Digitalisation training session

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CUBIC
NOVEL BIOBASED MATERIALS TO IMPROVE CIRCULARITY

VITAL

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ANI AGÊNCIA NACIONAL DE INOVAÇÃO
PRR Plano de Recuperação e Resiliência
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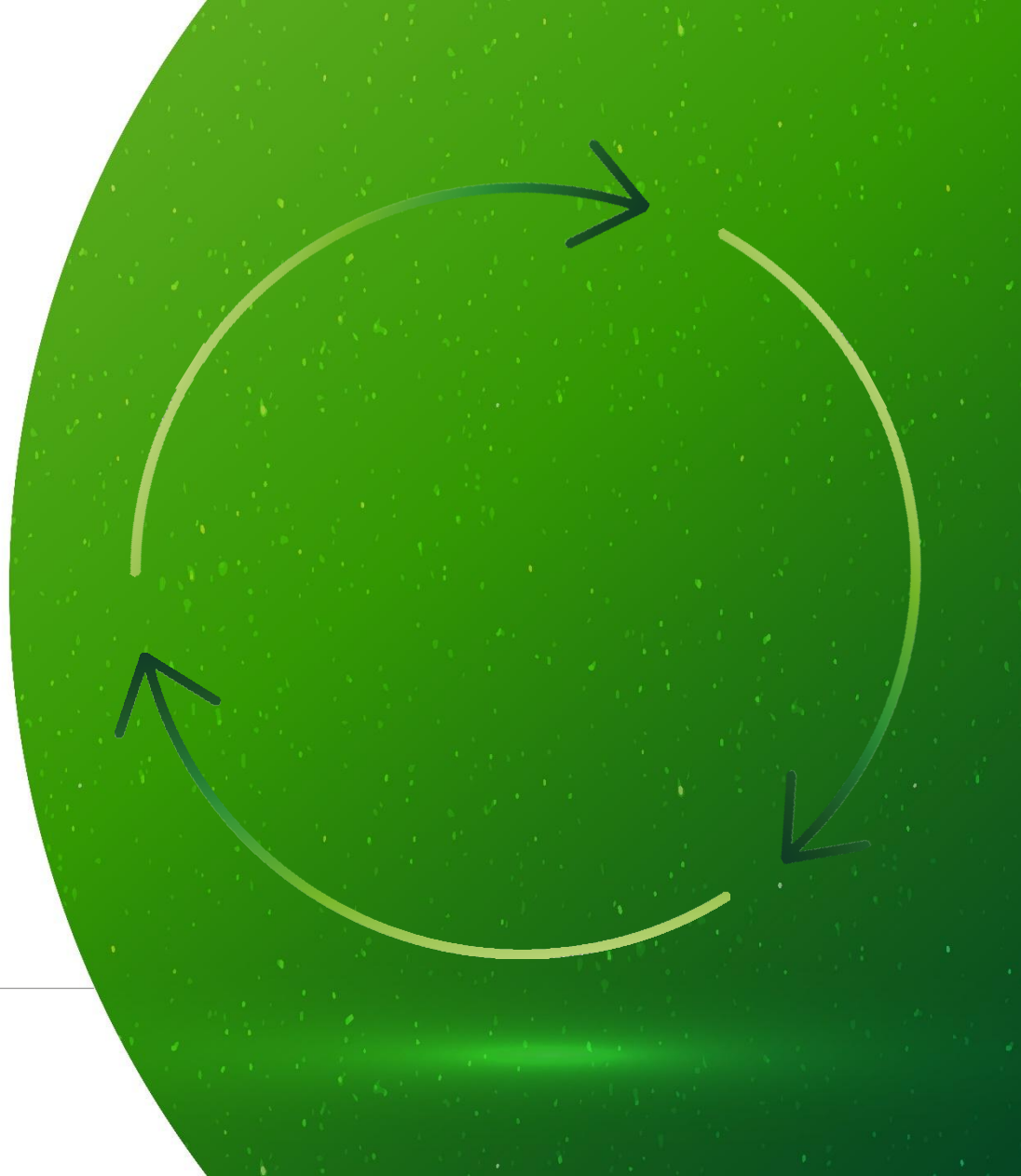

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Projects overview

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- To improve the circularity of complex plastic multi-material composites using novel biobased materials.
- Covering 2 different demonstrators.
- Develop an AI-powered system for optimizing CUBIC manufacturing processes.

