FIWARE Global Summit

Scale Up for a Real Smart Future

IMPLEMENTING HUMAN-CENTRIC MANUFACTURING WITH FIWARE

A4BLUE CASE - TEKNIKER UC

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Open APIs for Open Minds

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https://vimeo.com/360231253

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A4BLUE Objectives

Put together workers and **ADAPTATIVE AUTOMATION** mechanisms

+

Put together workers and context-aware **ADAPTATIVE ASSISTANCE TOOLS**

TO

Take **ADVANTAGE** of each others **STRENGTHS**

Increase worker SATISFACTION and workability

Increase productivity and overall PERFORMANCE

Augmented workers & workplaces

Long term socio-economic sustainability

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A4BLUE Outputs

Methods & Tools for Sustainability	• Methodology for the definition of the optimal level of automation • Methodology for usability and satisfaction assessment • Socio Economic assessment framework
New or enhanced automation mechanisms	• New: deburring robot and automated tool trolley • Enhanced: smart torque wrench, dual arm and logistic robot
A4BLUE Reference architecture and implementation	• New interaction mechanisms: verbal and non verbal • A4BLUE adaptive framework • Assistance tools: context aware on the job training and guidance, decision support system and collaborative knowledge management

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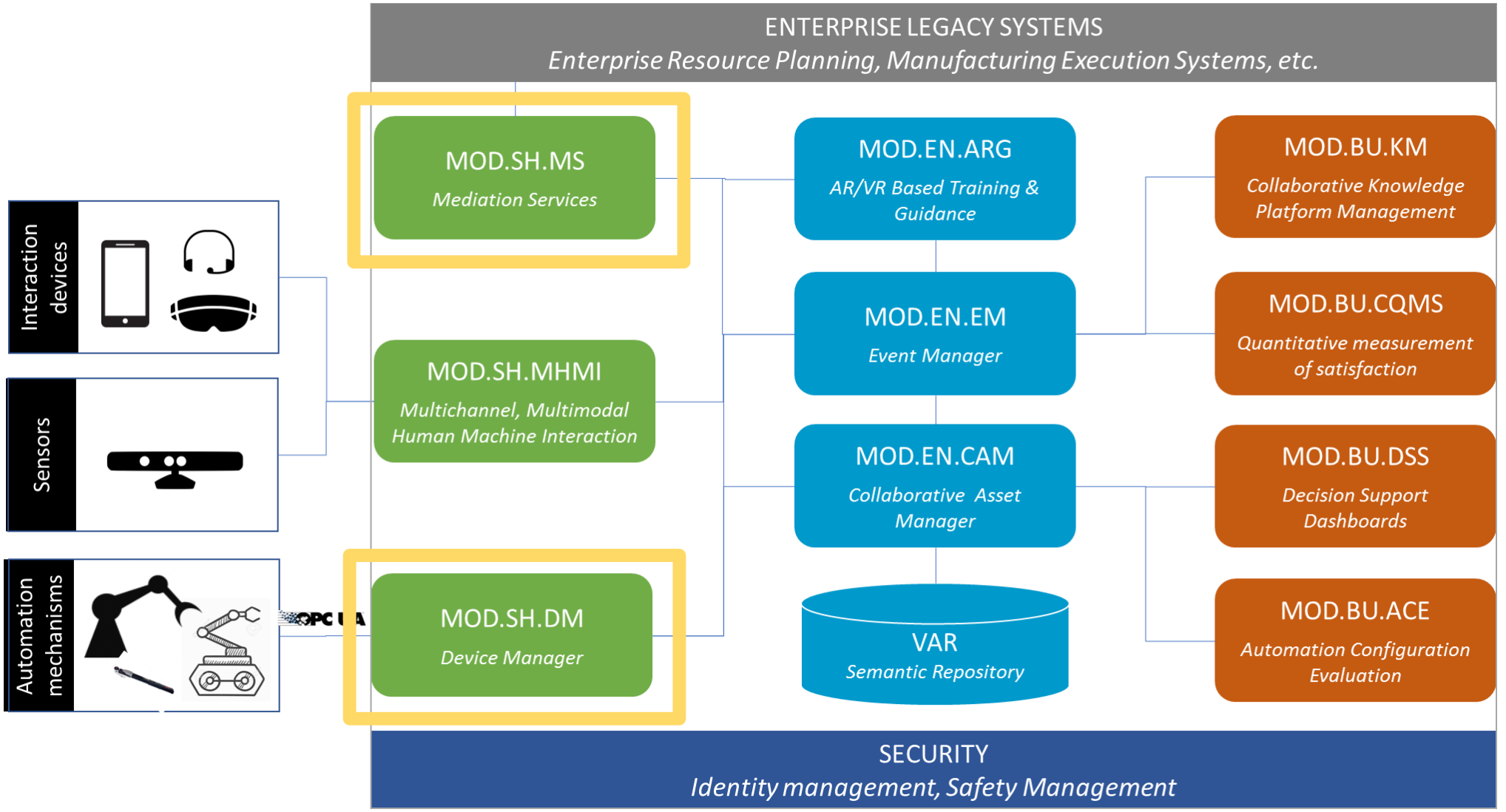
A4BLUE Framework – Integration



