

**VANGUARD INITIATIVE**  
New growth through smart specialisation

# ESM Pilot

## Efficient and Sustainable Manufacturing Pilot

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# Vanguard Initiative in a nutshell

## What is Vanguard Initiative

**Regional  
Cooperation**

**Smart  
specialisation**

**Political  
commitment**

**Entrepreneurship**

**Industrial  
Innovation**

# Vanguard Initiative ina nutshell

The structure



# Insights on Vanguard Initiative

## Vanguard Pilots



Efficient and Sustainable Manufacturing



3D-Printing



Bio Economy



ADMA-Energy



Nano-technology

# Insights on Vanguard Initiative

## The final goal of Pilot Projects

**European network of open facilities** where companies (including SMEs) can find:

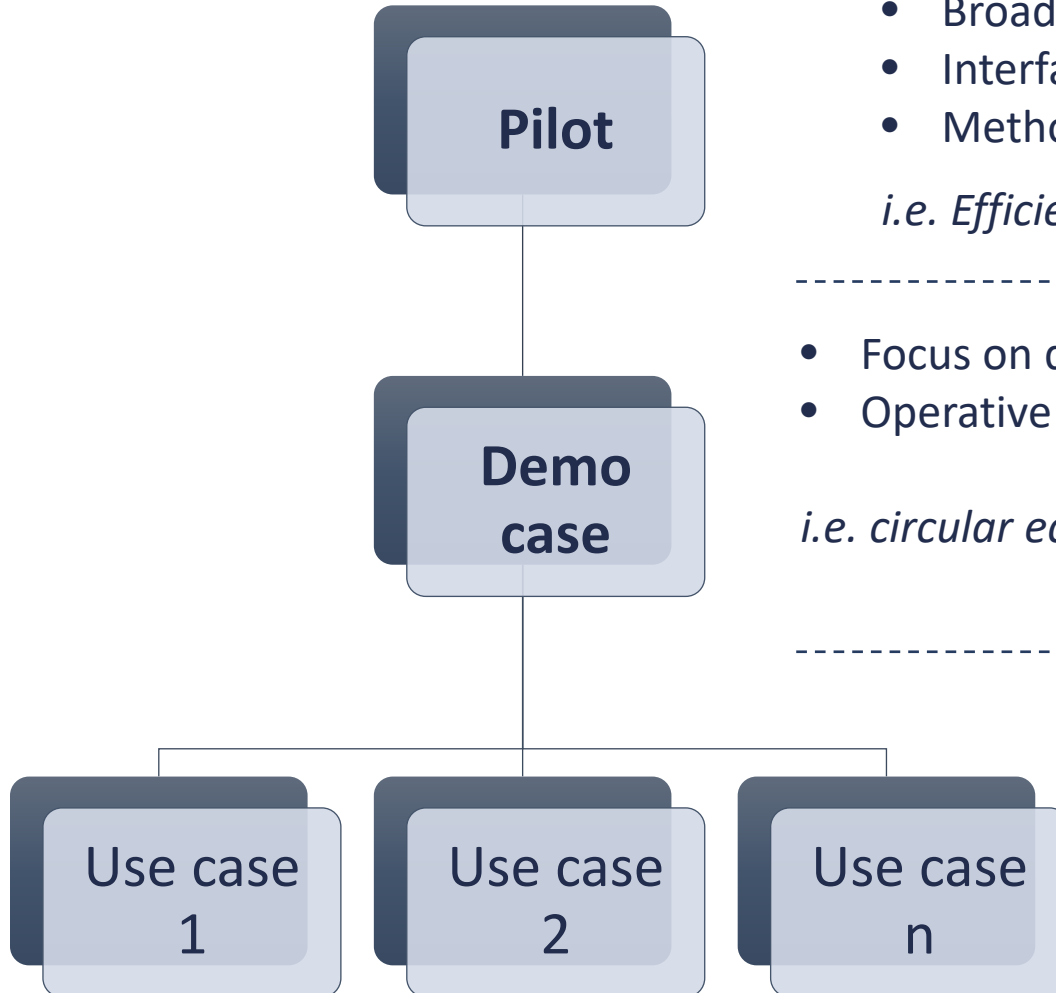
- Innovative **technologies**
- Multi-disciplinary **competences**  
(technology, business, innovation)
- Stimulating **cultural environment**

**To understand, test, set-up and uptake innovative technologies and methods**

- TRL>7
- Open
- Motivated and supported by industry
- Clearly focused on applicative domains

# Insights on Vanguard Initiative

## Pilot, demo-cases and use-cases



- Broad strategic scope
- Interface between industry and policy
- Methodological support

*i.e. Efficient and Sustainable Manufacturing, ...*

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- Focus on defined technology areas or manufacturing goals
  - Operative project level

