The Spanish initiative to develop a SKAO Regional Centre

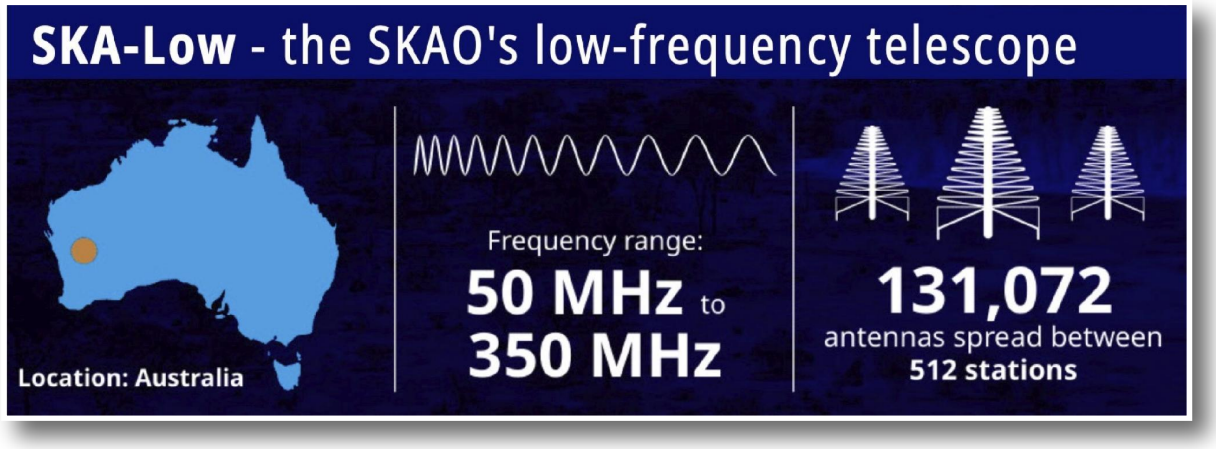
Susana Sánchez Expósito, Lourdes Verdes-Montenegro, Julián Garrido, Laura Darriba, Manuel Parra, Javier Moldón, María Ángeles Mendoza

IBERGRID 2026
27-29 October 2026. Santiago de Compostela.

SKAO, becoming a reality

SKA-Low: 69 stations assembled, 15 connected (July 2026)

Science Verification in 2027!





SKA-Mid: 20 dishes lifted (Sep 2026). 5 in operation (July 2026)

