TREASURE

D7.8: Report on clustering activities

31/05/2024 (M36)

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Technical References

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EXECUTIVE SUMMARY

This deliverable, developed within the framework of the TREASURE project (Leading the Transition of the European Automotive Supply Chain towards a Circular Future), constitutes a vital reference point in the project's activities in collaboration with sisters projects as well as other partners, projects and initiatives relevant on the topic.

This report aims to provide a comprehensive analysis of main collaboration activities carried out on the second reporting period of the project, along with a thorough assessment of their impact and effectiveness.

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1. Introduction

Deliverable D7.8, developed within the framework of the TREASURE project (Leading the Transition of the European Automotive Supply Chain towards a Circular Future), constitutes a vital reference point in the project's activities in collaboration with sister projects and/or other partners, projects and initiatives relevant on the topic. This report aims to provide a comprehensive analysis of main collaboration activities carried out on the second reporting period of the project, along with a thorough assessment of their impact and effectiveness.

2. Context and objectives

The context of the TREASURE project is based on the need to promote a transition towards a circular economy in the European automotive sector. In this perspective, deliverable D7.8 aims to document in detail the efforts made by the project consortium in terms collaboration and interclustering activities. These efforts are crucial for sharing the knowledge and results of the project, as well as best practices, with a wide range of stakeholders, including the automotive industry, academic actors, policymakers involved in relevant projects and initiatives.

2.1 Methodology

The methodology adopted for this report relies on a systematic and rigorous approach. Data was collected from various sources, such as partner activity reports and presentations at events. Both qualitative and quantitative analysis was conducted to assess the effectiveness of the different collaboration activities carried out by the consortium.

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2.2 Interclustering and collaboration activities

2.2.1 Targeted interclustering activities

This section of the report highlights the various interclustering and collaboration activities undertaken by the TREASURE project consortium.

During the second project reporting period, NextMove, the consortium partner in charge of the project's interclustering activities, have worked on the development and the strengthening of a European partners' network, which has proved useful both in terms of :

- The collection of information and contributions from European players in the electronics sector, in order to feed the project's activities, with the point of view of entities not directly active within the project, but which were able to provide information concerning their approach to the circular economy or, on the contrary, the obstacles they have encountered to date.
- The dissemination of the project's progress throughout the European electronics ecosystem, both through the sharing of specific information and through invitations to thematic events and workshops, aimed at highlighting the project and its progress, while including the European level in the discussions.

As a cluster organisation, NextMove targeted its strategy for interclustering activities at organisations of a similar nature: by doing so, TREASURE partners would not only have access to a single entity per contact, but also to the entire network that these clusters represent and which can then also receive information indirectly.

Some of the contacts and exchanges with European partners have now led to rather solid relations, which have foreseen their contribution and/or participation in TREASURE project activities and which, even after the end of the project, will make it possible to extend the impact of the project, while continuing to share the findings and good practices of the project through the European network established over the last few years.
Some examples of consistent collaborations include:

Mesap : MESAP is the innovation cluster for Smart Products and Smart Manufacturing of Regione Piemonte.
It supports the competitive capacity of its ecosystem, through initiatives supporting cross-fertilization, technology transfer and by participating in collaborative projects on the European level.
It is involved in several initiatives on Industry 4.0 topics to accompany and support SMEs in their Digitization process through the adoption of enabling technologies and paths on Mechatronics topics.

Since October 2022 NextMove and Mesap regularly exchange with the aim of identifying cross-border collaboration opportunities for their respective ecosystems, on the topics that concern both networks, notably Electronics and Circular Economy and have grown closer via the communications and discussions regarding the TREASURE project's activities.
Regarding the innovation side of this collaboration, both clusters have been active within EFFRA, the European association for the promotion and development of innovative production

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technologies : EFFRA accelerates and multiplies research and development activities related to the production of technologies in the European Research Area with a public-private partnership mechanism. The partnership acts as a driving force for the launch and development of cross-border and commercial collaborations in the EU area with applications in multiple production sectors.
The two clusters have also grown closer through the proximity respectively to the associations EPoSS and Aeneas, the industry associations promoting RD&I in electronic components and systems to boost European industry's competitiveness. The two associations represent a strong European network of major industrial companies and research organisations from over 20 EU Member States, which represent both an extremely relevant source of information and insights on one side and a very fertile dissemination ground for the TREASURE project activities.

Pôle MecaTech : The MecaTech Cluster aims to increase the partnership between the worlds of industry, research and training in order to improve the competitiveness of Wallonia through innovative projects. The cluster is active, among other things, in the strategic fields of action of electronics, advanced materials and recycling technologies. One of the most important economic sectors for the MecaTech is the circular economy, which has led them to get closer in connection in relation with the TREASURE project.