*i.e. circular economy, Digital&Virtual Manufacturing, ...*

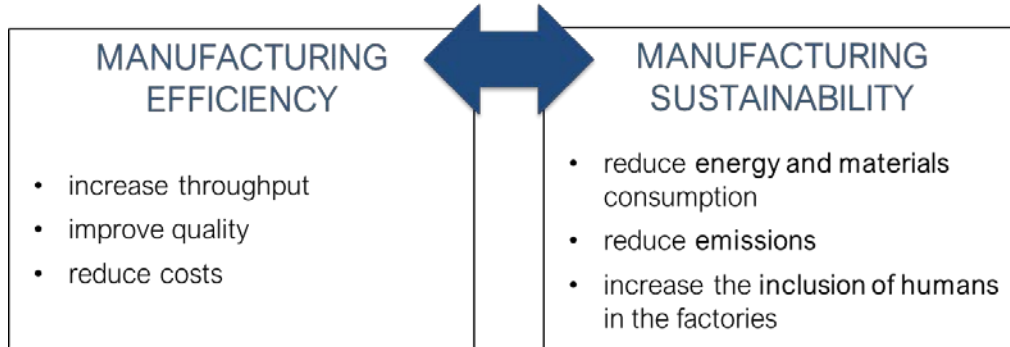
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- Focus on specific technologies and industrial sectors
  - Concrete implementation intent for the benefit of companies

*i.e. energy efficiency in automotive manufacturing processes*



# **EFFICIENT AND SUSTAINABLE MANUFACTURING PILOT**

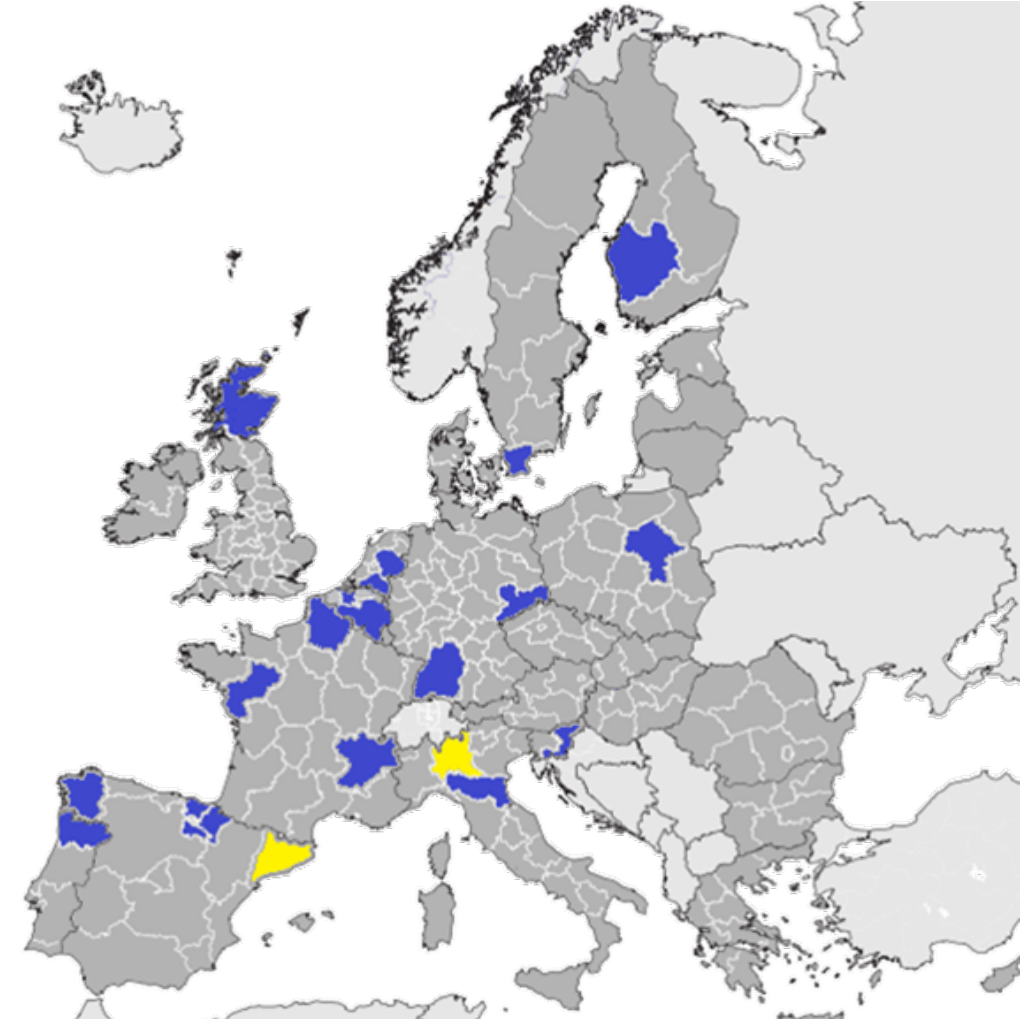
# ESM in a nutshell



## Partner Regions

### Lombardy & Catalonia

- Auvergne-Rhone-Alpes
- Baden Württemberg
- Basque Country
- East Netherlands
- Emilia Romagna
- Flanders
- Friuli Venezia Giulia
- Galicia
- Navarra
- Norte
- Pays de la Loire
- Piedmont
- Ranstad
- Saxony
- Scotland
- Slovenia
- South Denmark
- South Netherlands
- Tampere
- Trentino
- Wallonia
- Wales





# ESM demo-cases



## De- & Re-Manufacturing

### Lombardy

- Scotland
- Saxony
- Tampere
- Flanders
- Basque Country
- Norte
- Emilia Romagna
- Wallonia

- *Auvergne RA*
- *East Netherlands*
- *Slovenia*
- *Navarra*
- *Friuli Venezia Giulia*



