

The logo for HLRS, consisting of the letters H, L, R, and S in a bold, black, sans-serif font. The letter I is positioned between R and S, rendered as a vertical blue bar with a thin horizontal line at the top and bottom, resembling a stylized 'I' or a vertical bar.

Thirty Years, One Vision

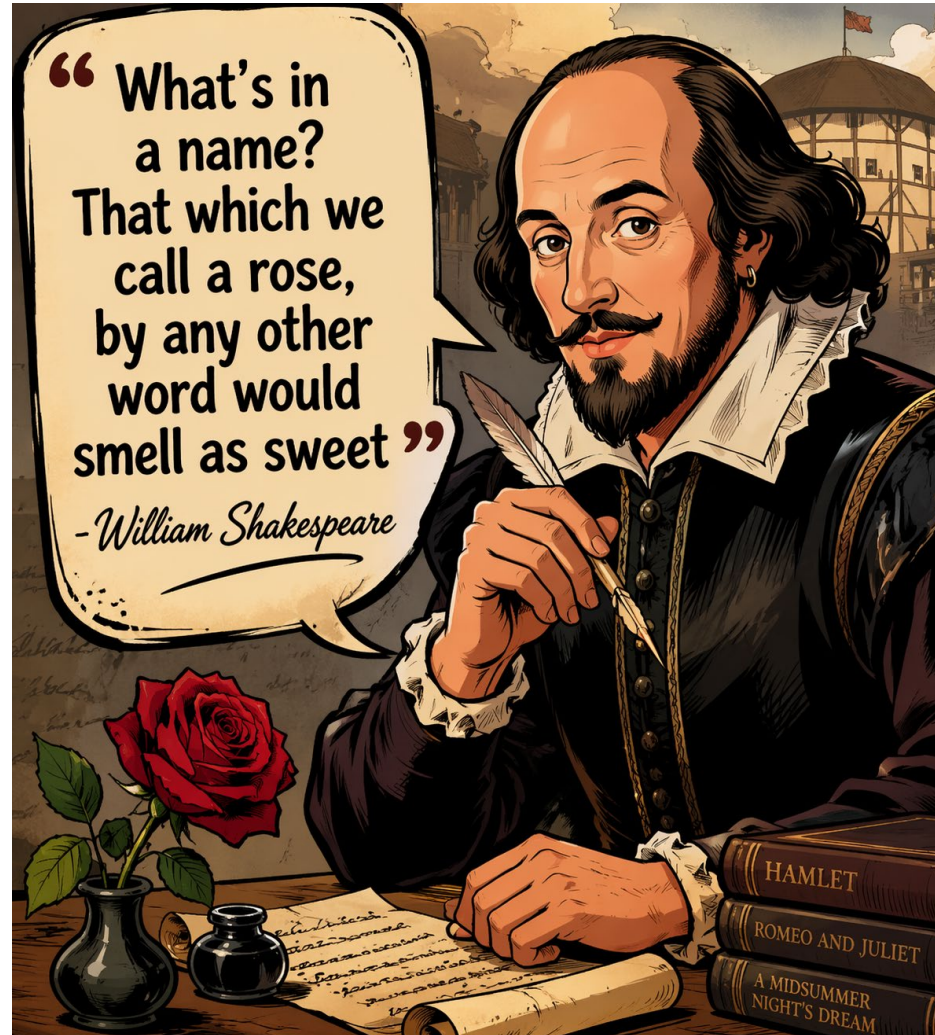
A large, modern building with a facade of horizontal blue slats and large windows, set against a blue sky with light clouds. The building is situated on a green lawn.

High-Performance
Computing Center
Stuttgart

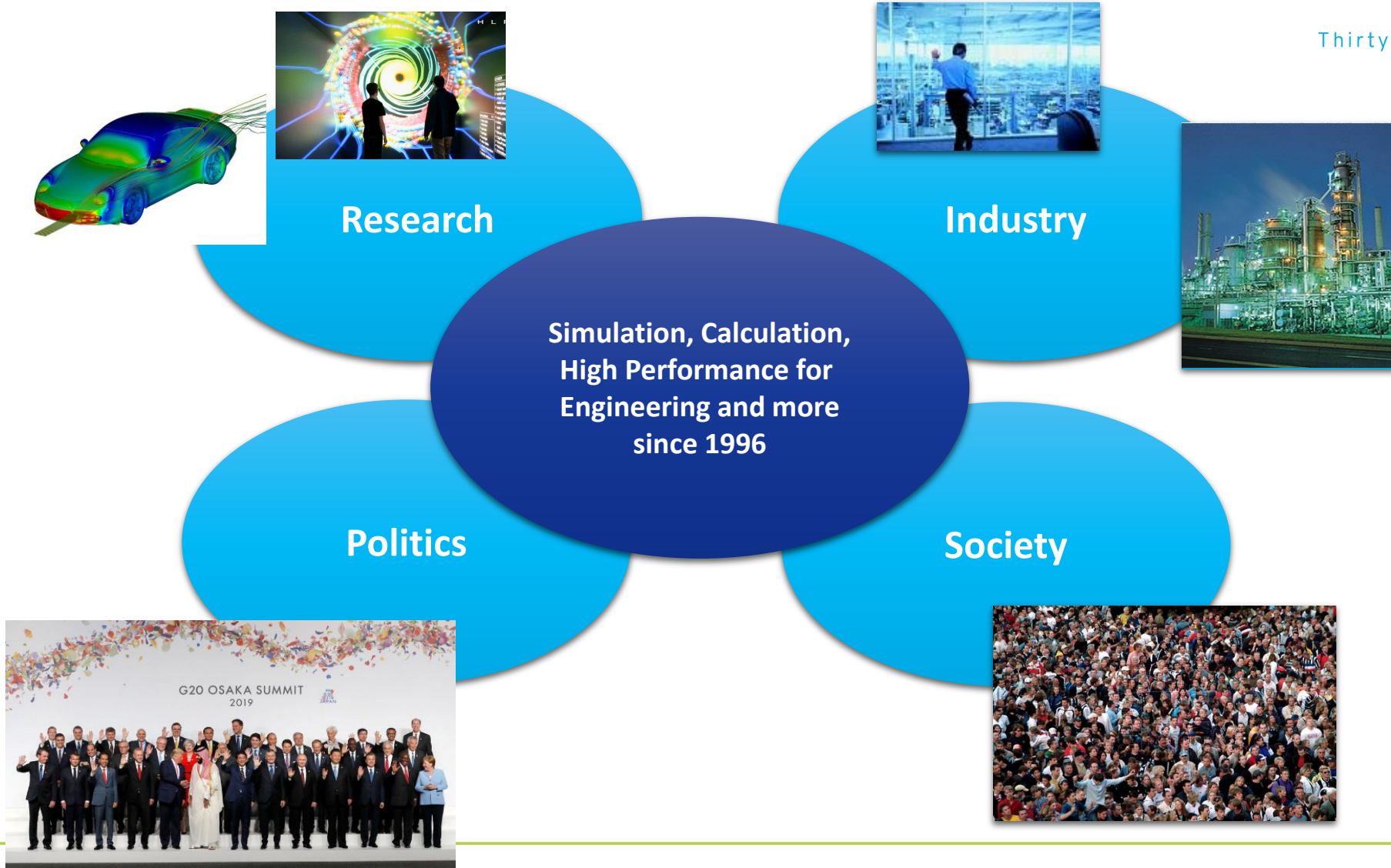
Combining HPC and AI to advance potential: Example from HLRS and HammerHAI

