ADASS 2026 · NOV 4

Making the Most of What You Have

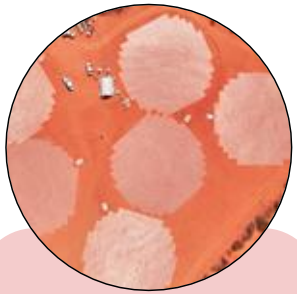
Platform Strategy and Science Verification Readiness at the Swiss SRC

Rohini Joshi · CHSRC Software Architect · FHNW / SKACH

SKAO milestones

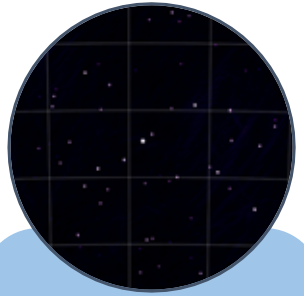
Slide credit: Shari Breen

Community involvement starts



Construction

- Building antennas, dishes, roads etc!
- Followed by Assembly, Integration and Verification



Commissioning

- SKAO activity
- Collaborative across system verification and science commissioning





Science Verification

- A full dress rehearsal of the end-to-end system for every mode of operation
- Modes and capabilities rolled out over time
- Data will be publicly available for scrutiny
- Number 1 goal is verification, science secondary
- Feedback crucial, for SKAO and SRCNet

Credit: I. Heywood, SARAO



- Shared-risk PI projects
- SRCNet resources ready for user
- proprietary periods

SRCNet real users doing real things!!!

Now	Now	First half 2027	First half 2029	2030
Now	Soon	First half 2029	First half 2031	2032

Not: how do we do/store everything?

But: how do we extract maximum science from the data and hardware we do have?

Lean into strengths, and complement not compete with the capabilities (current and future) of larger SRC nodes.

CONTEXT

CHSRC at a glance

HOSTED AT

CSCS

Swiss National Supercomputing Centre, Lugano. Alps infrastructure.

SOFTWARE

K8s-native platform

GitOps setup

COMMUNITY

SKACH

Ten Swiss institutions; astronomers, data scientists, developers

Current goal: SKAO Science Verification readiness and CHSRC user support

PEOPLE

CHSRC Team



PEOPLE

CHSRC

Distributed DevOps Team

ROADMAP

Swimlanes

SV Readiness, CHSRC user access, Maintenance and improvement



DOCUMENTATION

Roadmap

More on roadmap, stakeholders, timeline, risks outlined here

01

CHSRC Node architecture

NODE ARCHITECTURE

Four layers, from hardware to science

	User software	Jupyter notebooks · scripts for continuum imaging · simulation tools · user python packages
CHSRC	**Software platform**	Science platform · Storage manager · AAI service · Observability · Data Services
CSCS	**Orchestration**	Kubernetes · ArgoCD · Rancher
	Hardware	GraceHopper (GH200) nodes · CPU Nodes · Ceph, S3, dCache storage

