

› REMOTE SUPERVISORY CONTROL FOR A ROBOTIC CONTAINER HANDLING SYSTEM

TNO innovation for life

Connecting EU
Circle Group insights

DECEMBER EDITION
ONLINE STREAMING

From here to Autonomy

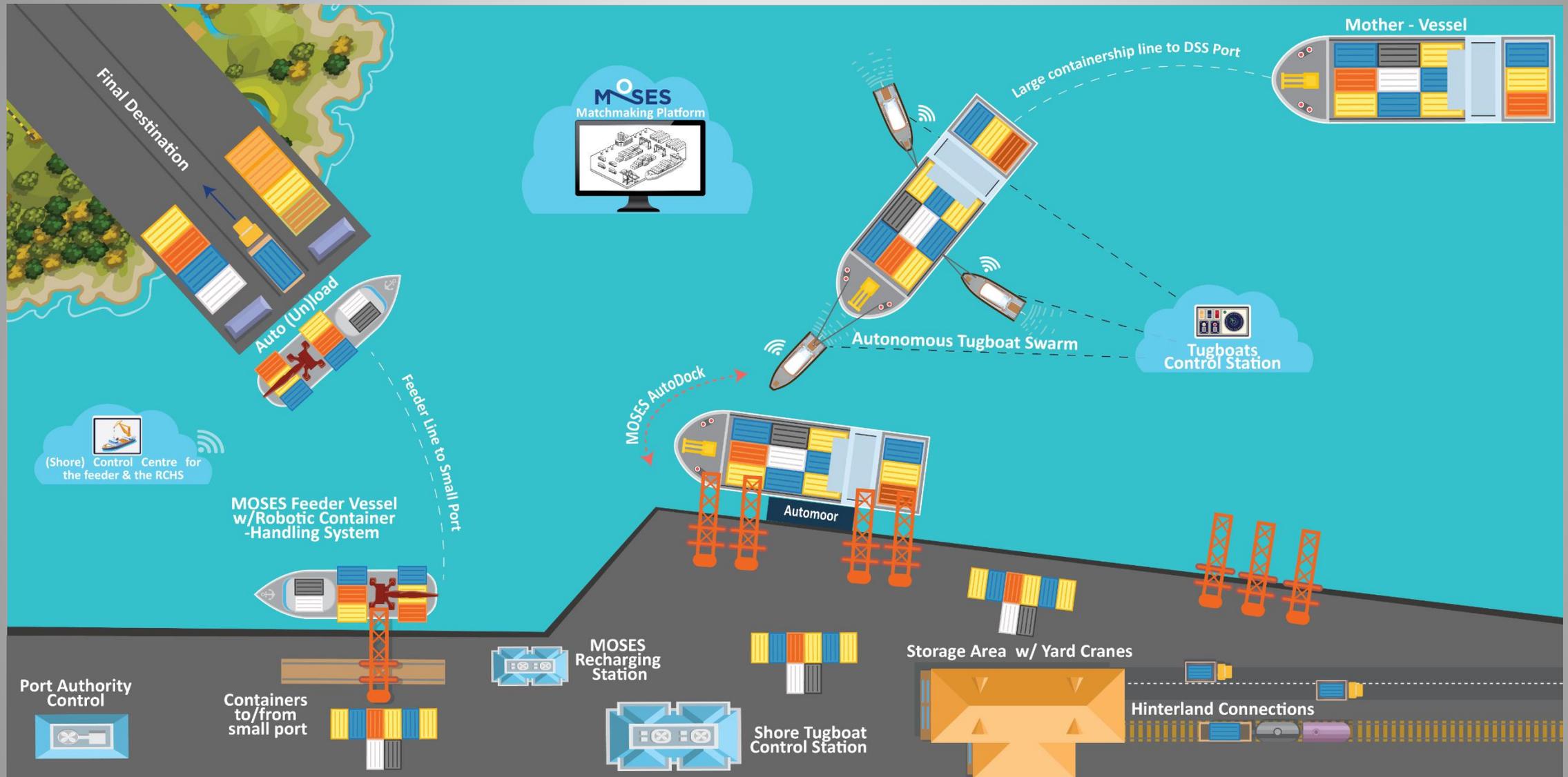
TNO
Sea of Experience 25 October 2021

MOSES

- As part of Horizon 2020, the EU Commission has launched a series of research and innovation projects to contribute to more automation and autonomy in short sea logistics
- MOSES aim: enhance the Short Sea Shipping (SSS) component of the European supply chain by addressing the vulnerabilities and strains related to the operation of large containerships
- Two-fold strategy:
 1. SSS feeder service
 2. DSS ports efficiency: Technological solutions for reducing DSS ports inefficiencies – reduce berthing time, improve safety
- MOSES website: <https://moses-h2020.eu/>



MOSES project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861678.