Bastian Koller, Managing Director HLRS, Coordinator HammerHAI

HPC, AI and friends – and Shakespeare



The mission of HLRS



Our Approach



Services4Science

Supporting our users in their leadership in science and industry

Research & Development

Explore new approaches to keep our leadership role in simulation and AI

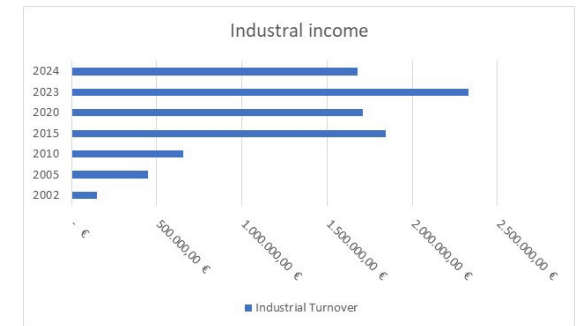
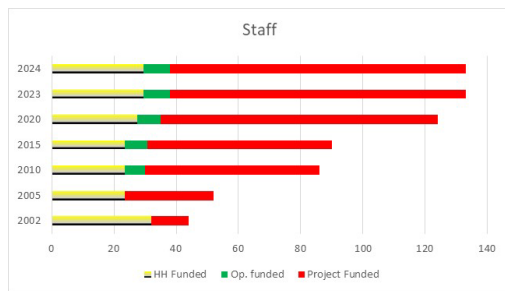
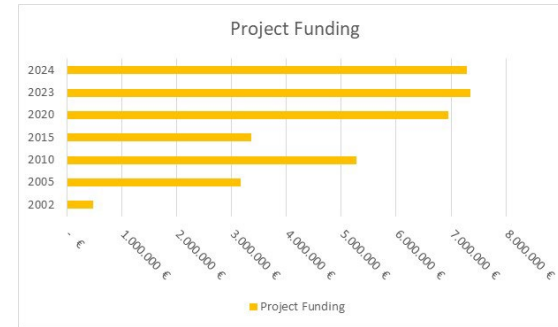


Operation & Infrastructure

Keep operations efficient, sustainable, stable and secure

Industry & Society

Provide best HPC solutions for industry and the public sector



Sustainability & Environment

- ISO 50001 (Energy management)
- ISO 14001 (Environmental management)
- EMAS (Eco-Management and Audit Scheme)
- Planning new building and exascale system with sustainability in mind, including reuse of waste heat for the University of Stuttgart campus
- Continual improvement of environmental performance
- Knowledge sharing with other HPC and data centers.



Security

- ISO 27001: Information Security Management Systems
- TISAX Level 3
- Knowledge sharing with other HPC and data centers