## Digital Transformation

### Lombardy - South Netherlands - Tampere

- Auv. Rhone Alpes
- Basque Country
- Catalonia
- East Netherlands
- Emilia Romagna
- Flanders
- Galicia
- Navarra
- Norte
- Pays de la Loire
- Saxony
- Slovenia
- Wales



## EFREFO Energy-flexible and resource-efficient factory operation

### Saxony- Norte

- Lombardy
- Navarra
- Slovenia
- Baden Wurttemberg
- Pays de la Loire



## Polymer-based functional products

### Catalonia - Auv. Rhone Alpes

- Lombardy
- Navarra
- Slovenia
- East Netherlands
- *Pays de la Loire*
- *Baden Wurttemberg*
- *Norte*

# De- and Remanufacturing

Technologies and business models for circular economy to re-use, remanufacture and recycle products and materials in all sectors.



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## Regions involved

- Lombardy
- Scotland
- Saxony
- Tampere
- Flanders
- Basque Country
- Norte
- Emilia Romagna
- Wallonia

## Regions interested

- Auvergne Rhone Alpes
- East Netherlands
- Slovenia
- Navarra
- Friuli Venezia Giulia

The main objective of the De-and Remanufacturing pilot network is to **integrate** a multidisciplinary set of **advanced and innovative enabling technologies and digital innovations** (TRL 7-8) and to exploit the **regional Smart Specializations** in synergic way to offer services to European end-users, mainly manufacturing companies, to solve specific **sustainability-oriented problems** related to their products.

Regional/Cross-Regional Use Case	Involved Regions
<b>1.Composite Recovery from Wind Energy System</b>	<u>Basque Countries</u> , Saxony, Lombardy, Tampere, Scotland
2.Heavy machinery components remanufacturing	<u>Tampere</u> , Basque Countries, Lombardy, Saxony, Emilia Romagna
3.Automotive parts remanufacturing	<u>Scotland</u> , Lombardy, Saxony, Norte
4.High-value TLC systems and Electronics Recovery	<u>Lombardy</u> , Tampere
5.Metal components reprocessing	<u>Saxony</u> , Tampere, Lombardy, Wallonia
6.Remanufacturing of e-motors	<u>Saxony</u> , Lombardy
7.Plastics recycling and re-use in electornics	<u>Flanders</u> , Lombardy, Wallonia
<b>8.Automotive Li-Ion batteries disassembly, remanufacturing and re-assembly for second use</b>	<u>Lombardy</u> , Saxony, Basque Countries
9.Photovoltaic panels de-manufacturing	<u>Flanders</u> , Lombardy
10. Machining equipment retrofit and upgrade	<u>Emilia Romagna</u> , Lombardy
11. Manufacturing of metal-sponge catalysts from aluminum waste material for chemical catalysts.	<u>Emilia-Romagna</u> , Lombardy
12.Recovery of both metallic and non-metallic parts of slags, incinerator bottom ash, leaded glass - closing the material loop.	<u>Wallonia</u> , Lombardy, Basque Countries

# Composite Recovery from Wind Energy System

## Use-case 1

### Regions involved

- Basque Country
- Saxony
- Lombardy
- Tampere
- Scotland

**Basque Country:** production of wind turbines; thermal recovery of glass and carbon fibers.

**Saxony:** re-design and remanufacturing of composite parts. Output market: automotive.

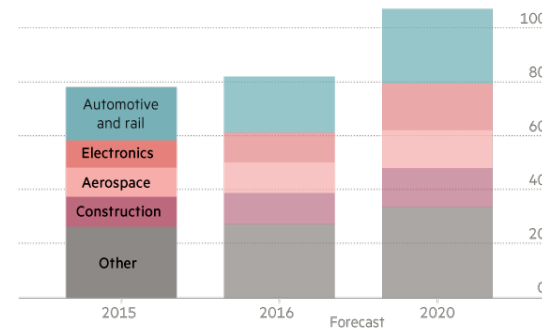
**Lombardy:** mechanical demanufacturing processes and composite reprocessing. ICT for value-chain integration. Output market: furniture, sanitary and construction.

**Tampere:** composite material re-formulation and characterization.

**Scotland:** inspection for composite parts repair. Value-chain integration, market scouting.

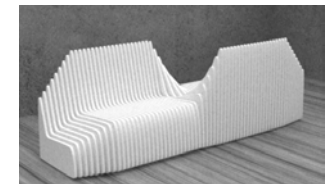


Growth prospects for composites market  
Sales by sector (\$bn)