Re-usability

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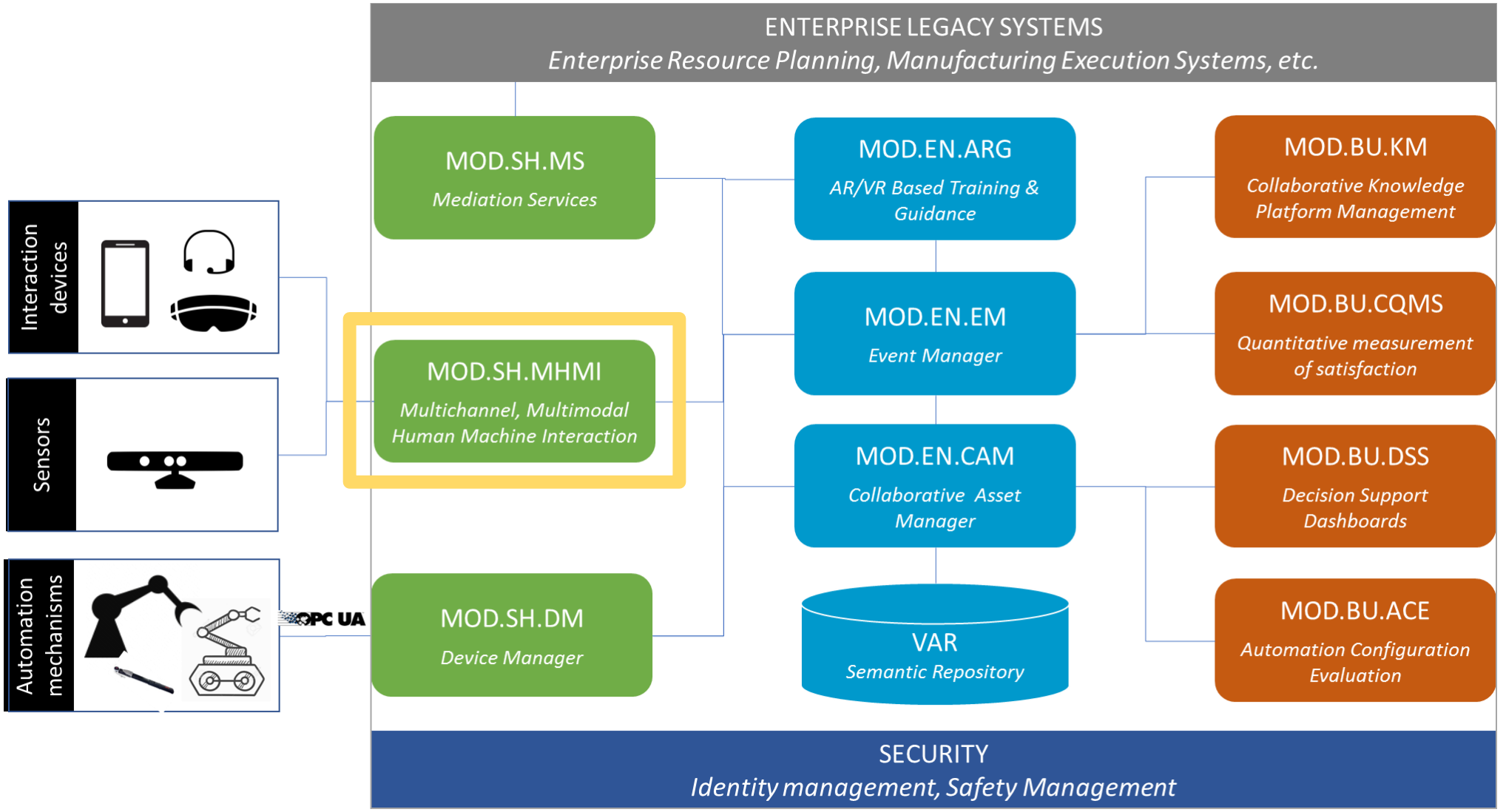
A4BLUE Framework – Interaction



