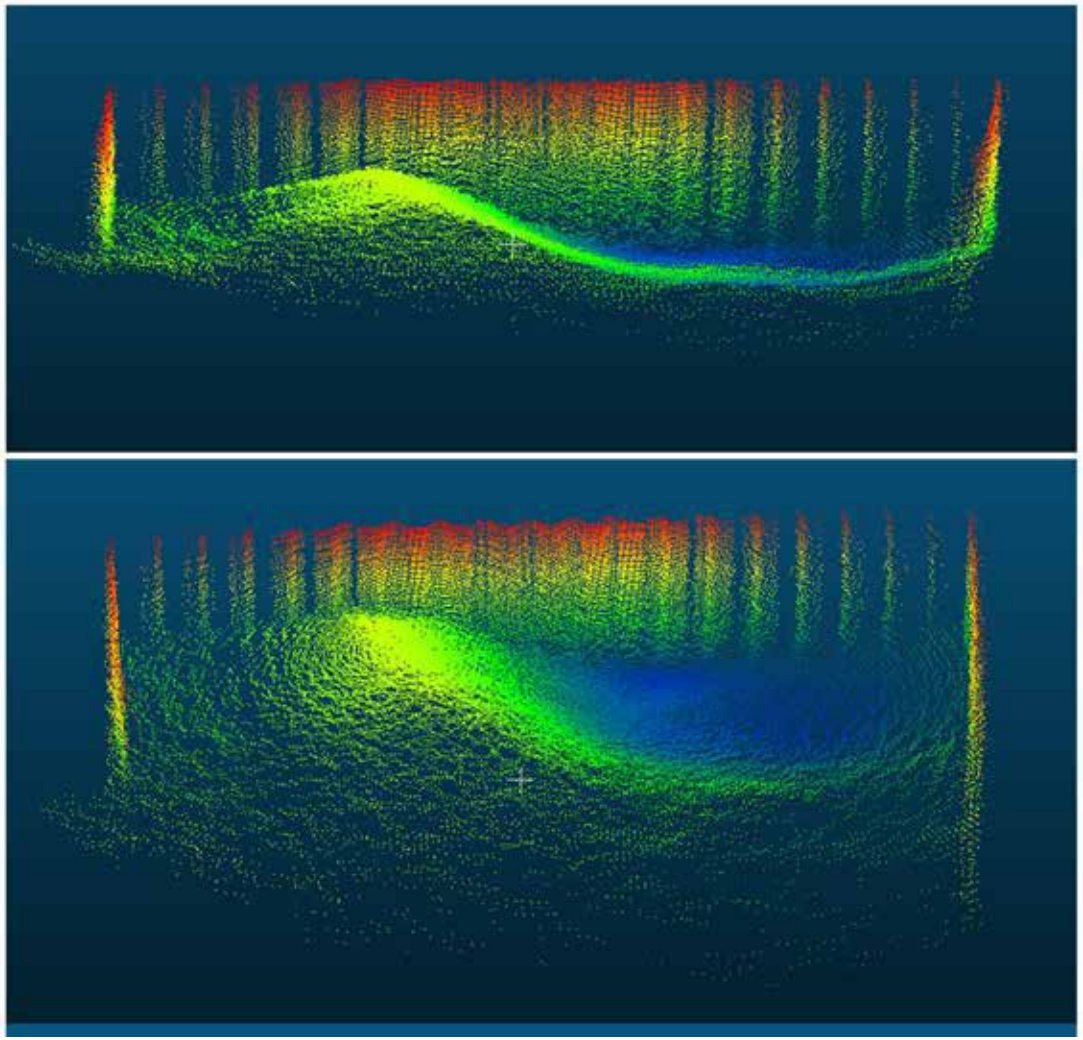
Northwestern Michigan College: Scour and Shoaling