CUBIC

NOVEL BIOBASED MATERIALS TO IMPROVE CIRCULARITY

- To develop innovative processing solutions for foamed bio-based Thermoplastics (b-bTPs).
- Covering 3 different value-chains.
- Develop a FIM smart control system.

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Current landscape

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Industry conservativism

- Only **30% of manufacturing companies** have effectively realized value at scale through **Industry 4.0 practices** across all their plants.
  - (McKinsey, Capturing the true value of Industry 4.0).
- Globally, **70% of manufacturers** still collect their data using **manual** processes and only 38% believe data analytics will improve their processes
  - (Manufacturing Leadership Council, Business Operations).
  - (IIoT Worlds) The state of DataOps in manufacturing
- Manufacturers invest **only 1.8%** of their net revenue in **digital transformation.**
  - (PwC, Digital factory transformation survey).

Digitalisation impact

15–20% inventory-holding cost reduction

15–30% labor productivity increase

30–50% machine downtime reduction

10–30% throughput increase

85% forecasting accuracy improvement

10–20% cost-of-quality improvement

(McKinsey, Capturing the true value of Industry 4.0).

Emerging technologies

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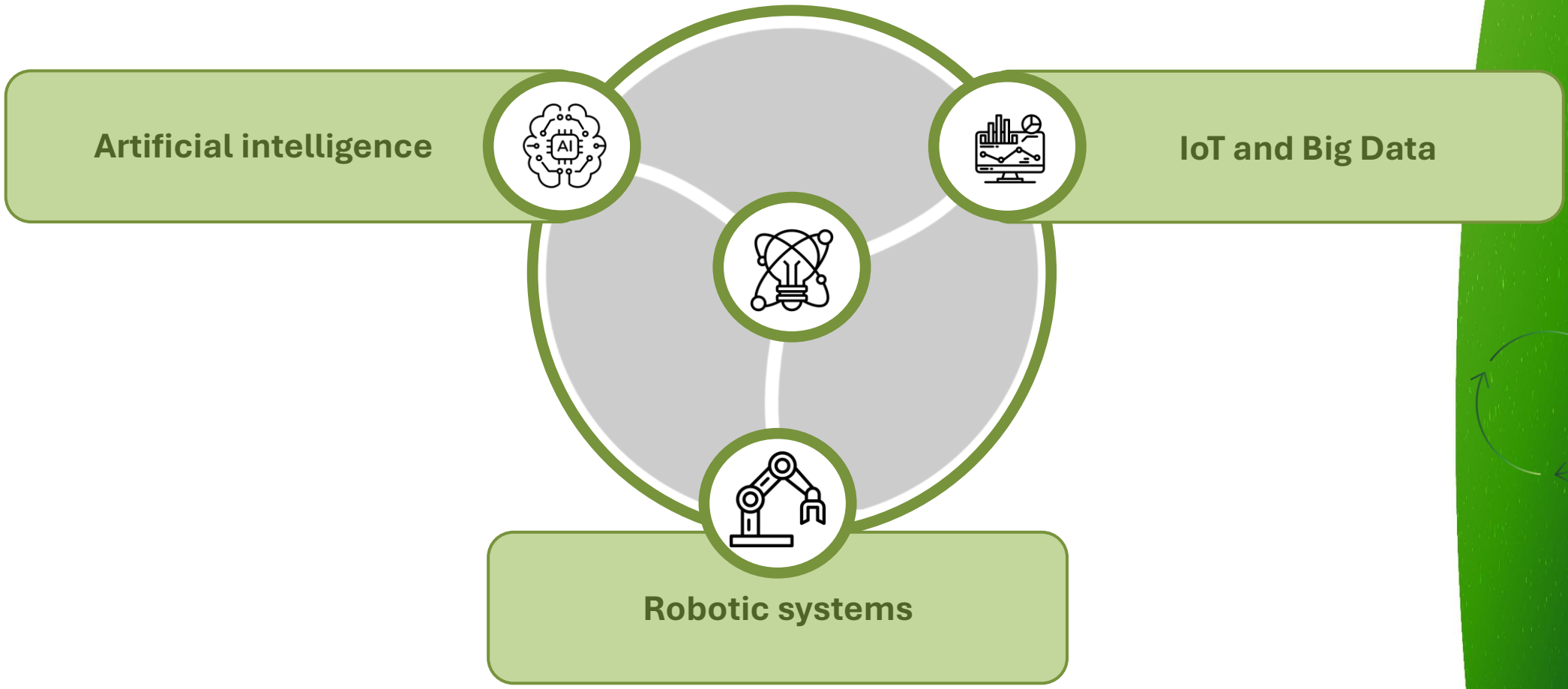
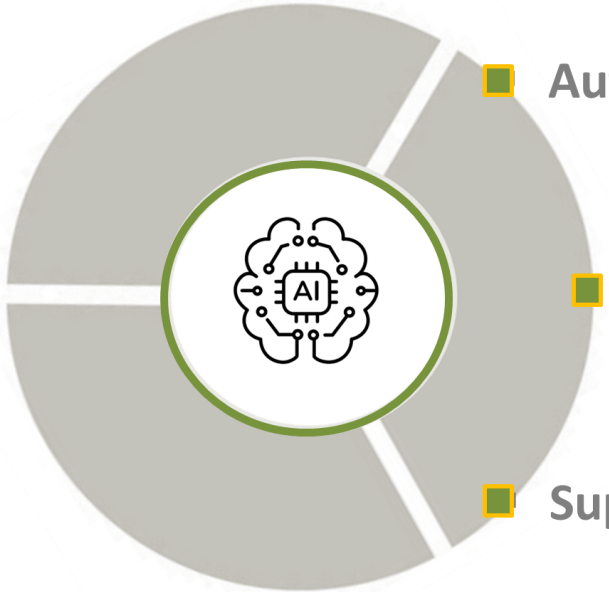
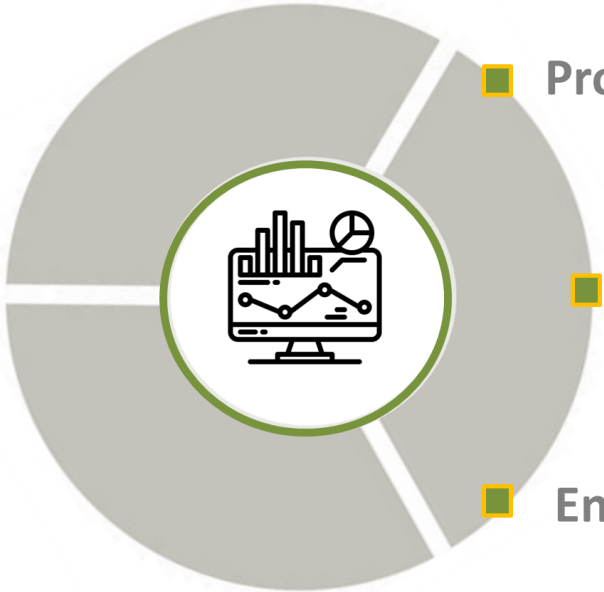

Artificial intelligence
IoT and Big Data
Robotic systems

ARTIFICIAL INTELLIGENCE



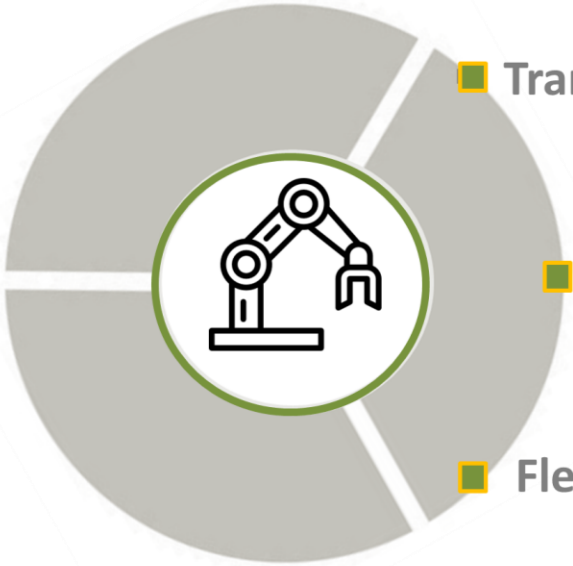
- Automated quality control → computer vision models.
- Adaptive control → AI-based optimization strategies
- Supply and demand forecasting → predictive models.

