

# DIMOFAC project

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# Outline

1. Introduction
2. Digital innovation approach
3. Implementation & trials
4. Conclusion



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# Multiple skills Partnership

## ➤ Eu Project consortium: a good example of a diversity cluster in DIMOFAC

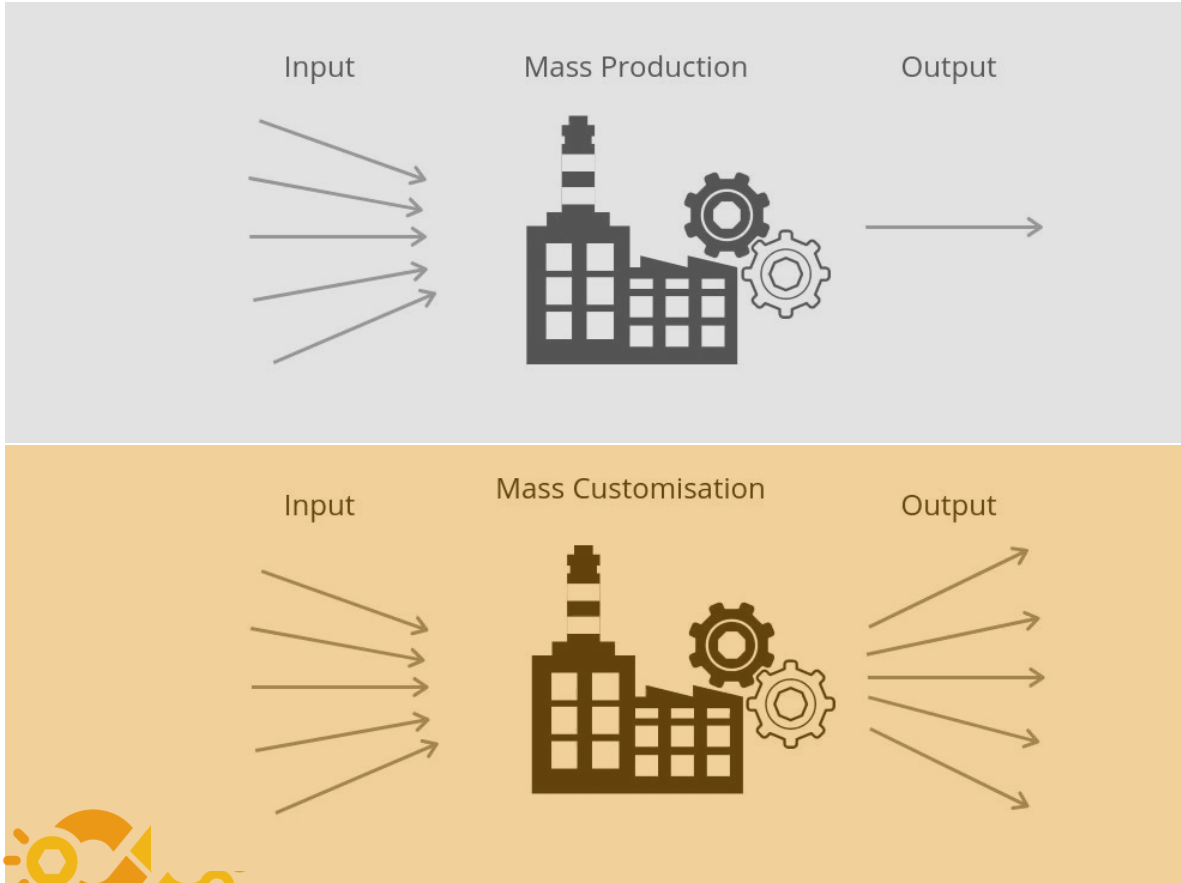
- 30 Eu partners,
- from 12 countries and 9 different languages
- 19 188 k€ (Eu fund: 14 163 k€ )

- › 6 types of organisations with many different skills



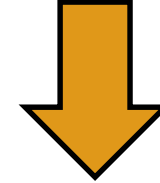
# Why modular factories ?

