KYKLOS 4.0 Project Overview

www.kyklos40project.eu

Project Manager: Jason Mansell - TECNALIA

KYKLOS 4.0 Factsheet

| KYKLOS 4.0	An Advanced Circular and Agile Manufacturing Ecosystem based on rapid reconfigurable manufacturing process and individualized consumer preferences
Project Number	872570
Starting Date	01/01/2020
Project Duration	48 months
Call (part) Identifier	H2020-DT-2019-1
Topic	Digital Manufacturing Platforms for Connected Smart Factories
Budget	€19.227.110

KYKLOS 4.0 Consortium

KYKLOS 4.0

| NO	PARTICIPANT	SHORT NAME	COUNTRY	TYPE
1	FUNDACION TECNALIA RESEARCH & INNOVATION	TECNALIA	ES	RI
2	MAGGIOLI SPA	MAGG	IT	LE
3	CENTRO DI RICERCHE EUROPEO DI TECNOLOGIE DESIGN E MATERIALI	CETMA	IT	RI
4	TWI ELLAS ASTIKI MI KERDOSKOPIKI ETAIREIA	TWI	GR	RI
5	JOTNE EPM TECHNOLOGY AS	Jotne	NO	SME
6	F6S NETWORK LIMITED	F6S	UK	SME
7	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.	FOKUS	DE	RI
8	EUROPEAN DIGITAL SME ALLIANCE	DIGITAL SME	BE	NPO
9	CENTRE INTERNACIONAL DE METODES NUMERICS EN ENGINYERIA	CIMNE	ES	RI
10	CIRTES SRC	CIRTES	FR	SME
11	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	GR	RI
12	GFT ITALIA SRL	GFT	IT	SME
13	KONNEKT ABLE TECHNOLOGIES LIMITED	KT	IE	SME
14	ADVANTIC SISTEMAS Y SERVICIOS SL	ADSYS	ES	SME
15	UNIVERSIDAD POLITECNICA DE MADRID	UPM	ES	UNI
16	PDM E FC PROJECTO DESENVOLVIMENTO MANUTENCAO FORMACAO E CONSULTADORIALDA	PDMFC	PT	SME
17	ENGINEERS FOR BUSINESS IPIRESIES TECHNOLOGIAS KAI MICHANIKIS ANONIMI ETAIRIA	EfB	GR	SME
18	ALGOSYSTEMS ANONIMI TECHNIKI EMPORIKI ETAIRIA PLIROFORIKIS AUTOMATISMON KAI METROLOGIAS	ALGOSYSTEMS	GR	SME
19	UNIVERSIDADE DE COIMBRA	UC	PT	UNI
20	INNOV-ACTS LIMITED	INNOV-ACTS	CY	SME
END USERS				
21	ASTILLEROS DE SANTANDER SA	AST	ES	LE
22	GE MEDICAL SYSTEMS ISRAEL LTD	GRC	IL	LE
23	VESTEL ELEKTRONIK SANAYI VE TICARET ANONIM SIRKETI	VESTEL	TR	LE
24	PRO MEDICARE SRL	Pro Medicare	IT	SME
25	DIAD GROUP SRL	DIGRO	IT	LE
26	AGROTIKOS PTINOTROFIKOS SYNETERISMOS IOANNINON "I PINDOS"	PINDOS	GR	LE
27	CONTINENTAL AUTOMOTIVE ROMANIA SRL	CONT	RO	LE
28	KANFIT3D LTD	KANFIT3D	IL	SME
29	SOFTWARE IMAGINATION & VISION SRL	SIMAVI	RO	LE

