FiberEUse

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

A platform to support circular economy of composite materials

Sustainable Places 2019
Cagliari – ITALY 6th June 2019

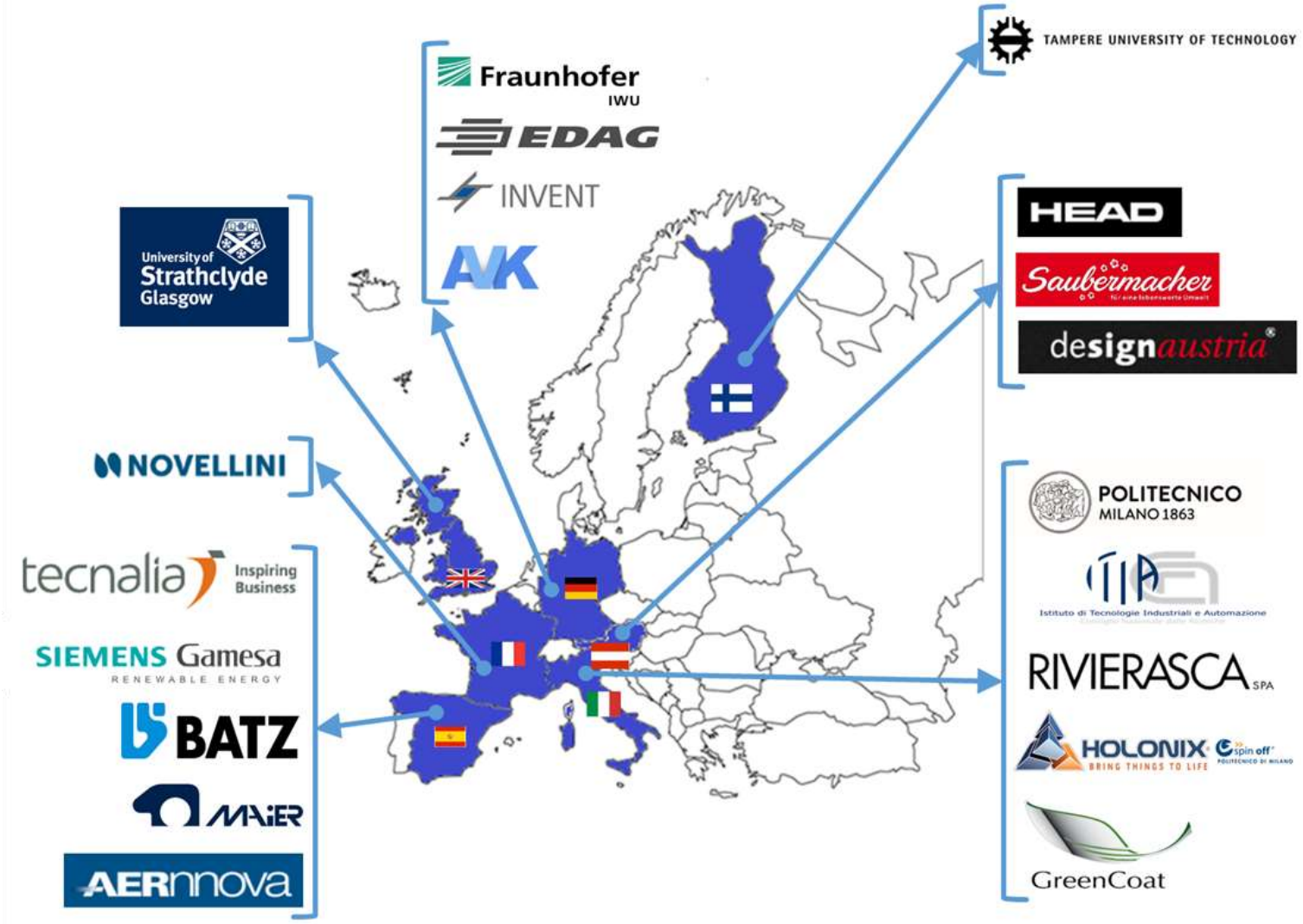
Dena Arabsolgar, Eva Coscia

HOLONIX

Introduction – What is FiberEUse

- Funding body: **EU Horizon 2020** (Grant Agreement No. H2020-730323-1)
- Grant: **€9.8 million**
- Duration: **4 years** started on June 2017
- Consortium: **20 partners**, from **7 EU countries**.
- Aim: **Integrating different innovation actions through a holistic approach to enhance the profitability of composite recycling and reuse in value-added products.**

