

Firenze, 27/03/2019

Thematic S3 Platform on Agri-Food Working Towards the Long-Term Sustainability

De- and Remanufacturing

Regions: Lombardy, Scotland, Saxony,
Tampere, Flanders, Basque Country, Norte,
Emilia Romagna, Wallonia



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 **Generalitat de Catalunya**
Government of Catalonia

 **AFIL**
Lombardia

 **Regione Lombardia**

Vanguard Initiative

Vanguard Initiative – New Growth by Smart Specialisations. Engagement for the future of industry in Europe: advancing of industrial innovation.

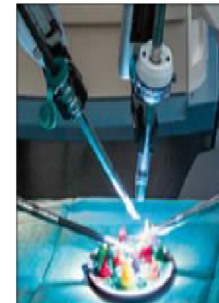
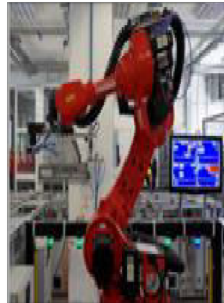
Co-ordinated effort of more than 30 EU-regions (from 13 EU-Member States) to better align regional specialization strategies towards 'EU Industrial Renaissance' (Milan Declaration)

Key Objective: speed up technology deployment in industry ... Why ?

- These technologies have already high level of Technological readiness + high Market Potential
 - But ... Fragmented / disconnected capabilities, incomplete value chains + Lack of visibility (supply – demand)
- ➔ Need to connect & upscale regional efforts !!!



Vanguard methodology tested in 5 Thematic Pilots



❑ Emergence of 3 VI Pilot Actions (June 2014 >)

- ❑ High Performance Productions through 3D Printing (South-NL, Flanders, Norte)
- ❑ Efficient and Sustainable Manufacturing (Lombardy, Catalonia)
- ❑ Advanced Manufacturing for Energy Applications in Harsh Environments (Scotland, Basque Country)

❑ 2 new VI Pilot Actions (June 2015>)

- ❑ Bioeconomy (South Holland / Lombardy)
- ❑ New nano-enabled products (Skåne, Tampere)

ESM Demo-cases



De- & Re-Manufacturing

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



Smart and Adaptive Assembly & Manufacturing

Lombardy
South Netherlands
Basque Country
East Netherlands
Emilia Romagna
Norte
Slovenia
Ranstad
Tampere



Advanced and sustainable materials and coating

Lombardy
Catalonia
Auv.Rhone Alps,
East Netherlands
Navarra
Pays de la Loire
Slovenia
Tampere