## Mass Production to Mass Customisation



## Mass Production to Mass Customisation #

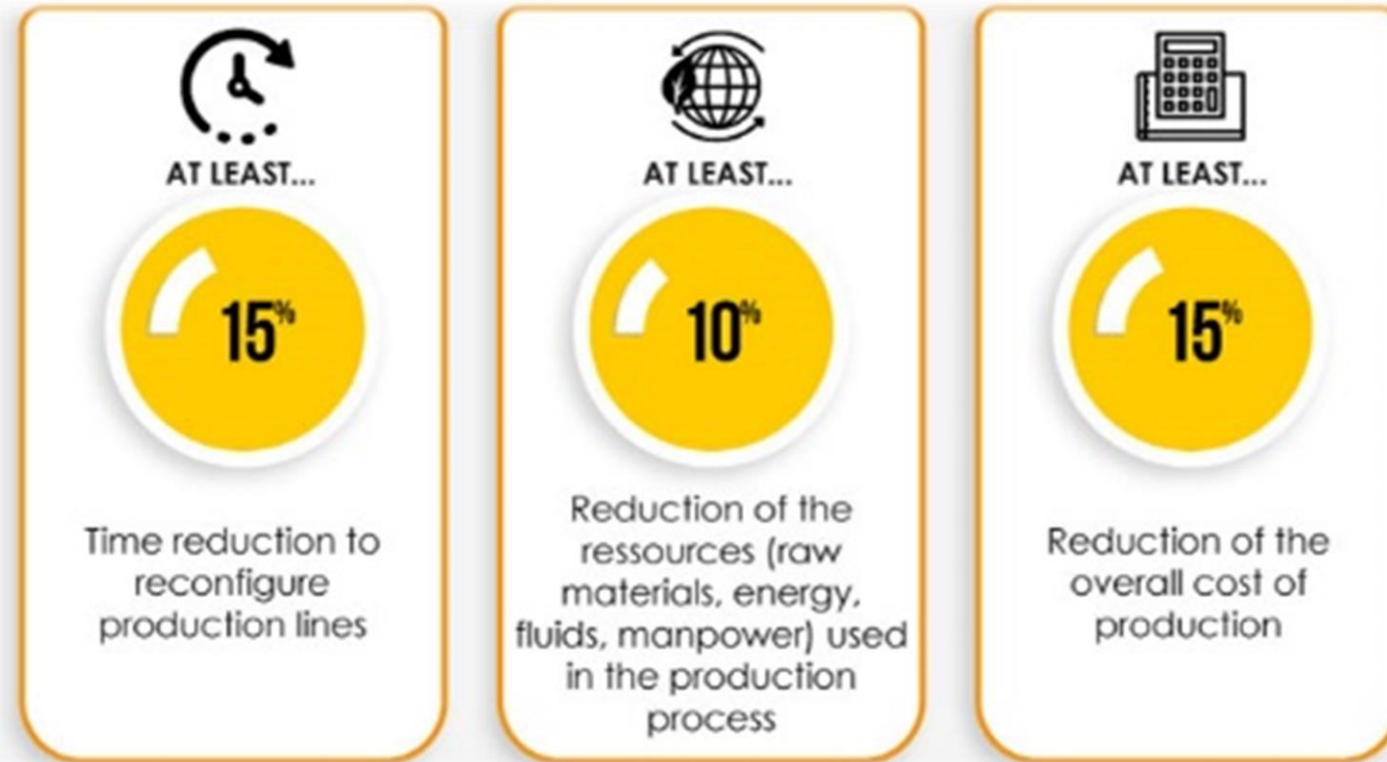
- Complexity of production layout
- Higher frequency of production line changes
- Lower volumes



*Customised product require customised prod. lines where their **efficiency** lays on their **Modularity, Adaptability & Responsiveness.***



# Objectives of DIMOFAC Modular Factory



- develop a customised manufacturing system that can be easily reconfigured for each of them with a solution as a whole



# How achieving modular factories ?

- **Innovative strategy** to increase the flexibility of reconfiguration and responsiveness by using:

## **MBSE:** Model-Based System Engineering

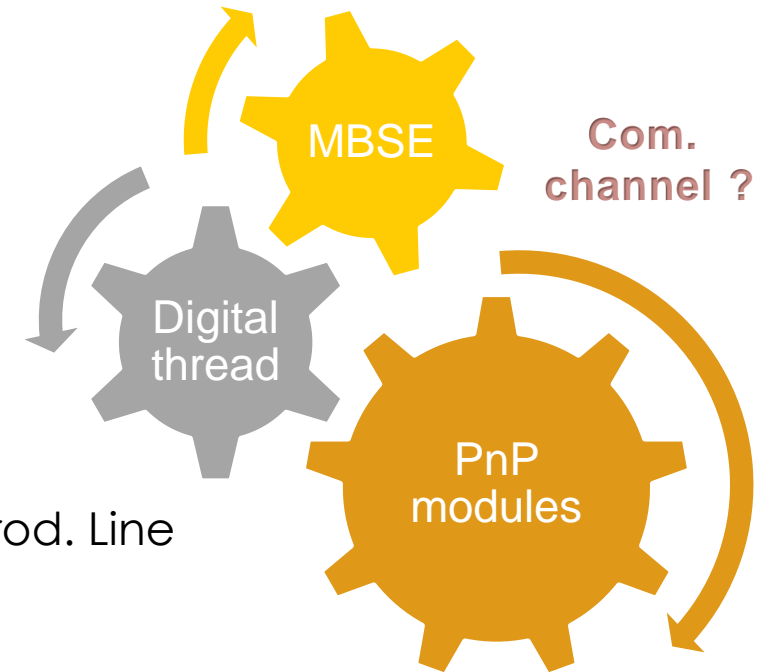
- Modelling to support system requirements,
- Design, Analysis, Verification and Validation activities