Following a first digital meeting in March 2023 where the two were able to present the circular economy initiatives in which they are active, including the TREASURE project as well as the GEMSTONE and DREAM projects, the two clusters had the opportunity to meet face-to-face at the Global Industrie international fair in Paris in April 2024, in order to continue exchanges and share updates on the progress of the respective projects.

ITRI : the Industrial Technology Research Institute based in Taiwan whose mission is to drive industrial development, create economic value, and enhance social well-being through technology R&D. ITRI is dedicated to enhancing technologies in the fields of circular economy, low-carbon manufacturing, and green energy & environment, putting emphasis on the green

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transition of chemical & material industries, sustainable electronics technology and low-carbon product design.
NextMove had the opportunity to arrange a meeting with ITRI when they came to Europe at the international exhibition Hannover Messe, which took place in April 2024.
On this occasion NextMove was able to present the projects in which it is involved, in particular the ARCHIMEDES and TREASURE projects. Given ITIRI's growing collaborations with R&D actors in Europe on the topic (CEA, VTT, Fraunhofer, TNO..) the institute has expressed a strong interest in following the project's updates and activities of an eventual followup.

Business Upper Austria : the Upper Austrian government's location agency and innovation driver for the local ecosystem, supporting to steer economic and research policy. The automotive cluster within the regional agency is indeed working on a local funded project for the automated dismantling of drive batteries and car electronics, called BATTBOX, which is intended to increase the circularity of the "battery" value chain and at the same time better meet demand, by developing efficient and sustainable handling processes for lithium-ion battery systems
As for the project a cost/benefit analysis of the (automated) disassembling based on the potential revenue for the recycled materials was needed, the coordinators of the two projects have established contact in August 2023, in order to study the relevance of the TREASURE tool in this framework.

ICM: As a French cluster, NextMove have been able to accompany the ICM (Mobility Circular Campus), a Renault initiative developed on the production plant of Flins with the objectives to keep employees (2000 peoples) and change the activities of the site from serial vehicle production to circular economy businesses. For this challenge, the eco-system brought by NextMove through the partnership with EU project as TREASURE on different level of the project. The strength of the circular economy eco-system is due to the plurality of those actors that brings academic, technical, regulation, industrials knowledges which are critical to the development of new circular economy businesses. The unknown criteria were the involvement of the employees and their envy to change from a clean – 0 km product to a dusty product. The force of the ICM have been to engage the implication of the partners (employees, suppliers, consortium partners) with dedicated and specific training sessions and support on circular economy pillars, principles and perspectives.
ICM is now a real success with dozens of companies have been integrated into the Flins site and over 1500 people have been trained with the circular economy training sessions. Now, ICM and NextMove continue to extend the project within Flins and focus also on the dissemination of the circular economy pillars. Thanks to the combination of the academic and industrial approach, the dissemination is simple and can be propose to a large public including students through dedicated tour, industrials and families.

Synapse: Synapse is a French network dedicated to circular economy and especially the territorial and industrial symbiosis. In November 2023, NextMove join the national meetings with Synapse and 150 attendees. After round tables, dedicated workshops and discussions were organized to present solutions and initiatives. As a contributor, NextMove have been able to present and share the roadmap developed within the TREASURE projects and to inform the participants to national meetings of the objectives and solutions developed by the project.

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JN2E: Organized by AQM Normandie, FACE Normandie and NEODD and in collaboration with NextMove, the J2NE (Journée Normandes des Entreprises Engagées / Engaged Normands Company Day) took place on Novembre 2023 in Le Havre. With 100 companies, the programme was mainly focused on RSE and circular economy. Following inspiring conferences, NextMove was present and the stand area and share its implication in EU project as TREASURE. Based on TREASURE project results on the last straight line, NextMove present the interest and the advantages to take the lead on critical new alternatives business as the eco-conception, the dismantling or the recycling.

2.2.2 Interclustering activities by other project partners

In parallel with the exchanges described above, lead by NextMove in order to foster interclustering activities, other presentations and cross participations have occurred during the period of the project, thanks to the support and engagement of the other project's partners.