IoT & BIG DATA



- Processes analysis → Statistical analysis and indicators.
- Smart inventory tracking → RFID tags and readers.
- Energy Optimization→ IoT-based monitoring systems

ROBOTIC SYSTEMS



- Transport of raw materials and manufactured parts → AGVs
- Fast packaging and sorting of parts → Pick-and-place robots
- Flexible and adaptative manufacturing → Reconfigurable cells

Case of success

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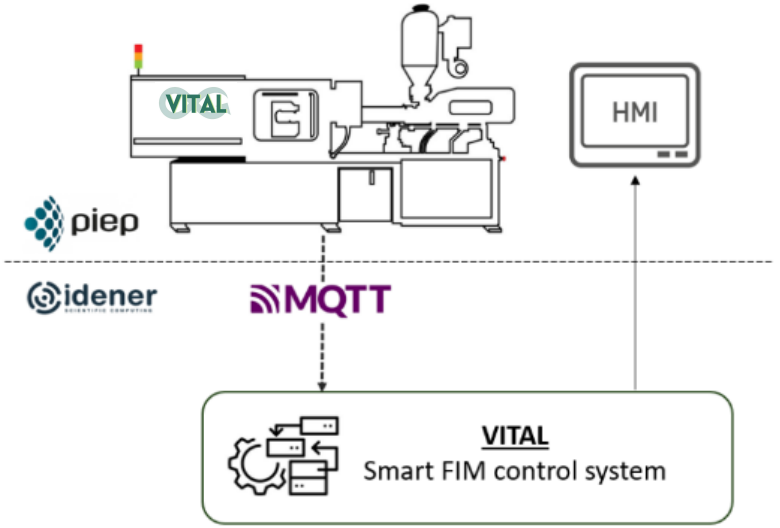
VITAL Smart FIM control system

- MPC integrating **AI-based models** for quality assessment.
- Dedicated interface for providing **decision support** to FIM operators.



- Solution **validated** in a **real manufacturing** environment

- Reduction in the **time** needed to fine-tune FIM processing parameters.

- **Anticipation** of potential **defective parts**.

Vital WebApp

Home

Date: 2025-03-18

Current FIM Parameters		
Screw Displacement	23,5	[cm]
Screw Diameter	40	[mm]
Blowing Agent (CBA)	2	[%]
Packing Time	0,5	[s]
Nozzle Temperature	170	[°C]
Injection Velocity	10	[mm/s]
Cooling Time	40	[s]

Facilities: PIEP0 **State:** active

Computed FIM Parameters		
Screw Displacement	23,5	[cm]
Screw Diameter	40	[mm]
Blowing Agent (CBA)	2	[%]
Packing Time	0,5	[s]
Nozzle Temperature	170	[°C]
Injection Velocity	10	[mm/s]
Cooling Time	40	[s]

Predicted Outputs		
Sink Mark Displacement	0,004273876547813415 5	[mm]
Total Displacement	0,5170717835426331	[mm]
Total Density	1,0817313194274902	[g/cm3]
Part Final Weight	32,08493804931640 6	[g]
Volume	29,650182723999023	[cm3]

