ReCiPSS

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Project Summary

ReCiPSS refers to Resource Efficient Circular Product Service Systems which is an EU funded project in the Horizon 2020 innovation action. The overarching goal of the project is to demonstrate implementation of Circular Manufacturing Systems (CMS)[1] addressing different aspects of the industrial and business environment. In doing so, ReCiPSS is working on two large scale demonstrators from white goods and automotive sectors represented by project partners Gorenje and Bosch. As depicted in the figure below, both demonstrators are taking a systemic approach where the entre value chain, i.e. value creation, delivery, use, recovery and reuse, is the scope of ReCiPSS. It starts with designing appropriate business models, which dictate how the products and supply chains should be designed in order to satisfy the requirements of the businesses. To demonstrate the implementation of CMS, the ReCiPSS team is developing necessary CE tools and ICT platforms as system enablers.
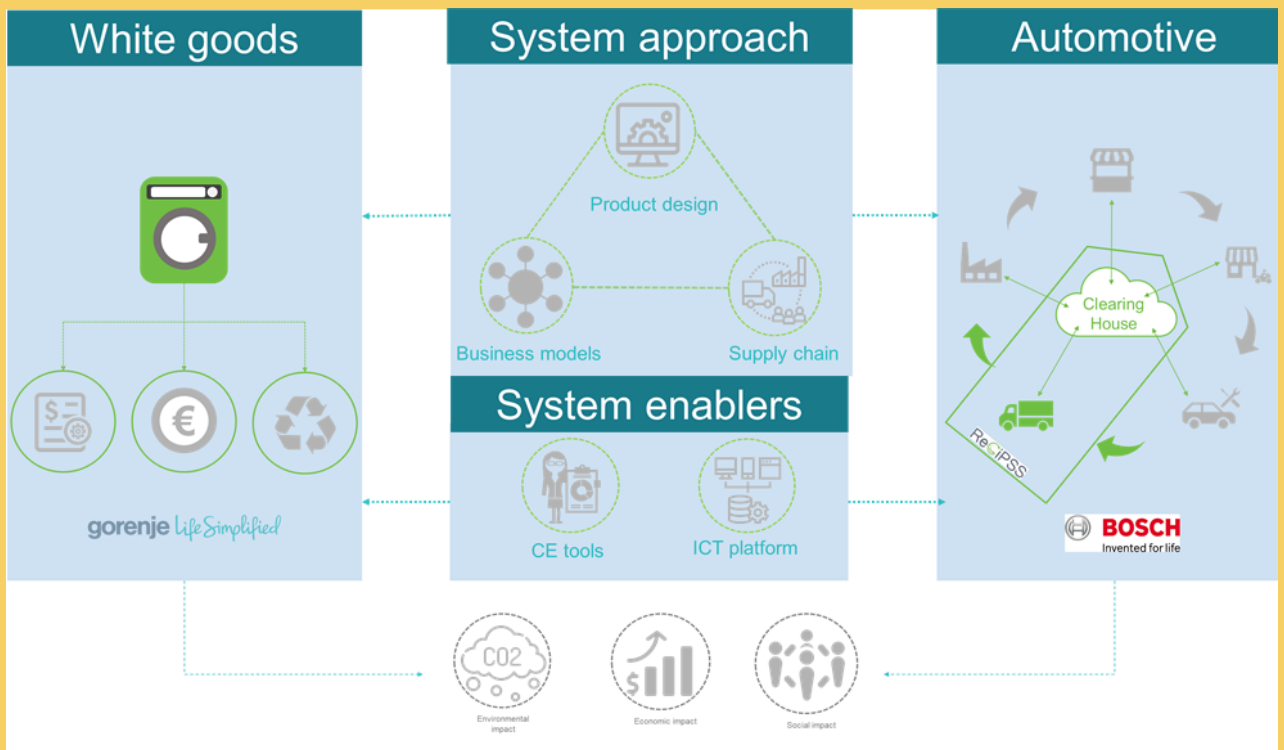
[1] CMS is a system that is designed intentionally for closing the loop of components or products preferably in their original form, through multiple lifecycles. This is a value management approach which includes the phases of value creation, delivery, use, recovery and reuse in a systemic perspective .

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The CE tools include, for example, virtual models of circular business operations, which by incorporating different issues of supply chain build scenarios and find optimized scenario by addressing the trade-offs between economic and environmental performance. In addition to developing design tools to support designers in developing multiple lifecycle products, the CE tools also assess the interactions between business models, product design as well as supply chains to define pricing strategies.