Re-usability

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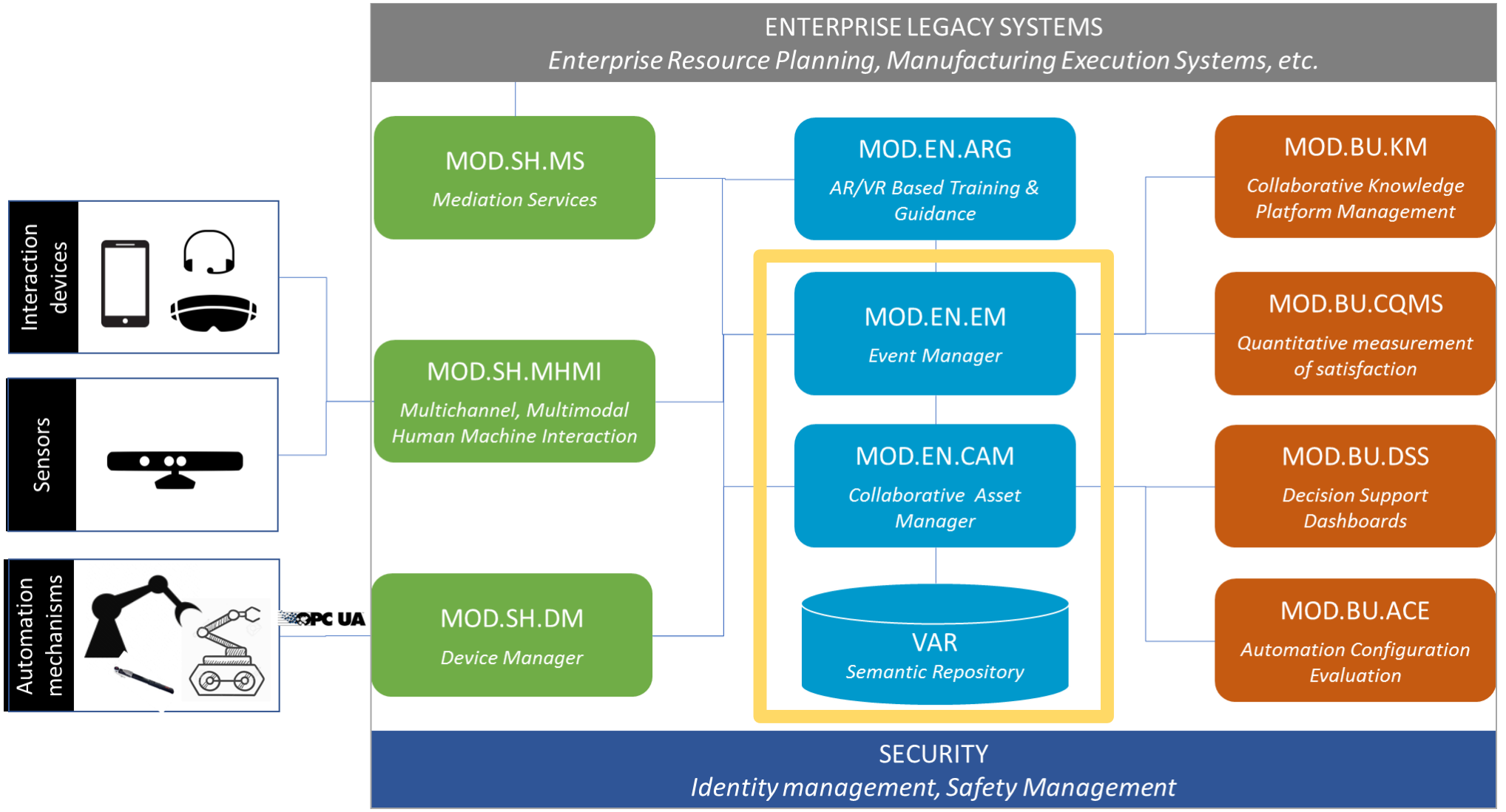
A4BLUE Framework – Adaptation



