THE MOBILITY VALLEY ECOSYSTEM

TREASURE SPRING SCHOOL

24-25-26 April 2024

TREASURE

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Context and objectives

Paolo ROSSA / POLIMI

TREASURE

Supporting the transition of the automotive sector towards circular economy

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003587

TREASURE

- **TREASURE is a 3-year- Research and Innovation Action** co-funded by the European Commission **under the H2020 programme** willing to offer new opportunities for testing innovative technologies to make the automotive sector more circular.
- **TREASURE consortium** is coordinated by Politecnico di Milano and it is **formed by a group of 15 organizations from 7 European countries**

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Objectives

TREASURE

Guaranteeing a sustainable use of raw materials in the automotive sector, by reducing material supply risks

Offering better vehicle-related economic, environmental and social performances to all the end users

Adopting in practice the circular economy paradigm in the automotive sector, by acting as demonstrators for the manufacturing sector

Creating new supply chains around End-of-Life Vehicles (ELVs), by focusing on a circular exploitation of raw materials embedded into cars.

Goals

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TREASURE solution **can assist both car parts suppliers and carmakers** in assessing their design decisions in terms of circularity level, also considering the effects of their decisions on EoL processes. Vice versa, car dismantlers and shredders could benefit from the TREASURE solution by knowing about new design features of cars to be recycled in order to optimize their processes.

TREASURE solution will define and exploit a new sustainability and circularity assessment methodology to quantify environmental, economic, social and CE-related performances through a set of dedicated KPIs. Based on these indicators, the solution moreover offers an advisory framework that supports the decision-making process of designers, recyclers and dismantlers

TREASURE will support companies in the automotive sector, by demonstrating in practice the benefits that the adoption of the circular economy paradigm can provide, both from a business/supply chain and from a technological/sustainability point of view, through the adoption of Industry 4.0 technologies in ELV management processes.

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TREASURE is willing to reach three main results

TREASURE

Developing a Digital Platform powered by an AI-based scenario assessment tool providing a digital layer supporting the information exchange and intelligence for the development of circular supply chains in the automotive sector.

Representing a set of success stories in three key value chains of the automotive industry, as dismantlers/shredders, recyclers and manufacturers, by demonstrating the benefits coming from the adoption of CE principles in the automotive sector.

Integrating Key Enabling Technologies (KETs) for the efficient design of car electronics and subsequent disassembly and materials recovery.

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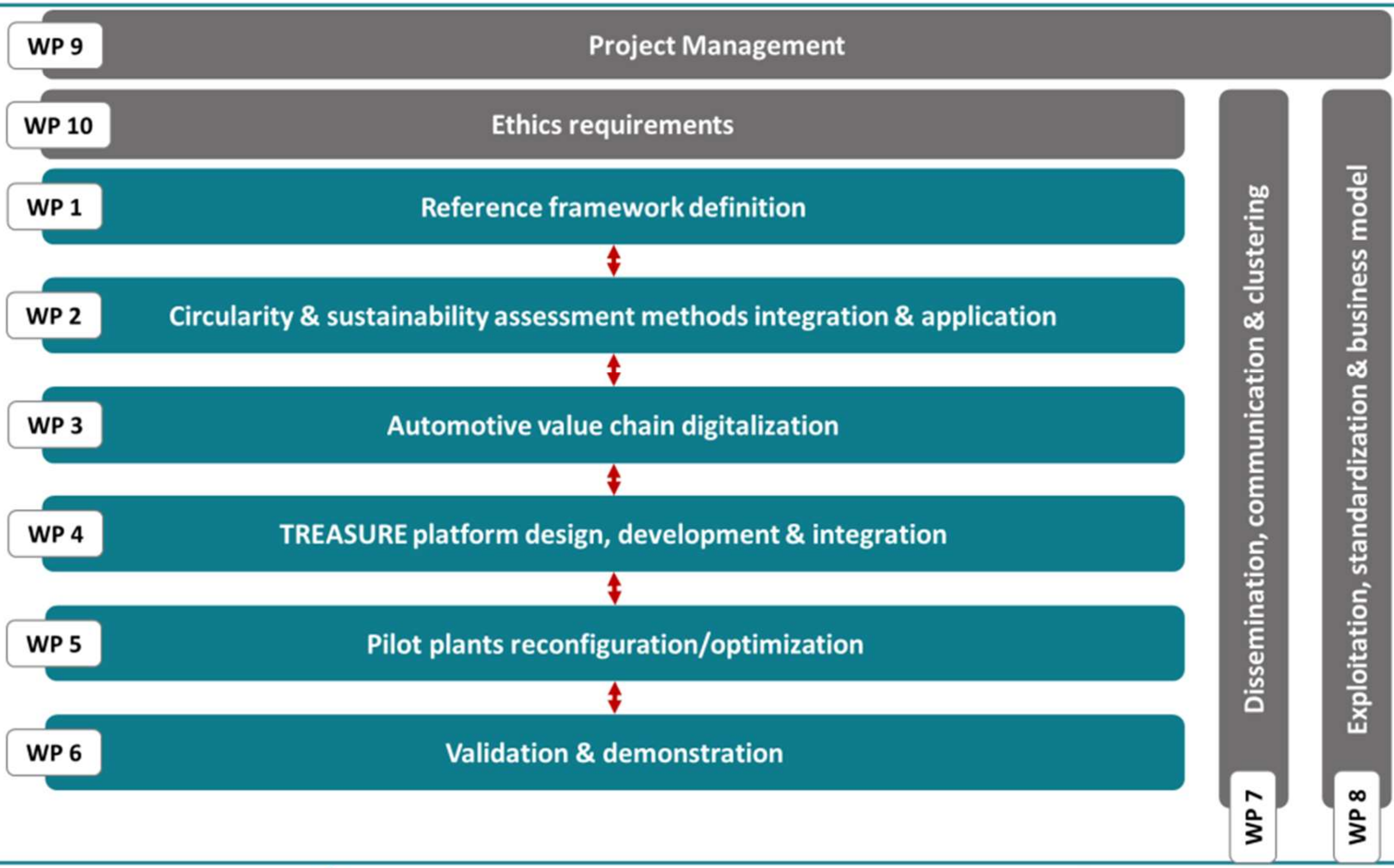
Project structure – Work Packages

TREASURE



Partners

TREASURE

- Politecnico di Milano (POLIMI)
- Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek (TNO)
- Universidad de Zaragoza (UNIZAR)
- Scuola universitaria proffesionale della Svizzera italiana (SUPSI)
- Università degli Studi dell' Aquila (UNIVAQ)
- Material Recycling and Sustainability B.V. (MARAS)
- Edgeryders OU (EDGE)
- EuroLCDs SIA (EUROLCDS)
- Walter Pack SL (WALTER)
- Pollini Lorenzo e Figli srl (POLLINI)
- SEAT SA (SEAT)
- TXT E-Solutions Spa (TXT)
- Industrias Lopez Soriano SA (ILSSA)
- Ente Nazionale Italiano di Unificazione (UNI)
- MOV'EO (MOVEO)

Partners

Politecnico di Milano (POLIMI)

TREASURE

POLITECNICO MILANO 1863 | Manufacturing Group SCHOOL OF MANAGEMENT

Coordinator
Tasks leader in WP1, WP5, WP6 and WP8

- Responsible for the "Project Management and Coordination", including the coordination among partners and Advisory board.
- POLIMI will apply its strong knowledge in Industry 4.0 technologies in order to develop, test and optimize a pilot station dedicated to car electronics disassembly.
- POLIMI will apply its knowledge in Circular Economy and Circular Business Models in order to identify and structure potentially new businesses (and related supply chains) focusing on car electronics.

Partners

Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek (TNO)

TNO innovation for life

WP5 leader
Tasks leader in WP5 and WP6

Within TREASURE, Holst Centre contributes with its expertise in Hybrid Printed Electronics

- Flexible and in-mould structural electronics
- Collaborating with industrial partners from automotive sector
- Flexible electronics pre-pilot line

Partners

Universidad de Zaragoza (UNIZAR)

TREASURE

Instituto Universitario de Investigación Mixto
CIRCE
Universidad Zaragoza

WP3 and WP7 leader
Tasks leader in WP3, WP4, WP6 and WP7

- IUIMC will apply its knowledge in eco-design, reusability and recyclability aspects to design and validate the corresponding modules of the TREASURE Platform.
- IUIMC is also in charge of the dissemination, communication and clustering aspects.

Partners

Scuola universitaria proffesionale della Svizzera italiana (SUPSI)

University of Applied Sciences and Arts
of Southern Switzerland

SUPSI

WP1 leader
Tasks leader in WP1 and WP2

- SUPSI will build a holistic reference architecture for the whole project dealing with framework, software and pilots.
- SUPSI will target the development and the consolidation of the sustainability & circularity assessment and the advisory methodologies.
- SUPSI will be engaged in the development of the eco-design, dismantling and recycling modules (T4.4) that will integrate the Sustainability Assessment Application developed in previous European and national projects: SAM (Innosuisse) - MANUTELLIGENCE (H2020 proposal ID 636951) - MANUSQUARE (H2020 proposal ID 761145-2).

Partners

Università degli Studi dell' Aquila (UNIVAQ)

TREASURE

Tasks leader in WP5, WP6 and WP8

- Simulation and lab-scale activities for the recovery of materials from selected critical components of cars.
- Reconfiguration of pilot plant, tests and optimization of the processes on pilot scale.
- Training activities on pilot plant.
- Exploitation routes: definition of the exploitation strategy, the exploitation of the results to identify the targeted market
- Exploitation plan development, preparation of blueprint for commercialization of project results.
- IPR strategy & management

Partners

Material Recycling and Sustainability B. V. (MARAS)

TREASURE

MARAS
Material Recycling and Sustainability

Tasks leader in WP3
Contributor in WP4 and WP5

- Innovative physics-based recycling system models for the calculation of recycling/recovery rates (total product and all materials/elements) and optimization for the system architecture of the physical and metallurgical recycling processes linked to improved disassembly strategy (new approaches in recycling technology)
- Recycling options of conventional versus printed flexible electronics by defining and exploiting the recycling process simulations
- Digital twins and digitalization of the automotive recycling system (link design to recycling)
- Recycling Labels : physics-based recycling standards

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Partners

Edgeryders OU (EDGE)

TREASURE

Tasks leader in WP2 and WP4

- EDGE will use Semantic Social Network Analysis (SSNA) to understand the role of circular economy focusing on the automotive sector. With our own unique methodology, we are to explore how CE plays out in society, economy and everyday life and the points of view of the people directly affected by CE.
- EDGE will launch online conversations on the existing Edgeryders platform, outreach and engagement, community management, ethnographic coding and technical support.
- EDGE will combine and analyse primary and secondary data gathered from the online conversations and creating navigable version of the conversation's semantic social network

Partners

EuroLCDs SIA (EUROLCDS)

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EuroLCDs

Contributor in WP5, WP6 and WP7

- EuroLCDs will dismantle displays (current models and under development) and in first step will investigate liquid crystal mixture reclaiming options.
- The remaining parts (e.g. ITO glass, flexible connectors and PCBs), containing CRMs will be shipped to partners for extraction. If suitable quantity of metals is extracted (e.g. Ag, Au, In, Sn), they can be processed into PVD sputtering targets.
- Display materials will be manufactured by using these targets, and new displays from recovered metals will be produced at validation stage.

Partners

Walter Pack SL (WALTER)

- Involved in the development of the demonstration action 3 and as contributors in the definition of requirements and specifications.

Contributor in WP5 and WP6

Partners

Pollini Lorenzo e Figli srl (POLLINI)

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Contributor in WP5 and WP6

- POLLINI, thanks to its wide computerised warehouses where it selects and catalogs automotive components by type and brand of all over car manufacturers and its specialized operators it will supply obsolete parts and workforce in order to test new disassembly processes.

Partners

SEAT SA (SEAT)

SEAT S.A.

Task leader in WP3
Contributor in WP4, WP5 and WP6

- SEAT will contribute with its expertise analyzing valuable car parts.
- SEAT has been researching the metal composition of several SEAT models, for identifying the most valuable car parts in terms of strategic metal content. The developed methodology, using Thermodynamic Rarity as resource use indicator, will be applied in TREASURE, for feeding the IT tool

Partners

TXT E-Solutions Spa (TXT)

Task leader in WP1 and WP4

- TXT will participate in the platform design, development & integration.

Partners

Industrias Lopez Soriano SA (ILSSA)

TREASURE

LÓPEZ SORIANO

Task leader in WP3
Contributor in WP5, WP6 and WP8

- To implement improvements in the recovery processes of materials from treatment.
- Accelerate improving the circular economy of these recovered materials.
- Integrate digital technologies in ELV disassembly and shredders processes to increase circularity performance and reduce recycling processes costs considering lower operation time, lower need for manual work, higher purity levels of recovered materials and higher process efficiency.
- Update and optimize new material recycling processes able to recover valuable and critical materials, other than base metals.

Partners

Ente Nazionale Italiano di Unificazione (UNI)

Contributor in WP8

- UNI will develop a standardisation strategic plan integrating project activities and outcomes spotting future international, European standardization activities (e.g. CEN Workshop agreement) and contributing to existing standards, whether necessary (e.g. introducing innovation, contradictory standards …). The document will codify project innovative metrics, requirements, methodologies and approaches resulting from project, focusing on risk assessment and safety issue. UNI will develop such document enhancing consortium skills.
- UNI will contribute to dissemination and exploitation activities enhancing national, European and International standardization communities and related experts.

Partners

MOV'EO (MOVEO)

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Task leader in WP7

- MOVEO will support the sharing and spreading of the project results through our network.
- Coordination of participation in clustering events and inter-project exchanges.
- Establishment of communication channels with past and on-going projects, as well as linkages with EUCAR, EIP Raw Materials and EIT Manufacturing. Evaluation of impact of TREASURE recycling technology and philosophy to other value chains.
- Organization of one 3-days workshop and summer school in M36.

TREASURE PROJECT PRESENTATION

Cicular web platform

Mattia CALABRESI / TXT

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WP4 – TREASURE platform design, development & integration

WP4 – TREASURE platform design, development & integration

TREASURE technological solution works as a knowledge catalyst that brings together data coming from key actors in the automotive value chains, as dismantlers/shredders, recyclers and manufacturers, used to perform CE assessments. It is designed as a digital toolbox based on integration of partners applications (MARAS Recycling Simulation Tool, SUPSI GRETA Tool) in an inclusive platform.

Within TREASURE use case, this solution ingests information coming from IMDS database (through MISS interface), processes it leveraging on **circularity experts' tools** according to specific KPIs and provides aggregated information on:

- **Disassembly procedures**
- **Recycling routes and assessment**
- **Eco design recommendations**

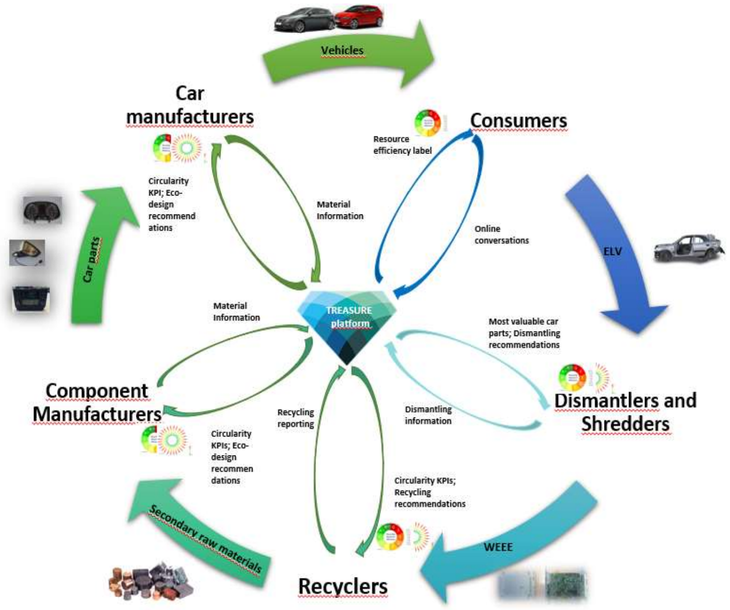
The platform is complemented by the **Circular Advisory** module that supports BoL and EoL actors in the decision-making process for each scenario

WP4 – TREASURE platform design, development & integration

TREASURE

TREASURE Web Circularity platform serves as a key **technological enabler** that connects the three processes (Disassembly, Recyclability and Eco-Design) investigated in TREASURE project. The integrated platform is a **toolbox** made up of 3 application modules supporting information and knowledge exchange for both BoL and EoL stakeholders in the automotive sector. For each module, the industrial partners and demonstrators are **supported by circularity experts** in validating TREASURE.