## **Digital thread**

- to create links with all the components of the Prod. Line

## **PnP modules**

- self-descriptives to allow compatibility in any situation



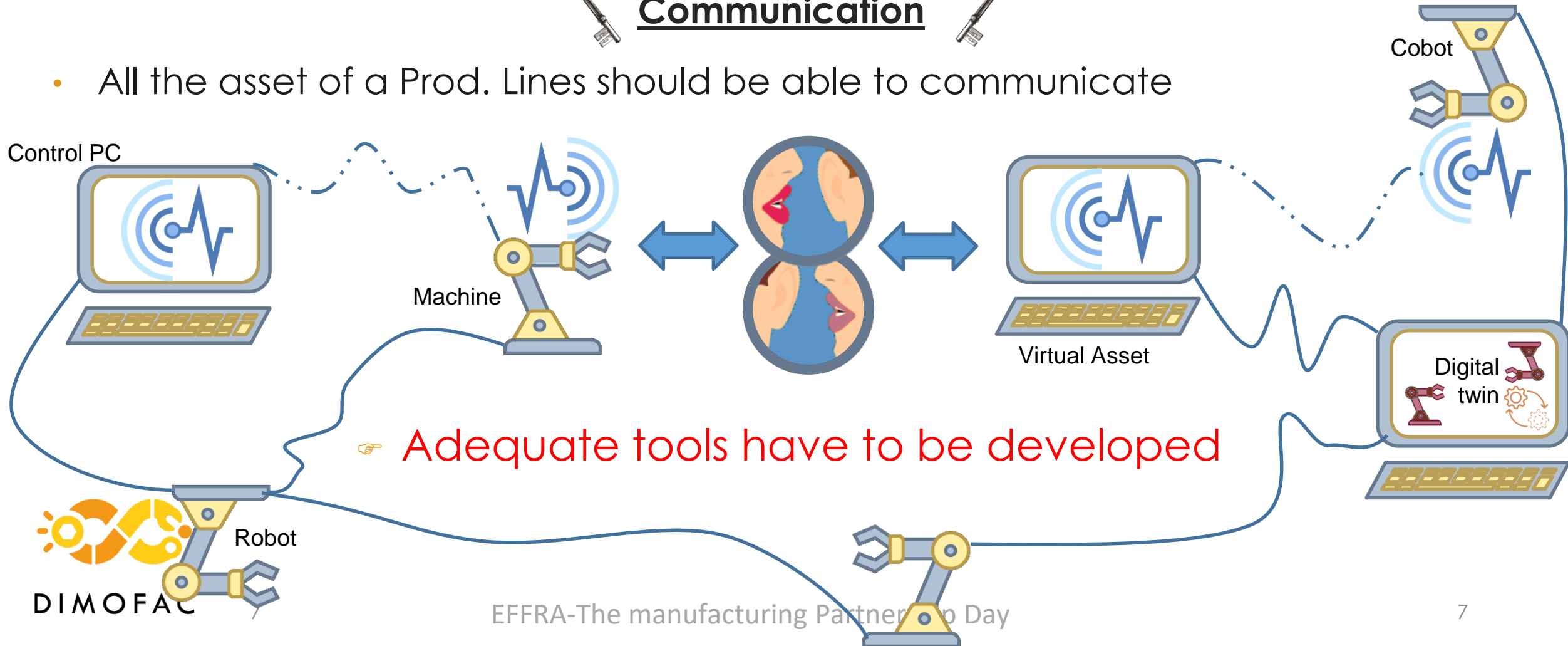
➤ From the **conceptual phase**, throughout **the development** and later **life cycle phases**

# Multiple skills needed for Modular factory (1/2)

- **Efficiency of Prod. Lines  $\Leftrightarrow$  Modularity, Adaptability & Responsiveness**

