



DaCapo

Digital assets and tools for circular value chains and manufacturing products



Funded by
the European Union

15 partners

10 countries

5,99 M€

42 months

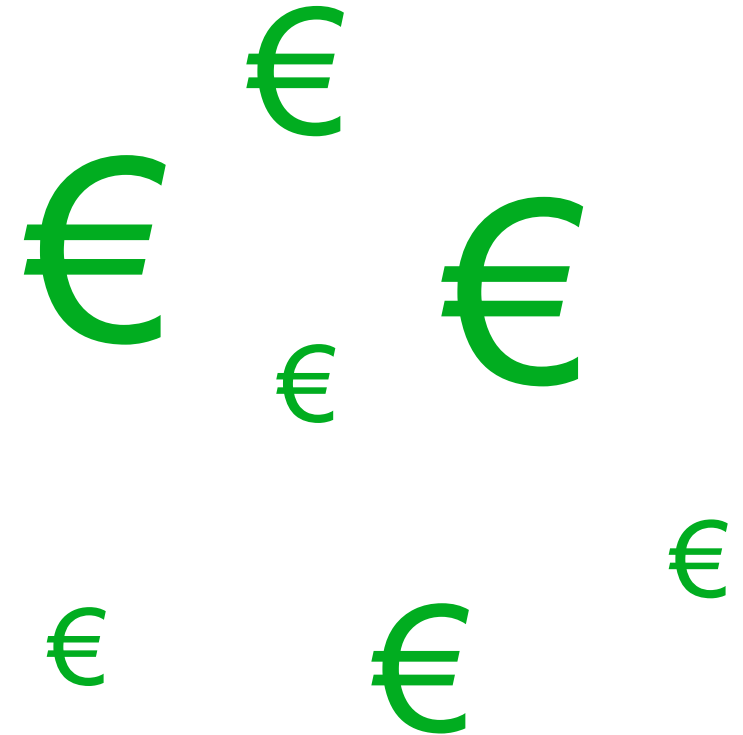
The Challenges

High dependence on imported materials with significant impact on the European economy, due to their application in high-tech products



The Challenges

Raw materials
constitute the largest
cost for European
manufacturing
companies



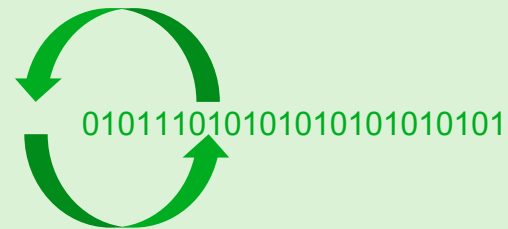
The Challenges

Need to improve raw materials usage efficiency in industrial value chains





The Vision



Create a new paradigm for digitally enabled industrial sustainability and resilience in the EU

The Vision



Significantly improve sustainability & efficiency of imported and critical raw materials in manufacturing



The Vision



Create human-centric digital tools & services to enhance Circular Economy (CE) adoption in manufacturing & product lifecycle



