

MARIN

BETTER SHIPS, BLUE OCEANS



Autonomous sailing from port to port

Bas de Kruif

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TNO
Innovation
for life

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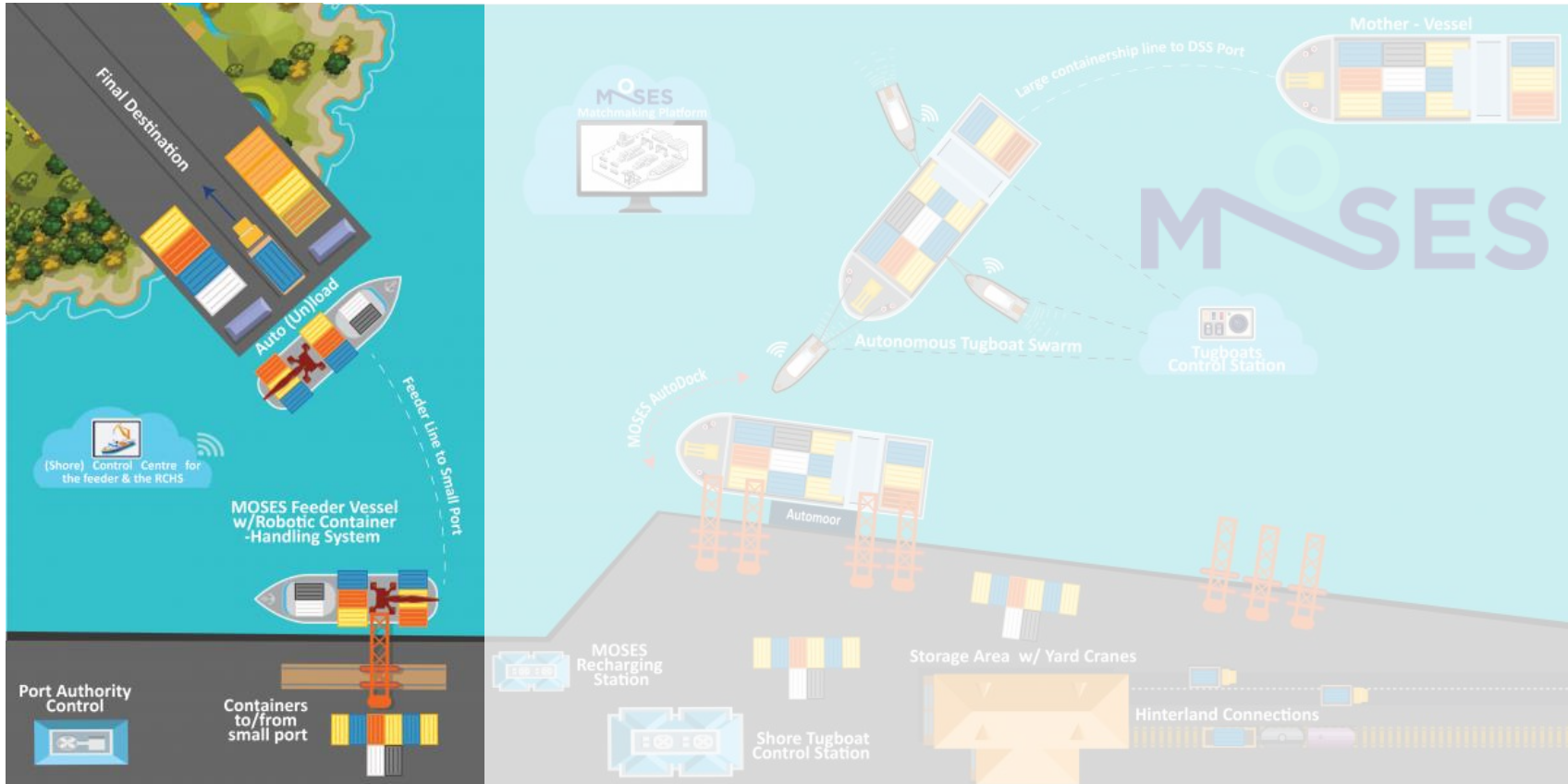
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Introduction - EU Moses project



Aim:

- demonstrate autonomous sailing from quay to quay

Why autonomy:

- decrease in qualified personnel
- minimise risk to ship and people

Why demonstration:

- proof of concept
- investigate critical components in autonomy

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Why demonstration:

- proof of concept
- investigate critical components in autonomy

- Ship
- Simulation to experiment
- Split operation
- Steps in demonstration



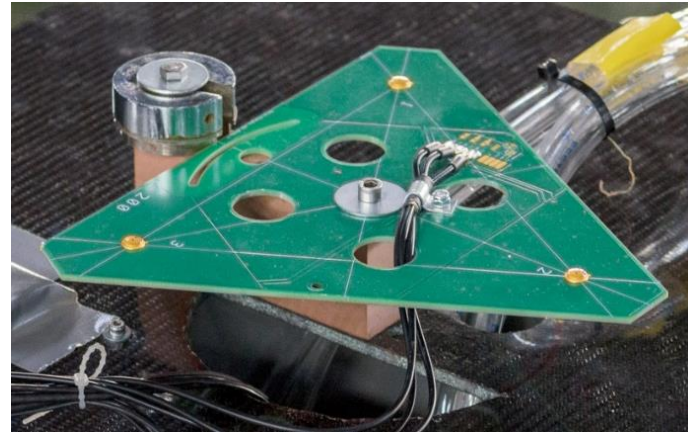
Lpp 71.0 m

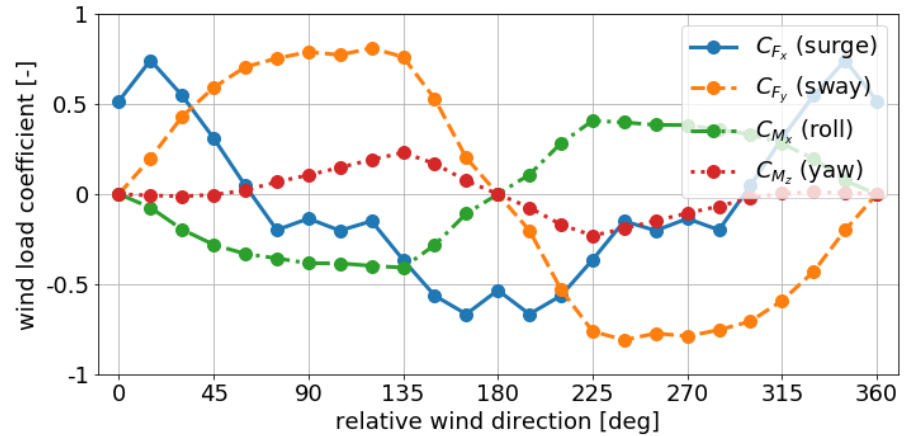
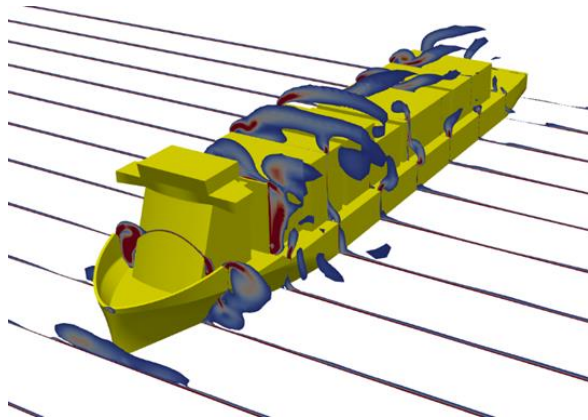
B 13.0 m

t 4.5 m

scale 1:17

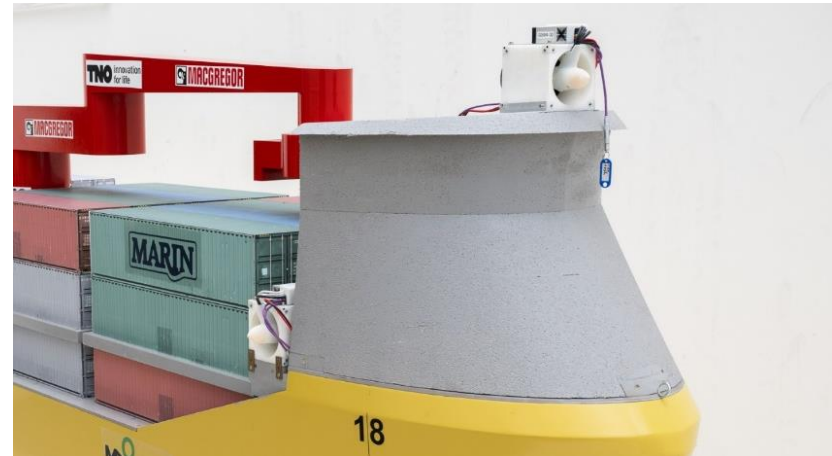
- 2 azimuthing thruster, 2 bow thrusters
- earth fixed pose, ship fixed velocities measured