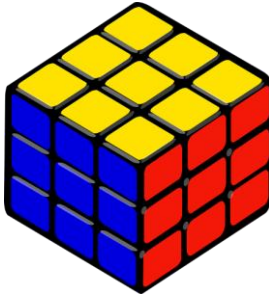
 Communication 

- All the asset of a Prod. Lines should be able to communicate



# Multiple skills needed for Modular factory (2/2)

## Holistic approach: 3 Digital Innovations



- **Digital Platform:** use of a specialised middleware (software) that allows easy deployment of standardized AAS models



- **AAS:** use of standards (AAS as a de-facto standard) to exchange the data between different modules through a Common Information Model (CIM)



- **Digital Twins:** to model and simulate processes, to make predictions, to visualise data, to perform virtual commissioning, (to name a few)





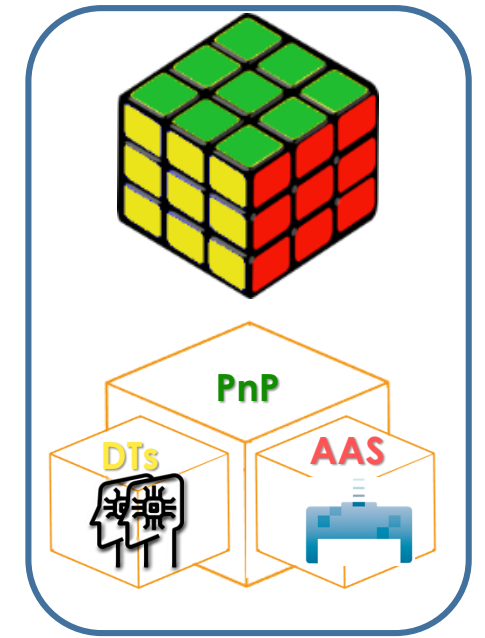
# Implementation of PnP modules

## ➤ Test of the holistic solution in real cases with PnP modules

- › Compound by multiples assets:
  - › machines, robot,
  - › virtual component such as DTs,
  - › simulation, modelling results (to name few)
- › Data generation
- › Data interoperability through AAS

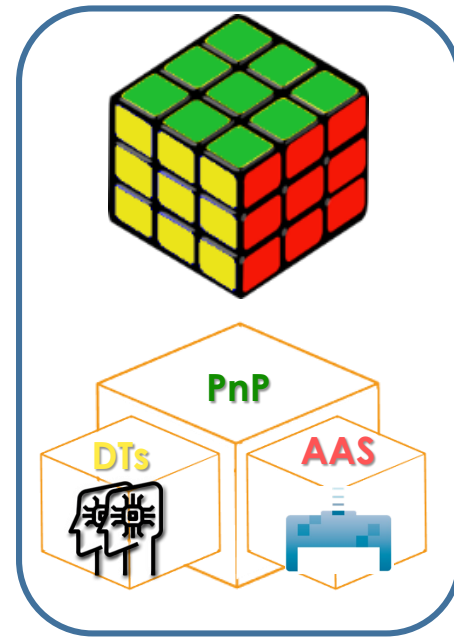
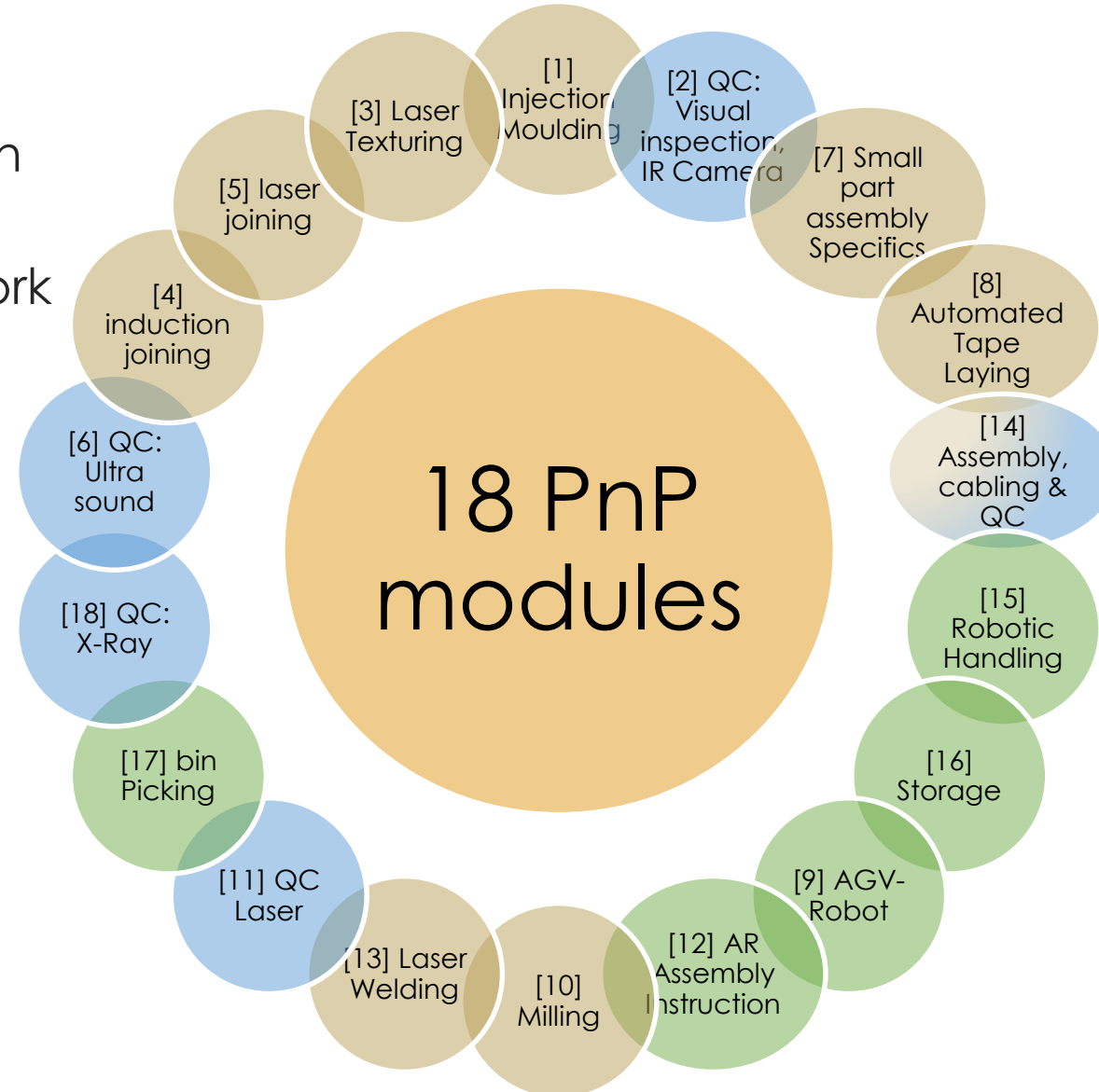
## ➤ For their own purposes:

Injection moulding system, Laser welding, Robotic Handling, specific quality control...



# Portfolio of PnP modules

- Each with their own main feature
- Common framework (ID card)



Manufacturing

Quality control

Handling/transport

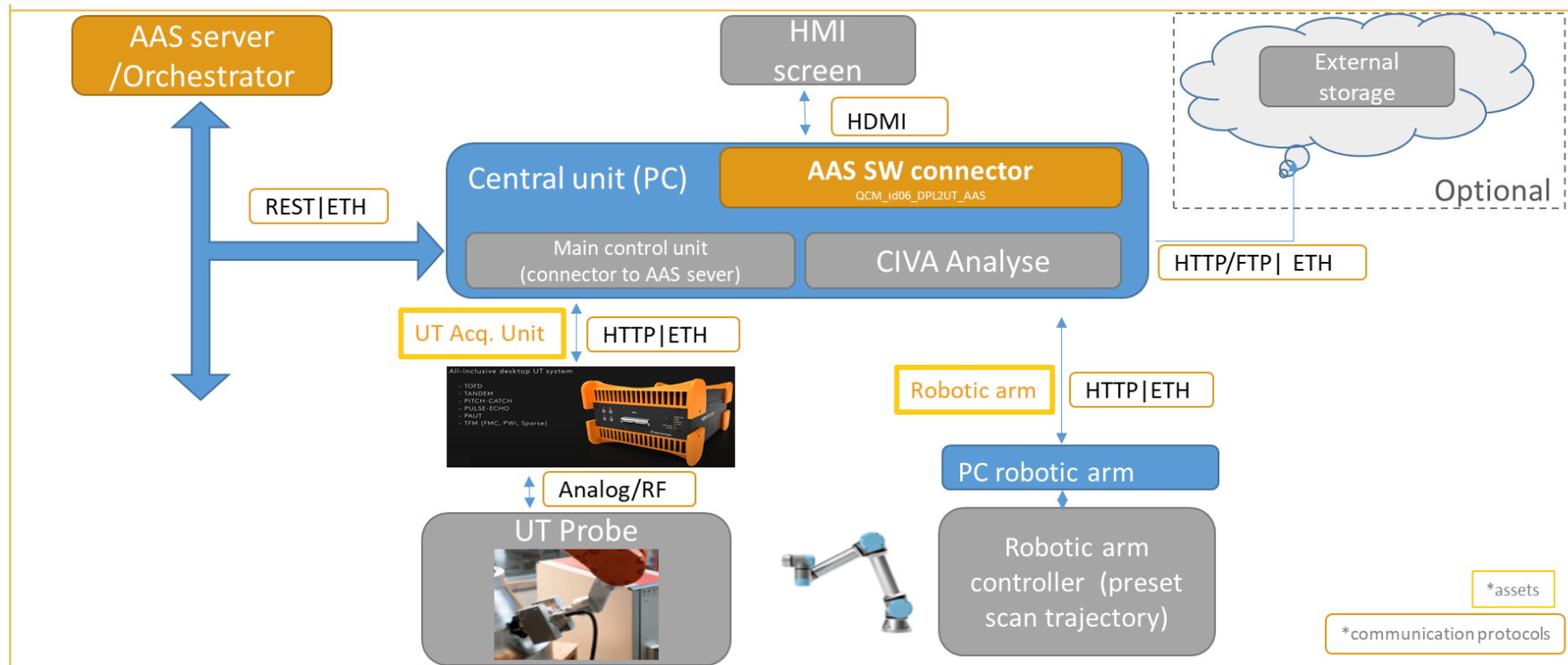


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# PnP module example:

## [6] Quality evaluation and control

- Composed by several Assets with their own function and parameters (volumes, working condition, ...)
  - ⇒ Example: 3 assets (Central unit, robotic arm, UT probe) and 7 submodels
- Communication with the platform ensured by in-house software based on the REST API protocol



ÉIRECOMPOSITES



aimen  
TECHNOLOGY CENTRE

tecnalia Inspiring Business



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netcompany

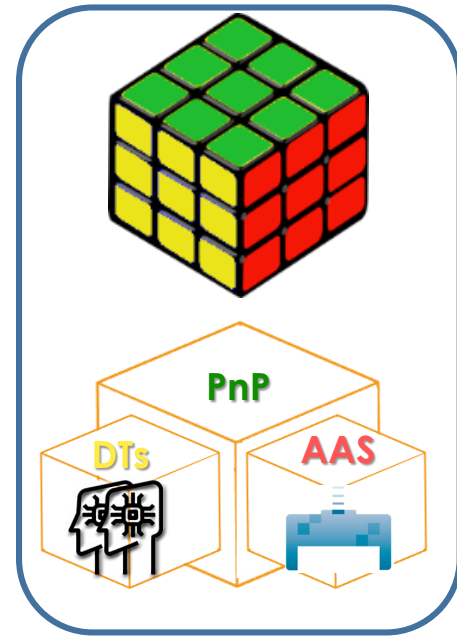
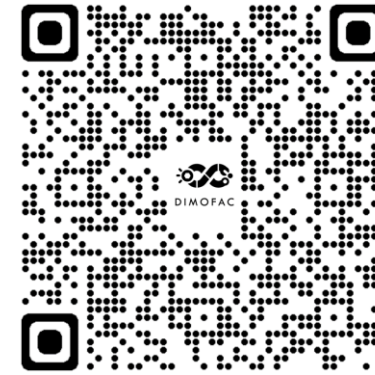
intrasoft

DFK German Research Center for Artificial Intelligence



# Portfolio of PnP modules

⇒ Short Description on DIMOFAC website



- Each with their own main feature
- Common framework (ID card)