Process	Circularity expert	Platform module
Disassembly	UNIZAR	Disassemblability
Recycling	MARAS	Recyclability
Eco-design	UNIZAR	Eco-design
DIS+REC+ECO	SUPSI	Advisory

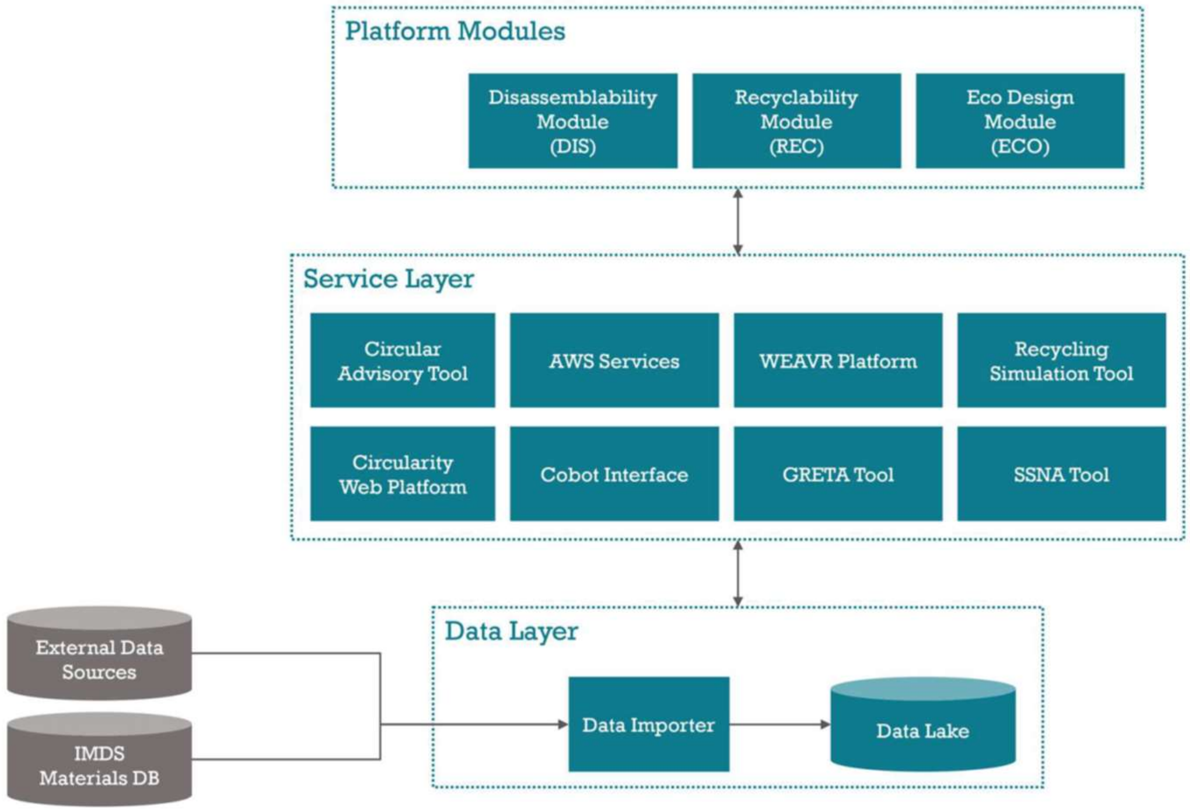


Technical Architecture

TREASURE

TREASURE technical architecture has been established as a web-based multi-layered data-driven platform which can be divided into three sub-architectures:

- **Data Layer**, containing components that manages data flow and manipulation
- **Service Layer** responsible for implementing main functionalities and related data streams used by Platform Modules
- three main **Platform Modules** (DIS, REC, ECO)



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Disassemblability Module

TREASURE

The Disassemblability Module contributes to improve timing and cost efficiency in the dismantling process by supporting two types of EoL actors:

- White collar employees: for efficacy in identifying the **best dismantling route** in terms of expenditure and timing
- Physical operators: as a toolset to improve efficiency by decreasing costs and speeding up operations by displaying dismantling AR/3D procedures and, for certain actions, assistance of a robotic arm, **the cobot**

Not only the platform displays input information but also collects user data both automatically in the form of log, timing of dismantling and manually as **feedbacks** provided by the operator concerning suggestions for improvements or issues incurred during the procedure.

Office

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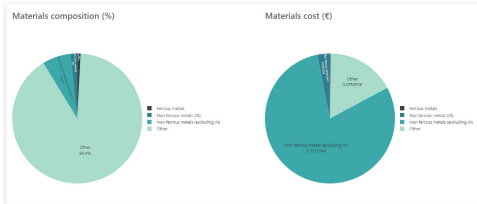
Garage



TREASURE Platform – Disassemblability Module


Cobot


WEAVR tool for AR/3D

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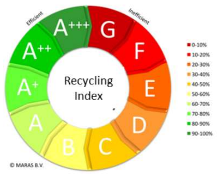
Recyclability Module

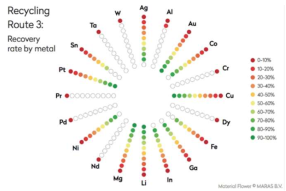
The Recyclability module supports industrial actors and automotive&WEEE professionals in quantifying the **recycling/recovery rates** for the total part/component as well as for all individual materials/ elements/compounds taking into consideration different industrial processing infrastructures and disassembly levels. The platform displays total and individual recycling indices based on advanced recycling flowsheet simulation models, supplied by the **Recycling Simulation Tool**.

According to user’s objective, the data provided by the module enables the assessment, quantification and optimisation of recycling routes and EoL circularity system and provides Design for Recycling advisory.

Recycling expert

Industrial process





TREASURE Platform – Recyclability Module

Recycling Simulation Tool

Eco-Design Module

TREASURE

The Eco-design Application supports car manufacturers and component supplier to improve car parts design from a CE perspective through the provision of **eco-design recommendations,** based on evaluation process performed by dismantlers and recyclers. This analysis considers data coming from internal sources (intelligence stored in the Data Lake and feedbacks collected in the Disassemblability module) integrated with information from MISS Database.

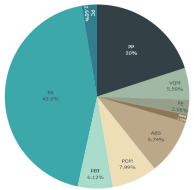
SEAT S.A.

Supplier

Car manufacturer

Feedbacks

	non crm 1 tq	crm 2 tq	non crm 3 tq	crm 4 tq	non crm 5 tq
Share over the total weight	1%	2%	3%	4%	5%
World recycling rates	>50%	>501%	>502%	>502%	>502%
Automobile demand with respect to annual production	13.28%	13.281%	13.282%	13.282%	13.282%
Total cumulative demand up to 2050 with respect to known reserves	17.42%	17.421%	17.422%	17.422%	17.422%
Supply risk	0.3	0.31	0.32	0.32	0.32
SMI	12.68%	12.681%	12.682%	12.682%	12.682%
Main country producer	Chile	Australia	China	China	China
Producing quote	15%	14%	13%	12%	11%



Eco-Design Module

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TREASURE Digital Toolbox

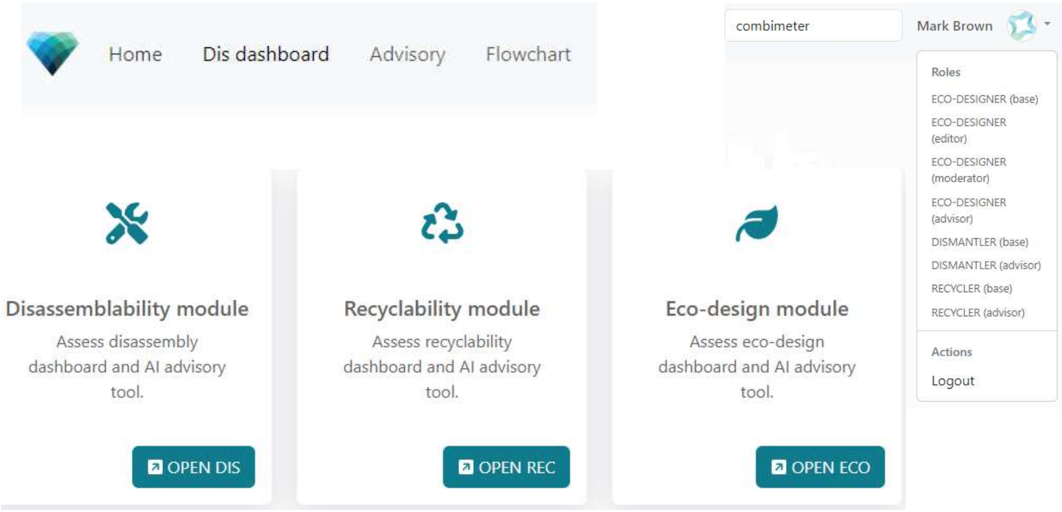
TREASURE

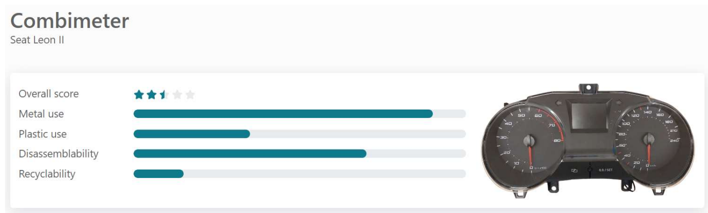
Web Circularity Platform

TREASURE GUI is designed with an upper part that is common for all modules followed by the section related to the specific module.

The shared section consists in the following elements:

- **Home, Module application, Advisory and Flowchart buttons**
- **Search bar to select a specific car component**
- **User profile type**
- **Overall score of the car part**, divided into specific scores regarding: 1) Metal use; 2) Plastic use; 3) Disassemblability and 4) Recyclability.





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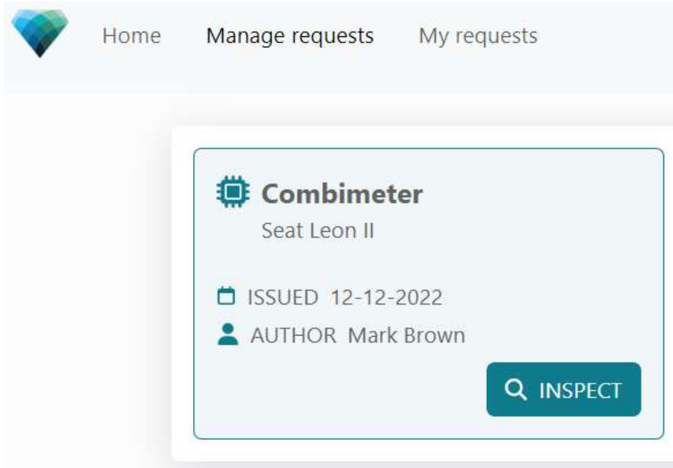
TREASURE Digital Toolbox

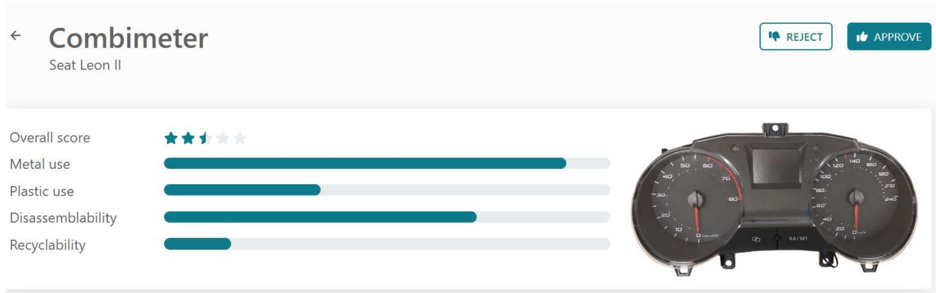
3 categories of users are possible based on the granted authoring rights:

• The **basic user** with visualization only mode: the user can only see the platform content with no authorization to edit

• The **editor mode**: enables the user not only to visualize the information but also to add new content on specific platform sections by clicking on the “Edit” button

• The **moderator mode**: the user can approve or reject the data provided by the editor, leaving feedback in case of non-approval



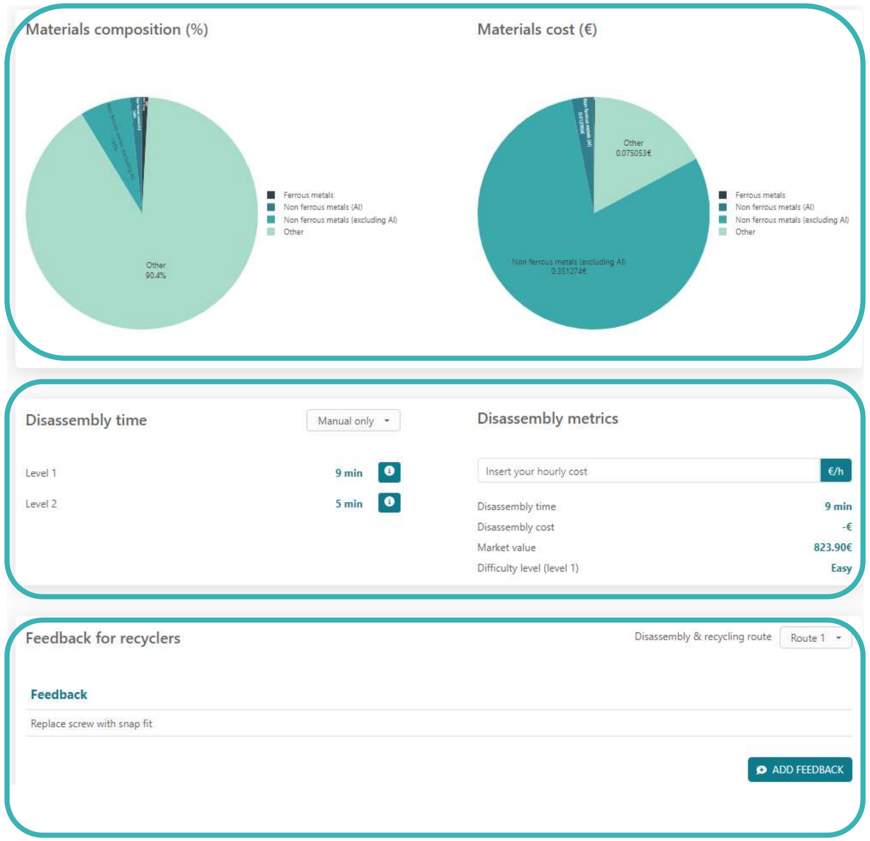


TREASURE Digital Toolbox

Disassemblability Module

The Disassemblability Module provides the following information based on the analysis performed in T3.2:

- **Materials classification** in the following categories **and respective economic value**: Ferrous metal, Non-ferrous metal (both including and excluding Aluminum) and Other.
- **Disassembly metrics**:
  - Disassembly **time** for Disassembly Level 1 and 2
  - Disassembly **cost**
  - The **market value** of the car part if it were new.
  - Disassembly **difficulty** of Levels 1 and 2 classified as High / Medium /Low
  - **Cobot** metrics for Level 3 disassembly of PCB
- **Feedbacks for recyclers**



TREASURE Digital Toolbox

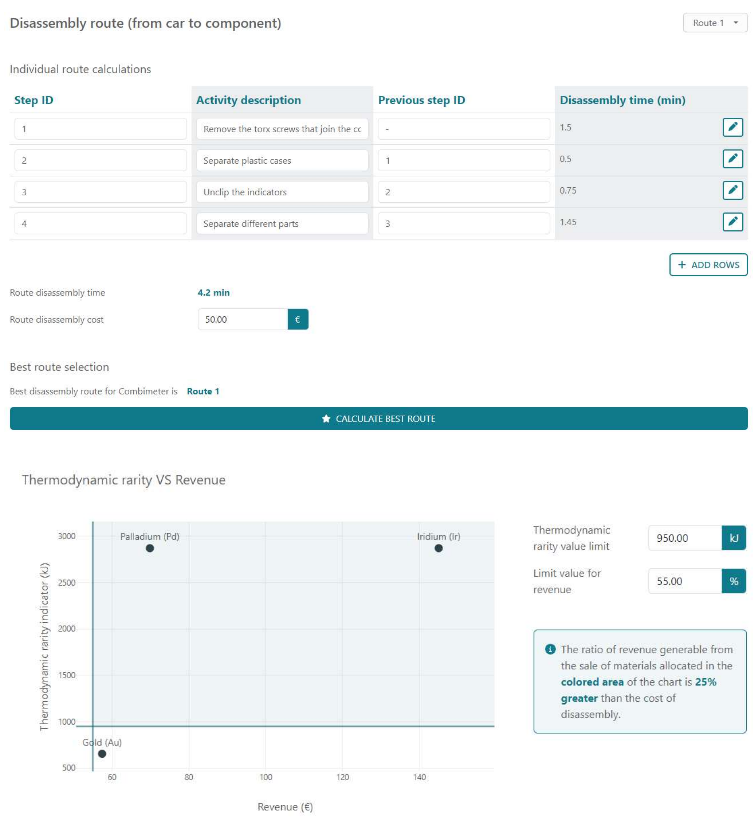
TREASURE

Disassemblablity Advisory Module

It provides intelligence on **critical metals** to extract according to a prioritization calculated from specific KPIs related to:

- the **disassembly process**: operation time and cost (actualized for specific hourly/rate);
- the **car component composition**: material mass, recovery rate, thermodynamic rarity and market value of the removed part/s at material level