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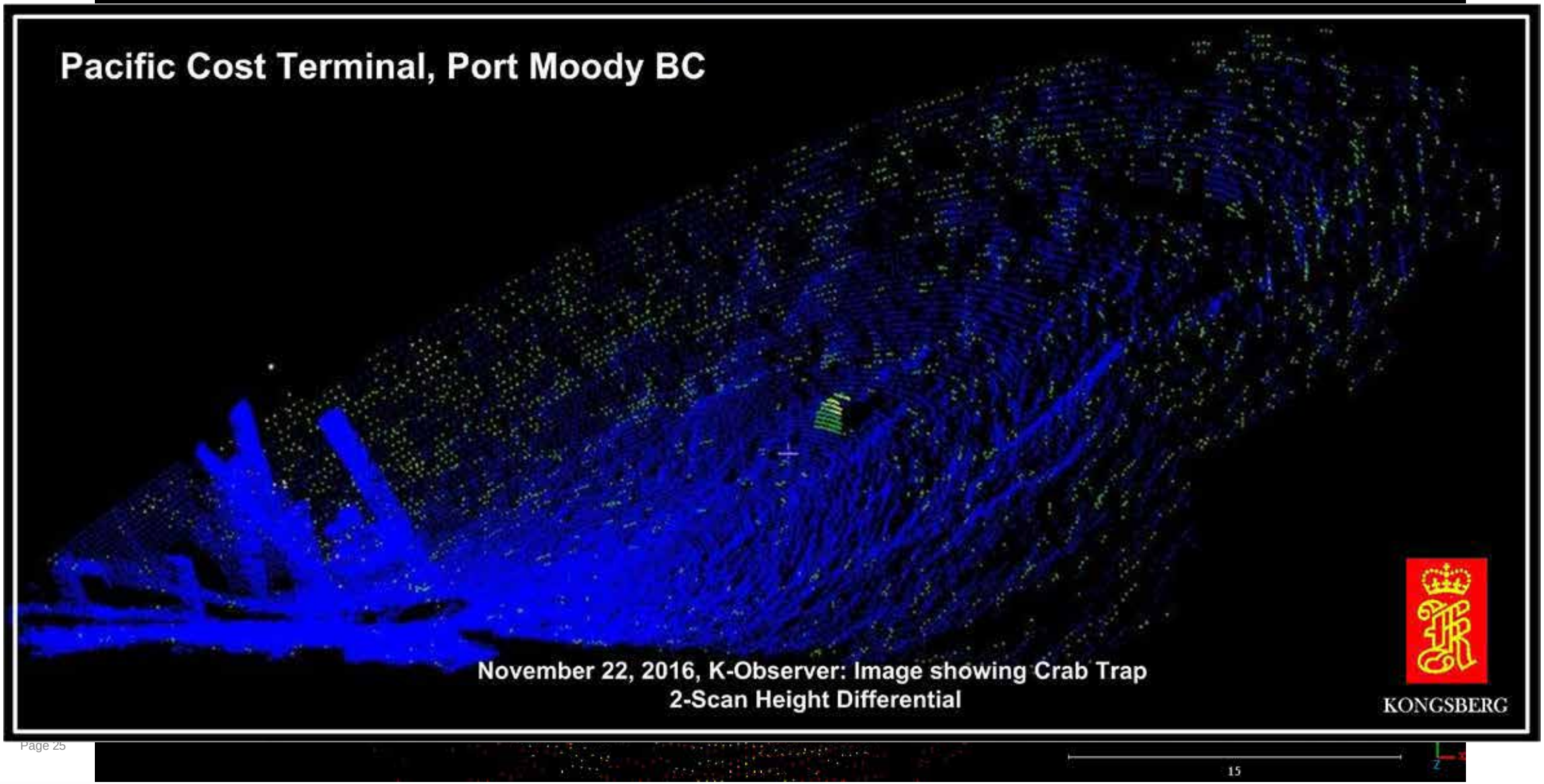
Examples – bottom scan with target



