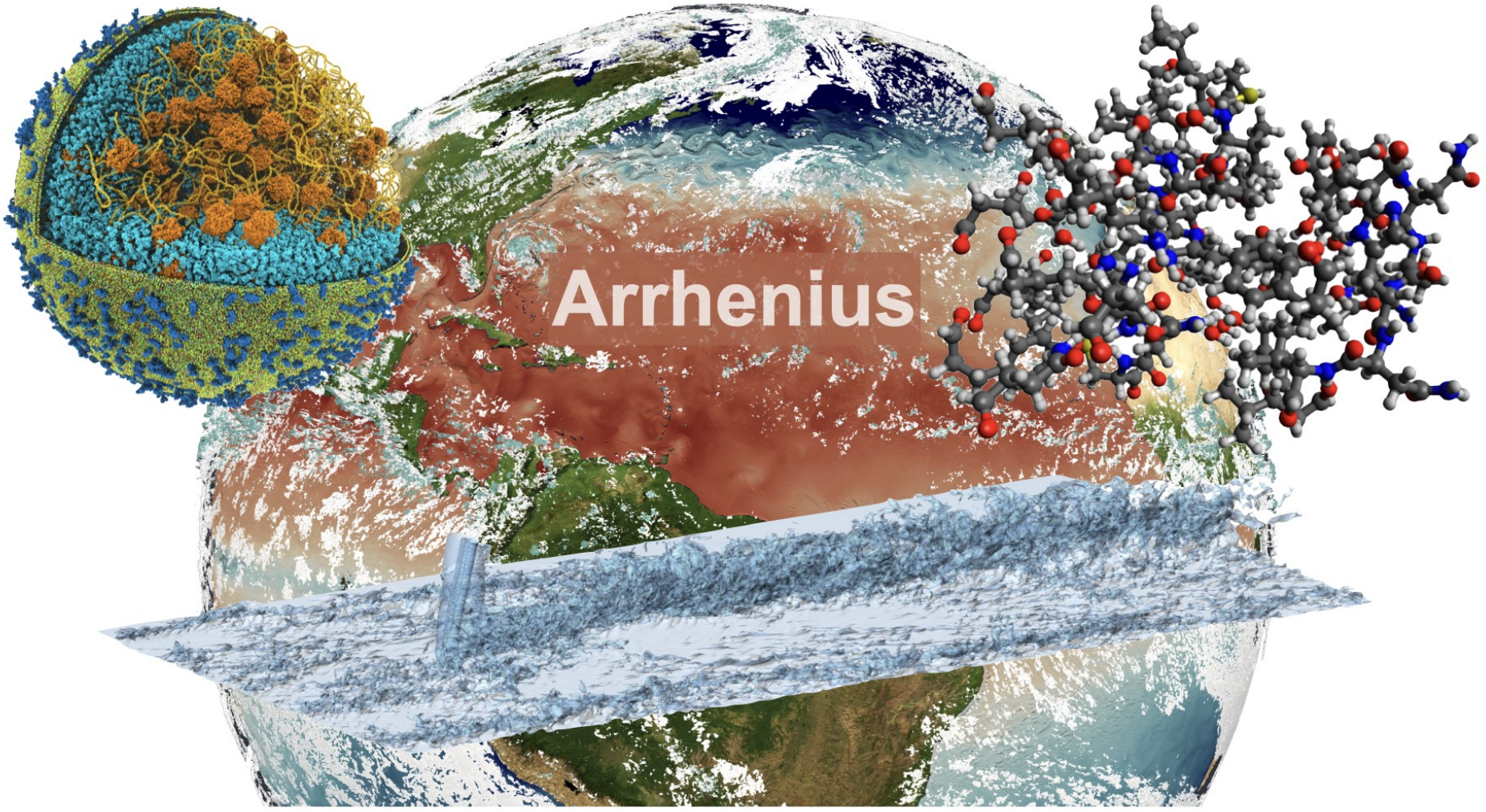
National Academic Infrastructure for Supercomputing in Sweden

