ReziProK
Resource-efficient Circular Economy –
Innovative Product Cycles

The focus of "DIBICHAIN" is the collection of product life cycle data in order to make the product development process fair, secure and economical. The basis is the block chain model, in which data is stored in a decentralized manner and without sovereign rights. However, current block chain models are usually too slow to scale to large data volumes. This is where the research in the "DIBICHAIN" project starts.

DIBICHAIN
Digital image of circulation systems using blockchain

Resource-efficient Circular Economy – Innovative Product Cycles (ReziProK)

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Software demonstrator

"DIBICHAIN" aims to investigate the application of blockchain technology for the digital representation of product cycles in contrast to other distributed ledger technologies (DLT).

First of all, the main differences between the individual DLTs will be highlighted in order to subsequently evaluate the suitability of the individual technologies for the selected case study. The aim is to deepen the knowledge base for the application of a block chain for a circular economy in order to enable further and more in-depth research projects that will open up the full potential for DLT in this context. A software demonstrator is to be developed, which contains the following application scenarios using the case study of the "Bionic Partition":

- (Back-)tracing of selected materials, from the extraction of raw materials to their return to material cycles.
- Ensuring compliance with social and ecological standards of the entire product life cycle.

- Blockchain for integrated life cycle analyses and for use as a basis (data backbone) for sustainability driven design applications.
- Clear identification and traceability of products of the entire product life cycle.

Innovations in decentralized data storage

Traditional data management currently works via centralized servers. If a user uploads an image to his social media page, this image is stored by a centralized server at a location usually unknown to the user. If the user now wants to delete his image, he must trust the server provider not only to make the data unreachable, but also to actually delete it from the server. Since the modern world and also the so-called Internet of Things
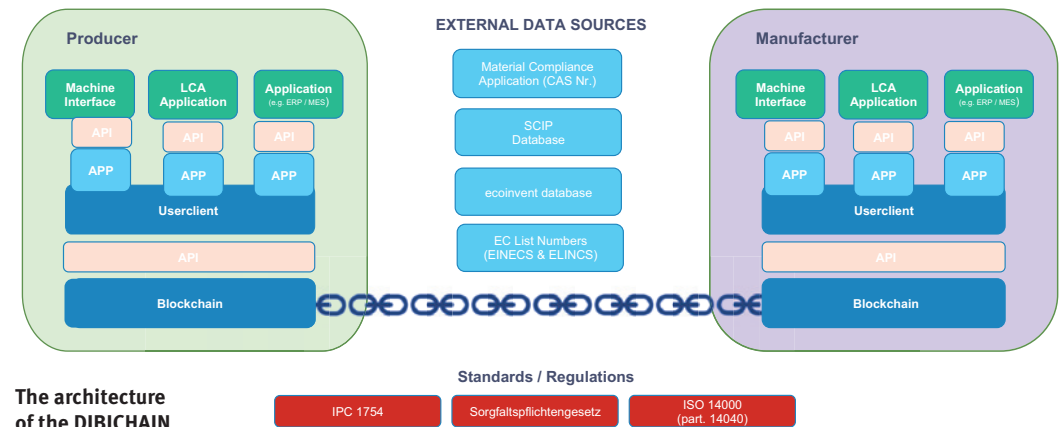
The architecture of the DIBICHAIN

would no longer function without server data storage, it is almost impossible to circumvent this completely. Decentralized storage, i.e. distributed over many individual users instead of on a single server, would be one approach to solve the problems mentioned above.

The potential of DLT can currently only be guessed at. The application of DLT would be a refinement of the not yet fully explored "Web 3.0". The project as a whole is being worked on according to the waterfall model, while the software development is carried out using the so-called scrum method. Scrum is an agile project management method, which is primarily used in software development.

First results

First, the application scenarios (use cases) were developed with the partners for a specific focus. These are "material and process tracking" and "end-of-life & recycling". The following aspects were elaborated:

- Tracking of materials with simultaneous protection of IP and privacy requirements
- Modular structure for connecting various operational software (no vendor lock-in) for processing the data, e.g.
  - Life Cycle Assessment data
  - Material / Dismantling
  - Quality information
- Incentive and marketing opportunities for participants

This approach is intended to reach the broadest possible field of potential participants – i.e. recyclers. In the long term, product development will also benefit. Existing information sources and standards such as SCIP Database, Ecoinvent Database, EC List (ELINCS) as well as the standards IPC 1754 and ISO14040 and others are taken into account.

The innovation team

The five participating companies each contribute their own expertise to the project, some of which has been acquired over many years, in order to achieve the best possible results. This knowledge includes classical software development, blockchains, recycling management, ecology and product development. The project is divided into five work packages. The administrative part is followed by focus groups, analyses and finally the development of the software and its evaluation.

The goal of the project partners Airbus, Altran, Blockchain Research Lab, Chainstep, iPoint is not only to highlight the differences of current DLTs, but also to design a new technology that can be evaluated in a final application scenario, the software demonstrator. Thus, "DIBICHAIN" aims to develop a technology that can be used by companies worldwide for modern, decentralized data storage.
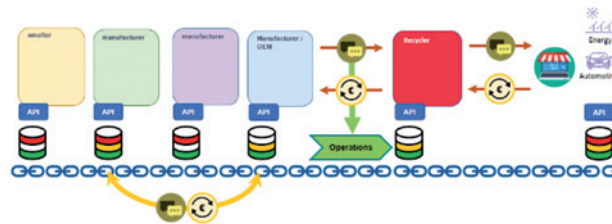
Graphic of the entire chain over product life cycle participants of the blockchain network in an example.

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"ReziProK" is part of the research concept "Resource-efficient Circular Economy" of the Federal Ministry of Education and Research (BMBF) as part of the FONA Field of action 6: "The circular economy – efficient use of raw materials, avoiding waste" and supports projects that develop business models, design concepts or digital technologies for closed product cycles.

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