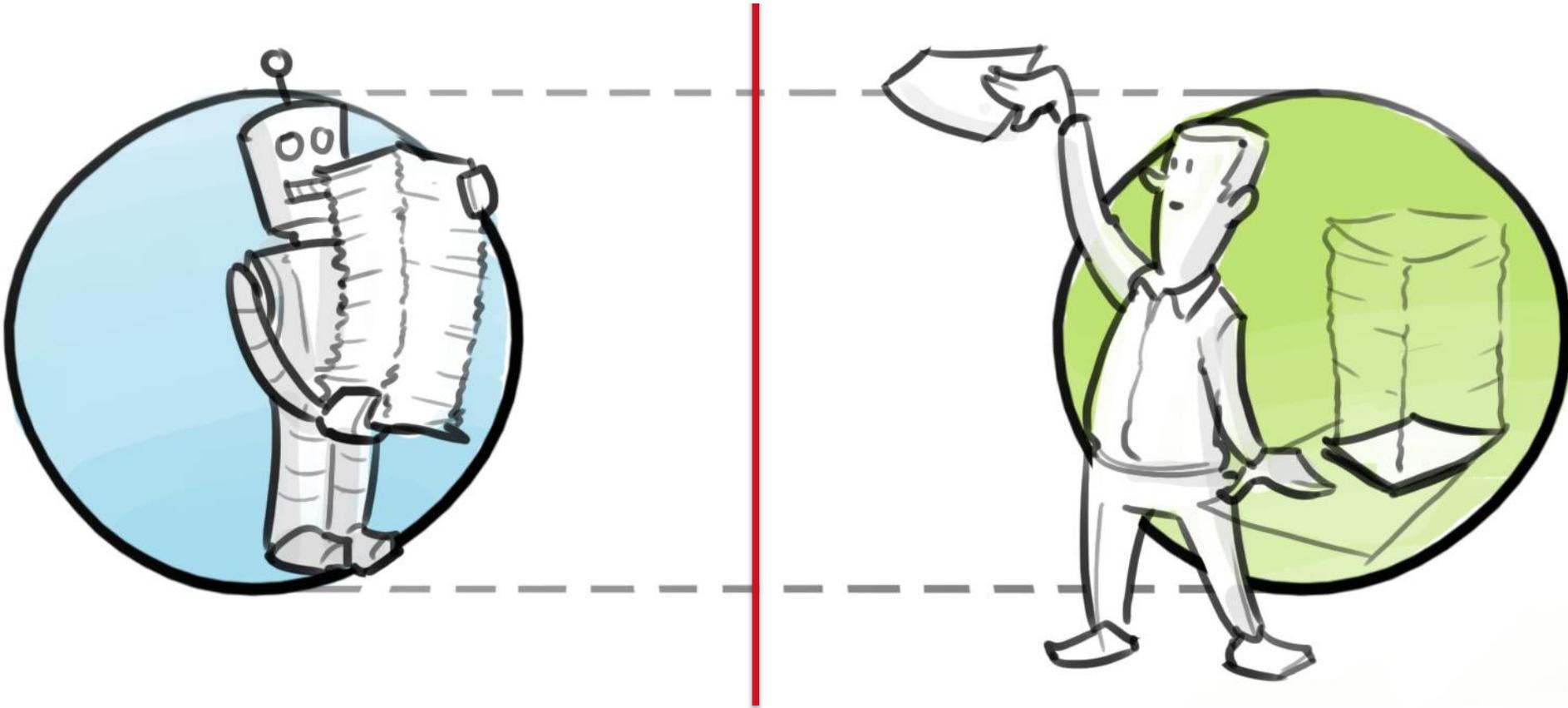




**Robotic Container
-Handling System**

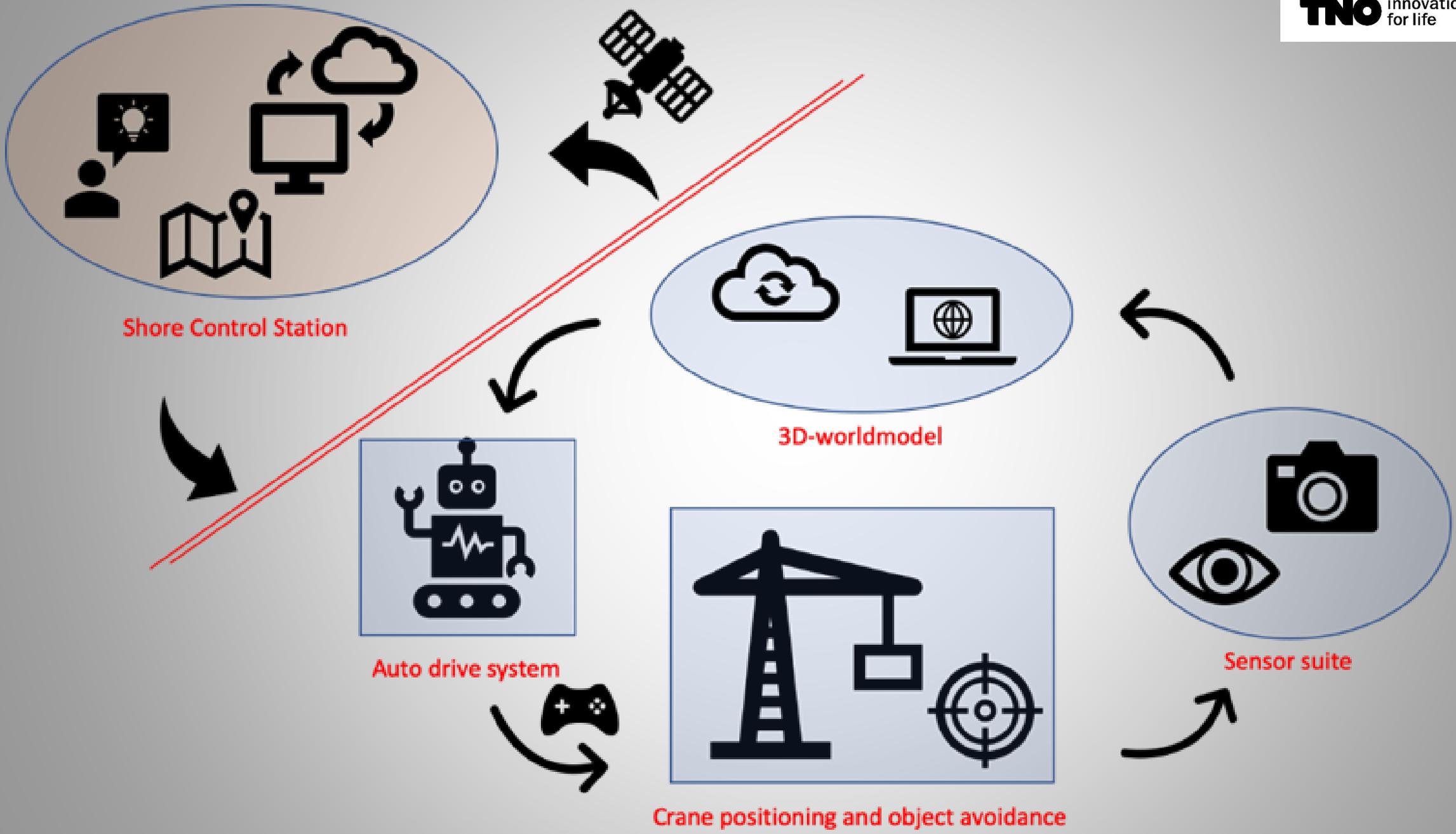


der Vessel

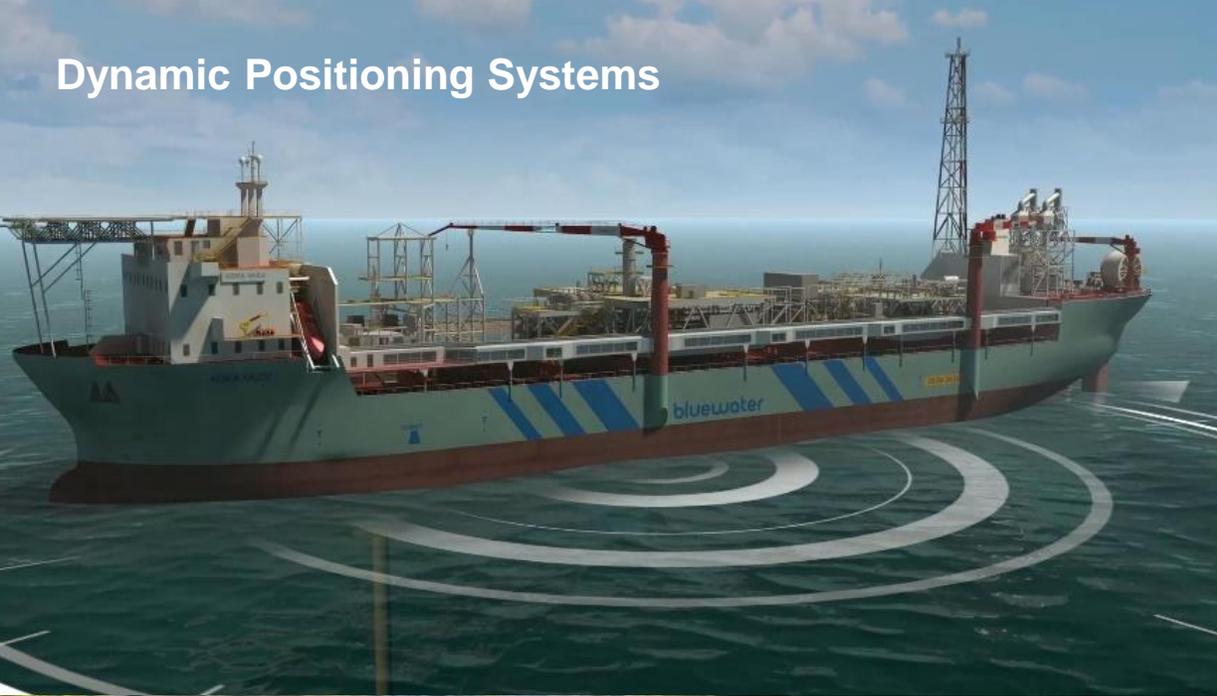


An autonomous system is a system which, **in varying degree**, can operate independently of human interaction





Dynamic Positioning Systems



Maritime Autonomous Surface Ships (MASS)



