

# REPLICA: a solution for Next Generation IoT and Digital Twin Based Fault Diagnosis and Predictive Maintenance

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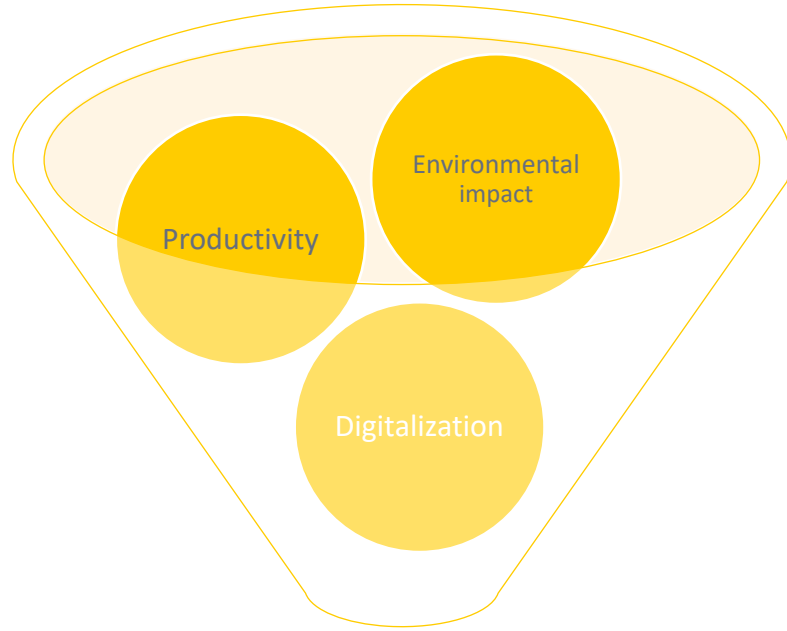
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**Security | AI | Modelling**

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# Introduction



Optimization

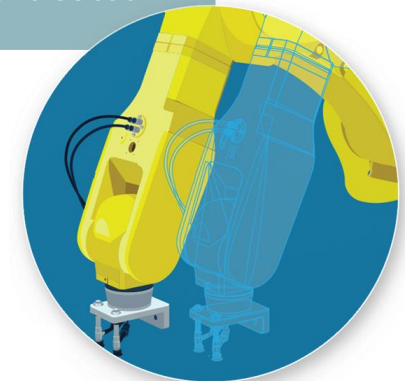
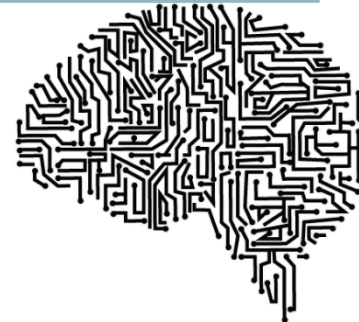
Competitiveness

Technology is advancing fast and helping industries to obtain more and more detailed data about their processes and equipment.



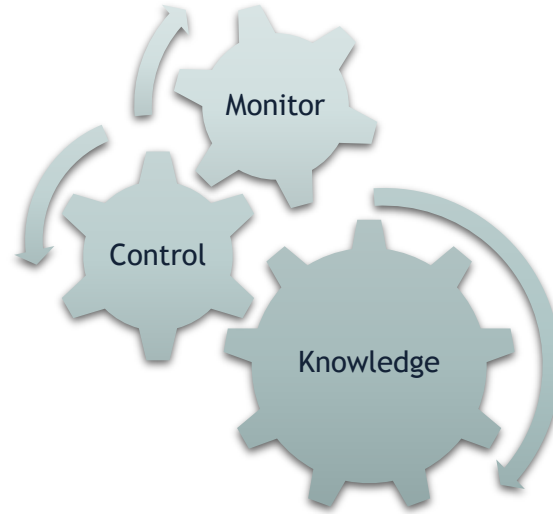
Artificial Intelligence

Digital Twin



# Introduction

The possibility to **monitor** and **control** each part of the process is a strong base on which a more intelligent and focused control can be built.