**Module 4: Processing module : Induction joining** 1/2

**Module 17: Bin picking handling** 1/2

**Module 18: quality control- X-ray** 1/2

**Module 4: Processing module : Induction joining** 2/2

**Module 17: Bin picking handling** 2/2

**Module 18: quality control- X-ray** 2/2

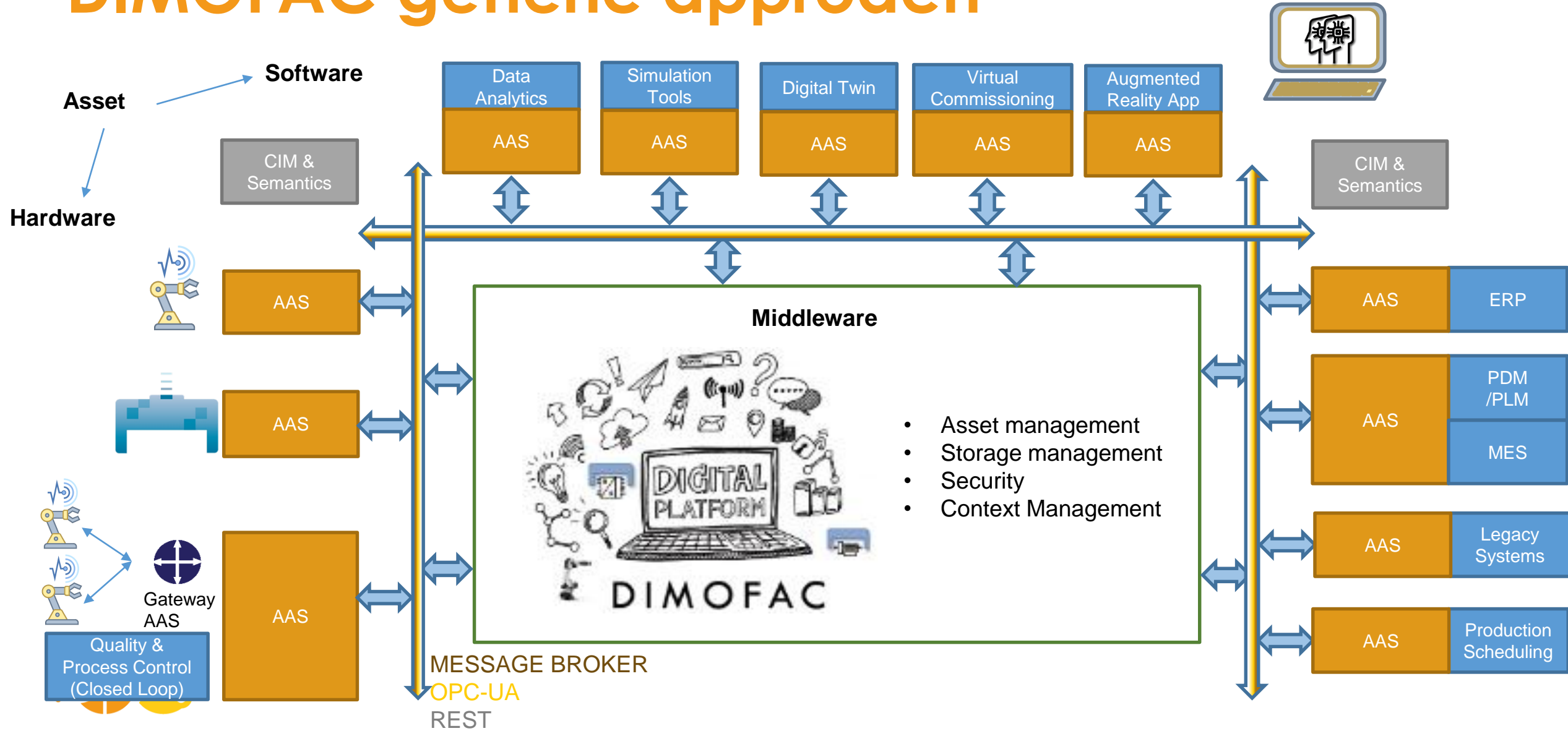
Short description

Architecture

Use cases requirements => DIMOFAC generic approach



# DIMOFAC generic approach



# To conclude



- Mass customisation => Modular factory and flexible production lines
- Innovative strategy => digital development to ensure liaison between hardware and virtual components.
  - Need of different perspective to tackle huge system compose by multicomponents
  - Need of various expertise as the approach address multidomains with very specific expert
  - Strong motivation to understand each other as each has its own language, methodology and issues
- DIMOFAC project: Demo of a Synergy of multiple skills that enables the development of the Modular Factory:
  1. **Approach: combination of AAS & CIM concept + DT + data management Platform**
  2. Trial with a set of PnP modules compatible and self-descriptives
  3. Implementation on RTOs and on Industrial use-cases



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EFFRA-The manufacturing Partnersh



# And you ?

**High-mix low-volume production: are your process on-point ?**

- Can you reconfigure your processes **fast enough to not face any delays?**
- Can you maintain **low levels of waste** when doing so?
- Can you still guarantee **optimal quality** for your products?

