BATTERY 2030+

BatCAT Battery Cell Assembly Twin

BatCAT
Battery Cell Assembly Twin

Battery Roadmap Workshop
Oslo, 27th June 2024

BatCAT has received funding from the European Union's **Horizon Europe** research and innovation programme under **grant agreement no. 101137725**. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the EU nor the CINEA can be held responsible for them.

Project overview

- BatCAT (Battery Cell Assembly Twin) is one of the two projects, alongside BATTwin, that will realize the BATTERY 2030+ manufacturability programme from 2024 to 2027 by developing a digital twin platform and data space for battery manufacturing.
- BatCAT primarily considers vanadium-based redox-flow batteries (pilot line at VANEVO) as well as Li-ion and Na-ion coin cells (pilot line at CPI).
- MCO and logical programming will be used for a decision support system.
- Simulation methods include MD/MC with classical pair potentials, DPD with nDPD potentials, and continuum simulations, including Poisson-Nernst-Planck solvers and equivalent-circuit as well as population balance models.
- Surrogate models will include cellular neural networks with the potential for exploitation by on-chip deployment.

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Project overview

(1) management, simulation, data — 90 PM

(2) Fraunhofer ITWM — data, simulation, management — 42½ PM

(3) KEMIJSKI INŠTITUT — process — 32 PM

(4) simulation, data — 49 PM

(5) RPTU — data, simulation — 42½ PM

(6) ifp Energies nouvelles — process, simulation — 44 PM

(7) UNIVERSITÄT KLAGENFURT — data — 35 PM

(8) DTU — simulation, data, process — 27½ PM

(9) IndiScale Data Services — data, process — 27½ PM

(10) Universidad LOYOLA — simulation — 24 PM

(11) Hochschule Kaiserslautern University of Applied Sciences — simulation, process — 24 PM