Re-usability

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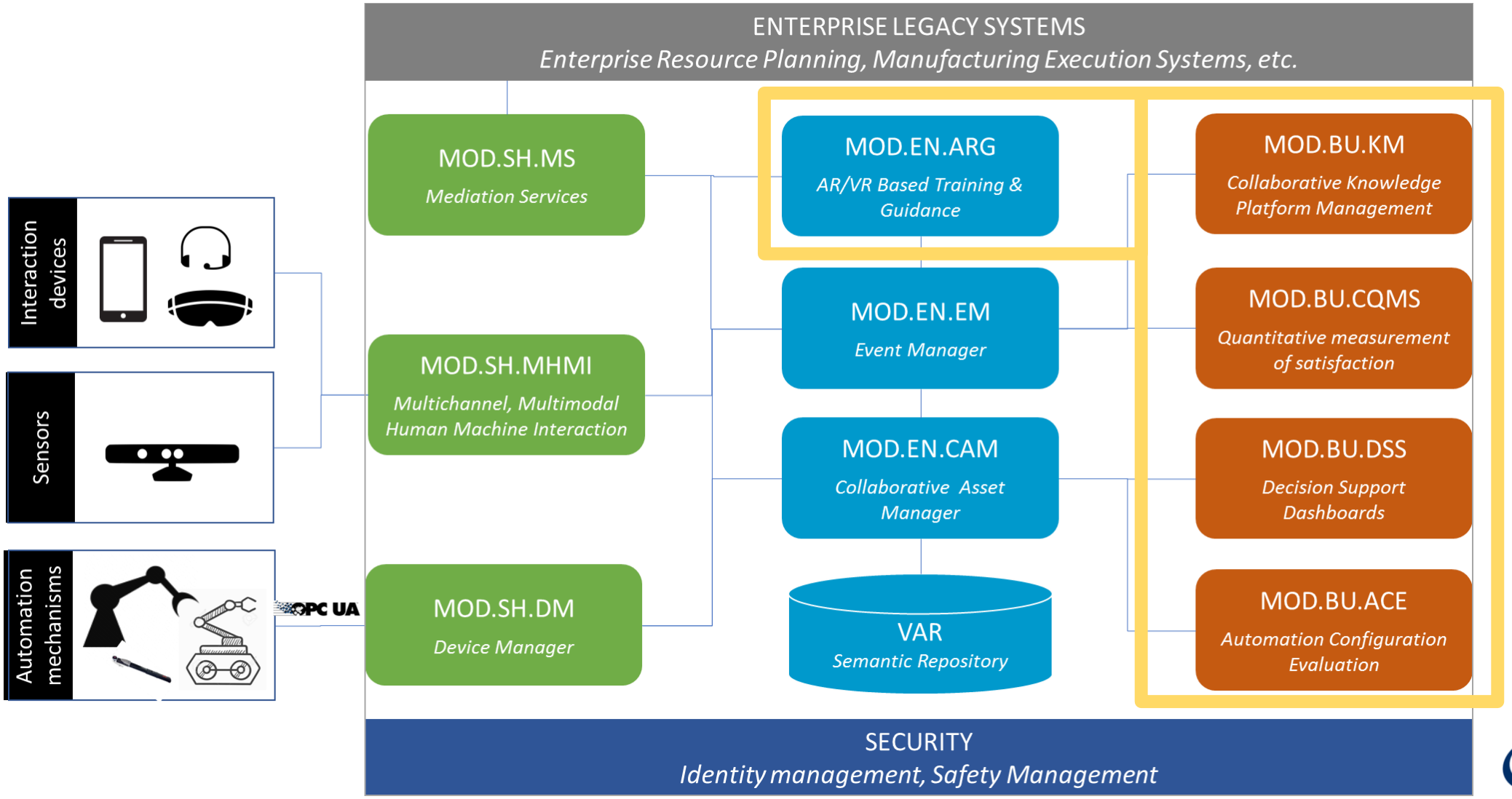
A4BLUE Framework – Assistance