Rationale
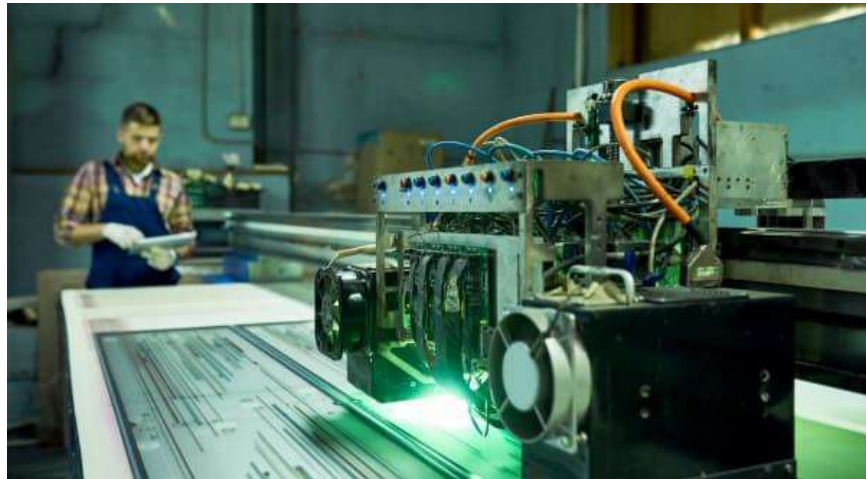
Manufacturing companies **consume** high amounts of energy as well as **natural resources** in their product-making processes:

- The respective amounts and overall costs of product making are increasing
- EU energy prizes are continuously increasing
- Raw materials price trend is ascending, increasing short term volatility
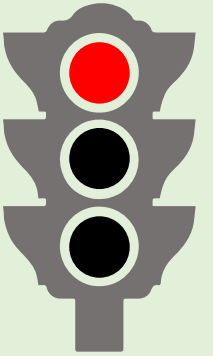
Optimizing the manufacturing processes becomes "a must" to ensure **sustainability**

KYKLOS 4.0 Briefly
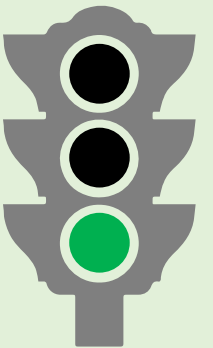
KYKLOS 4.0 aims at providing a **Circular Technology Ecosystem** which creates and supports the configurations, methodologies, production techniques, decision and actions at all different levels and stages of the manufacturing value chain so as to achieve:

- **Increased energy efficiency**
- **Decreased use of raw materials (second use of parts or materials)**
- **Customer-centricity**
- **On-demand manufacturing**

Meeting Industry 4.0 objectives:

- **Operational excellence**
- **Mass customization and personalization**
- **Increasing efficiency**
- **Reducing waste**
- **Boosting competitiveness**
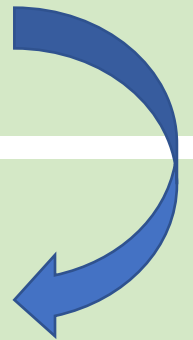
KYKLOS 4.0 contribution to Circularity

The future of manufacturing will see a gradual development towards a **high-quality circular manufacturing industry**, in which the demand for scarce raw materials is met by raw materials from the value chain wherever possible, considering the following five strategic goals

Five Strategic Goals of Circular Manufacturing
(Source: World Manufacturing Foundation)

Redesign Products & Materials Selection

Conserve & Recover Resources

Develop New Ways of Production

Implement Service-based Model

Shift to Renewable Raw Materials

In the global landscape, KYKLOS 4.0 is promoting low-cost and easy-to-use tools and data platforms, so that SMEs could adopt Circular Economy principles with limited investments from an ICT platform and data space point of view

How EU-funded research contributes to Industry 5.0

Some examples

1 BEYOND 4.0
Examining the future impact of new technologies on JOBS, BUSINESS MODELS AND WELFARE

2 HuMan Manufacturing
Demonstrating ways FACTORY WORKERS AND AUTOMATION can operate in harmony, increasing productivity, quality, performance, satisfaction and safety

3 KYKLOS 4.0
Showing how cyber-physical systems, product life-cycle management, life-cycle assessment, augmented reality, and artificial intelligence technologies and methods can transform CIRCULAR MANUFACTURING

@EUScienceInnov #Industry5.0 #ResearchImpactEU

From shareholder to stakeholder value
INDUSTRY 5.0
human-centric, sustainable and resilient

European Commission

KYKLOS 4.0 Services

Service 1: Advanced support for production

KYKLOS 4.0 Backend / PLM: Delivers secure data collection and access

LCA Simulations Engine: Calculates the environmental impact of the process in (near) real-time

