



MOSES

Introduction: H2020 Project MOSES

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On Thursday 28th of September 09:30 – 15:00

MOSES and AEGIS demonstrate the Robotic Container Handling System

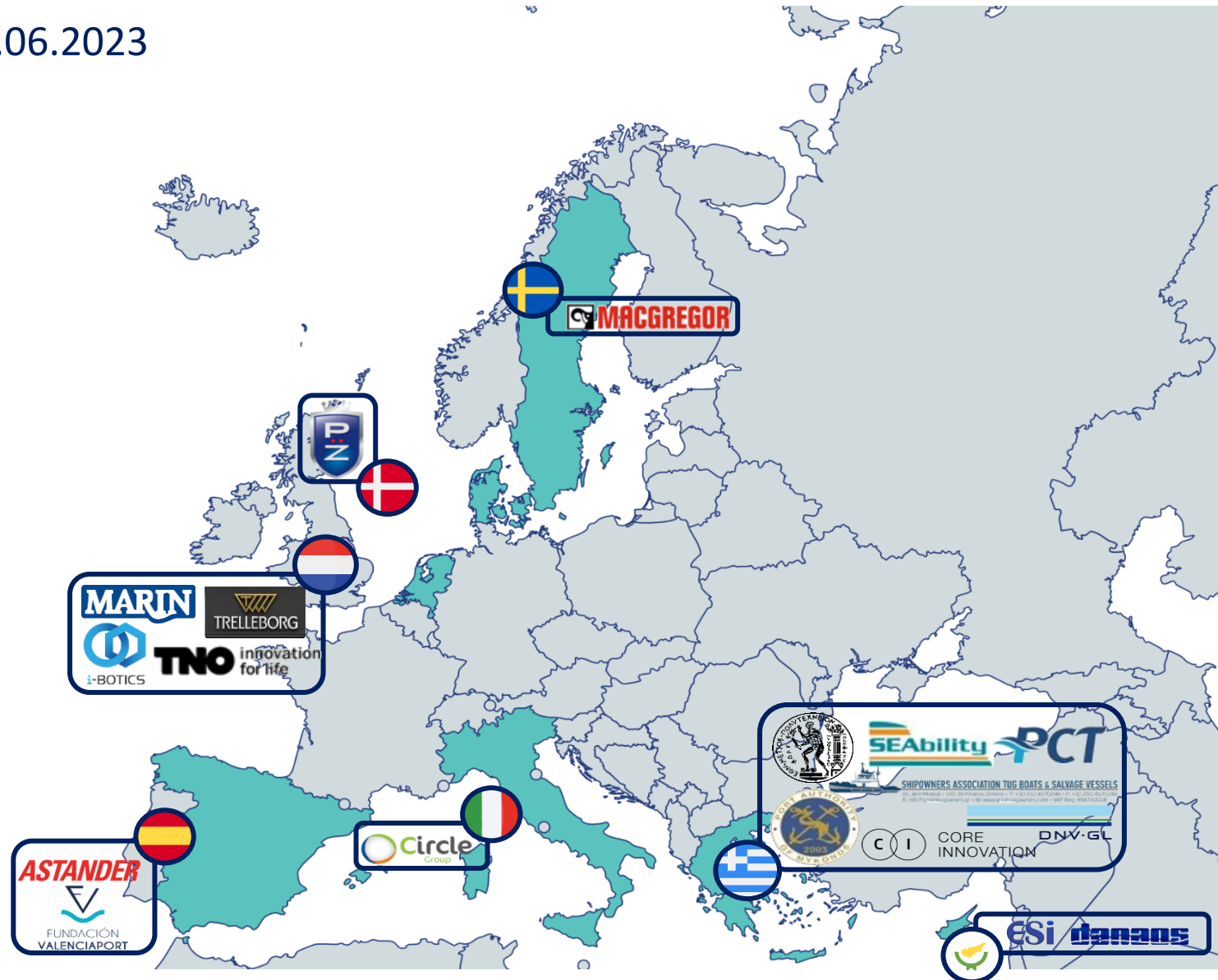
A system developed by MacGregor, TNO and Bromma.

You are very welcome to join the demonstration at TNO in Soesterberg, The Netherlands;
MacGregor in Örnsköldsvik, Sweden; or online.