Energy-flexible and resource-efficient factory operations

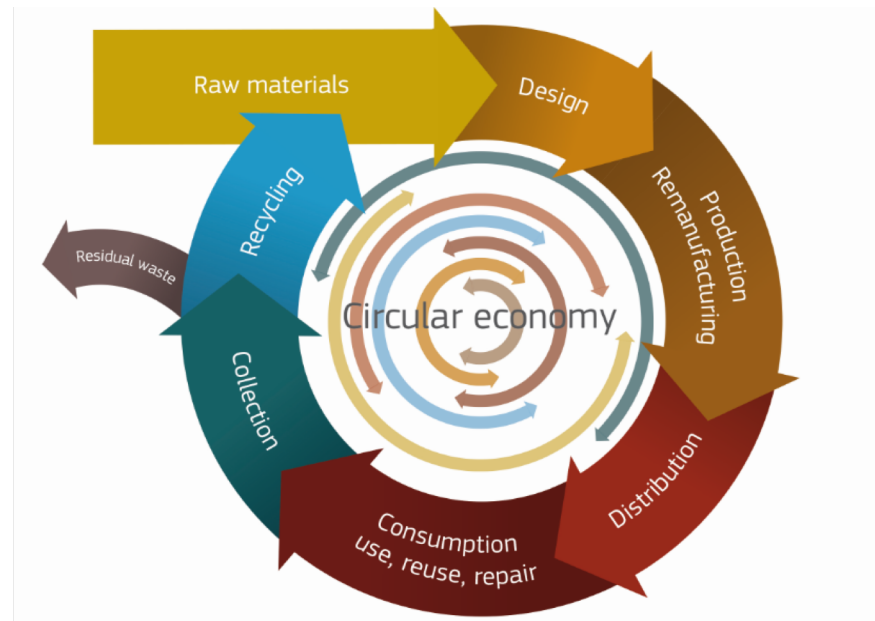


Digital and Virtual Factory

Lombardy
South Netherlands
Tampere
Catalonia
Norte
Saxony
Galicia
East Netherlands
Navarra
Pays de la Loire

Thematic domain of the demo-case

De- and Remanufacturing includes the set of technologies, tools and knowledge-based methods to recover, re-use and upgrade functions and materials from industrial waste and post-consumer high-tech products, under a new producer-centric Circular Economy perspective.



EU – Towards a circular economy, a zero waste programme for Europe, COM (2014) 398 final

Strategy: demonstrating integrated innovative solutions and de-risking private investments in Circular Economy



G7 Summit Declaration June 2015: The **G7 Alliance on Resource Efficiency** promotes Circular Economy, Remanufacturing and Recycling as strategic actions.



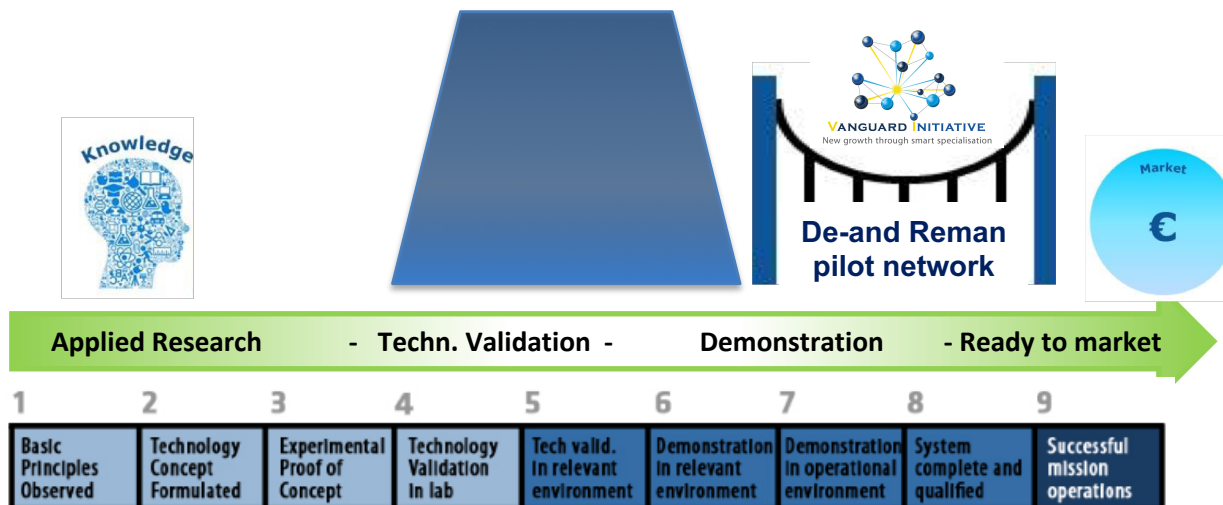
At European level, the Commission has launched in December 2015 the strategic initiative **“Closing the loop - An EU action plan for the Circular Economy”**.



H2020 R&I projects under the Focus Area **“Industry 2020 in the Circular Economy”**, calls CIRC, Spire and FOF, at TRL 6-7.