Industrial Use Case: *The service delivers secure data collection AR-based guidance, and monitoring for production and environmental impact information*

Augmented Reality Tool: Guides the operator when performing manufacturing tasks and provides real-time information from IoT systems and LCA
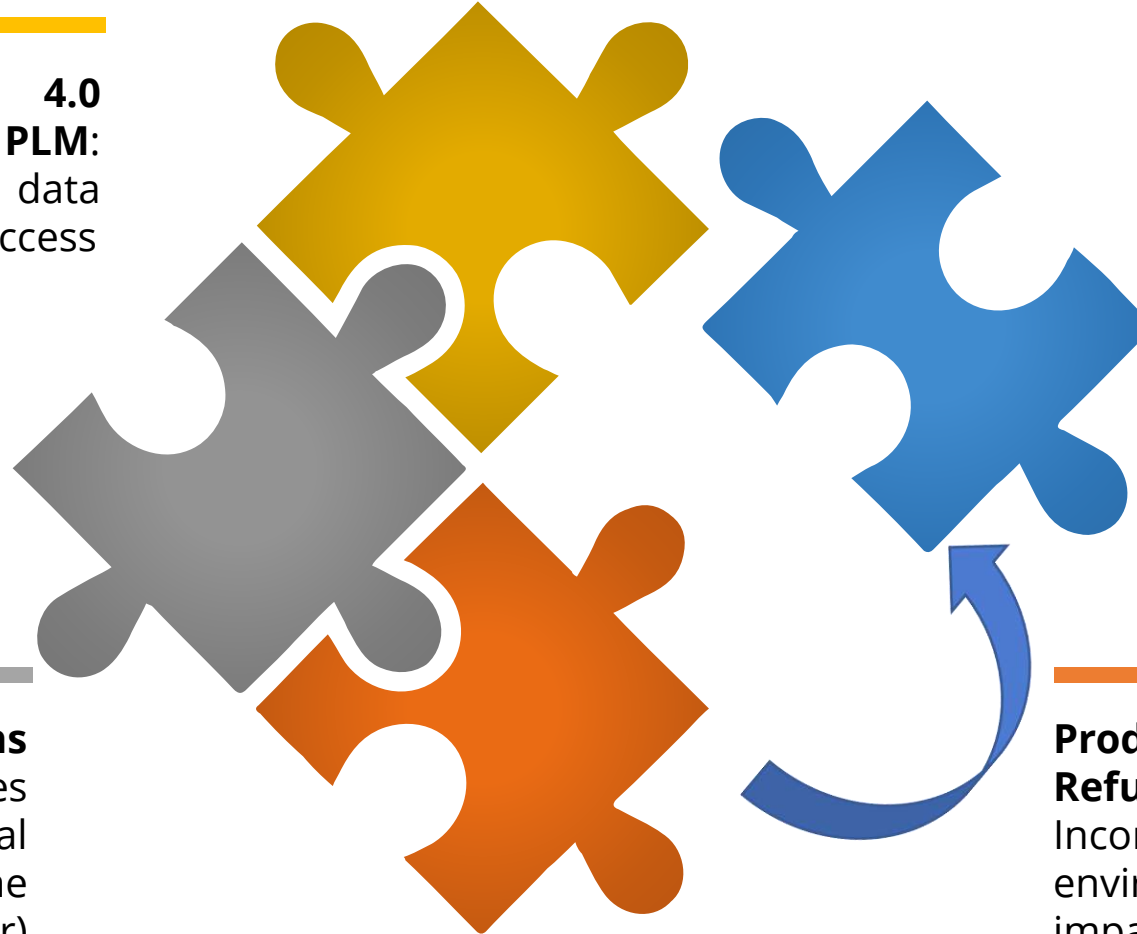
KYKLOS 4.0 Backend / PLM: Delivers secure data collection and access

Web 3D Modelling / Rapid Prototyping Module: Design and deployment of the product on the web / optimization of process parameters

Industrial Use Case: *The service enables web-based configuration of the product for customer, environmental impact monitoring, product tracking and certification*