Re-usability

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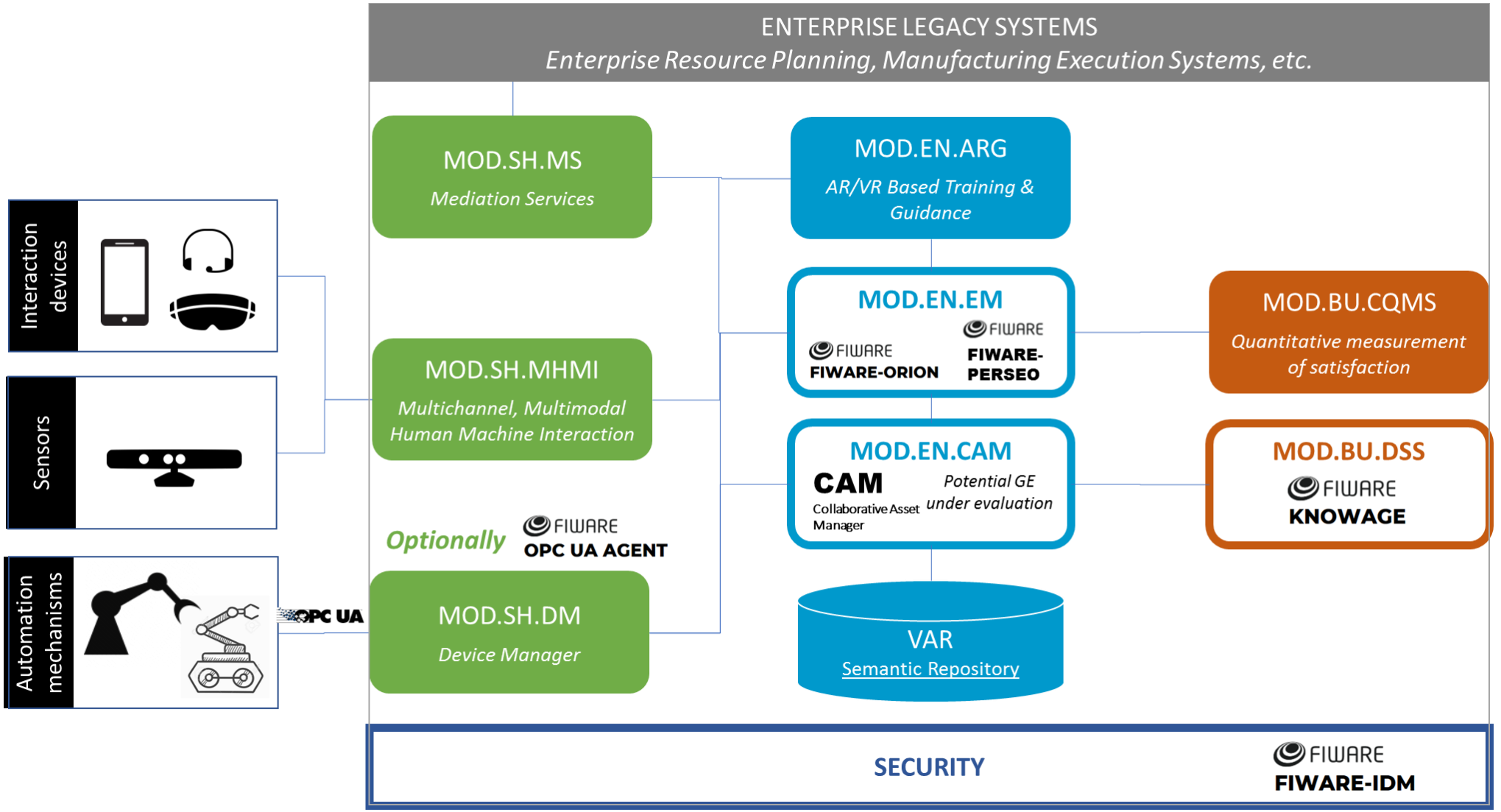
A4BLUE Framework – FIWARE powered



Re-usability

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TEKNIKER Use Case – Scenario

Business case

- Collaborative assembly of a latch valve in a fenceless environment including auxiliary activities as logistics and maintenance.