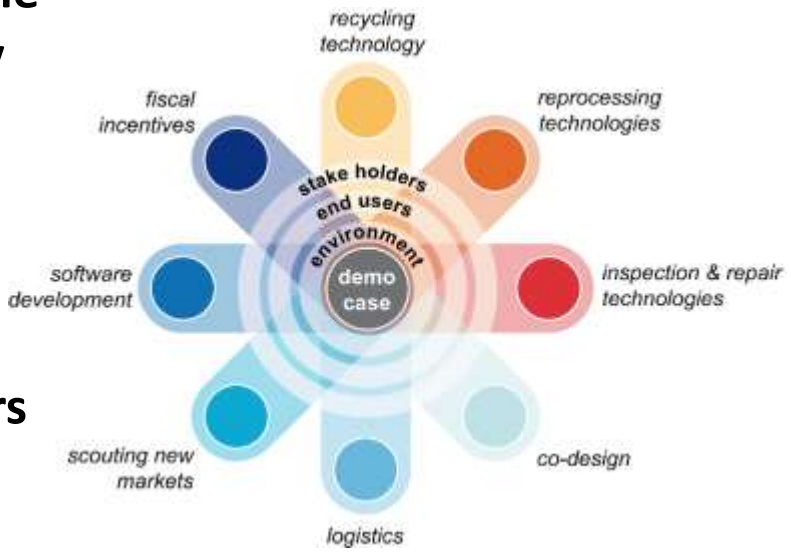
Project partners



Project objectives

FiberEUse aims to develop and demonstrate a large scale reuse of end-of-life (EoL) composites materials via:

- **Integration of innovative remanufacturing technologies addressed to develop profitable reuse options for mechanically or thermally recycled EoL GFRP and CFRP composites** - enabling ease of operation, significant cost reduction, compliance with EU Directives
- **Development of an innovation strategy for mobilization and networking of stakeholders from all the sectors related to composites** - from original equipment manufacturers (OEMs) to tier 1 suppliers, logistical operators, technology providers and exploiters, designers, and end-user associations

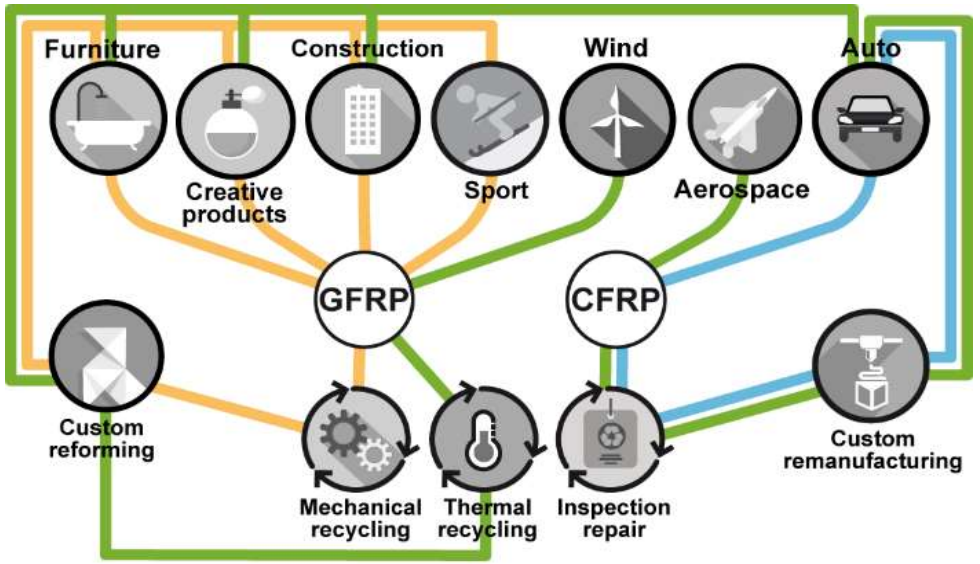


FiberEUse Concept

GFRP: Glass Fiber Reinforced Polymer – GFRP: Carbon Fiber Reinforced Polymer

FiberEUse is based on the realization of three macro use-cases, further detailed in eight demonstrators:

- **Use-case 1:** **Mechanical** recycling of short GFRP and re-use in added-value customized applications, including furniture, construction, sport and creative products
- **Use-case 2:** **Thermal** recycling of long fibers (glass and carbon) and re-use in high-tech, high-resistance applications
- **Use-case 3:** Inspection, repair and **remanufacturing** for EoL CFRP products in high-tech applications



FiberEUse Use-Cases and involved industrial sectors

Construction: how it is now

The market for GFRP in buildings and construction is very large (around 300 kton/y) but very fragmented with a variety of SMEs involved in this business.

Representative products are:

- pipes
- ladders
- laminates
- roofs
- conduits
- shafts
- frameworks

This kind of composite waste is one of the more frequently landfilled, creating a high environmental concern.