LCA Simulations Engine: Calculates the environmental impact of the process in (near) real-time

Product Refurbishment: Incorporate the environmental impact data into a refurbishment certificate
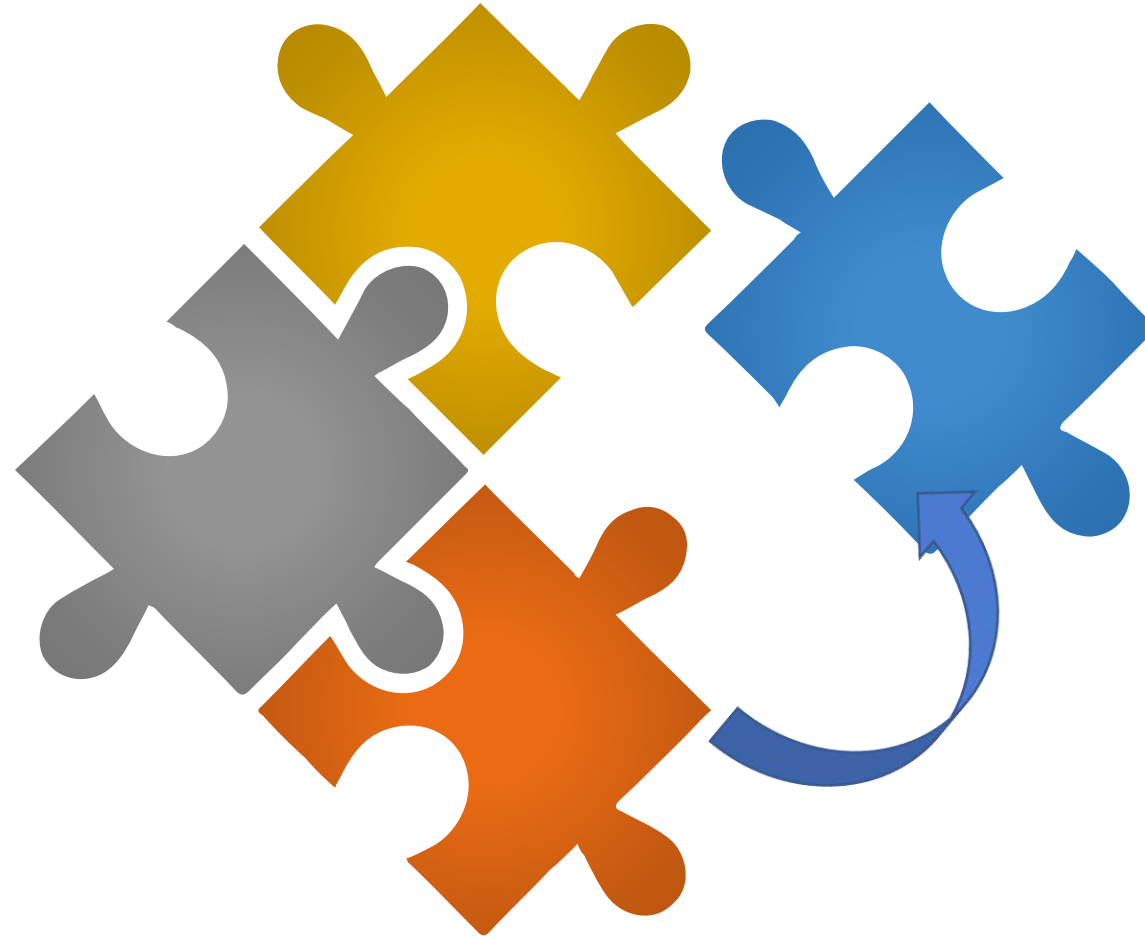
Service 3: Circular indicators monitoring

KYKLOS 4.0 Backend / PLM: Delivers secure data collection and access

LCA Simulations Engine: Calculates the environmental impact of the process in (near) real-time

Industrial Use Case: *The service enables the formulation of long-term strategies to enhance production efficiency and circularity*

Decision Support System: Provides circularity suggestions based on real-time LCA information