Source: Lucintel

FT



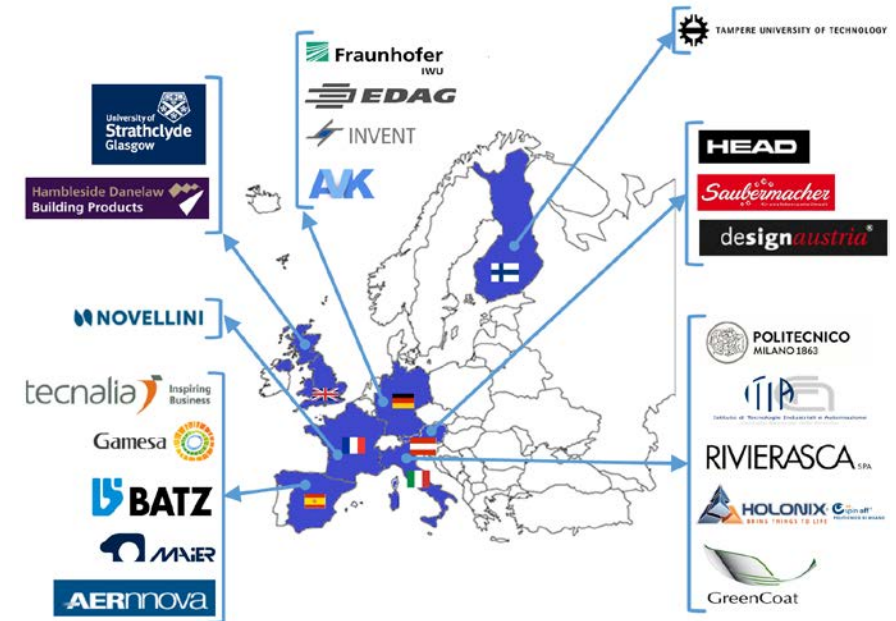
# Composite Recovery from Wind Energy System

## Use-case 1 – FiberEUUse project

**Large scale demonstration of new circular economy value-chains based on the reuse of end-of-life fiber reinforced composites.**



- **Duration:** 48 months, starting on June 2017.
- **Consortium:** 21 partners, from 7 EU countries.
- **Coordinator partner:** Politecnico di Milano
- **EC Funding:** ca. 10 mln €.



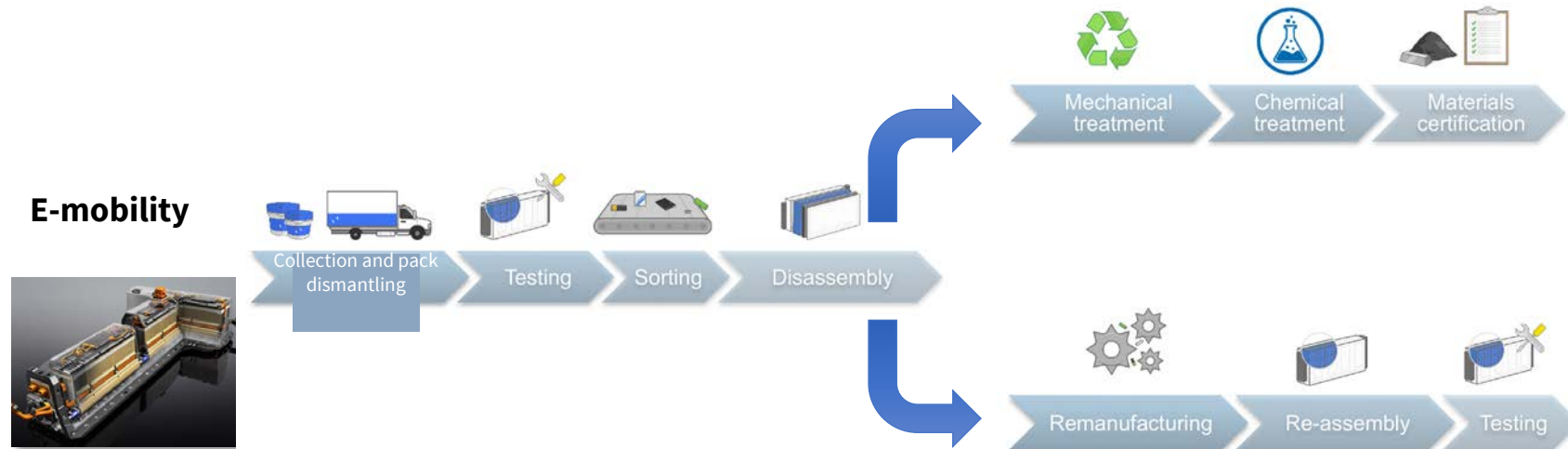
Topic: Systemic, eco-innovative approaches for the circular economy: large-scale demonstration projects (CIRC-1-2016)

The FiberEUUse project aims at integrating in a holistic approach different innovation actions aimed at enhancing the profitability of *composite recycling and reuse in value-added products*.

# E-mobility batteries remanufacturing for re-use

## Use-case 8

**Goal:** a new process-chain for the re-use of Li-Ion battery cells under a circular economy perspective, with a cross-sectorial approach.



### Characteristics:

- Average life-time 8 years.
- Current cost 150 Euro kWh.
- Residual capacity >80% (24 kWh on average).
- Warranty for manufacturers usually for 5 years (e.g. Tesla, Nissan).