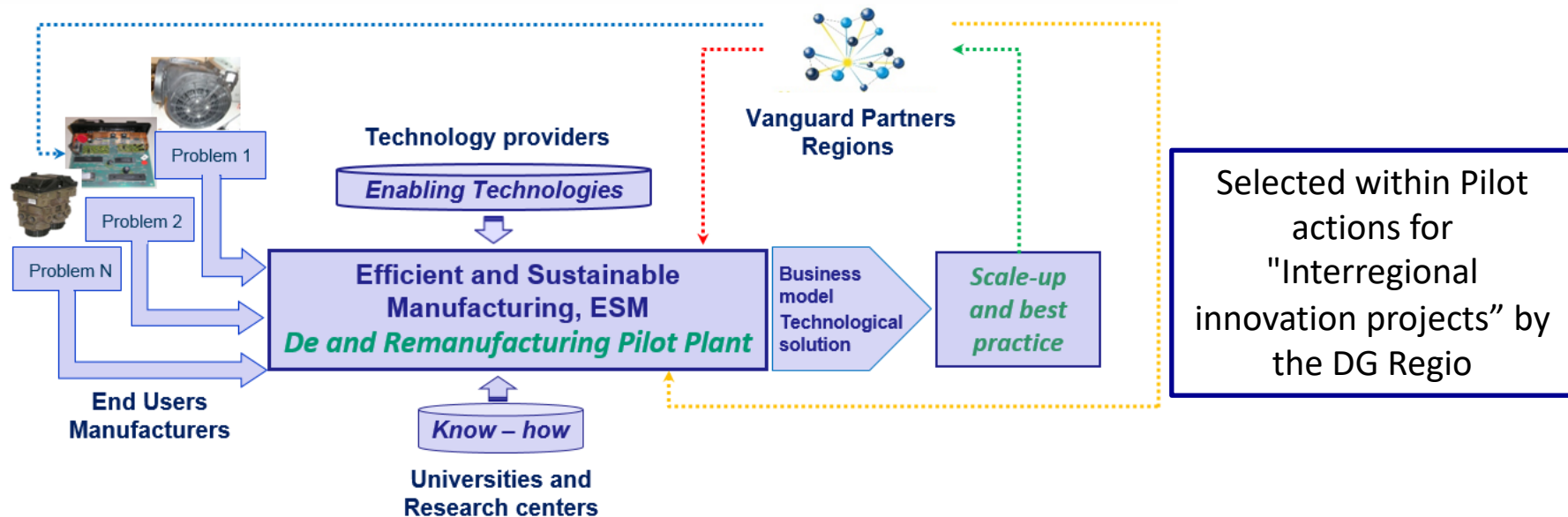
Lack of infrastructures that can demonstrate to industry integrated circular economy solutions and business models, de-risking the private investment.

These Innovation Hubs should act as **“technology gateways”** that any business sector can use.



Pilot Idea: application domain

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.



The pilot network nodes will act as *Innovation Hubs for Circular Economy (Circular Innovation Hubs)*, being a network of competence and technology centers and supporting future producer-driven replication at industrial scale (TRL 9).