The Project

**Unlocking success with agile methodology
to support the decision making around:**

**accounting
business models**

**material
flows**

**relevant
indicators**

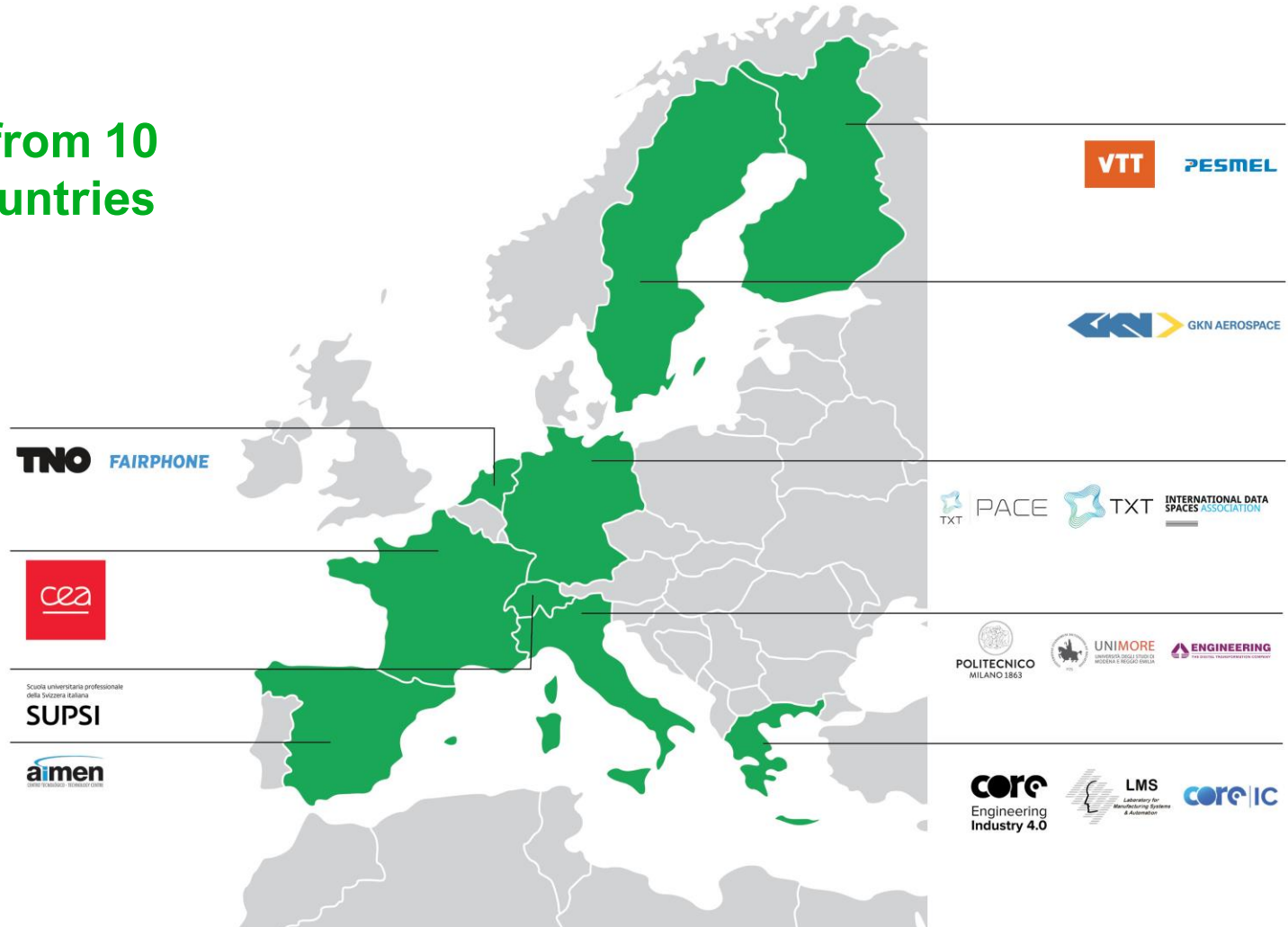
**data-sharing
circular strategies**



Who we are

15 partners from 10 European countries

8 RTOs
4 large companies
2 SMEs
1 European Association



Objectives

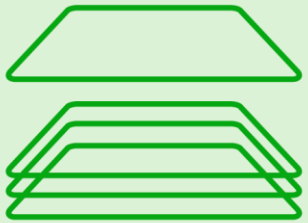
Establish an agile methodology for the efficient implementation of CE strategies in EU manufacturing value chains

Develop AI-based tools and Digital Twins (DT) for the new circular product lifecycles

Implement a digital architecture to enable new sustainable and circular business models

Facilitate the uptake of the digital tools and circular business models by industry and society

Digital tools and methods



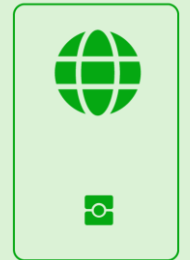
**A RAMI 4.0-compliant
digital platform**