Facts about the MOSES project

- **Duration:** 01.07.2020 - 30.06.2023
(36 months) – *extension*
31.12.2023 (42 months)
- **Budget:** 8 million €
- **Consortium:** 17 Partners
- **Coordinator:** NTUA





MOSES aims to...



Containerised cargo



Create sustainable feeder services from large container terminals to small ports with no infrastructure to replace trucks on Ro-Ro ships

The MOSES concept



The MOSES Use Cases



Northern Case

Submit by 31-Aug-2023 (05:00:00 PM CEST)

[SUBMIT HERE](#)

Western MED-Spain

Decongest truck transport traffic in Valencia port and connect it to Sagunto and Gandia satellite ports



Eastern MED-Greece

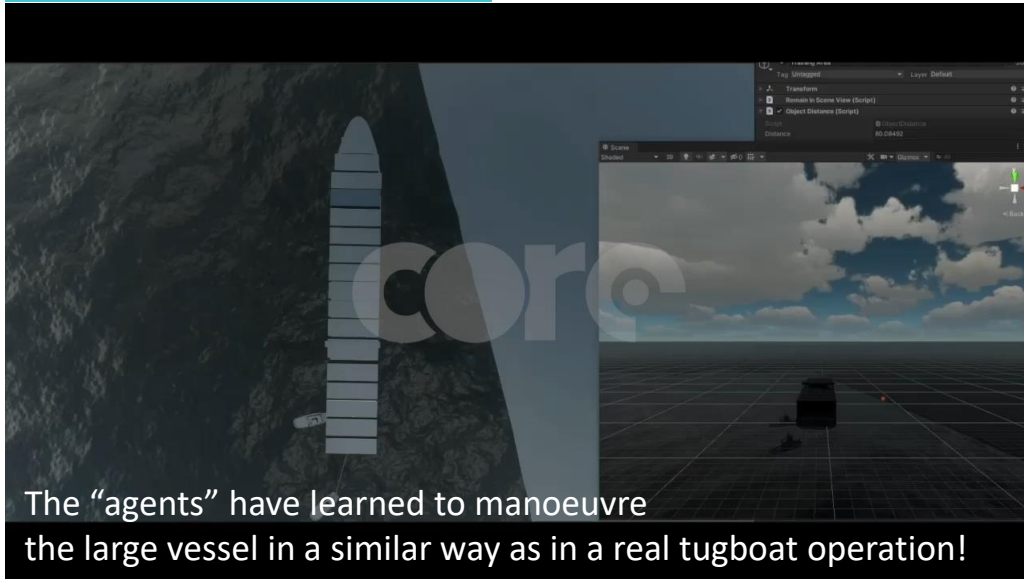
Decongest Piraeus container terminal and integrate small Greek ports into the container supply chain



MOSES AutoDock System

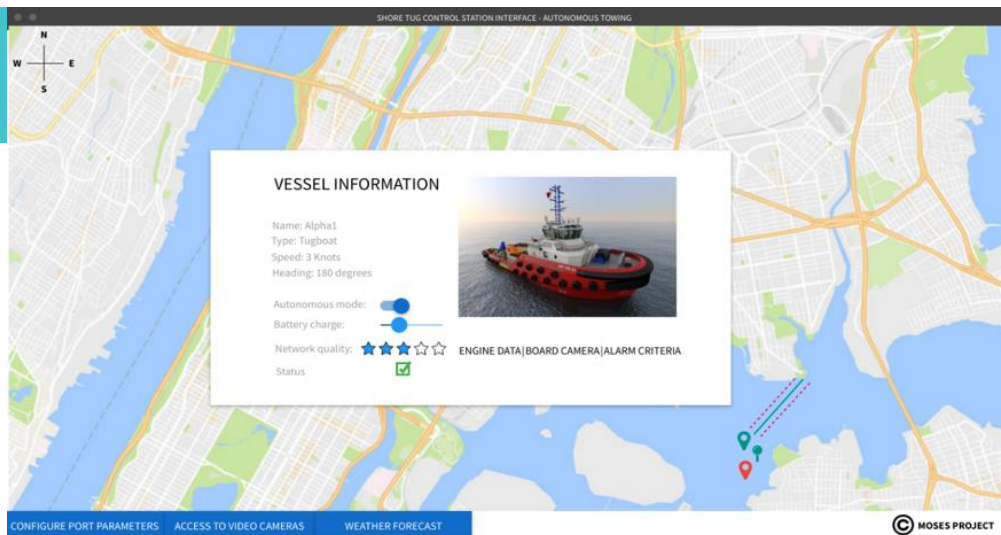


Autonomous tugboats



The “agents” have learned to manoeuvre the large vessel in a similar way as in a real tugboat operation!