An additional analysis is provided via chart comparing thermodynamic rarity and revenue, based on parameters defined by the user



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TREASURE Digital Toolbox

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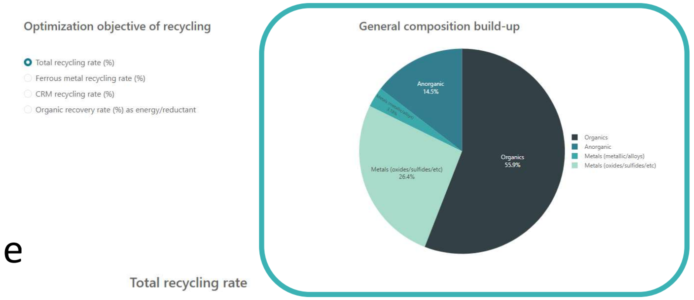
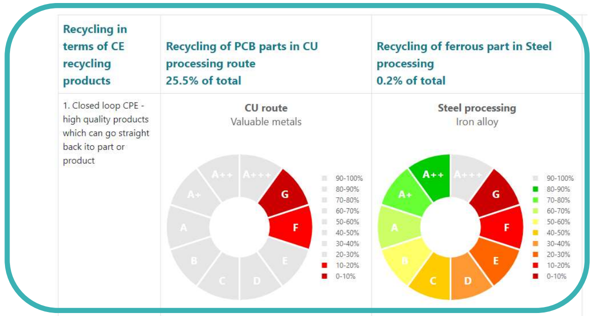
Recyclability Module

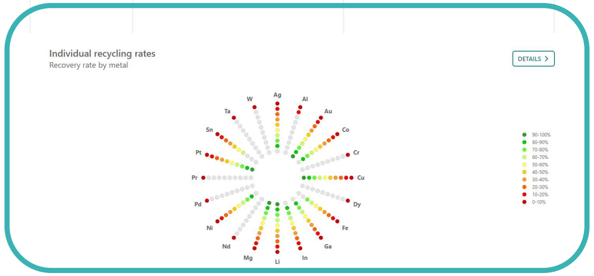
The Recyclability Module provides the following information:

- **Total recycling rate** (%) visualized by the Recycling index of the car part as a whole (%), as a function of the recycling objective (total, ferrous metal, CRM, organics etc)
- **Individual material recycling rate** of all materials/elements/compounds included in the car part in % (also available in mass) – visualized by Material Recycling Flower (%)
- **Energy recovery** in MWh/t of feed or per car part
- Assessment based on full compositional detail - **composition build-up** depicted in major categories/classes (depth of composition maintained in calculations): Cu, Ferrous, Light Metals (incl oxides), PMs/PGMs, REEs, Other metals (incl. Oxides), Organics, Anorganics/others
- **Recommendations and Advisory** on most optimal recycling flowsheet architecture (as a function of recycling objective), advisory for disassembly & Design for Recycling for each unique design/part



Total recycling rate





TREASURE Digital Toolbox

TREASURE

Recyclability Advisory Module

It provides a ranking of most convenient recyclability routes starting from the analysis performed by the Recycling Simulation Tool and further complemented by a **socio-economic impact assessment**. Regarding the latter, the social analysis measures the effect of the decision to avoid material extraction while the economic study refers to the possible revenues that this process can generate.

A graphical representation has been added in the form of a **3D chart** that enables the user to understand at a glance **the impact of selected disassembly and recycling routes in the three domains** (environmental, social and economic).

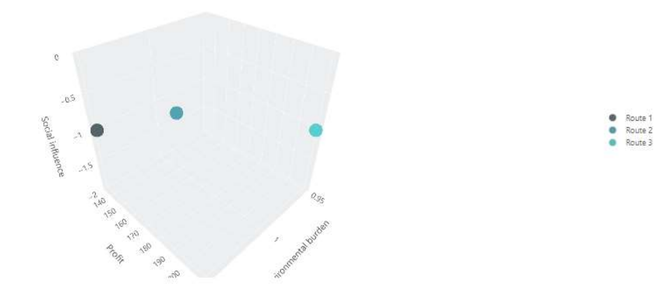
Combimeter

Seat Leon II

Determine which combination of disassembly path and recycling process to implement (from component to material)

Route ID	Recycling Simulation Tool ranking	Social impact assessment	social assessment ranking	Economic impact assessment	Economic assessment ranking	Environmental impact assessment	Environmental assessment ranking
1	1°	Medium risk (-1)	1°	135.32€	3°	1.05 points	3°
2	2°	Medium risk (-1)	1°	150.77€	2°	1 points	2°
3	3°	Medium risk (-1)	1°	210.56€	1°	0.95 points	1°

Graphical integration approach



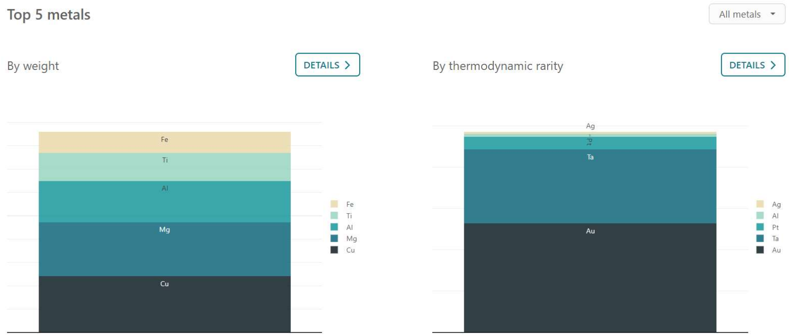
TREASURE Digital Toolbox

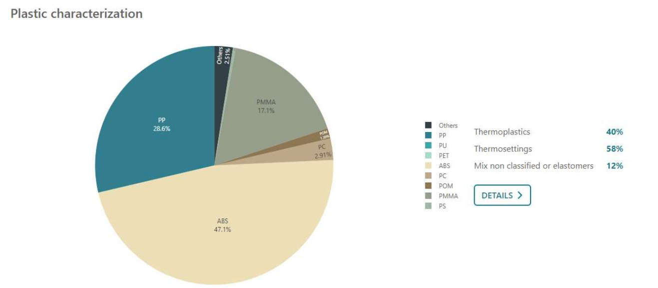
TREASURE

Eco-design Module

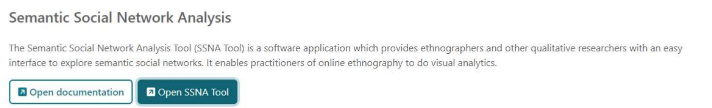
The Eco-Design Module provides the following information:

- **Ranking of 5 top metals** by weight and thermodynamic rarity based on:
  - World recycling rates
  - Demand with respect to annual production
  - Supply risk
  - SMI (Strategic Metal Index)
  - Main country producer and producing share
- **Plastic characterization** by % share and mass
- **Disassembly metrics** by time and level
- **Recommendations** to BoL actors to improve car part design for disassembly (DfD) and Design for Recycling (DfR) (on basis of unique recycling fingerprint and pinpointing/quantification of hot-spots by Recycling Simulation Model)





The module is complemented by SSNA Tool, a software application which provides ethnographers and other qualitative researchers with an easy interface to explore semantic social networks



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TREASURE Digital Toolbox

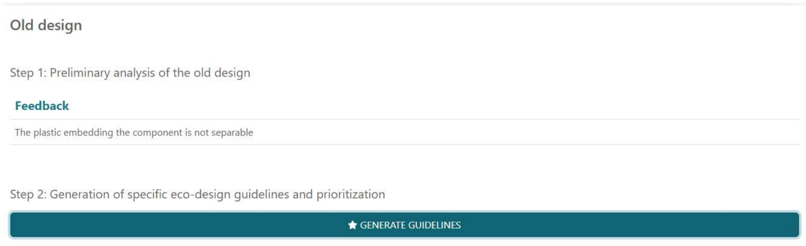
TREASURE

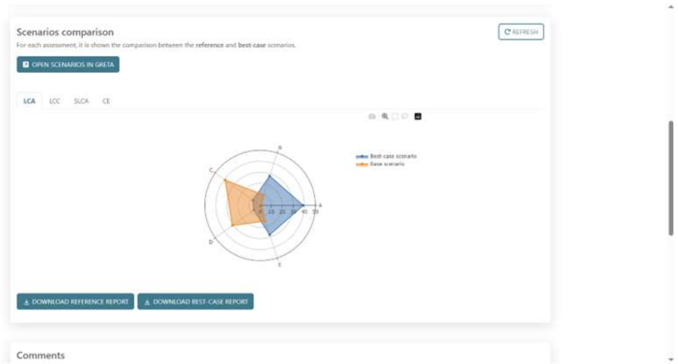
Eco-Design Advisory Module

It enables users to compare different scenarios concerning car part design in terms of sustainability and circularity with the goal to support car manufacturer in the decision making process. The Eco-design advisory platform is split in 2 sections:

- the first is assigned to provide key information related to the existing design examining its **compliance to specific guidelines** in terms of disassembly and recyclability;
- the second is focused on showing the s**ustainability and circularity analyses performed** using GRETA* Tool; **a comparison** of the selected scenarios is shown with a radar chart with the possibility to include comments/notes inserted by the user in GRETA

*GRETA is a web application designed to assess the sustainability and circularity performances of products and processes in manufacturing contexts. It offers diagnostic and advisory functionalities, enabling users to optimize their manufacturing practices and make data-driven decisions.





DEMO

- Demo Storyboard of the Combi pilot case:

- EoL user:
  - Using the Disassemblability module, the dismantler white collar employee selects the component to disassemble (with the previous support of the advisory for the car part ranking) according to time and costs metrics
  - The dismantling operator uses the 3D application partially supported by the cobot, providing feedbacks

  - The best recyclabing processing flowsheet is identified through the Recyclability module based on the Recycling Simulation Models providing individual materials recovery rates and energy and exergy balance and EoL LCA detail for each unique design/part, complemented by the socio-economic impact assessment

- BoL user:
  - Car manufacturers have access to data and feedbacks collected in the Disassembly and Recyclability modules to improve component design in CE perspective (including advisory assessment of the design compliance to recyclability and disassembly guidelines)

TREASURE PROJECT PRESENTATION

Eco design assessment & advisory tool presentation

Ludovica ROSSI / SUPSI


GRETA
GREen TArgets
A web application for GREen TArgets
Scuola universitaria professionale
della Svizzera italiana
SUPSI

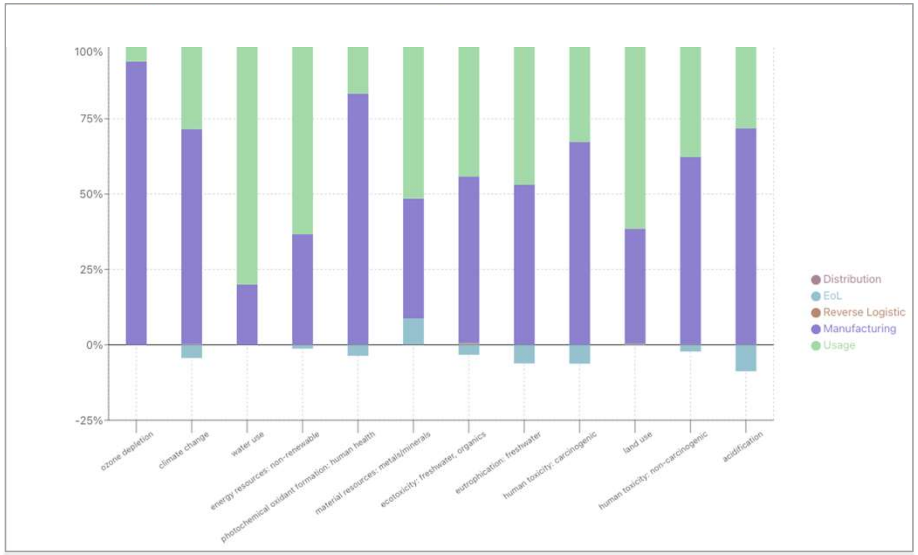
Agenda

1. What is GRETA
2. Why do we need GRETA?
3. The users' Journeys
4. GRETA Integration in TREASURE
5. DEMO

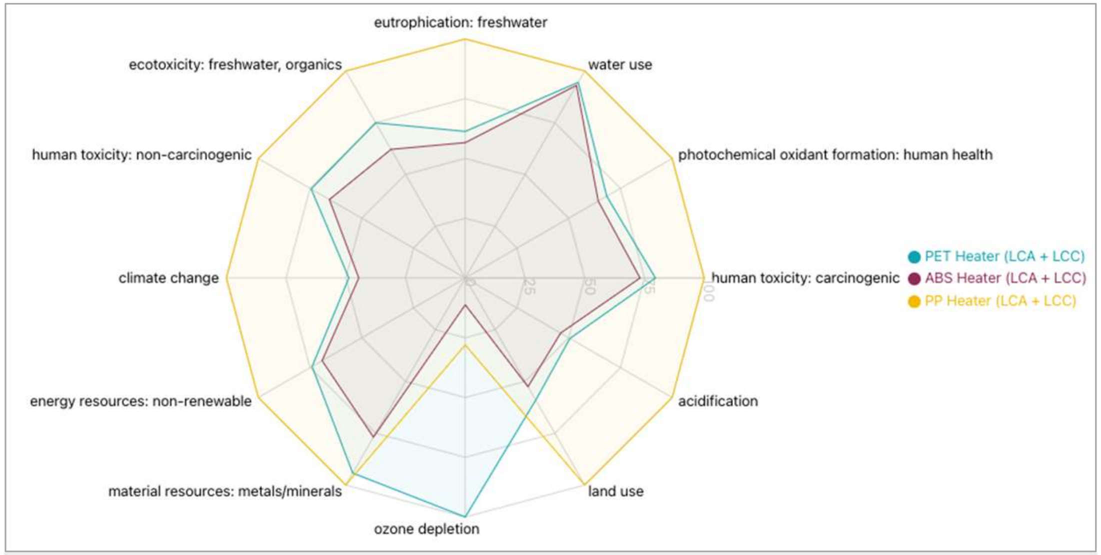
What is GRETA?

GRETA is a web application designed to assess the sustainability and circularity performances of products and processes in manufacturing contexts. It offers diagnostic and advisory functionalities, enabling users to optimize their manufacturing practices and make data-driven decisions.

Results of LCA, LCC assessments



RADAR chart for scenarios comparison



GRETA Features

- LCA, LCC, SLCA and CE assessments
- Different assessment subjects: product, process, machine, production line, and company
- Sustainability reporting compliant with GHG protocol
- Real-time comparison between different alternatives of product
- Easy integration with real production environments via remote services (IoTs, middleware, REST services, etc.)
- Possible integration with legacy systems (ERP, PPS, etc.) and external applications (DPP, project platforms, etc.)
- Reporting functionalities
- OpenLCA models importing
- BoM standard files importing
- Authenticated REST APIs web services for allowing third-party applications to exploit GRETA
- Multi-domain solution and data isolation to ensure data confidentiality
- AI-based Advisory for supporting users in making decisions (under development)

Why do we need GRETA?

TREASURE

	GRETA	Existing Tools
Sustainability skills	**No sustainability skills** required	The user must have sustainability skills
Methodology	Based on ISO14040	Based on ISO14040
Performances	Assessments take **few seconds**	Assessments can take several minutes
Comparison	**Real-time comparison** between scenarios	Comparison between two scenarios can take several minutes
Report	Valuable comparison result **report**	Comparison result report is often not valuable
Data collection	Inventory data can be gathered from **real production environment** via IoT	Rarely integration with the real production environment
Integration	**Web services** via APIs	Web services rarely provided
Advisory	**AI/ML-based advisory** functionalities	Advisory functionality rarely provided
Eco-design	User can be supported for performing an **eco-design** approach	Due to performance, it is not always possible to use them as eco-design tool
Process modelling	Model editor not (yet) provided	**Model editor** usually provided

GRETA Users' journeys

Sustainability expert - The experts model, by means of existing model editor (like OpenLCA) all processes, along the life cycle phases, behind a product. By means of GRETA, the expert can define the customization spaces meant to describe the production constrains and possible production alternatives (in terms of raw materials, electricity mixes, transportations, etc.), enabling manufacturers to optimize their manufacturing practices.

Customer – Manufacturers/designers can use GRETA to assess their own products/processes/company from a sustainability point of view enabling them to optimize their manufacturing practices and make data-driven decisions.