Links to more detailed node deployment diagrams

HARDWARE

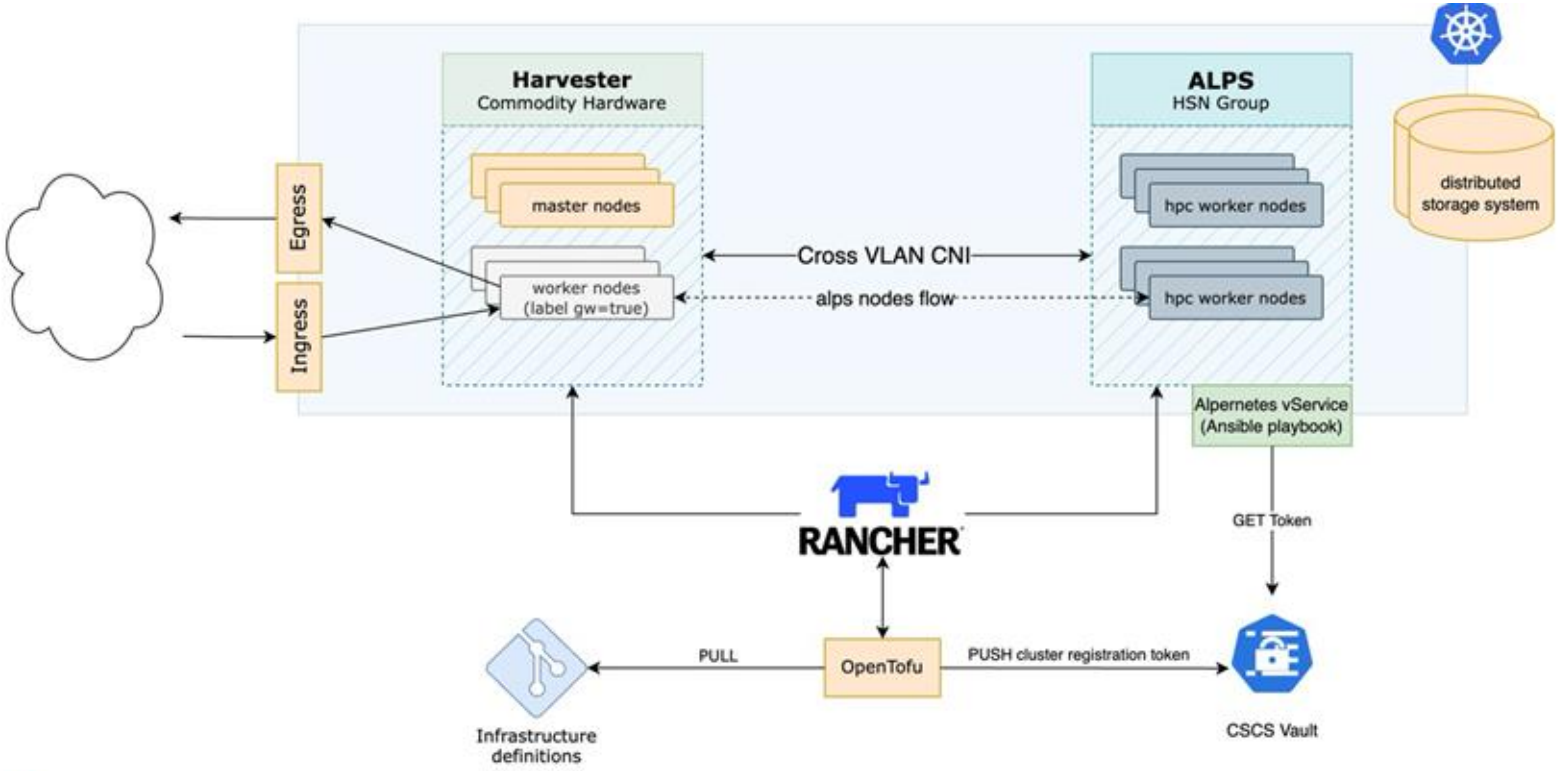
Alps

What we have

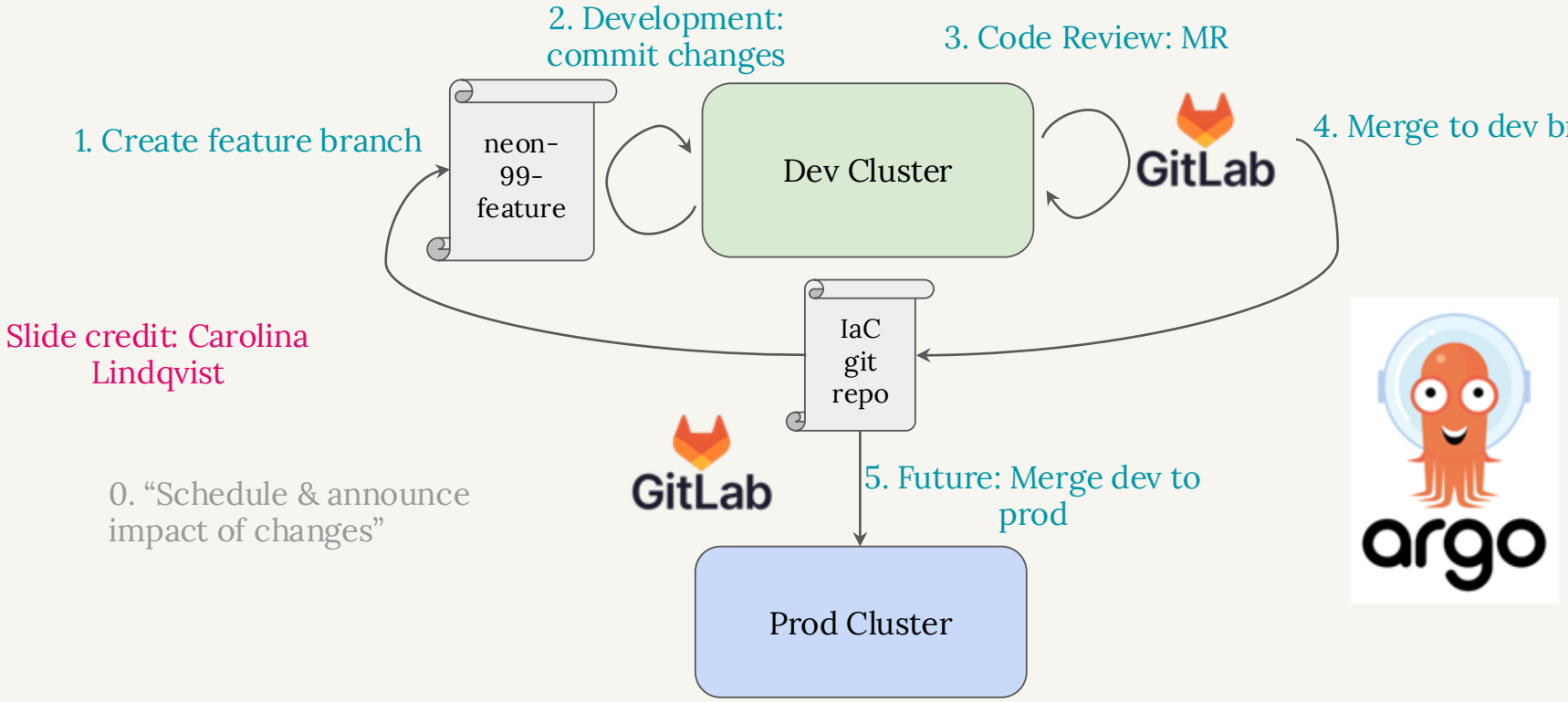
- Alps CPU nodes (256 cores/512 GB RAM)
- GH200 nodes via Daint cluster
- Storage: 400 TB Ceph
- HPC Cray Slingshot-11 with 200 Gbps injection bandwidth per module / GPU
- PUE 1.2, 100% hydro power
- A distinct contribution to SRCNet: https://www.cscs.ch/computers/alps



Alpernetes


Harvester
Commodity Hardware
ALPS
HSN Group
distributed storage system
Egress
Ingress
master nodes
worker nodes (label gw=true)
Cross VLAN CNI
alps nodes flow
hpc worker nodes
hpc worker nodes
Alpernetes vService (Ansible playbook)
RANCHER
GET Token
PULL
OpenTofu
PUSH cluster registration token
Infrastructure definitions
CSCS Vault

CHSRC GitOps setup



Slide credit: Carolina Lindqvist

0. “Schedule & announce impact of changes”

Why a cloud-native platform

What we have

- A cloud-native platform: Kubernetes, ArgoCD, Vault, artefact registry, SRCNet applications
- HPC nodes integrated into the cluster
- Chosen by balancing:
  - Available hardware, APIs to access the h
    user needs
  - What our operators can run
  - Operators' professional development



02

HPC Considerations

HPC in Kubernetes, problem solved. Right?



THE CONSIDERATIONS

Specialised HPC in a science platform is non-trivial

+

Cost

Nodes networked into the cluster are expensive → inflexible architecture

+

Access model

Batch HPC vs interactive platform expectations

+

Identity & policy

SRCNet AAI vs CSCS accounts and policies

Secondary considerations

User application support for different CPU/GPU architectures, data movement across HPC and Kubernetes domains



THE CONSIDERATIONS

Specialised HPC in a science platform is non-trivial

FirecREST

Keycloak

Cost

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Access model

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Karabo ARM support

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ABSTRACTION LAYER

FirecREST abstracts heterogeneous HPC access



The platform targets one interface; hardware can change underneath. This allows us to use Alps nodes and pay-per-use without having them locked into our cluster where they are underutilized and will cost us even when they are unused.
https://www.cscs.ch/services/products/firecrest

AUTHENTICATION AND AUTHORISATION

Keycloak adds a complementary route into CHSRC services

Why Keycloak

Open source and standards-based (OIDC, SAML). Federates external identity providers and runs natively on Kubernetes.