Construction: how we can improve future

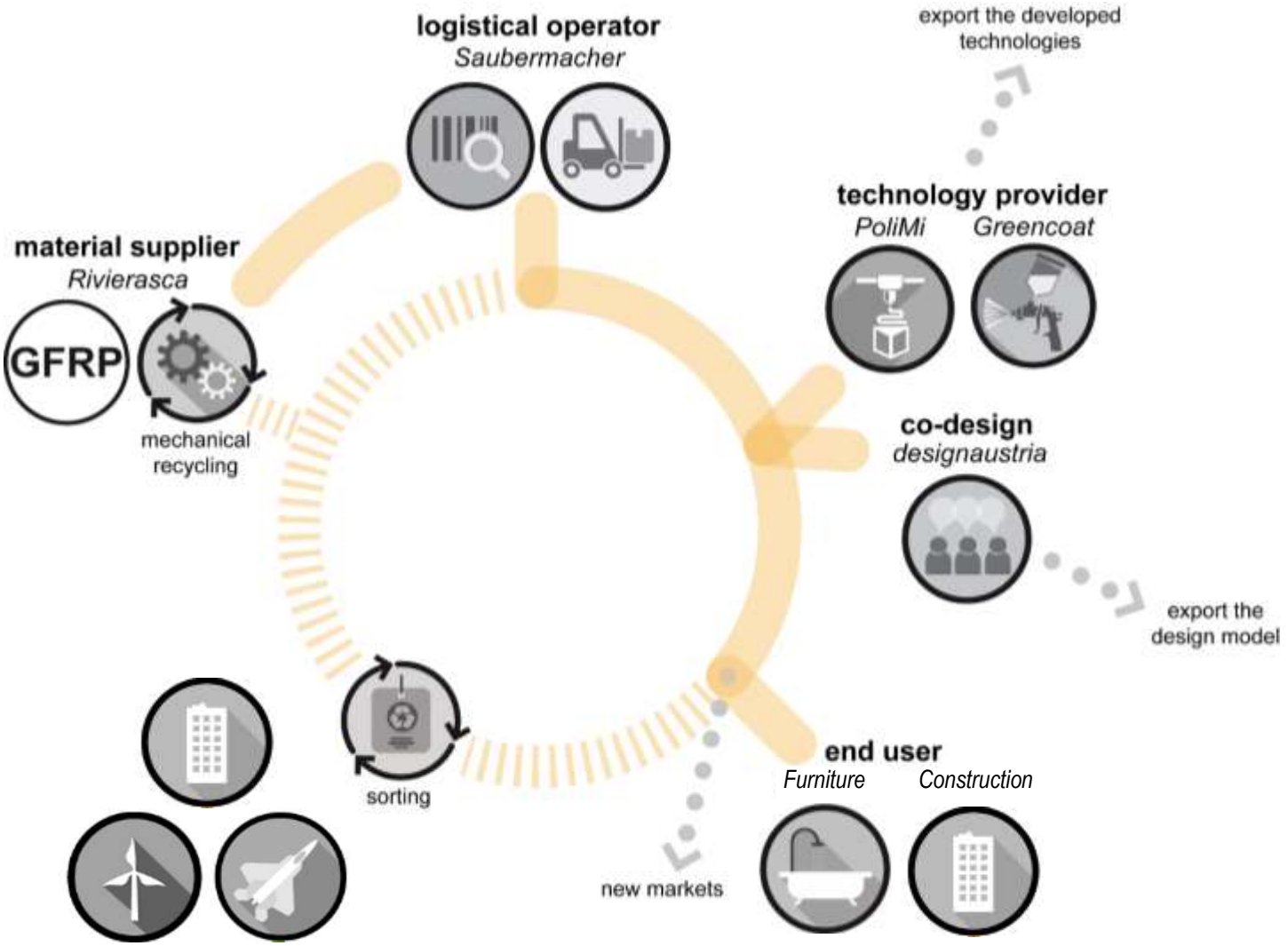
GFRP manufacturers need to be encouraged and stimulated to

- **take back** their products at the end of their useful lives,
- and shown how to make **profit** from this.

New business opportunities can be realized by careful evaluation and minimization of **logistical** costs.

New product concepts based on **recyclates** need to be developed for a wider market and social acceptance, making possible the realization of new circular economy business cases

Result 1: example of new value chain



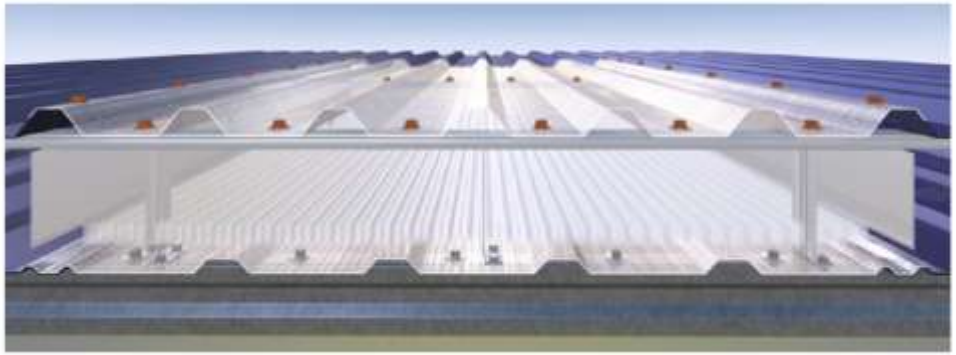
Result 2: example of new products - rGF

rGF (recycled Glass Fiber): old glass fibers recycled through thermal process and reused in standard processing.
Machinery can be different to spread cutted glass fibers

Old glass fiber roofs

Glass fibers recycled through thermal process

The product will be a
light transmitting single skin profiled
made in recycled GFRP sheet
for internal and external roof, wall and ceiling.