Shore Tugboat Control Station



Automated Mooring



Prototype innovations:

- Small-scale
- Surge motion control
- Energy harvesting
- Communication with tugboats

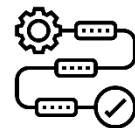
MOSES AutoDock System – Demonstration



3rd week of October 2023



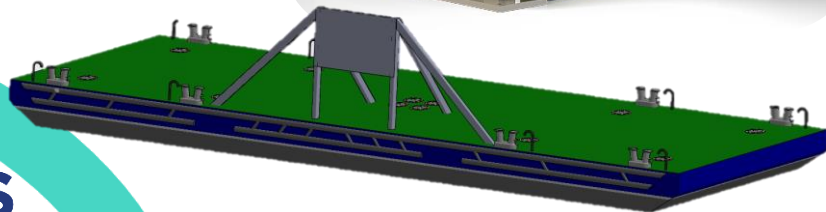
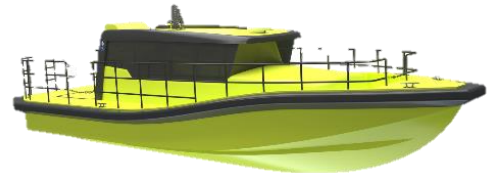
Showcase the automated maneuvering, docking, and mooring scheme for large ports



- Two workboats will simulate a swarm of autonomous tugboats
- They will guide a floating vessel towards a berthing spot
- The re-engineered AutoMoor prototype will safely moor and secure the floating vessel at berth



Faaborg, Denmark

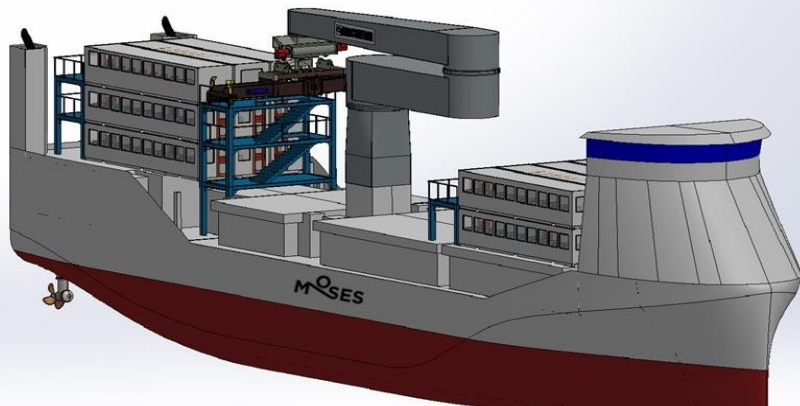
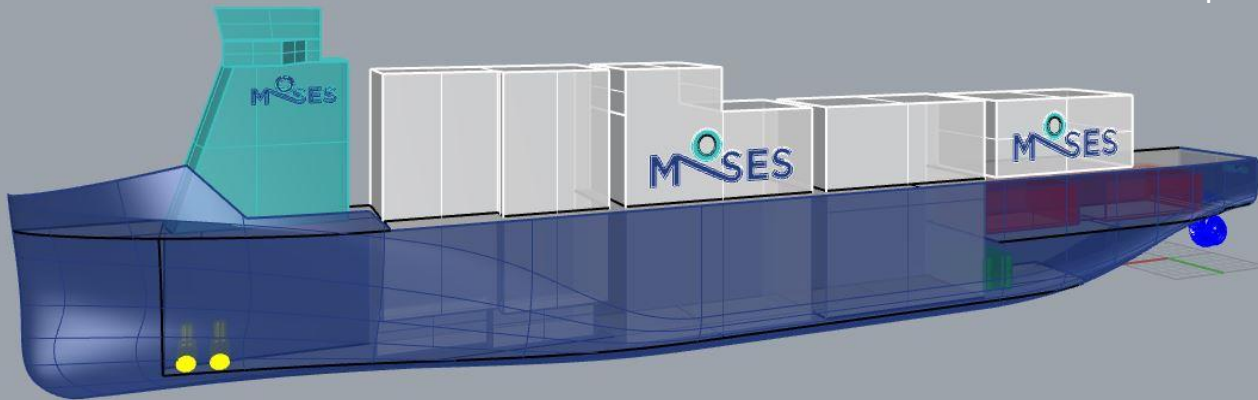