Authentication, delegated

Users log in through SKA IAM or another trusted identity provider e.g. SWITCH edu-ID, Github, etc.

Authorisation, local

Groups, scopes and clients set up in Keycloak decide who reaches which service.

A second, standards-based way into the platform for Swiss community projects, training and testing, alongside SRCNet access.

SIMULATION TOOLS

Karabo

Coming soon...

Improved noise models!

Simulation Tool: Karabo

Notebooks · conda · by and for the community

Multi-arch support

x86 · ARM · ska-sdp packages

Karabo at CSCS

SKA AA2 simulated visibilities · images

Radio astronomy software distribution for validation and benchmarking of radio telescopes and algorithms

Karabo: A versatile SKA observation simulation framework
Astronomy and Computing, Volume 54, January 2026

https://doi.org/10.1016/j.ascom.2025.101004
https://github.com/i4Ds/Karabo-Pipeline

Contributions and collaborations welcome!



03

Demo

What the platform can do today.

Demo

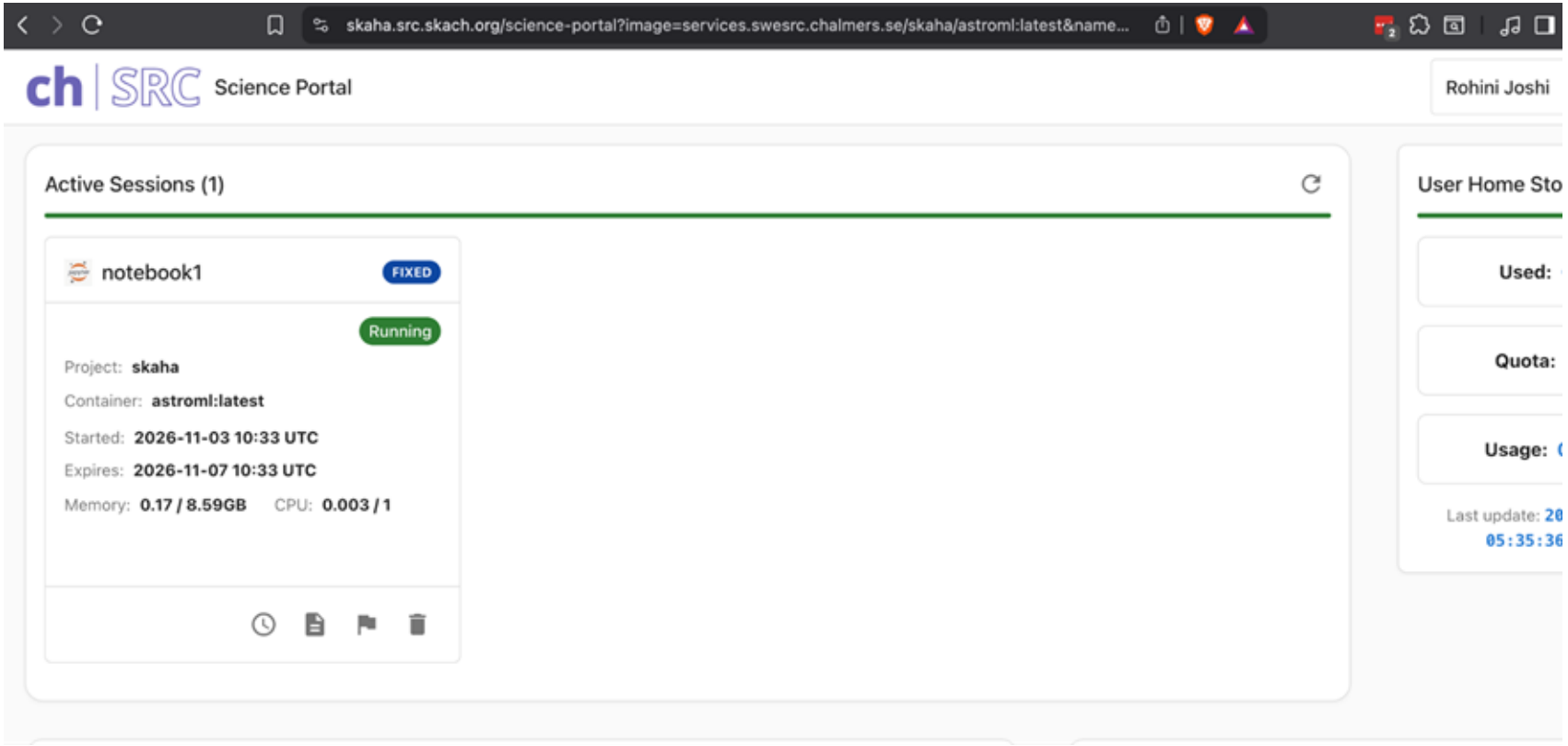
SRCNet applications