Result 3: Example of new material: Glebanite

Glebanite is GRP (Glass Reinforced Polyester) recycled into GRP again, it is obtained from:

Grinded scraps
Mechanical processing

+

Fresh resin

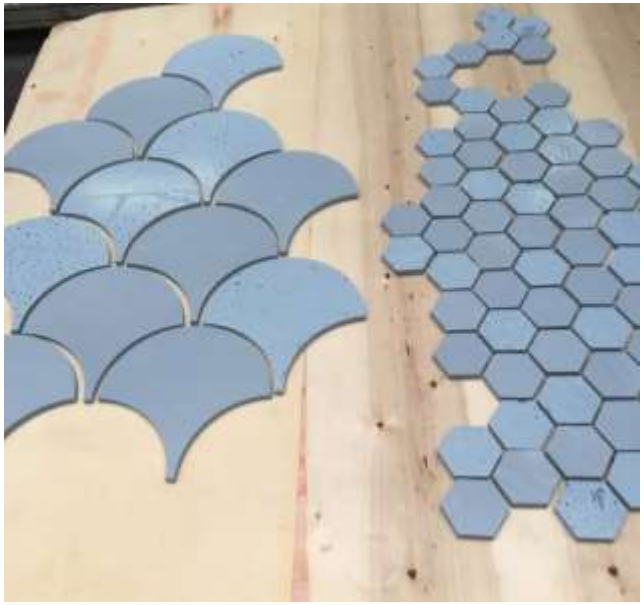
= glebanite®

Glebanite for forniture products

Water tap
In glebanite marble-like

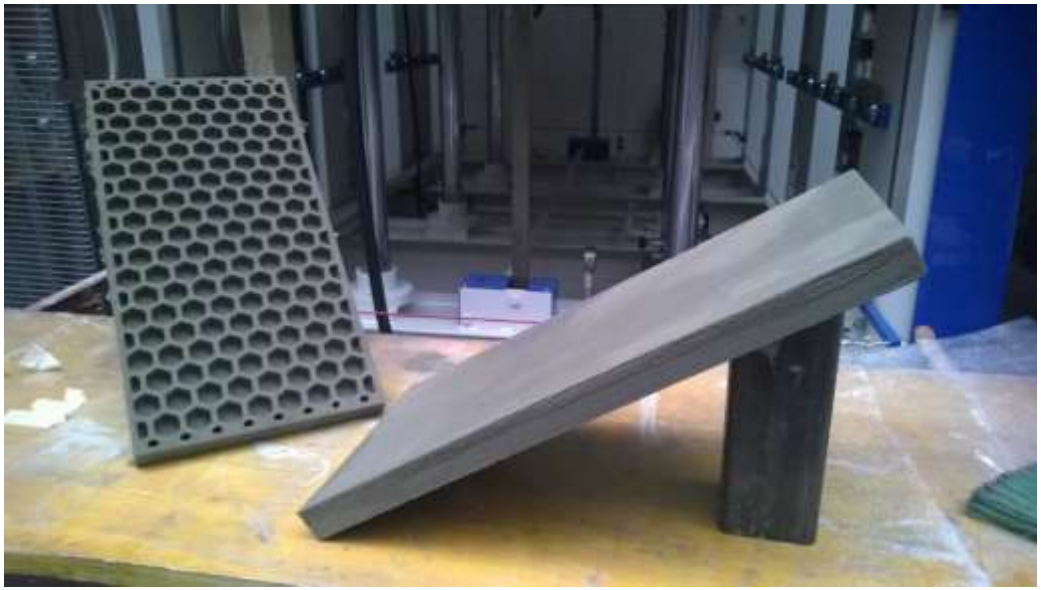
Novellini bath tubes

Glebanite for construction

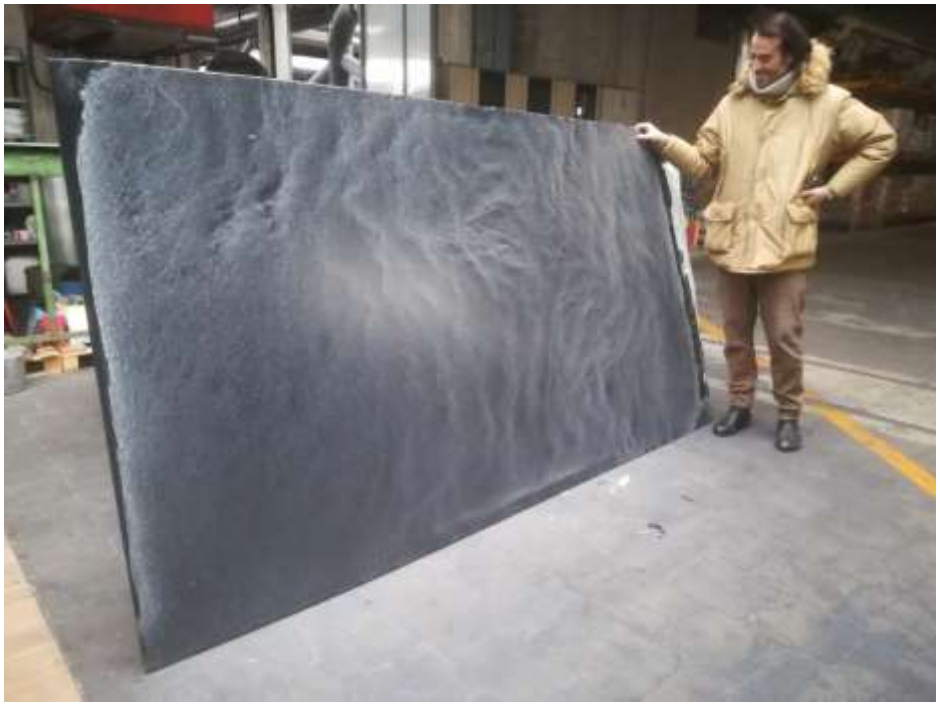


Gio Minelli design: Tiles (internal or outdoor)

