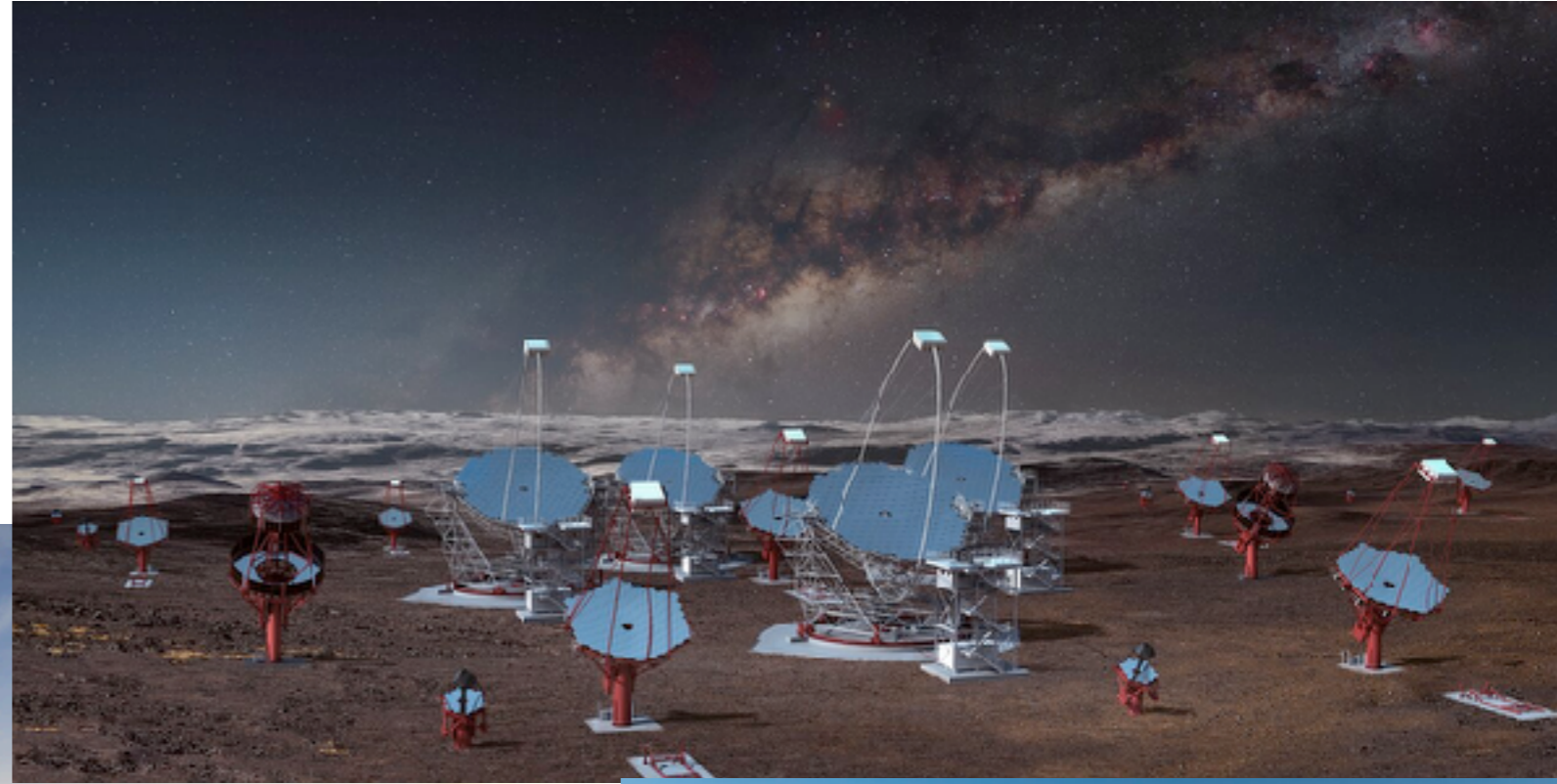


SKA/CTA synergy on scientific computing

The ETH-CSCS/EPFL performance agreement



Outline

- ▶ The Swiss SKA/CTA Computing measure
- ▶ Swiss SKAO updates
- ▶ Swiss SKAO/CTAO Synergies
- ▶ Work Achieved
- ▶ Future Plans