**Second-life stationary systems  
(renewable energy, home, office)**

# E-mobility batteries remanufacturing for re-use

## Use-case 8 – CarE-Service

Title: **Circular Economy oriented services for re-use and remanufacturing of hybrid and electric vehicles components through smart and movable modules**

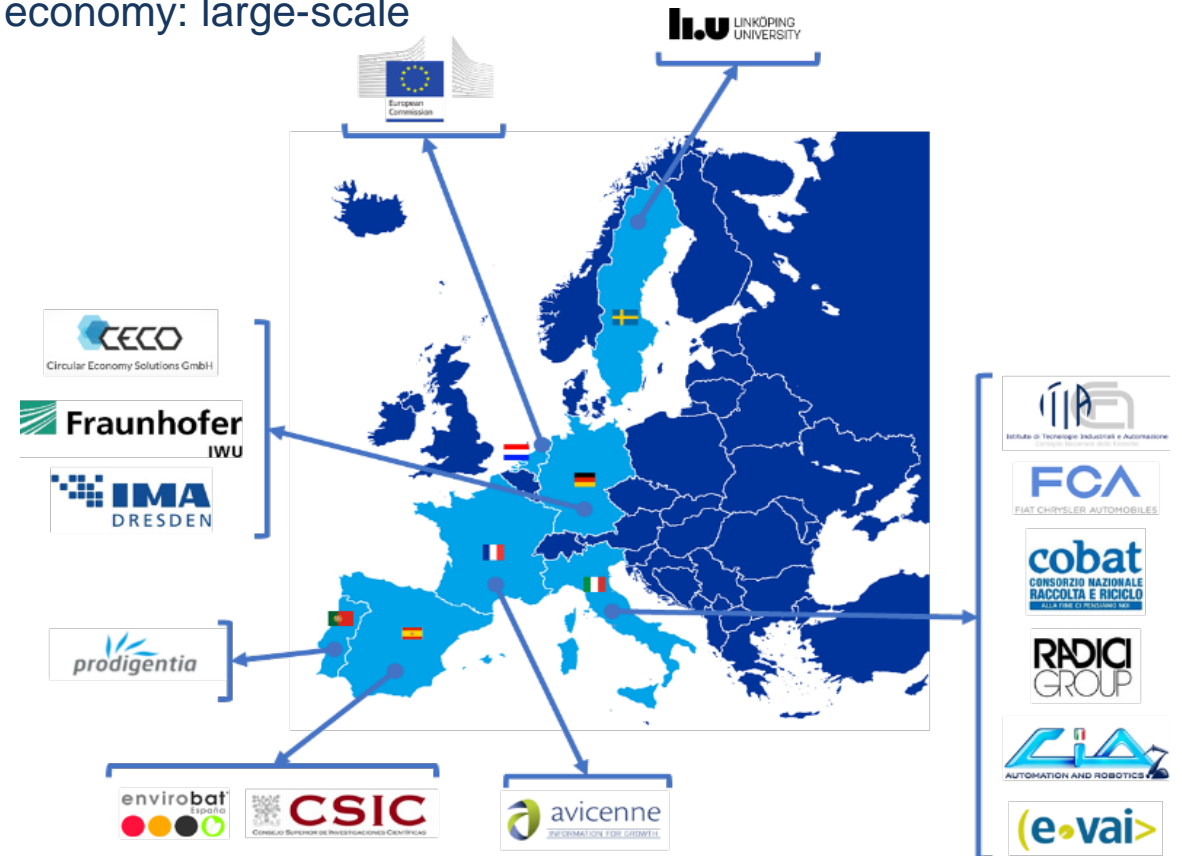
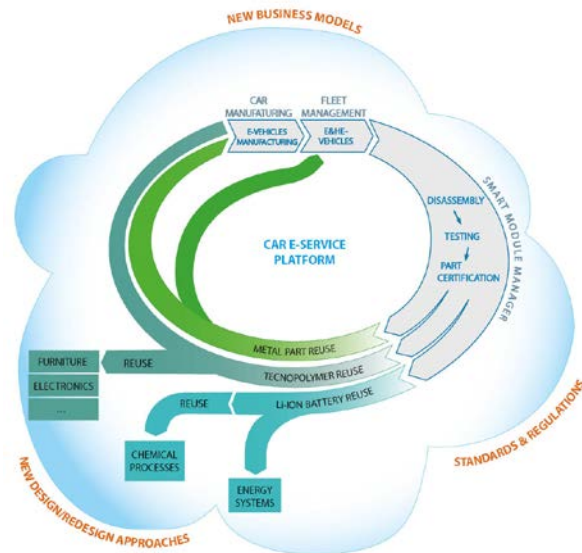
Acronym: CarE-Service

Topic: Systemic, eco-innovative approaches for the circular economy: large-scale demonstration projects (CIRC-1-2017)

