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## DELIVERABLE

### D3.1 – AI-based tools for production line/station and resource level autonomy- Initial prototypes

|                                     |                                                 |
|-------------------------------------|-------------------------------------------------|
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| <b>Deliverable Leader</b>           | TECNALIA                                        |
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| <b>Keywords:</b>                    | planning, orchestration, autonomy, mechatronics |

## Executive Summary

The report details the progress made in CONVERGING's WP3 over the past nine months, highlighting the creation of software and hardware components aimed at implementing adaptable, scalable, and AI-powered production systems across different levels, with a focus on robotics.

WP3 has seen the creation of eight (8) cutting-edge software and hardware modules, as an outcome of 4 distinct tasks (T3.1-T3.4). The **Dynamic Work Reorganization** module (DWR) incorporates considerations of human factors, safety, and environmental sustainability into the allocation of tasks and actions for cell resources. Meanwhile, the **AI Station Controller** module (AISC) undertakes the flawless execution of robotic application decisions via real-time coordination. The **Collaborative Robot Control** module (CRC) improves robots' path planning and real-time task modification abilities, leveraging human feedback and self-learning for superior performance. Furthermore, the **Perception and Autonomy Module** (PAM) boosts robot independence by providing advanced perception capabilities for effective human-robot collaboration, including anticipatory adjustments and 3D environmental mapping. The **Humanoid Collaborative Robot** (HCR) consists of a humanoid robot undertaking precise assembly tasks. The **Remote Inspection Robot** (RIR) is used for remote inspection and maintenance tasks in confined spaces, consisting of a robot-on-robot configuration. The **Medium Payload Collaborative Manipulator** (MPCM) comprises of a medium payload industrial robot enhanced for collaborative applications. Lastly, the **Polishing Robot** (PR) is used to perform automated polishing tasks.

In conclusion, CONVERGING D3.1 comprehensively presents the first prototypes of the previously mentioned modules. The substantial effort dedicated to achieving the current, advanced status of these modules was primarily aimed at enhancing time management in several key areas:

- Allocating time for optimizing the developed solutions to ensure software stability and high performance.
- Allocating time for integrating the solutions within factories and making software adjustments based on the specific needs of each factory.
- Allocating time for improving the modules based on feedback from operators during the factory evaluation phase.
- Allocating time for enhanced reporting and the development of software usage guidelines.

Early versions of the hardware modules for WP3 have also been crafted to facilitate the project's early stages, with their ultimate versions scheduled for development between months 19 and 36.