The sustainability expert's journey

TREASURE

01

The expert models, from a sustainability perspective, all life cycle processes behind a product (production, assembly, transport, etc.) by means of existing modelling editor (like OpenLCA)

The sustainability expert's journey

TREASURE

01 The expert models, from a sustainability perspective, all life cycle processes behind a product (production, assembly, transport, etc.) by means of existing modelling editor (like OpenLCA)

02 The expert imports all models in GRETA and define the related customization spaces

The sustainability expert's journey

TREASURE

01 The expert models, from a sustainability perspective, all life cycle processes behind a product (production, assembly, transport, etc.) by means of existing modelling editor (like OpenLCA)

02 The expert imports all models in GRETA and define the related customization spaces

03 The expert defines the product alternatives (scenario templates) and make them available to the customer

The customer's journey

TREASURE

01

The customer selects the scenario template related to the product she/he wants to customize and evaluates the sustainability aspects

The customer's journey

01 The customer selects the scenario template related to the product she/he wants to customize and evaluates the sustainability aspects

02 The customer creates different alternatives of the product by customizing them

The customer's journey

01 The customer selects the scenario template related to the product she/he wants to customize and evaluates the sustainability aspects

02 The customer creates different alternatives of the product by customizing them

03 The customer executes the sustainability assessments

The customer's journey

TREASURE

01 The customer selects the scenario template related to the product she/he wants to customize and evaluates the sustainability aspects

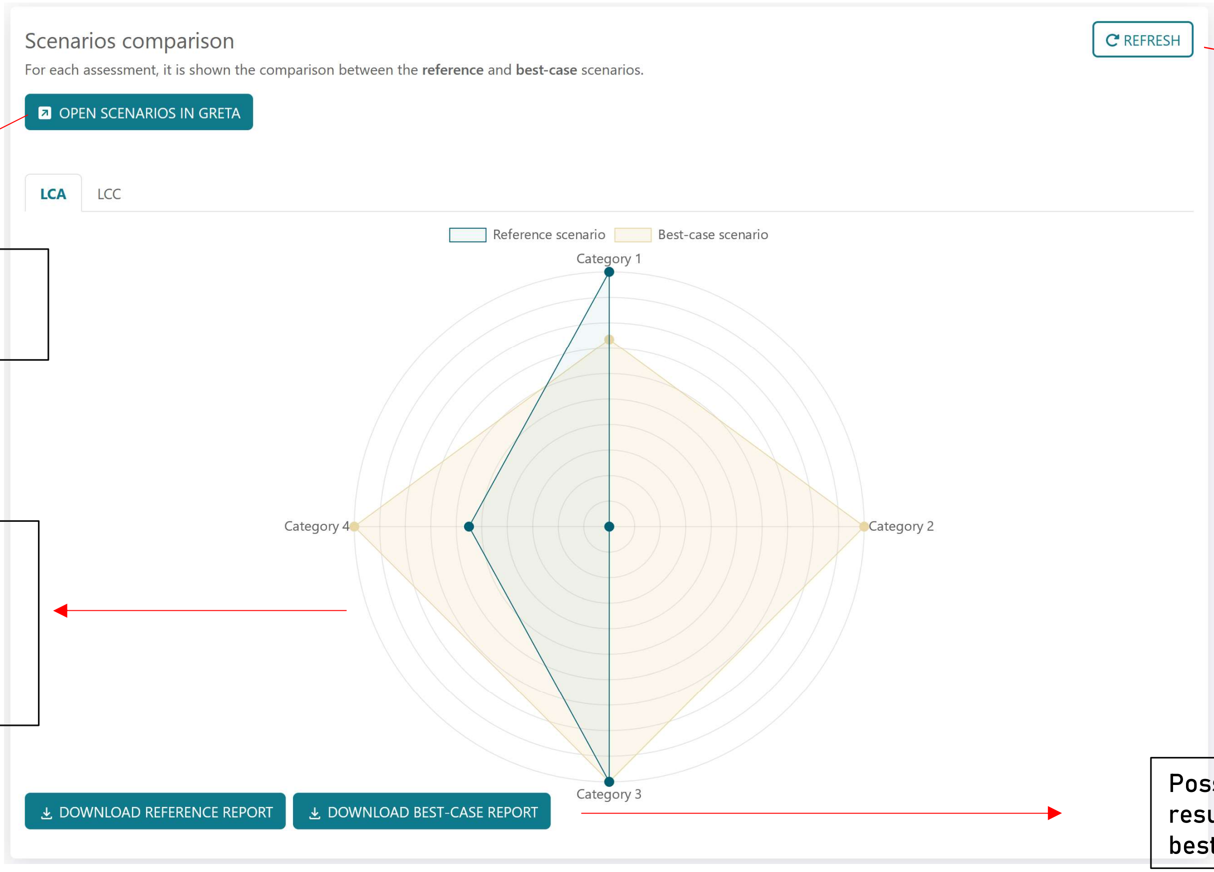
02 The customer creates different alternatives of the product by customizing them

03 The customer executes the sustainability assessments

04 The customer compares the customized product alternatives from a sustainability perspective, thus making design decisions accordingly

GRETA Integration in TREASURE Platform

TREASURE



Refresh button to update scenarios according to modification in GRETA

Link to GRETA to visualize the list of alternative scenarios available for the comparison with reference scenario

Radar chart for LCA, LCC to compare the performance of the reference scenario (e.g., current design) with the one of the best design alternative (selected among possible alternative design scenarios modeled in GRETA)

Possibility to download report with resulting impacts for both reference and best alternative design

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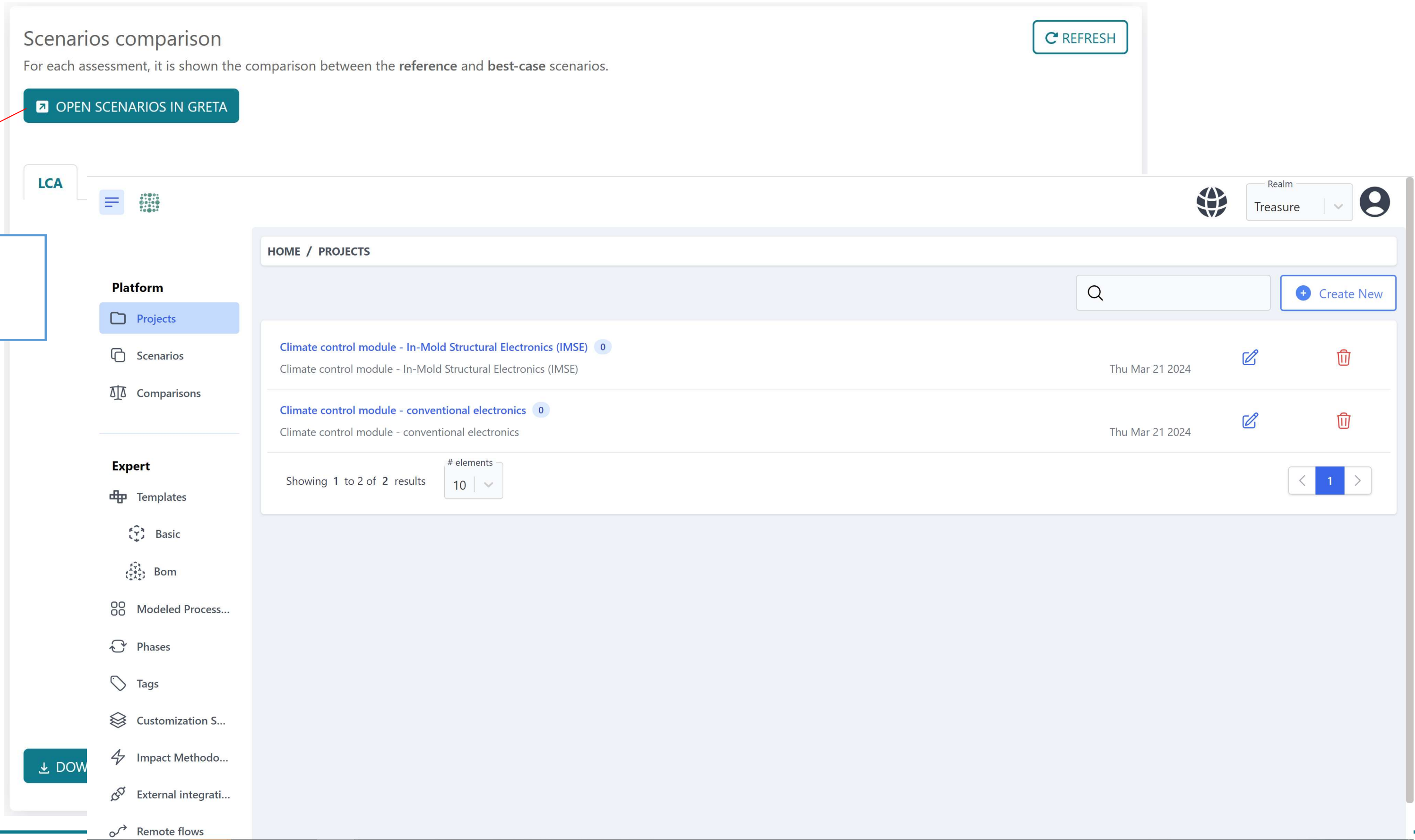
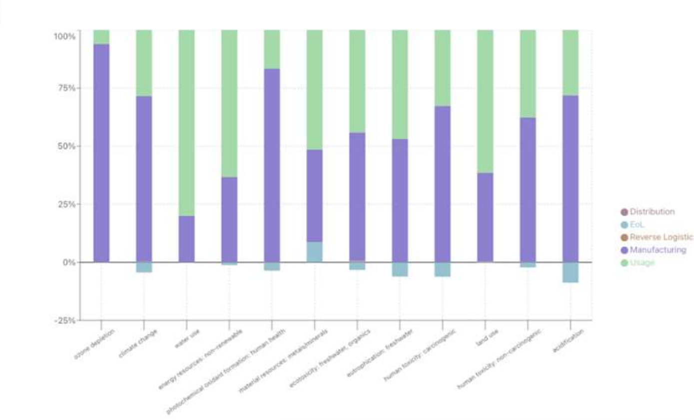
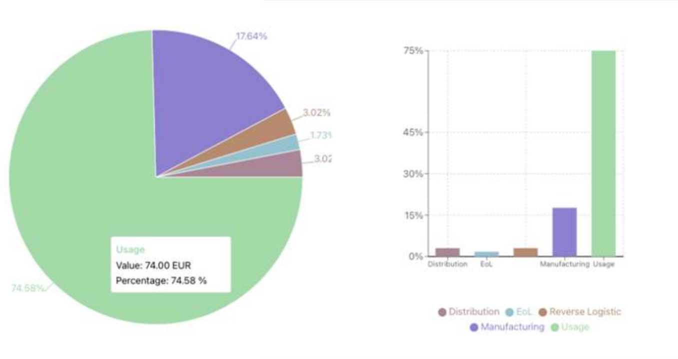
GRETA Integration in TREASURE Platform

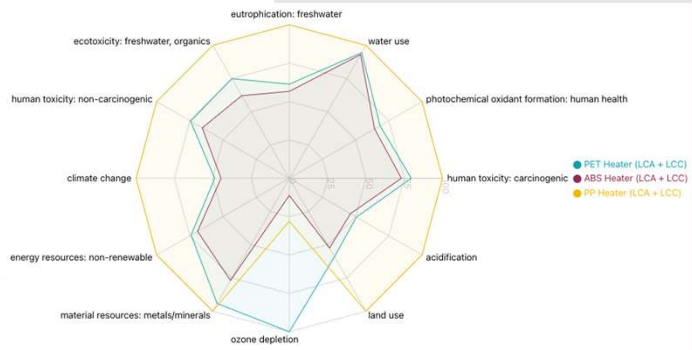


Link to GRETA to visualize the list of alternative scenarios available for the comparison with reference scenario

DEMO







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ARE YOU INTERESTED IN TRYING GRETA?

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TREASURE PROJECT PRESENTATION

TREASURE

Pilot Plant for semi-automated PCBs Disassembly

Lorenzo GANDINI / POLIMI

TREASURE

Losses in end-of-life vehicles recovery chain and new technological solutions

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003587

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Treasure Project

TREASURE

Guaranteeing a sustainable use of raw materials in the automotive sector, by reducing material supply risks

Offering better vehicle-related economic, environmental and social performances to all the end users

Adopting in practice the circular economy paradigm in the automotive sector, by acting as demonstrators for the manufacturing sector

Creating new supply chains around End-of-Life Vehicles (ELVs), by focusing on a circular exploitation of raw materials embedded into cars.

Electronic components in automotive industry

TREASURE

- 15 to 50 electronic components
- About 1.5 Kg within a 1.16 tons modern medium-sized car
- Car's average mass relevance (%): about 0.1%

- Increasing trend usage of electronic components CAGR 13,8 percent
- ELVs mass grow rate 4,49%

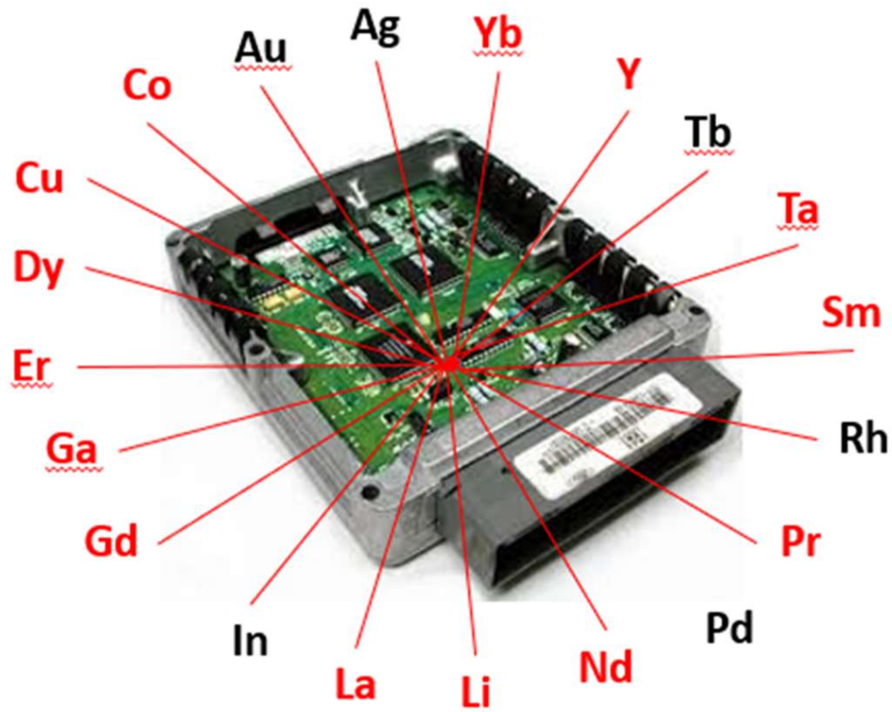
- From 30 to 50 percent of the vehicle total production cost
- Value of embedded car electronics ranging from 136,50 to 607,621 euro/t based mostly on gold recovery

- Consequent increase in demand for CRMs
- Supply chain exposure to bottlenecks due to lack of raw material supply

Policies Status

TREASURE

- Current ELV recovery processes/EU ELV Directive do not consider wasted automotive electronics
- Weighted-based approach of the EU ELV Directive, pushing basic materials recovery
- Information related to generated volumes of wasted automotive electronics are not available
- ELV reverse logistic chain/recovery technologies are not ready for managing automotive electronics
- EU CRM Act
- At least 20% of the EU's annual consumption of CRMs for recycling
- Possibility of new business around ELVs and need of compliancy



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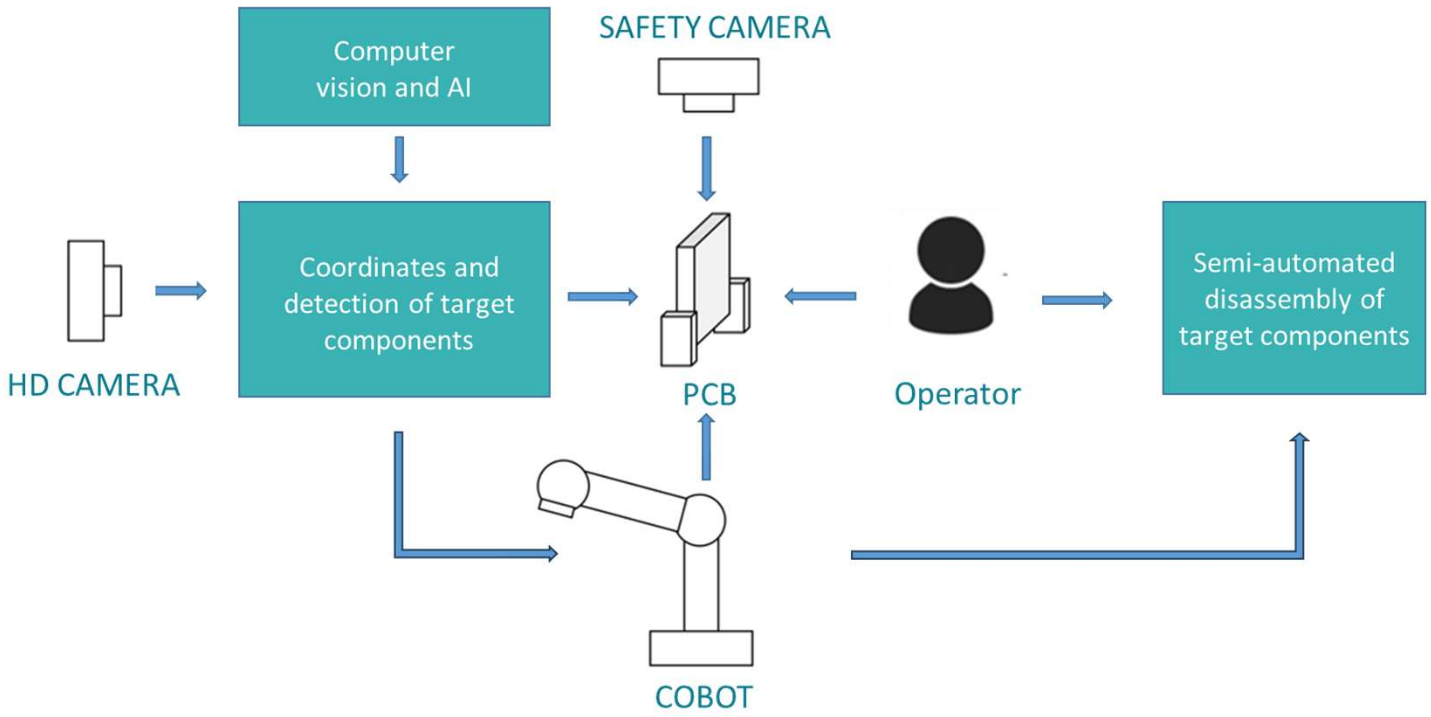
Need for new technological solutions