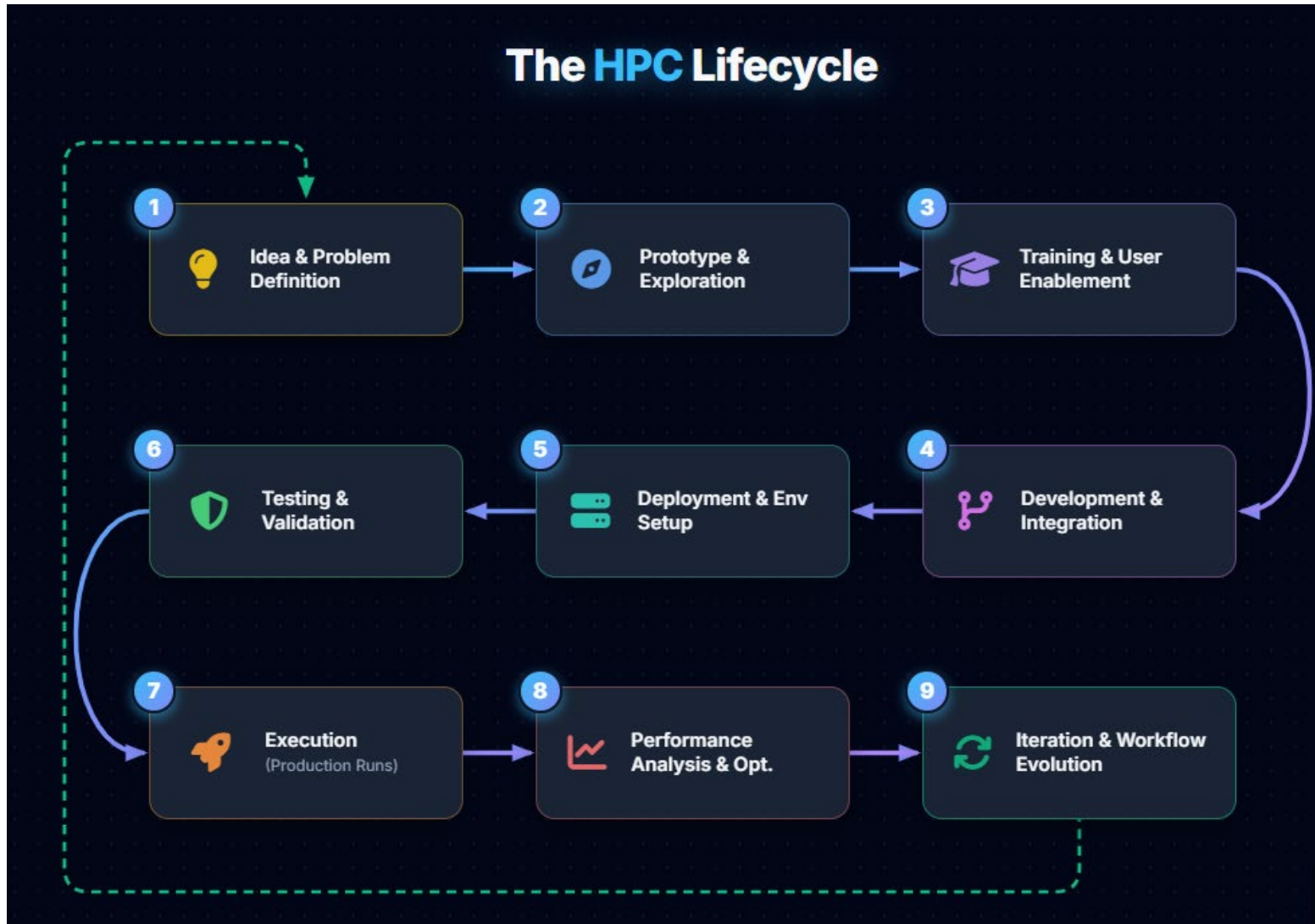
H L R I S

Thirty Years, One Vision



Convergence from HPC to HPC +

How HLRS supports its HPC Users



Systems to support the mission – HPC Flagship Hunter

H L R I S
Thirty Years, One Vision

- **HPE Cray EX4000**
- **Performance:**
 - HPL: 48 Pflop/s (FP64) – 2 PF sustained
 - HPCG: 350 Pflop/s (FP64)
- **Technology:**
 - 752 AMD MI300A APU in 188 nodes
 - 512 AMD EPYC 9374F CPU in 56 nodes
- **Storage**
 - Cray ClusterStor ES2000
 - 25 PB capacity on 2120 disks
- **Network**
 - HPE Slingshot 11 Dragonfly



The Next HPC Flagship - Herder

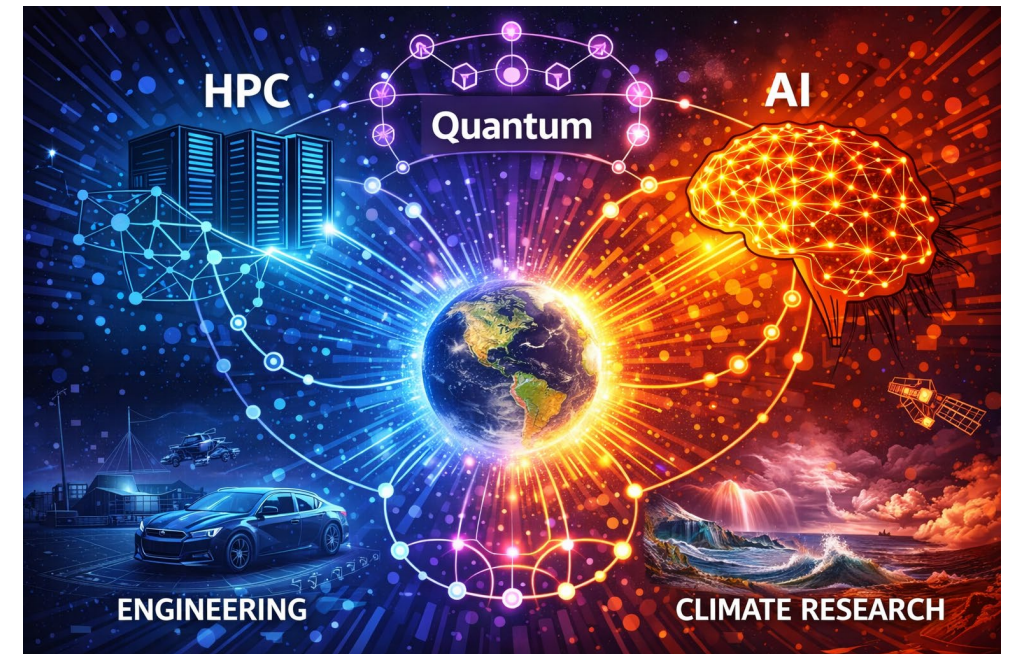
- HPE Cray NGI (Herder)
 - Technology
 - 1488 AMD MI430X
 - 372 AMD Venice CPUs
 - Performance
 - ~200 PetaFlops peak
 - Netzwerk
 - Internal 800 Gbit/s
 - External 400 – 1000 Gbit/s