*Start the test here:*

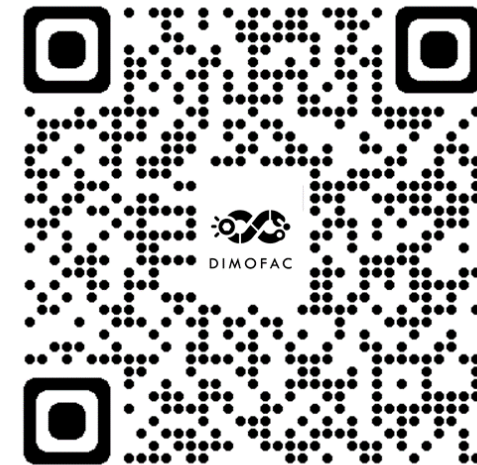


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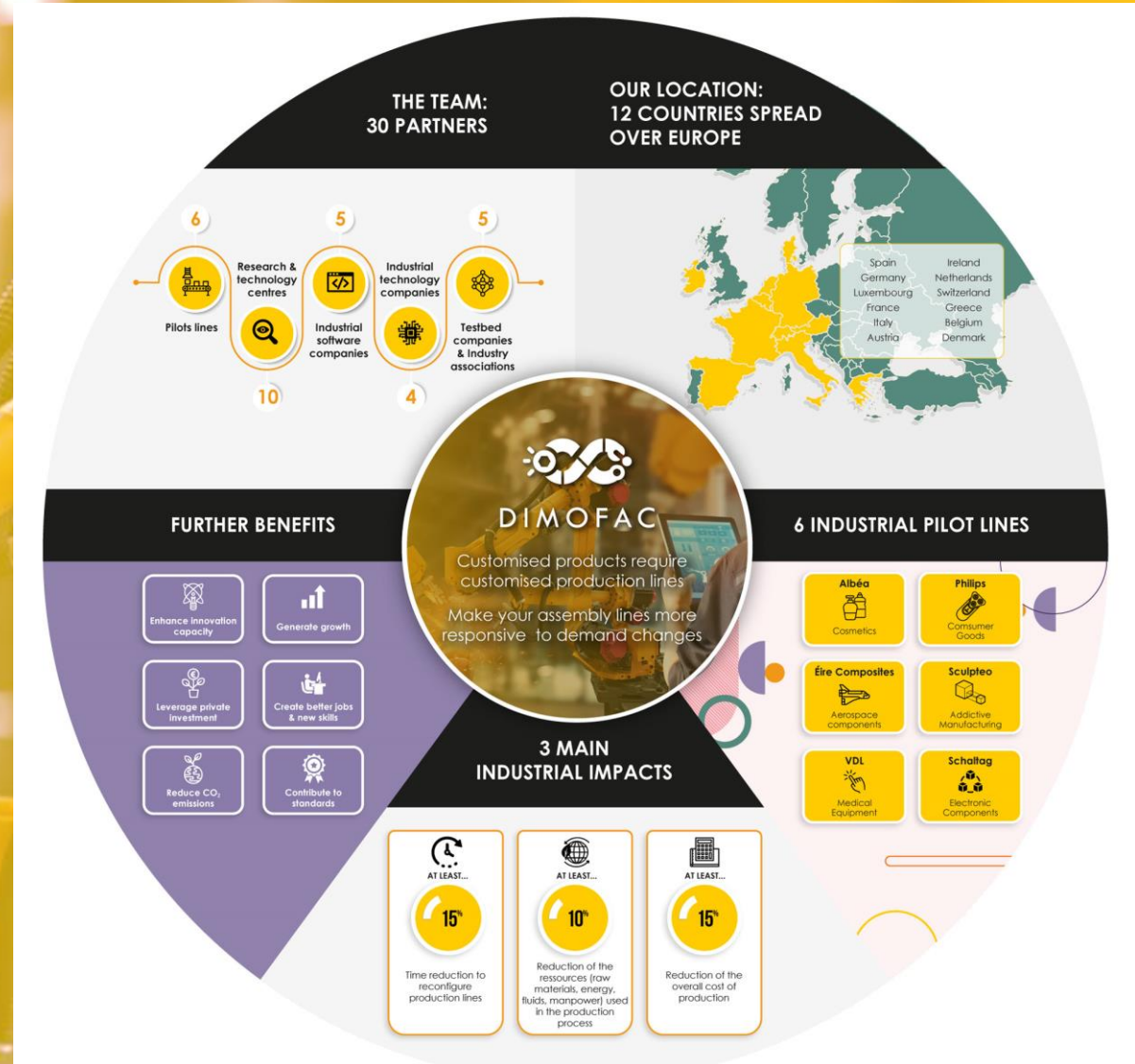
# For the gamer:

A screenshot of the 'TIME GUARDIANS' game interface. At the top, logos for 'Integrade', 'Penelope', and 'DIMOFAC' are visible, along with 'Designed by: CRIPTHOS' and 'FAQ's'. The main title 'TIME GUARDIANS' is prominently displayed. Below it is a 'Start!' button. To the right, a challenge is posed: 'Will you be able to crack the message on time?' followed by a description: 'You will have 40 minutes to solve the riddles and discover the technologies and processes that are revolutionising the manufacturing industry.' At the bottom, icons indicate '40 MINUTES', 'ONLINE ESCAPE ROOM', and '3 PLAYERS'. A small European Union logo and text are in the bottom left corner.



# Thank you for your attention

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