The SKA/CTA Compute Measure

- ▶ **Dec 2021:** Proposal submitted to SERI
- ▶ **Jan 2022:** Signature of the Contract between SERI/CSCS+CTAO-CH+SKAO-CH
- ▶ **Mission:**
 - ▶ Build the Swiss CTAO offsite DataCenter
 - ▶ Develop the Swiss SKA Regional Center
 - ▶ Develop synergy on data handling/processing
- ▶ **Budget 2022-2024:** for FTE+compute+storage
 - ▶ CTA: 1.95 MCHF
 - ▶ SKA: 1.29 MCHF



- ▶ **Jan 2022:** Switzerland become a full member of SKAO
- ▶ **5th Dec 2022:** Construction Ceremony in both Australia and South Africa
- ▶ **~2025-26:** First dataset stamped “SKAO”, start of the SKA Regional Center services
- ▶ **~2029-30:** Construction Complete - SKA Regional Center fully functional

nature

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NEWS | 04 December 2022

‘Great scientific step forward’: Construction of world’s largest radio observatory is finally under way

Two giant telescopes – one in Australia, the other in South Africa – will comprise the supersensitive Square Kilometre Array.

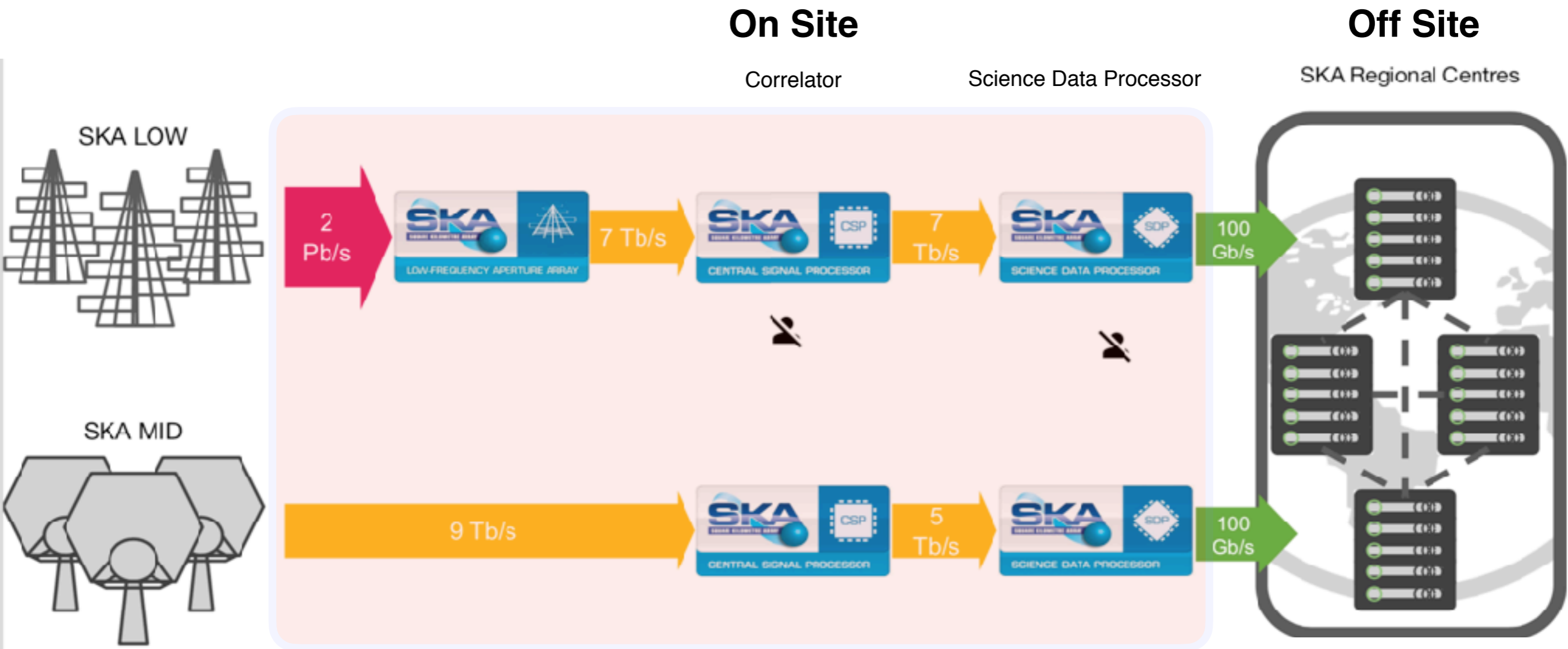
Sarah Wild



An artists' impression of SKA-Low antenna arrays. Credit: DISR

- **SRCNet** will likely be an effort of ***most of the member countries***: its development is ramping up but is still limited by available FTE in many countries.
- Working SRCNet needs to be ready by early 2026 to support SKA science verification
- Governance of SRCNet is not yet in place - SRCs are not part of the SKAO construction project, but a separate effort.
- SRC Fair Work Return is not fully defined, leading to a slow start.