NAISS



EuroHPC HPC Systems

Pre-Exascale

- LUMI, Kajani, Finland
- Leonardo, Bologna, Italy
- MareNostrum5, Barcelona, Spain

PetaScale

- Vega, Maribor, Slovenia
- Meluxina, Bissen, Luxenbourg
- Karolina, Ostrava, Czech Republic
- Discoverer, Sofia, Bulgaria
- Deucalion, Guimarães, Portugal

ExaScale

- Jupiter, Jülich, Germany
- *Jules Verne (GENCI+SURF), CEA, France*

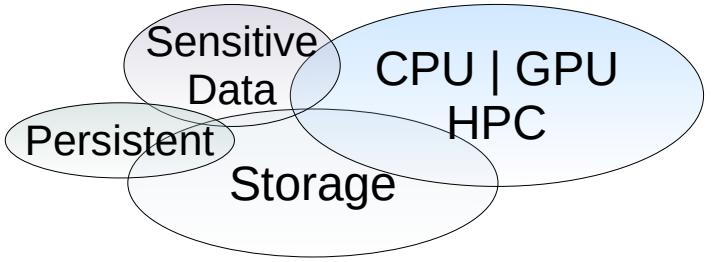
Mid-Range

- Daedalus, GRNET, Greece
- Levente, KIFU, Hungary
- CASPIr, Univ of Galway, Ireland
- EHPCPL, Cyfronet, Poland
- *Arrhenius, Linköping, Sweden*

Arrhenius – Application

Budget: 68,500 kEUR

- CAPEX: 42,800 kEUR
- OPEX: 25,700 kEUR



Arrhenius is co-owned:

- 65% NAISS
  - NAISS existing budget
  - Additional funding VR
- 35% EuroHPC

Capabilities

- HPC Computing
  - CPU Module
  - GPU Module
- HPC Storage
- Sensitive Data and Computing
- Persistent Compute and Data Services

Arrhenius Application cont.

Benchmarks

- Gromacs
- NEKO
- VeloxChem
- MLPerf

Also:

- Long experience of HPC
- Network Connectivity
  - Sunet, Nordunet, Geant
- Possible DC
  - Available power

Procurement

Arrhenius Procurement

- **Steering Group**
  - Björn Alling
  - Patrik Norman
  - Erik Lindahl
  - Niclas Andersson
  - Marcus Lundberg

- Project leaders
  - Gert Svensson
  - Andreas Johansson

Procurement type

- Negotiated procedure with prior publication
- Two or several step
  - Invitation to demonstrate capacity to deliver such a system
  - Shortlist (being processed)
  - RFP (at EuroHPC for approval)
  - Proposal submission
  - Possible negotiations
  - [Possibly minor changes to the RFP
  - Third step proposal submission
  - Possible negotiations
  - New proposals]
  - Contract

Evaluation

- Based on Total Cost of Ownership (TCO)
  - Purchase costs
  - Maintenance costs
  - Power and cooling costs

  - We give the max TCO for 5 years
  - Mandatory requirements
  - Optional requirements
  - The vendor is selected based on benchmark results and points for optional requirements.

Tentative Time Plan

- Invitations to Tender in October 2024
- Deadline to Tender, January 31, 2025
- Evaluation, negotiation and dialogue, February – March 2025
- Contract Award, March – April 2025
- Contract Signed, April 2025
- Delivery CPU Before January 31, 2026
- Delivery GPU Before May 30, 2026