TREASURE

- Needed to extract and maximize embedded value in electronic components
- Need to achieve better material flow separation to achieve better recycling performances
- Capability of recovery of materials presenting small ppm using semi automated solutions
- Development of ad-hoc know how in the context of Treasure Project
- Research in different Key Enabling Technologies to fill the technological gap



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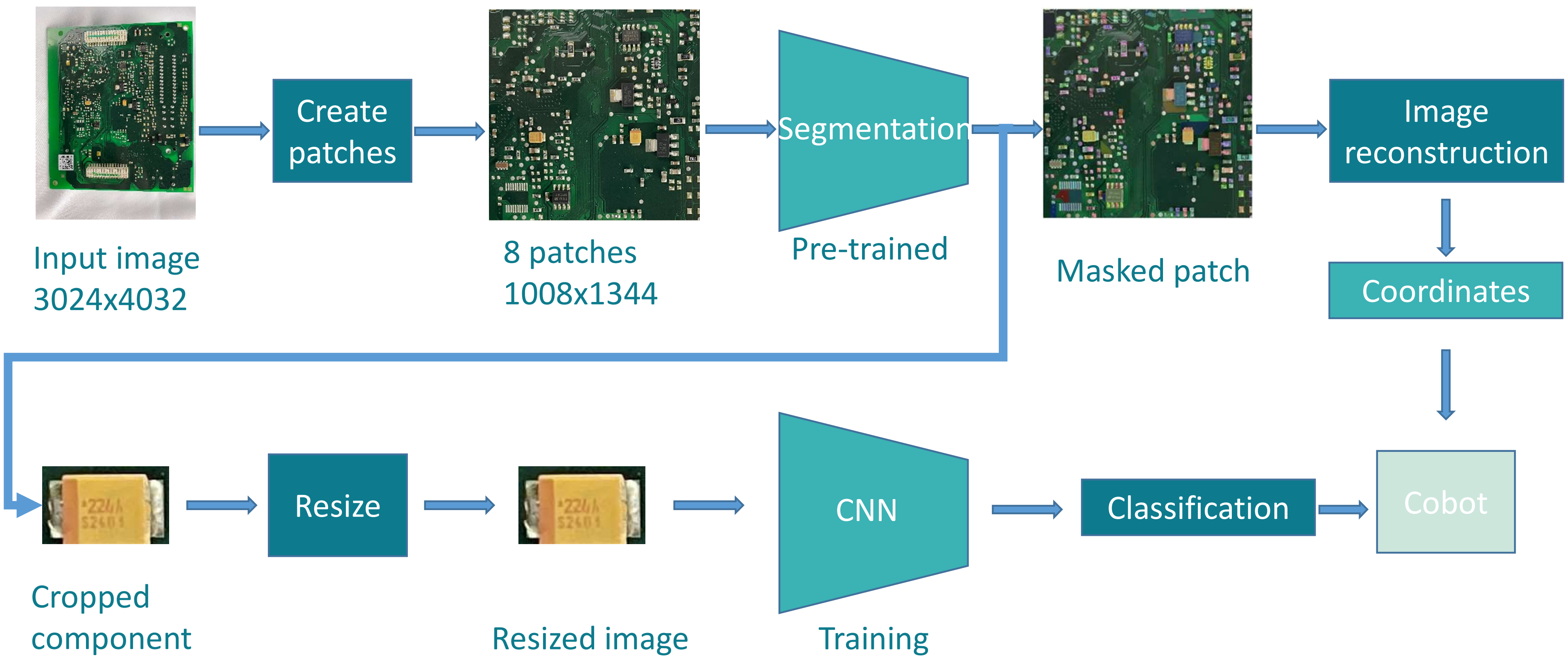
Framework of classification approach

TREASURE



Results of the Treasure project

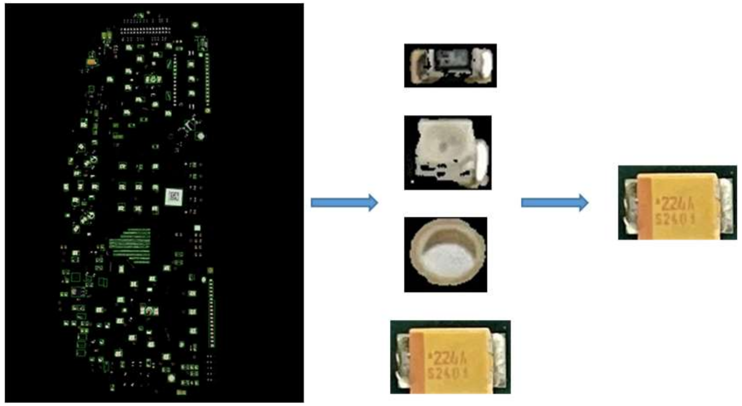
TREASURE

- Although the presented framework represents the optimal solution, the problem of accessing sufficiently large datasets for training the classifier proved to be critical.

- For this reason, a hybrid approach combining both computer vision and artificial intelligence was chosen to detect relevant components for disassembly from the PCB.

- The first AI-based solution will focus on identifying the integrated circuits present on the board.

- The second solution, based on computer vision and leveraging the presence of the operator to filter out any false positives, will concentrate on identifying tantalum capacitors.



Cobot Disassembly of SMD components

TREASURE

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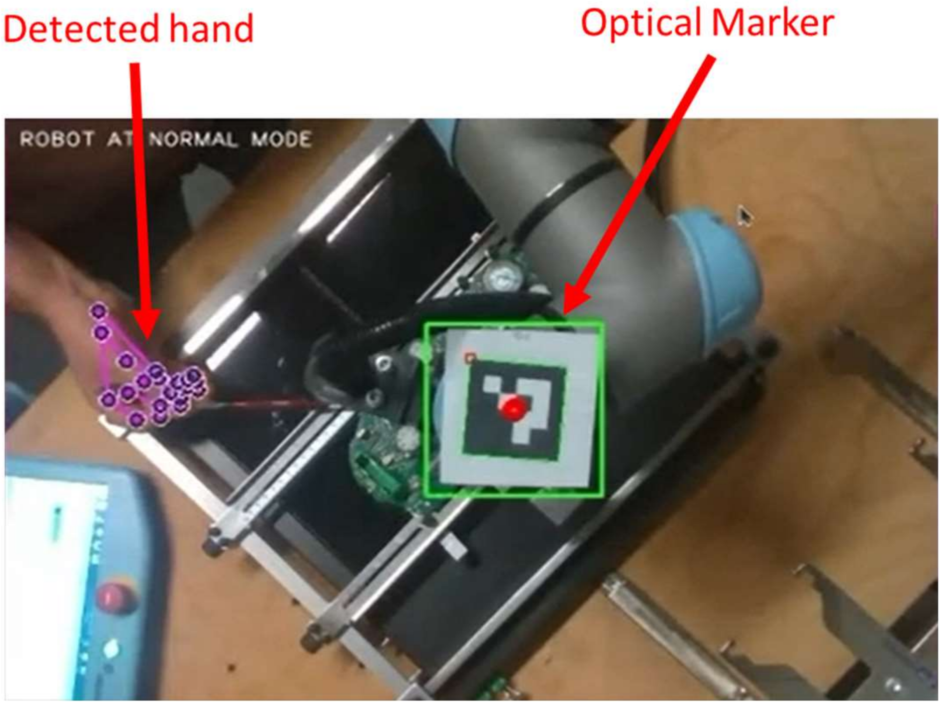
Human Robotic Collaboration

TREASURE

- While the cobot is capable of handling potential impacts with the operator, when equipped with a dangerous tool, it requires additional precautions to ensure safe operation with the operator.
- This prompted in devising an innovative solution that could mitigate the risks introduced by the presence of a potentially dangerous tool
- Computer vision and AI approach developed in collaboration with SUPSI to detect the operator's hand and the work area of the cobot



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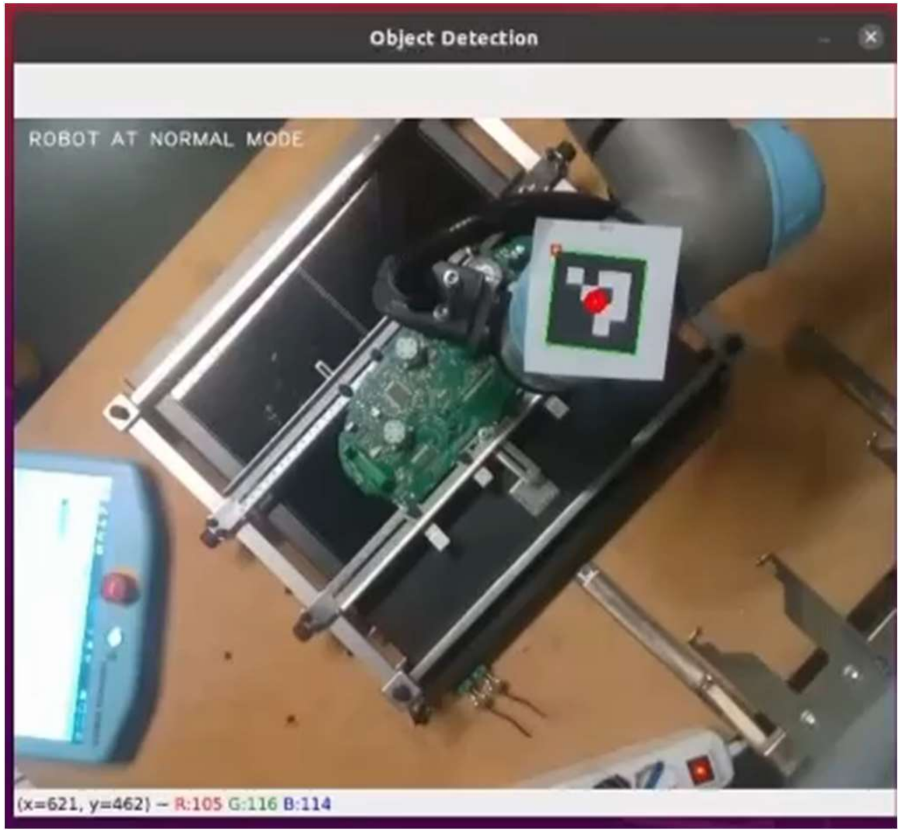
Human Robotic Collaboration



TREASURE PROJECT PRESENTATION

State of the art of critical raw materials assessment

Daniele PEROSSA / POLIMI

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STATE OF THE ART OF CRITICAL RAW MATERIALS ASSESSMENT

TREASURE

Daniele Perossa (daniele.perossa@polimi.it)

Politecnico di Milano, Department of Management, Economics, and Industrial Engineering

TREASURE Spring School, 24th-26th April 2024, Paris, France.

Introduction

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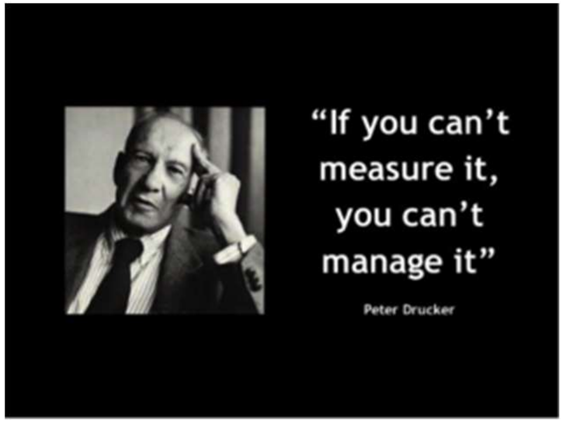
Critical Raw Materials (CRMs) can be defined as materials that are necessary or extremely relevant for industry and/or society but whose usage may expose to significant risks [1][2][3].



Tools and methodologies for criticality assessment

Existing tools and methodologies for CRMs assessment

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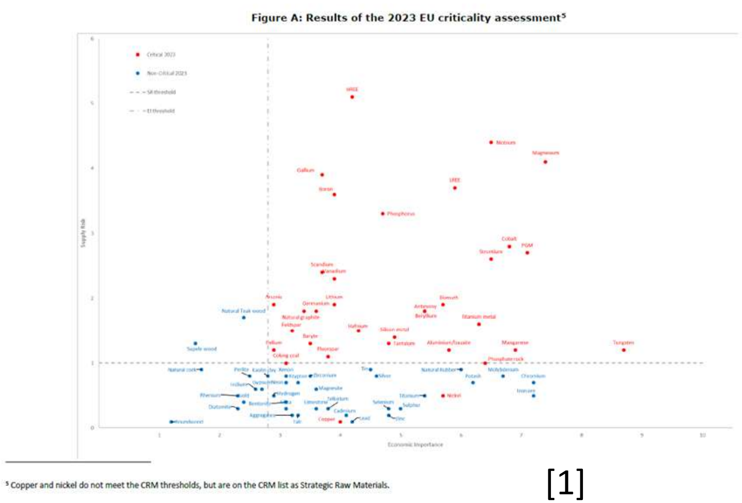
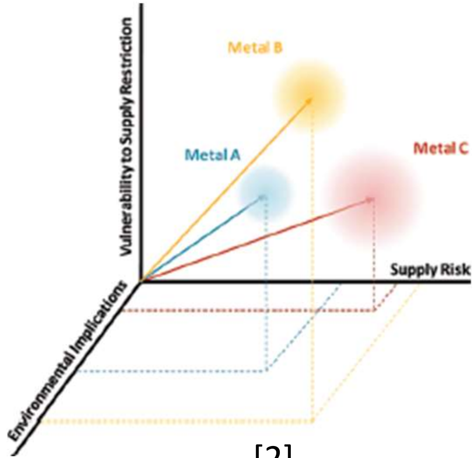


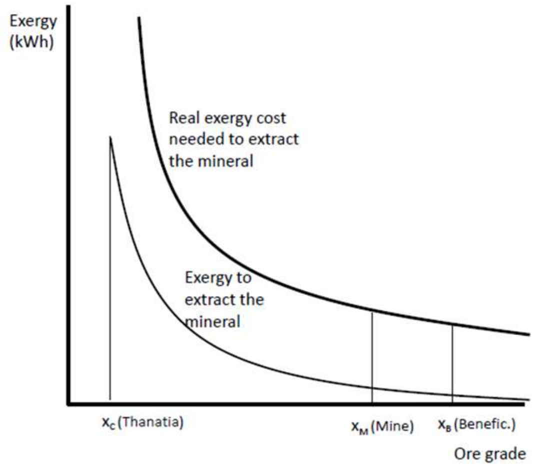
[1]

Differences in conceiving the criticality concept even at ontological level

Literature is unstructured and very confused



[2]



[4]

Research Objective

Mapping the existing criticality assessment models and tools, providing a snapshot of the current state of the art of this knowledge domain.

In doing so, a particular focus has been put on the relationship between the concepts of criticality and environmental sustainability.

Originality: No previous review about criticality assessment tools and methodologies has ever been so extensive and with a so strong focus on the connection between criticality and environmental sustainability.

Benefits: The resulting map may support interested actors in orienting themselves inside criticality assessment domain. This and further reviews may support in structuring better the literature and contribute the systematization of the selection and development of criticality assessment methods.

Methodology

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A total of 107 different tools and methodologies was identified and classified by means of systematic literature review methodology

Criticality Scope	Considered criticality dimensions	Model Typology	Criticality criteria	Consideration of Environmental sustainability	Consideration of circularity aspects and practices

Results

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- **Lack of focus at company level**: Big emphasis at world and country level. Only 7 artifacts out of 107 were meant to support companies.

- **Most considered criticality dimensions**: (i) Unavailability risk (102 times); (ii) Economic impact (42 times); (iii) Environmental impacts (33 times).

- **Criteria to determine criticality:** most artifacts consider a relative concept of criticality (benchmarking 54 times). Several others consider an absolute concept (threshold 6 times, clustering 27 times).

- **Circularity aspects:** almost exclusively considered as a parameter offsetting unavailability risk.