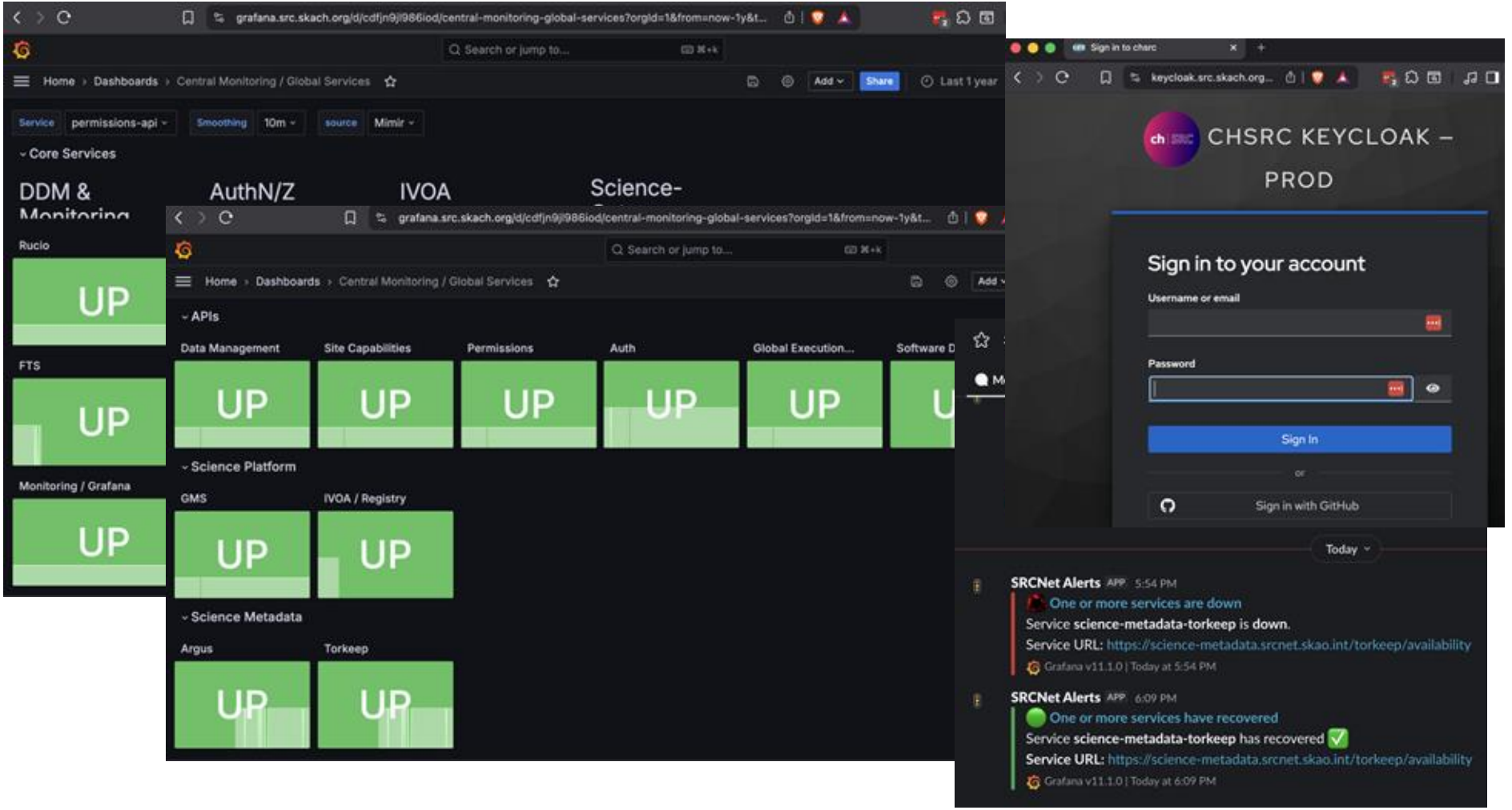
CANFAR, Monitoring

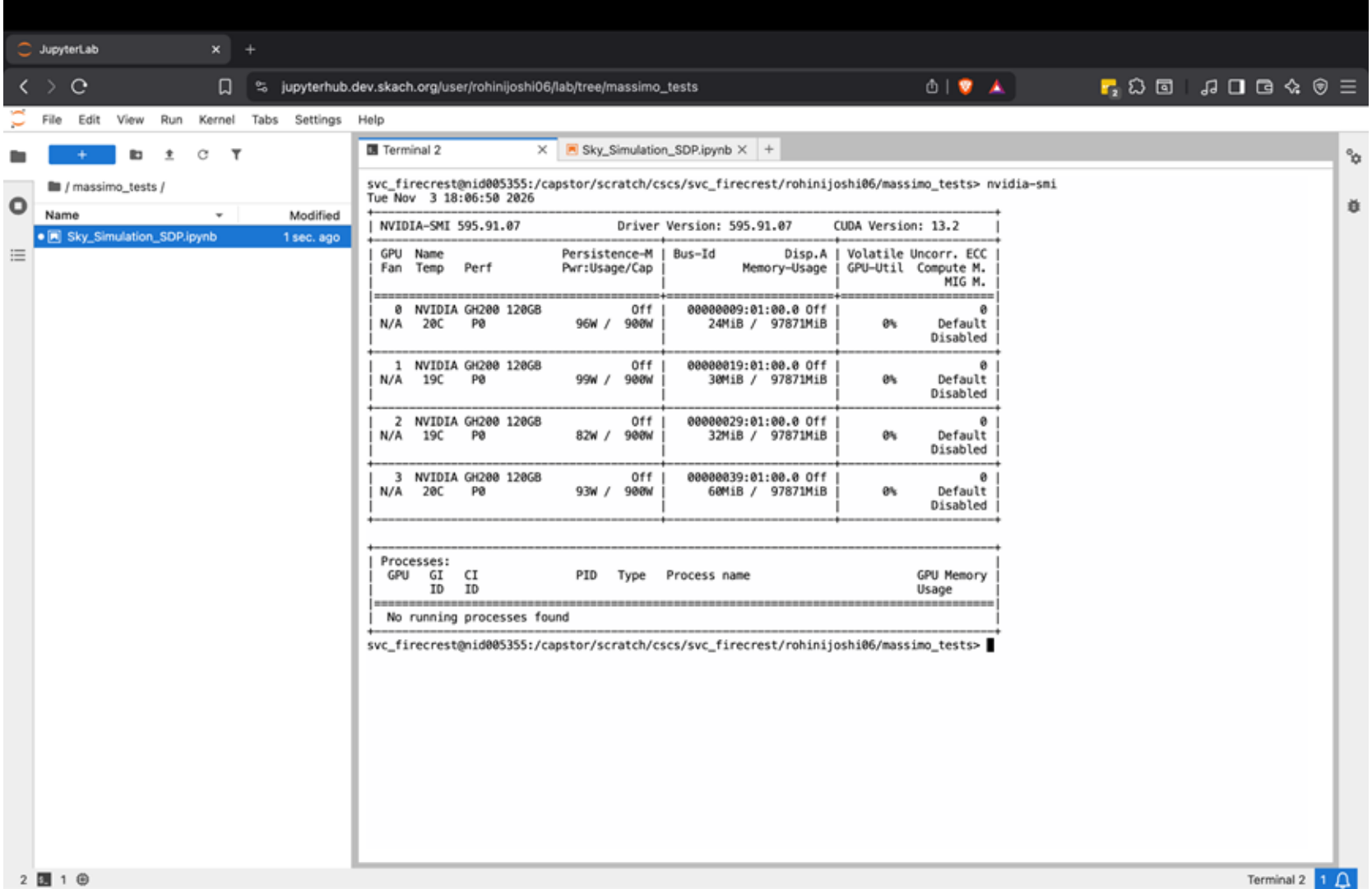
Keycloak

Simulated data on HPC

Karabo + Alps on Jupyterhub


skaha.src.skach.org/science-portal?image=services.swesrc.chalmers.se/skaha/astroml:latest&name...
ch | SRC Science Portal
Rohini Joshi
Active Sessions (1)
notebook1
FIXED
Running
Project: skaha
Container: astroml:latest
Started: 2026-11-03 10:33 UTC
Expires: 2026-11-07 10:33 UTC
Memory: 0.17 / 8.59GB
CPU: 0.003 / 1
User Home Sto
Used:
Quota:
Usage:
Last update: 20
05:35:36