(12) simula — simulation — 18 PM

(13) bi-rex Big Data Innovation & Research Excellence — process — 15 PM

(14) VANEVO — process — 32 PM

(15) LIST — data, simulation — 18 PM

(16) UKRI Science and Technology Facilities Council — data, simulation — 84 PM

(17) cpi — process — 77 PM

(18) GOLDBECK CONSULTING — management, simulation — 18 PM

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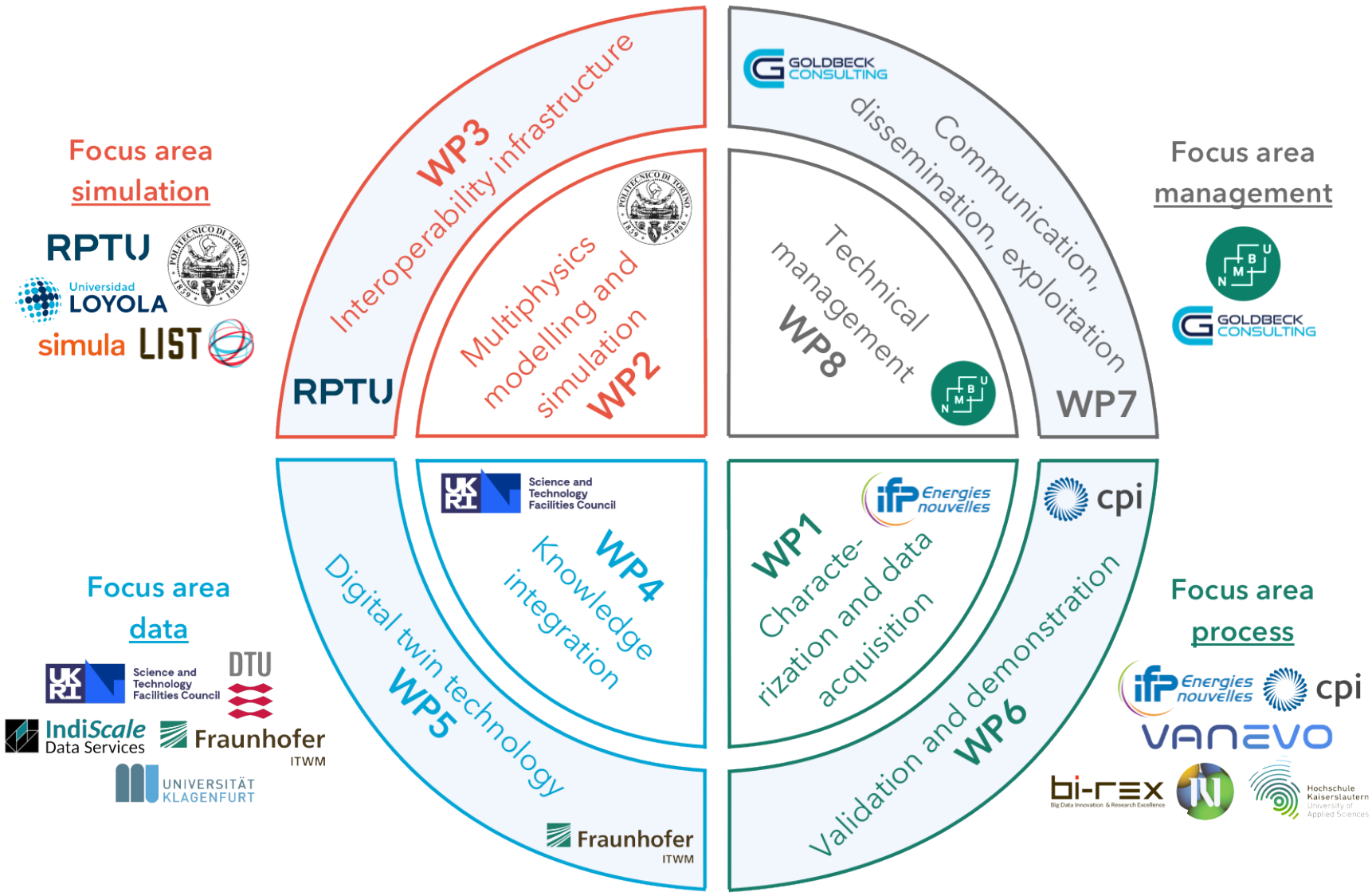
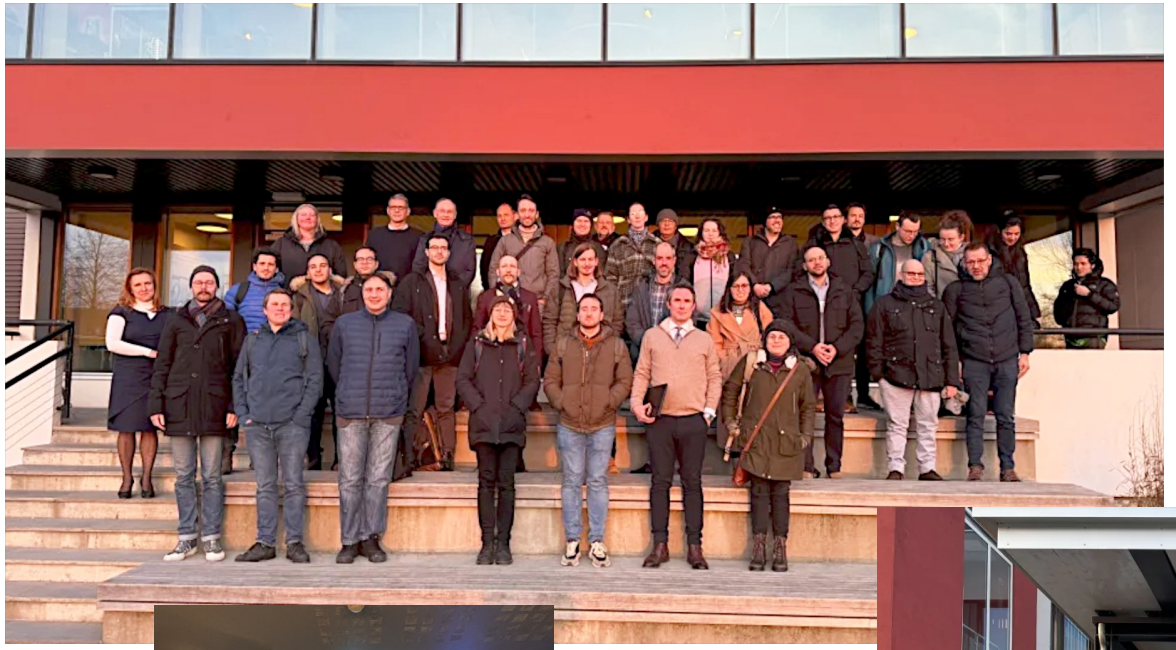
Project overview



Project kickoff held in March 2024



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Top Goals

	WP lead	IFPEN	POLITO	RPTU	UKRI	ITWM	CPI	GCL	NMBU
		WP1 characterization	WP2 simulation	WP3 interoperability	WP4 knowledge	WP5 digital twin	WP6 demonstration	WP7 exploitation	WP8 management
KO1	experiments and sensorics								
KO2	multiphysics modelling								
KO3	technical interoperability								
KO4	integrated data space								
KO5	digital twin platform								
KO6	pilot and transferability								
KO7	long-term exploitation								

main responsible work package | substantial contribution | some contribution | minor contribution

KO1: In situ measurements and **characterization**, targeting cell manufacturing and behaviour.

KO2: Multiscale and **multiphysics modelling**, targeting scalability and computational efficiency.

KO3: Technical interoperability and **linking of models, data, and processes**.