Scenario

- **Actors**: Assembly operator and Maintenance technician.
- **Legacy systems**: Manufacturing Execution System.
- **Robots**: dual arm robot involved in assembly and mobile robot performing logistic activities.

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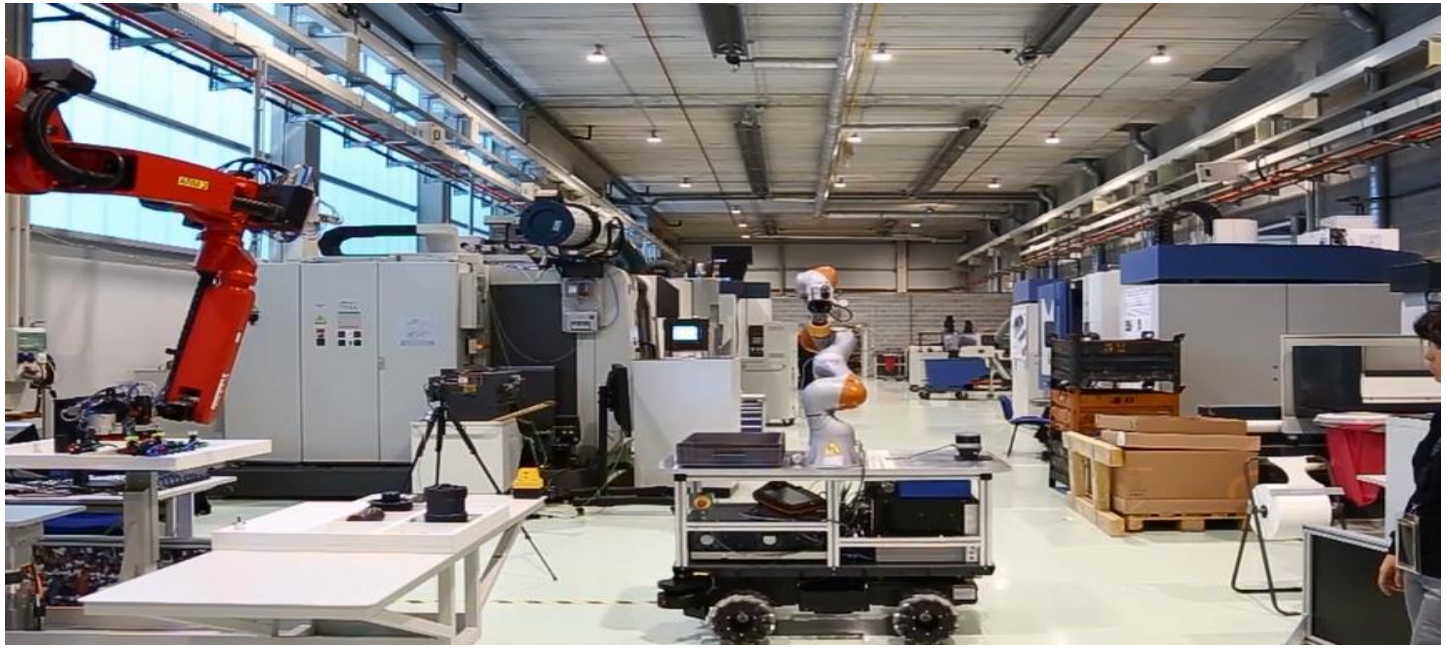
TEKNIKER Use Case – Challenges

- To introduce multimodal Human-Robot **interaction**.
- To **adapt** workplace to process, human (i.e. physical characteristics, capabilities, skills, etc.) and context variability.
- To provide **assistance** to the maintenance technician.
- To **evaluate** trust, usability and worker satisfaction.