Waymo Driverless Car



Drones (Aviation)



Truck Platooning

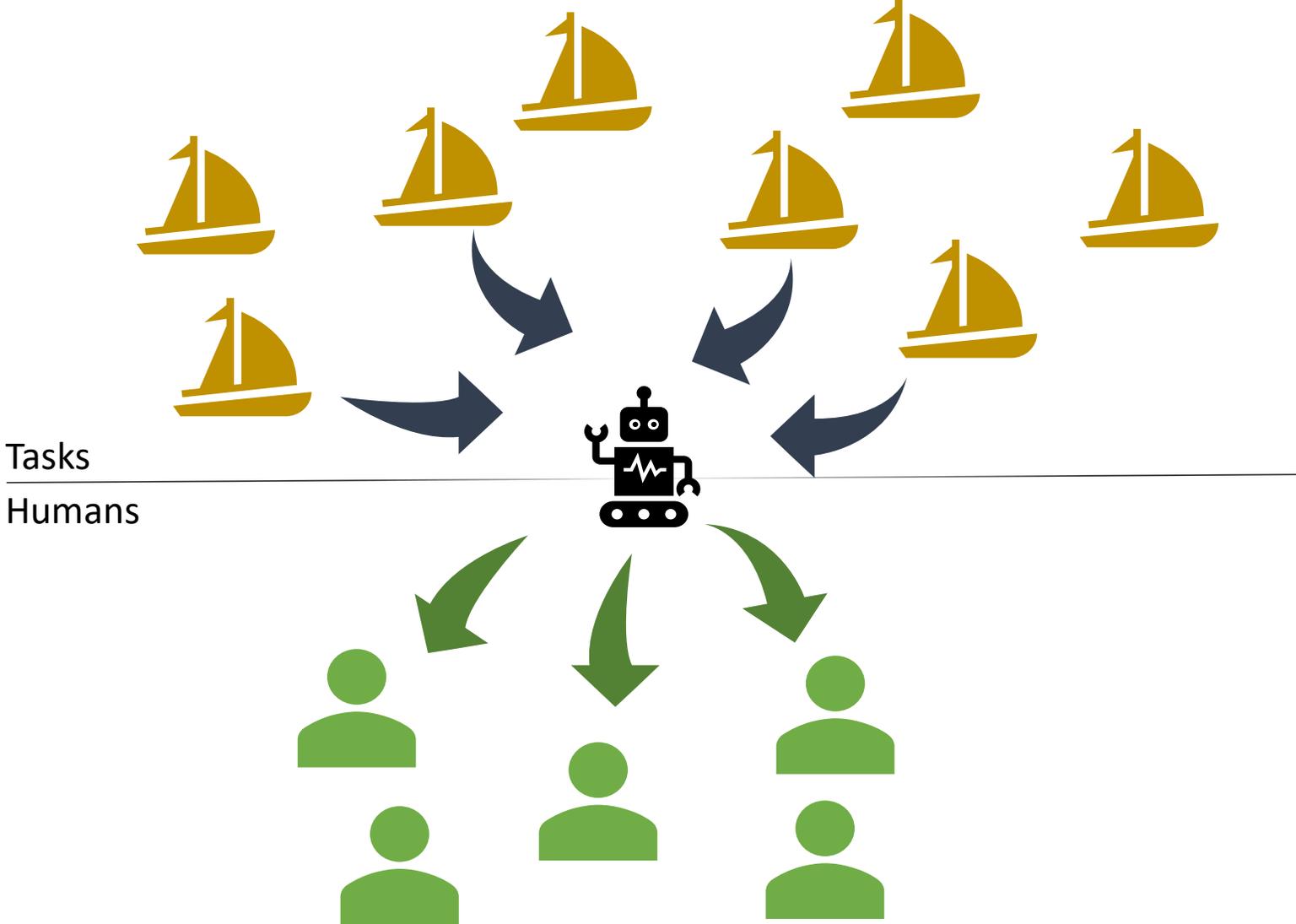


AUTOMATION CONUNDRUM (ENDSLEY)

the more reliable and robust that automation is, the less likely that human operators overseeing the automation will be aware of critical information and able to take over manual control when needed...



