

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



Occupational exoskeletons for assisting workers

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The technology



The technology



MARI4S_EXO

SEMI-ACTIVE SPRING-LOADED SHOULDER SUPPORT EXOSKELETON



MARI4L_EXO

LIGHT-WEIGHT SPRING-LOADED LUMBAR SUPPORT EXOSKELETON



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TOTAL WEIGHT: 4100 g

EASY TO WEAR AND UNWEAR

ADJUSTABLE SIZES

5 LEVEL OF ASSISTANCE

FIRE-RESISTANT TEXTILES

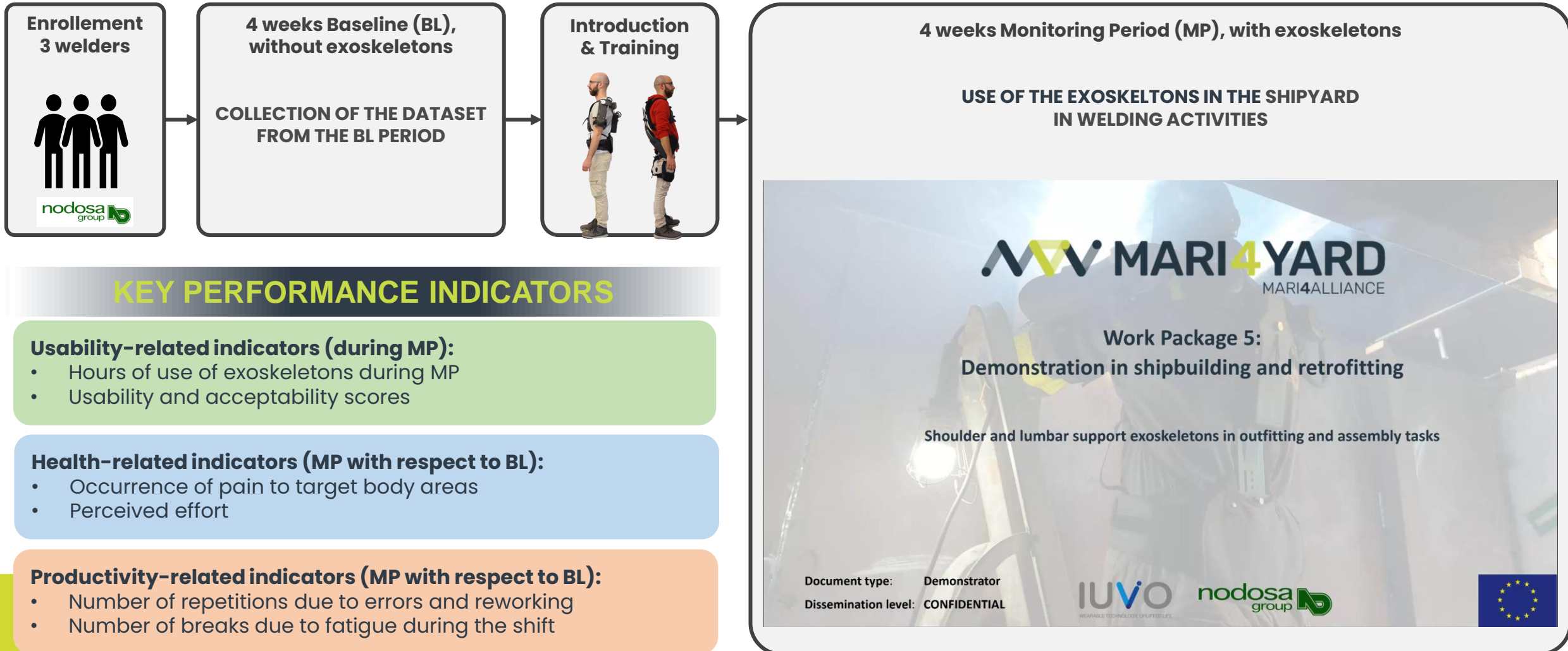
IoT CONNECTIVITY

The demonstration in the shipyard



The demonstration in the shipyard

EXPERIMENTAL PROTOCOL



KEY PERFORMANCE INDICATORS

Usability-related indicators (during MP):

- Hours of use of exoskeletons during MP
- Usability and acceptability scores

Health-related indicators (MP with respect to BL):

- Occurrence of pain to target body areas
- Perceived effort

Productivity-related indicators (MP with respect to BL):

- Number of repetitions due to errors and reworking
- Number of breaks due to fatigue during the shift

Document type: Demonstrator
Dissemination level: CONFIDENTIAL



The impact for the shipbuilding industry



The impact for the shipbuilding industry

OUTCOMES

USABLE AND ACCEPTABLE



100
hours of use
over 18 working days



ALL
usability and acceptability
scores over threshold

SAFER WORKING CONDITION



60%
reduction of pain episodes
at shoulder and back



40%
reduction
of physical strain

INCREASED PRODUCTIVITY



50%
reduction of errors
and reworking



50%
reduction of breaks
due to fatigue



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Thank you!



Catalogue
of technologies



MARI4YARD

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