D3.1 Adaptation Features and Modules – Executive Summary (September 2017)

This deliverable provides evidence of advances towards the achievement of project objectives related to WP3 *Methods and tools for continuous adaptation of the manufacturing process*. It is a technical report of the Demonstrator deliverable D3.2 '*Simulation environment adaptation components'*, and is intended as both a user manual for that deliverable, as well as a WP3 progress report documenting the components developed during the first 12 months of the project, the methodologies implemented to address specific industrial requirements for adaptation and hints at future work.

More specifically, in this deliverable we present a refined adaptation process flow updated from our original approach first described in D1.4 '*Adaptation Architecture'*. This flow describes how workers are matched to tasks they are best fit to be assigned to, by using their capabilities as a basis for matching worker characteristics against task requirements. Worker preferences are then taken into consideration to refine the actual conditions of automation which best fit the worker's self-reported (and in the future, automatically recognised) requirements for enjoying an optimal work experience. The appropriate worker selection is then further adapted to fit criteria such as shift starting times, shift durations and response to a variety of events. Digital simulation tools are provided to supervisors at this stage to test a variety of specific configurations. In the future developments of WP3, the best fit will be propagated to a virtual simulation scenario for operational validation, before finally being sent as an order to the real shopfloor.

Towards realising the goals of this adaptation process flow, tools and methodologies are defined and presented in this document, which aim to address different requirements and needs for adaptation. Data storage tools have been developed to define information about a factory's Resource Ontology, Pre-process Plans and Worker Capability Model. Real-time decision-making tools address requirements for adaptation based on worker capabilities and re-adaptation to the occurrence of events. A connectivity framework between the different components is realised through the OPC-UA standard. Finally, simulation routines are defined in preparation for the next step towards realising the adaptation results in a virtual factory where human factors (e.g. worker walking routines, etc.) can also be simulated.

We conclude this report by illustrating these concepts within the scope of demonstration scenarios approximating real use cases identified by Factory2Fit industrial partners Continental, Prima Power and UTRC-I. During the next phases of the project, we will particularly focus on harnessing the virtual simulation capabilities of the VC4.0 software to approximate the most potential use cases described in D1.3, targeting validation of the adaptation solutions within the simulation environment early in 2018.