The ReCiPSS team is developing two dedicated ICT platforms to support the demonstrators. For white goods an IoT based platform that enables connection between machines and value chain actors is being developed. To access data both web app and mobile app are being developed. The apps will support different value chain actors to access necessary information and take actions accordingly. The IoT platform will also exploit technologies such as machine learning and augmented reality to support, monitoring (including failure prediction) and maintenance of the machines. To increase efficiency of reverse logistics and ensure higher return rate of quality cores, the automotive demonstrator will develop a part data management platform. This platform will make core trading among different stakeholders possible, allow single point core selection and shorten core return routes. ReCiPSS is using co-creation approach in all developments meaning that requirements from key stakeholders are acquired, analysed and used in every stage of the development.

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Overview of Industrial Case Studies

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Overview of Industrial Case Studies

White Goods Demonstrator

Gorenje is a traditional manufacturer that is practicing linear business approach built upon the model of product sales and after sales services since decades. In taking the circular approach, Gorenje will develop and implement a pay-per-wash offering for over 300 washing machines in both B2B and B2C markets. These washing machines will be deployed in four European countries including Slovenia, Austria, Germany and the Netherlands. To implement this, Gorenje will develop long lasting smart washing machines that are able to monitor operational and user data as well as send the data to the IoT platform. The ICT platform will process and streamline the data for appropriate stakeholders, which will be accessed through both mobile and web app. Different interfaces will be developed for different users to display information relevant to their business relations. The IoT platform will also deploy machine learning techniques for predictive maintenance and to improve user experiences. Augmented reality will be used to demonstrate maintenance and refurbishment activities.

As part of the value recovery activities each washing machine will be refurbished twice and serve at least 3 lifecycles of 5 years. Gorenje will set up necessary reverse logistics infrastructure for refurbishment of the machines and create a dedicated service organization that is able to provide the service proactively and in timely manner.

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Overview of Industrial Case Studies

Automotive Parts Demonstrator

The automotive spare parts follow a traditional forward supply chain that travels trough several trade levels in order to reach the final users (car owners). The conventional reverse logistics of the cores (used spare parts) follow the same route until cores are returned to the remanufacturer (Bosch). As each core carries a value (in the form of surcharge with the 'right to return' that applies between two closest trade levels), each trade level does a selection/inspection in order to ensure that the surcharge flows back to the appropriate stakeholder. Despite these multiple inspections, wrong cores and cores with insufficient quality return to Bosch. This creates serval issues such as economic loss for one of the actors in the supply chain (usually it is the wholesalers and Bosch that takes this economic burden) and on the other hand frustration and dissatisfaction among suppliers (when cores are rejected by Bosch due to not fulfilling the return criteria and suppliers are expecting to be compensated for the cores returned by them). This also causes loss of time due to multiple inspections of the same cores and unnecessarily long transportation.

The automotive parts demonstrator have two main objectives. Firstly, develop a part data management platform that will separate the 'right to return' (value of the core in the form of surcharge) from the physical flow of the cores. By separating the economic incentive from the physical flow of the cores and ensuring that reliable information is available to all stakeholders, the economic incentive becomes transferable and the cores can be sent directly to the remanufacturer. This also makes highly reliable single point core selection and inspection possible, which can be carried out by core selection specialists such as C-ECO. While making core-travel routes shorter and likelihood of repeated and wrong inspection lower, the surcharge is paid to the correct stakeholder in shortest possible time. This also makes surcharge freely tradeable with core brokers, which opens the possibility of access to high quality cores from free market. Secondly, using this data management platform , the demonstrator will streamline the reverse logistics flow for 80,000 cores, enabling aftermarket stakeholders to close the loop by using a single service provider for reverse logistics. Cores will be identified and evaluated only once and then directly shipped to the final destination.

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Overview of Key Activities

The European research project Resource-efficient Circular Product-Service Systems (ReCiPSS) is well carried out following the planned schedule. Project progress including the key activities done and results obtained till now are summarized as below:

WP2: Proposal of the Circular Business Models

The overall objective of this work package is to propose the circular business models for both demonstrators with the innovative solutions for transition from current business models.

