

REDUCE

Reduced Carbon Footprint using Explainable AI for Human Empowerment in Design/Engineering and Production



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MOTIVATION & GOALS

- **Lack of precise data** – Limited availability and high uncertainty regarding energy/material consumption and production systems/products.
- **Insufficient methods and tools** – Missing resources for redesigning products and processes to reduce CO₂ emissions.
- **Low awareness** – Little sensitivity among product designers and production planners to energy and material use.

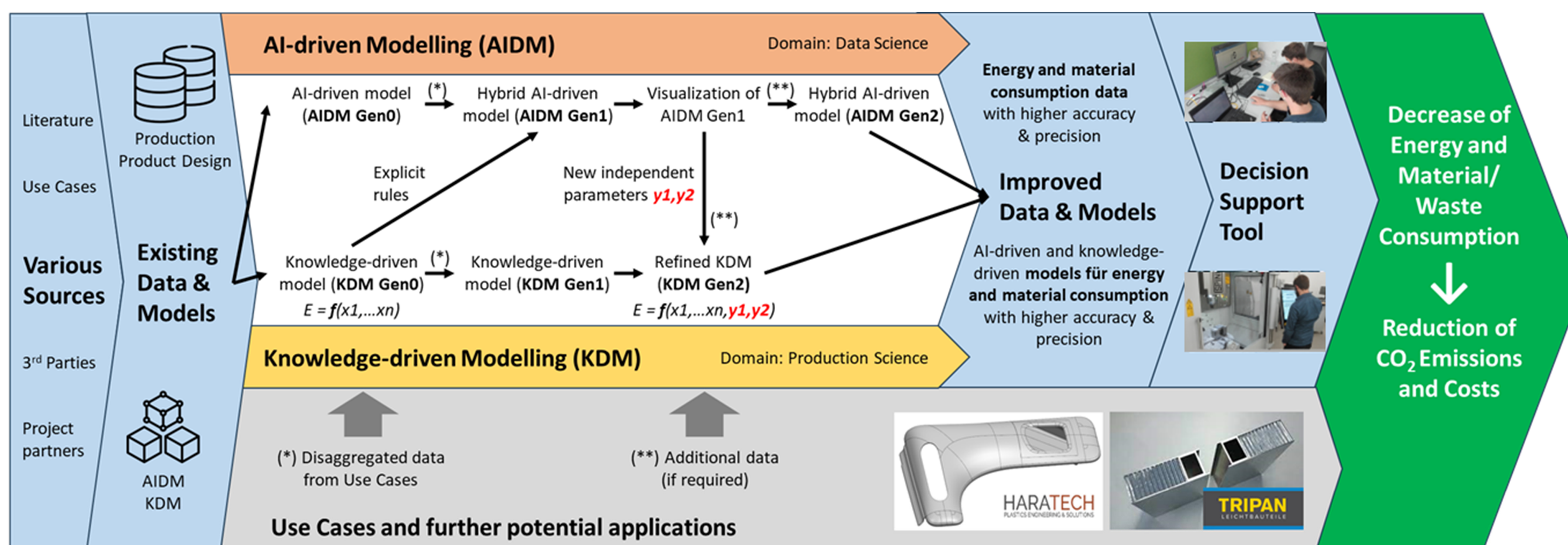
Project FactBox

Project Name REDUCE
Project ID 925795
Duration 36 Months

Area 4.2
Cognitive Production Systems

Project Lead
Dr. Markus Brillinger

APPROACH



CONTRIBUTION

Scientific contribution

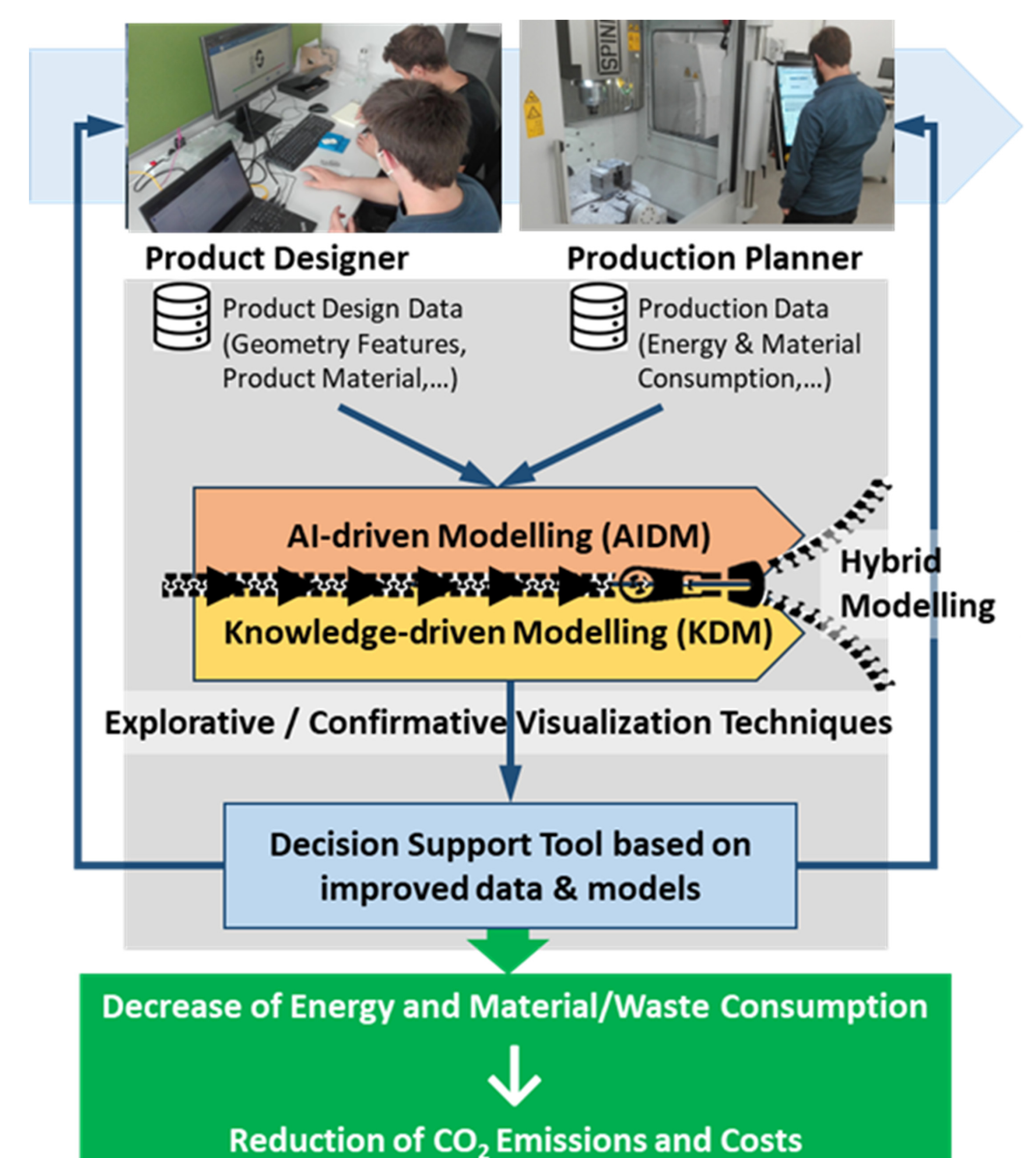
- **New AI-based data breakdown methods** – Generating precise data.
- **Hybrid modeling approaches** – Combining knowledge-based and AI-based methods.
- **Visualization techniques** – Improving the clarity of data and models.

Economic contribution

- **Decision Support Tool** – Helps reduce energy and material/waste consumption in product development and production.

SYSTEM ARCHITECTURE

- **Data and model creation** – Existing data/models will be evaluated for quality, explainability, and usability, then enhanced via hybrid modeling with precise disaggregated data, added parameters, and visualization techniques.
- **Iterative improvement** – Visualization will refine models, derive new parameters, and quantify improvements at each step; visualization components will also be a core element of the DST.
- **Tool development** – The DST will combine accurate data, hybrid models, and interactive visualizations in a decision framework to balance factors like energy reduction and cost.



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