Many to many support

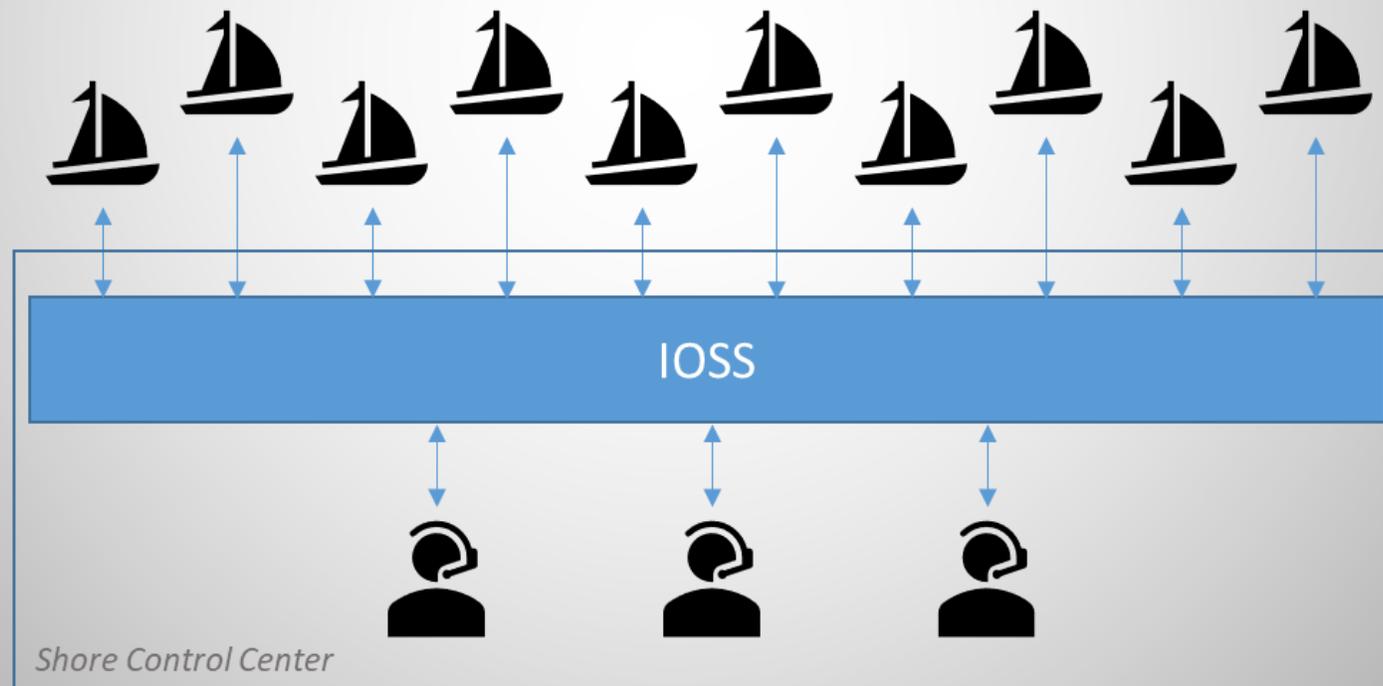




HUMAN – MACHINE TEAMING

IOSS: Intelligent Operator Support System

“A system that supports remote operators in their supervision and control of autonomous cranes loading and offloading containers in parallel.”



Main IOSS functionalities

- **Dynamic task allocation**

Assign vessels to operators based on user and task profile.

- **Continuous Risk Assessment**

Assess in real-time potential risks and warn, inform, explain and help solve them

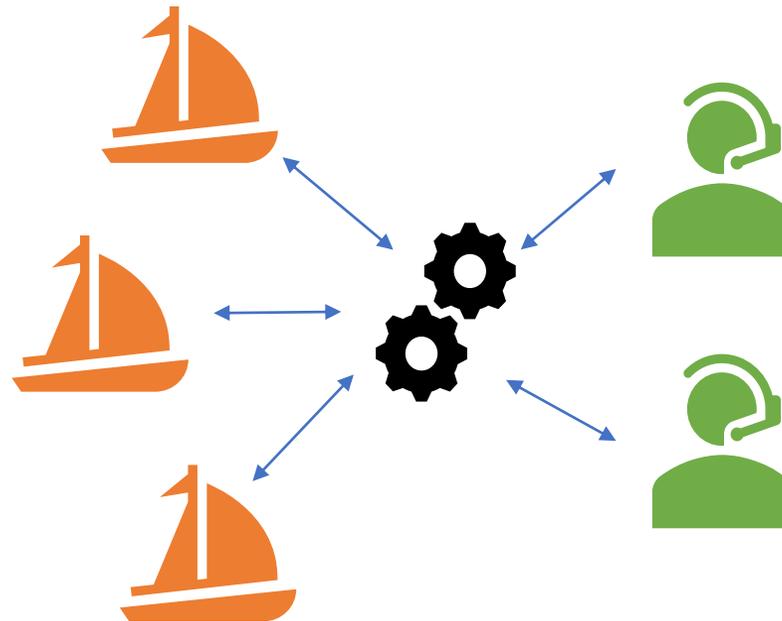
- **Progressive Disclosure Interface Design**

Show information and offer control on different abstraction levels.

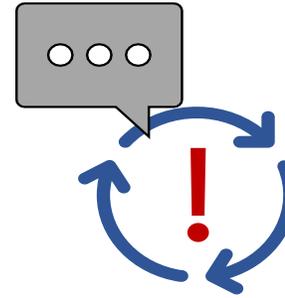
Dynamic task allocation

Purpose

Allocating tasks over time to operators based on operator and task profiles, with real-time adjustments based on these changing profiles.