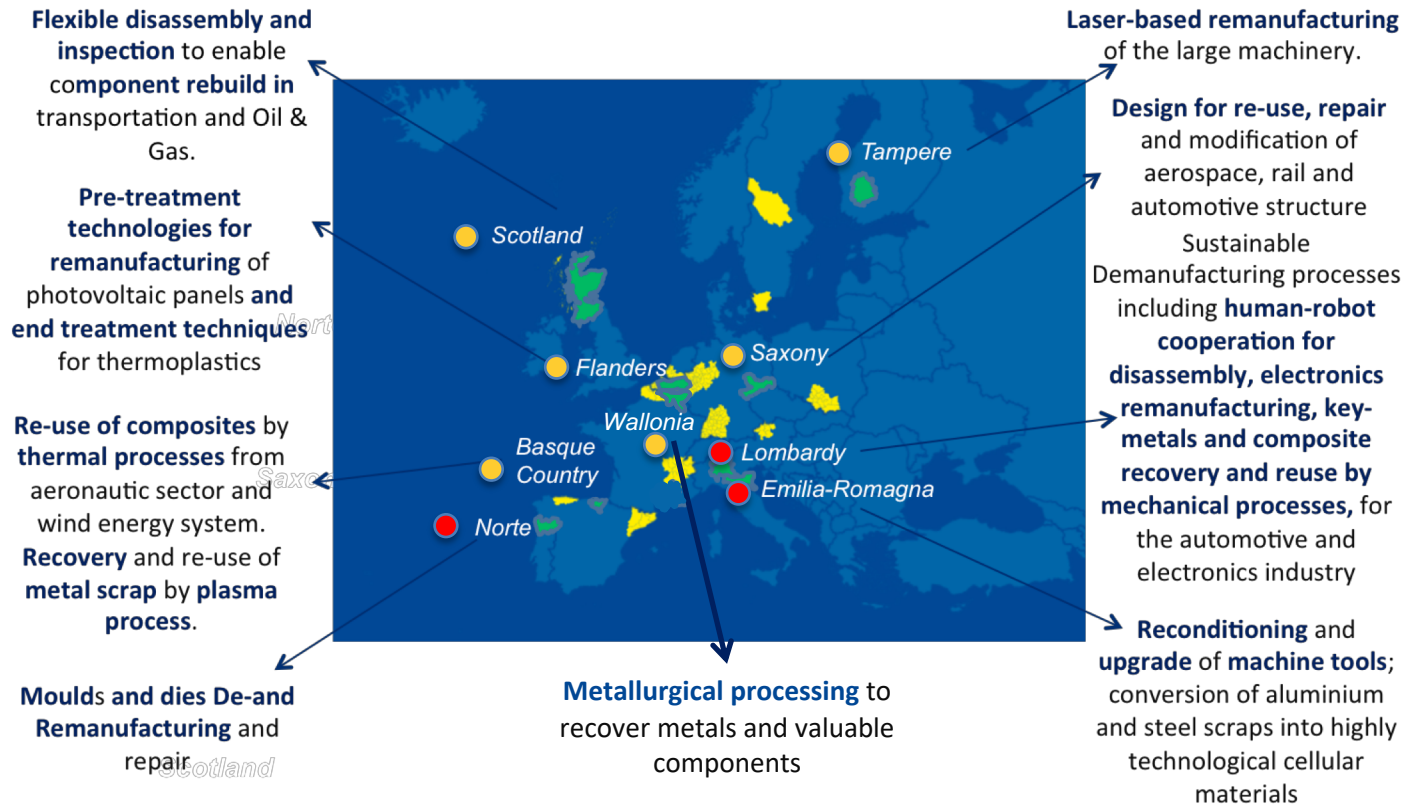
De-and Remanufacturing Innovation services

The Pilot Network is seen as a *One-stop-shop* for delivering innovation services to the industrial end-users with a multi-regional approach.

Industrial Innovation Service Portfolio

Reverse logistics optimization.	Technical feasibility assessment.
Product Life-cycle information management.	De-and Remanufacturing Process-chain design and demonstration.
Environmental sustainability assessment and LCA.	System integration and control.
Patent and technology IPR searches.	Product design/re-design for circular economy.
Market analysis and business models.	Prototyping and product testing.
Legislation review and innovation deals.	Production of pre-series.
Product and process certification.	Process chain optimization, simulation, and analytics.
Business case validation and scenario analysis.	Value-chain integration.
Circular economy training.	Support to Environmental Technology Verification (ETV) applications.

Pilot Geographic Configuration and Smart Specialization



● Totally new pilot site (or connection)

● Upgraded existing pilot site (or connection)

Key Issue: integrated pilot plant solutions, needed by industry to *validate high-risk investments* in circular economy businesses before the industrial implementation.

Example of Lombardy Region infrastructure

Lombardy Infrastructure: new infrastructure: 400m2 ca.; 12,5M€

- Integration of advanced and innovative technologies and digital innovations (**TRL7-8**)
- **Modular** and **reconfigurable** Pilot Plant for different use-case.
- High degree of **integration, automation and control**.