KYKLOS 4.0 Circularity Approach: Circular Economy Indicators

KYKLOS 4.0

RI: Reducing inputs and the use of natural resources

- Feedstock intensity
- Circularity Transition Indicators (CTI) - water Circularity

RR: Increasing the share of renewable and recyclable resources

- Circularity Transition Indicators (CTI) - renewable energy
- Circularity Transition Indicators (CTI) - % Circular inflow

RL: Reducing valuable materials and energy losses

- % to upcycling
- Disassembly time
- Reusability/Recyclability/Re coverability rate

DU: Increasing the value durability of products

- Longevity
- Use Phase Circularity Indicator

Reducing emissions levels

- Ecoefficiency

KYKLOS 4.0 Circularity Approach: Circular Economy Indicator Dashboard

Circular Indicators Overall [Circular Indicator Formulas]

02-2023 - 03-2023 | Enabled ⬤ | Search

ID	Name	Description & Formula	Base Scenario	Future Scenario
CIR01	Feedstock Intensity	Feedstock intensity (FI)* estimates the fraction of mass of primary feedstock needed in production (Mprimary.mat) in relation to the total mass of products (Mprod) and useful co-products (Mco.prod). $$\text{Feedstock Intensity } (\%) = \frac{M_{primary.mat}}{M_{prod} + M_{co.prod}}$$	30.00	40.00
CIR03	Circularity Transition Indicators (CTI) - renewable energy	The renewable energy* estimates the renewable energy consumption per total energy consumption in plant. $$\text{Renewable energy } (\%) = \frac{\text{Renewable energy (annual consumption)}}{\text{Total energy (annual consumption)}} * 100$$	15.00	10.00

Closeness Coefficiency

	Base Scenario	Future Scenario
Si-	0.20	0.08
Si+	0.08	0.20
Closeness Coefficient	0.71	0.29

KYKLOS 4.0 Pilots

KYKLOS 4.0

IoT CATALOGUE

Search

Aerospace Pilot – Additive manufacturing technology for aerospace – aircraft part customization systems (KANFIT3D)

2	1	5	3	2
Validations	Places	Components	Value Propositions	ICT Problems

Aerospace Pilot – Jet engine manufacturing & maintenance

1	1	3	2	3
Validations	Places	Components	Value Propositions	ICT Problems

Automotive Pilot – Addressing the critical components of each piece in automotive industry (DIAD GROUP — BRINGING GREEN DESIGN IN MANUFACTURING)

1	1	6	2	2
Validations	Places	Components	Value Propositions	ICT Problems

Electronic Devices/Equipment Pilot – Electrical Equipment Manufacturers (VESTEL)

2	1	5	5	1
Validations	Places	Components	Value Propositions	ICT Problems

Electronic Equipment Industry Pilot (Continental)

6	1	10	8	17
Validations	Places	Components	Value Propositions	ICT Problems

Food Industry Pilot – Reduction of Energy Consumption and Waste Management (PINDOS)

2	1	4	3	6
Validations	Places	Components	Value Propositions	ICT Problems

Medical Pilot – Custom and smart wheelchair systems manufacturing (PROMEDICARE)

3	1	9	6	6
Validations	Places	Components	Value Propositions	ICT Problems

Shipyard Pilot – Product Service Solutions in Shipyards (ASTANDER)
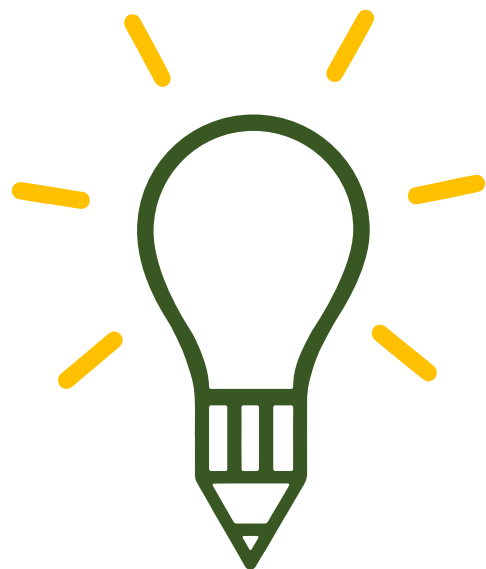
2	1	6	7	5
Validations	Places	Components	Value Propositions	ICT Problems

KYKLOS 4.0 Open Calls

KYKLOS 4.0 has organized two Open Calls during the project with the objective of **engaging European SMEs** in the design and implementation of highly innovative experiments/prototypes using research infrastructure available within the framework of the project

A total of **€3M** has been assigned to the KYKLOS 4.0 Open Calls.