Type of Action: Innovation Action

Date of Submission: 05/09/2017

Funding: 6.229.505€



# Digital Platform for Cross-Sectorial Circular Value-Chains

## DigiPrime Project

### Digital Platform for Circular Economy in Cross-sectorial Sustainable Value Networks

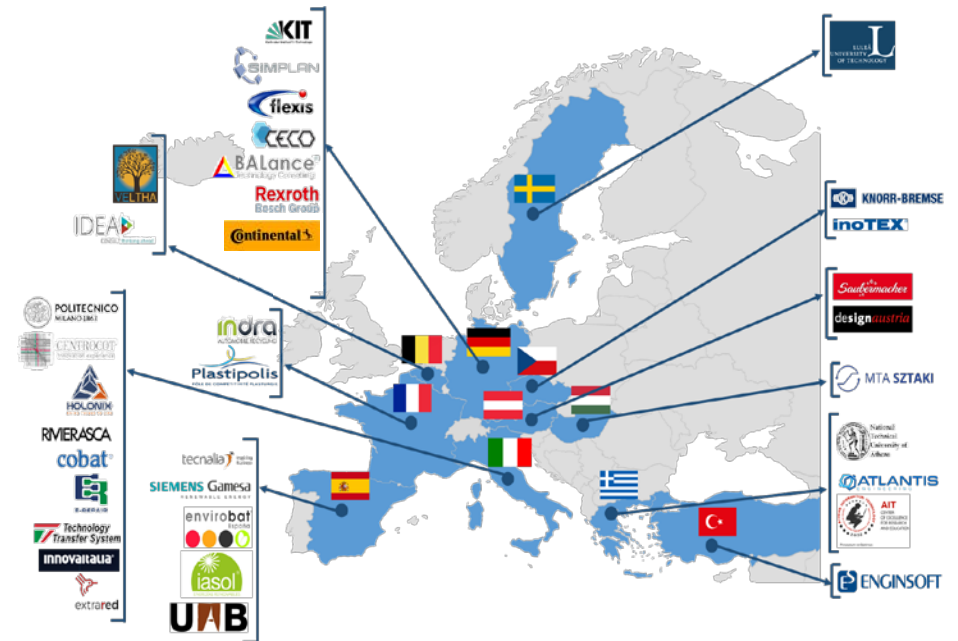


Topic: Digital Manufacturing Platforms for Connected Smart Factories (H2020-DT-ICT-07- 2018-2019)

To develop a new concept of Circular Economy digital platform overcoming current information asymmetry among value-chain stakeholders, in order to unlock new circular business models based on the data-enhanced recovery and re-use of functions and materials from high value-added post-use products with a cross-sectorial approach.

- **Duration: 48 months, starting on January 2020.**
- **Consortium: 36 partners, from 11 EU Member States.**
- **Coordinator partner: Politecnico di Milano**
- **EC Funding: ca. 16 mln € of which 2 mln € open calls**

One of the six Pilots is dedicated to the development of a digital platform for connecting the nodes of the “De-and Remanufacturing” Network of Infrastructures and unlock cross-regional services.

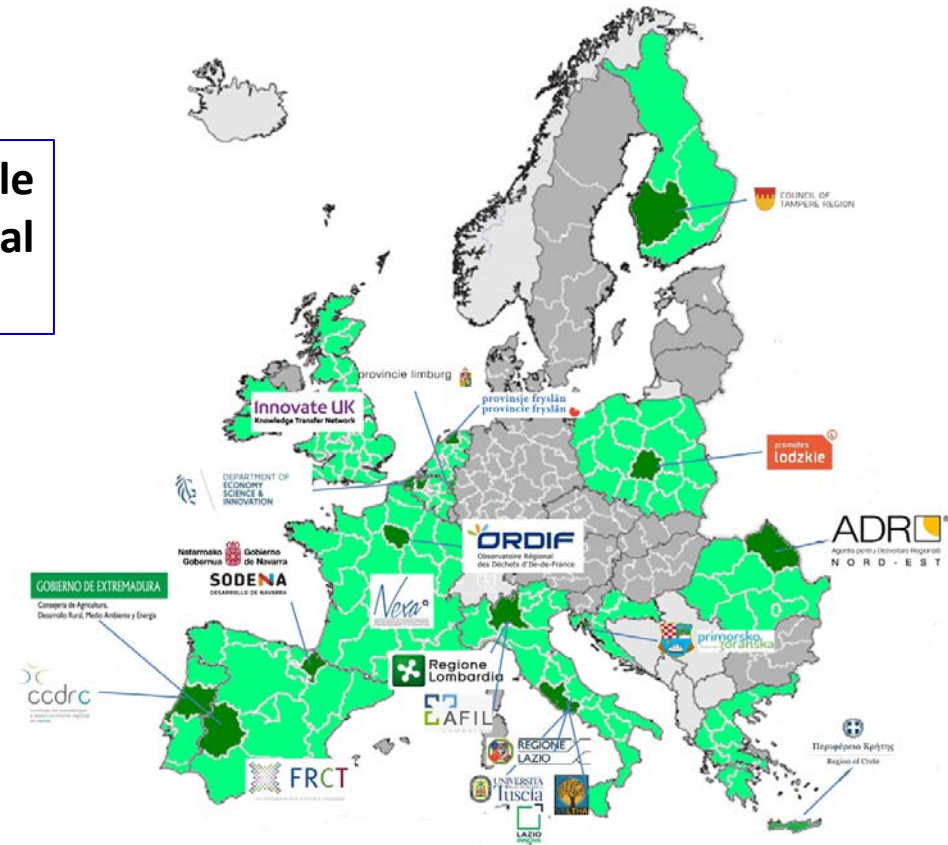




# The Screen H2020 Project

SCREEN H2020 aims at the definition of a replicable and scalable approach, to support European Regions in the transition to **new Circular Economy cross-regional value-chains**. This will be done through the identification and implementation of operative synergies between R&I investments of H2020 program and EU structural funds.

The methodology developed within the project is replicable in all the European Union, thus creating an interregional framework for financing Circular Economy value chains.



