

# Boosting HPC and AI energy efficiency with a European software solution

## OBJECTIVES

SEANERGYS designs and develops a production-quality integrated software suite for energy-efficient operation of European HPC and AI systems by:

- Creating a holistic monitoring infrastructure and common data repository for comprehensive operational HPC/AI data
- Developing an advanced AI-based data analytics framework for HPC and AI operational data
- Implementing a dynamic resource management system to optimise use of resources and energy efficiency in heterogeneous HPC/AI systems and to adapt to dynamic workloads
- Validating the SEANERGYS software suite in real operational environments and making it available under a permissive license

## KEY COMPONENTS

### COMPREHENSIVE MONITORING INFRASTRUCTURE (CMI)

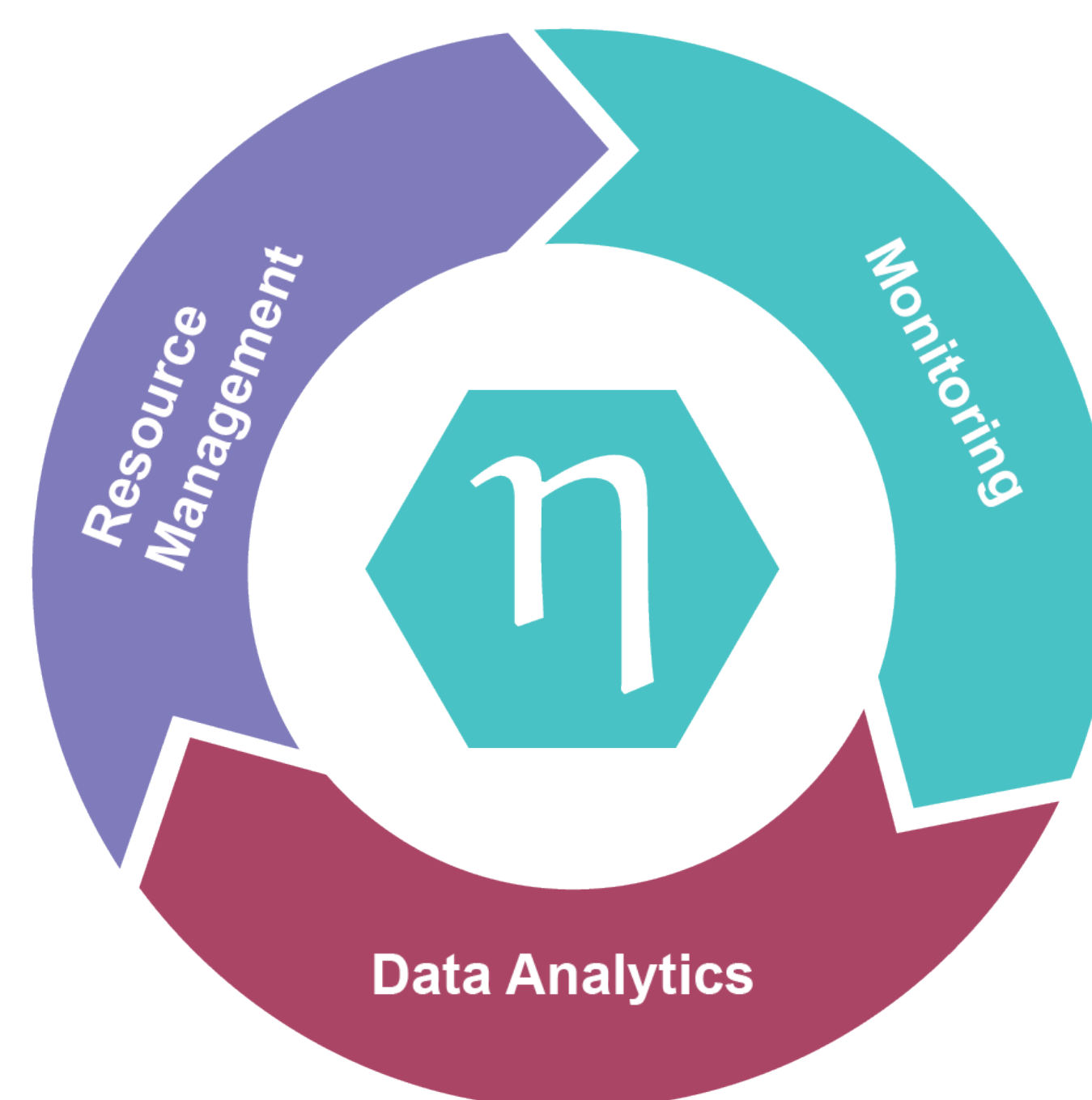
- Collects and consolidates data from sensors, nodes, control systems, and applications
- Supports structured and unstructured telemetry data (e.g., resource usage, cooling, scheduler metadata)
- Data flows through a standardized data plane - replacing fragmented tools with a unified source and interface for real-time and historical analysis

### AI-BASED DATA ANALYTICS (AIDAS)

- Analyzes system behavior at node, job, and system level based on the CMI monitoring data
- Offers real-time insights and modelling for power, energy, and performance optimization
- Utilizes a shared “Model Zoo” for adaptive model selection
- Includes powerful visual tools for administrators, SW developers and system end-users to assist in efficient use and operation of HPC and AI supercomputers

### DYNAMIC SCHEDULING & RESOURCE MANAGEMENT (DSRM)

- Ingests AIDAS analytics to manage and optimize workload scheduling and execution across system, node, and job layers
- Can adapt resource allocation and configuration to dynamic workload behaviour
- Integrated feedback loop with AIDAS will enable intelligent, self-adjusting operations



## INTEGRATED SOFTWARE STACK

For the three core components to effectively interact, SEANERGYS defines, documents and standardises a series of interfaces and shared data models/formats. They will allow a clear compartmentalisation, smooth integration, streamlined testing and deployment and ultimately efficient execution across the different European HPC and AI sites.

## IN A NUTSHELL

### BUDGET:

Overall budget € 33 Million,  
EuroHPC JU funding € 16.5 Million

### PROJECT TERM:

June 2025 – May 2029

### CONSORTIUM:

Coordinator:  
Forschungszentrum Jülich  
16 Partners, 7 European countries

### MISSION:

SEANERGYS delivers a cutting-edge European software solution that boosts HPC systems efficiency by optimizing resource use and minimizing energy consumption.

## FUNDING

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