The activities in this work package include:
- Understanding the current business models of the two demonstrators; on the needs, attitudes, perceptions and fears of the potential customers for the circular value offering and functioning of the circular business models utilizing information and communication technologies based on the literature review and the empirical research.
- For white goods, in-depth surveys are conducted among consumers in 4 markets (Austria, Denmark, Netherlands and Slovenia). In case of automotive parts, in-depth interviews with wholesalers are realized in France and Germany.
- Reviewing existing innovative tools for the transition of the linear business models to the circular ones.

The innovations in this work package include:
- Identifying the valuable innovative ideas emerging from the results of the literature review and empirical research. These include:
  - a) Considering the potential of circling the flows of products, materials and packaging, usually neglected in business model designs;
  - b) Applying the knowledge from the systemic thinking, organisational and behavioural change theories and organisational network theories to study mental patterns of customers and partners within the transformation processes towards circular business models.

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WP 3: Co-creation Sessions for Demonstrators

The overall objective of this work package is to carry out the co-creation sessions for both the demonstrators and continue working on developing further circular tools/methodologies and ICT platforms.

The activities in this work package include:

- Organizing the co-creation workshops with consumers and stakeholders for both case demonstrators.
- Identifying the user needs, concerns and desires along with the potential opportunities and barriers concerning the acceptance of circular product-service-systems for washing machines, through 2 co-creation workshops with Gorenje.
- With C-ECO, two more co-creation sessions were done, focusing on important stakeholders in the reverse supply chain of used car parts. One workshop centered on wholesalers, and one on core brokers.

The innovations in this work package include:
- The insights from the Gorenje co-creation sessions were used to further define the value proposition of the pay-per-wash service.
- The insights from C-ECO co-creation sessions are currently used to shape the digital design of the CoremanNet service platform. One of the important insights, for instance, is that stakeholders in the reverse supply chain think the core return process lacks transparency

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WP4: Circular Supply/Value Chains Development

The overall objective of this work package is to develop, implement and evaluate supply/value chain models and train the stakeholders with them.

The activities in this work package include:

- The main objective of the work within WP4 during the first 18 months of the project relates to the development of circular value and supply chain report, the key topics of the report were the state-of-the-art analysis of supply chains, the best practices in closed-loop supply chains, outlining the baseline characteristics of the two demonstrators supply chains and development of simulation models to enhance decision making for circular supply chains.
- Aligning the work with the project objectives in terms of streamlining the reverse logistics of the automotive spare parts demonstrators in line with the intended business strategy of improving the transparency of the flow of cores and reduce operational redundancy.
- Introducing the pay-per-use offering for the customers by the white goods demonstrator with the ambition to refurbish the washing machines at the end of their lifecycle. Thereby exploring the operational supply chain design to ensure efficient reverse logistics.

The innovations in this work package include:

- Developing a decision-support based simulation tool for both demonstrators based on their specific supply chain characteristics encompassing the economic performance and environmental performance indicators. With clearly define KPIs for economic and environmental indicators, the trade-offs for circular supply chain network can be identified and adapted to the specific supply chain configuration of the demonstrators.

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WP5: Part Data Management Platform

The overall objective of this work package is to develop a part data management platform that gives access to the spare part related data with full transparency throughout the supply/value chain.

The activities in this work package include:

- Creation of the first user stories, which includes users creation and login securely, holder, writer and remanufacturer options, requests for payments, buy-back process etc. by the development team.
- Development of a front end, a gateway and a user-services layer on the infrastructure hosted in an Azure cloud.

The innovations in this work package include:

A functional part data management platform has been developed. The main functionality of the platform is to separate the economic incentive from the physical flow of the cores and ensuring that reliable information is available to all stakeholders, the economic incentive becomes transferable and the cores can be sent directly to the remanufacturer. This also makes highly reliable single point core selection and inspection possible resulting in shortening core travel routes and access to high quality cores.

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WP6: White Goods Demonstrator

The overall objective of this WP is to deploy and manage 300 smart washing machines in 4 European countries and align the activities in the other WPs in preparation of the white goods demonstrator.

The activities in this work package include:

- Evaluation of all non-technical barriers and legal issues for service based business models
- Design novel user interfaces Using co-creation sessions to establish communication with the users
- Elaborating the value-propositions model and setting pricing strategy for the pay-per-use
- Producing an industrial pre-series of smart washing machines – first samples of WM are produced, programming of electronics is in progress.
- Setting up an effective reverse supply chain to collect used washing machines – The analysis where to locate the repair and refurbishment facility is done. For the project implementation SBU will collect, do major repairs and during the project refurbishment will be done in Slovenia.
- Developing the ICT-platform for the white goods demonstrator

The innovations in this work package include:

- Major preparations needed for pilot launch are done. Gorenje is looking forward to deploy 300 washing machines in Austria, Slovenia, the Netherlands and Denmark in 2020 as part of the white goods demonstrator.