Technology advance brings innovation and the possibility to manage the production in terms of "near future" through AI prediction and decision-making support.



**Forecasting** demands and **planning** production, **optimizing** process by **reducing** costs and **improving** efficiency without corrupting the quality of the product is a big challenge at the plant level.



# RE-manufaCturing and Refurbishment LARge Industrial equipMent (RECLAIM)

Call: H2020-NMBP-FOF-2019 Funding Instrument: **IA** (Innovation Action)

Duration: **42 months**

Starting Date: **1 October 2019**

Partners: **22 partners**

Country Coverage: **8 countries**

**Greece, Spain, United Kingdom, Italy, Switzerland, Portugal, Slovenia, Germany, and Turkey**



## RECLAIM

## High Level Objs

Application of big data analytics techniques

Predictive analytics and model-based forecasts and optimization procedures, based on completely data-driven processes

Increased flexibility in changing machine operation purpose

Re--manufacturing systems for material and resource efficiency



# REclaim oPtimization and simuLation Cooperation in digitAl twin (REPLICA)

AIM: creation of a Digital Twin of the factory environment to be used to monitor and predict the performance and status of factory assets.

## Objectives

Simulation and Optimization

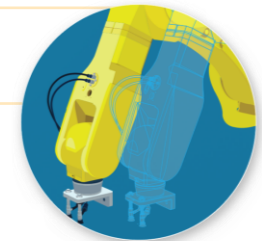
Support digital retrofitting based on real data simulation

Introduce/enhance the smartness of the machinery

Deploy a digital retrofitting infrastructure

Provide a flexible, scalable architecture for intelligent digital twin

Provide Fault Diagnosis and Predictive maintenance tool



Digital Twin





# REPLICA Architecture

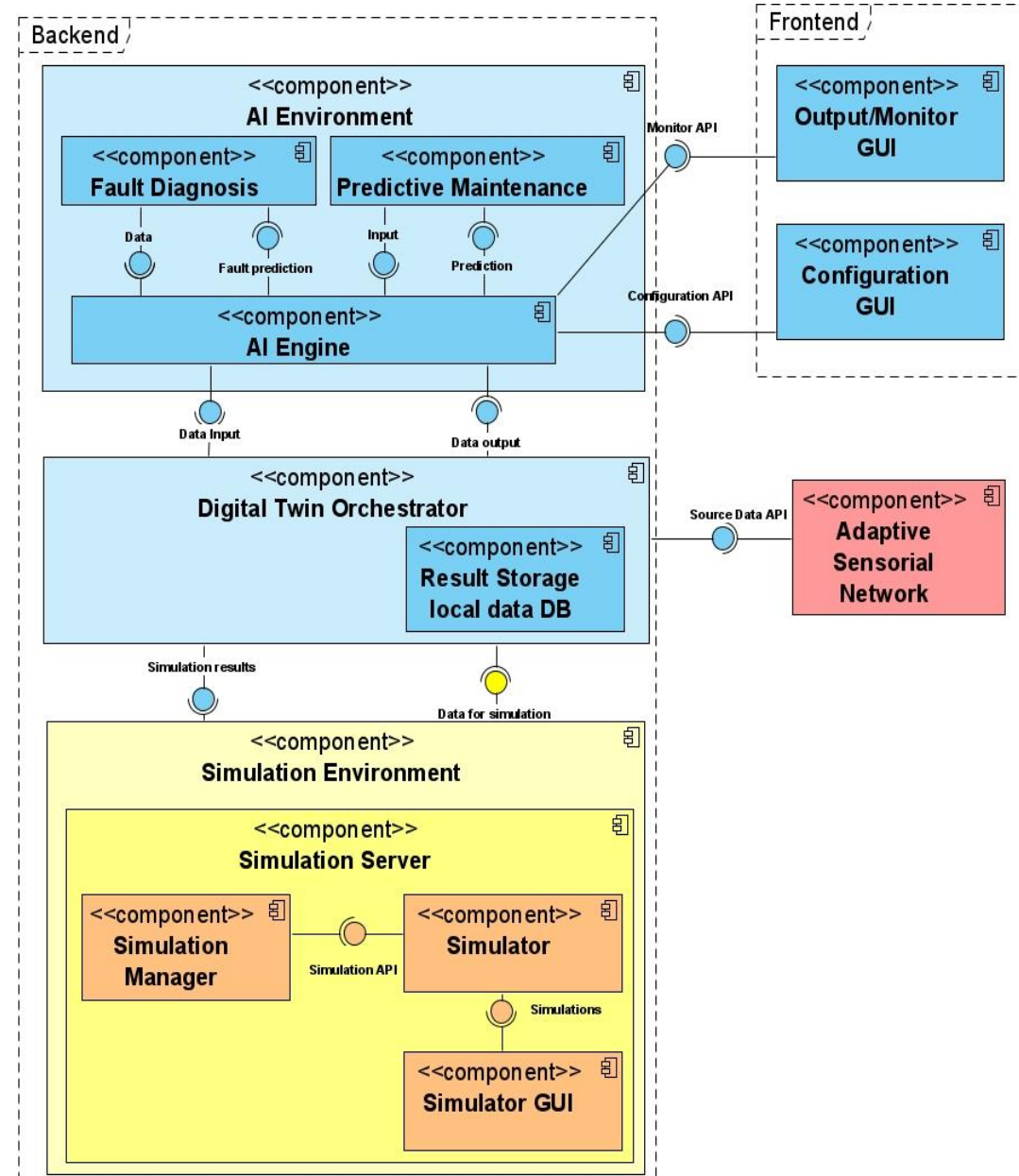
REPLICA is composed by several modules mainly subdivided in two blocks:

## Backend

- **Artificial Intelligence (AI) Environment**
  - hosts the AI modules and the AI Engine.
- **Digital Twin Orchestrator (DTO)**
  - orchestrates all the operations done by REPLICA.
- **Simulation Environment**
  - distributed environment including several heterogeneous simulators deployed in different machines.

## Frontend

- **OutputMonitor GUI**
  - Application devoted to show the results obtained using REPLICA.
- **Configuration GUI**
  - Application used to configure the components.

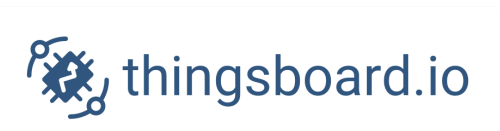




# REPLICA technologies and standard



REPLICA  
РЕРГІСА



kubernetes  
кнр6лu6f62



RECLAIM



## Use cases

### Deployment in industrial site

- **Objective:** Simplify the development and deployment of a fault diagnosis and predictive maintenance solution based on digital twin.
- **Advantages provided by REPLICA**
  - Rapid customization to the present infrastructure, allowing the integration of already available IoT sensors, models, and AI algorithms.
  - Flexible deployment adaptable to the specific needs.

### Replacement of a machine in the shopfloor

- **Objective:** Simplify the adaptation to change in the physical environment.
- **Advantages provided by REPLICA**
  - Rapid replacement of current components to adapt to the changed environment at runtime.
  - Intuitive interface to recreate the needed data flow with the new components.





## Conclusion

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Current **innovative technologies** allow implementing advanced fault diagnosis and predictive maintenance techniques based on **Digital Twin**

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REPLICA provides an architecture that can be customized in different scenario, **to ease the development and deploy** of such solutions.

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The solution combines **opensource software** with modules that will be developed ad-hoc during the **RECLAIM** project.

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REPLICA will provide advantages in different industrial use-cases, from the **deployment** of fault diagnosis and predictive maintenance mechanisms in industrial sites, to their **adaption** to the changes in the shoopflor.





**RECLAIM**

**Thank you  
for your attention!**

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