Data Center

NSC DCs on Campus Valla

Kärnhuset

2013 –

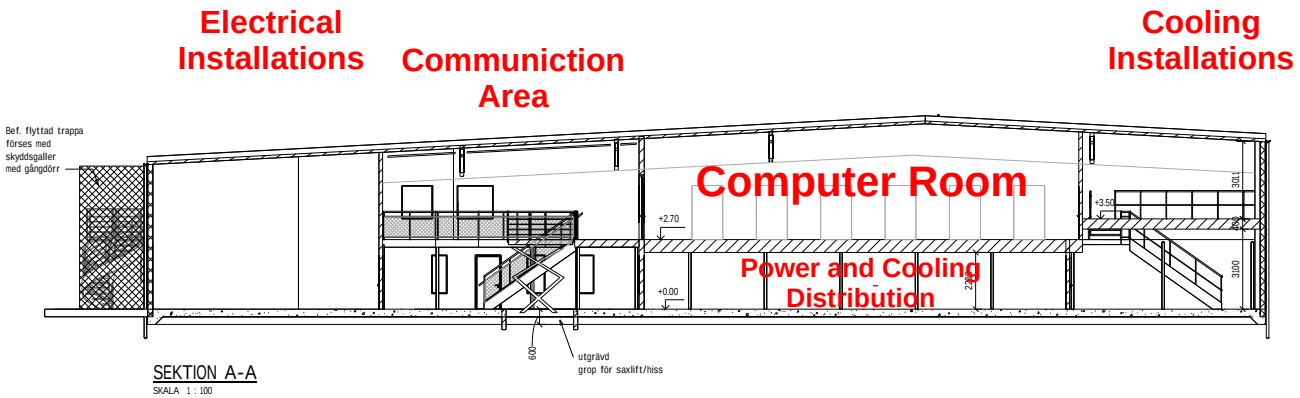
Cell #1:
Hot aisle encapsulation
Max ~ 1 MW (air cooled)

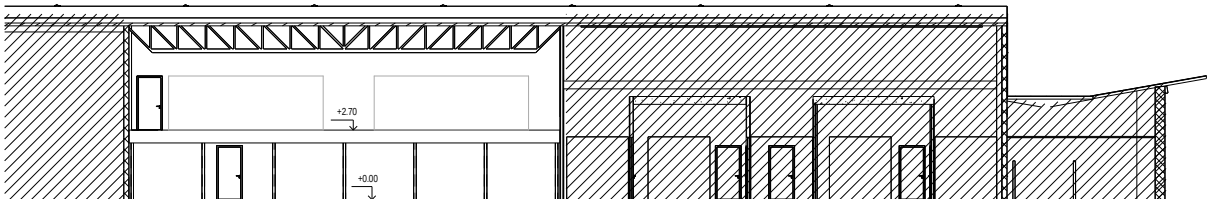
Cell #2:
Water cooled
Installation Floor
Max 4 (2.5) MW

Hangaren

2007 –
Traditional open design, installation floor
Max ~ 500 KW (air cooled),
~ 500 KW (water cooled)