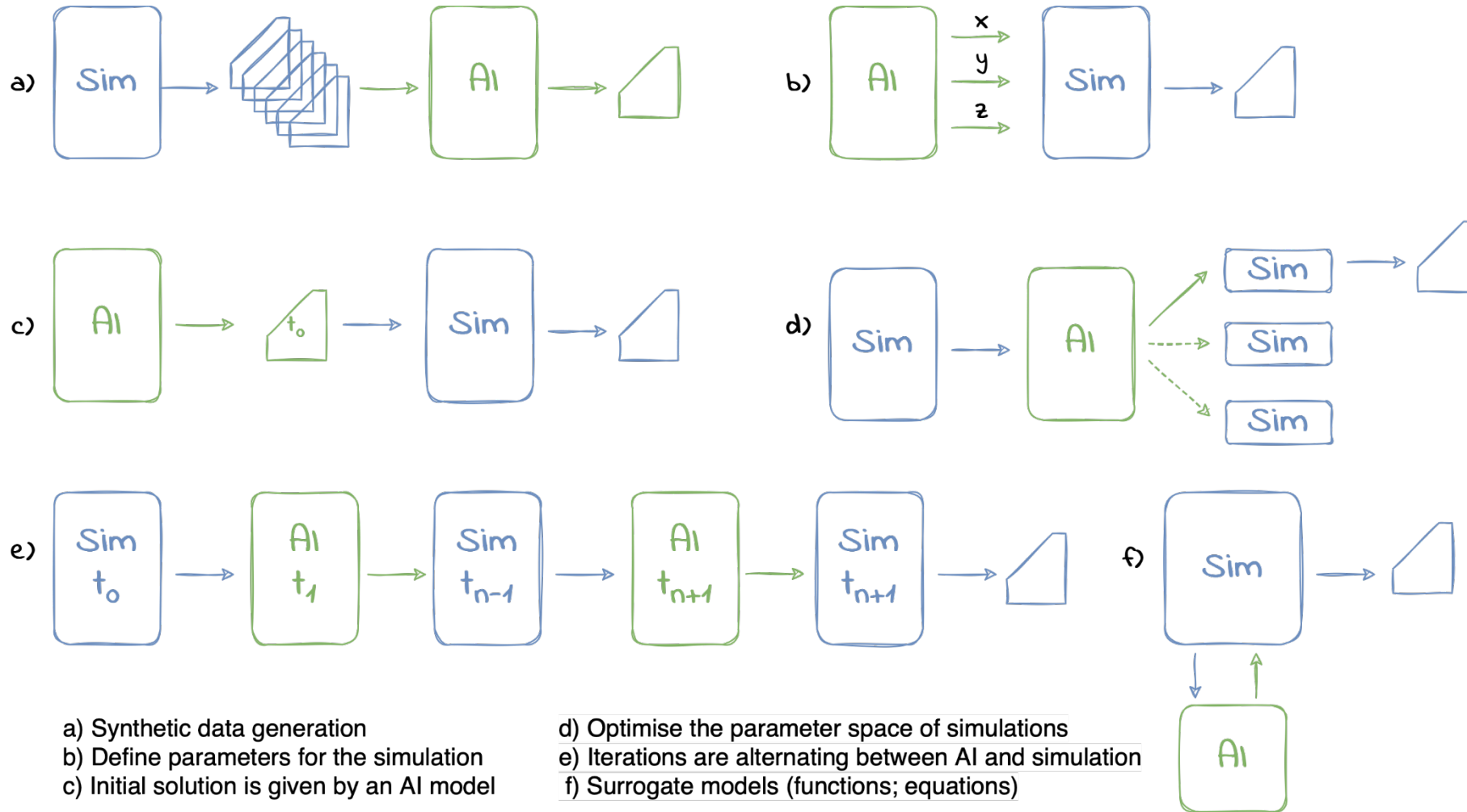
Then came AI

Convergence of HPC and AI (and Quantum)

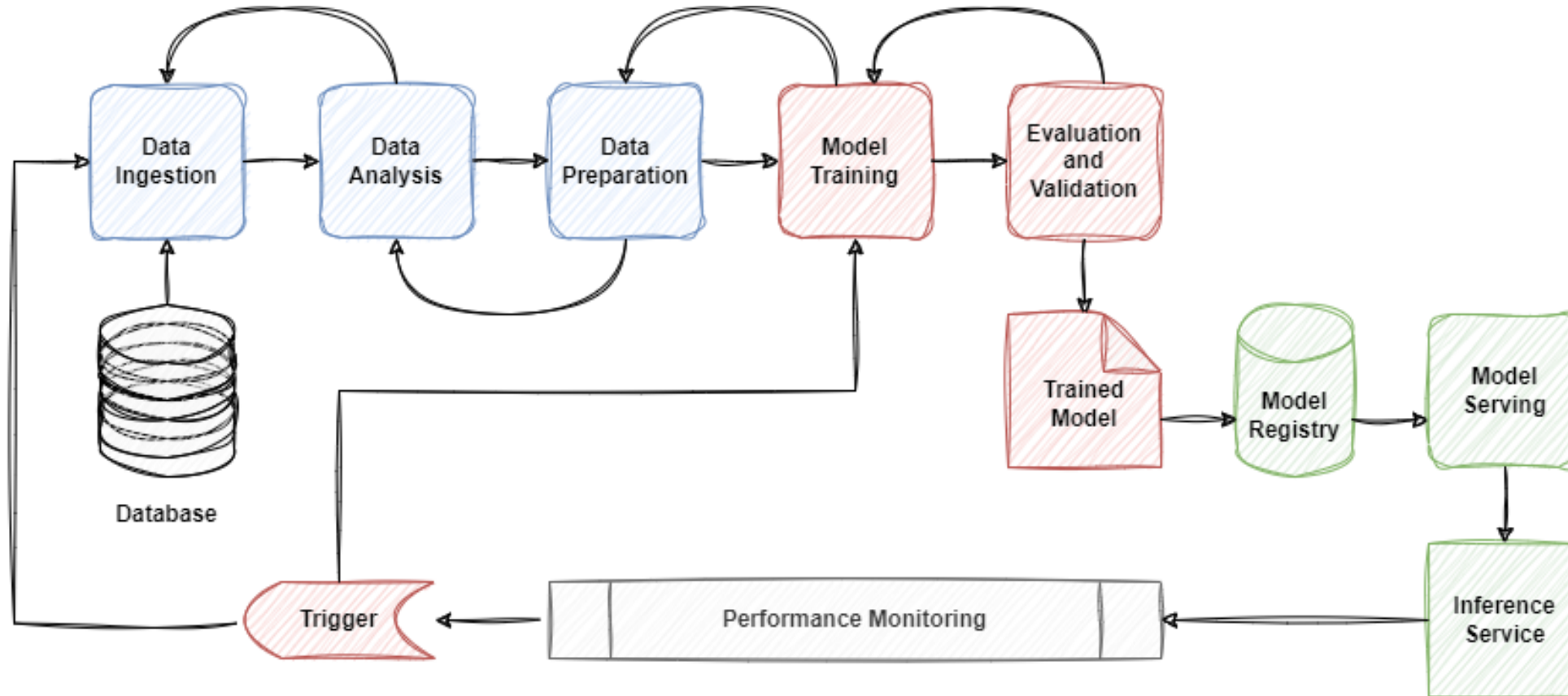
- HLRS represents a converging ecosystem of technologies:
 - HPC (High-Performance Computing) → large-scale simulations and numerical modeling
 - AI (Artificial Intelligence) → data-driven modeling, pattern recognition, prediction
 - Quantum Computing (emerging) → future acceleration of complex optimization and simulation
- These technologies are complementary, not competing:
 - HPC provides computational power
 - AI provides intelligence from data
 - Quantum computing offers future breakthroughs for hard problems



