Intelligent Operator Support for Shore Control Centers
MOSES Introduction

• 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

• Started 01/07/2020 and ends 30/06/23

• 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 Consortium

17 Partners across Europe

Expertise in:
- Naval design
- Maritime Logistics
- Risk, Safety, Environmental Assessment
- Sustainability and Cost-benefit Analysis
- Autonomous System operation
- Port Infrastructure & operations
- Business Modelling
- Innovation Management

4 Technology Providers
4 Stakeholders
3 Ports
2 Research Institutes
1 University
1 Class Society
1 Shipyard
1 IT
**MOSES Innovations:**

1. MOSES AutoDock (MOSES Autonomous tugboats + AutoMoor)
2. MOSES Recharging Station
3. Innovative Feeder Vessel
4. Robotic container-handling system
5. MOSES matchmaking platform
MOSES Business cases

BC #1 (Western MED-Spain)

Containers are trans-shipped from Valencia port using land-based transportation modalities

<table>
<thead>
<tr>
<th>Port</th>
<th>TEUs/year</th>
<th>Pax/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valencia</td>
<td>4.5 m</td>
<td>950 k</td>
</tr>
<tr>
<td>Sagunto</td>
<td>48.5 k</td>
<td>50</td>
</tr>
<tr>
<td>Gandia</td>
<td>7</td>
<td>35 k</td>
</tr>
</tbody>
</table>

BC #2 (Eastern MED-Greece)

Cargo from Piraeus to the Aegean islands is picked up by truck, delivered to warehouses and then loaded on another truck that off-loads it on RoRo ferries that serve the islands from Attica ports

<table>
<thead>
<tr>
<th>Port</th>
<th>TEUs/year</th>
<th>Pax/year</th>
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</thead>
<tbody>
<tr>
<td>Piraeus Container Terminal</td>
<td>4.5 m</td>
<td>-</td>
</tr>
<tr>
<td>Mykonos</td>
<td>20 k</td>
<td>1.2 m</td>
</tr>
</tbody>
</table>
Port of Rotterdam, NL

Port of Mykonos, Greece
The Robotic Crane – Test site Örnsköldsvik (SWE)
How to support remote operators in their supervision of dozens of autonomous operations in the maritime industry.
The future we contribute to…
Intelligent Operator Support
Support functions

Dynamic Allocation of Operations to Operators

- Progressive Disclosure
- Continuous Interpretable Risk Assessment
Dynamic Task Allocation; Who does what?

Operation difficulty

Operator expertise & workload
Risk Assessment: Timely and interpretable notifications

LIDAR 1 failure → ? Lacking 3D data → ! Decreased detection capabilities → Risk to operation safety

Camera 2 failure → ? Missing Camera feeds → !

Higher risk to physical harm due to decreased detection capabilities caused by several sensors failing.

At next port, contact the local port authorities to review LIDAR 1 and Camera 2.
Progressive Disclosure; What to show when?
Progressively Disclosing Interactions; When to show what?
Progressively Disclosing Interactions; When to show what?
“Quay” Immersive view

Operator situation awareness

“Local quay situation”
MOSES Experiment
MOSES experiment
PILOTS

Pilot 1: AutoDock
Intelligent cooperation of autonomous tugboat swarm to manoeuvre a large floating vessel and dock it by collaborating with an automated mooring system.

Pilot 2: Feeder
Seakeeping and energy performance capabilities. Capability to be used for automated mooring.

Pilot 3: Robotic CHS
Autonomous container handling capability and shared control between human operator and system.
MOSES publications


MOSES H2020 Project – TNO contribution

MOSES Presentation ICMASS 2022 (Jasper van der Waa)
Which competencies and skills should the Shore Control Operators have in the future?

• Can we just ask skilled crane operators to sit behind a control station desk in an office space or does that take more?

• Should STC establish a generic training program to develop and train skills for remote supervisory control operators?

• Who is eligible for that?
Thank you for your attention!

Speaker, TNO
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