Regarding the second reporting period, TREASURE has been presented in the following three activities, with the aim of identify synergies and establish long term crossed relations with the involved partners :

Table 1: Clustering activities

Title	Partners	Date
Project/research with FAIRPHONE : the purpose was to perform a Recycling assessment and Design for Recycling	MARAS	2020/2022

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of the FP2 &3 smartphone models. The result is presented on this page		
Cluster meeting on plastic attendance – Ecomondo	POLIMI - WALTER	Nov 2022
Cluster meeting with Club of Rome	UNIZAR	Nov 2022
Mutual presentation with CIRCTHREAD project : a partner of CIRCTHREAD has been invited as panelist in a workshop organized by UNI within Treasure project	UNI	May 2023

In addition to the actions described above, which had a target each time rather specific in terms of interlocutor and network to mobilize, and which can therefore be defined more as "bilateral", activities of an event component and with a more collective format, involving several stakeholders at the same time, which will be detailed below :

2.2.3: Raw Material week in Brussels

On November 17th, a ground-breaking event was organized by the TREASURE Project as part of the Satellite events during the Raw Materials Week at Le Plaza Hotel in Brussels.

Aptly named “AUTOMOTIVE RAW MATERIAL CIRCULARITY: Challenges and Opportunities,” this gathering aimed to dive deep into the sustainability of vehicles, scrutinizing every facet from design to end-of-life recycling. The workshop drew together a consortium of experts, researchers, and technical professionals, injecting the session with invaluable insights. Kicking off the event, Paolo Rosa, the coordinator of the TREASURE Project at Politecnico di Milano, set the stage with an insightful presentation on the project’s objectives.

With an attendance of approximately 30 in-person participants and an additional 30 tuning in online, the event succeeded across diverse audiences. Some partners joined the workshop to benefit from the presentations, as well as be part of the collective discussions. Some relevant actors and associations of the sector, but also representatives of the European Commission attended the activity, as :

- CLEPA (European Association of Automotive Suppliers)
- ACEA (European Automotive Manufacturers Association)
- CEEW (Council on Energy, Environment and Water)
- AVERE
- Hyundai
- DG GROW (Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs)
- DG RTD (Directorate-General for Research and Innovation)

Our heartfelt appreciation goes out to our esteemed speakers, enthusiastic attendees, and the tireless organizing team, whose dedication elevated this workshop to resounding success. A detail of the public’s composition is presented in the “Results and impacts” section below.

This workshop was a great opportunity to present Treasure project completions and propose open discussion on the future of our automotive industry considering new solutions and business models.

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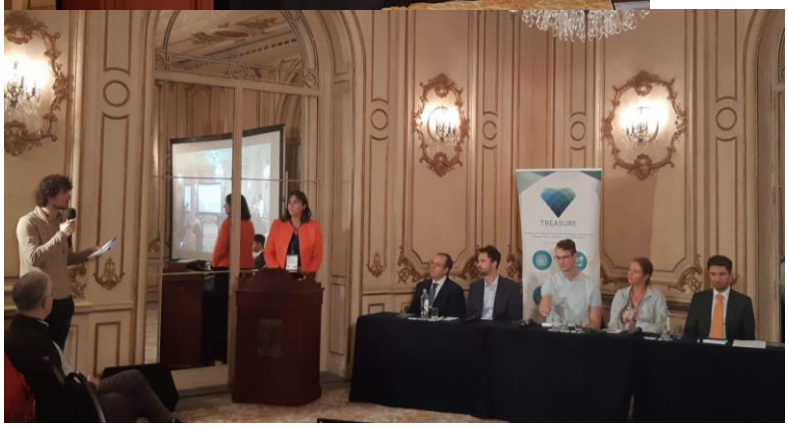
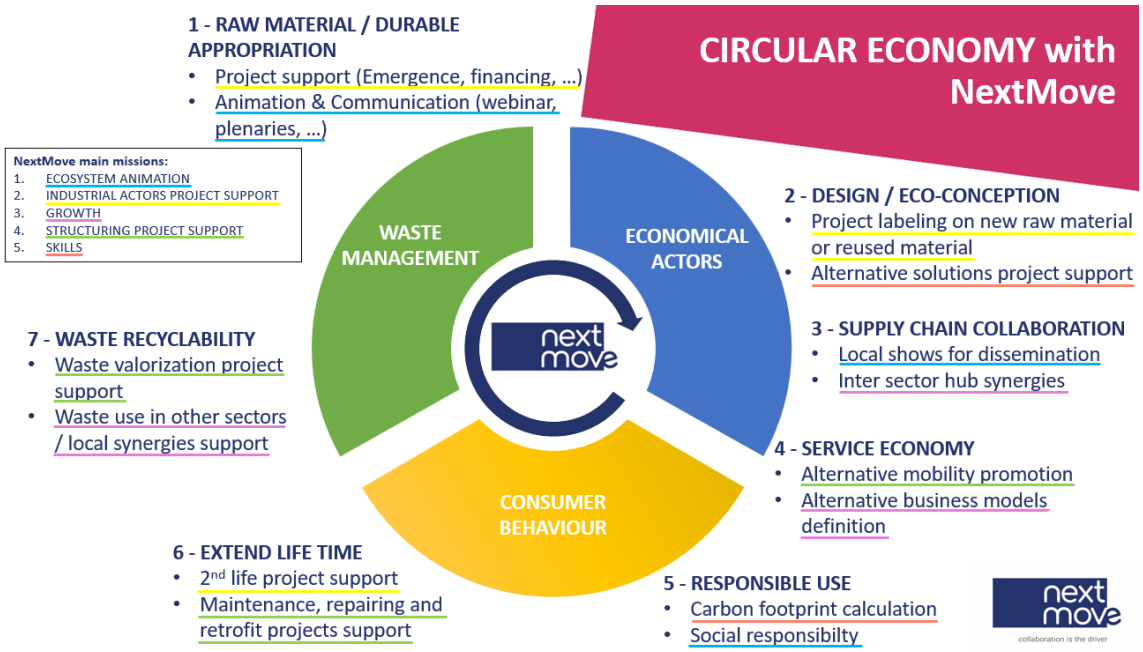