Environmental impacts and criticality

Sheer environmental impacts as directly influencing criticality

VS

Environmental impacts as influencing social acceptability and unavailability risk

- In 19 cases out 33, environmental impacts is considered **as a main criticality dimension, but why??**
- Application of **ReCiPe model** is suggested several times, exploiting **Ecoinvent** database.
- Etc…

- **Environmental country risk**: measurement of the risk of supply restrictions due to environmental regulations in the considered country.
- Etc…

Few more take-aways

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- Strong focus on energy sector. **Other sectors where CRMs are strategic are overlooked.**

- Big (even ontological) differences and inconsistencies around criticality concepts among different works.

- Most tools and models are mathematically and conceptually **simple**.

- There are different attempts of **integrating criticality assessment with LCA or LCSA methodologies**. Typically, the study is purely methodological. Criticality is often considered as an **additional end-point**. Thus, the baseline is considering criticality as a **component of the overall sustainability concept**.

Future steps

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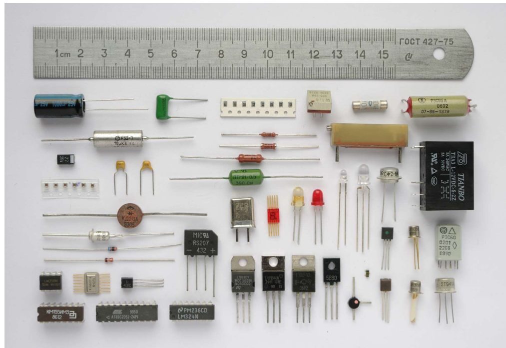
1. Different contexts and needs call for **customisation** of assessment methodologies.

2. Literature is greatly unstructured and confused. It is suggested creating **accepted guidelines for the development of criticality assessment methodologies**.

3. **Need for a theoretical framework for the concept of criticality**.

4. Which of the following is more valuable?

OR



Criticality of competencies and processes "embedded" in the components

Sources

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THANK YOU!

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TREASURE PROJECT PRESENTATION

POLITECNICO MILANO 1863 | PORTFOLIO MANAGEMENT Manufacturing Group

Standardization and show case

Cristina DIMARIA / UNI

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TREASURE project
Spring School

TREASURE standardization activities:
a support in the development of a future digital product passport for printed circuit boards (PCBs)

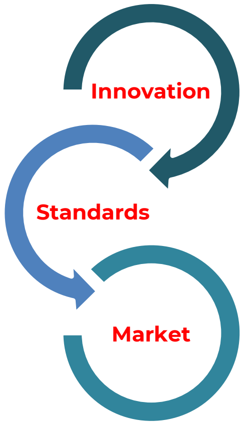
Cristina Di Maria – Research Project Manager

UNI Ente Italiano di Normazione

Paris, 24th – 26th April 2024

TREASURE standardization activities

TREASURE



STATE OF THE ART ANALYSIS:

Which are the standards relevant for the project?

D8.4 Standardization toolkit (M24, completed)

NEED ASSESSMENT AND GAP ANALYSIS:

What's missing in standards?

STRATEGIC ROADMAP / CWA:

How can we transfer to the market the output of the project?

D8.5 Strategic standardization roadmap and CWA (M36, May 2024)

TREASURE

STATE OF THE ART ANALYSIS:

Which are the standards relevant for the project?

Standards Mapping: methodology

TREASURE

- **Analysis of the relevant Legislative Framework -> Directive on waste electrical and electronic equipment (WEEE) and Directive on end-of life vehicles - Commission Statements**
- **Review of the CENELEC TC 111 TX Environment working programme**

  To deal with environmental aspects for electrical and electronic products and systems. To promote activities in CENELEC relevant to reducing detrimental impacts of electrotechnical activities/products/systems on the natural environment (In this context "reducing" means a process of continual environment improvement aimed towards an optimum balance with social, economic, safety and performance requirements). To enhance CENELEC's environmental links with the European legal framework, particularly in the context of standardization aspects of EU environmental regulations and directives. To prepare the necessary standards framework and in co-operation with other CENELEC Technical Bodies co-ordinate the development of, or when necessary produce, the needed standardization deliverables. Product TCs remain autonomous in dealing with environmental aspects relevant to the products included in their scope.

  -> Are there any standard potentially applicable to the automotive sector?

  All phases covered (from design to reuse and recycle)

- **Check DIN standards (recovery of car electronics) -> given the relevance of the sector for the German economy**
- **Horizontal topics: LCA/LCC -> mapped standards LCC methodology (although not in the automotive sector)**
- **Check standards by CEN SS 26 Environmental management and ISO TC 323 – Circular Economy**
- **Partner survey -> validation by consortium partners**

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Standards Mapping: results

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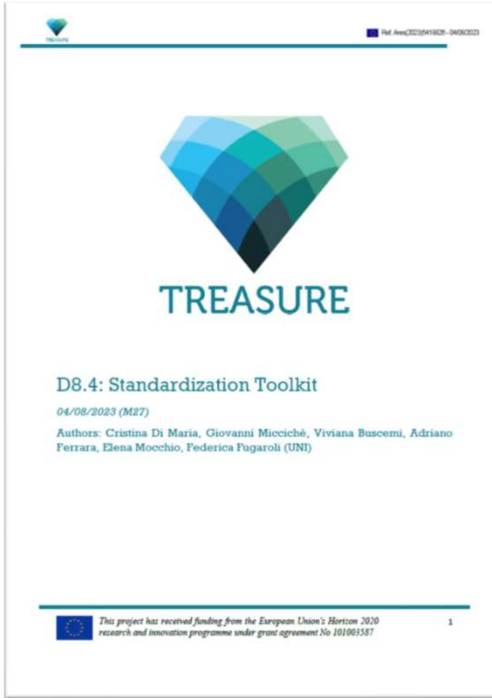
Overall, 86 standards were mapped, of which 72% "current" and 28% "work in progress". Most of these standards relate to sectors different from the automotive. The standards cover the following Areas:

Area	**Definition (from ISO catalog when available)**
Design	stage of information development that is concerned with determining what information for users will be provided in a product and what the nature of the information will be (SOURCE: ISO/IEC 26514:2008)
Deployment	phase of a project in which a system is put into operation and cutover issues are resolved [SOURCE: ISO/IEC/IEEE 24765:2017(en), 3.1113]. Or process to bring entities or resources into effective action
Assembly	number of component parts fitted together to perform a specific function ISO 10209:2022(en), 3.1.8
Use	activity that the user may perform with or on the product during its whole life cycle Use covers the intended use and the reasonably foreseeable misuse in normal and reasonably foreseeable conditions of use. [SOURCE: ISO 10209:2022(en), 3.14.45]
Reuse	activity of recovering components and materials for further use without reprocessing ISO 21070:2017(en), 3.1.6
Disassembly	process whereby a product is taken apart in such a way that it could subsequently be reassembled and made operational. [SOURCE: IEC 62542:2013, 6.1]
Substance determination	-
Recover of CRMs	List published by EC
Recycling	any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. [SOURCE: ISO/TS 21929-2:2015(en), 3.33]
Traceability systems	ability to trace the origin, processing history, application, distribution or place of materials or products under consideration. [SOURCE: ISO 23664:2021(en), 3.22]
Circular Economy strategy	organisation's approach to achieve circular economy goals
Data exhange format	template/format which presents standardized and trustworthy information on the circularity aspects of a product
Life-cycle	consecutive and interlinked stages of a product system, from raw material to acquisition or generation from natural resources to final disposition [SOURCE: ISO 14040:2006, definition 3.1]
Security, privacy and ethics	Security any of a variety of procedures used to ensure that information exchange is guarded to prevent disclosure to unauthorized individuals. Security measures are intended to prevent disclosure of sensitive information even to those who have valid access to the communication network. Privacy: right of individuals to control or influence what information related to them may be collected and stored and by whom and to whom that information may be disclosed [SOURCE: ISO 7498-2, 3.3.43]
Decision support framework	Includes tools and standards that help the different actors in taking decisions.
Waste management	Waste generation: any residue of a production operation, transformation or use, any substance, material, product that its holder intends for disposal. [SOURCE: ISO 22716:2007(en), 2.36]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D8.4: Standardization Toolkit

04/08/2023 (M27)

Authors: Cristina Di Maria, Giovanni Miccichè, Viviana Buscemi, Adriano Ferrara, Elena Mocchio, Federica Fugaroli (UNI)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003587 1

https://www.treasureproject.eu/resources/

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Standards Mapping: next step

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Updating the mapping
(DPP standards)

STANDARD REFERENCE	LINK	TITLE	YEAR	SCOPE	AREA
EN 62542:2013	https://webstore.iec.ch/	Environmental standardization for electrical and electronic products and systems - Glossary of terms	2013	IEC 62542:2013 specifies gen	Decision support framework
EN IEC 62430:2019	https://mycatalogo.cein	Environmentally conscious design (ECD) - Principles, requirements and guidance	2019	IEC 62430:2019 describes pri	Design
prEN IEC 63372		Quantification and communication of Carbon FootPRINT and GHG emission reductions/avoided emissions from electric and electronic products and systems – Principles, methodologies, requirements	-	-	Circular Economy strategy
EN 50693:2019	https://mycatalogo.cein	Product category rules for life cycle assessments of electronic and electrical products and systems	2019	This document defines prod	Life-cycle
prEN IEC 63366:2023		Product category rules for life cycle assessment of electrical and electronic products and systems.	2023	-	Life-cycle
EN 50625-1:2014	https://mycatalogo.cein	Collection, logistics & Treatment requirements for WEEE - Part 1: General treatment requirements	2014	This European Standard is	Waste management
CLC/TS 50625-3-1:2015	https://mycatalogo.cein	Collection, logistics & treatment requirements for WEEE - Part 3-1: Specification for de-pollution - Gener	2015	This Technical Specification i	Waste management
CLC/TS 50625-4:2017	https://mycatalogo.cein	Collection, logistics & treatment requirements for WEEE - Part 4: Specification for the collection and logis	2017	This Technical Specification a	Waste management
CLC/TS 50625-5:2017	https://mycatalogo.cein	Collection, logistics & Treatment requirements for WEEE - Part 5: Specification for the final treatment of	2017	This Technical Specification a	Recover of CRMs
EN IEC 62321-2:2021	https://webstore.iec.ch/	Determination of certain substances in electrotechnical products - Part 2: Disassembly, disjointment and	2021	This part of IEC 62321 provid	Disassembly
EN 50581:2012		Technical documentation for the assessment of electrical and electronic products with respect to the res	2012	This European Standard spe	Substance determination
EN IEC 63000:2018	https://mycatalogo.cein	Technical documentation for the assessment of electrical and electronic products with respect to the res	2018	This Standard specifies the te… to be completed by the manufacturer to declare compliance with the applicable substance restrictions.	Substance determination
EN 62321-1:2013	https://mycatalogo.cein	Determination of certain substances in electrotechnical products - Part 1: Introduction and overview	2013	This first edition of Standard … partial replacement of Standard	Substance determination
prEN IEC 62321-10:2020	https://webstore.iec.ch/	Determination of certain substances in electrotechnical products - Part 10: Polycyclic aromatic hydrocarb	2020	This part of IEC 62321 specifies … technique for the determination of polycyclic	Substance determination
prEN IEC 62321-11:2022		Determination of certain substances in electrotechnical products - Part 11: Tris (2-chloroethyl) phosphat	2022	This part of IEC 62321 specif	Substance determination
prEN IEC 62321-12:2022		Determination of certain substances in electrotechnical products - Part 12: Simultaneous determination	2022	IEC 62321-12:2023 specifies	Substance determination
prEN IEC 62321-13		Determination of certain substances in electrotechnical products - Part 13: Bisphenol A in plastics by liqu	1-13	Part 3-1 of IEC 62321 describ	Substance determination
prEN IEC 62321-3-1	https://webstore.iec.ch/	DETERMINATION OF CERTAIN SUBSTANCES IN ELECTROTECHNICAL PRODUCTS - Part 3-1: Elemental Scre	-3-1	IEC 62321-3-1:2013 describes the screening analysis of five substances, specifically lead (Pb), mercury (Hg), cadmium (Cd), total chromium (Cr) and total bromine (Br) in uniform materials found in electrotechnical products, using the analytical technique of X-ray fluorescence (XRF) spectrometry.	Substance determination
prEN 50419:2021		Marking of electrical and electronic equipment (EEE) in respect to separate collection of waste EEE (WEE	2021	This document specifies a m	Marking
EN 50419:2006	https://mycatalogo.cein	Marking of electrical and electronic equipment in accordance with Article 11(2) of Directive 2002/96/EC (	2006	This Standard specifies how to mark electrical and electronic equipment falling within the scope of Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).	Marking
EN IEC 62474:2019	https://mycatalogo.cein	Material declaration for products of and for the electrotechnical industry	2019	procedure, content and	Material declaration
EN IEC 62474:2019/A1:2021	https://mycatalogo.cein	Material declaration for products of and for the electrotechnical industry	2021	This Standard is a Variant to IEC EN 62474:2019-04, which specifies the procedure, content and form of material declarations for products and accessories of organisations operating in the sector and supply chain of the electrical engineering industry.	Material declaration
EN 50614:2020	https://mycatalogo.cein	Requirements for the preparing for re-use of waste electrical and electronic equipment	2020	This document is applicable	Re-use
prEN 50614		Requirements for the preparing for re-use of waste electrical and electronic equipment	0614	This document is applicable	Re-use
IEC 60300-3-3:2017	https://webstore.iec.ch/	Dependability management - Part 3-3: Application guide - Life cycle costing	2017	IEC 60300-3-3:2017 establishes a general	Life-cycle
UNI EN ISO 15663:2021	https://store.uni.com/en/p/UNI1609469/uni-	Petroleum, petrochemical and natural gas industries - Life cycle costing	2021	Introduction Cost management within	Life-cycle
UNI EN ISO 19008:2018	https://store.uni.com/e	Standard cost coding system for oil and gas production and processing facilities	2018	ISO 19008:2016 describes the standard cost coding	Life-cycle
ISO 15686-5:2017	https://www.iso.org/ob	Buildings and constructed assets — Service life planning — Part 5: Life-cycle costing	2017	Introduction Objectives	Life-cycle
AS/NZS 4536:1999	https://www.standards.	Life cycle costing — An application guide	1999	Sets out a process for life cycle costing of a product as	Life-cycle
ISO/FDIS 20468-8 ed.1-id.77418	-	Guidelines for performance evaluation of treatment technologies for water reuse systems — Part 8: Evaluation of treatment systems based on life cycle cost	2022	This document provides life-cycle cost (LCC)	Life-cycle

Expected by May 2024

Dataset ~ 100 standards

Filters

Direct link

Open Research Tool in Power BI

https://www.treasureproject.eu

An example

Link

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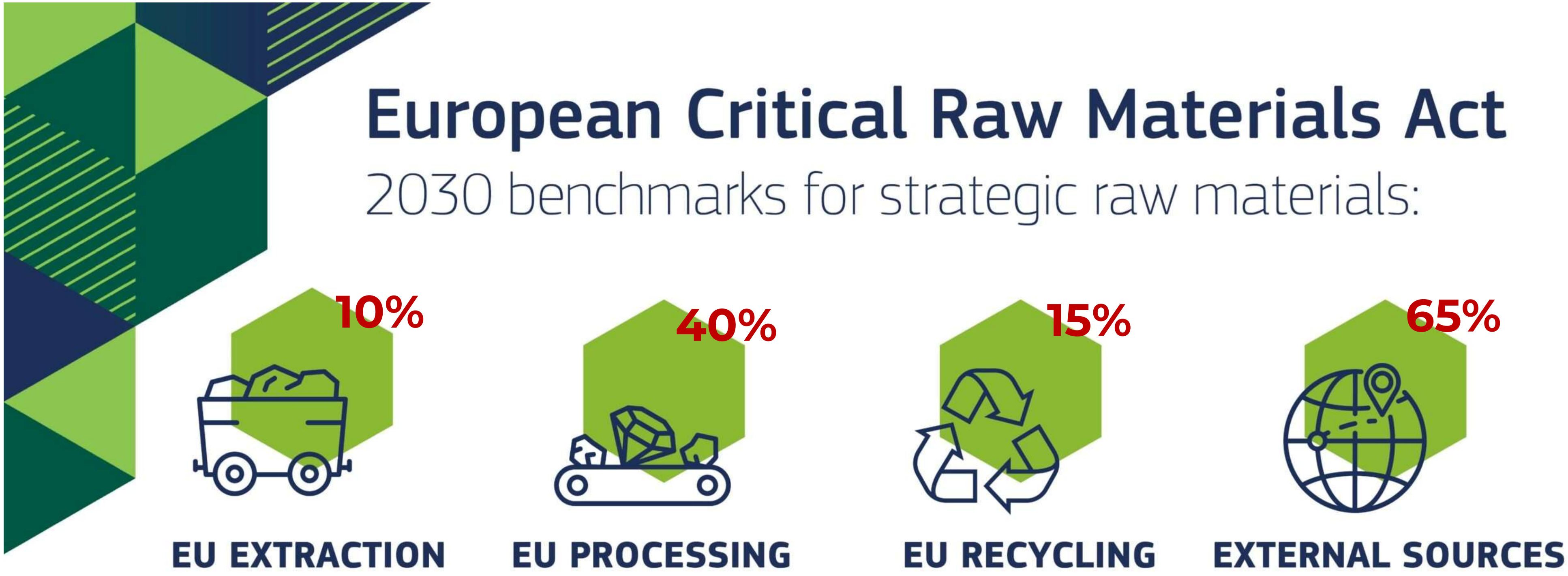
STATE OF THE ART ANALYSIS:

A focus on CRM

EU Legislative context

TREASURE



Identified **34 CRM**, of which **16 'strategic'**

Standardisation context

TREASURE

Position Paper

CEN and CENELEC response to European Commission proposal for Critical Raw Materials Act

June 2023


CEN CENELEC

EUROPEAN STANDARDIZATION GET INVOLVED AREAS OF WORK NEWS AND

Link

POSTED: 2023-06-27

CEN and CENELEC response to European Commission proposal for Critical Raw Materials Act

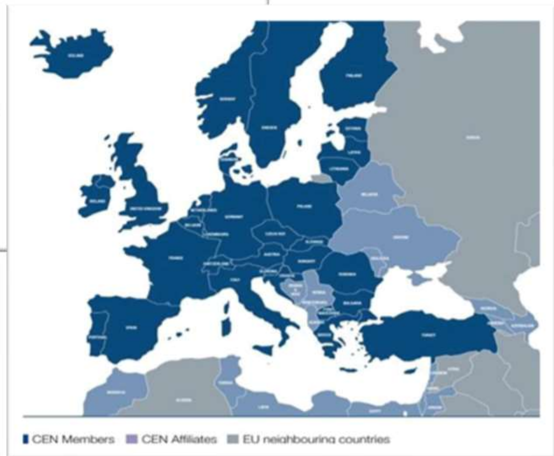
Policy CEN-CENELEC

CEN and CENELEC welcome the European Commission's proposal for the Critical Raw Materials Act, published 16 March 2023 and the aim to reinforce EU monitoring capacities and strengthen both the EU value chain (through the identification of mineral resources and raw materials projects in the EU's strategic interest, with strong environmental protection) and the EU external policies on CRMs. The CRMA has provided several references to the of use European Standards, how to make the relationship with international standards and what resources can be allocated to support these activities.

