Refine the Circular Economy By Rethinking It -

A Holistic Approach For The Advanced Circular Economy

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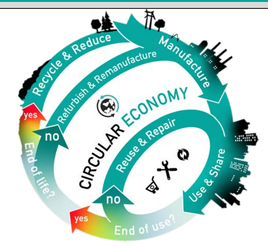
➢ ***Goal: from End-of-life concepts to Circular Economy, but…***

- The owner of the information goes bankrupt
- Insufficient documentation of information
- Insufficient communication between different owners
- No direct relationship between stakeholders
- Relevant information is classified as irrelevant
- Insufficient communication between stakeholders
- Company or product secrets
- Data security



➢ **Closing the Information Gap with digitalization methods and information technologies between all stakeholders as solution!**

Data and Information Marketplace

Bridging the information gap by providing a legal framework to interconnect all stakeholders and trade information

- Open and secure environment
- Decentralized architecture
- Provides trust
- Connect stakeholders
- Data trading as a service for the Advanced Circular Economy
- Handles Static & Dynamic information

Design for an Advanced Circular Economy (DfACE)

Database to provide the design engineer more information regrading the circularity of the product in the making

Data about:
- Chemical elements
- Engineering materials
- Joint technology

Information about:
- Material compatibility within recycling processes
- Tool to aid the design engineer to develop products for a CE
- CE-Design approaches for Reuse, Remanufacturing, Repair and Recycling

Information Flow Analysis and Management (Information Flow Control)

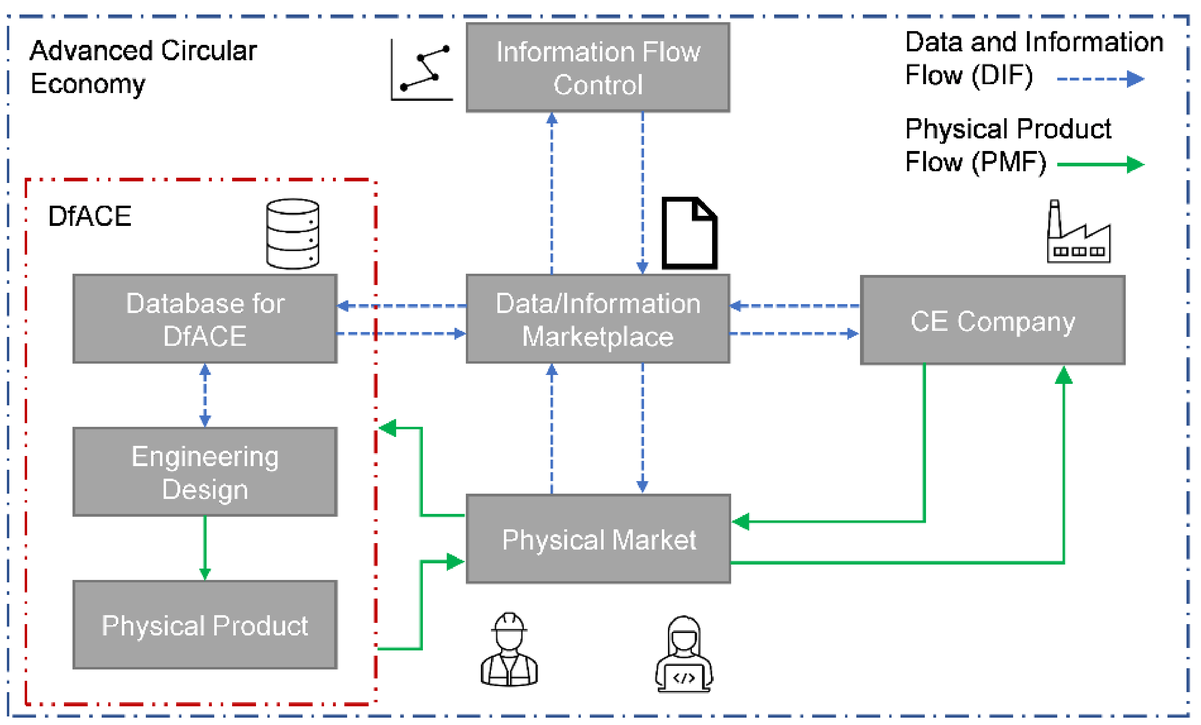
System Dynamic Approach to analyze and manage complex value chains

- Simulation-based approach to understand non-linear complex systems
- Analyze and manage raw material and information flows
- Integration of longer time periods, pre-periodic states (e.g., CE strategies) and all market participants
- Provide well-founded decisions for the stakeholders

Holistic Approach for the Advanced Circular Economy

Physical Product Flow (PMF)

- Related to all ´physical exchange between the stakeholders (product itself, inherent assemblies, parts, materials and energy)
- Product is designed within the DfACE sub system
- Products are sold, used and maintained within the Physical Market
- PMF diverted into the CE Companies
- Different decisions (CE Strategies) ought to be made by the CE Companies to make materials accessible again for DfACE sub-system



Data and Information Flow (DIF)

- Information Marketplace gather the single data and transform the set into information regarding the product
- Enables or ease circular intentions for the CE Companies
- Marketplace communicate with Information Flow Control sub-system
- The Information Flow Control sub-system reacts to each decision of the CE Companies, simulate and analyses them and provide decision support
- The resulting data and information are transmitted back via the Information Marketplace

- Decisions of the CE Companies about the future design of the product result in new requirements and properties for them which in turn have an impact on the market
- New requirements and properties are transmitted to DfACE, which takes them into account in the redesign or new design

Conclusion

- The three main components support each other in various ways and build together the foundation of an Advanted Circular Economy
- The Data and Information Marketplace is the key component to connecting the different systems and providing a continuous data and information flow
- These data and information are necessary inputs for the DfACE toolbox
- Information Flow Control important to simulate, analyze and provide well-founded decisions

Outlook

- To verify this theoretic system, an empiric examination is needed
- The DIF and PMF have to be synchronized
- A definition is necessary, in how far stakeholder will be affected by both Flows at what time
- Generated Static and Dynamic information along both flows have to be analyzed in detail

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