Structural laminates



Glebanite design



Gio Minelli design:
Table deck

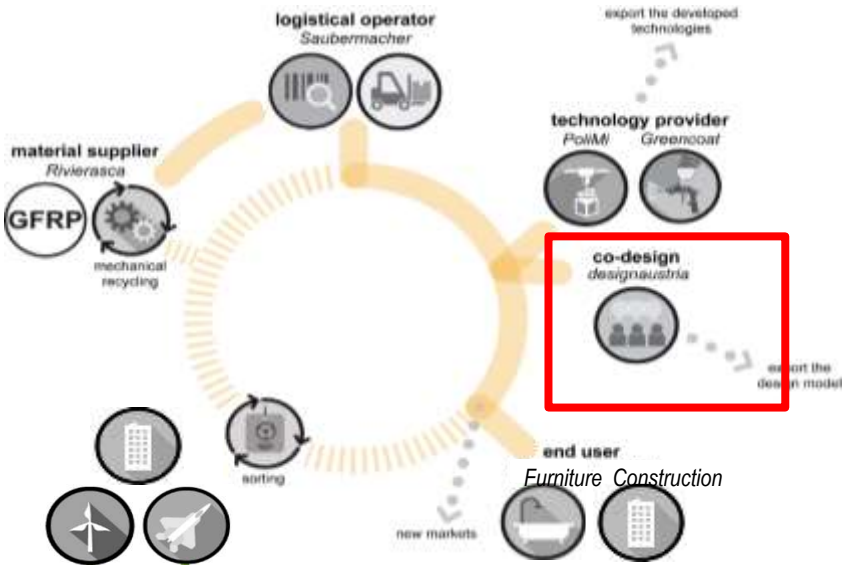
GioMinelli design: Table in Glebanite

IT solutions for co-creation with waste

So: we have new materials..
What to do with them?

Designers: we need your help to co-create solutions!

Final users: we need your vote to select best ideas!



A **co-design** methodology engages all citizens to **design new concepts** to exploit second-life composites and **vote for the best ideas** proposed by designers
The selected designs will then be realised in the course of the project.