# Polymer-based functional products

Advanced sustainable surface treatments and material technologies for functional polymer components in various applications



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Source: Plastipolis

## Regions involved

- Catalonia
- Auvergne Rhone Alpes
- Lombardy
- Navarra
- Slovenia
- East Netherlands

The main objective of the democase is to develop **EU Manufacturing Value Chains 4 Functional Components based in Polymeric materials** through development, testing, up scaling and integration of Advanced and Sustainable Materials & Processes

Regional/Cross-Regional Use Case	Involved Regions
1. Smart Plastronic Components	<u>Auvergne Rhone Alpes</u> , Catalonia
2. Nano-Functionalised Polymer Products	<u>Catalonia</u>
3. Sustainable coatings and surface treatments on Polymers for demanding applications	<u>Lombardy</u> , Navarra
4. Polymeric Bio-based solutions	<u>Auvergne Rhone Alpes</u> , Navarra
Advanced Lightweight Polymer Composites ( <i>Potential Topic</i> )	<u>East Netherlands</u>

# Digital Transformation

“Industry 4.0” technologies applied to manufacturing environments to realise highly performing and human-centred digital/virtual factories



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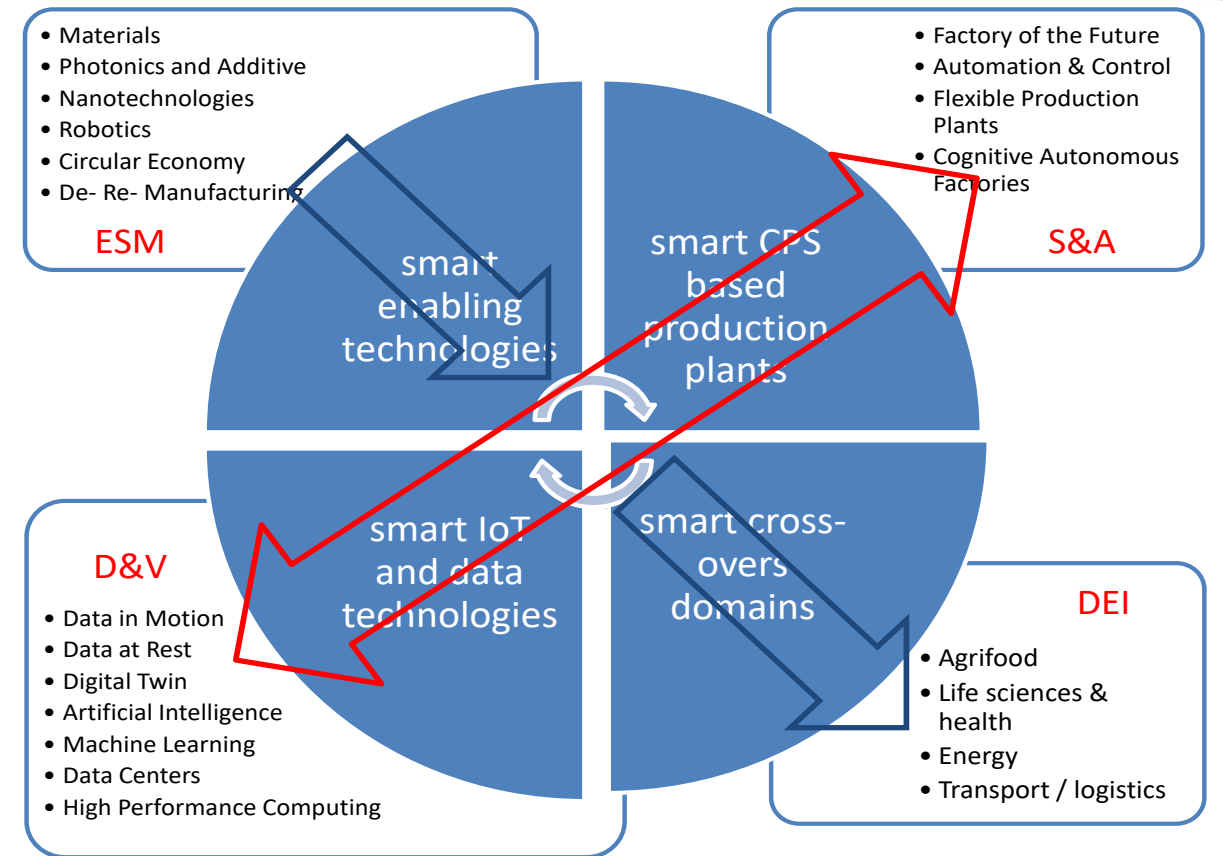
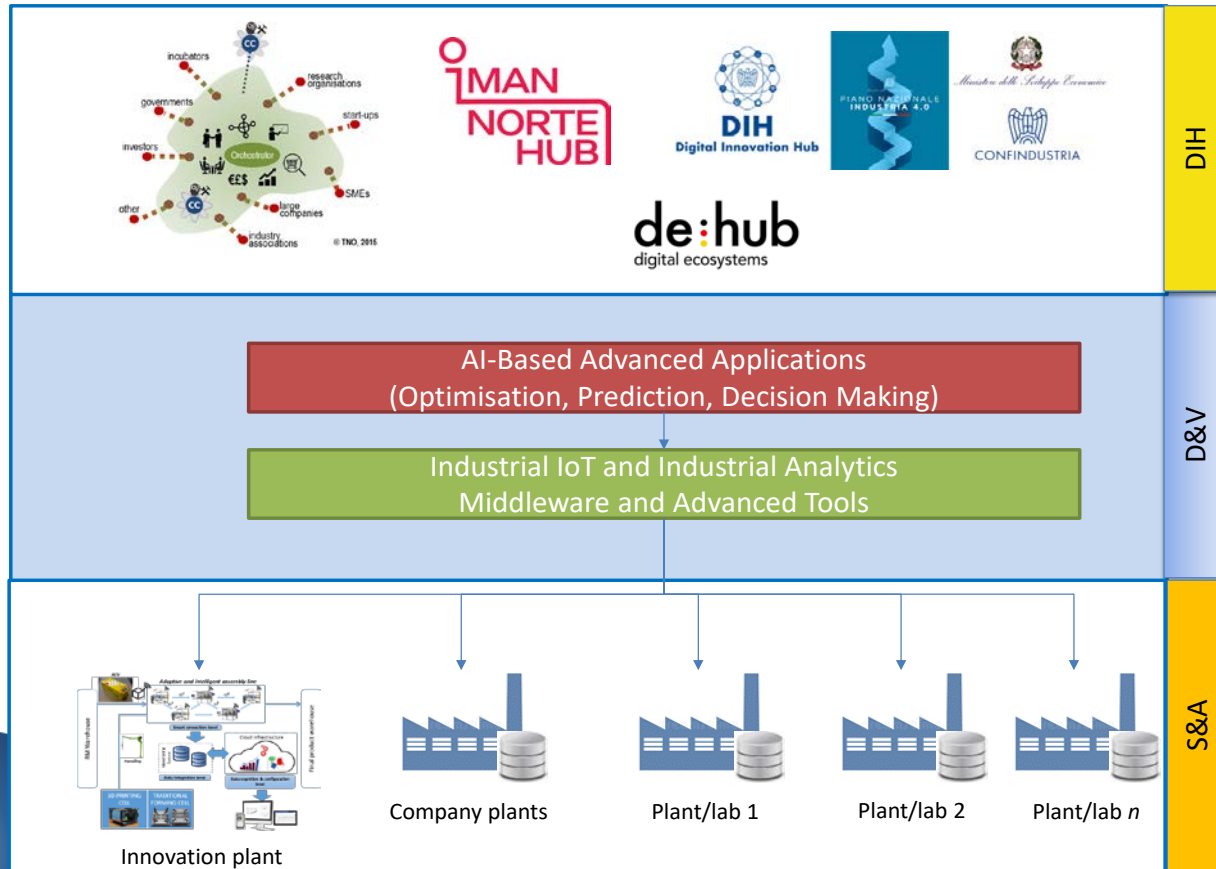
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## Regions involved