MOSES Innovative Feeder



Greek concept I

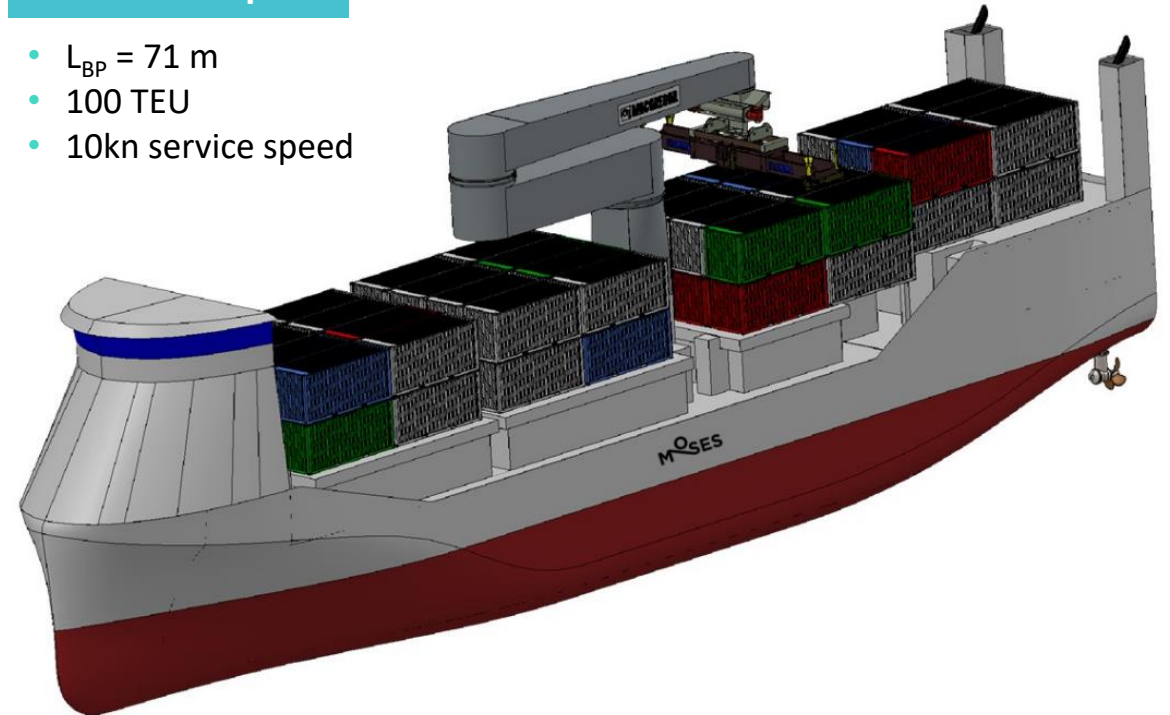
- $L_{BP} = 80$ m
- 180 TEU
- 10 kn service speed



Modular concept design for pax transport

Greek concept II

- $L_{BP} = 71$ m
- 100 TEU
- 10kn service speed



Innovations:

- Sustainable propulsion (Hybrid – methanol ICE + batteries, Full electric)
- Azimuth thrusters for enhanced manoeuvrability
- Automated cargo-handling, *as first step towards higher autonomy*

MOSES Innovative Feeder Vessel – Demonstration



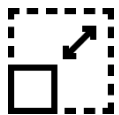
September 14, 2023



Demonstrate **port-to-port autonomous operation** of the MOSES Innovative Feeder vessel in a Seakeeping and Manoeuvring Basin (SMB)