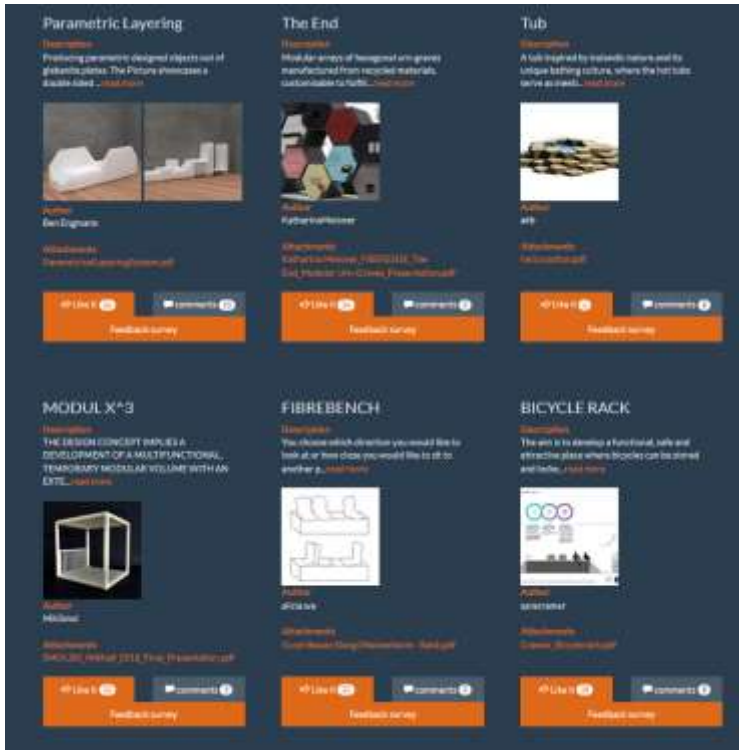
IT solutions for co-creation with waste

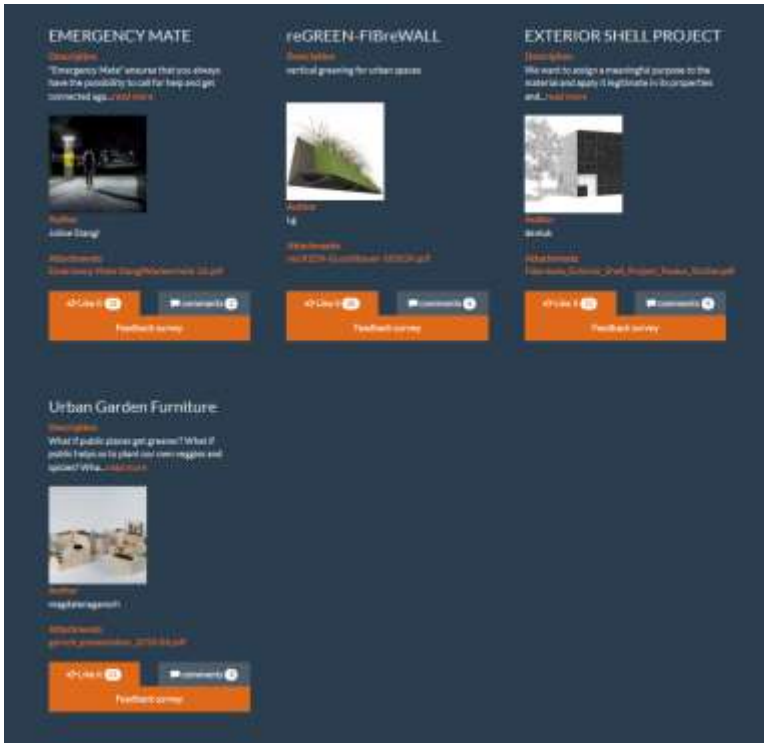
A web based tool to:

- Collect new ideas
- Tag them with keywords
- Rate and comment them
- Supervise the process
- Ask for external evaluation through Questionnaires and Survey
- Create Concepts, as merging of different ideas

- Accessible at: https://fibereuse.holonix.biz/ideamanager/#/
- Video: https://www.youtube.com/watch?v=0mrQN7D9LpI&feature=youtu.be

Examples of ideas

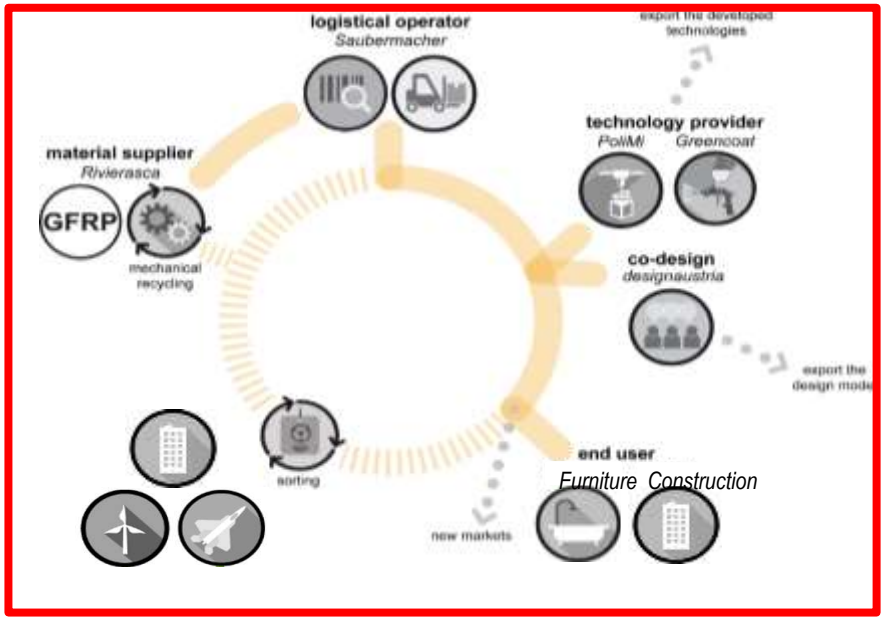




IT platform to support new value chains

So: we have many different actors.. How to support new business processes?

A digital platform can offer an holistic approach to support the new emerging value chains



What is a Multi Sided Digital Platform?

MULTI-SIDED PLATFORM

Multi sided platforms means that they offer services supporting the interactions between two (**or more**) distinct types of affiliated stakeholders. This goes **beyond the traditional two-sided platforms** (eShops, marketplaces) addressing traditional product and service offerings

DIGITAL:

empower real-world applications, processes, products, and services with different key digital technologies (IoT, Big Data, AI, …)

Why a Multi Sided Digital Service Platform?

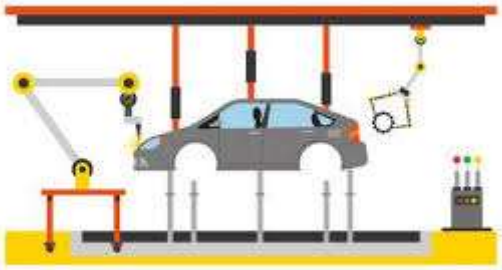
To effectively boost Circular Economy, new ecosystems and value chains have to be created to support the **cooperation** of actors coming from different domains, each one bringing expertise, competence and resources.

Digital services are crucial to put in contact different worlds and to support the execution of new circular processes.

I am a Waste / By-product provider and….

- I need to dispose my end of life products but
  - I want to reduce costs
  - I cannot send them to landfill anymore…
  - I want to do that in a sustainable way
- BUT…
  - I do not know who to offer them
  - Should I pre-process my waste? How?