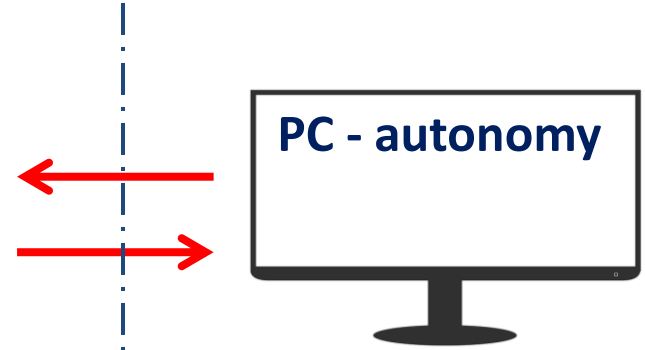
Wind

- coefficients from CFD
- applied to fans





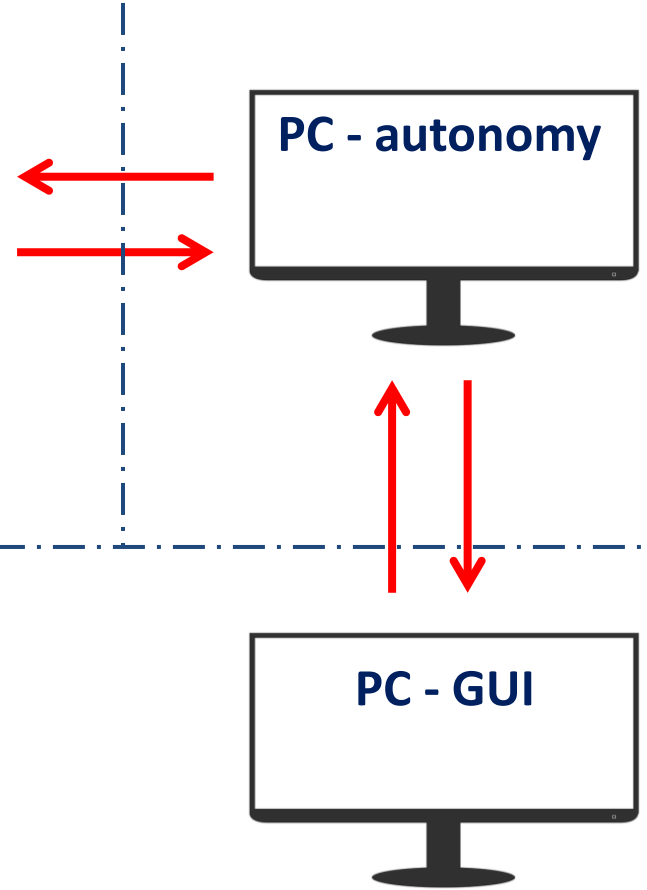
PC - simulation model



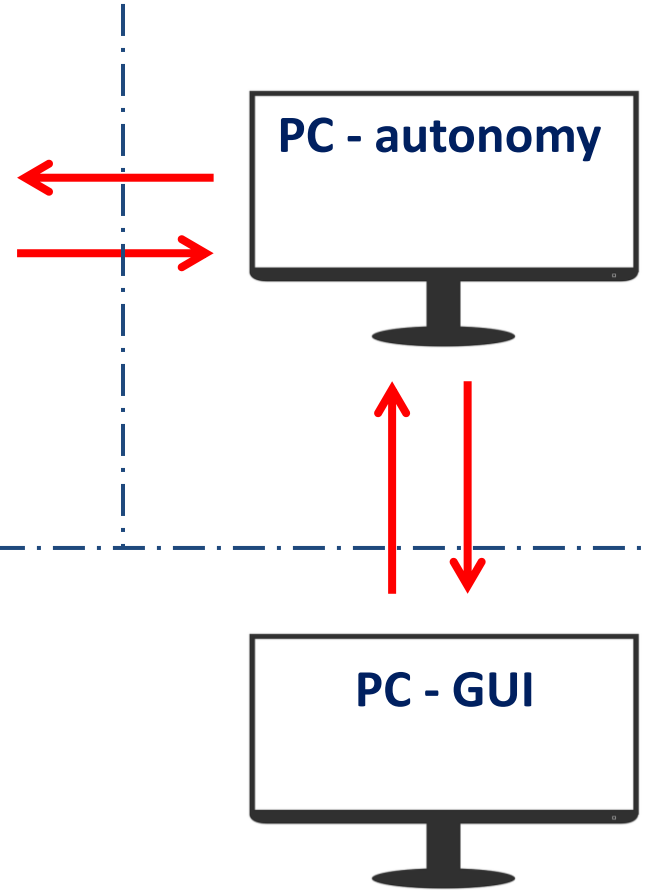
Simulation to experiment



PC - simulation model



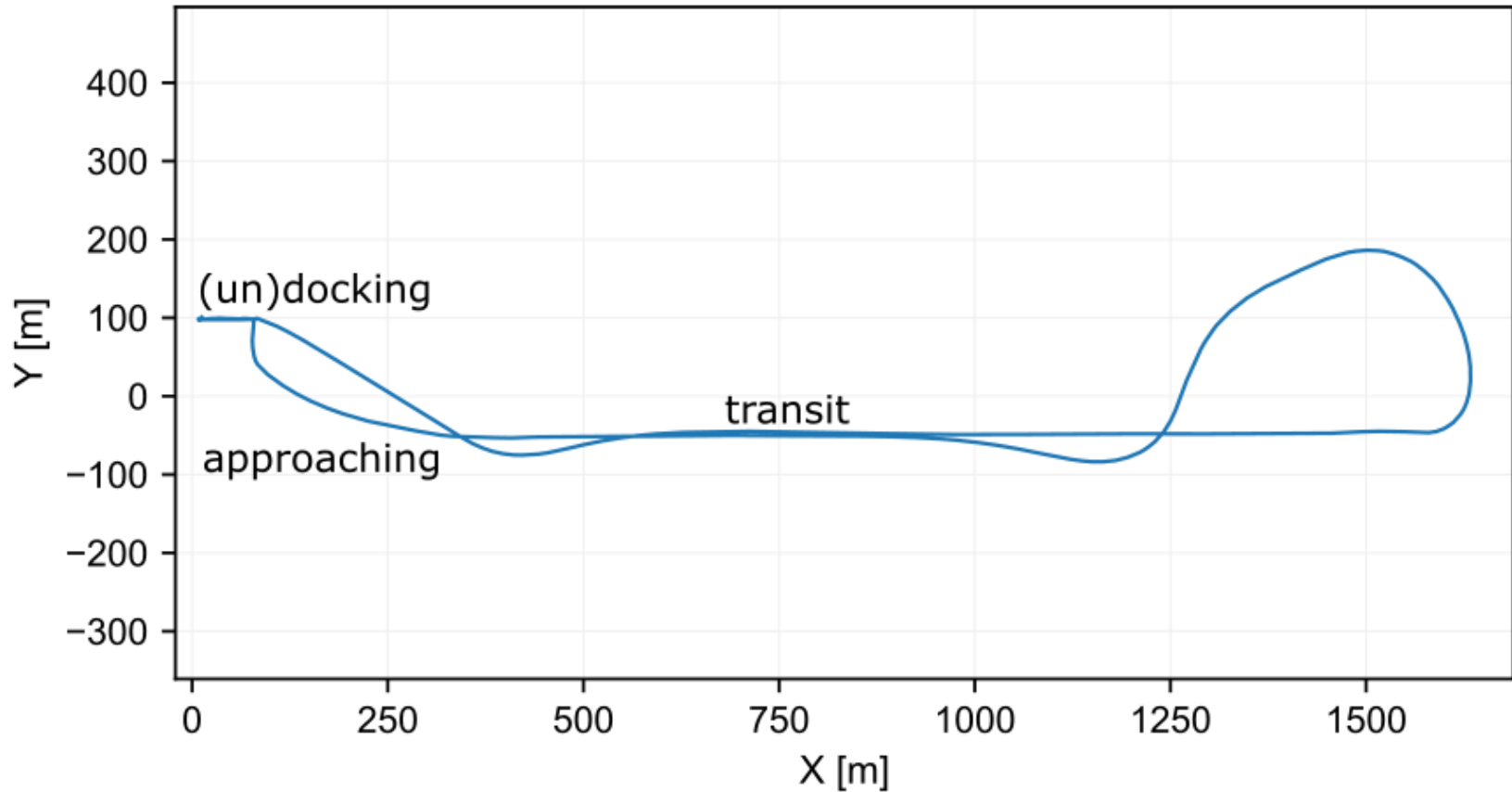
Simulation to experiment



Split operation



Split operation



Demonstration - undocking

West

CO

-
-



370.25