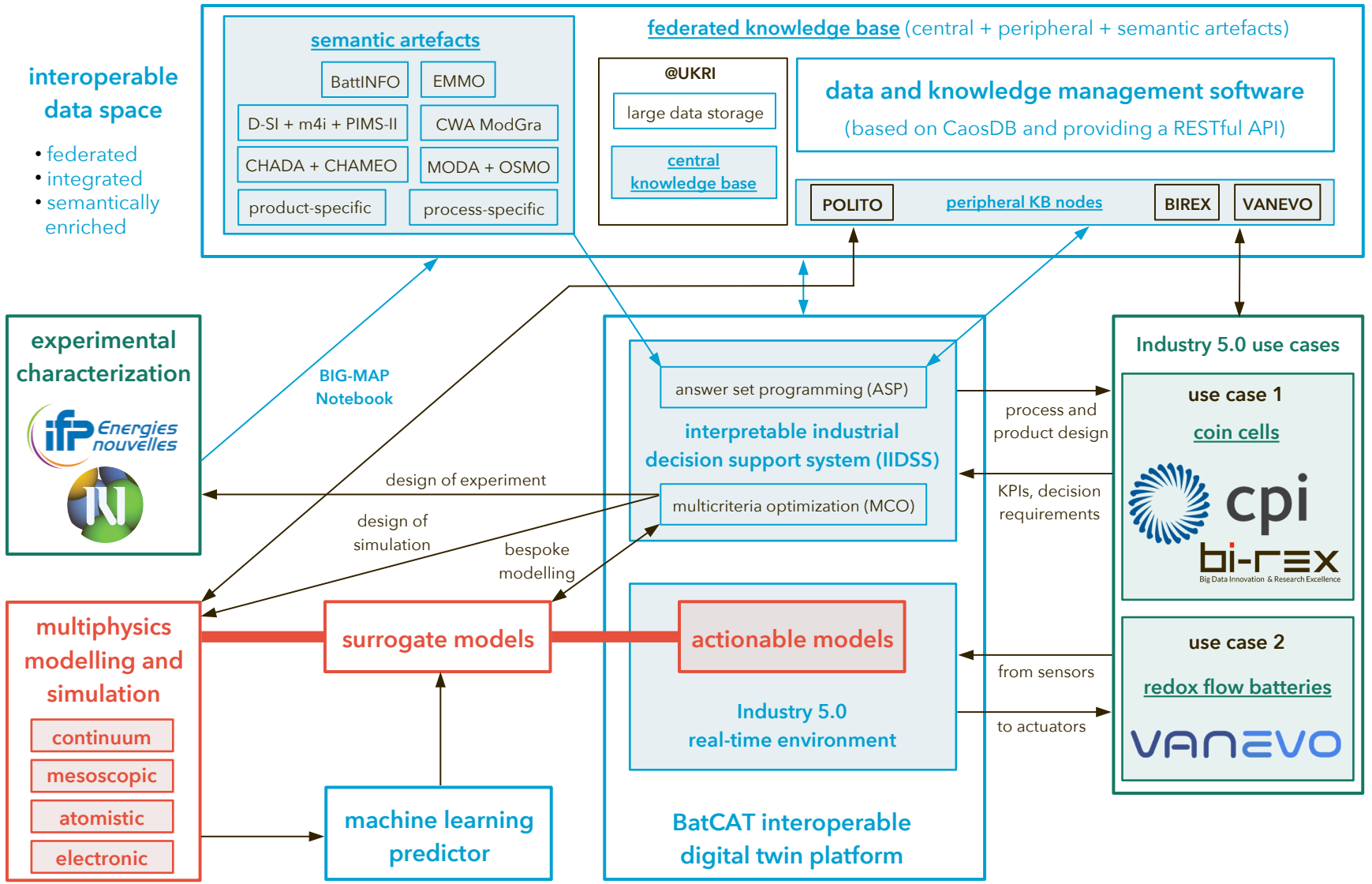
KO4: **Knowledge base** for a federated, integrated, and semantically enriched data space.

KO5: Interpretable industrial **decision support system** and Industry 5.0 **real-time environment**.

KO6: Demonstrate the developments in a **pilot production line** and verify transferability.

KO7: Create the preconditions for a **long-term exploitation** of the project outcomes.

BatCAT architecture



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Requirements analysis

The following tasks conduct internal & external **stakeholder interviews** as part of an **agile requirements analysis** jointly, with task T4.1 taking the lead:

T4.1: "Knowledge infrastructure requirements analysis" (lead: NMBU, contrib.: AAU, DTU, IS)

- Supply "digital twin specs" by month 6 as part of milestone 2.

T4.3: "Data and metadata landscape" (lead: UKRI, contrib.: CPI, IFPEN, NIC, SIMULA)

- T4.1&3 deliver D4.1, "Data landscape & infrastructure related requirements," by M9.

T6.1: "Industrial & use-case requirements analysis" (lead: VANEVO, contrib.: BIREX, CPI, DTU)

- T6.1: "Functional validation requirements";

T7.2: "Citizens' role and societal & gender dimensions" (lead: NMBU, contrib.: DTU, POLITO)

- T7.2: "Requirements on societal/gender issues"

We proceed in the following stages:

1) Preparatory **first-stage interviews** (30 minutes), exchange of ideas.
2) **Second-stage interviews** (30 minutes), developing concrete user stories.
3) Communication with interviewees on the deduced requirements.
4) Analysis and catalogue of the collected requirements.

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