Kärnhuset, cell #2, cross section



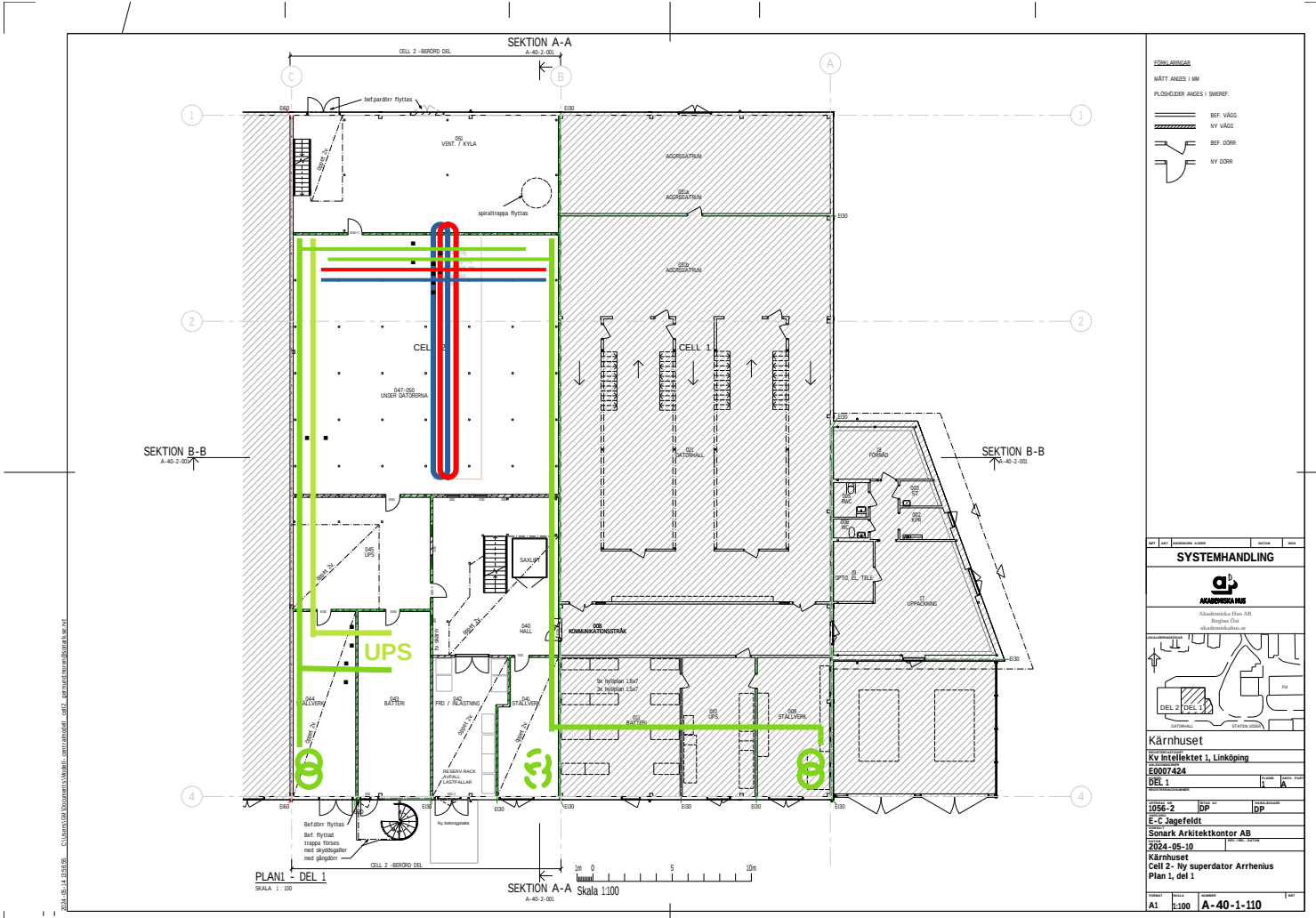


SYSTEMHANDLING

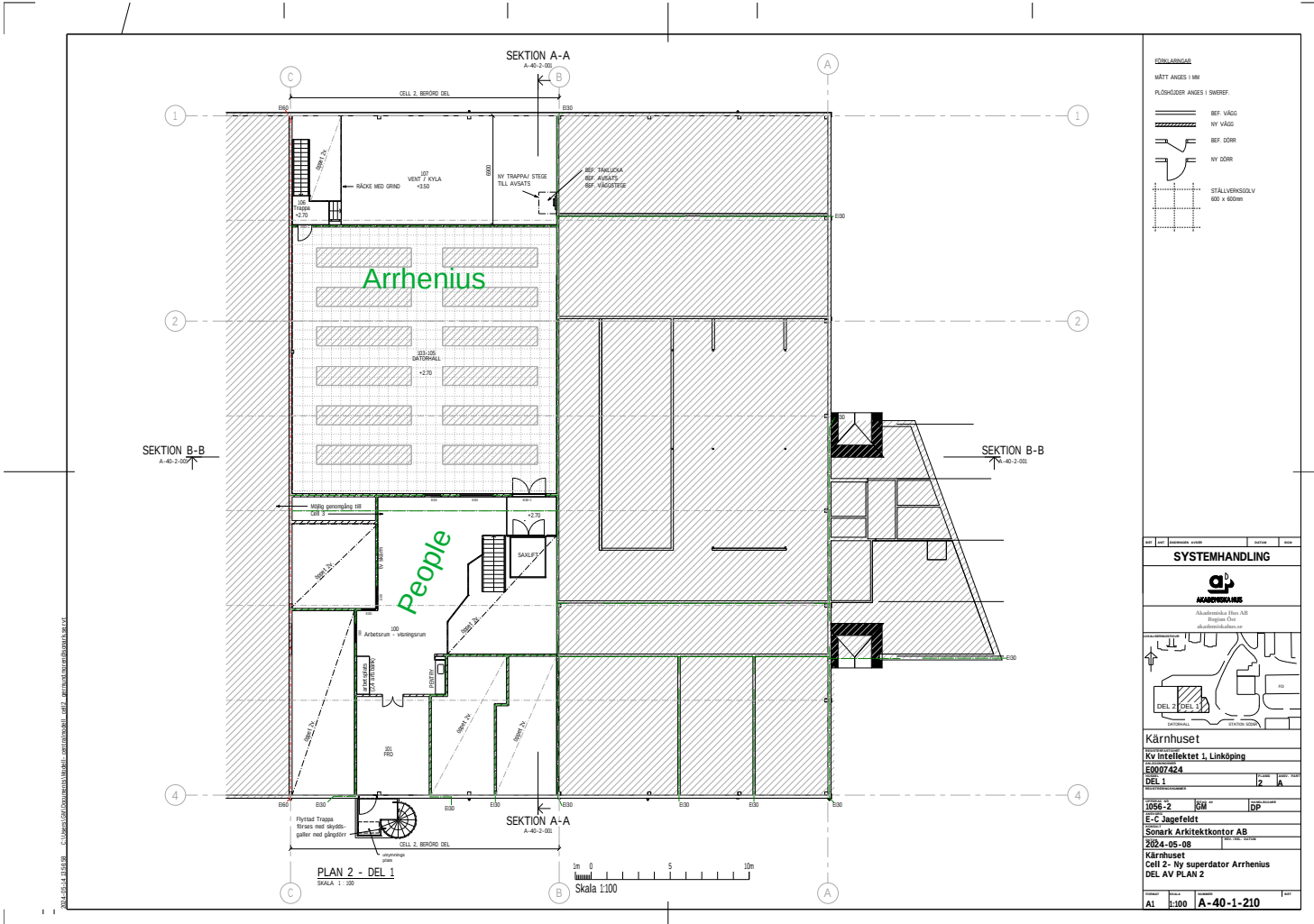
AKADEMISKA HUS

Akademiska Hus AB
Region Öst
akademiskahus.se

Kärnhuset, cell #2, level 1



Kärnhuset, cell #2, level 2



Operation

Operation

Deliver the services / capabilities

Manage and Monitor

- Configuration
- Software Packages
- Users and Groups
- Projects
- Granting and Scheduling of resources
- Security

Develop, Optimize, Refine

Operation @ NSC

Cluster System Software (CSE)

- **DevOps**
  - Development and
  - Operation
- DevOps is a combination of
  - Cultural philosophy
  - Practices
  - Development
  - Maintaining Services
- Continuous processes and workflows

Purpose

- Conf. Mgmt of system servers
- Conf. Mgmt of nodes
- Node provisioning
- Coherent env. for sysadmins
- Interface to Nagios, Munin, Grafana, SUPR/SAMS, SLURM, etc.

Use

- Yepu (Puppet manifests)
- Kryolith (Tools for creating images)
- Packages and scripts

CSE is used to deliver the following services

Academic

- **Tetralith** (NAISS) – General Research
- **Sigma** (LiU) – General Research
- **Berzelius** (KAW) – AI

Public Sector

- **Stratus** (MetCoOp, SSM, FM) – Numerical Weather Prediction
- **Cirrus** (MetCoOp, SSM, FM) – Numerical Weather Prediction
- **Nebula** (MET Norway) – R&D
- **Freja** (SMHI) – R&D, Climate Research

Private Sector

- A Few Systems at Saab

CSE

- CSE is an actively developed code base. CSE is not a product
- CSE is not general purpose software. CSE is highly specialized
- CSE i an flexible environment where we can develop new features
- CSE is shared between many different computer systems
- With CSE we own and maintain our software stack and decide which other software packages we use and depend upon.

Questions?