**A digital pipeline based
on a Modular Digital
Thread concept**



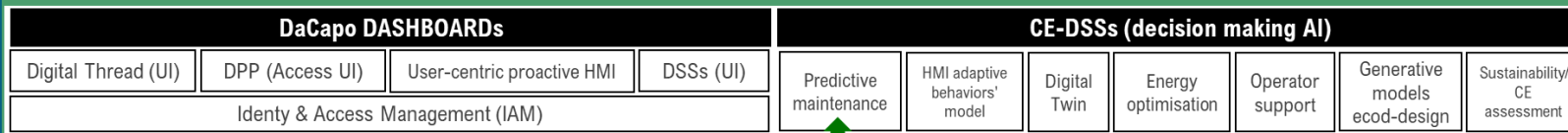
**Realistic products and
processes DT**



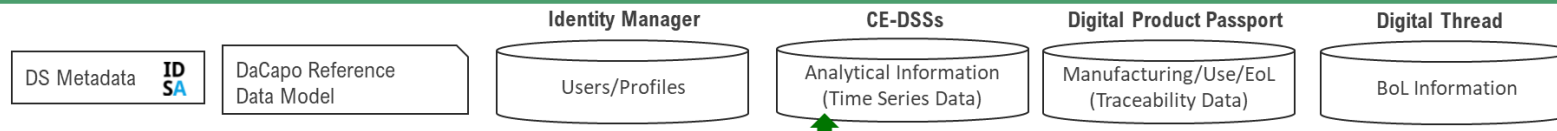
**A newly
conceptualised
Digital Product
Passport**



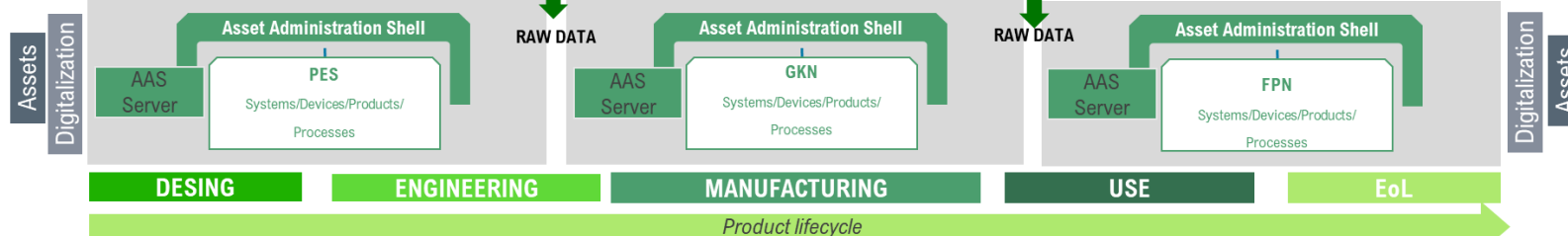
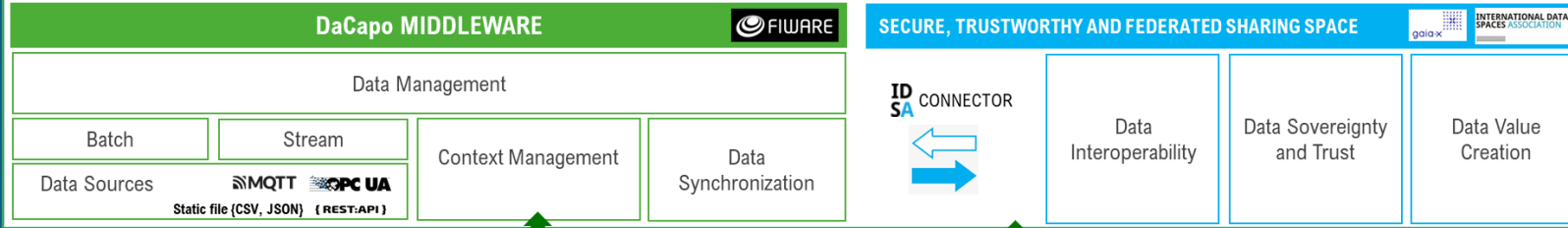
Business Layer - Use case specific data analysis Dashboard and UIs