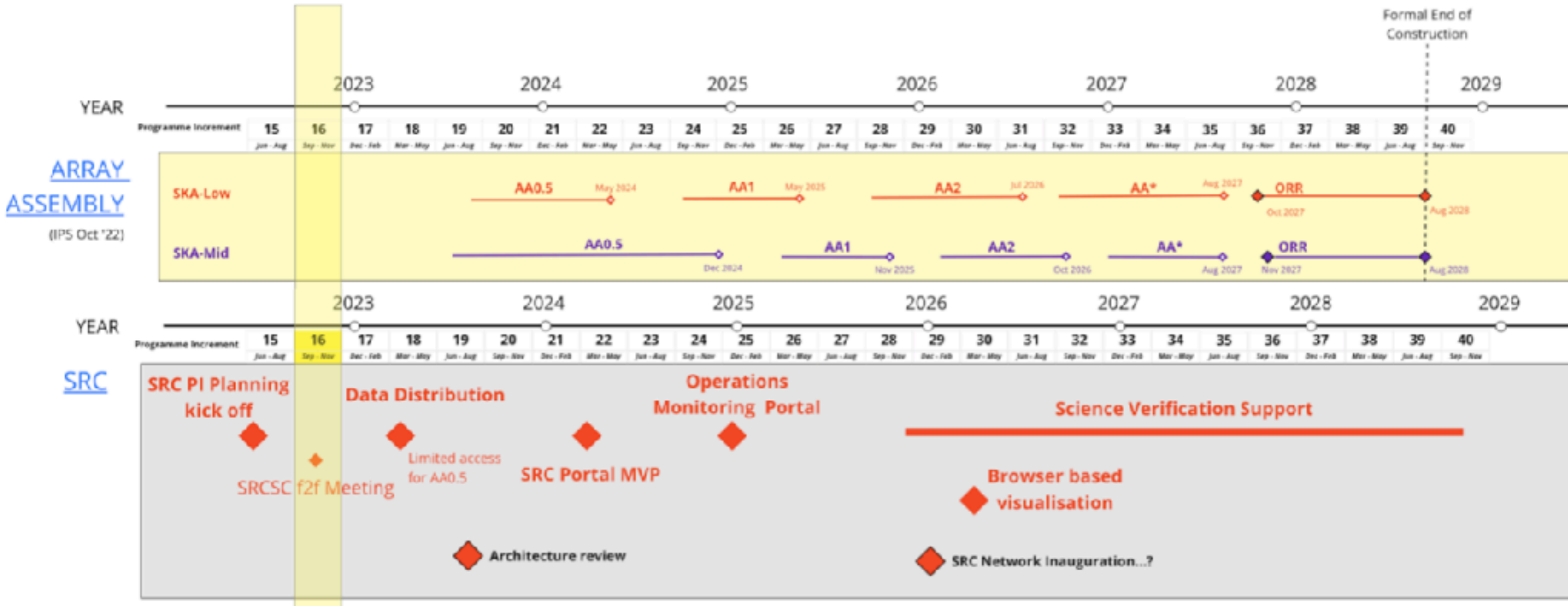
SKAO Data Flow



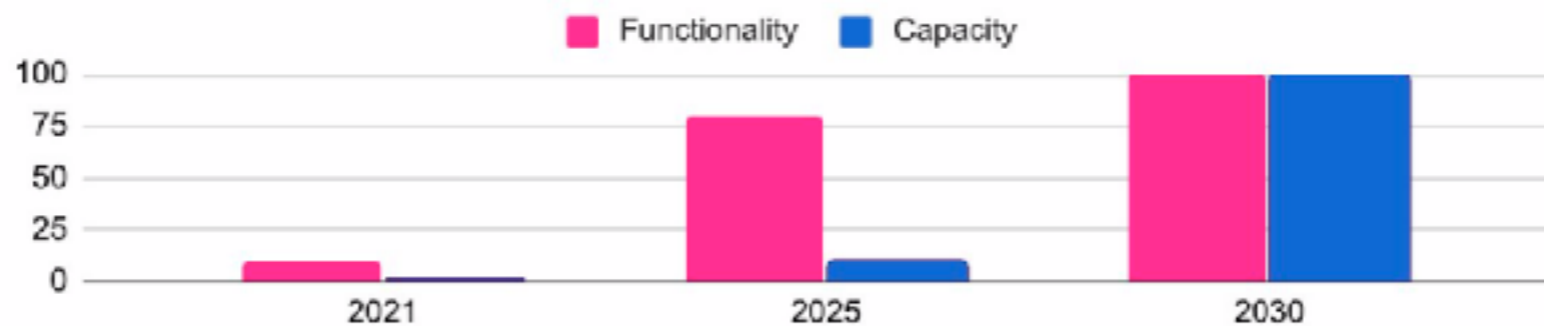
700 PB/year in 2030

Network of SKA Regional Centers (SRCNet)

From SRC Paris Meeting Dec 2022



Timeline



Plan 2025+

SRCNet

Swiss SRC

Science platform development

SKA Data logistics

SRCNet benchmarking

Storage & compute proportional to Swiss SKA contribution

Sky to observations

SKA digital twin

Simulation development

Analysis tools: imaging algorithms, data science

HPC precursor pipelines

SRC Demonstrator with precursor data

Storage and compute to enable + enhance Swiss activities

& project management =>
Need a technical lead to help with the src architecture/system design

SKAO/CTAO computing synergies

- **Common challenges:**