Where we started from



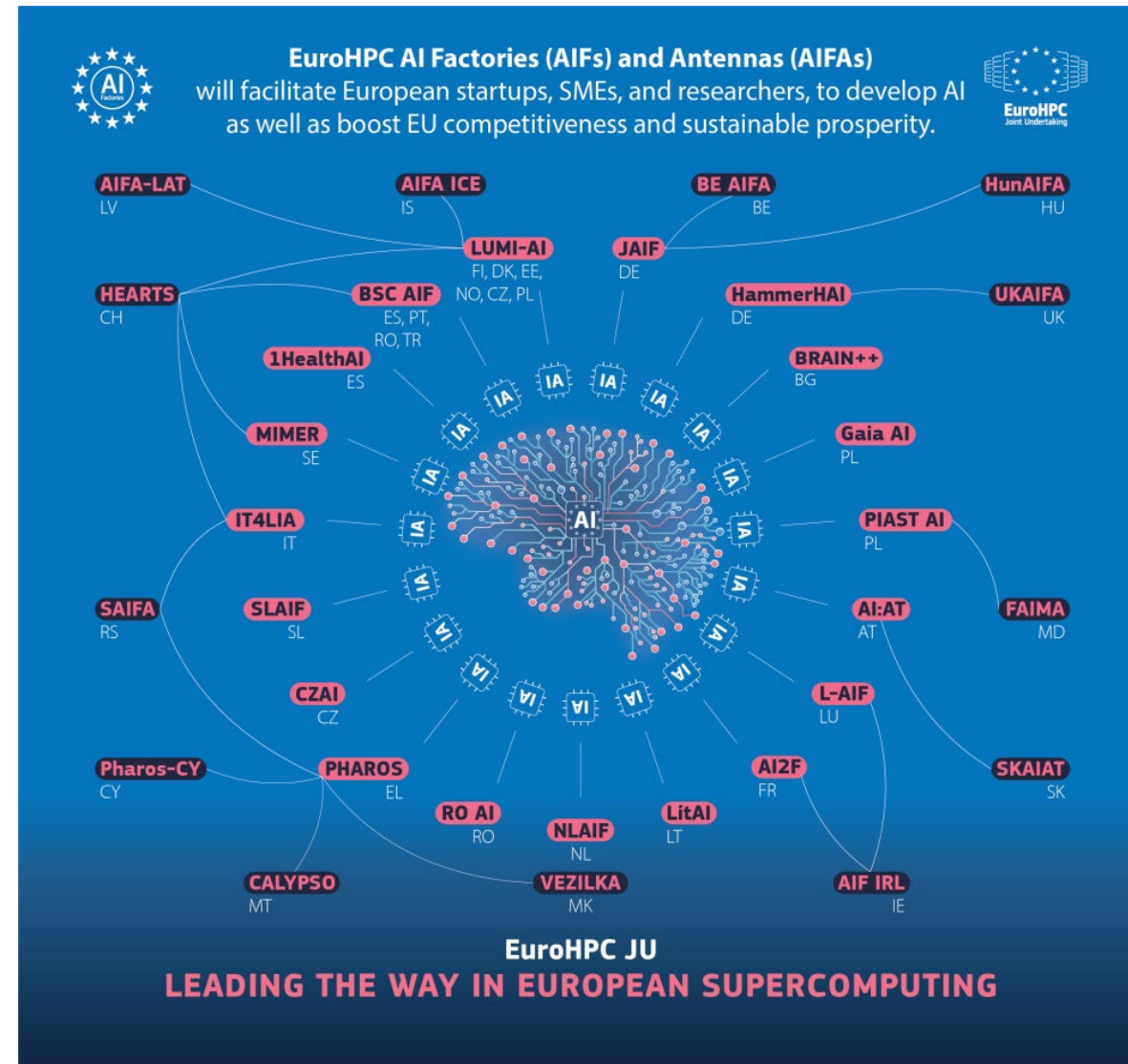
Analogy with the HPC lifecycle – the AI Lifecycle



AI Factories (AIF) and Antennas

“AI Factories are dynamic ecosystems that will build around AI-optimised supercomputers, offering computing resources and support services to the European industry, as well as to the European scientific users for the development of large AI models to take advantage of AI technology capabilities in the European Union, and for the development of skills and knowledge in the domain of AI.”

(Source: EuroHPC JU
https://eurohpc-ju.europa.eu/ai-factories_en)



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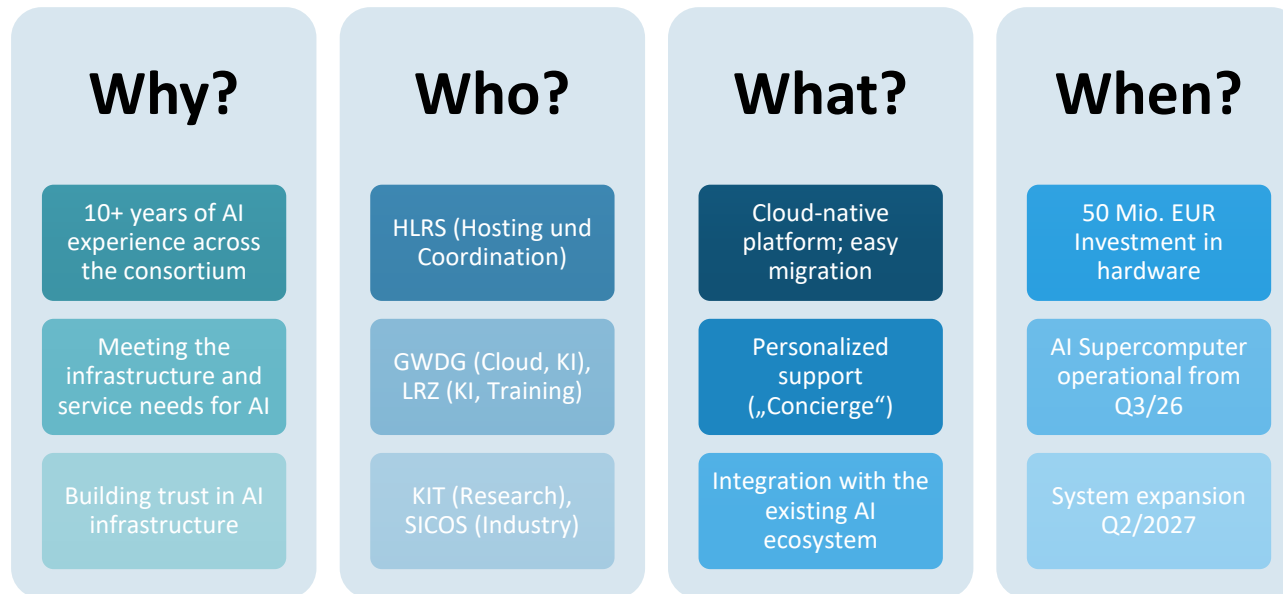
Bridging the Gap to Operate Effectively on AI Factories

- Operating a AI-optimized system needs to ensure that the user-experience is as best as possible
- Professional services tailored to assist users at all stages of the AI lifecycle
 - Concierge support
 - Strategic planning
 - Data innovation workshop
 - Technical support
 - Expert training