- Producing an industrial pre-series of smart washing machine. The demonstrator will be the first WM in the world that will report critical lifecycle parameters. It is 98% recyclable, built to last 10x normal domestic lifetime, innovative gasket that prevents mold buildup. Most suitable for intensive multiuser usage and refurbishment.

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WP 7: Aautomotive Demonstrator

The overall objective of this work package is to align the activities in the other work packages in preparation of the automotive-demonstrator.

The activities in this work package include:

- Creating the customer-profiles and interviews of different stakeholders from automotive-aftermarket
- Elaborating the value-propositions and Co-Creation-sessions with automotive-wholesalers and core brokers
- Creating the simulation-models of the reverse-supply-chain
- Developing the ICT-platform for the automotive-demonstrator
- Acquisition of a German wholesaler as demonstrator-user

The innovations in this work package include:

- Describing and incorporating "the right to return a used-part (core)" in a digital platform by using the concept of financial warrants (options) and adapt it to the already existing circular business model of remanufacturing in automotive aftermarket.
- In the demonstration-phase, this construct will be validated, tested and developed further in combination with automotive-parts-wholesalers in order to evaluate and improve its relevance for the challenges of circular-business for trading-companies.

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WP8: Dissemination, Synergies & Ecosystem Development

The main objectives of this WP is to disseminate the project results and the development of an ecosystem around the project, in order to guarantee its sustainable impact, once completed.

The activities in this work package include:

- Development of project communication infrastructure and dissemination strategy. Continuously follow up dissemination activities and deploy the strategy.
- Develop, manage and deploy open data and publication policies.
- Create a supporting ecosystem around the project

The innovations in this work package include:

In addition to standard dissemination activities the WP has taken an initiative to unite all relevant research projects funded by the EC to find synergies and create a community of experts who will push Circular Economy.

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WP9: Exploitation, Standardization & Innovation Deals

The overall objective of this work package is to compile the results from the demonstrators for broad dissemination and analysis of policies and their implications on the developments in Circular Manufacturing Systems.

The activities in this work package include:

- Develop an effective exploitation strategy for the market replication of project results. The aim is to bring the demonstrators to TRL6+, create value for the companies and create a buzz in the respective fields of application.
- Promoting business models that aim for keeping products in use using remanufacturing and refurbishment rather than focusing on the end of life and recycling.
- Disseminate business cases for the demonstrators to convince internal and external parties.

The innovations in this work package include:

Influencing markets, customers and producers through the amendment of existing or creation of new standards and guidelines as well as policy through highlighting difficult setups, will be accomplished by proposing appropriate policy changes to enable circular innovation and finally competitiveness.

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Project outcomes and next steps

ReCiPSS's main outcome will be the demonstration of reuse, remanufacturing and recycling of discarded products, at the end of their first useful life, creating new value streams, reducing costs and building greater business resilience, with the goal to increase the amount of reused, remanufactured and/or recycled products. With implementation of the IT platforms that are being developed, the products would be able communicate throughout their lifecycle, increasing information sharing and transparency. The results and learnings from this project will help the other industries in their transition towards a circular business model . The non-technical and legal barriers encountered in this project could potentially lead to revisions and improvements in the European policies for service based business model.

The next main steps to move the project towards completion in the different work packages include the following:

- Run the demonstrators in the relevant markets and close to the users.
- Set up necessary reverse logistics infrastructures to run the demonstrators. Set up single point core selection facility for automotive parts demonstrator and remanufacturing / refurbishment facilities for the white goods demonstrator.
- Test, verify and further develop the IT- platforms taking feedback coming from the real markets/user environment
- Continuing with the modifications in circular business models in accordance with key market characteristics and planning the circular business implementation of the demonstrators
- Conducting workshops with both the demonstrators to discuss the questions of interest, sharing simulation models with the relevant stakeholders and training workshops for the demonstrators
- Mobilize the supporting ecosystems around the project
- Reviewing the draft plan of exploitation, developing business cases by discussions with the partners involved,   formulating a roadmap for standardization and interoperability and analyzing the relevant political issues from the project results

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