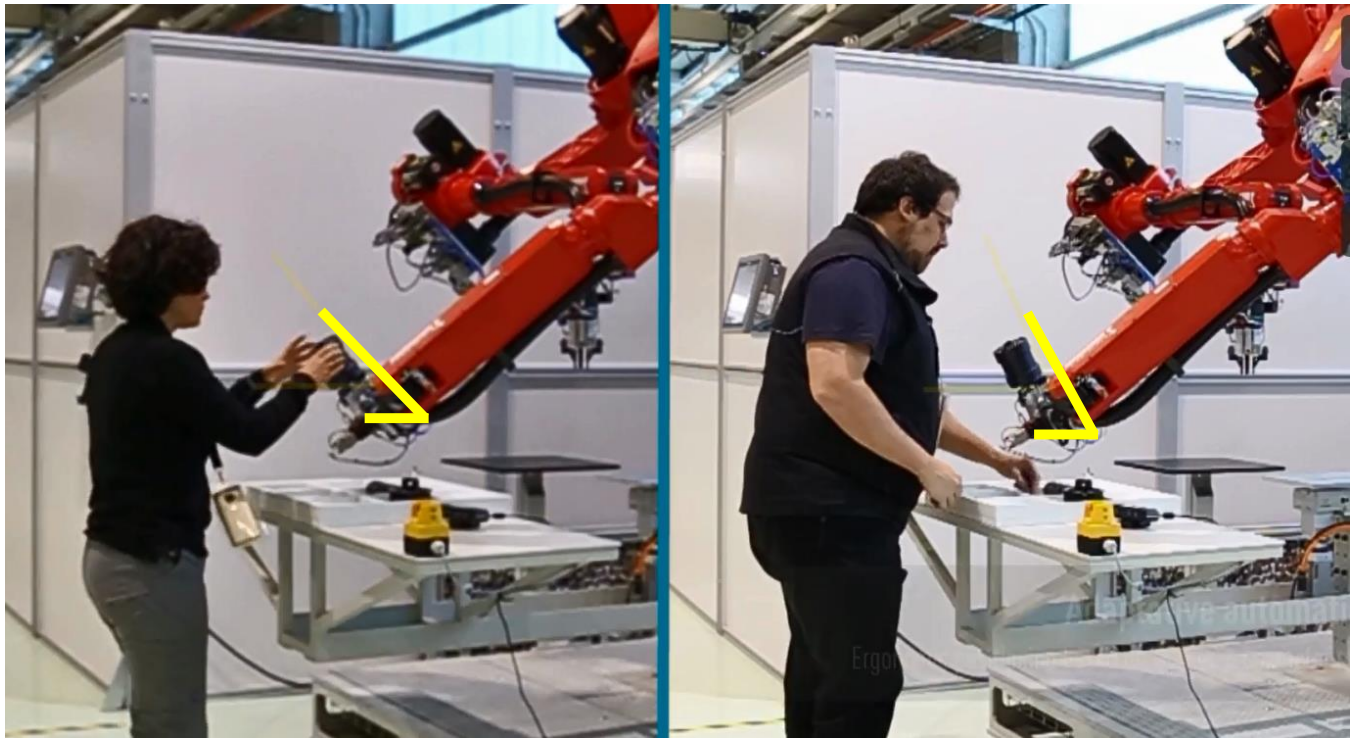


TEKNIKER Use Case – Interaction

- Multimodal, interaction with both the dual arm assembly robot and logistic as well as the Manufacturing Execution System.
  - **Verbal interaction**: Natural speaking in Spanish.
  - **Nonverbal interaction**: Gesture commands. The natural interaction of both left-handed and right-handed workers has been considered.

TEKNIKER Use Case – Adaptation

- The collaborative assembly workspace is integrated with the shop floor manufacturing execution system (MES) and automation mechanisms (i.e. dual arm robot and logistic robot) to adapt its behaviour to process, human and context variability