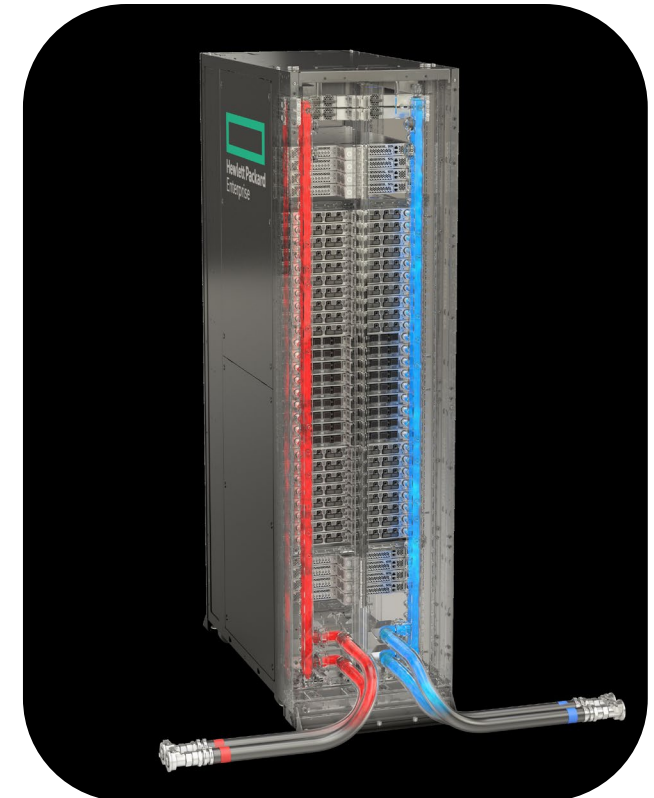
What is HammerHAI

- A **cloud-native** AI Factory for Germany and Europe.
- Designed for **industrial AI solutions, trust, and value creation.**



HammerHAI

- Shift toward end-to-end data-driven workflows requires dedicated AI Infrastructure
- Lowering financial and technical barriers for **startups** and **scientists** to adapt & deploy foundation models like TerraMind for Earth observation.
- **System:** 215 NVIDIA GB200 NVL-4 nodes (860 GPUs).
- **Storage:** 10 PB VAST Data DASE
- **Software:** Cloud-native stack for end-to-end data-driven workflows.
- **Trust:** Germany-based, ISO 27001 & TISAX certified, ensuring trust in climate data governance.



NVIDIA GB200 NVL by HPE liquid-cooling system.
Image: HPE

HammerHAI Antenna - UKAIFA

HammerHAI Cooperates with EPCC in Establishing UK AI Factory Antenna (UKAIFA)



Stuttgart, Germany – October 13, 2025 – The EuroHPC Joint Undertaking today [announced the creation of 13 “AI Factory Antennas,”](#) a new category of competence centers for artificial intelligence that will complement and extend the activities of AI Factories across Europe. Among the winning proposals was the UK AI Factory Antenna (UKAIFA), led by the Edinburgh Parallel Computing Centre (EPCC) at the University of Edinburgh. This action includes a partnership with [HammerHAI](#), an AI Factory coordinated by the High-Performance Computing Center of the University of Stuttgart (HLRS), which will serve as a bridge between the United Kingdom and the European AI Factory network. The partners will also collaborate on a variety of efforts to accelerate the adoption of artificial intelligence in SMEs, startups, industry, and the public sector.

Published
Oct 13, 2025

[← See all press releases](#)

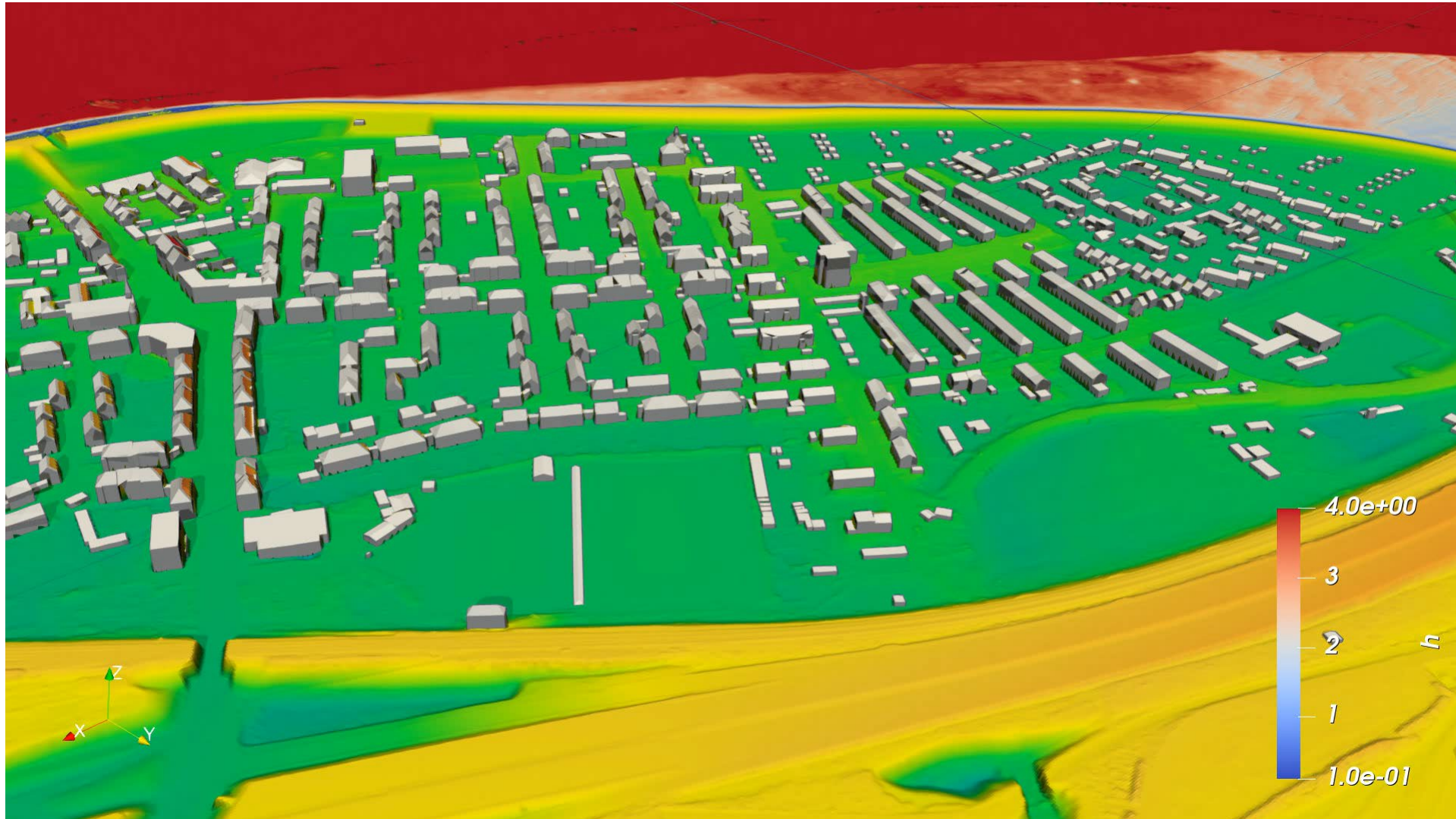
Under the AI Antenna agreement, HammerHAI will provide access for the UKAIFA user community to a new, large-scale AI-optimized supercomputer that is scheduled for installation at HLRS in early 2026. HammerHAI will work with UKAIFA to enable secure, federated data sharing and cross-platform compatibility. This collaboration will also enable UKAIFA to integrate with the wider EuroHPC AI Factory network, leveraging HammerHAI’s connections to participate in European AI infrastructure development efforts.