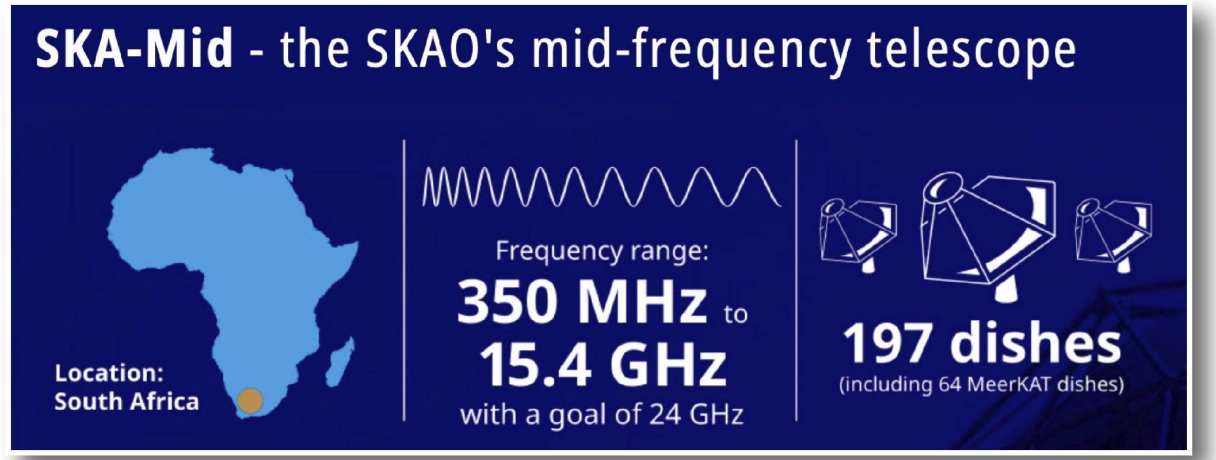
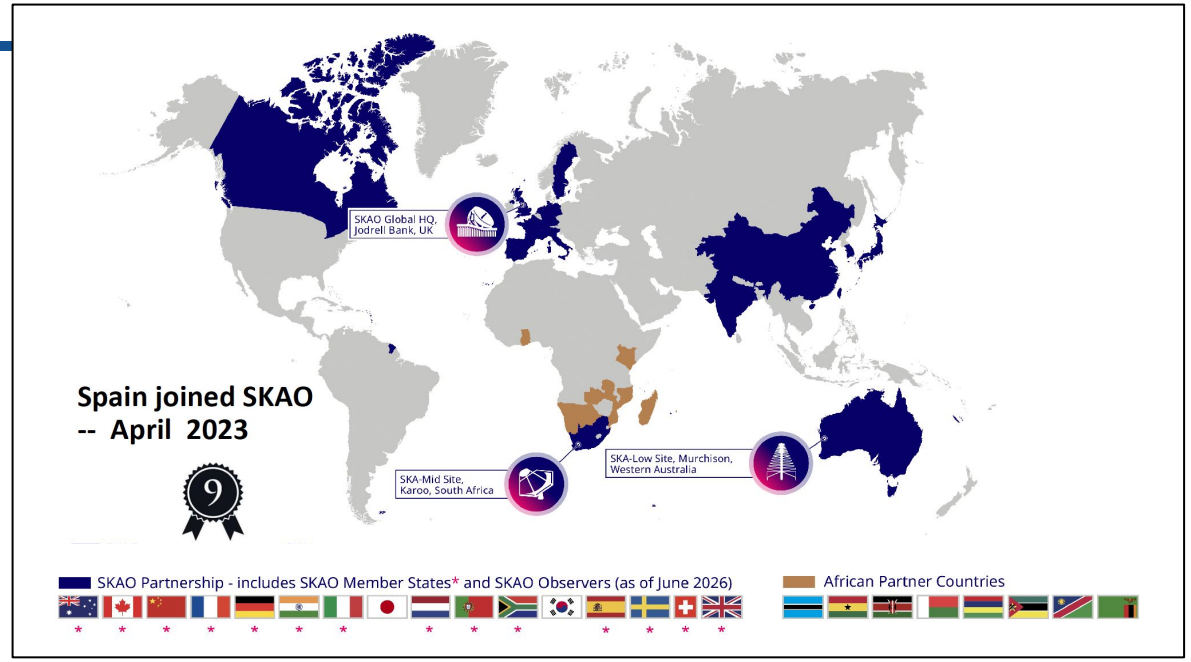