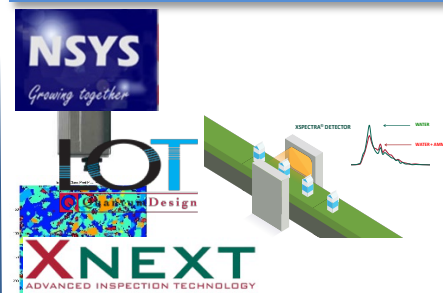
Remanufacturing



ICT tools & Simulation



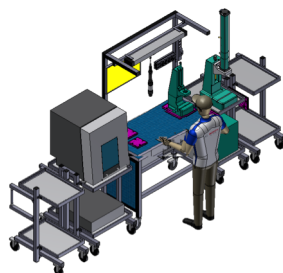
Inspection, Materials Analysis, Certification



Business Model, Reverse Logistic and LCA



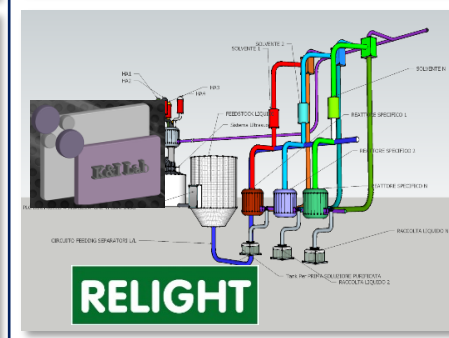
Smart Disassembly Manual Semi-automated



Mechanical Processes



Chemical Processes



Industry-led cross-regional use cases

A detailed analysis of identified **sectorial Use Cases**, with industrial partners associated, has been performed, where more regions are involved. For each Use Case, a business case has been detailed including a **business plan** for the industrial take-up of the solutions.

Regional/Cross-Regional Use Case	Involved Regions
Composite Recovery from Wind Energy System	<u>Basque Countries</u> , Saxony, Lombardy, Tampere, Scotland
Heavy machinery components remanufacturing	<u>Tampere</u> , Basque Countries, Lombardy, Saxony, Emilia Romagna
Automotive parts remanufacturing	<u>Scotland</u> , Lombardy, Saxony, Norte
High-value TLC systems and Electronics Recovery	<u>Lombardy</u> , Tampere
Metal components reprocessing	<u>Saxony</u> , Tampere, Lombardy, Wallonia
Remanufacturing of e-motors	<u>Saxony</u> , Lombardy
Plastics recycling and re-use in electornics	<u>Flanders</u> , Lombardy, Wallonia
Automotive Li-Ion batteries disassembly, remanufacturing and re-assembly for second use	<u>Lombardy</u> , Saxony, Basque Countries
Photovoltaic panels de-manufacturing	<u>Flanders</u> , Lombardy
Machining equipment retrofit and upgrade	<u>Emilia Romagna</u> , Lombardy
Manufacturing of metal-sponge catalysts from aluminum waste material for chemical catalysts.	<u>Emilia-Romagna</u> , Lombardy
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

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Composite Recovery from Wind Energy System

Use-case 1: Composite Recovery from Wind Energy System

- **Regions participating** to the use case: Basque Country (lead), Saxony, Lombardy, Tampere, Scotland.
- **Reason for the Regions** to work in the use case:

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

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

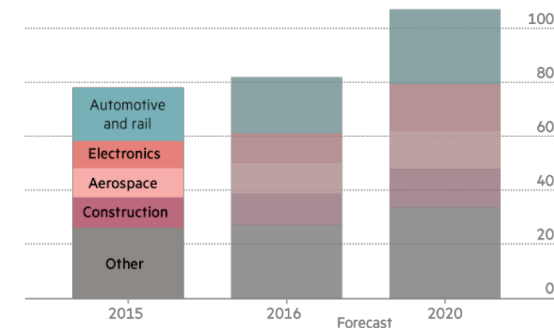
Lombardy: mechanical demanufacturing processes and composite reprocessing. ICT for value-chain integration. Output market: furniture, sanitary and construction.