From NextMove side, it was also the opportunity to present some of the initiatives accompanied by the cluster within their ecosystem. This presentation showed the interest to focus on all the pillars of circular economy to achieve our goal to increase resilience and autonomy in our critical raw material supply chain.



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2.2.4: Spring School in Paris

From April 24 to 26, the TREASURE project organized a Spring School. It was an event organized by NextMove, partner of the TREASURE consortium, in charge of the interclustering and collaboration activities. This event was held in Paris, where different presentations and activities were carried out during the 3 days that the workshop lasted.

On the 1st day, in a dedicated conference room, project partners presented the work they have carried out during the TREASURE project, along with the results obtained from various activities.

After a reminder of the context and the objectives of the project, it was a shared moment to present for the 1st time completed achievement of the project as circular web platform developed with TXT and presented by Mattia Calabresi, presenting the 3 modules proposed by the platform.

Including, the disassembly module:

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Disassemblability Module

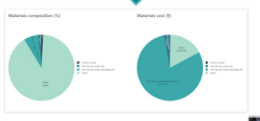
The Disassemblability Module contributes to improve timing and cost efficiency in the dismantling process by supporting two types of EoL actors:

- 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


Garage


TREASURE Platform – Disassemblability Module


Cobot


WEAVR tool for AR/3D

The Recyclability module:

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

And the eco-design module:

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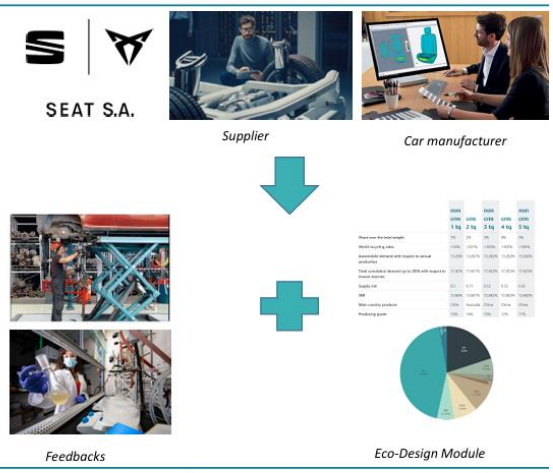
Eco-Design Module

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.



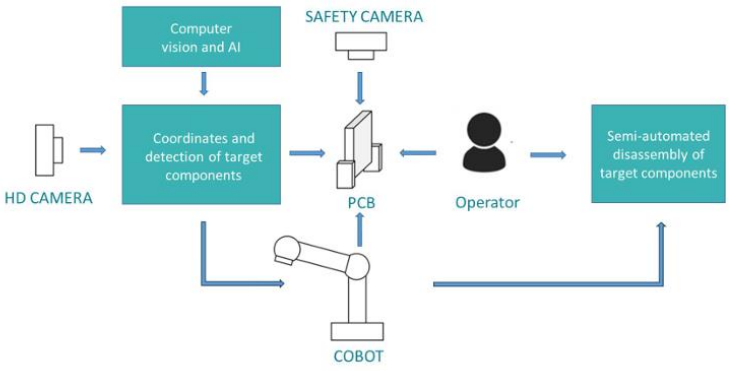
Ludovica Rossi from SUPSI presented the GRETA (a web application for GREen Targets) a new tool for sustainability experts but also for customers and propose to assess products / processes / company from a sustainability point of view. This presentation was ended by a demo of the working application to show possibilities and explain how it works and present benefits.