- Lombardy
- Tampere
- South Netherlands
- Basque Country
- East Netherlands
- Emilia Romagna
- Flanders
- Friuli Venezia Giulia
- Galicia
- Navarra
- Norte
- Pays de la Loire
- Saxony
- Slovenia
- Wales

The MDT demo-case aims at **developing a pan-EU network of regional cyber-physical pilot plants**, supporting the digital transformation of Manufacturing Industry and SMEs in particular.



# Energy-flexible and resource-efficient factory operation

Technologies and methods to optimise energy/materials consumption in manufacturing processes and to realise emission-neutral factories



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Source: Fraunhofer IWU

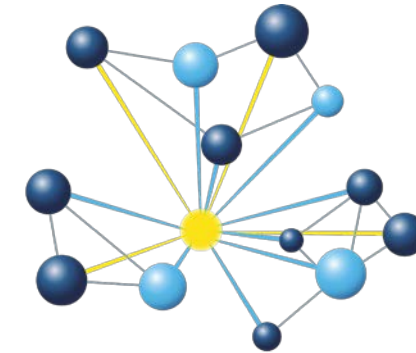
## Regions involved

- Saxony
- Norte
- Lombardy
- Navarra
- Slovenia
- Baden Wurttemberg
- Pays de la Loire

The demo case's main target is to **improve all planning and energy-related operations in factories towards a more flexible and resource-efficient overall system.**

- **Production planning and optimisation:** need to revise analytic and heuristic optimisation methods to create more suitable target criteria and constraints. This also implies the algorithmic implementation and consideration of advanced digital technologies.
- **Factory and process simulation:** Simulation models for improved decision-making, also based on stochastic factors, are required when factories need to cope with different production and energy supply scenarios.
- **Energy management:** As a result of the planning and simulation processes, the actual control of the factory elements is inevitable. Besides production, the accompanying building infrastructure, decentral energy sources and battery systems have to be planned and controlled simultaneously.

Regional/Cross-Regional Use Case	Involved Regions
1. Energy-aware scheduling for improved factory operation	Saxony, Norte, Lombardy, Navarra, Baden Wurttemberg, Pays de la Loire
2. Energy and environmentally-efficient steel making and advanced manufacturing plants	Lombardy, Navarra, Saxony, Norte
3. Eco-efficient thermal industrial processes	Norte, Saxony, Navarra, Baden Wurttemberg, Lombardy
4. Smart Energy in industrial applications	Baden-Württemberg, Saxony, Pays de la Loire, Navarra



**VANGUARD INITIATIVE**

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# ESM Pilot

## Efficient and Sustainable Manufacturing Pilot

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