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



FiberEUse Project

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

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

The FiberEUse 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*.

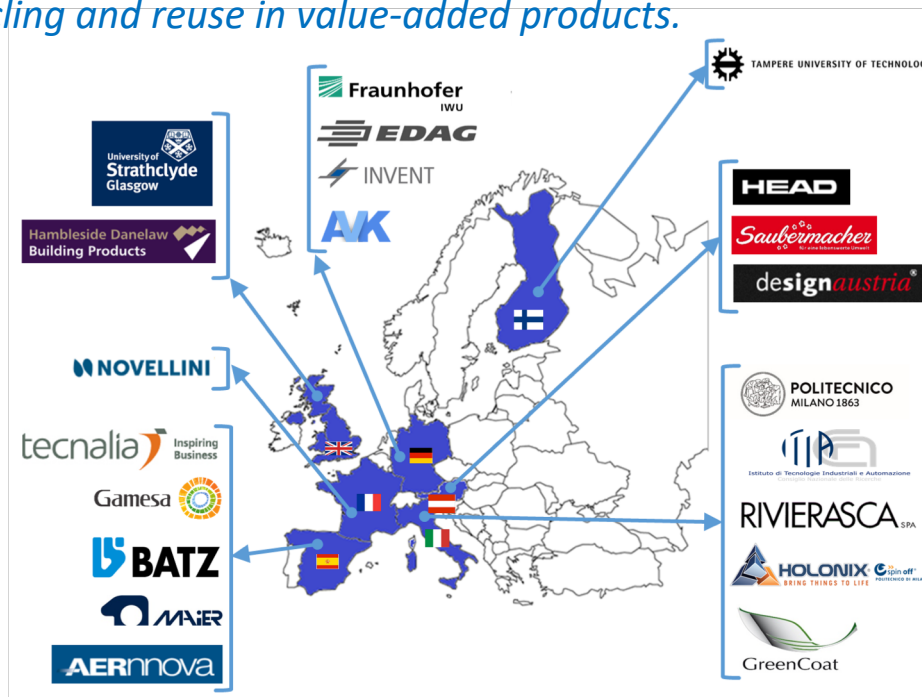


Duration: 48 months, starting on June 2017.

Consortium: 21 partners, from 7 EU countries.

Coordinator partner: Politecnico di Milano

EC Funding: ca. 10 mln €.



Industrial Participants and investors

More than 60 European companies, with a cumulative **turnover of 32 B€** and with some **175,000 employees**, and 69 universities and RTOs distributed among the involved regions are involved.



The stakeholders have signed **Letters of Intent** to participate to the definition of this Pilot Network and, in the case of future end-users, to access the pilot network and to carry on industrial take-up, in case of positive evaluation of the developed solution.