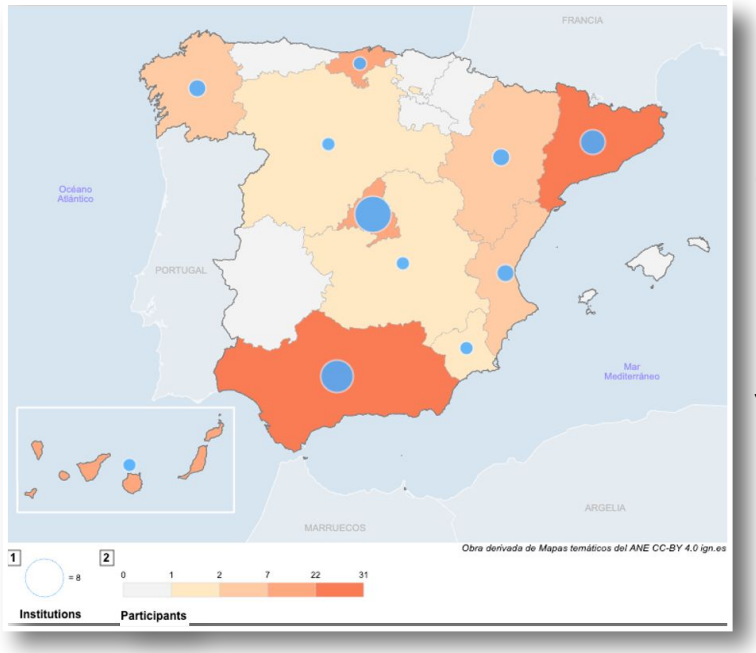


Image credits: SKAO

Spanish Community Engagement in SKAO

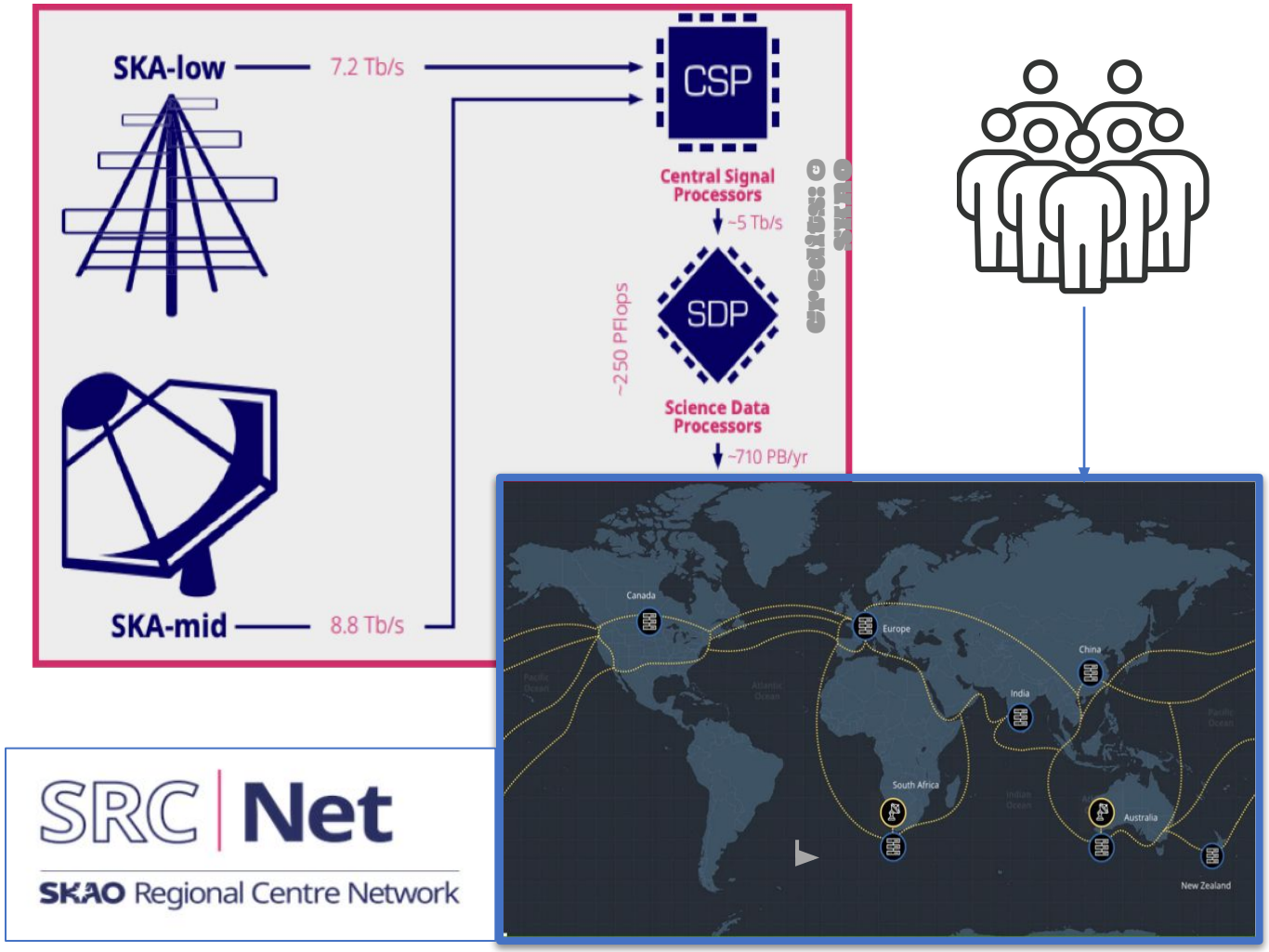
- Spain: full SKAO IGO member since 2023;
- IAA-CSIC coordinates the Spanish participation in SKAO since 2009
- Industry: 5 construction + 2 operations contracts awarded to Spanish companies
- 121 people from 32 Spanish institutions involved in SKA-related activities:
  - Committees
  - Working Groups
  - RedSKA
  - Science Book
  - Data Challenges