grafana.src.skach.org/d/cdfjn9j986iod/central-monitoring-global-services?orgId=1&from=now-1y&t...
Search or jump to...
Home › Dashboards › Central Monitoring / Global Services
Add
Share
Last 1 year
Service
permissions-api
Smoothing
10m
source
Mimir
Core Services
DDM & Monitoring
AuthN/Z
IVOA
Science-
Rucio
UP
FTS
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Monitoring / Grafana
UP
APIs
Data Management
Site Capabilities
Permissions
Auth
Global Execution...
Software D
UP
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UP
Science Platform
GMS
IVOA / Registry
UP
UP
Science Metadata
Argus
Torkeep
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UP
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keycloak.src.skach.org...
CHSRC KEYCLOAK – PROD
Sign in to your account
Username or email
Password
Sign In
or
Sign in with GitHub
Today
SRCNet Alerts APP 5:54 PM
One or more services are down
Service science-metadata-torkeep is down.
Service URL: https://science-metadata.srcnet.skao.int/torkeep/availability
Grafana v11.1.0 | Today at 5:54 PM
SRCNet Alerts APP 6:09 PM
One or more services have recovered
Service science-metadata-torkeep has recovered
Service URL: https://science-metadata.srcnet.skao.int/torkeep/availability
Grafana v11.1.0 | Today at 6:09 PM


JupyterLab
jupyterhub.dev.skach.org/user/rohinijoshi06/lab/tree/massimo_tests
File Edit View Run Kernel Tabs Settings Help
/ massimo_tests /
Name
Modified
Sky_Simulation_SDP.ipynb
1 sec. ago
Terminal 2
Sky_Simulation_SDP.ipynb
svc_firecrest@nid005355:/capstor/scratch/cscs/svc_firecrest/rohinijoshi06/massimo_tests> nvidia-smi
Tue Nov 3 18:06:50 2026
NVIDIA-SMI 595.91.07 Driver Version: 595.91.07 CUDA Version: 13.2
GPU Name Persistence-M Bus-Id Disp.A Volatile Uncorr. ECC
Fan Temp Perf Pwr:Usage/Cap Memory-Usage GPU-Util Compute M.
MIG M.
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N/A 20C P0 96W / 900W 24MiB / 97871MiB 0% Default
Disabled
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N/A 19C P0 82W / 900W 32MiB / 97871MiB 0% Default
Disabled
3 NVIDIA GH200 120GB Off 00000039:01:00.0 Off 0
N/A 20C P0 93W / 900W 60MiB / 97871MiB 0% Default
Disabled
Processes:
GPU GI CI PID Type Process name GPU Memory
ID ID Usage
No running processes found
svc_firecrest@nid005355:/capstor/scratch/cscs/svc_firecrest/rohinijoshi06/massimo_tests>
Terminal 2

04

Users, culture and lessons

Who is going to use this?
Platforms are only as good as the habits around them.

FIRST-CLASS ACTIVITY

Supporting users from first login to first result

User training

From laptop scripts to containerised, versioned workflows.

Containerisation workshop

Earning trust

Manage expectations and first impressions.

1:1, in-person support builds trust.

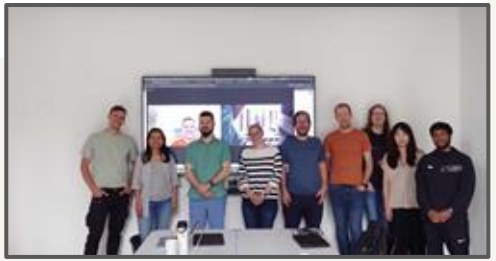
Avoid fatigue: early users need a clear return on their time.