- PBytes of data to handle every year
- Current algorithms that do not scale (yet)
- Need of large numerical/Monte-Carlo simulations to analyze and interpret the data
- *Scientific goals:* e.g. transient phenomena (AGN, GRB, Gravitational Waves, FRB/magnetars? ...), but also cosmology.

Synergies

Many SKAO/CTAO synergy possibilities on various aspects!

CTAO

SKAO

Data Center

Regional Center

Sky Simulation Science Support

HPC Expertise for pipelines

Online Data Science Analysis

Science Results

Work Started

- **Simulations:**

- SKAO: Sky to Simulation (SPH-EXA)
- CTAO: Monte-Carlo Production

- **Data Handling:**

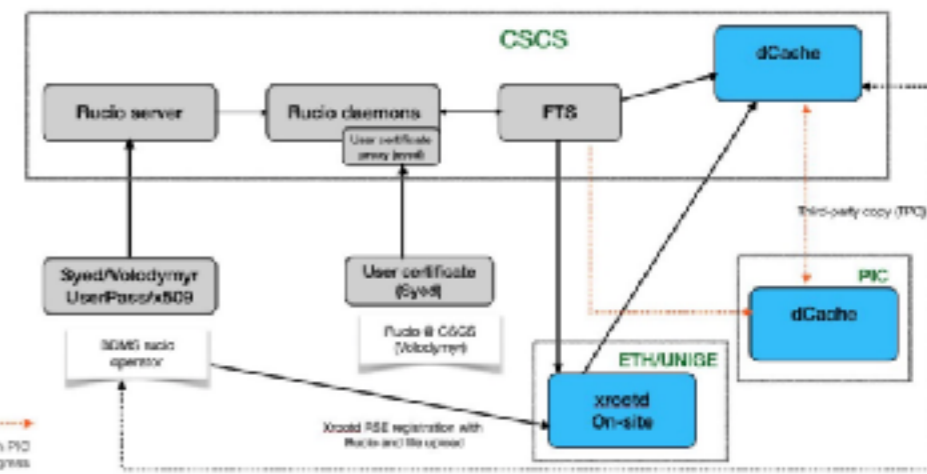
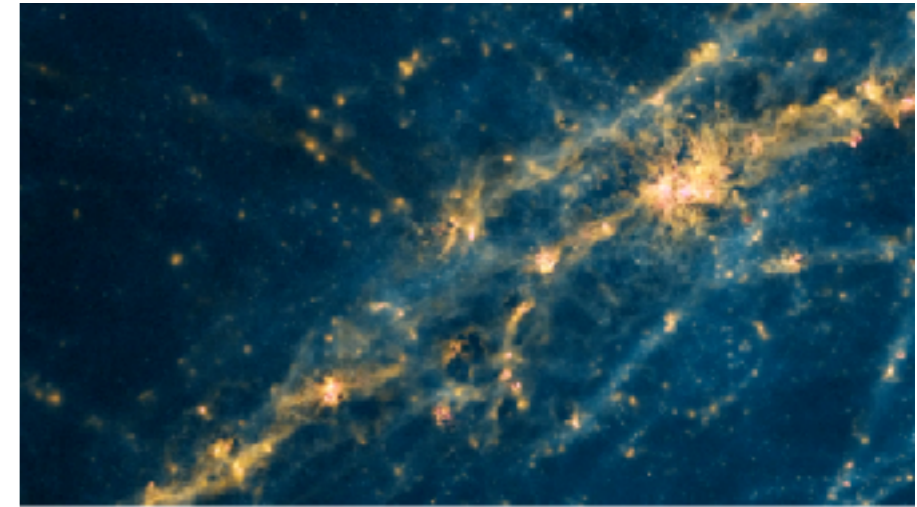
- SKAO: Precursor Data (Meerkat)
- CTAO: LST data