BSC, CAB INTA-CSIC, CEFCA, CESGA, CIEMAT, ESA, IAA-CSIC, IAC, ICC-UB, ICE-CSIC, IFAE-UAB, IFF-CSIC, IFCA-CSIC, IFIC CSIC-UV, IFT UAM-CSIC, IRAM, OAN, Obs. de Yebes, Telespazio UK - ESA, UB, UAM, UCM, UC, UGR, UMA, USAL, USC, US, UV, UZ, UPCT, Univ. Europea de Madrid

The SRCNet



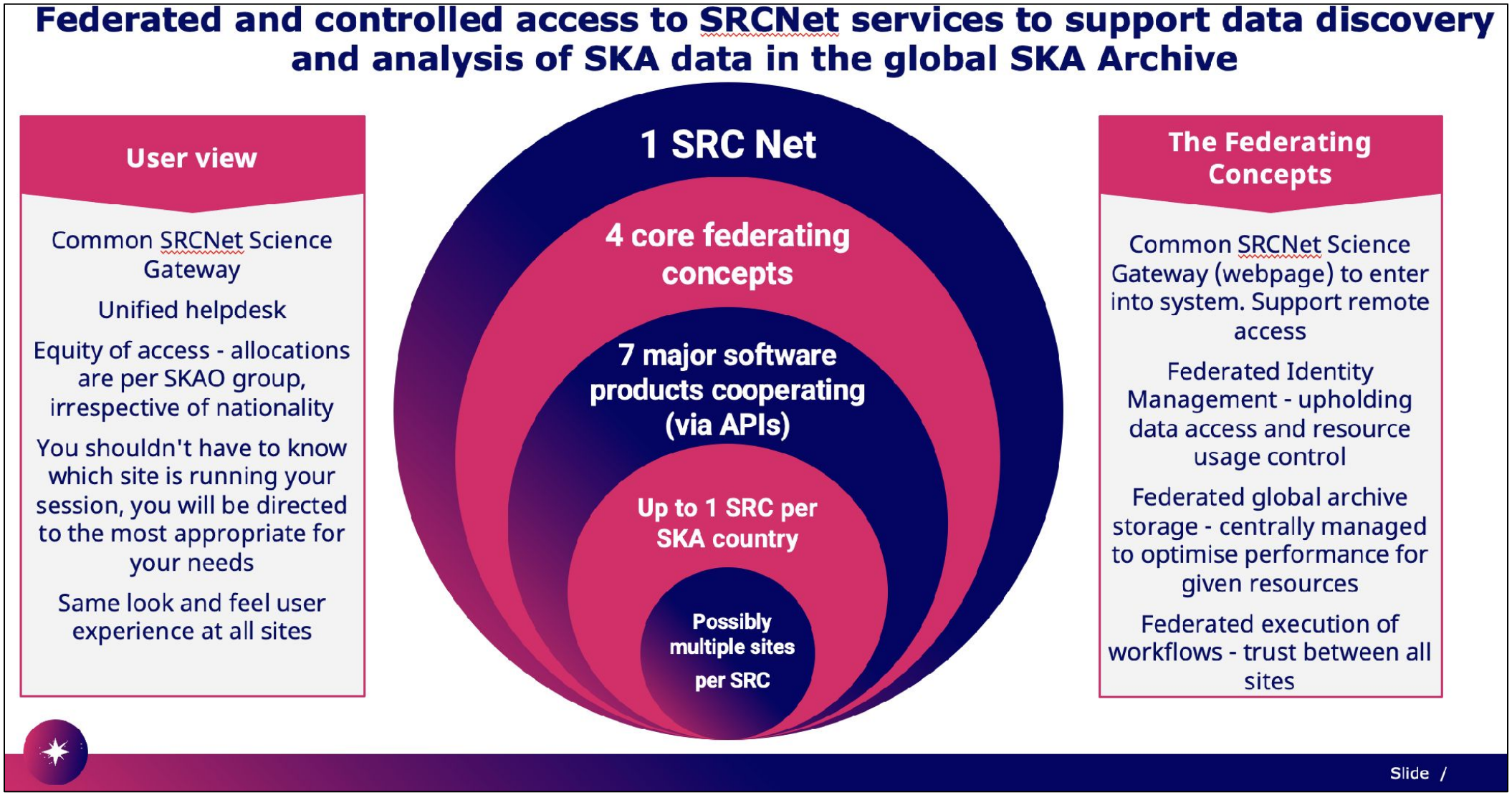
SRC | Net

SKAO Regional Centre Network

16 on-going national initiatives

The SRC Network (SRCNet) will be a set of federated resources providing the scientific community with access to SKAO data, as well as the computing and storage resources required for their scientific exploitation.

The SRCNet



Slide courtesy of R. Bolton

The SRCNet: Evolution and Spain's Role

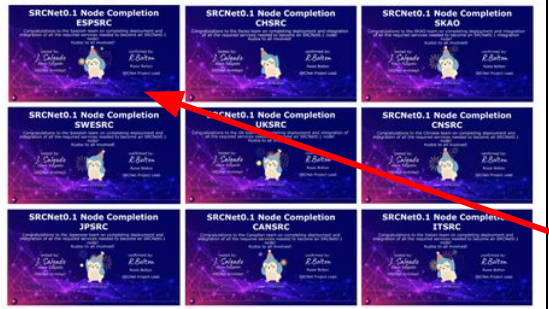
- (**2016 - 2018**) **SRC Coordination Group**, L. Verdes-M, as external advisory
- (**2019 - 2023**) **SRC Steering Committee**, L. Verdes-M, as Spanish representative
- (**2020 - 2022**) **SRCSC Working Groups** – Design Phase
  IAA-CSIC, **BSC**, **IFCA**, **ICE** and **OAN**
- (**2022 - 2025**)**Prototyping phase** - IAA-CSIC, coordinator of one of the development teams ("Coral")
  The miniSRCNet demonstrator: collab. among caSRC, chSRC, sweSRC, ukSRC and espSRC
- (**Q1 2024**) EOI for nodes to participate into the SRCNetv0.1
  The espSRC among the 9 EoI sent to SKAO
- (**Q2 2024**) **SRCNet Resource Board**. F. Colomer, Spanish Ministry repr. and co-chair
  SRCNet Advisory Committee, L. Verdes-M. expert
- (**Q1 2025**) SRCNetv0.1 starts. The espSRC, first accredited node in Feb. 2025

The SRCNet, current status

SRCNet 0.1 was a huge milestone!

Proof of concept established across many sites





SRCNet 0.1 2025

Milestone passed!