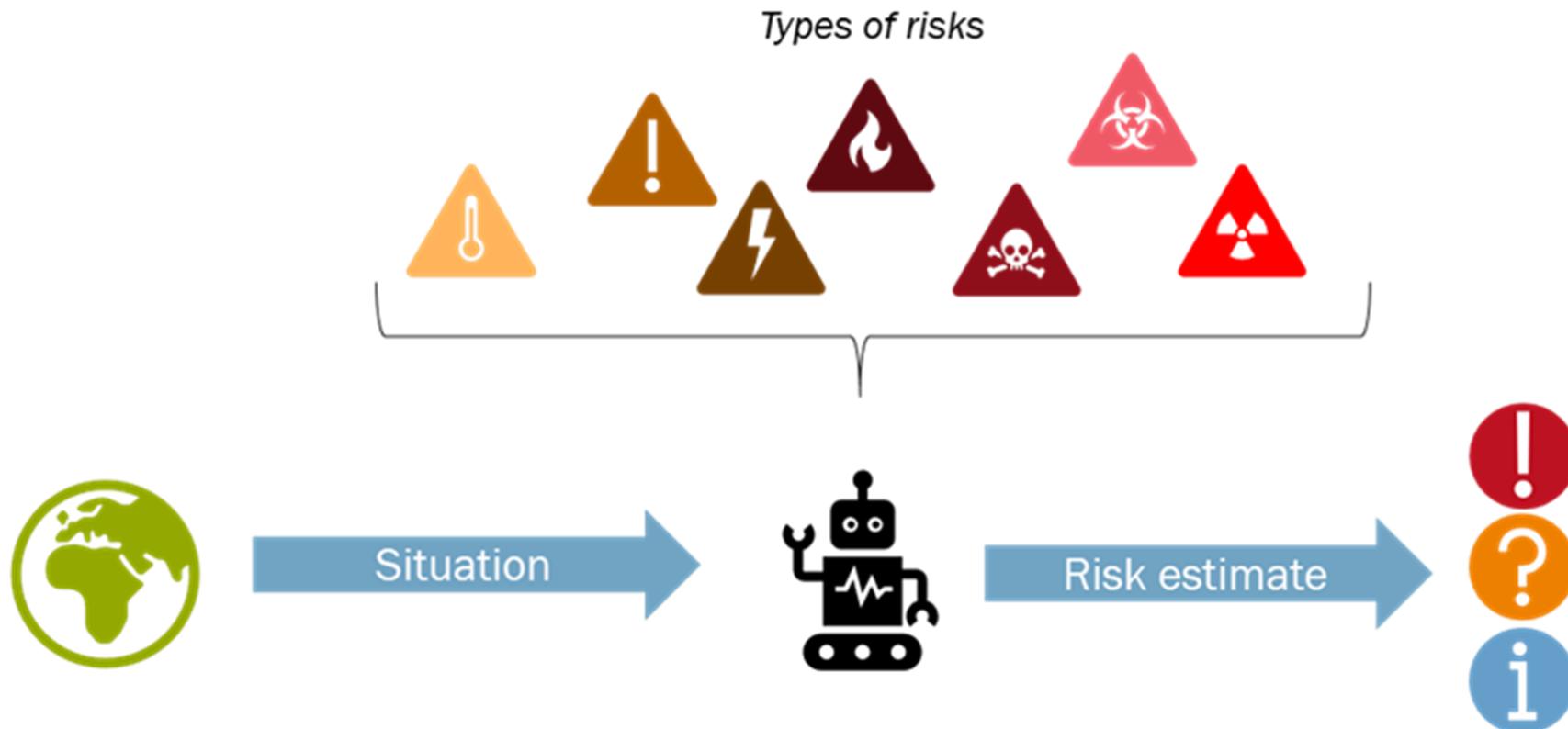


Continuous Risk Assessment



Purpose

Proactively bringing the operator into the loop with all relevant information for just-in-time awareness



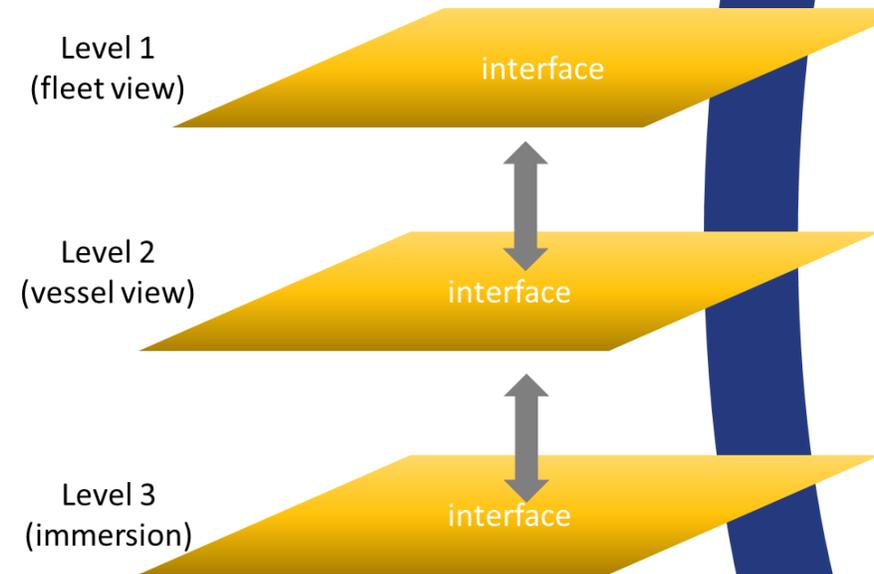
Progressive Disclosure Interface Design

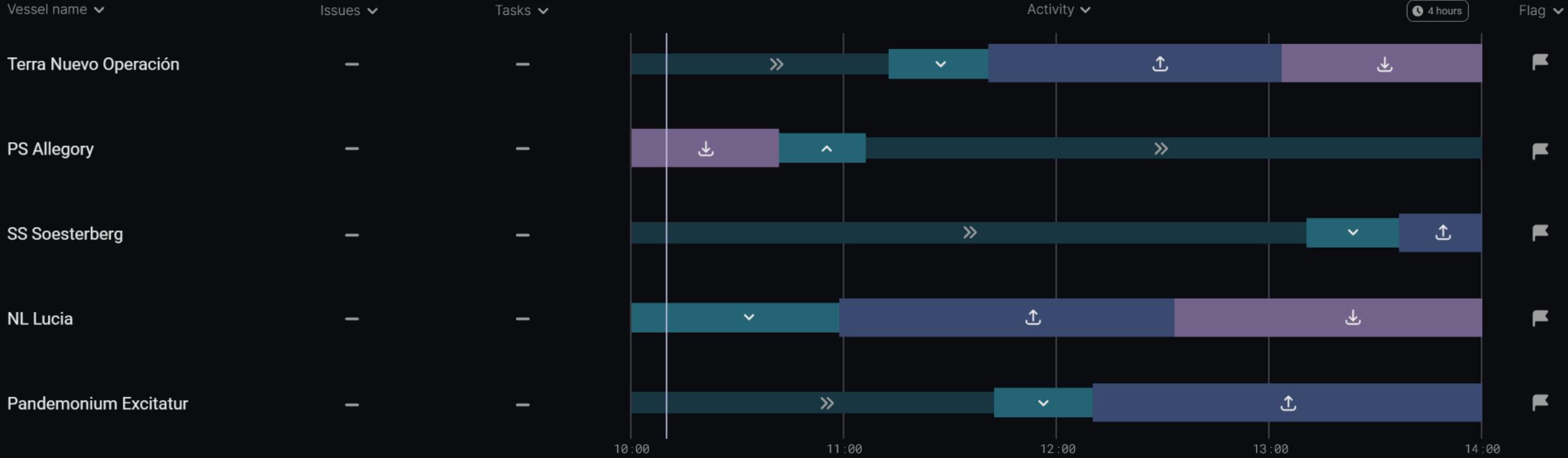
Purpose

Provide situation awareness on three levels of abstraction

- *fleet level*
- *vessel level*
- *Quay level (immersive level)*

An operator can progressively zoom in to a level of detail in which the user is immersed in a real-time reality, namely the situation on the quay.