KYKLOS4.0
Open Call #2
27 July - 12 Oct 2022

Calling on SMEs and the industry to deliver **innovative solutions** to improve digital manufacturing processes

1st Open call projects (7):
ADME
BEERco2
D4CM
DREAM
EFIN-FOOD
METALICA
PET-Circle
MORE INFO HERE

2nd Open Call (17)

ANATOLIA	ARACOWELD	ARETRO
ATILIUS	CE4Con	DLP4CME
DYBLI-ML	EasyPrint	ERMES
MaChAwAI	POET4POEM	MainSol
PUMP	RoboWeldAR	ROCTex
SMARTER-MAN		VirtFuse

MORE INFO HERE

KYKLOS 4.0 Open Call Project Results

More info on Open Call project results on
https://www.youtube.com/channel/UCjExattPrmLOetNPI4OxD0g

EasyPrint : Empowering your ideas through 3D printing

ATILIUS : Innovation in Space propulsion

RoboWeldAR : Cognitive robotic welding solution for shipbuilding
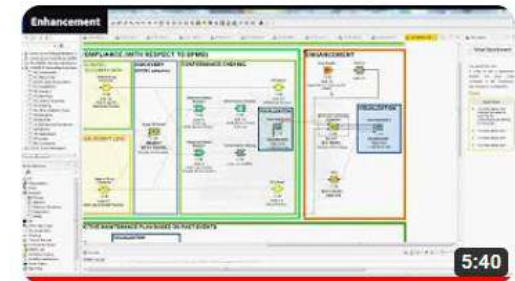
ERMES : Optimize maintenance of your
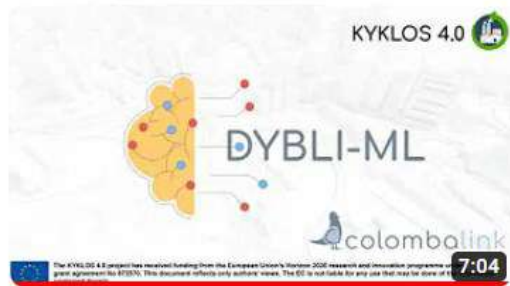
DYBLI-ML : Fault detection revolution

Aretro : Virtual interface for machinery

DLP4CME : Product digital lifecycle passport technology

Unlock your solar potential with Solario by Anatolia

KYKLOS 4.0 Marketplace

Image by Pete Linforth from Pixabay

The KYKLOS 4.0 Marketplace uses an ontology that represent all **offers** from **suppliers**, and all **requests** from **clients**, while being small enough to be workable

KYKLOS 4.0 Marketplace provides the following:
- A **catalogue** of products and services enriched with contextual and semantic information
- Improved searching results by finding close **matches** that are still semantically relevant but would otherwise be ignored
- Focus on **circular economy** of materials, creating specific handling for greener alternatives
- Specific **LCA** information related to materials and services available in the market

KYKLOS 4.0 Marketplace

Image by Pete Linforth from Pixabay

KYKLOS 4.0 Marketplace

KYKLOS 4.0 on IoT Catalogue

KYKLOS 4.0

The IoT Catalogue brings together IoT users and **technology providers**

Learn more about **KYKLOS 4.0 Use Cases** and **Components** on
https://www.iot-catalogue.com/projects/61eecf88120630002afdfef6

KYKLOS 4.0 follow us and like at

https://www.facebook.com/Kyklos40Project

https://twitter.com/Kyklos40Project

https://www.linkedin.com/company/kyklos-4-0-eu-project

Find **demo videos** of KYKLOS 4.0 Components on
https://www.youtube.com/channel/UCjExattPrmLOetNPI4OxD0g

www.kyklos40project.eu