I am a Producer and….



- I am interested in new materials that
  - Are less expansive then traditional ones
  - Offer the same/similar properties then traditional ones
  - Whose availability meets my production needs
- BUT…
  - I cannot compare traditional and new materials
  - I do not know how to purchase them…who can provide me the material?

I am a technology provider and….

- I can process end-of-life products
- I can create new materials
- I can offer technologies to use new materials (i.e.: additive manufacturing,…)

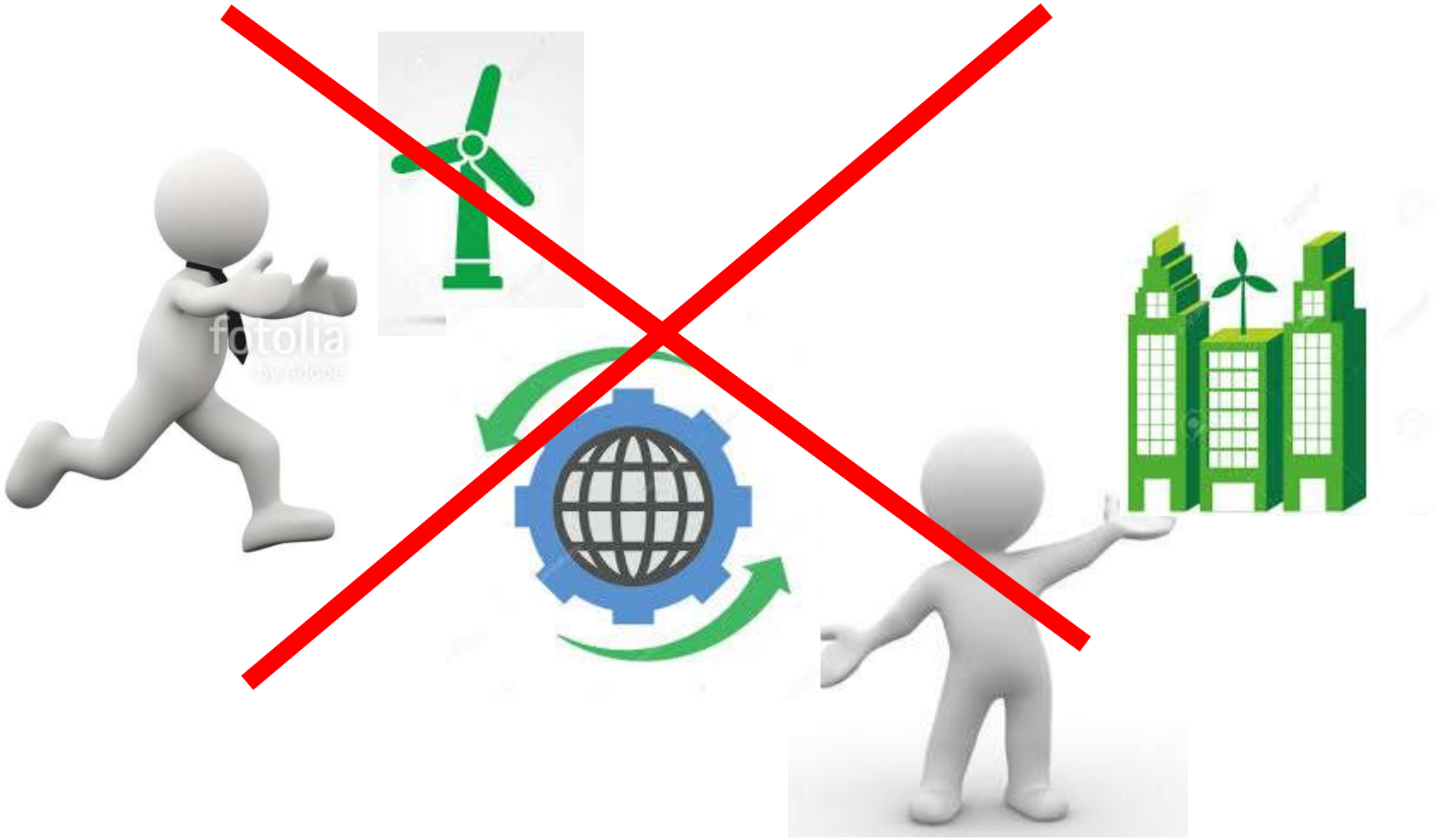
- BUT…
  - I do not know who can provide me waste
  - I do not know who is interested in the new materials/technologies

I am a Logistic Operator and …

- I can pre-process end of life products
- I can organise national/international transport

- BUT…
  - Who needs my services?
  - Which are the regulations that are applied to waste and new materials in each country?

A two-sided platform is not enough…



A two-sided platform is not enough…

On site pre-treatment

Transport

Processing

Transport

What can we offer?