Demonstration - sailing



Wes

CO

-
-
-



P_N

Demonstration - approaching



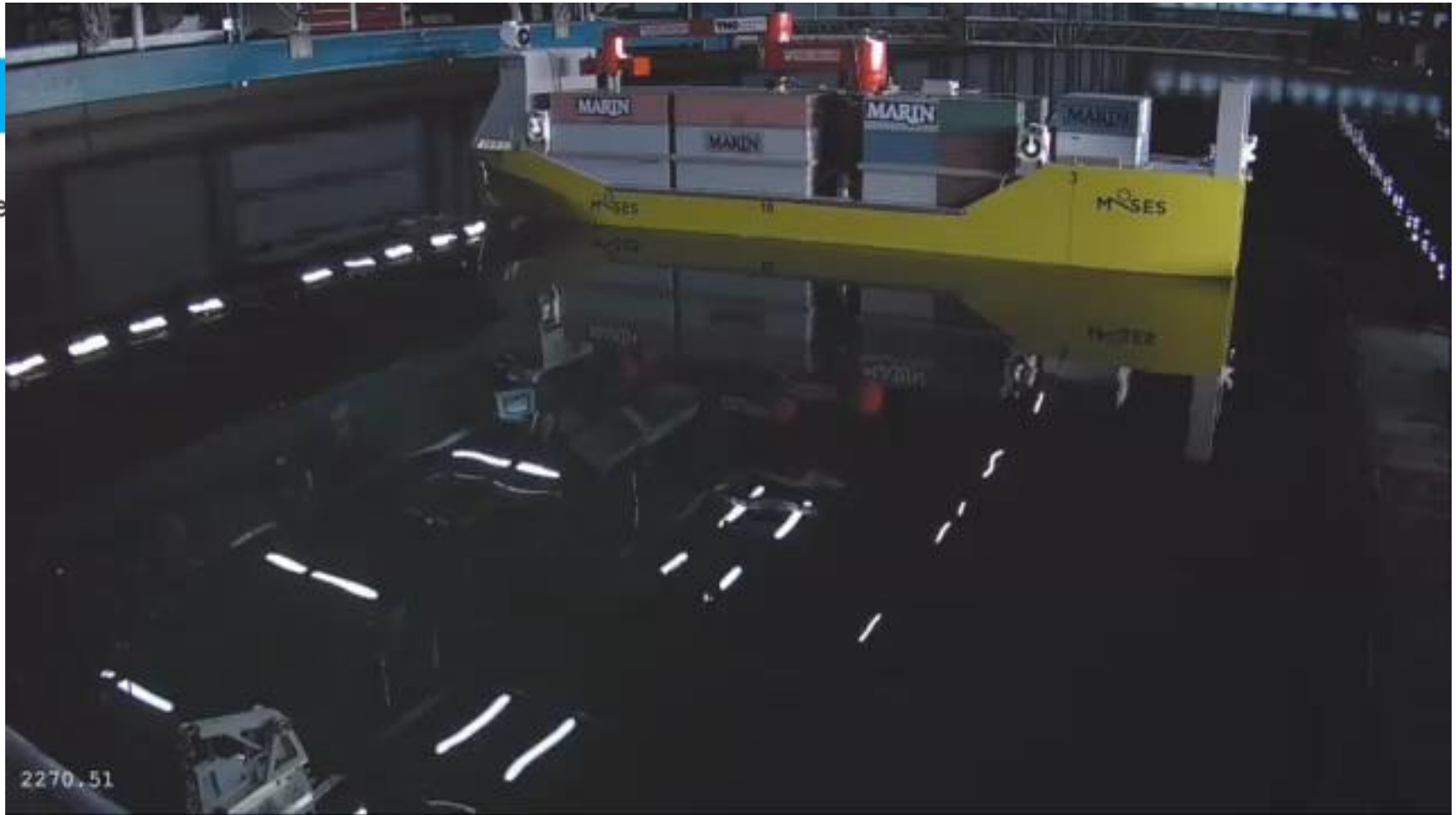
We

-
-
-



1602.43

Demonstration - docking



We

2270_51

- divided operation and project phases to sail from port to port
- proof of concept will be shown in SMB...

***Acknowledgement:** MOSES project has received funding from the European Union's Horizon 2020 research & innovation programme under grant agreement No. 861678. Content reflects only the authors' view and the Agency is not responsible for any use that may be made of the information it contains.*

- divided operation and project phases to sail from port to port
 - proof of concept will be shown in SMB...
 - critical elements:
 - test
 - smooth path is good
 - power makes approaching easy
- } good trajectory



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