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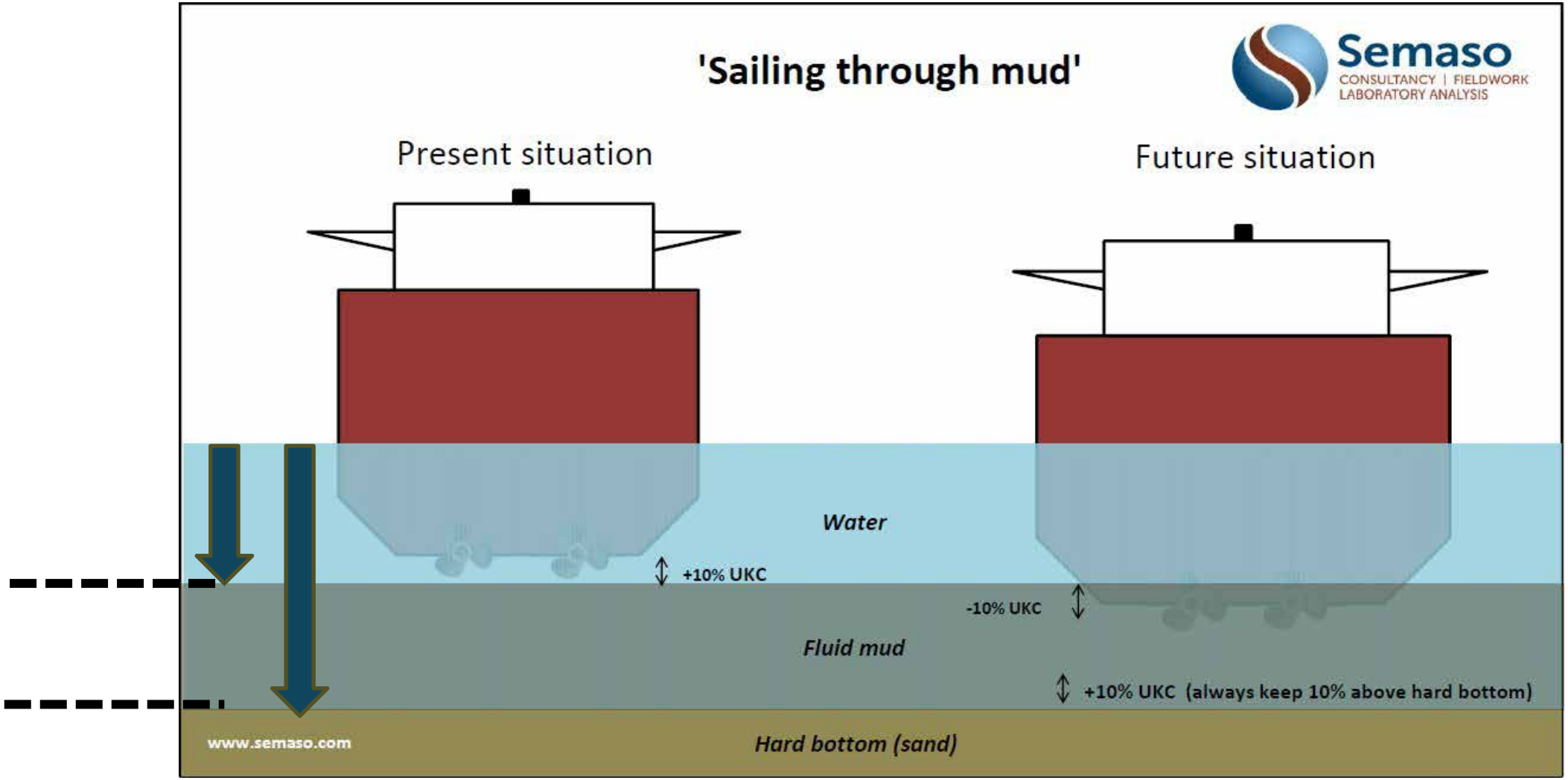
Unconstituted solids, AKA fluid mud