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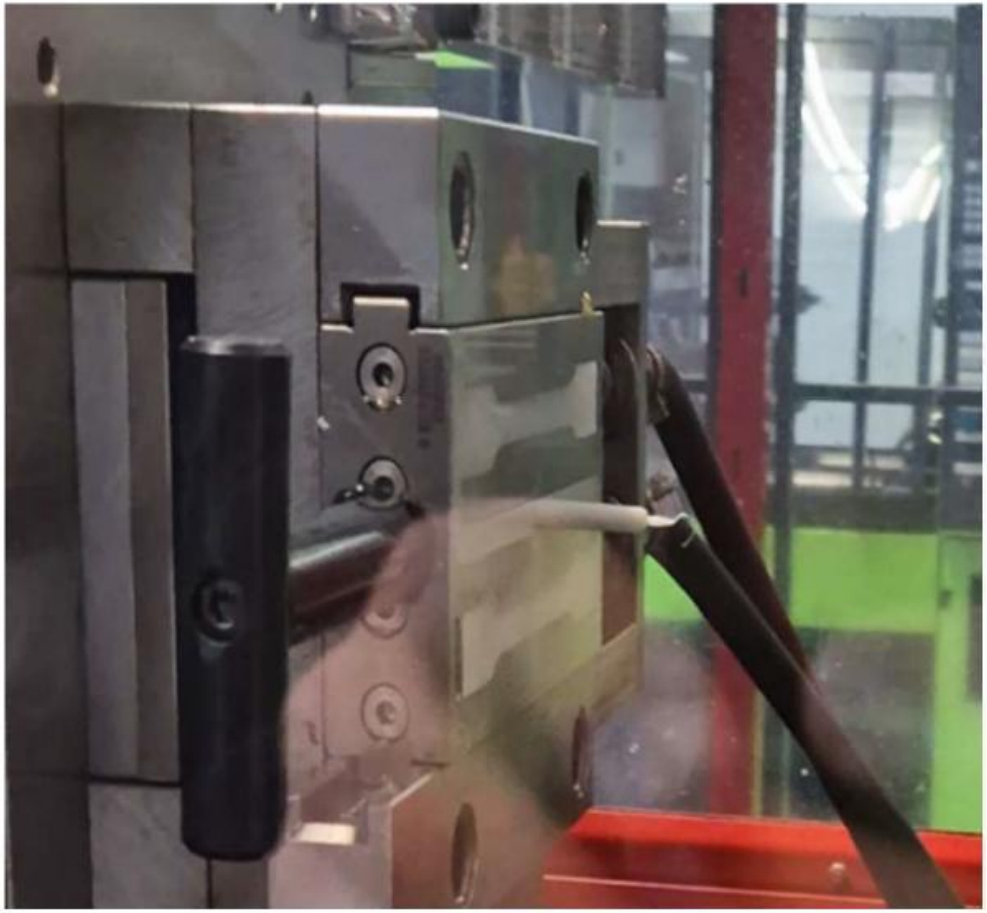
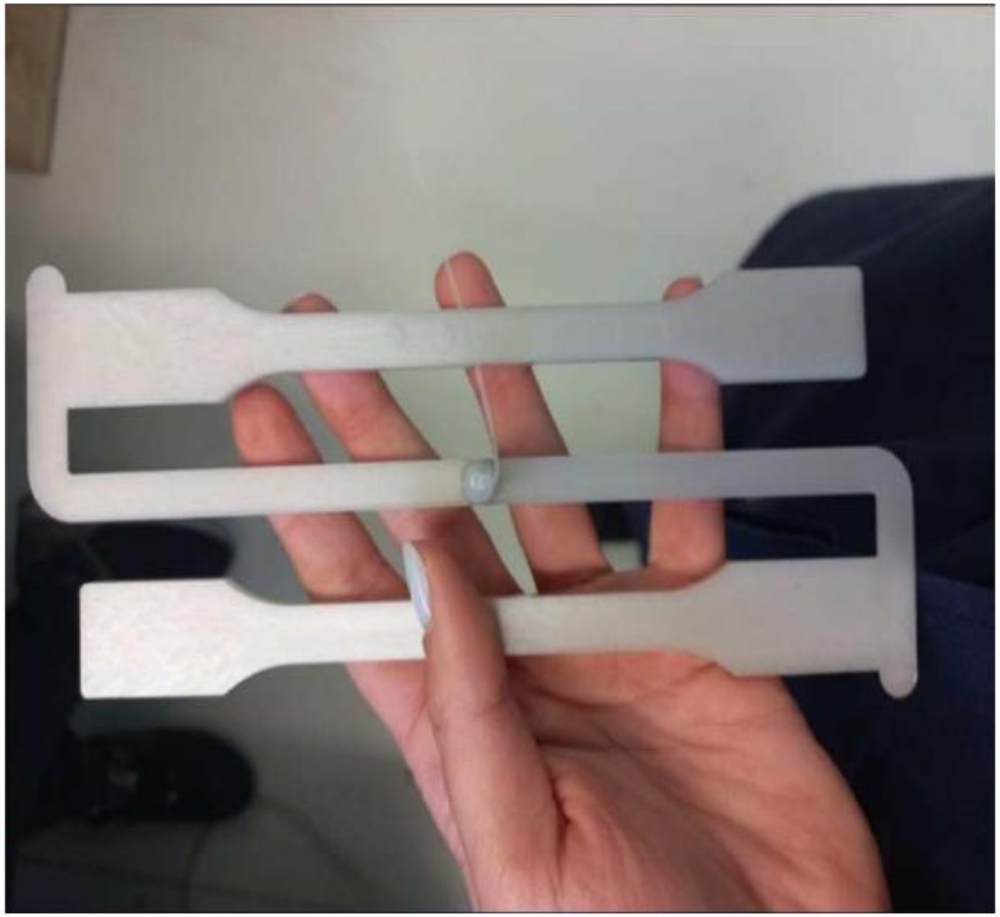
MOSAIC
VITAL
FUJITSU