In this paper, CEN and CENELEC would like to:

- encourage the EC to boost standardization activities in critical raw materials and to work with CEN and CENELEC to develop these European standards;

34 National Standardization bodies



- **Encourage the EC to boost standardization activities in critical raw materials** and to work with CEN and CENELEC to develop these European standards;
- Agree on a **joint Action Plan supporting necessary standardization activities**, especially in consideration to **international standards**;
- Provide a **background on current standardization activities**;
- Request that **harmonized standards be used as the primary route for standardization** and that delegated acts remain a fall back solution.

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Standardization current state

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CEN/TC 132 Aluminium and aluminium alloys

CEN/TC 133 Copper and copper alloys

CEN/TC 459 European Committee for Iron and Steel Standardization

CEN/SS M14 Nickel

CEN CLC/JTC 10 Energy-related products. Material Efficiency Aspects for Ecodesign

CLC/TR 45550:2020	Definitions related to material efficiency
UNI CEI EN 45552:2020	General method for the assessment of the durability of energy-related products
UNI CEI EN 45553:2021	General method for the assessment of the ability to remanufacture energy-related products
UNI CEI EN 45554:2020	General methods for the assessment of the ability to repair, reuse and upgrade energy-related products
UNI CEI EN 45555:2020	General methods for assessing the recyclability and recoverability of energy-related products
UNI CEI EN 45556:2019	General method for assessing the proportion of reused components in energy-related products
UNI CEI EN 45557:2020	General method for assessing the proportion of recycled material content in energy-related products
UNI CEI EN 45558:2021	**General method to declare the use of critical raw materials in energy-related products**
UNI CEI EN 45559:2021	Methods for providing information relating to material efficiency aspects of energy-related products

According to Standardisation Request M/543, it is necessary to consider "Use and recyclability of EU-critical raw materials as listed by the European Commission". This standard facilitates this requirement by identifying the appropriate information.

Standardization next steps

TREASURE

CEN/TC 472 Rare earth

→ **NEW July 2023, DIN proposal**

- To adopt existing ISO documents as European standards and develop future projects under the Vienna Agreement
- To mirror the work of ISO/TC 298 'Rare Earth' contributing concretely to at least 10 SDGs →

ISO/TC 298 'Rare Earth'

- ISO 22444-1:2020
  Rare earth — Vocabulary — Part 1: Minerals, oxides and other compounds
- ISO 22444-2:2020
  Rare earth — Vocabulary — Part 2: Metals and their alloys
- ISO 22450:2020
  Recycling of rare earth elements — Requirements for providing information on industrial waste and end-of-life products
- ISO/TS 22451:2021
  Recycling of rare earth elements — Methods for the measurement of rare earth elements in industrial waste and end-of-life products
- ISO 22453:2021
  Exchange of information on rare earth elements in industrial wastes and end-of-life cycled products
- ISO 22927:2021
  Rare earth — Packaging and labelling
- ISO 23664:2021
  Traceability of rare earths in the supply chain from mine to separated products

ISO/TC 298 Rare earth

ISO/TC 345 Specialty metals and Minerals (AFNOR)

ISO/PC 348 Sustainable Raw Materials (DIN):

This document specifies **criteria for sustainable raw materials along industry best practices** and is intended to be used for mineral-, raw iron- and non-iron-metals. It is applicable to the full value chain of all raw materials.

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STATE OF THE ART ANALYSIS:

A focus on DPP

EU Legislative context

The proposal for a new Ecodesign for Sustainable Products Regulation (ESPR), published on 30 March 2022, is the cornerstone of the Commission's approach to more environmentally sustainable and circular products. The proposal builds on the existing Ecodesign Directive, which currently only covers energy-related products.

The future Digital Product Passport

Challenges

- Universal readability of product data carriers across product groups
- Integration with existing product information management systems
- Standardised services IT access to retrieve and provide DPP data
- Common and up-to-date definitions and semantics
- Multi-language support in DPP information for multi-country use
- Setting adequate rights and responsibilities for each economic actor

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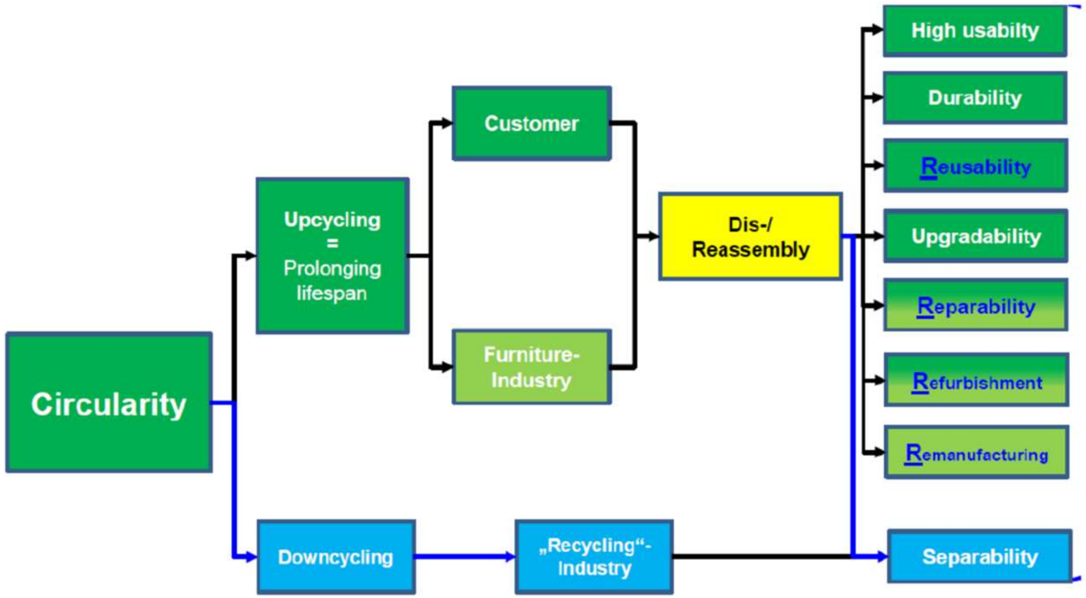
An example of side activities

TREASURE

Specific circularity product group information/data standards for circularity will interlink with DPP

Standardisation committee CEN TC 207 (Furniture) and its WG 10 (Requirements and tools for furniture circularity) → working on standards for product aspects under article 5 of the ESPR

- **FprEN 17902 on evaluation method for dis/reassembly capability (2024)**



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Standardization activities

TREASURE

- CEN/CLC JTC 24 “DPP” works started on December 2023.
- Next plenary: Summer, 2024

Reference information	
1.	Harmonised standard(s) on unique identifiers
2.	Harmonised standard(s) on data carriers and links between physical product and digital representation
3.	Harmonised standard(s) on access rights management, information, system security, and business confidentiality
4.	Harmonised standard(s) on interoperability (technical, semantic, organisation)
5.	Harmonised standard(s) on data processing, data exchange protocols and data formats
6.	Harmonised standard(s) on data storage, archiving, and data persistence
7.	Harmonised standard(s) on data authentication, reliability, integrity
8.	Standards on APIs for the DPP lifecycle management and searchability

December 2023

December 2025

hENs

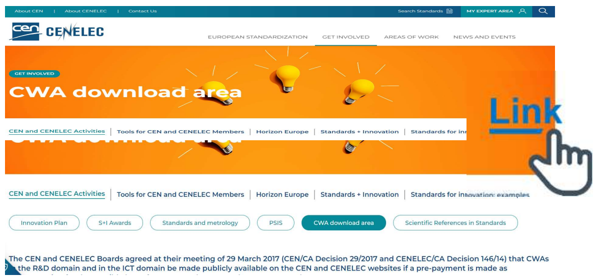
ISO 59040 Product circularity data sheet

STRATEGIC ROADMAP / CWA:
How can we transfer to the market the output of the project?

CEN WORKSHOP (CEN/WS) CONCEPT

TREASURE

- **Flexible** working platform:
  - Light procedures
  - **Direct and voluntary participation of stakeholders**
  - Participants decide on the working arrangements
- **Open** to any company or organization:
  - **Inside or outside Europe**
  - Public process
- **Rapid elaboration** of documents
  - Few physical meetings
  - Work by electronic means encouraged
- **A tool to innovate supporting the transferring of the results of EU funded projects:**
  - Codify the results of a project (Example: Horizon 2020, Horizon Europe …)
  - Share best practice from the experience coming from projects



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TREASURE

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EUROPEAN STANDARDIZATION GET INVOLVED AREAS OF WORK NEWS AND EVENTS

POSTED: 2023-10-25

A methodology to improve the recyclability rate of Strategic/Critical Metals from car electronics

Link

Transport and Packaging Workshop CEN

This CWA is related to two aspects: the identification of Critical Raw Materials (CRMs) embedded in car electronics and the information sharing among all the actors involved (for several reasons and with different roles) in automotive supply chains. This CWA defines a method to support all the automotive actors in identifying the presence of CRMs in car electronics and disassembling/separating/recycling these components in a proper way. The final aim is improving the recyclability rate of CRMs from cars, create a market for secondary CRMs and reuse CRMs in new high-value applications (possibly within the automotive sector).

Potential interested stakeholders to be involved in this CEN Workshop are:

Car parts suppliers, car makers, car dismantlers and shredders, academic and research, governmental authorities, non-governmental organization (NGOs).

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CWA in a nutshell

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- Definition of **method to support all the automotive actors in identifying the presence of SCMs in car electronics**, particularly in ECUs, and **disassembling/separating/recycling these components** in a proper way. The final aim is improving the recyclability rate of SCMs from cars, create a market for secondary SCMs and reuse SCMs in new high-value applications.

- The overall goals:

  a) the identification of SCMs embedded ECUs (PCBs);

  b) the information sharing among all the actors involved (for several reasons and with different roles) in automotive supply chains.

This document is intended to be used by car makers, car parts manufactures or suppliers and ELVs managers. **It can support the policy makers in the development of a future digital product passport specific for PCBs** and is based on the experience and results developed within TREASURE project. This activity is coherent with the new version of ELV regulation under development and the current WEEE regulations. Finally, the procedure could be adoptable by other sectors where the presence of electronics is relevant and SCMs can be recycled and reused.

CWA Draft Table of content

TREASURE

Timeline

TREASURE

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

2023-10-23

Draft Agenda for the kick-off meeting of CEN/WS "TREASURE"

13th December 2023

Venue: Hybrid

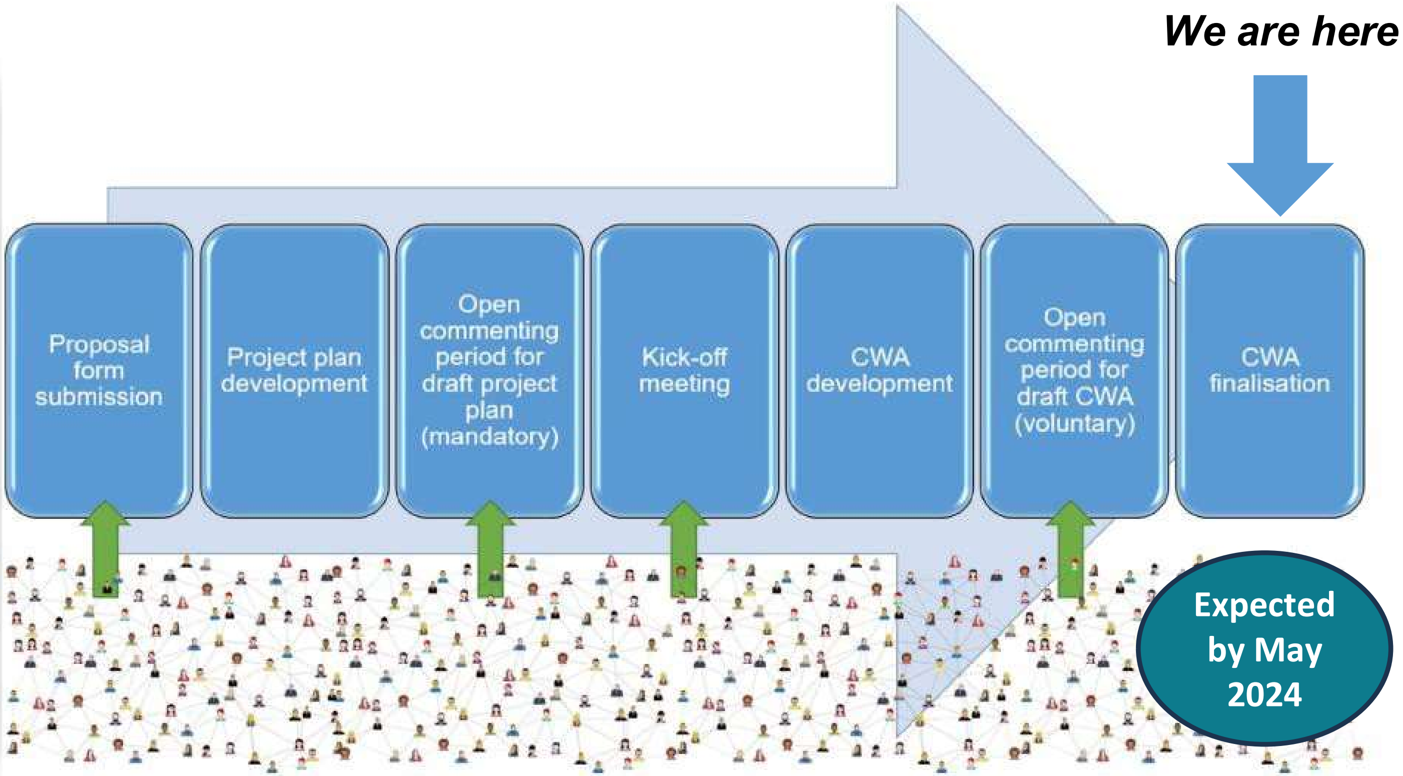
UNI – Italian Standardisation Body
Via Sannio, 2, Milan - Italy

Zoom platform:
https://us06web.zoom.us/j/89053762469?pwd=ITQoe6rnMcM28rwQbibqdGfkEHhhVp.1

ID meeting: 890 5376 2469
Access code: 310476

Agenda **09.30 – 14.30 (CEST time)**

1. Opening of the meeting (**h. 09.30 – 09.35**)
2. Roll call of participants (**h. 09.35 – 09.40**)
3. Adoption of the agenda (**h. 09.40 – 09.50**)



Source: CEN-CENELEC Guide 29 « CEN/CENELEC Workshop Agreements – A rapide way to standardization »

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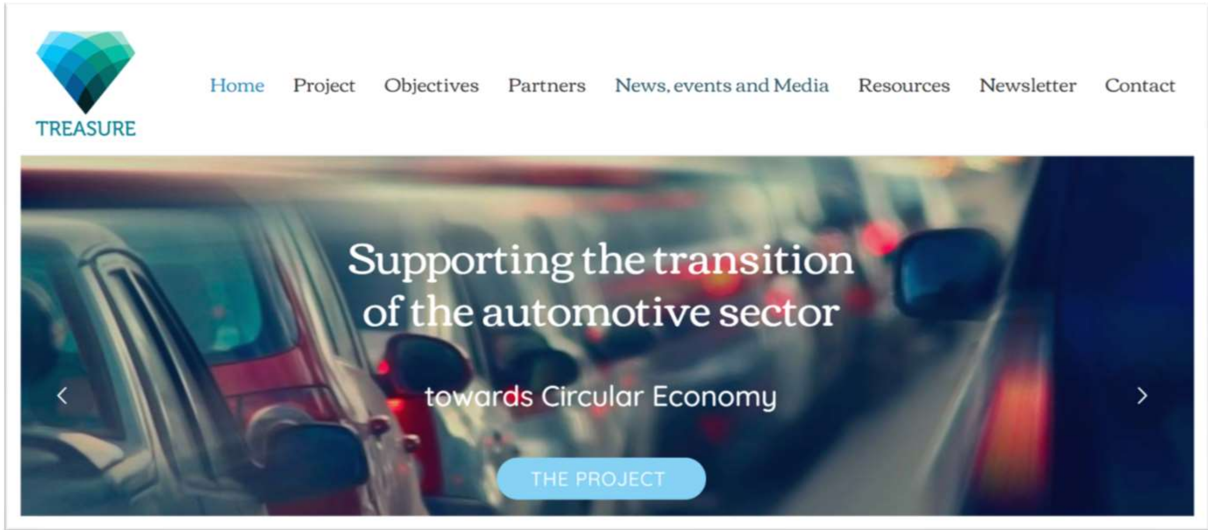

@HorizonTreasure

TREASURE HORIZON 2020

THANK YOU!