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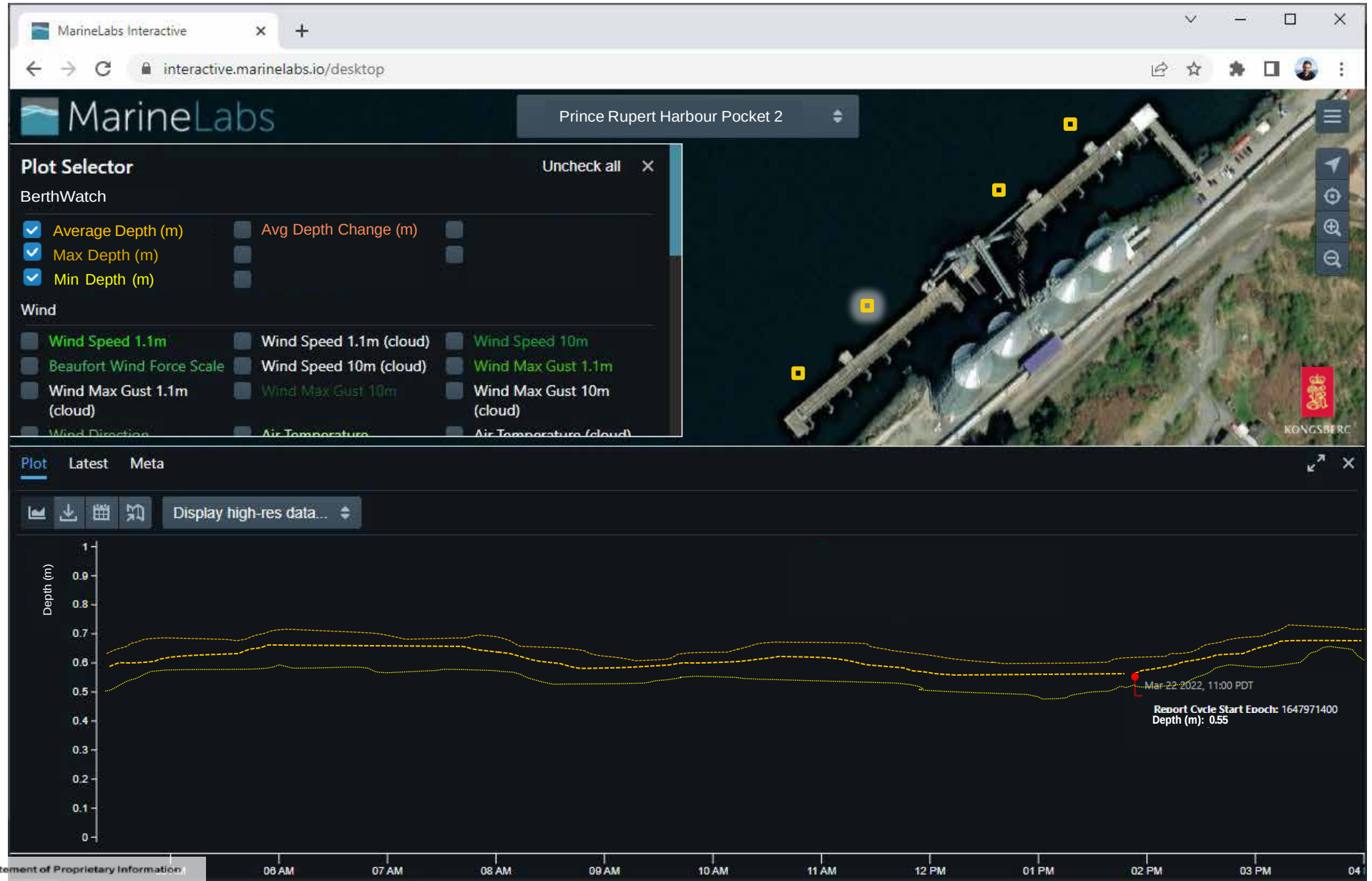
BerthWatch – Desktop view