Funding opportunities

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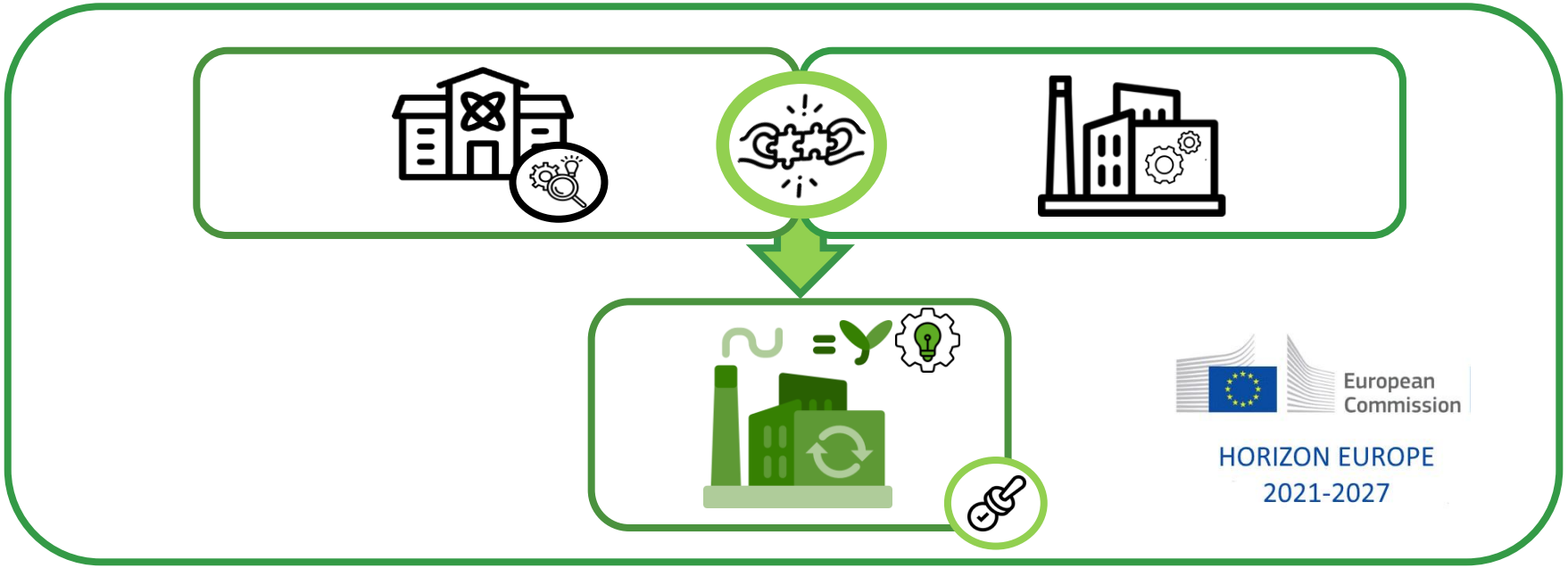
EC funding



European Commission

HORIZON EUROPE
2021-2027

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Thank you so much for your attention!

https://vital-project.eu/

https://cubicproject.eu/

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