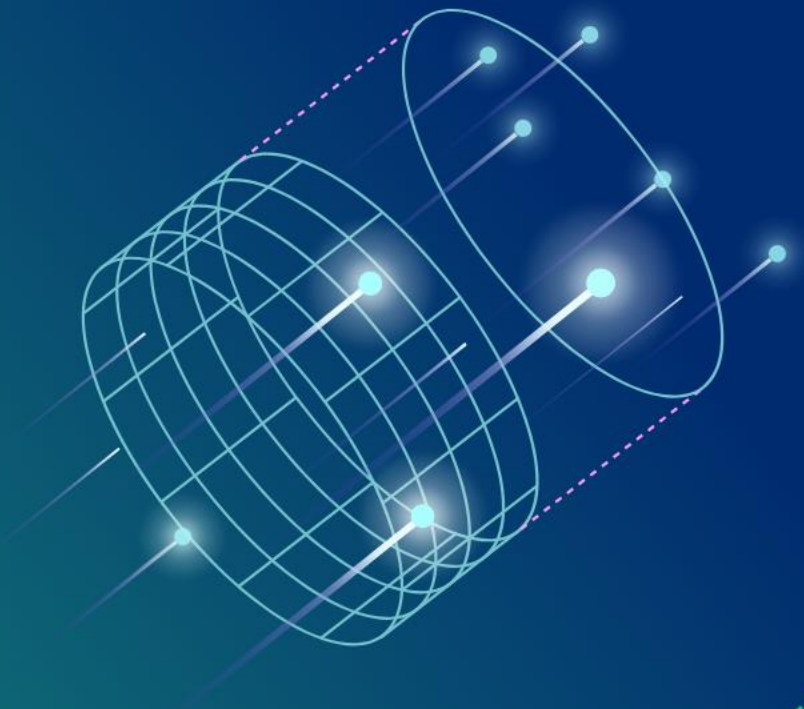
EUROPEAN BIG DATA VALUE FORUM

Technology, Platforms, and impact TRACK

Digital Twins and Standards

November 22, 2022 - 14:00 - 15:30

Ceremony room



ORGANISED BY:

BDV BIG DATA VALUE ASSOCIATION

IN COLLABORATION WITH:

European Commission

Plan4all

VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

UNDER THE AUSPICES OF:

EU2022.CZ

Combining AAS specifications for Digital Twins with AI methods and Industrial Data Spaces in Circular Manufacturing

SERGIO GUSMEROLI, Politecnico di Milano

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Circular TwAIn

Funded by the European Union

HORIZON-CL4-2021-TWIN-TRANSITION-01-07: Artificial Intelligence for sustainable, agile manufacturing

Circular TwAIn

Circular TwAIn researches, develops, validates, and exploits a novel AI platform for circular manufacturing value chains, which will support the development of interoperable circular twins for end-to-end sustainability.

Based on the use of trustworthy AI techniques, the project enables human centric sustainable manufacturing, fostering the transition towards Industry 5.0 as well as the integration and combination of different data from various sources, with the intent to exploit the advantages of seamless data sharing within trusted and effective manufacturing data spaces, over the entire product life cycle considering sustainability aspects.

21	11	36	7.2M
PARTNERS	COUNTRIES	MONTHS	BUDGET

The Objectives of Circular TwAIn

Highlight European Industry as a leader sustainable manufacturing through trustworthy AI technologies

