

User-centric solutions for a flexible and modular  
manufacturing in small and medium-sized shipyard



## Mobile Manipulator for Intralogistics

Luis Rocha  
Senior Researcher  
INESC TEC

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**4<sup>th</sup> Workshop** - AIMEN Technology Center, Spain



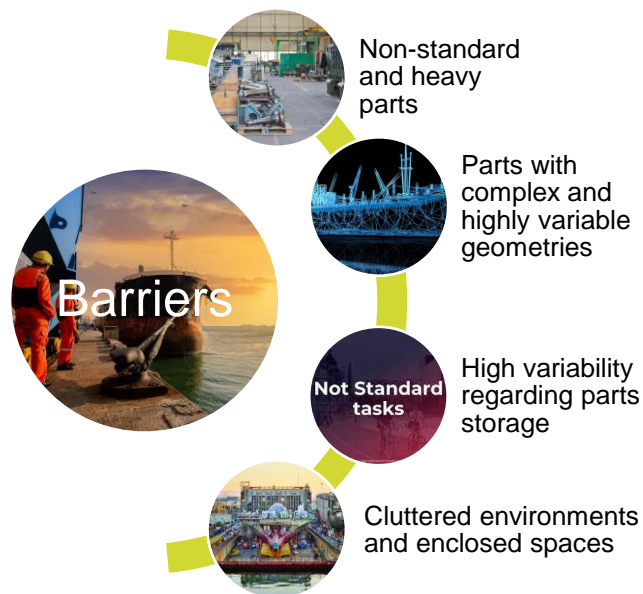
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006798

# The technology



# The Technology

The introduction of mobile robotics for logistic operations into shipbuilding processes is hindered by several factors, including:



## Mobile Manipulator for Intralogistics Operations, able to autonomously:

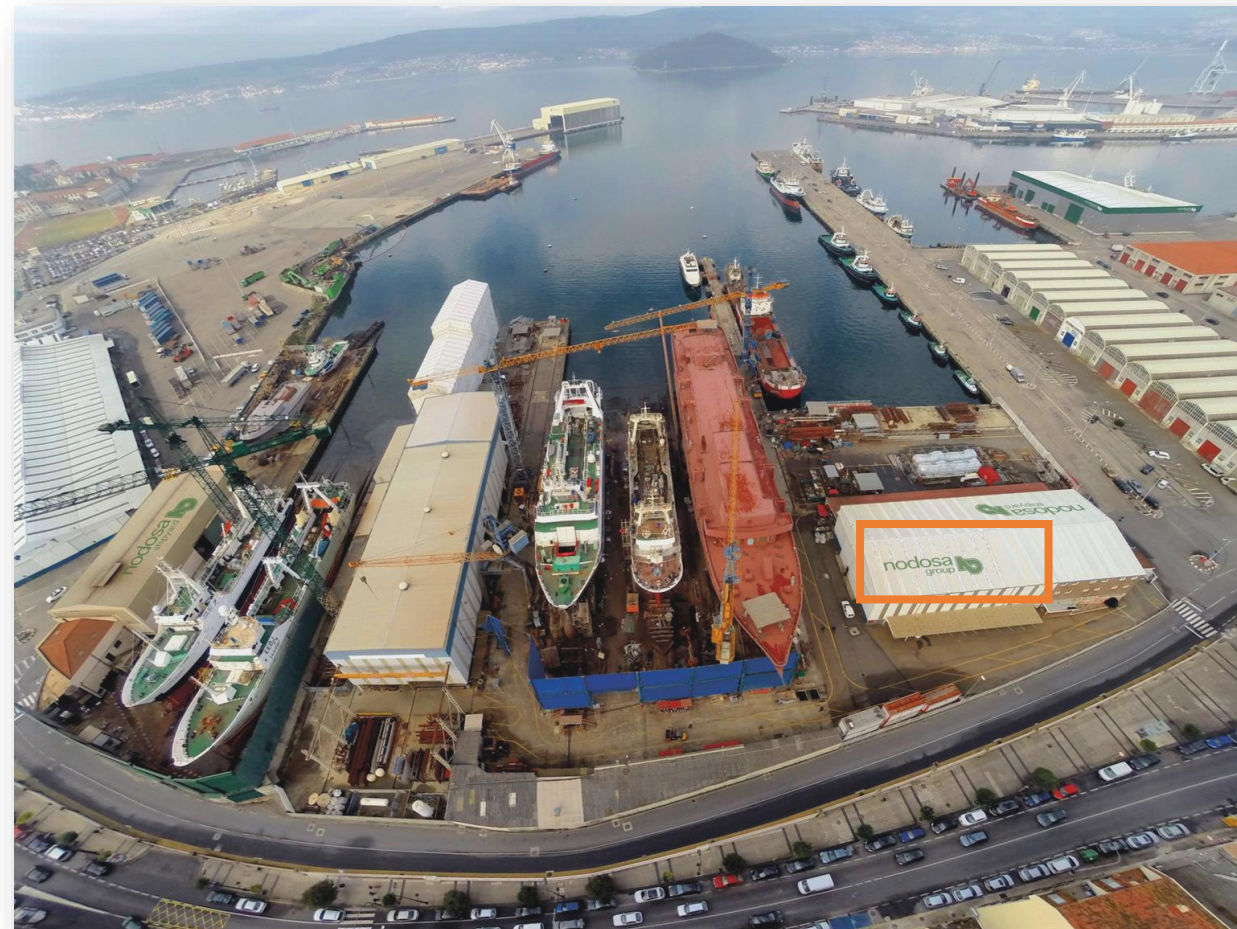
- Pick individual parts from containers
- Transport them parts from stores to workshop and/or workshop to building area