In a press release announcing the UKAIFA, EPCC Director and UKAIFA Lead Coordinator Professor Mark Parsons said, “EPCC and HLRS have led the use of national supercomputing services in Europe by industry over the past 30 years. The emergence of AI as a key application of supercomputing, and this funding from EuroHPC and the UK Government, is now enabling our organizations to embark on this new collaboration. We’re honored to be working with HLRS and the University of Stuttgart again.”

Recognizing that large scale adoption of AI will require more than computational hardware, the UKAIFA will also provide companies the knowledge and tools they need to develop and implement innovative AI products and services. The UKAIFA will offer training for AI skills development, expert support and consulting services, and access to relevant datasets and other resources that will enable them to create and roll out artificial intelligence applications more quickly.

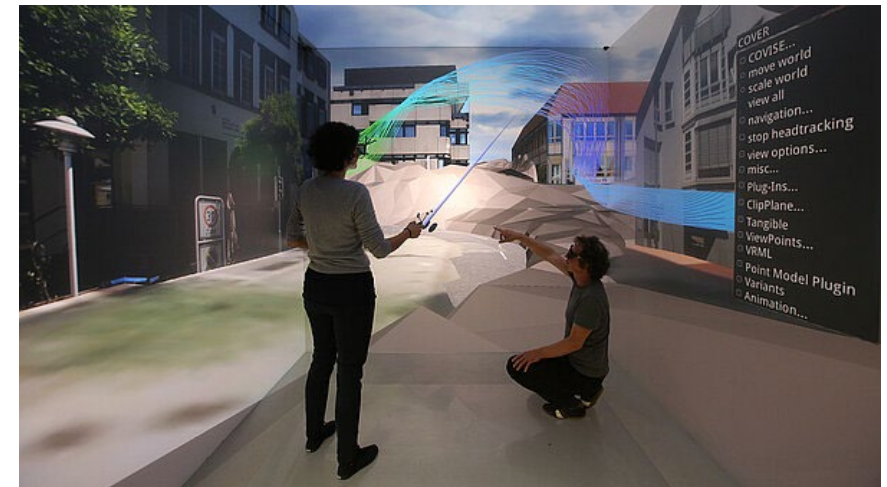
Applying our capabilities to real-world challenges

Flooding predictions – Dam Break



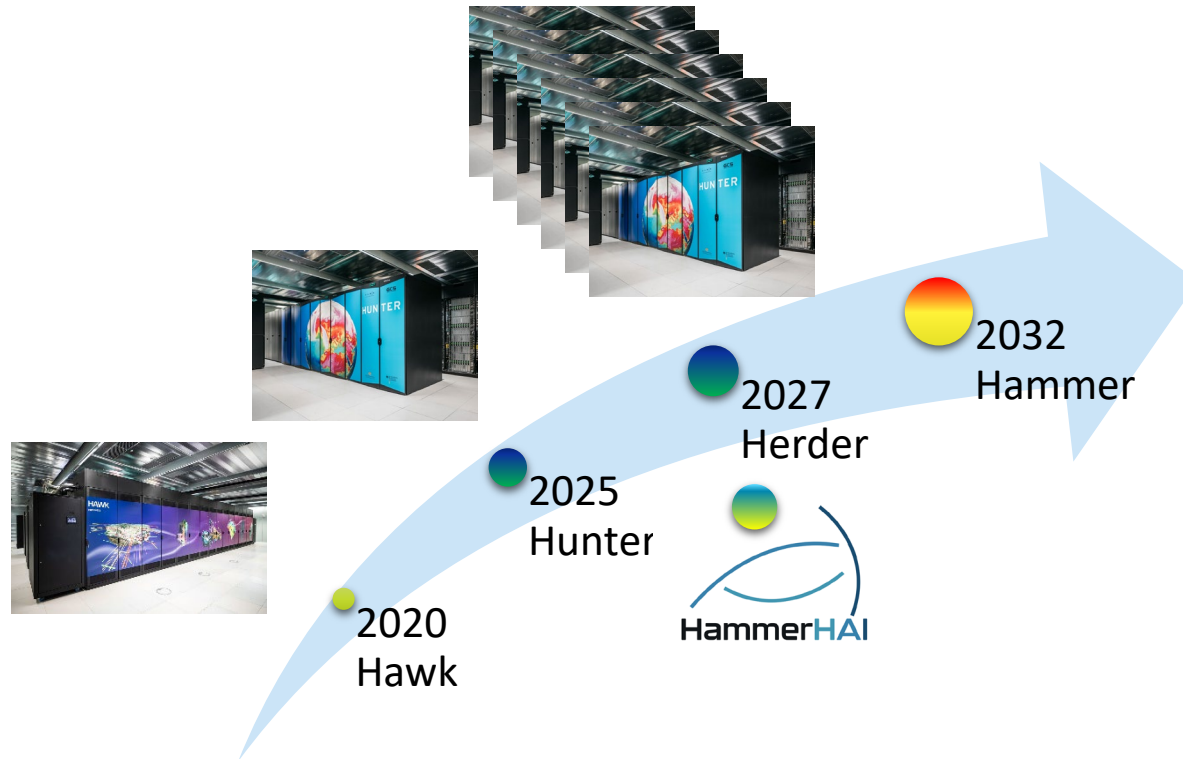
Enabling Real-Time Digital Twins

- How to scale physical insights into real-time digital twins?
- **Neckar Landscape Management:** HLRS developed a digital twin of Ludwigsburg's wine-producing landscape along the Neckar River.
- **Herrenberg Digital Twin:** This landmark project creates a highly detailed virtual representation of the city of Herrenberg, integrating air quality and wind flow data.
- **Bridging simulations and AI:** In the Relexi workflow, developed at the University of Stuttgart, simulation data are fed into the RL algorithm, which then predicts the eddy viscosity for the larger CFD simulation.