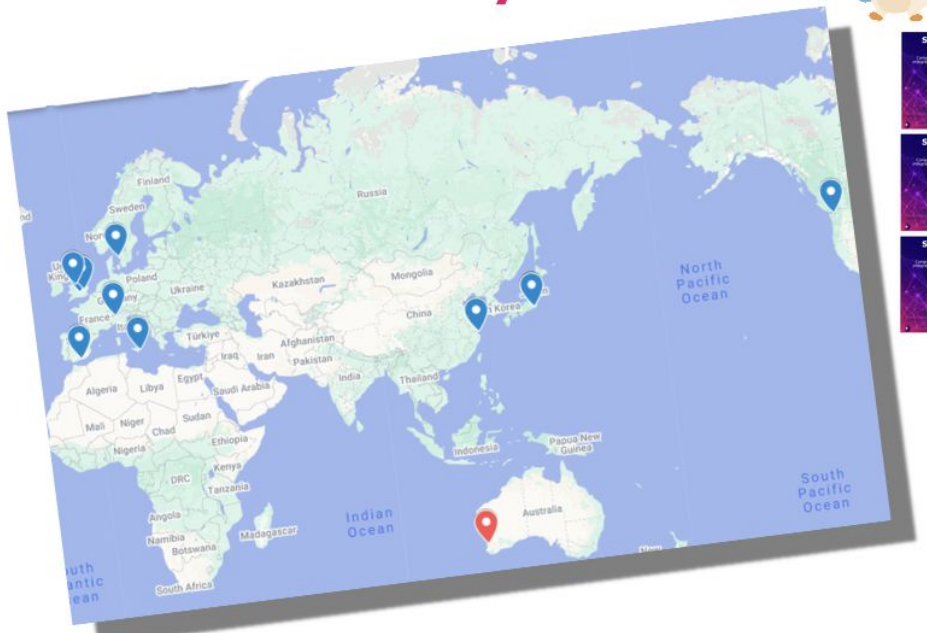
9 nodes now

Test campaigns already taking place

Data movement between sites centrally managed

Data ingestion at SDP location in Perth

Internal version, testing architecture



Millions of global data transfers made in test campaigns already



- **Centrally managed** data archive of 3 PBytes total now
- **Ingestion of data from an SDP site (Pawsey) on SKAO resources**
- **Trust between sites** allowing resources to be integrated

Map Key: 0.1 nodes (Spain, Switzerland, SKAO, Sweden, UK, China, Japan, Canada, Italy) SKAO ingestion site (Pawsey)

Slide / 3

Slide courtesy of R. Bolton

The SRCNet, next steps

- (**2026**) Getting ready for Science Verification
- (**2027**) Science Verification begins. First real users
- (**2027 - 2028**) Continuous improvement and increased resources to scale up to meet SKAO needs
- (**2030**) The organisational model would be re-evaluated for the long-term operations
- SKAO will operate for 50 years and the SRCNet will provide the community with support

The SRCNet project: Science, development and operations streams

Science Delivery Stream

It supports, enable and coordinates the delivery of science via SRCNet in tandem with SKAO.

This stream provides:

- User representation
- Tools for user support
- Example workflows

Operations Stream

It deploys, operates and maintains the infrastructure and services required to keep SRCNet reliable, operational and ready for science.

It also includes:

- Benchmarking
- Helpdesk system
- IT Security Risk Mgmt.
- Documenting
- Node Monitoring/Testing

Development Stream

It develops and integrates the software products and capabilities required to build and evolve SRCNet.

List of software products:

- Science Gateway
- Data Management
- A&A
- Metadata Management
- Science Enabling Apps.
- Federated Execution
- Monitoring Tooling

The SRCNet project: Science, development and operations streams

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A Project Scientist & a science team member

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The espSRC Lead Node Operator

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List of software products:

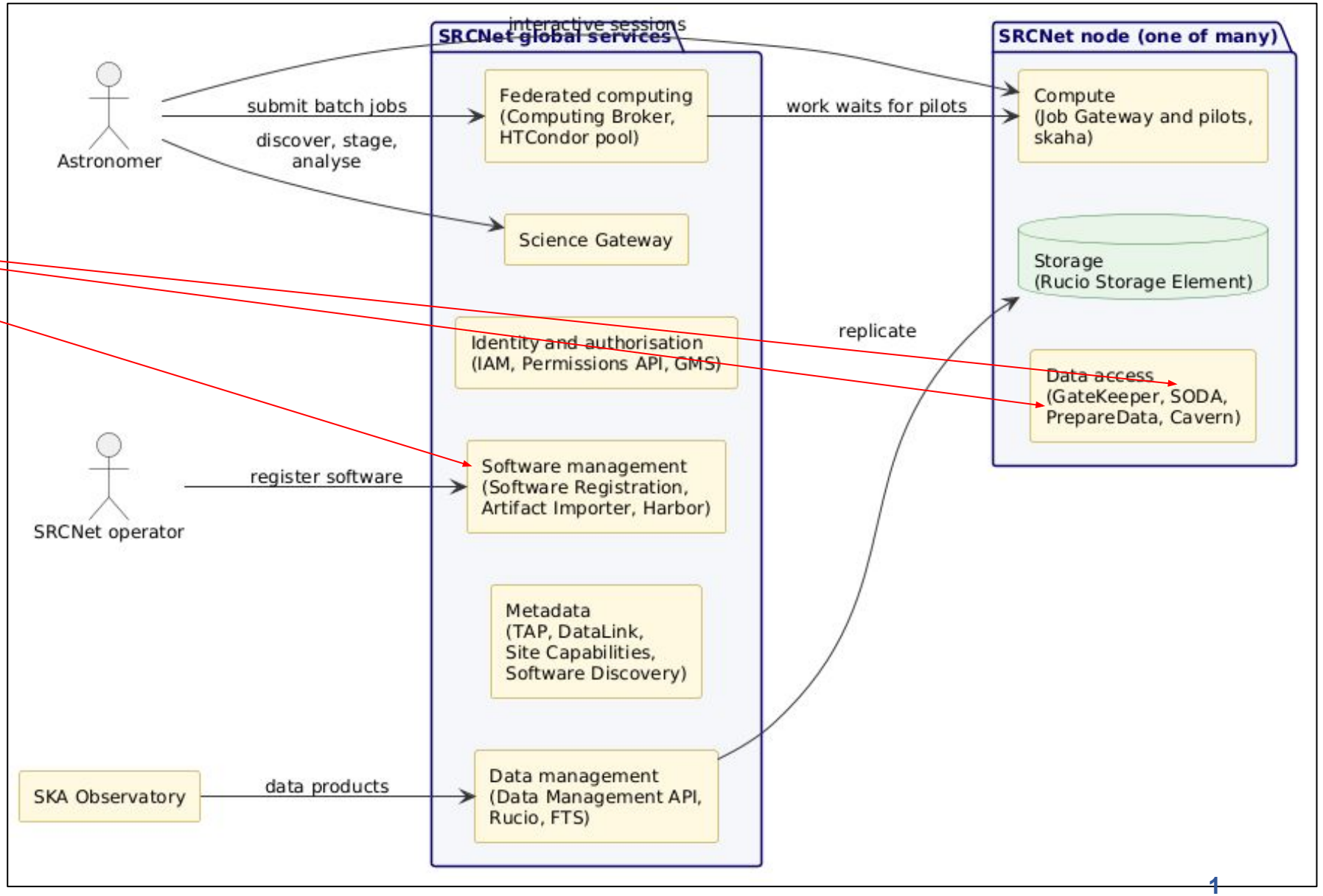
- Science Gateway
- Data Management
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- Metadata Management
- Science Enabling Apps.
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Coral Team's leadership & Developers in Coral and Beige

SRCNet in its context: global and local services



Spanish contribution to Development stream.