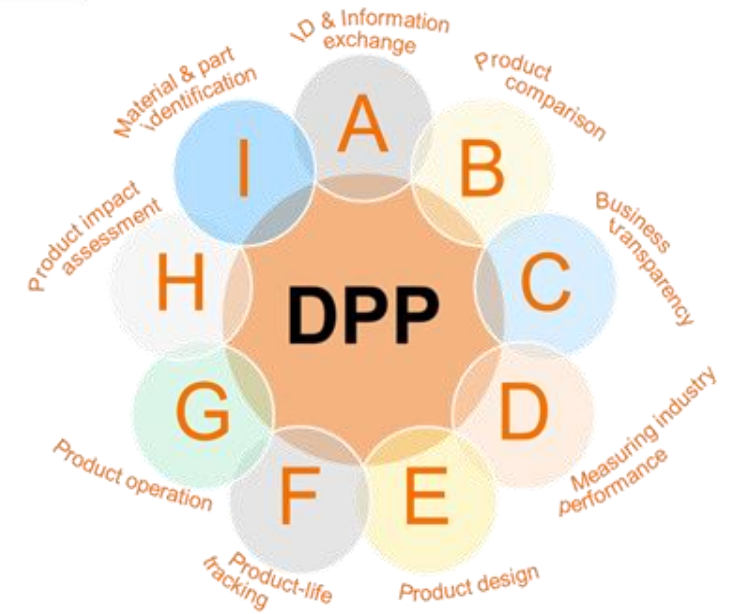
Information Layer



Communication Layer

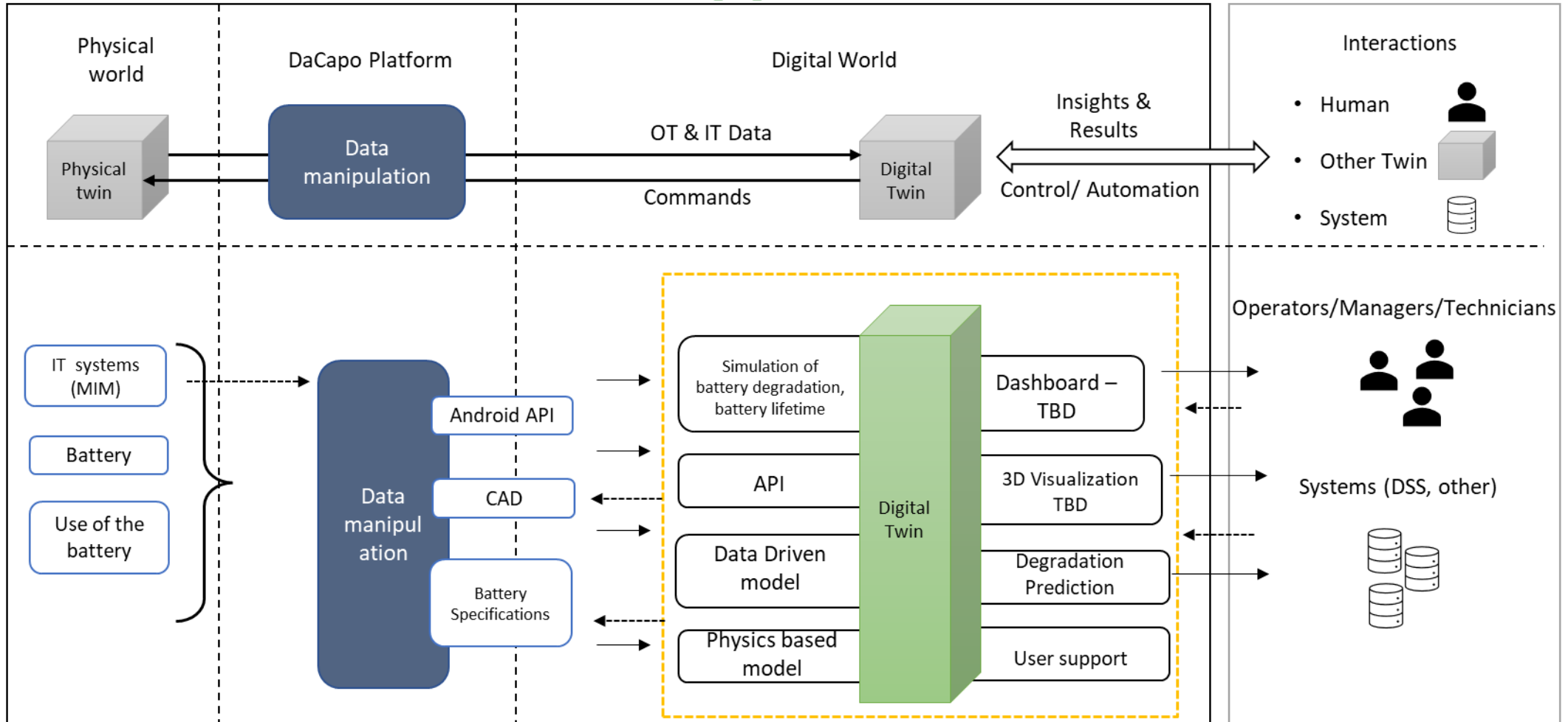


9 viewpoints on DPP [King, Timms, and Mounney 2023]





DT approach



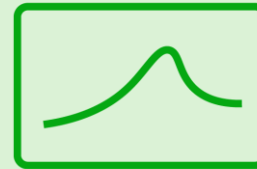
Digital tools and methods



**A Circular
Economy Decision
Support System**



**Sustainable
manufacturing strategies