A presentation from POLIMI (Lorenzo GANDINI) showed new technological solutions to manage the disassembly of electronics at the end of life of vehicles based on experiments.

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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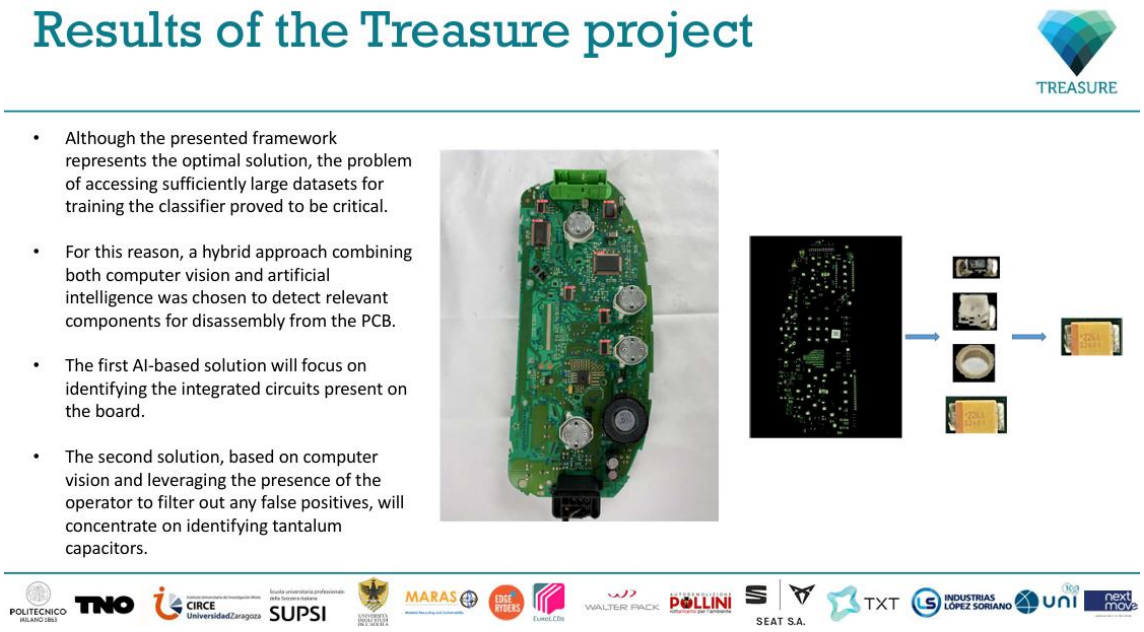

Additionally, private companies such as VALEO and FORVIA shared their current vision on circular economy and how they are preparing for the future by recycling specific components of vehicles.

Mino Yamamoto as circular economy manager for Valeo, presented the group initiative to develop a circular business around the front car camera. Even if the front car camera is developed and produced by a Valeo competitor, Valeo succeed in the implementation of a virtuous circle by training of Nevers plant operators to develop a root causes analysis, dismantling and repairing activities to create a circular business on front car camera.

Last presentation was dedicated to Forvia and their DECORE project where they act to achieve the carbon neutrality in 2045 and with a -45% reduction in 2030.

This project, where partners as Renault or BPIFrance are involved, is driven by many transformations: development, sustainability, and circular economy are the pillars of this new mindset. Main learnings brought were about the difficulties to bring partners, develop profitable business models and involve all stakeholders along the circular supply chain to achieve their goals. This is an important learning for all partners who would like to introduce circular economy in an existing business

The 1st day ended with a networking cocktail where industrial partners, academics, institutions, and project members were able to share their visions, positions and proposals for the future.

The focus of the second day was a visit to Renault's Re-factory plant. This iconic production plant where millions of cars were produced have been retrofitted to the circular economy master plant of Renault. As a worldwide OEM leader, Renault introduce circular economy all along the lifecycle of their vehicles and the Flins plant represent this transformation with Renault partners companies taking place on the site in place of the production lines.