- **Check beside the berth data you want**



- **Click on a berth pocket**

- **Mouse over the report you want**

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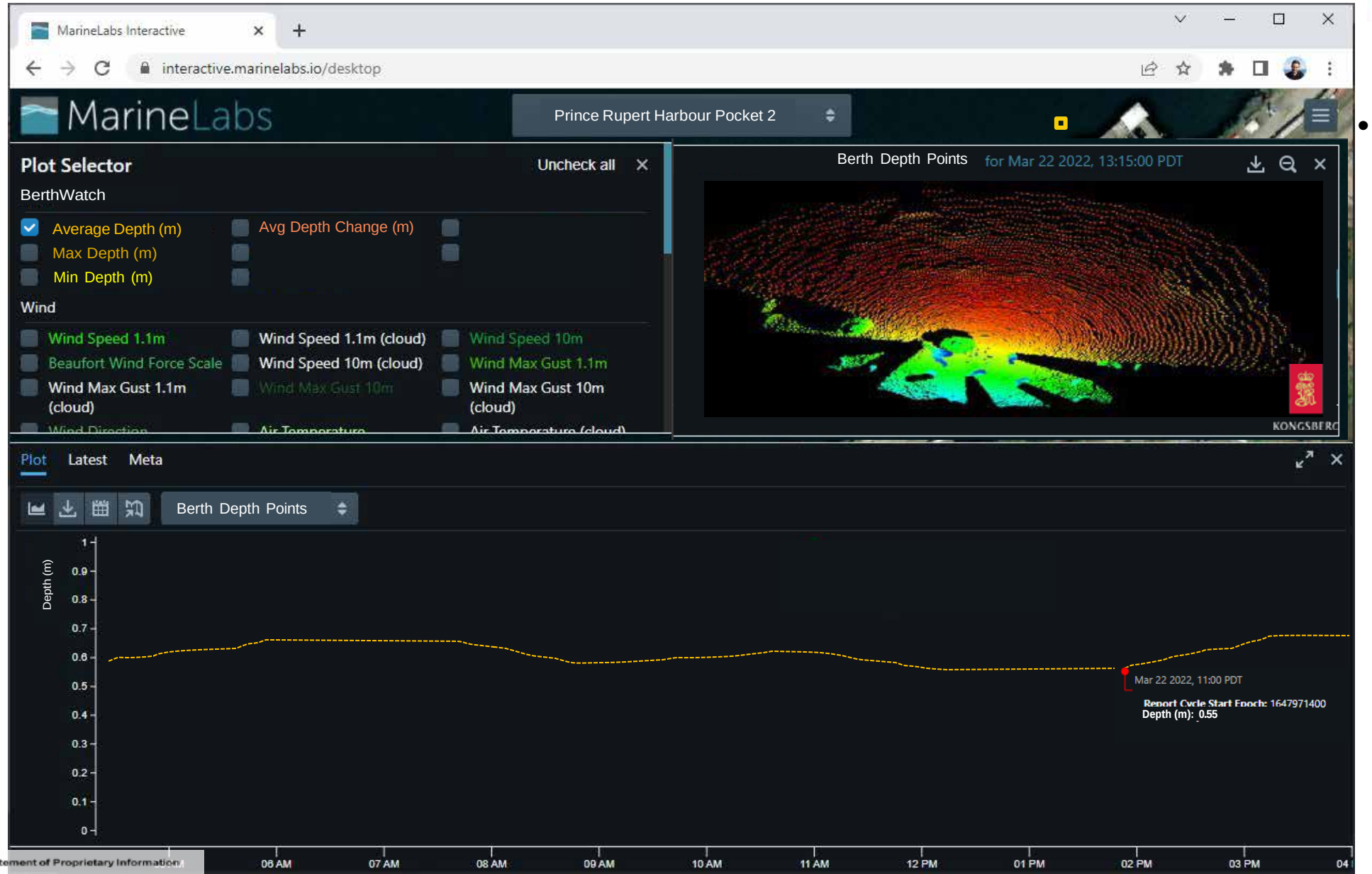
BerthWatch – High-res panel