Estimated workload



Marlyn

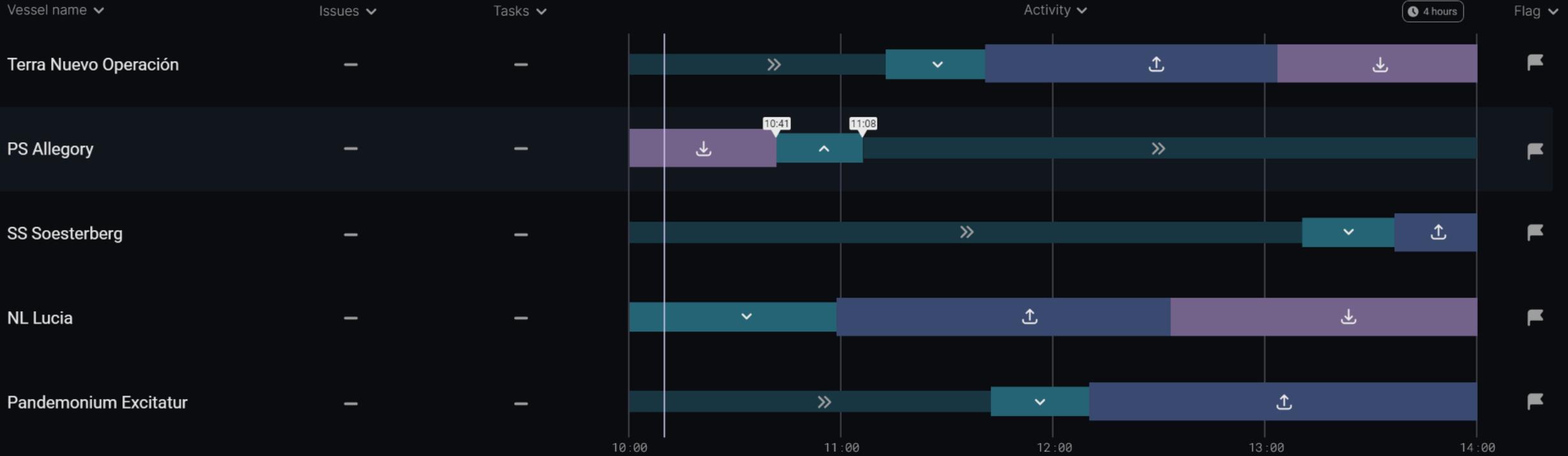


Peter



Danique





Estimated workload



Marlyn

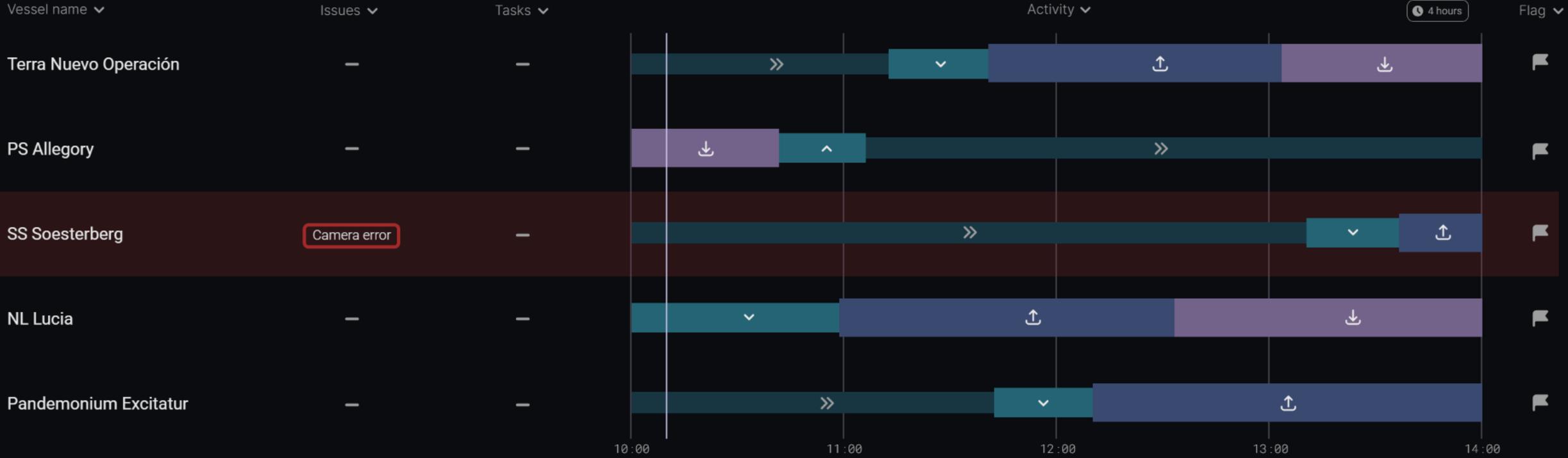


Peter



Danique





Estimated workload



Marlyn

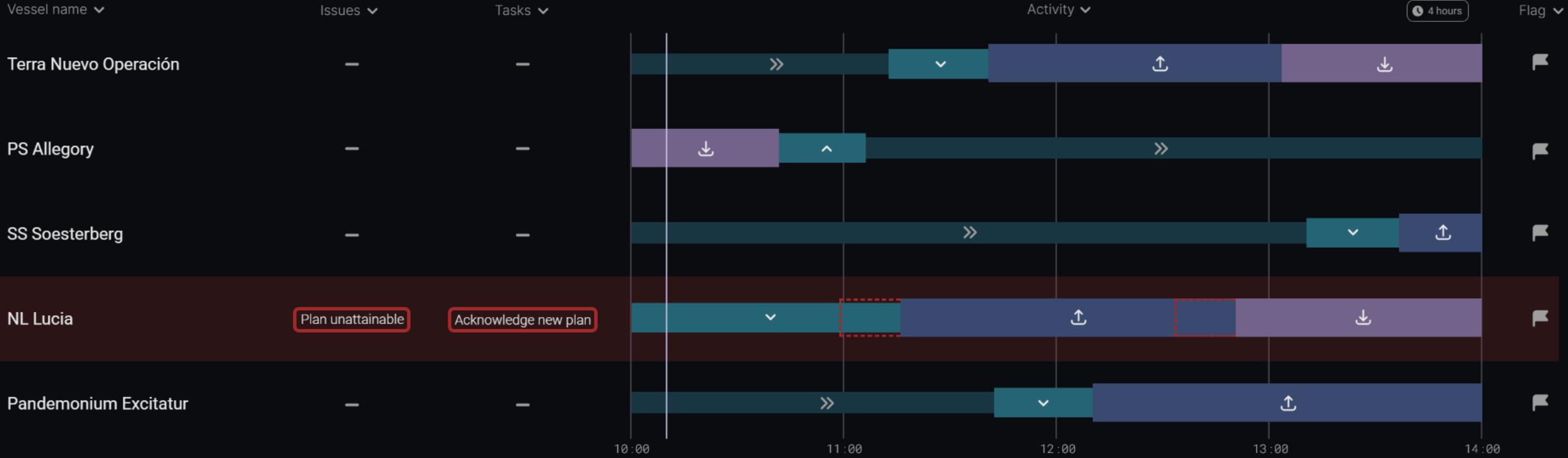


Peter



Danique





Estimated workload



Marlyn

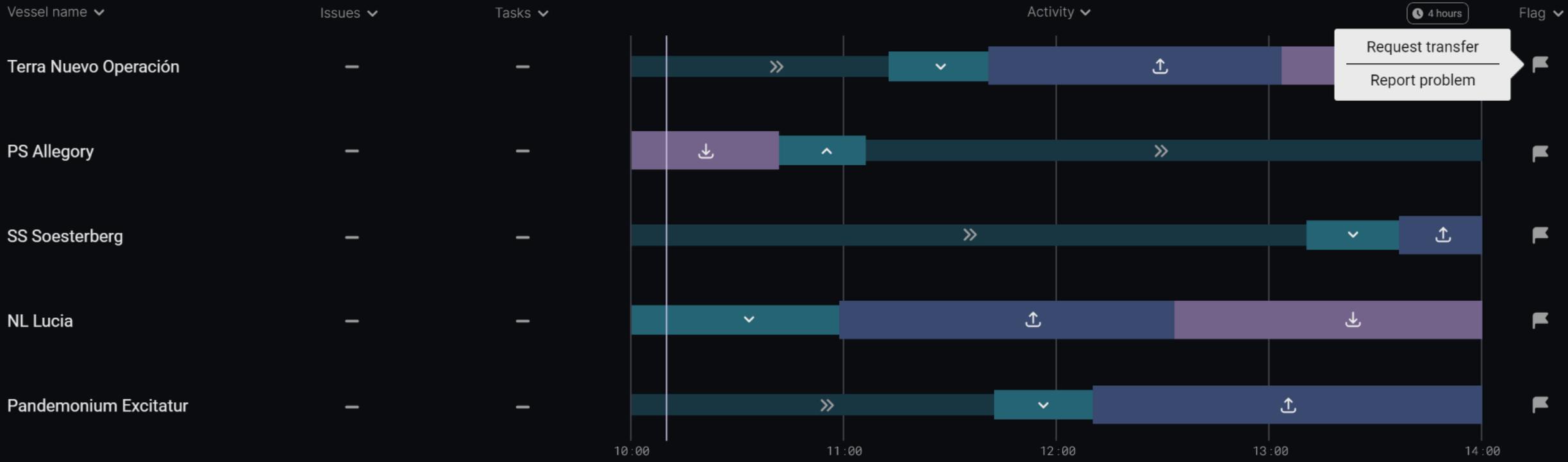


Peter



Danique

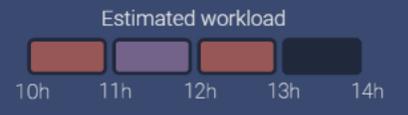




Estimated workload



Marlyn



Peter



Danique



🔍 Fleet view

< MSC La Spezia >