Core Services meeting stakeholders expectations/needs

- Profiling …*I want others can find me….*
- Availability declaration …. *I have something to offer…*
- Material and treatment process search…*I am looking for something new…*
- Support to value chain creation…*I am not simply buying/selling goods…*
- Access to material and process information …*I need more information and some technical support…*

Integration with external services for

- Environmental impact calculation (LCA/LCC)…*what is the environmental impact of my new product?*
- Decision support system for calculating costs of alternative waste treatment scenarios…*which is the less expensive solution for the EoL of my products?*
- Innovative products co-design…*I have a smart idea on how to re-use a product or create a product with recycled fibers*

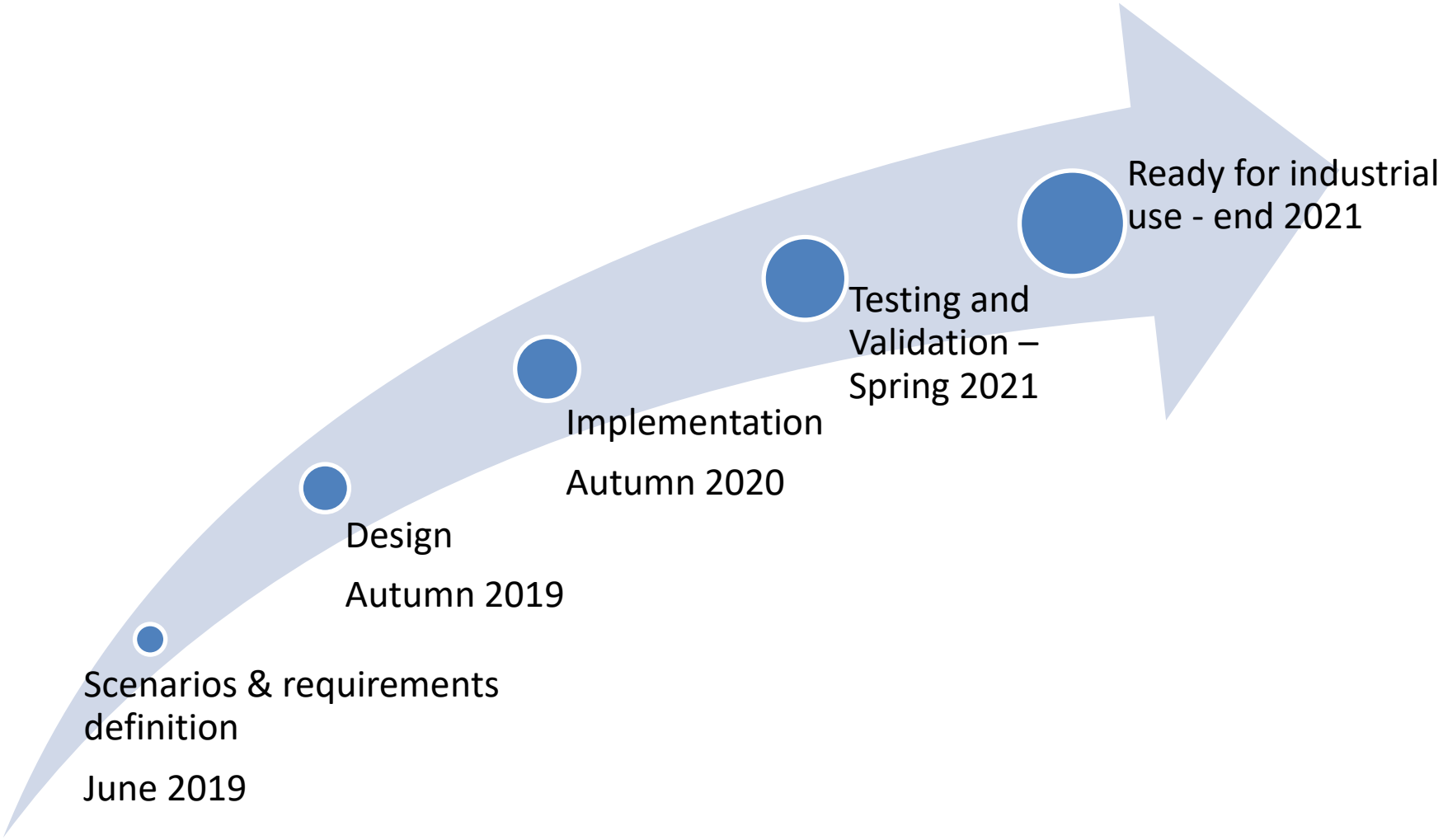
Its not so easy….Main expected challenges

- ADOPTION: none wants to jump on a “uninhabited” platform
  - Chicken and egg problem: can be solved
  - Easiness of adoption: no friction, usability, customizability
  - Security and Privacy of data is crucial

- MAINTENANCE
  - Technological and domain knowledge is necessary
  - Continue evolution of code
  - New requests are always coming…

- SCALABILITY
  - To enlarge the number of users
  - To adapt to new sectors: support new stakeholders and services to deal with new materials & processes

Our roadmap


Scenarios & requirements definition
June 2019
Design
Autumn 2019
Implementation
Autumn 2020
Testing and Validation – Spring 2021
Ready for industrial use - end 2021

FiberEUse

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

www.fibereuse.eu

Thank you for your attention

Presenters: Dena Arabsolgar, Eva Coscia
HOLONIX srl
research@holonix.it