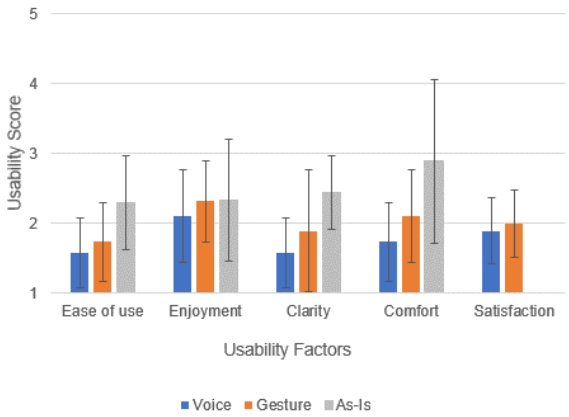


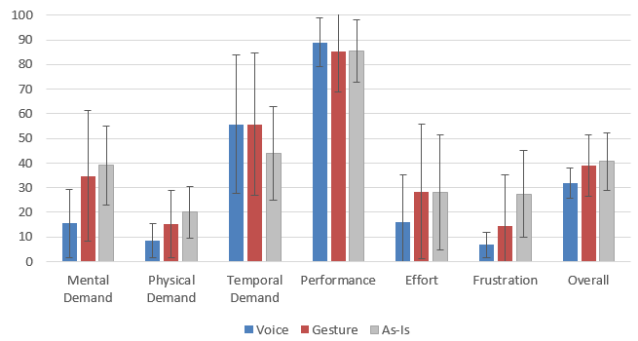
TEKNIKER Use Case – Assistance

- Assisting the maintenance technician
  - Intervention request alerts.
  - Maintenance decision support dashboard,
  - Step by step on the job guidance.

TEKNIKER Use Case – Evaluation

19 Participants: 5 Female & 14 Male with an average age of 40 years (9.39)





Usability, Mental Workload and Trust

- High usability scores. Natural Speaking gets better usability rates than gestures recognition.
- Centralised Mental Workload: neither under nor overloading.
- Good trust levels.

Benefits

- Improves efficiency: reduction of displacements.
- Reduces physical demands.
- Increases safety.
- Opens up job opportunities.

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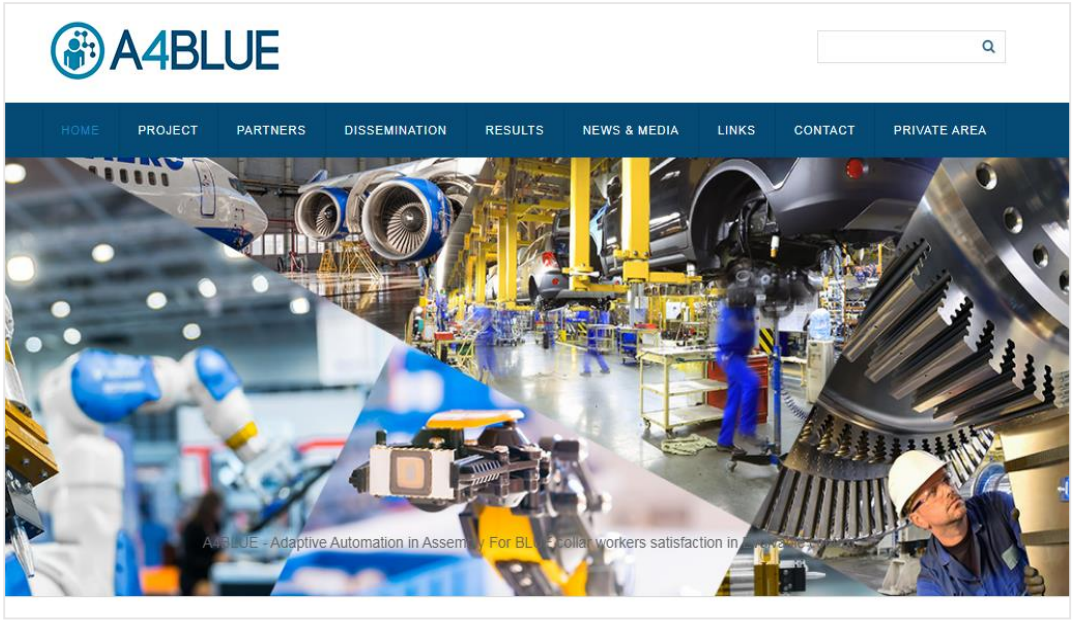
A4BLUE Case: TEKNIER UC video & Further Information

TEKNIKER UC video

https://vimeo.com/330958923

Further info A4BLUE



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