- **Select ‘Berth depth points’**

- **3D pan and zoom depth points, coloured as a function of depth or Δ***

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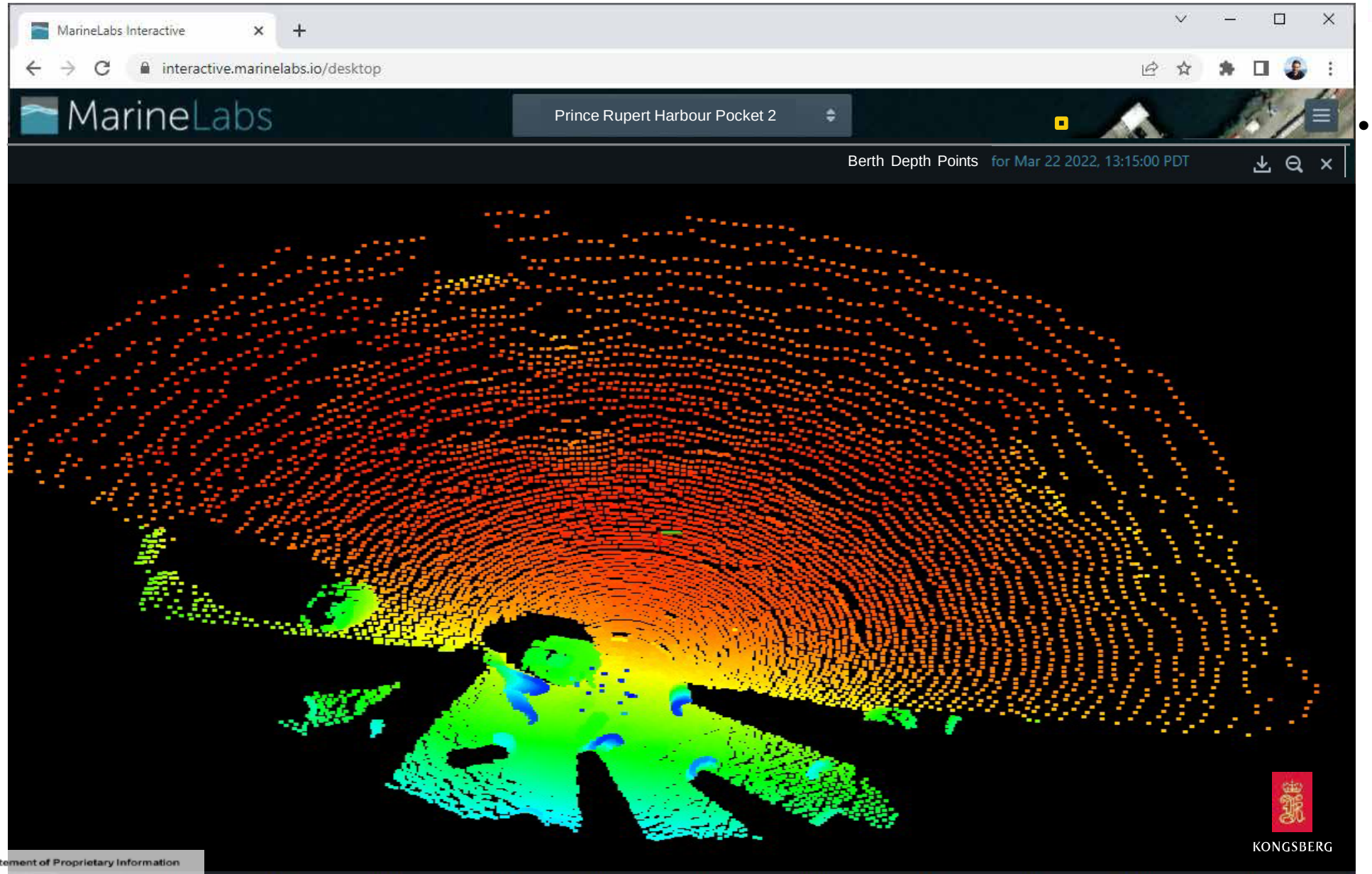
BerthWatch – High-res panel



- **Hover on points to observe depth value**

- **Expand the panel window for close inspection**

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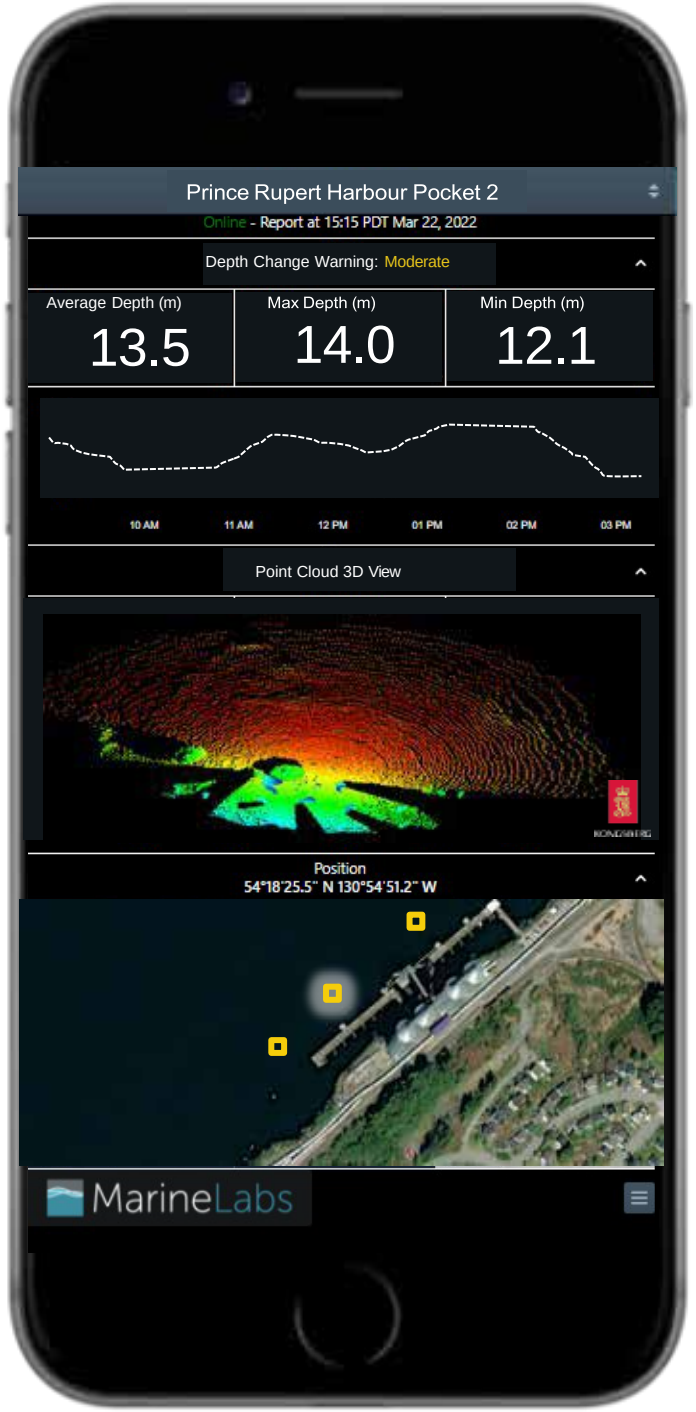
BerthWatch – Dashboard