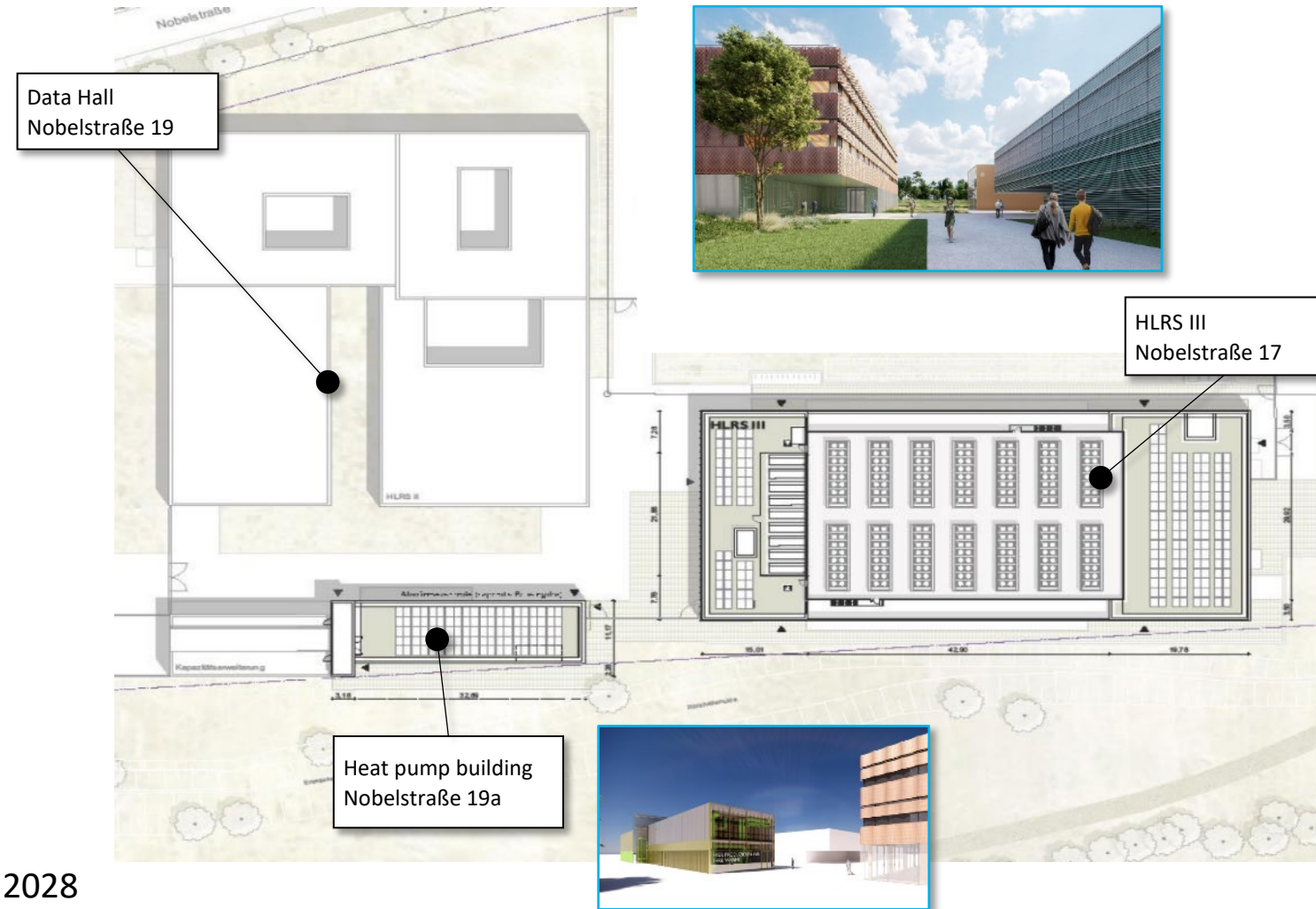
Whats next?

Hardware Roadmap

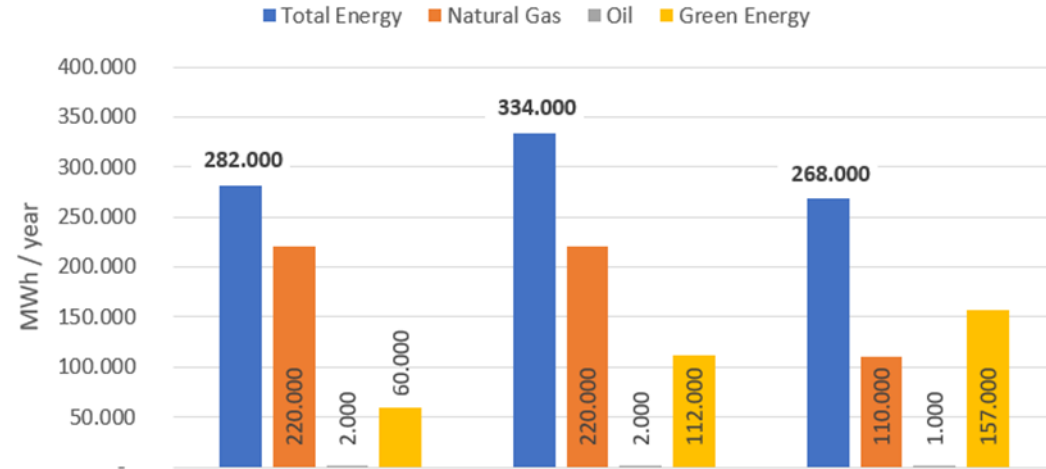


The New Datacenter

- Placed alongside existing Buildings
- Two Buildings
 - Data Center HLRS III
 - Heat Pump Building
- Design Target: 8 MW IT-Power
- UPS-Systems
 - 600 kW battery powered
 - 7400 kW fly wheel powered
- Cooling
 - Water cooling: 8 MW @ 32°C / 42°C
 - Air cooling: 800 kW @ 18°C / 24°C
- Start of construction: Q1/2025
- Ready for system installation: Oct. 2027
- Final acceptance: End of 2027/
Beginning of 2028



A sustainable building



	Current State	HLRS III	
		without waste-heat reuse	with waste-heat reuse
Total Energy	282.000	334.000	268.000
Natural Gas	220.000	220.000	110.000
Oil	2.000	2.000	1.000
Green Energy	60.000	112.000	157.000

„By waste-heat utilization approx. 20% of total energy usage at the campus can be saved.“

„Natural gas consumption and therefore also CO₂ emission will be reduced by 50%.“

Key Takeaways and Outlook

- Long history in operating HPC Systems and Services
- Now fostering the convergence of HPC and AI
 - HammerHAI operational in 2026 Q3.
- Our services and systems are for the end users
- Complexity of Applications increases with new and adapting application fields
 - E.g. in the area of Global Challenges
- Future evolution of the centre towards more solutions for a variety of fields
- Sustainability and Security as a main pillar to ensure proper support of all user groups



Thank you!

Bastian Koller

Managing Director

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