at shopfloor level**

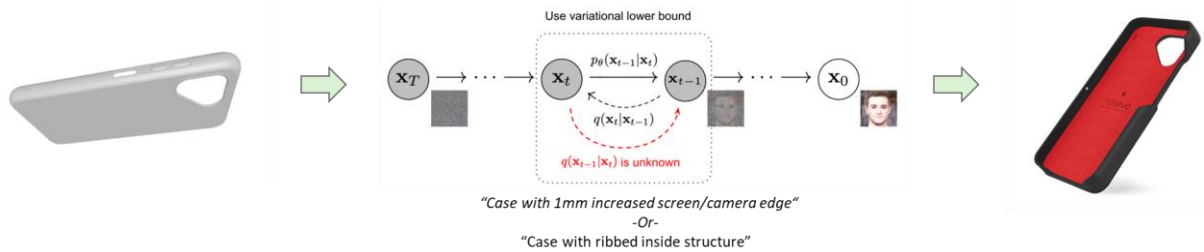
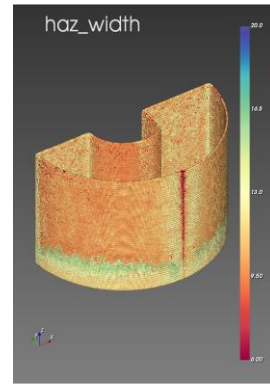


**Advanced diagnostics
tools & predictive
maintenance strategies**

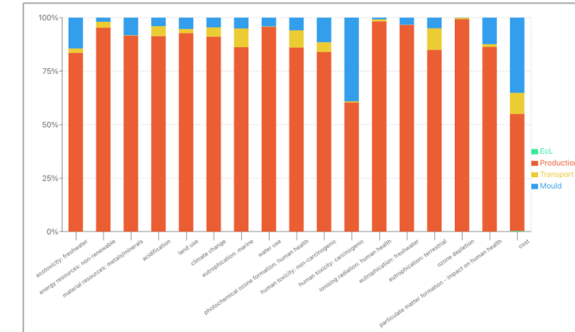


**Product-centric
management and
eco-design approaches**

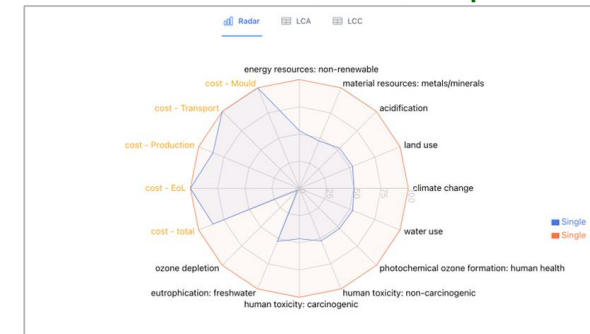
Ecodesign and Engineering Data-Driven Tools