🔍 Immersive View

🕒 4 hours



- Overview
- Status
- Tasks
- Operation
- Cargo
- History

Status

OK

Operation

Berthing in 1 hour

Tasks

Check rapport

Cargo

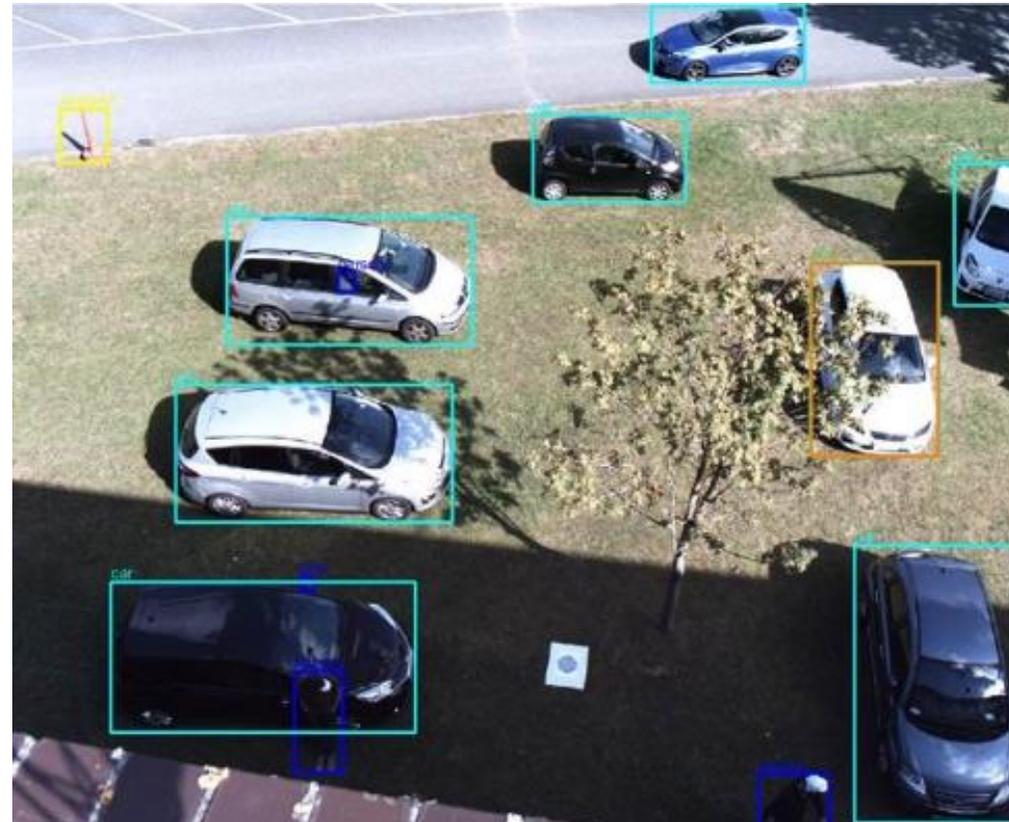
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Progressive Disclosure Interface Design

“Quay” Immersive view

Purpose

The operator is immersed in a real-time reality, namely the situation on the quay



Operator situational awareness

“Local quay situation”

choose the right order (A-G)