Engagement

Surveys, Workshops, in-person events, knowing who to contact

Manage expectations

CHSRC Field Test



05

Way Ahead

Science Verification, and continued collaboration

STILL AHEAD OF US

SRCNet Science Verification

SRCNet Development

- SDP–SRCNet interface being defined
- Pipeline and data requirements in progress
- We follow this work and will deploy and support the solution when ready

SRCNet Operations

- SV node criteria still to come
- Meanwhile: feedback on policies and a security audit

What this means for CHSRC: the platform's flexibility, human-in-the-loop AI-assisted development and CSCS's hardware and network should enable us to deploy SV services and support SRCNet.

STILL AHEAD OF US

CHSRC Development and Operations

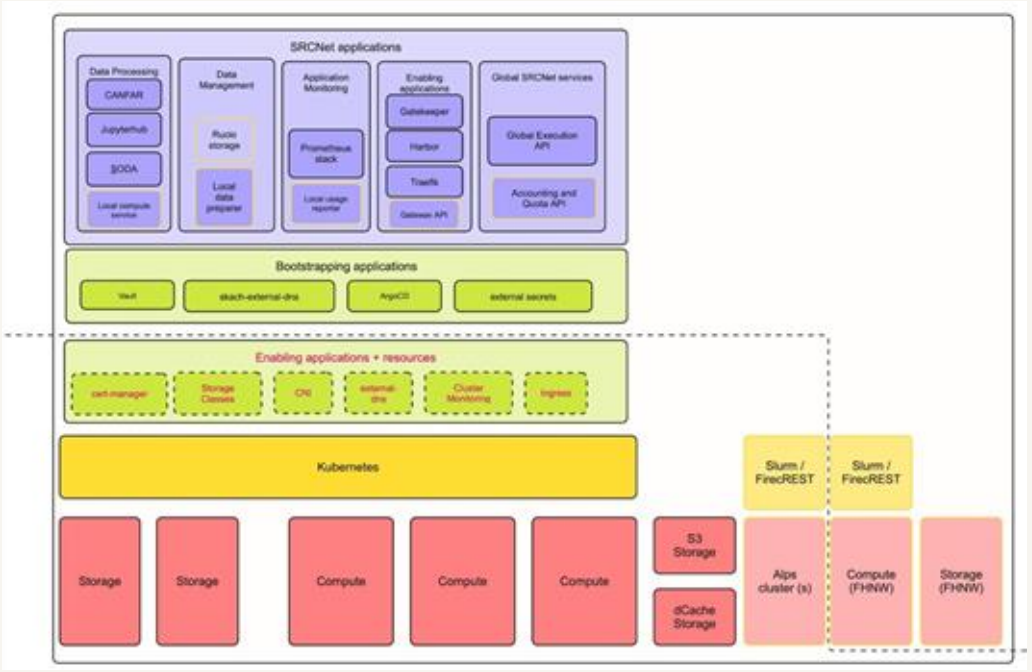
- User engagement!
- Data movement, identity and observability across HPC and Kubernetes domain
- Maintenance and improvement is an ongoing process
- Node resiliency - secondary site
- Leaning into cross-country collaborations

STILL AHEAD OF US

Node resilience: a secondary site at FHNW

What a second site gives us

- GPU nodes and Slurm access
- A test bed: build here, then deploy to CSCS
- Opportunistic use of spare capacity
  - Could be a model for using underused university resources
- Possible service failover (needs a small k3s cluster)



MAKING THE MOST OF WHAT YOU HAVE

What do we have?

1 **Funding, a collaborative consortium**

Let’s build stuff while we have this wonderful team.

2 **A flexible node architecture**

Anything we should be deploying, testing (user tools, science platforms, etc)? Come tell us!

3 **Simulated data**

Even though we don’t have our shiny new telescope yet.

4 **A great international community**

Different constraints and node architectures but many shared challenges → shared solutions.



FOR OTHER SRC NODES AND NATIONAL PLATFORMS

Takeaways

1 Socio-technical challenges

Acknowledge and act, don't avoid tackling this. Complement not compete.

2 Focus on interoperability, not matching solutions

AI development means we can build some fast, performant, custom solutions. Let's do it! With interoperable APIs

3 Document document document

Node deployment, service procedures, roadmap, Write and read your own documentation.

4 Treat user culture as infrastructure

Support is what turns hardware into science.

If you want to help us test what we're building, please reach out!



Merci · Danke · Grazie

Questions, comments?

rohini.joshi@fhnw.ch · skach.org · CHSRC docs · CHSRC CD repo

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