- Select berth pocket
- Check for Δ warnings
- View latest pocket depth summary
- 3d pan rotate point cloud
- Check another berth pocket



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Summary of User Value:

• Is berth safe?	• Risk Mitigation; digital yes/maybe/no condition • Accelerates post-storm event recovery
• Maximize cargo load	• Real-time data at departure and arrival berths
• Reduce lightering – reverse-lightering costs	• 1st order effect: lower lightering costs • 2nd order effects: lower GHG emissions; faster port turn-around
• Reduce dwell-time	• 1st order effects: lower GHG emissions; faster port turn-around
• Optimize dredging	• Trigger when to dredge berth pockets based on real time event data

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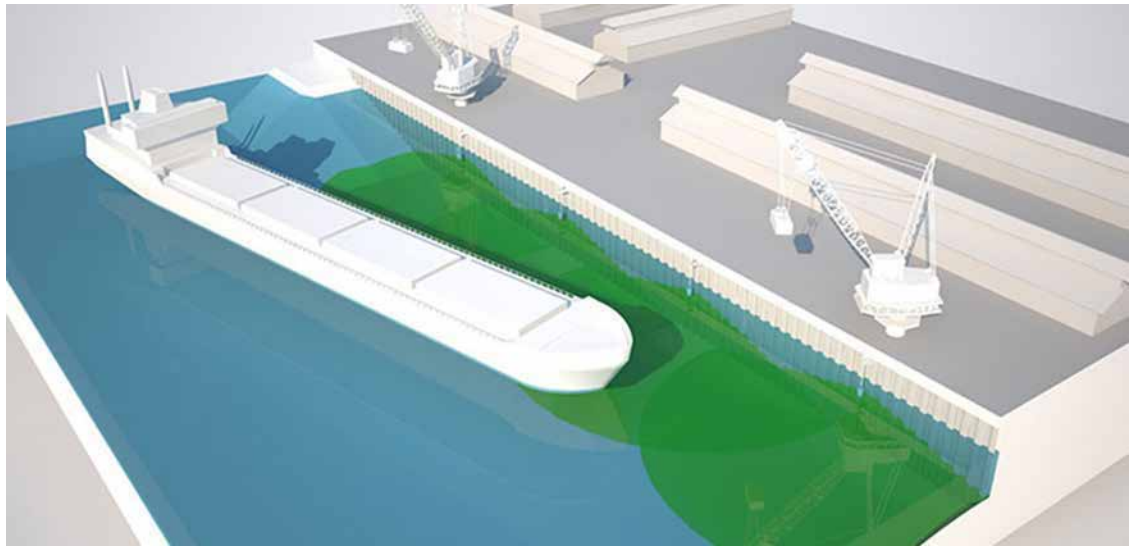
Methodical Approach – A Phased Project