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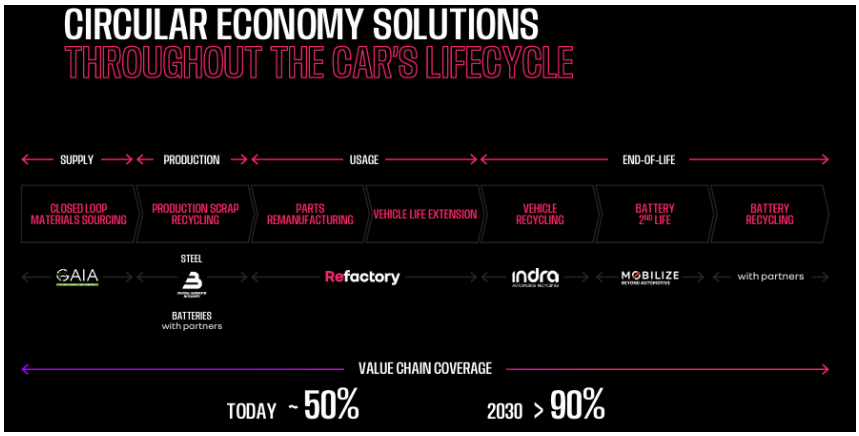
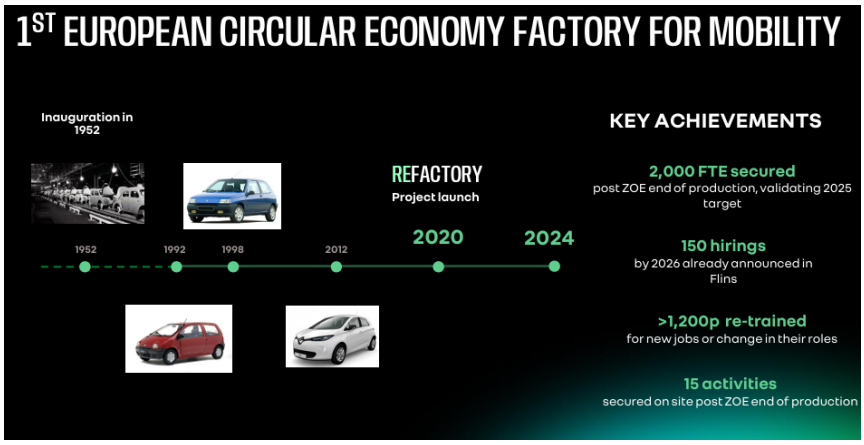


The plant is now the 1st EU circular economy plant for mobility. The visit of the Renault initiatives and site was really in phase with the project's objectives and a great opportunities to prove that circular economy is feasible and can be profitable at the industrial level.



2 groups were taken to different locations in the plant to present in field initiatives. Including the ReMan factory. A complete workshop dedicated to the disassembly, expertise, cleaning and completely new building of specific elements as the injection's components, turbos or engines. This visit shows how Renault is dealing with electronics as well with specific tools and processes dedicated to the disassembly and repairing of entertainment electronic equipment's.

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Renault present as well how they re-introduce retrofitted robots for car production lines after the end of the serial production of a car model. All robots are dismantled, renewed and retested in hard and specific condition to warranty their 2nd lifecycle in a new production plant.

Last visit was dedicated to the repairing workshop of Renault Flins plant. Each day, 100 vehicles from Renault or other OEM are renewed in a completed processes inspired with industrial technics as LEAN or 4.0 industry and allows to reinject almost brand-new vehicles in the field with a new dedicated warranty.

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Finally, a training activity on circular economy was conducted involving all attendees, emphasizing the transition from a linear to a circular economy. Based on the pedagogic approach of the fresk, the involved trainees discover a new method to present circular economy pillars.

During this event, partners from different horizons were able to meet around the Treasure project and circular economy projects and initiatives.

60 peoples joined on the 1st day to discover the results of the Treasure project and 40 peoples participated to the 2nd (limited places). Thanks to discussions and activities together, synergies and future collaborations have been created during the spring school within the stakeholders.

The public identified as stakeholders is composed of:

- Project partners (Treasure project or other EU projects)
- Industrial partners (Valeo, Forvia, DPAN, Skytech, Schneider, ST Microelectronics, Continental, …)
- Institutions (European Commission, PFA)
- European Associations (CLEPA, ACEA)
- Other partners (Renault Campus)

Contacts have been taken between project partners and industrial stakeholders to developed future collaboration activities, notably:

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- DAPN x Renault Campus
- Schneider x Forvia
- DPAN x Valeao

Open collaborations can emerge from the discussions initiated during these project events, at the EU project level (DPAN) or at the industrial level (Schneider) or academics (Polimi x Renault Campus).