- **Code development:**

- SKAO: HPC/GPU code porting
- CTAO: deployment tools for Data Center

- **Data Challenges:**

- Coming up in 2023 for both SKA/CTA



Infrastructure resource used

Currently under-spending the compute/storage allocation:

● SKA

- 235k (out of 470k) node-hours: allocated to big projects: Explained by a shift in the utilization from Q1 to Q3'22. So will catch-up in 2023.
- 62 TB (out of 400 TB): Delays on SKAO prototypes and lack of data to transfer. Funds shall be transferred to compute where needs are bigger.
- 1/4 of the resources were spent for what was planned in 2022.

● CTA

- 1500 (out of 2000) cores have been used for Prod6 activities, but only for 1/2 year, due to delays.
- 500 TB (out of 3PB) were used only toward Q4. Delays in CTAO. Some resources are used for the LST data (complementing H2020 resources).
- 1/4 of the resources were spent for what was planned in 2022.

Personnel Effort

For 2022, 3.6 FTEs were foreseen (1 EPFL, 2.6 CSCS), and 4 FTE were spent.

For 2023, 5.3 FTEs are foreseen, but likely only 5 FTEs will be used.

Institute	Team Member	Role / Expertise	Approx. total effort in 2022
CSCS	Victor Holanda	Collaboration Mgr.	0.3 FTE
EPFL	Andrii Neronov	Data Center Mgr.	0.5 FTE
CSCS	Pablo Fernandez	Collaboration Mgr.	0.1 FTE
EPFL	Volodymyr Savchenko	Engineer	0.5 FTE
CSCS	Sebastian Keller	Software Engineer	0.8 FTE
CSCS	Miguel Guila	Architect Engineer	0.33 FTE
CSCS	Hussein Nasser	Solution Engineer	0.25 FTE
CSCS	Giuseppe Lo Re	Solution Engineer	0.3 FTE
CSCS	Riccardo di Maria	Solution Engineer	0.23 FTE
CSCS	Paola Colferai	Financial Administrator	0.1 FTE
CSCS	Dino Conciatore	System Engineer	0.25 FTE
CSCS	Dario Petrusic	System Engineer	0.25 FTE
CSCS	Elia Oggian	System Engineer	0.08 FTE

Future plans

● SKA

- Further, define and implement SRC prototype
- Continue software development and integration of consortium activities at CSCS
- Provide compute/storage resources to SKA-CH
- 2025+ SRCnet exists with SwissSRC connected, some data may exist
- 2029+ regular SKA Operations start

● CTA

- Transferring the data from LST, enabling analysis and reprocessing
- Reduce costs by implementing offline data with tapes
- Deployment tools, start running "mini-services" for CTAO
- Provide compute/storage resources to CTAO-CH
- 2025+ regular CTA Operations start, LST integrated with ERIC

● Both

- Continue synergies between CTAO and SKAO
- *Further collaboration with SDSC+*