Business Model of the Pilot Network

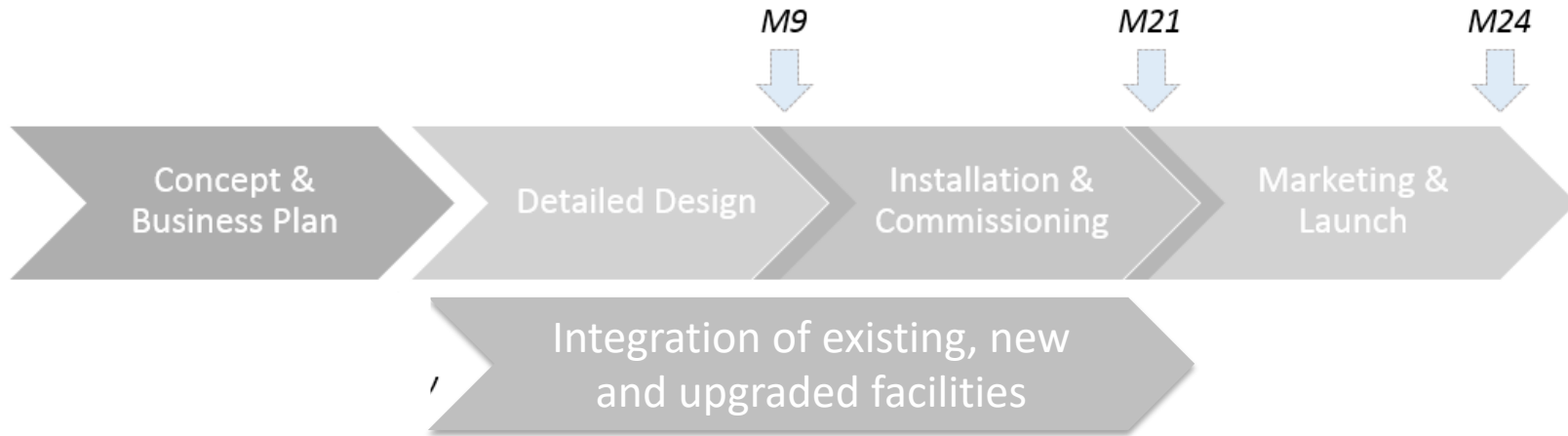
Business Model of the Pilot Network

	Year after installation				
	1	2	3	4	5
<i>Accesses to the pilot network (n°)</i>	18	23	30	33	36
<i>Pilot total revenues (mln €)</i>	2.281	3.414	4.916	5.963	7.565
<i>Total costs (mln €)</i>	0.88	2.34	2.69	2.86	3.03
<i>Installation & Launch costs co-funding (mln €)</i>	12	/	/	/	/
<i>Installation & Launch costs funding (mln €)</i>	28	/	/	/	/
<i>Annual margin (mln €)</i>	-10.6	1.07	2.23	3.1	4.53
<i>Cumulative margin (mln €)</i>	-10.6	-9.53	-7.3	-4.2	0.34

- ✿ The installation and launch investments will be *paid back in 5 years* if *4 demonstration projects* are attracted per year (on average) by each regional pilot.
- ✿ Considering a successful industrial replication rate of the developed solutions of 25%, about *35 new industrial installations* will be originated by the pilot network in these 5 years.
- ✿ The cumulative revenue for the involved companies of about *215 million Euros*.
- ✿ The 35 new installations will mobilize private resources for 535 million Euros.
- ✿ *Leverage factor* for the public investment of about *19* in five years from the pilot network installation.

Business Model of the Pilot Network

Implementation & Investment Plans



Phase	1 Concept & Business Plan	2 Detailed Design	3 Installation & Commissioning	4 Marketing & Launch	Total
Funding	0	3.15	24.5	0.35	28
Co-funding	0.5	0.85	10.5	0.15	12
Total	0.5	4	35	0.5	40
Schedule	Achieved 2017	M1-M9	M6-M21	M18-M24	

Main activities and achievements in 2018

ID	Specific action Plan approved for 2018
1 ✓	Definition of the financial sources combining regional, national and European support. Continue the interaction with EIB and regional financial stakeholders.
2 ✓	Continue the collection of Letters of Intent (LoI) from the stakeholders and achieve 100 letters of intent (60 currently signed).
3 ✓	Formalize the participation of interested regions (Wallonia, South Netherlands, Trentino, Catalunya, Pays de la Loire, East Netherlands).
4 ✓	Involve more potential users and technology providers from emerging European regions (Organization of match-making events in emerging regions)
5	Finalize the formats for IPR agreements during users accesses, by interacting with the EC IPR helpdesk .
6 ✓	Promote proposals in H2020 and regional programs to bring new enabling technologies into the pilot plants (Large Equipment Remanufacturing, ICT Platform for Circular Economy, Plastics recycling and re-use).
7 ✓	To contribute to the definition of new cross-regional circular economy value chains (Screen CSA).
8	Prepare specific material to further promote Dissemination, Communication and Awareness .
9 ✓	Overcome the identified barriers through the support of the “Expression of interest” from the DG Regio (if approved).
10	Start designing the platform for connecting the existing facilities and be ready for the pilot network service delivery.