Promote end-to-end sustainability in industrial production

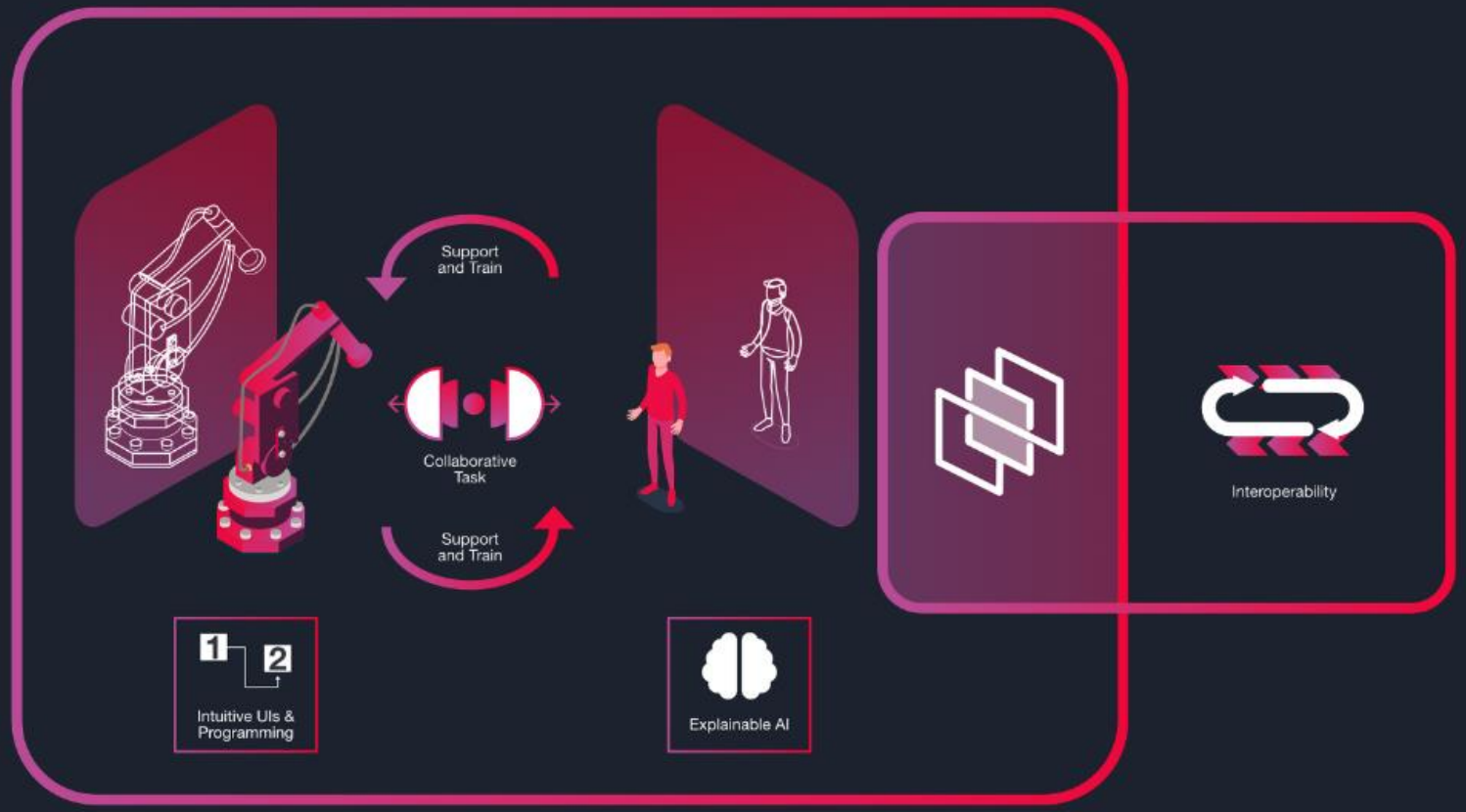
Boost the agility of European industry and its resiliency to external and internal influences

Integrate state-of-the-art AI technologies with circular manufacturing and re-manufacturing technologies, exploiting their potential across the entire product's lifecycle

The main challenge of Circular TwAIn

Collaborative AI

AI technology is seen as meaningful support for the human worker on the shop floor – not as a replacement. The collaborative approach aims to reach performances that man or machine, acting independently, cannot reach.



Circular Data Space

Technical and semantical interoperability as well as trustworthiness between all actors of the circular manufacturing system is vital.

Industrial Pilots and demostrators

De- and Re-manufacturing of Li-Ion battery packs in e-mobility

Remanufacture and the re-use of the disassembled cells with proper residual characteristics into second-life stationary applications

De- and Re-manufacturing of consumer WEEE

Overcome limitations in the de-manufacturing and re-manufacturing of consumer WEEE

Petrol-Chemical Pilot: Hybrid Circular Twins for Process Industry

Reduce the CO2 emissions and energy consumption from the production of Ethylene Oxide and Ethylene Glycol

Interoperability for AI-driven Digital Twins for Circularity

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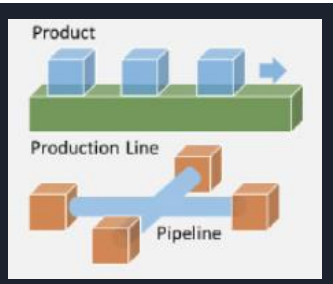
Digital twins will be built for products, processes and humans to effectively design, configure, simulate, operate, and maintain them in their lifecycle stages



Active interaction and collaboration between digital twins is needed

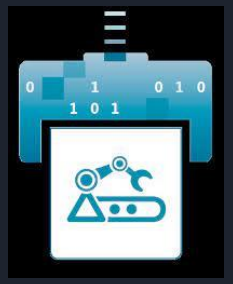
Such a system of digital twins must be highly interoperable, both with the real-world systems and other software systems running in the plant

To ease the interoperability burden and avoid duplicated efforts, both systematic and standards-based approaches are needed in building digital twin systems

Digital twins will be AAS-compliant

FA³ST – Fraunhofer Advanced AAS Tools

NOVA Asset Administration Shell



Interoperability issue as different versions of the AAS specification could be used

FA³ST Package Explorer Converter

Standards for AI-driven Digital Twins for Circularity

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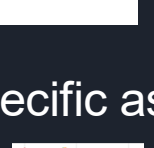
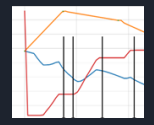
For digital twin modelling, we will use and contribute to the standardized AAS submodels

IDTA

„Product-Carbon Footprint“ submodel for circularity specific aspects



„Time-Series Data“ submodel to support ML/AI tasks



„Asset Interface Description” submodel for connecting to physical assets and external information sources to enrich and synchronize the content of digital twins

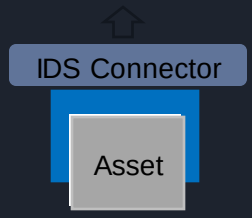
To ensure trustworthiness between all actors in the circular production system, the integration of digital twins in data spaces is required

INTERNATIONAL DATA SPACES ASSOCIATION

There is a tool that can be used to effortlessly integrate any AAS-compliant digital twin into an EDC connector:

FA³ST

EDC Extension for AAS



Circular TwAIn

Funded by the European Union

Thank you

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