2.2.5: Sisters Projects Workshop

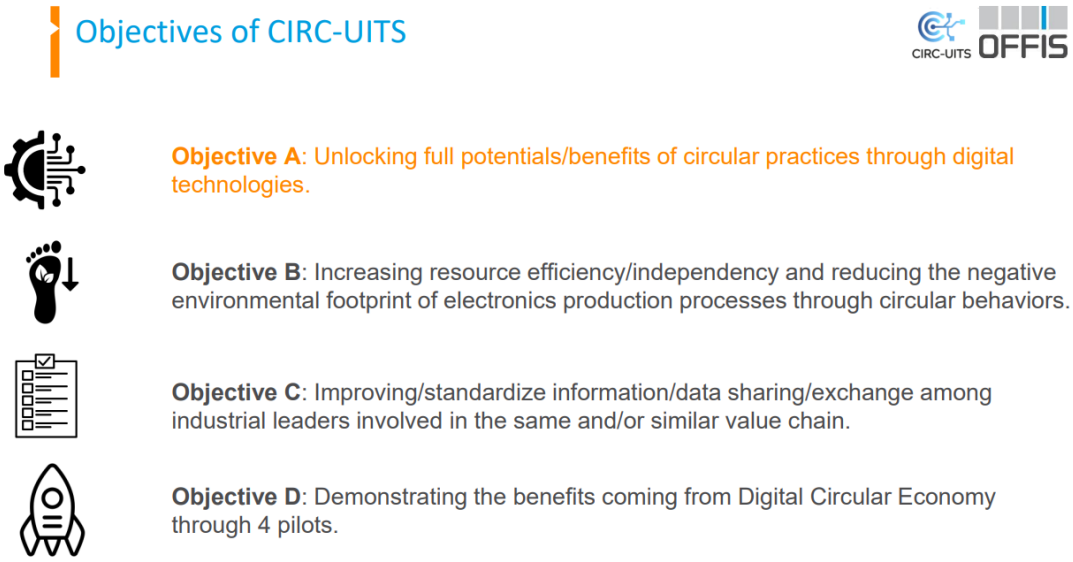
On the occasion of the Spring School, TREASURE partners decided to use the opportunity of a face-to-face meeting to organize a workshop with partners of active projects on complementary topics : the meeting was held in the impressive building of the French Automobile Manufacturers Committee (known as CCFA in French) and had the objective of gathering around the table projects with potential synergies to explore, whether for potential followup activities (as in the case of TREASURE, which is reaching its end) or for ways of collaboration between ongoing projects concerning activities planned in the short term.

To do this, a round table was planned to allow each project to present itself, notably :

The FREE4LIB project :

The EECONE project :

And the CIRC-UITS project with presentation from BOSCH, CONTINENTAL and OFFIS of their connections and achievements during this project.



And finally ECOTRON, the mission of ECOTRON is to improve the sustainability of functional electronics by developing innovative technologies, new materials and processes for circular, recyclable and bio-based electronics

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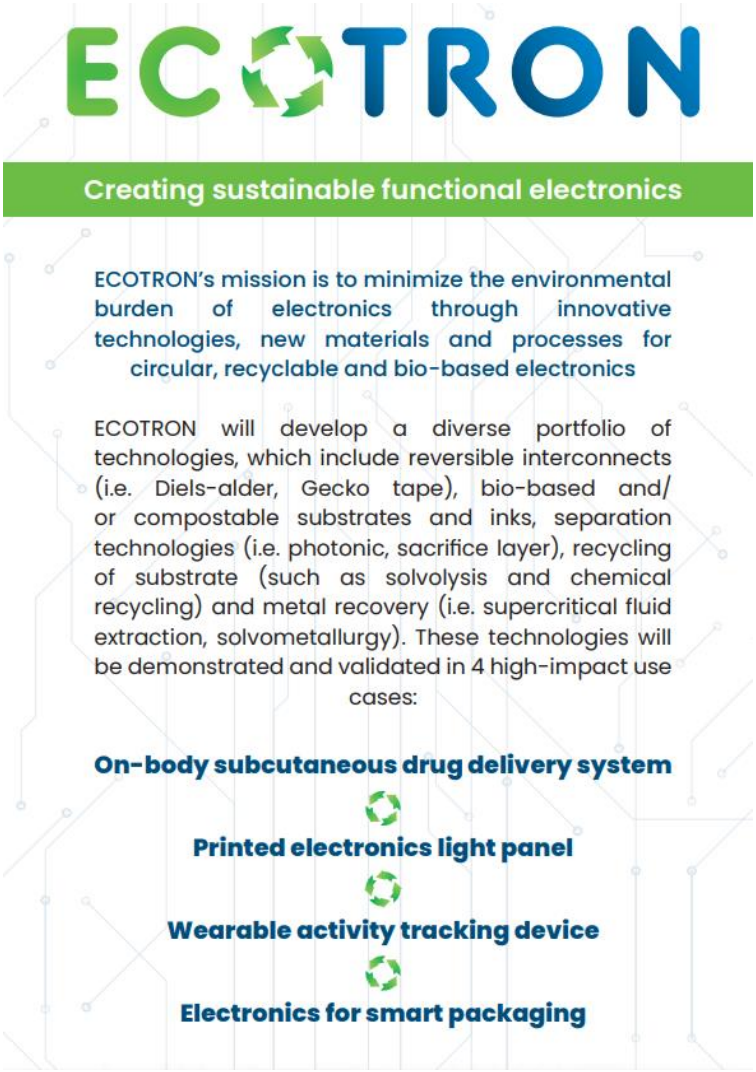