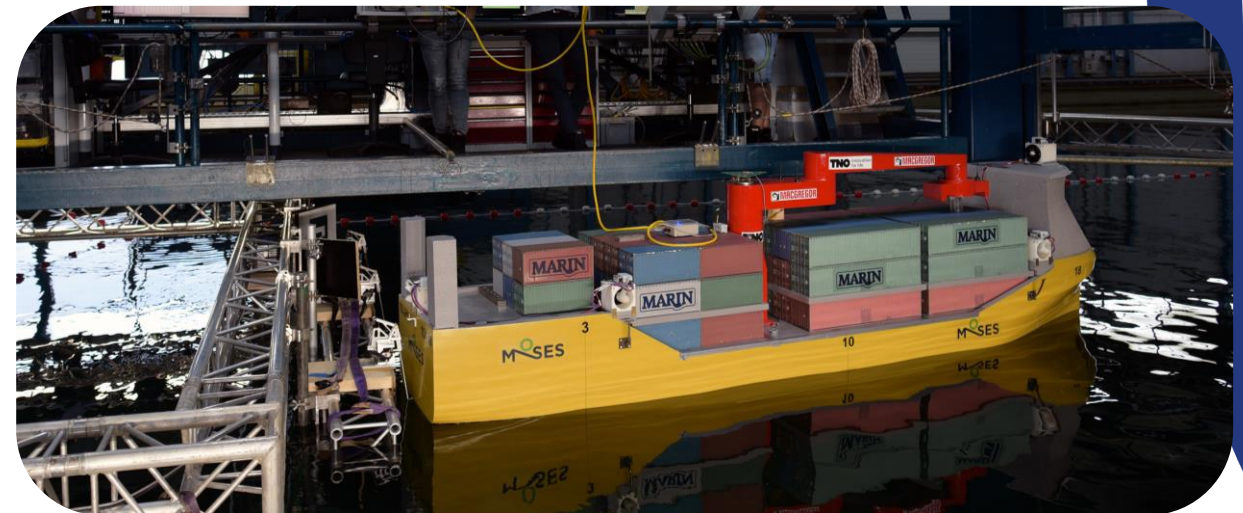
Wageningen, the Netherlands



Free sailing, **1:17 scale ship model** of Greek II concept design



Round-trip between two ports, including autonomous docking and undocking



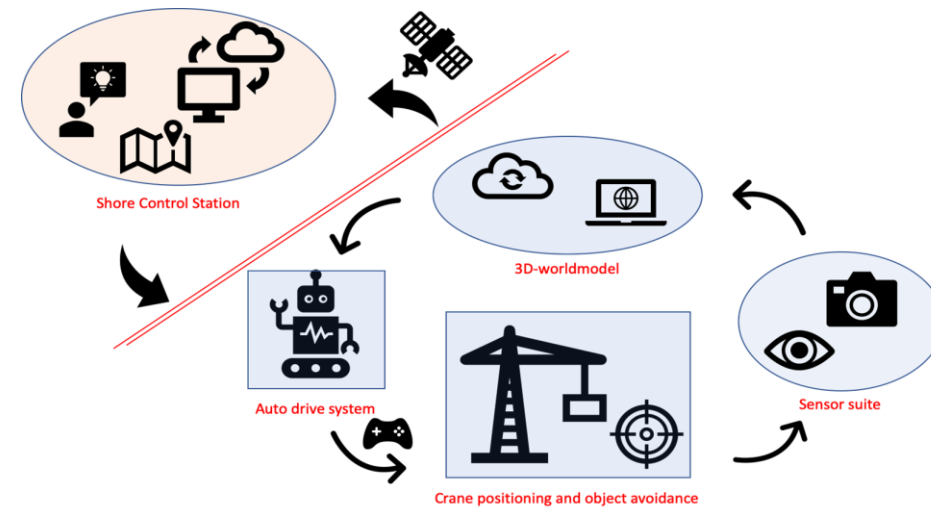
MOSES Robotic Cargo Handling System



Automated Crane

- Compensation of pendulation (ship motions, weather conditions)
- Identification of container to load

Intelligent Operator Support System (IOSS)



- Enabling local situation awareness – anomaly detection
- Robot self awareness in problem detection
- Control Intelligence
- Dynamic task allocation (One-to-many)
- Risk assessment for problem solving

MOSES Robotic Cargo Handling System – Demonstration



Today's pilot demonstration



Demonstrate the **automated operation for (un)loading containers** from the MOSES Innovative Feeder with the Robotic Container-Handling System