- Confirm needs of key stakeholders
- Identify test site
- Schedule site survey
- Agree on pilot scope, criteria for success
- Discuss desired Desktop User and Mobile User Dashboards
- Scale as desired per PHA’s needs



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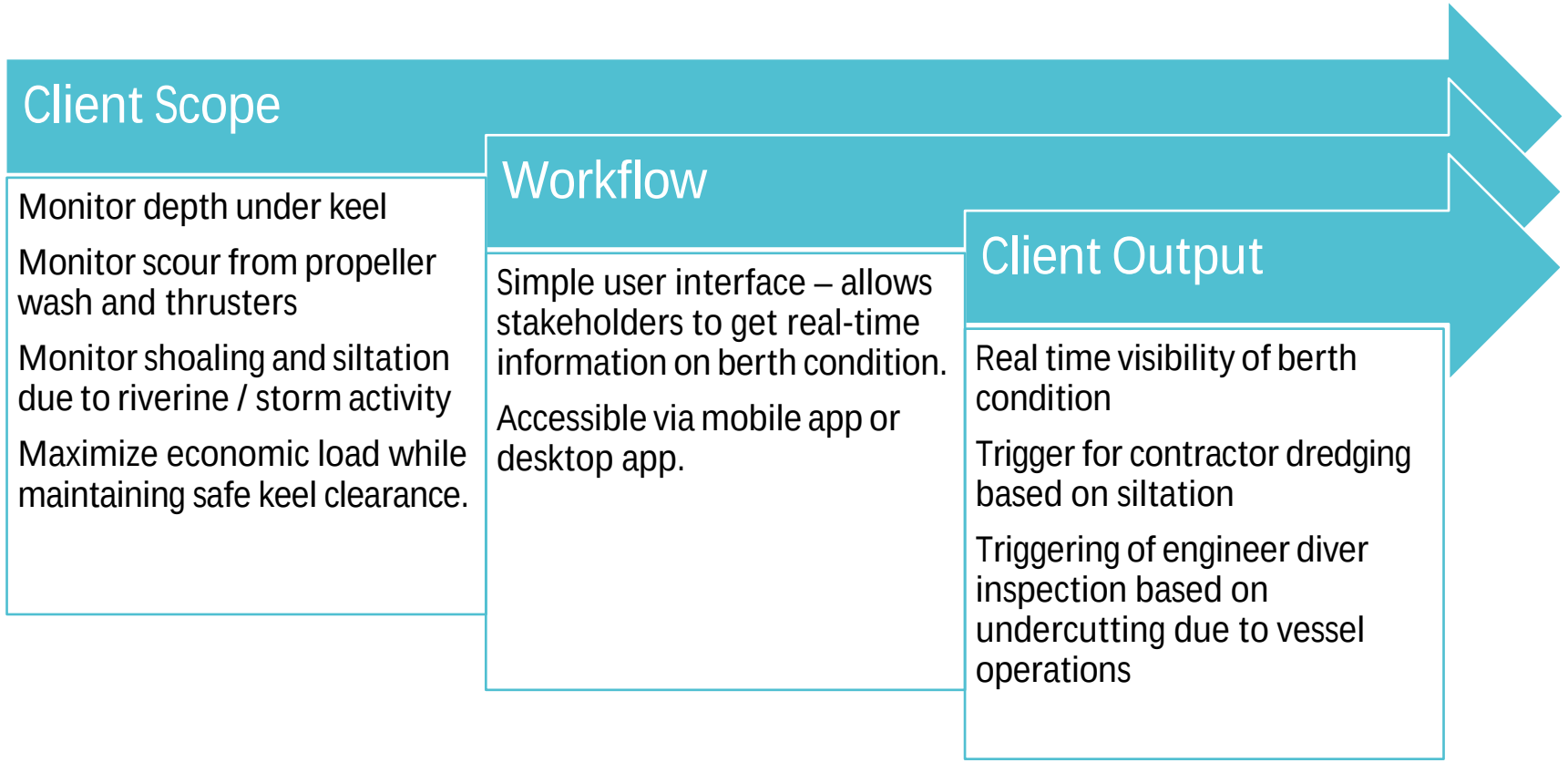
BerthWatch Value Proposition



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