## Technical Overview

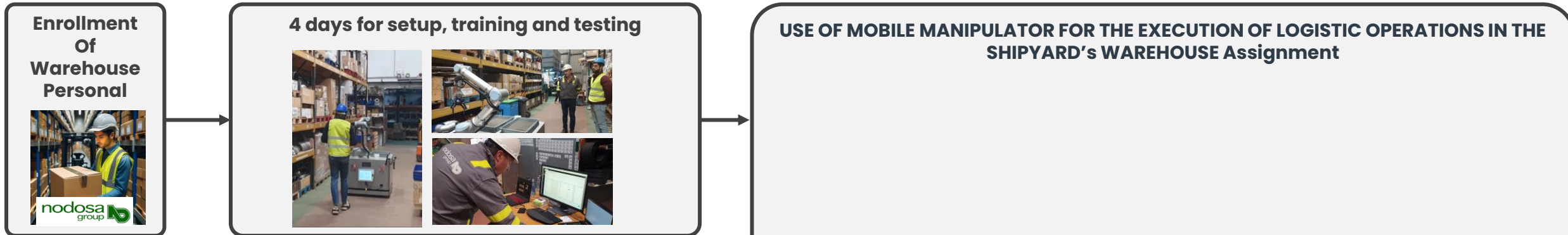
- MRO** ➤ **Mobile** robotic platform + **Collaborative** robot arm
- PPM** ➤ **Process Perception**
- WMS** ➤ **Workspace Monitoring**
- COP** ➤ **Control Orchestration and Planning**
- HRIM** ➤ **HRC – Human Robot Interaction Mechanisms**

# The demonstration in the shipyard



# The demonstration in the Shipyard

## EXPERIMENTAL SCENARIO



## KEY PERFORMANCE INDICATORS

### Usability-related indicators

- Time required to set up the full system
- Easy of interaction with the robotic arm (Task Programming, Mission Assignment, Monitoring)

### Health-related indicators:

- Improved ergonomics (robot assist warehouse operator)

### Productivity-related indicators :

- Reliability of the system (number of assigned tasks versus total task fully completed)
- Number of operators/time that was free for other operations.

WATCH THE VIDEO OF  
[THE DOMONSTRATION IN SHIPYARD](#)

## The impact for the shipbuilding industry



# The impact for the shipbuilding industry

## OUTCOMES


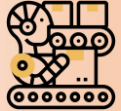


### High usability and acceptability:

- ❑ 1,5 Days – Full System Setup 
- ❑ Faster non-expert robot programming /configuration/interfaces/monitoring 



### Increased productivity and ergonomcy:

- ❑ 95% Reliability (20+ Missions w/different Requests) 
- ❑ Able to assist in logistic operations. Operator can execute parallel tasks. 

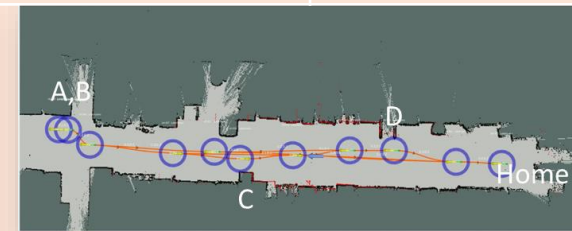
#### Picking of 4 products different locations

Operator ~3 min

Receive Order, Check what's needed and where is stored, move to the right location, pick product, register pick using bar code reader, get back to the entrance, register requester, associate to project.

Robot ~6 min

During this time, the operator can perform other tasks; Robot Mission can be scheduled ahead; Robot can operate during two shifts, considering the need for recharging



20 metres



Funded by the European Union

# The impact for the shipbuilding industry

## Remaining Challenges

### Need to improve the efficiency of the picking process:

- ❑ Nevertheless, a human will always be more efficient, at least for lighter parts.
- ❑ Robots can work unstop and carry heavier parts.

### The way parts are stored must be adapted for robot operation





# Thank you!



Catalogue  
of technologies



# MARI4YARD

Luís Rocha | Senior Researcher

luis.f.rocha@inesctec.pt



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