These presentations allowed partners to identify sister projects, common objectives and connections between companies and institutions were established, fostering potential future collaborations. The workshop has ended with a discussion around potential collaboration opportunities and related funding options (notably within the Horizon Europe Cluster 4, 5 and 6), in order to exploit the results of the different projects presented and ensure the continuation of the work with a long-term impact.

2.3 Results and impacts

The dissemination of the objectives, solutions and results of the TREASURE project have been conducted during the 3 years of the project with different approaches: discussion and involvement of our partners, during events (around the circular economy or not), during our daily exchanges with our industrial eco-system members or during specific event dedicated to the TREASURE project. This report present the most relevant interclustering activities performed during the 2nd half of the TREASURE project.

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The process will continue even after the end of the TREASURE project on NextMove side. Based on the needs of the new ecosystem identified, the cluster has been able to plan several activities, thanks to the insights and learnings throughout the contacts established, in order to continue promoting circular economy.

During the TREASURE project, the project partners have been able to reach and involve hundreds of professional working on the topic, but it's not sufficient, that's why within the project framework NextMove has decided to develop a new specific roadmap dedicated to the circular economy for a period of 3 year (2024 to 2026). This roadmap (under consolidation) will focus on 3 main pillars to continue the dissemination of the circular economy principles: the eco-system, the communication (through events) and the services.

With the extension of the dissemination of the TREASURE project, NextMove plan to inform, train, accompany and motivate their eco-system partners and contribute to the involvement growth around the circular economy.

2.4 Lessons learned and recommendations

2.4.1 Dissemination process

This section identifies key lessons learned throughout the interclustering and collaboration process, as well as recommendations to enhance strategies in the future. Key lessons include the importance of early strategic planning, the need for close collaboration among project partners, as well as adaptability to the changing needs of stakeholders. The recommendations aim to strengthen the effectiveness of collaboration activities and maximize their long-term impact.

Important learnings are coming from the large public expectations and needs and the different points of view on the parties. As an advanced project, Treasure defines the future options and solutions dedicated to industrials mainly developed with academics. In parallel, industrial stakeholders requests approved solutions already validated. The recommendation for this kind of exercise between academics / project partners and industrial is the open discussion between partners and let all the people give their feedback on the feasibility or risk on the proposed solutions. All along the project, partners and especially industrial partners should focus on the results but also on the profitability of the models to ensure the acceptance and the future of the technical solutions.

2.4.2 Circular economy

On another side, theses interclustering activities with real initiatives and solutions pointed some lessons learned on the project subject itself: the implementation of the circular economy.

All the actors met during the different interclustering even have the same shown the importance of a strong eco-system in the definition of the circular economy. On industrial side, companies are not used to share and open the business to external stakeholders. The main recommendation is to identify all the different steps needed to develop the circular economy and involved partners on all these steps. The main difficulty is the sharing of the cake: all the

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partners of the circular process should be profitable and get advantages of the circular situations. In most of the cases, the circular business involved specific actors as shredders, dismantlers, recyclers. Sharing and involvement of the actors at the very beginning of the process is the key factor of success according to the partners involved.

3. Conclusion

In conclusion, Deliverable D7.8 of the TREASURE project represents a crucial step in the interclustering and collaboration activities with other partners, projects and initiatives on Circular Economy. This report provides an in-depth analysis of these activities conducted on the second reporting period , their results, impact, and lessons learned from this experience. By consolidating collaboration efforts and implementing the recommendations, the project consortium, as well as the involved external partners can enhance its ability to positively influence the transition towards a circular economy in the European automotive sector.

4. Abbreviations

CEEW	Council on Energy, Environment and Water
CCFA	Comité Constructeurs Français Automobile

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