

How the Circular Economy really makes a difference: Trustworthy multi-stakeholder approaches to use Digital Twins for sustainable manufacturing

Special Session Code: TBD

This proposal is endorsed by TC51 Manufacturing Plant Control

Prof. Dr. Martin Ruskowski*, Dr. Christiane Plociennik**, Svenja Knetsch***

**University of Kaiserslautern-Landau, Germany (e-mail: martin.ruskowski@rptu.de)*

***German Research Center for Artificial Intelligence, Kaiserslautern, Germany
(e-mail: christiane.plociennik@dfki.de)*

****German Research Center for Artificial Intelligence, Kaiserslautern, Germany (e-mail:
svenja.knetsch@dfki.de)*

Abstract:

Circular economy is seen as one of the biggest enablers for a carbon neutral economy. The questions that result from this claim show that the status quo of the term circular economy is not as circular as it appears to be. Material flows are not yet led in circles. Reality shows that common practices in the area of recycling technically are considered as downcycling. So what is needed to close the loop and bring materials into a circular treatment? To achieve this, diverse information about a product is required: Ingredients, compounds, technical possibilities of recycling, reusability of recyclates, laws and regulations and many more.

This information shows that circularity does not begin at the end of a product's lifecycle but in product engineering. Therefore, it is important that information is available to multiple stakeholders. But information should not be only collected in a static model of a so called "Digital Twin" but exist as a trustworthy Digital Product Passport with various requirements: The allocation of writing and reading rights, tracking of changes during the use of a product or the record of carbon footprint data. These are just a few examples that show properties which lead to a more sustainable and circular economy of manufactured products. Due to their dynamic characteristics those properties seem to exceed the requirements in the current discussions on political levels. A further role plays the choice of widely usable data formats or the concept of a data space as the place to exchange data or Product Passports.

This session aims to introduce, match and discuss different approaches and requirements from research and standardization as well as technical enablers for more sustainable production through the use of data in all phases of a product lifecycle by multiple stakeholders.

Topics may include, but are not limited to:

- Information modelling for sustainable manufacturing and the product lifecycle
- Digital Twins in the context of the Circular Economy
- Information access for multiple stakeholders in the Circular Economy
- Addressing privacy concerns in the Circular Economy

- Addressing security concerns in the Circular Economy
- Interoperability issues in sustainable manufacturing
- Incentivising stakeholders to share information in the Circular Economy
- Facilitating the use of R strategies via Digital Twins
- Data Spaces for the Circular Economy
- Leveraging data from Digital Twins for sustainability

Time schedule	
Deadline for paper submission	January 31, 2024
Notification of acceptance/rejection	March 15, 2024
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Manuscript Preparation

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For any further information, please contact the Guest Editors of this Special Session:

Prof. Dr.-Ing. Martin Ruskowski

martin.ruskowski@rptu.de

University of Kaiserslautern-Landau
Chair of Machine Tools and Controls (WSKL)
Gottlieb-Daimler-Str. 42
D-67663 Kaiserslautern

Dr. Christiane Plociennik

christiane.plociennik@dfki.de

German Research Center for Artificial Intelligence (DFKI)
Department of Innovative Factory Systems
Trippstadter Str. 122
D-67663 Kaiserslautern

Svenja Knetsch

svenja.knetsch@dfki.de

German Research Center for Artificial Intelligence (DFKI)
Department of Innovative Factory Systems
Trippstadter Str. 122
D-67663 Kaiserslautern