

# ReCircE – Digital Lifecycle Record for the Circular Economy



Transparent design of material cycles and optimization of waste sorting with the help of artificial intelligence

Tabea Hagedorn<sup>a\*</sup>, Alice Lopes<sup>a</sup>, Malte Vogelgesang<sup>a,c</sup>, Monireh Pourjafarian<sup>b</sup>, Liselotte Schebek<sup>a</sup>, Christiane Plociennik<sup>b</sup>, Ali Nazeri<sup>b</sup>, Wladislaw Benner<sup>c</sup>, Waldemar Windholz<sup>d</sup>, Svenja Knetsch<sup>d</sup>, Julian Rickert<sup>e</sup>, Andreas Ciroth<sup>e</sup>, Martin Ruskowski<sup>b</sup>

## Background

- The European Green Deal aims to decouple economic growth from natural resource use [1]. The supply of high-quality secondary raw materials is essential for a successful implementation of a functioning circular economy and the European Green Deal [1]
- However, the lack of information sharing among the stakeholders hinders these efforts.
- The German Federal Ministry for the Environment, Nature Conservation and nuclear Safety (BMU) developed the concept of the **"Digital Product Passport (BMU)"** [2]:
  - should contain a set of data summarising a product's components and proper disposal, considering all its lifecycle phases,
  - is used for various purposes in all life cycle phases (design, manufacture, use, disposal),
  - has a standardised data, and
  - is a basis for reliable consumer information and sustainable consumer choices

## The Project

The ReCircE Project aims to **improve the resource efficiency** of material cycles by **integrating an artificial intelligence supported digital description of products** (including information on their entire lifecycle) in a **Lifecycle Passport**.

- Implement a Lifecycle Passport.
- Develop a user-friendly resource efficiency tool.
- Optimize the sorting of waste through artificial intelligence and lifecycle data.
- Collection and processing of LCA-friendly data.
- Use of information to design transparent material lifecycles and optimize waste sorting processes with the help of artificial intelligence.

## The Lifecycle Passport

### The Lifecycle Passport

- is an **extension** of the Digital Product Passport of the BMU.
- is a **dynamic and digital center** for the exchange of information among all stakeholders of the circular economy,
- and contains a tool **to support decision-makers** regarding the efficient use of natural resources.

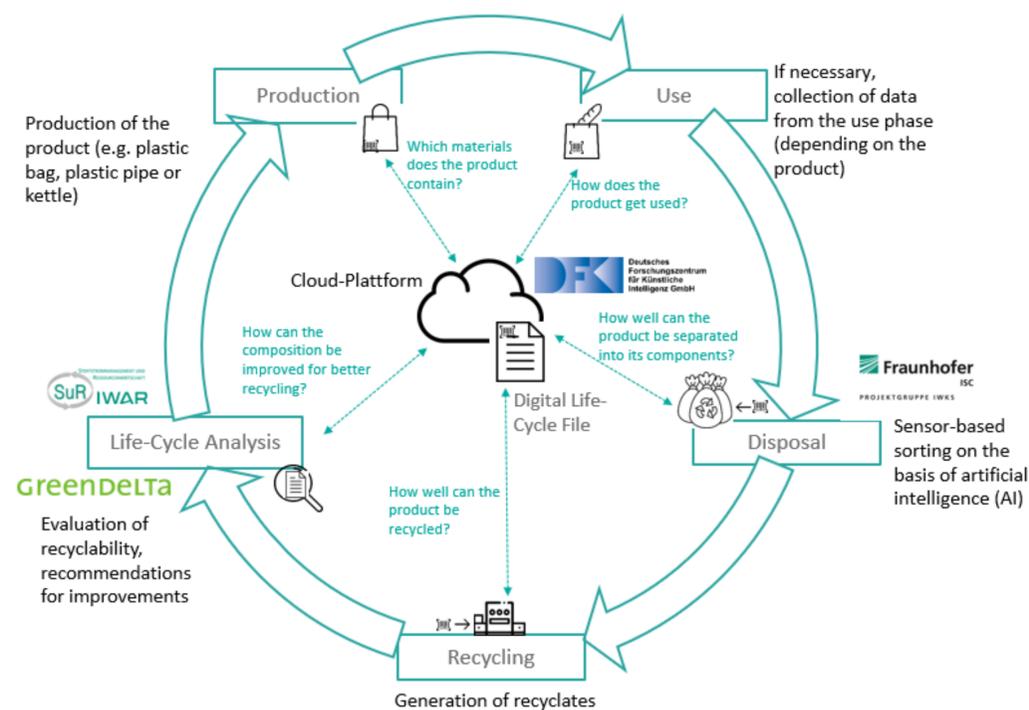


Fig. 1: Stakeholders connection through the Lifecycle Passport.

We would like to establish a **"Lifecycle Passport" working group** in the final phase of the project to

- regularly discuss the newest developments after the project has come to an end,
- test the project results with a broader user base, and
- contribute to standardization efforts

## Project Consortium



**Contact (\*Corresponding author)**  
**Tabea Hagedorn, M.Sc.**  
 Franziska-Braun-Str. 7  
 64287 Darmstadt Germany  
 t.hagedorn@iwar.tu-darmstadt.de

### Institut

- <sup>a</sup> Stoffstrommanagement und Ressourcenwirtschaft (SuR), Institut IWAR, Technische Universität Darmstadt, Karolinenplatz 5, 64289 Darmstadt, Germany
- <sup>b</sup> German Research Center for Artificial Intelligence (DFKI), Trippstadter Str. 122, 67663 Kaiserslautern, Germany
- <sup>c</sup> Fraunhofer IWKS, Brentanostraße 2a, 63755 Alzenau, Germany
- <sup>d</sup> SmartFactory-KL, Trippstadter Str. 122, 67663 Kaiserslautern, Germany
- <sup>e</sup> GreenDelta GmbH, Kaiserdamm 13, 14057 Berlin, Germany

### References

- [1] European Commission. The European Green Deal, 2019.
- [2] Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) (2021): BMU Digital Policy Agenda for the Environment: Environmentally friendly streaming | Cluster | BMU. Available at: <https://www.bmu.de/en/service/frequently-asked-questions-faq/faqs-measures-in-the-bmu-digital-policy-agenda-for-the-environment> (accessed 09.08.2021).