- A **full-scale crane** (*located at MacGregor's test site*) will be outfitted with a sensor package and control systems to enable remotely controlled and autonomous operation
- A remote operator (*located at TNO's facilities*) will monitor the operation through the **Intelligent Operator Support System (IOSS)**



Örnsköldsvik, Sweden and Soesterberg, the Netherlands

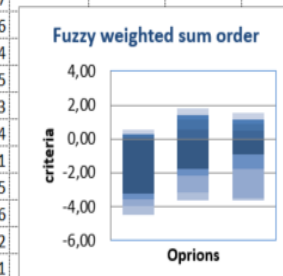
Pilot Demonstration results

- The pilot demonstration results will provide input to the **sustainability framework** developed by MOSES
- The objective is to evaluate the **sustainability and added value to SSS of the MOSES Innovations, based on specific criteria (incl. cost, environment, safety etc.)**



Attributes		E1		E2		E3		E4		Weighted			x1	x2	x3								
Code	Description	Asses	Type	BAU	MOSES	BAU	MOSES	BAU	MOSES	BAU	MOSES	E1	E2	E3	E4	wi	x1	x2	x3				
A1	COST	O	cost	900	500	900	500	900	500	900	500	1	9	9	9	0,381	-0,333	-0,185	-0,090	0,056	0,944	0,000	Fuzzy
A2	ENVIRONMENT	LS	Benefit	VL	VH	VL	M	VL	M	VL	VH	1	1	1	1	0,067	0,067	0,052	0,067	0,051	0,066	0,034	Crisp
A3	SAFETY	LS	Benefit	VL	VH	VL	L	VL	M	VL	VH	1	1	1	1	0,066	0,037	0,066	0,037	0,066	0,037	0,066	0,037
A4	COMPLIANCE	LS	Benefit	L	H	VL	M	VL	M	L	H	1	1	1	1	0,039	0,021	0,032	0,026	0,039	0,021	0,033	0,024
A5	REGULATION	LS	cost	L	M	VL	M	L	L	M	L	1	1	1	1	0,097	-0,080	-0,056	-0,085	0,097	-0,073	-0,064	-0,083
A6	HEALTH	LS	cost	M	M	VL	M	VL	M	L	M	4	4	4	4	0,206	-0,142	-0,150	-0,174	0,206	-0,146	-0,146	-0,171
A7	SOCIAL VALUE	LS	cost	M	VH	H	M	H	M	VH	M	1	1	1	1	0,070	-0,047	-0,052	-0,015	0,070	-0,044	-0,055	-0,016
A8	BUSINESS VALUE	LS	Benefit	M	VH	VL	M	L	M	VH	H	1	1	1	1	0,061	0,044	0,042	0,042	0,061	0,038	0,048	0,041
												10	8	7	4	0,061	-0,479	-0,235	-0,211	0,061	-0,442	-0,293	-0,206

enter weight of attribute as number or linguistic
In next line enter yr knowledge level for the



Microsoft Excel
and the winner is X2 And the FUZZY winner is x2
OK

MOSES making waves...



MOSES was *awarded* by the Institute of Logistics Management of Greece (ILME) with the Logistics Excellence Award "**Alexander the Great – Project of the Year 2022**"

6TH INTERNATIONAL LOGISTICS FORUM

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01.06.2023 \ 14.00-20.00

ΚΕΝΤΡΙΚΟ ΑΜΦΙΘΕΑΤΡΟ ΧΑΡΟΚΟΠΕΙΟΥ ΠΑΝΕΠΙΣΤΗΜΙΟΥ

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One more thing...an interesting event



**AEGIS
AUTOSHIP
MOSES**

**JOINT FINAL
EVENT 2023**

7 NOV **Rotterdam
(Europort)**

**SAVE THE DATE
and stay tuned for registration**

Discover the future of maritime innovation! Join us to learn how AEGIS, AUTOSHIP and MOSES have united to revolutionize European waters, demonstrating autonomous ships, enhancing supply chain resilience, and shaping greener waterborne transport

These projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreements N° 815012, 859992, 861678.





MOSES

Thank you for your attention!

If you have any questions or require further information, please contact me:

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 www.moses-h2020.eu

 MOSES project2020

 @mosesproject20

 MOSES Project



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