TREASURE

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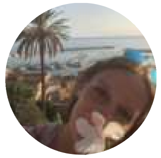

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Ethnographic study presentation

Bojan BOBIC / EDGERYDERS

collaboration is the driver

Paris Spring School Ethnographic Exercise

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003587

Edgeryders

Who we are and what we do?

- Collective intelligence company, social enterprise and a research think-tank
- Global network of over 7000 members
- Developing engaged community of experts

Ethnographic research

- Qualitative social science method
- Showing how cultural meaning is formed and experienced from the perspective of the interlocutors under study
- Helps to understand what people think and feel
- Example: Assumptions that certain phenomena, for example, car electronics, are green and self-evidently good sustainable and good

Ethnographic research

<u>How does it benefit the research?</u>

- Provides a comprehensive understanding
- Unveils hidden meanings and gives nuanced insights

<u>Who can use it and to whom does it serve?</u>

- Researchers across various fields
- Businesses, Policymakers, Non-profit organizations
- Anyone who wants a deeper understanding of human behavior and cultural influences

Semantic Social Network Analysis (SSNA) & Visualizations

- A tool and method for innovative ethnographic analysis.
- Analyzes collected data about a specific topic.
- Ethical data collection with informed consent.
- Open source softwares - Open Ethnographer, Graphryder, Tulip

Semantic Social Network Analysis (SSNA) & Visualizations

1. **Data collection**: Gather information from from online and offsite events, interviews, forum discussions, surveys etc.
2. **Data coding**: Analyze the collected data to understand the underlying themes and perspectives.
3. **Visualization**: Create graphs that map relationships between ideas and user groups
4. **Insights & Value**: Gain valuable insights into social perceptions, trends and behaviours

next move
collaboration is the driver

EDGE RYDERS

TREASURE

Paris Spring School Exercise

- Mini-exercise showing how ethnography and network analysis work together
- Link between broader beliefs and concrete goals and initiatives
- The topics mimic those explored in TREASURE project

Data collection

- Data collected through Q&A on the Edgeryders platform
- Participants answered the prompts and commented on each other answers

The Role of the Individual

What role do you think individuals can play in reducing waste in the automotive industry? How much power and influence do individuals have in this context?

CE and the Automotive Sector

Do you think it is possible to achieve a circular economy in the automotive industry? Why or why not? What would this outcome depend on?

Environmental Impacts

If you think about the environmental effect of the car industry, what comes to mind? How important would it be to you as a car user / car consumer that a car company uses sustainable practices in its operations?

Data is coded

julien_van_damme5665 2024-03-29 08:41:23 UTC #11

How can I do something for reducing the waste in the automotive industry ? I have no impact ! Indeed the individual has no DIRECT impact on this matter. But can we doe something INDERCTLY ? Yes I do believe so ! First our own behaviour related to waste and avoidance of waste contributes. If every-one's buying decision will be driven by production practice considerations the manufacturers will ensure they have the "most sustainable supply chain". So, no as an individual our action will have (almost) no impact on the industry's behaviour, but a member of a big group our voice will be heard !

USED CODES:

- collective decisions have impact
- consumer power
- ethical consumption
- individual indirect impact
- individual sustainable behavior
- structure > agency

daniele_perossa6868 2024-04-05 14:37:18 UTC #12

I think that individuals, meant as consumers, have the power of awareness. If they are aware of the issues related to waste in automotive, and how they can be tackled, they can influence the industry in pursuing circularity by driving their product purchasing path considering also circularity aspects related to cars and their components. Furthermore, their own individual behaviours when related to EoL phases are crucial of circular economy implementation.

USED CODES:

- awareness is power
- consumer power
- individual sustainable behavior
- individuals have power as consumers
- life cycle
- promoting circularity
- shift to circularity
- supply responds to demand

elena9983 2024-04-08 10:43:49 UTC #13

Not much power, as informed choices for concumers are difficult to be done without the support of the industry

USED CODES:

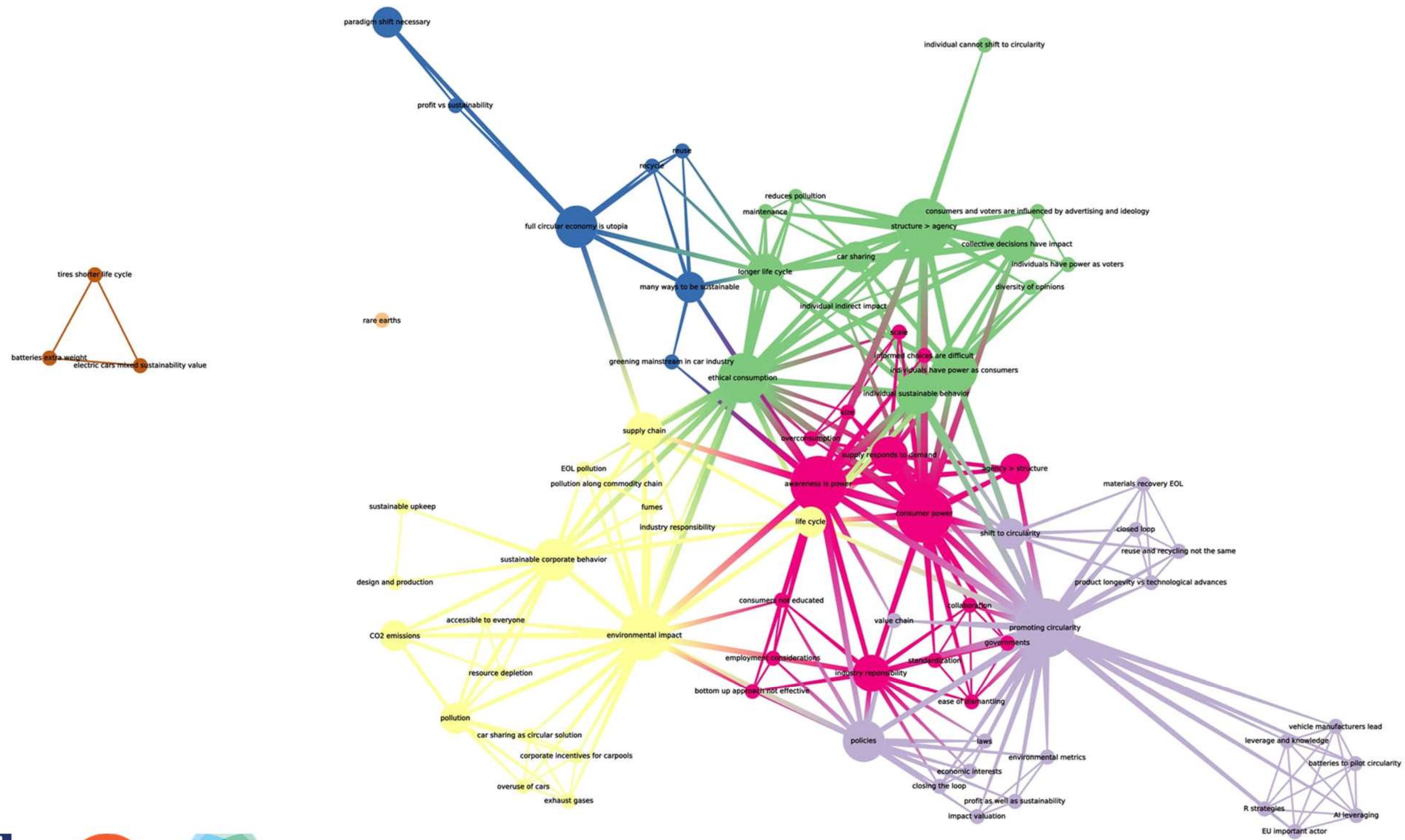
- awareness is power
- consumer power

Data is visualized

- 79 codes total
- 607 links
- 7 clusters
- coherent communities of meaning

- promoting circularity (9) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- structure > agency (8) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- awareness is power (8) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- consumer power (8) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- environmental impact (6) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- ethical consumption (6) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- individuals have power as consumers (5) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- full circular economy is utopia (4) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- policies (4) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- sustainable corporate behavior (4) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- individual sustainable behavior (4) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- industry reponsibility (3) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- supply chain (3) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- collective decisions have impact (3) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- longer life cycle (3) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- supply responds to demand (3) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- car sharing (2) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- many ways to be sustainable (2) by Nica Show | Edit | Annotations | Merge | Copy | Delete
- agency > structure (2) by Nica Show | Edit | Annotations | Merge | Copy | Delete

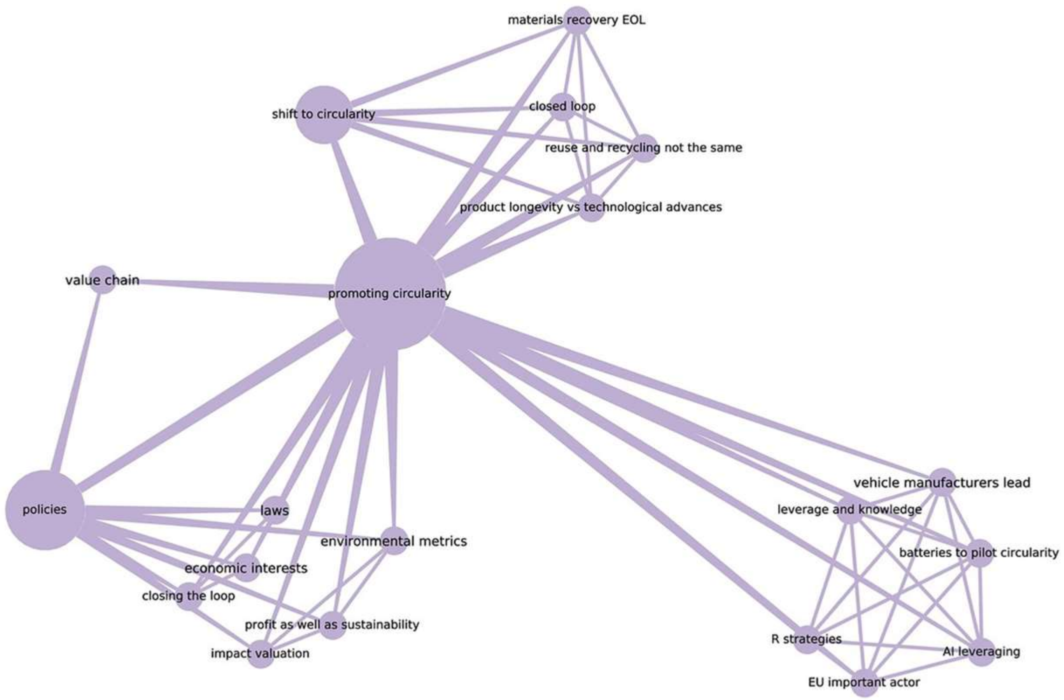
next move
collaboration is the driver
EDGE RYDERS
TREASURE


paradigm shift necessary
profit vs sustainability
reuse
recycle
full circular economy is utopia
many ways to be sustainable
greening mainstream in car industry
tires shorter life cycle
batteries extra weight
electric cars mixed sustainability value
rare earths
individual cannot shift to circularity
reduces pollution
maintenance
consumers and voters are influenced by advertising and ideology
structure > agency
collective decisions have impact
car sharing
individuals have power as voters
longer life cycle
diversity of opinions
individual indirect impact
scale
informed choices are difficult
individuals have power as consumers
ethical consumption
individual sustainable behavior
size
overconsumption
supply responds to demand
agency > structure
awareness is power
consumer power
life cycle
shift to circularity
supply chain
EOL pollution
pollution along commodity chain
fumes
industry responsibility
materials recovery EOL
closed loop
reuse and recycling not the same
product longevity vs technological advances
sustainable upkeep
sustainable corporate behavior
design and production
consumers not educated
collaboration
value chain
promoting circularity
governments
accessible to everyone
CO2 emissions
environmental impact
employment considerations
standardization
industry responsibility
resource depletion
bottom up approach not effective
ease of dismantling
pollution
car sharing as circular solution
policies
laws
environmental metrics
corporate incentives for carpools
economic interests
closing the loop
overuse of cars
exhaust gases
profit as well as sustainability
impact valuation
vehicle manufacturers lead
leverage and knowledge
batteries to pilot circularity
R strategies
AI leveraging
EU important actor

Example: lilac community

Promoting circularity is connected to three conceptual nodes:

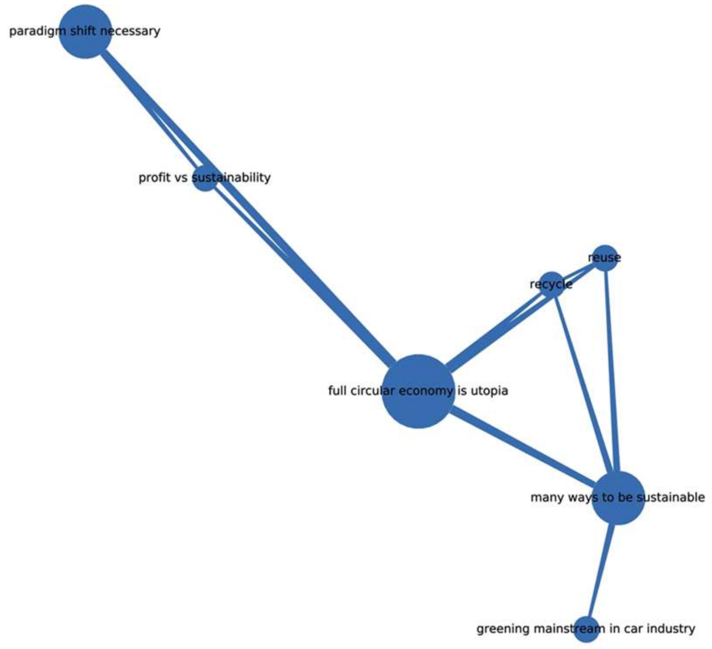
1. knowledge in the car industry
2. policies and macro concepts (e.g. laws and profit)
3. shift to circularity



Example: blue community

Full circular economy is **utopia**

- possibilities of sustainable behavior
- considerations of mental and cultural shifts necessary



Insights and value

Methodologically

- Visualizations are followed by audits of codes, then revised visualizations
- In a multi-stage process insights from visualizations are used to produce new survey and interview questions

Conceptually

- Visualizing what concepts people are connecting to other concepts
- Mapping these resonances can inform actionable recommendations

Insights and value

- There are positive expectations associated with knowledge and expertise about sustainability in the car industry. Auto manufacturing companies could consider **creating prominent public platforms for sustainability experts** and **invest in creating educational campaigns for the general public**
- People may consider full circularity utopian and impossible without a major paradigm shift, but are at the same time see circularity as a spectrum and are **excited about practical measures to move along the spectrum**. This insight can be used to shape **awareness-promoting initiatives**
- People distinguish between **recycling** and **reuse**, and **reuse is seen more favorably** (this mirrors real findings in our study). A focus on reuse may prove to be a stronger force in convincing the public that a move towards circularity is meaningful and something they should participate in in their role as car consumers

Thank you

Thank you for your time!

Visit our website for more information and to get involved

www.edgeryders.eu

next move

collaboration is the driver

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TREASURE

Thank you for your attention

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