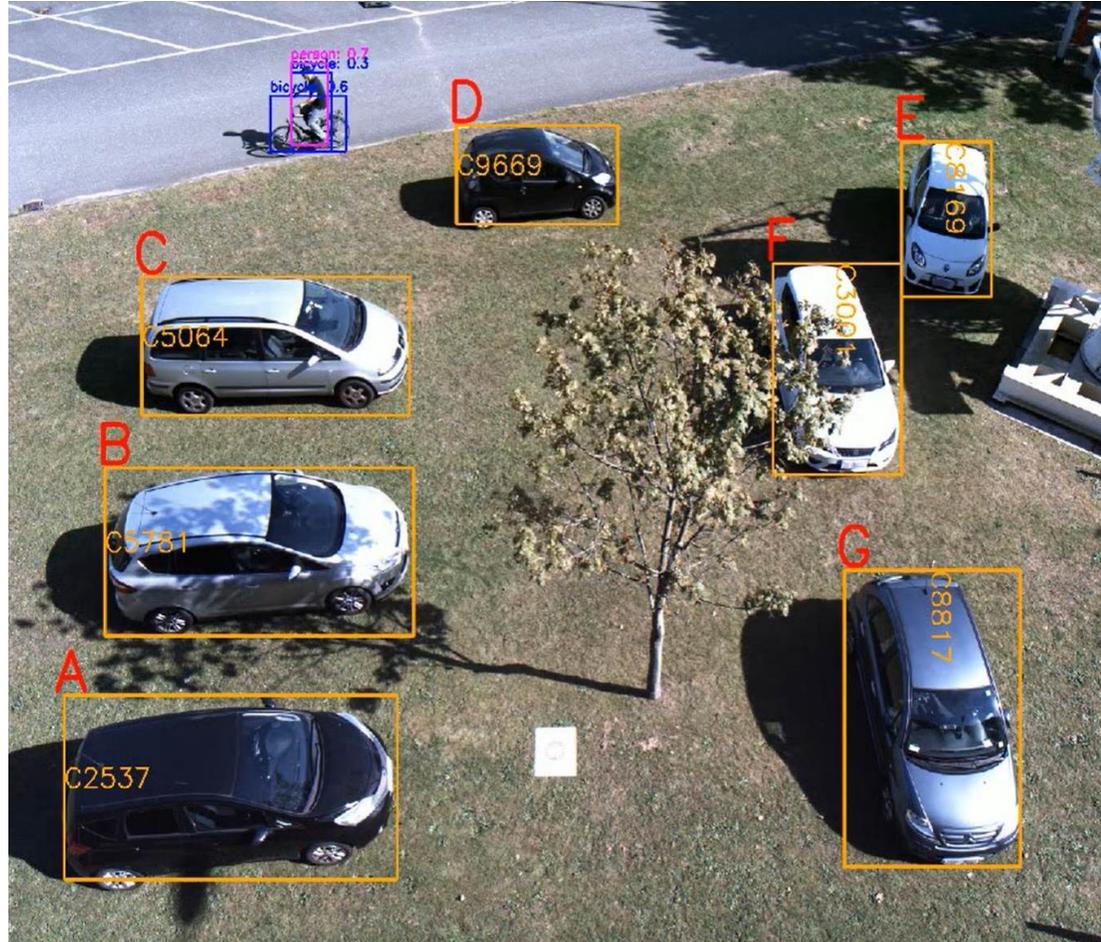
Offloading scheme

C9669

C5781

C8169

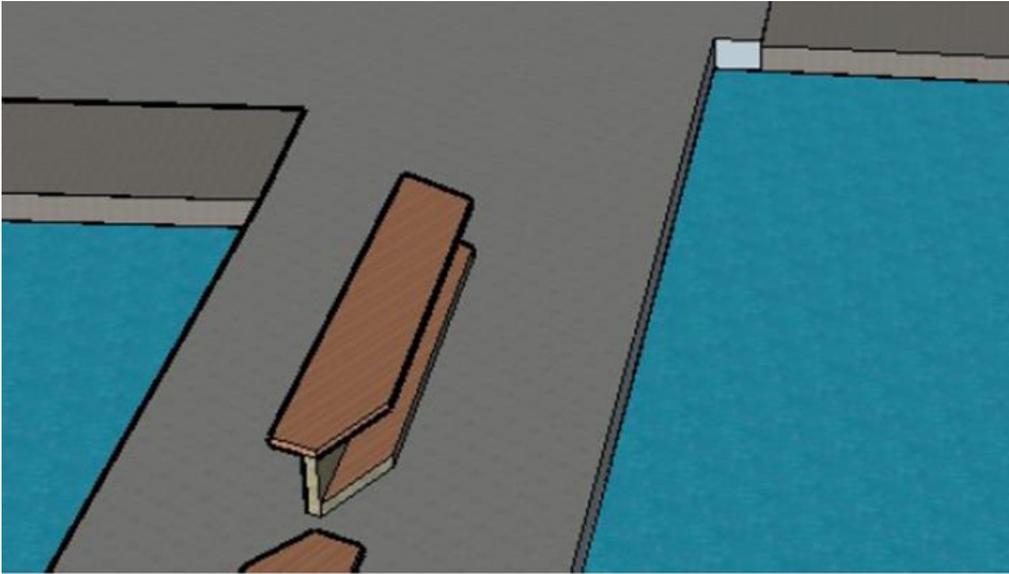
C5064



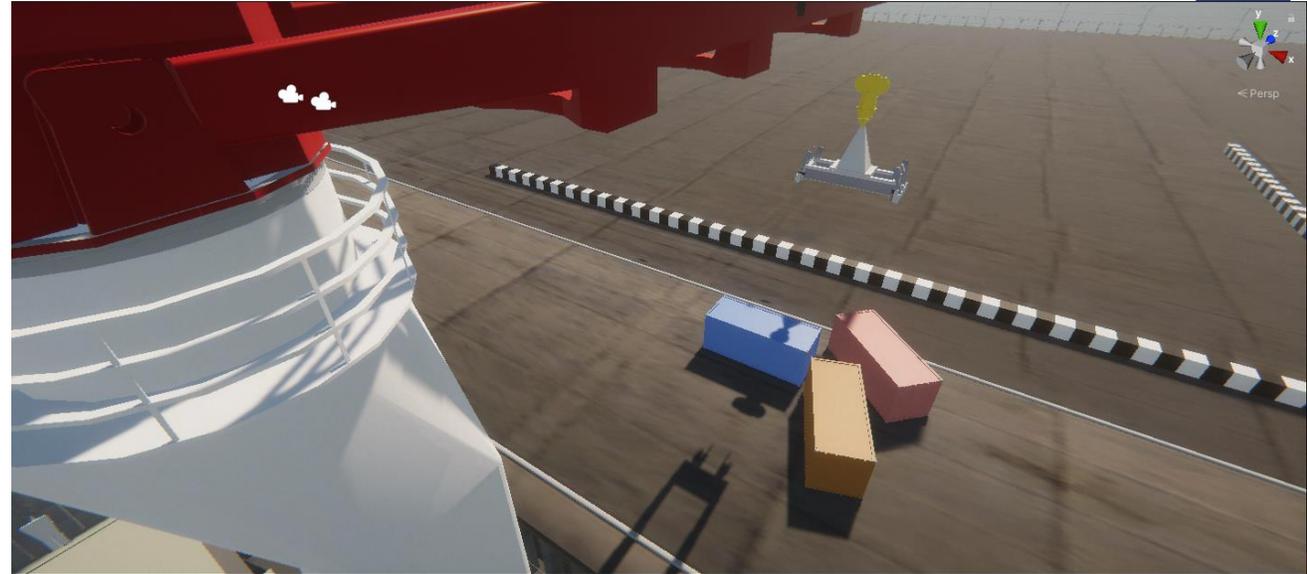
A	B	C	D	E	F	G
MISSING						

Progressive Disclosure Interface Design

“Quay” Immersive view



Operator immersive view



“Local quay situation”

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Thanks for the attention

For more information please contact
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Connecting EU
circle
insights

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