Results of LCA, LCC assessments



RADAR chart for scenarios comparison



Extension towards Circular Economy Assessments (including AI support) for Sustainability Experts & Industrial Customers

Aeronautics:

Extending sustainable manufacturing and reparability approaches for aeronautic value chains



Critical Materials addressed

Titanium alloys
(Ti 6-4)

Product lifecycle addressed stages

Engineering,
Manufacturing, Use phase

Enabled Circular Economy Strategies

Reduce, rework/remanufacture
and repair/refurbish

ICT & consumer electronics: Eco-design, diagnosis and maintenance for modular mobile phones

FAIRPHONE



Critical Materials addressed

Smartphones components
raw materials: Co, Au, Li, W,
Ag, rare earths

Product lifecycle addressed stages

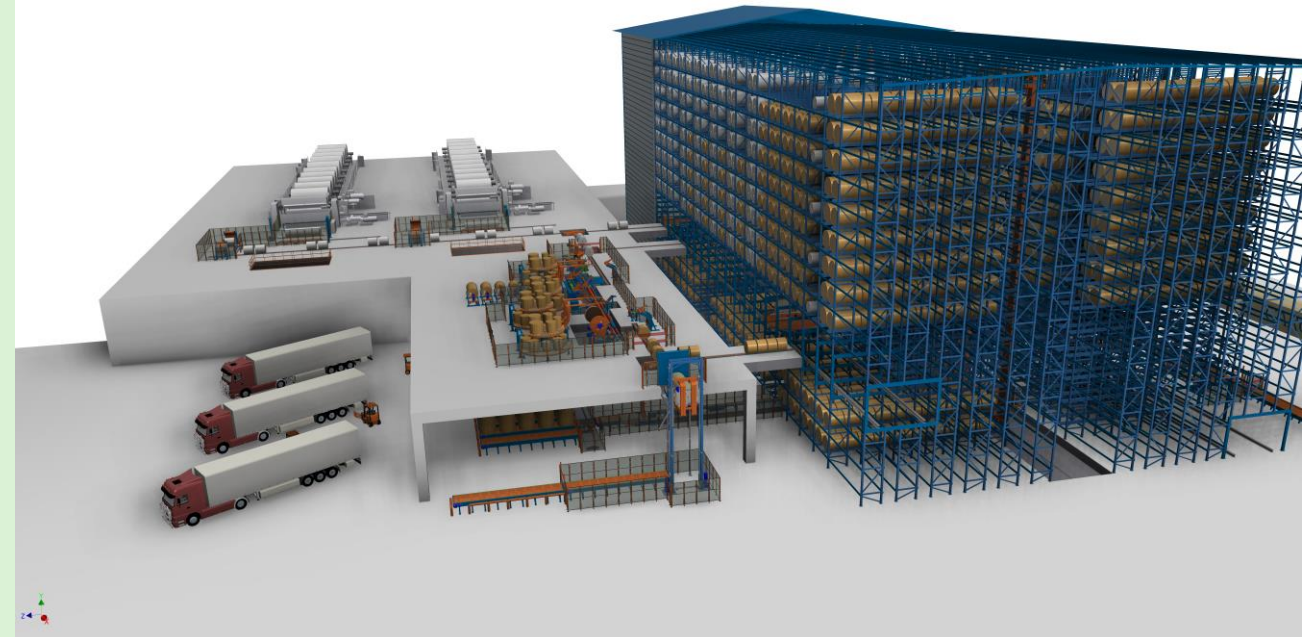
Design, Engineering, Use
phase, EoL

Enabled Circular Economy Strategies

Reduce, repair/refurbish, reuse
and recycle

Warehousing: R-cycles in material flows for warehouse design, construction and operation

PESMEL



Critical Materials addressed

Warehouse construction and
equipment components: AI,
ICT components etc.

Product lifecycle addressed stages

Design, Engineering, Use
phase, EoL

Enabled Circular Economy Strategies

Reduce, repair/refurbish, reuse
and recycle



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