Mid-term ESM Meeting, Milan, June 2018



Vanguard ESM-Efficient and Sustainable Manufacturing Mid-Term Event in Milan

29th June 2018
Lombardy Region – Palazzo Pirelli
Via Fabio Filzi 22
20124 Milan

AGENDA

08.30 – 09.00 Registration

“De and Remanufacturing Session”

09.00 – 09.30 State of progress of the De-and Remanufacturing demo-case
(*Marcello Colledani – Politecnico di Milano*)

09.30 – 10.00 Highlights from participating Regions:

- **Tampere** (*Nillo Halonen, Tampere University of Technology*)
- **Norte** (*Luis Carneiro, Prodetec*)

10.00 – 10.30 Introduction of new candidate Regions

- **East Netherlands** (*Marcel de Huan, Polymer Science Park*)
- **South Netherlands** (*Coen de Graaf, Brainport*)
- **Wallonia** (*Eric Pirard, Reverse Metallurgy Center*)

10.30 – 11.00 Coffee Break

11.00 – 11.30 Presentation of linked projects

- **CircE** - (*Alessandro Dacomo, Lombardy Region*)
- **Car-E Service, Greenomed** - (*Giacomo Copani, ITIA-CNR*)
- **FiberEUse** - (*Marcello Colledani, Politecnico di Milano*)

11.30 – 12.15 Industrial stakeholders' viewpoint

- **Rivierascia** - *Giacomo Bonaiti*
- **Radici Group** - *Riccardo Galeazzi*
- **Italtel** - *Roberto Pinci*

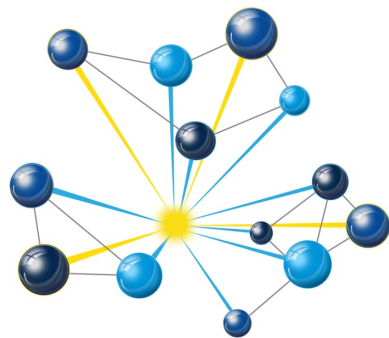
12.15 – 12.45 Collaborative Workshop: use-case update and identification of new use-cases

12.45 – 13.00 Wrap-up and action plan.

13.00 – 14.30 Lunch and matchmaking



Working Towards the Long-Term Sustainability - Firenze, 27/03/2019



VANGUARD INITIATIVE

New growth through smart specialisation

Thank you for attention

**“De- and Remanufacturing”
Pilot Network**

Business Model doc



VANGUARD INITIATIVE
New growth through smart specialisation

Pilot Initiative
“ESM – Efficient and Sustainable Manufacturing”
Coordinating Regions: Catalonia and Lombardy


BUSINESS PLAN FOR THE PILOT NETWORK
“De- and Remanufacturing”

17/02/2016

Prepared by:
Working Group Coordinator: Marcello Colledani
Involved regions: Lombardy, Scotland, Saxony, Tampere, Norte
and Basque Country

63 pages

Pilot Summary



VANGUARD INITIATIVE
New growth through smart specialisation

Pilot Initiative
“ESM – Efficient and Sustainable Manufacturing”
Coordinating Regions: Catalonia and Lombardy

INVESTMENT PLAN FOR THE PILOT IDEA
“De- and Remanufacturing”

15/02/2016

Prepared by:
Working Group Coordinators: Marcello Colledani
Involved regions: Lombardy, Scotland, Saxony, Tampere, Norte
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4 pages

Investment Plan



VANGUARD INITIATIVE
New growth through smart specialisation

Pilot Initiative
“ESM – Efficient and Sustainable Manufacturing”
Coordinating Regions: Catalonia and Lombardy

INVESTMENT PLAN FOR THE PILOT IDEA
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15/02/2016

Prepared by:
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35 pages

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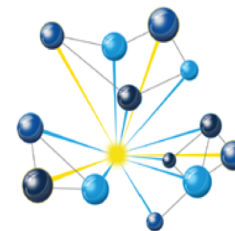
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