SRCNet Architectural drivers and principles

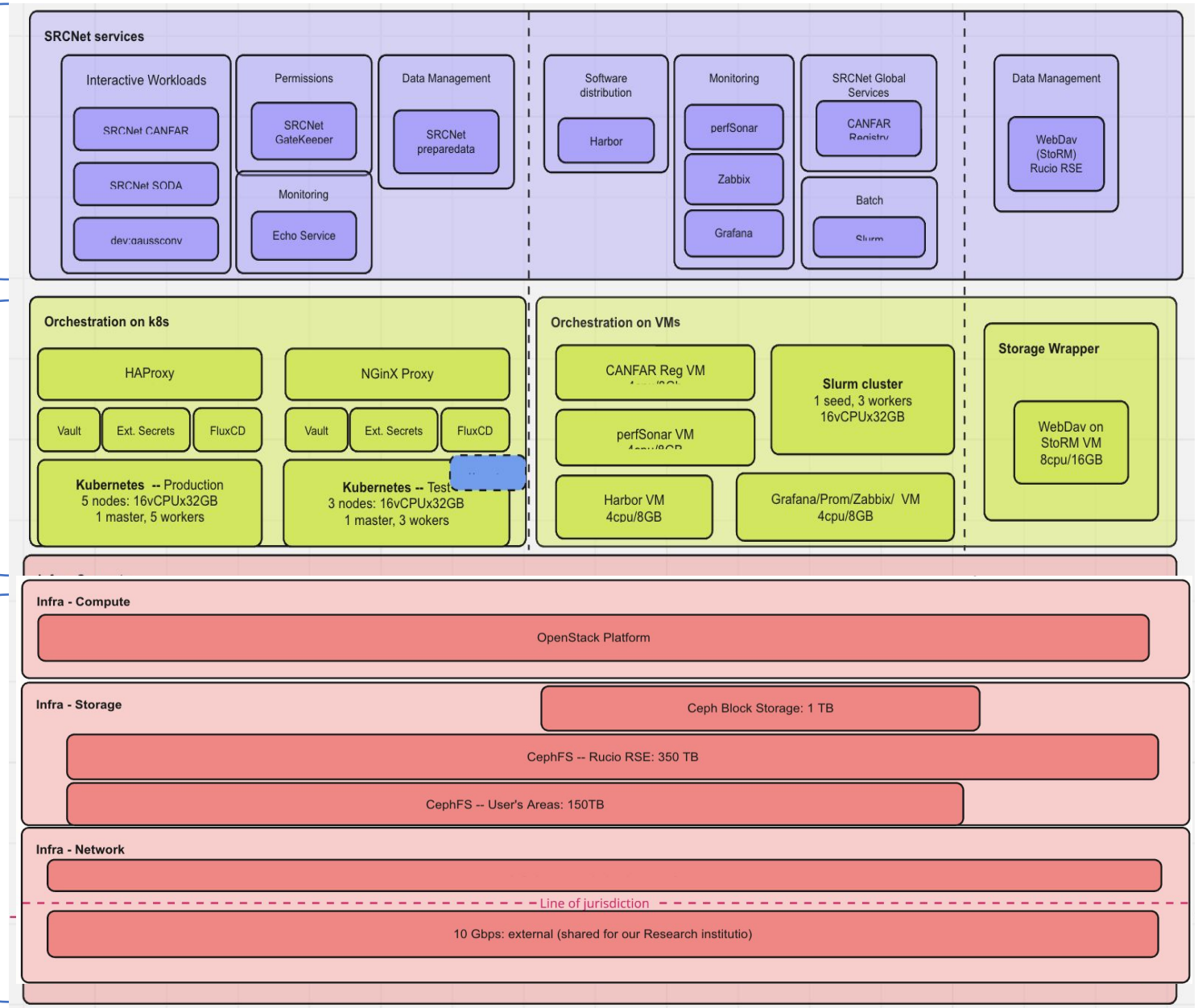
- **Federated centres:** Independent nodes can join, drain or fail without central control.
- **Data locality:** Compute runs where all required data replicas are accessible
- **Standards:** IVOA standards for data discovery and access; OIDC/IAM for Auth.
- **Reuse proven components:** Leverage established technologies (e.g. Rucio, FTS, Harbor).
- **Cloud-native operations:** Containerised services managed through GitOps (ArgoCD/FluxCD).
- **Secure software supply chain:** Software Registration scans and labels container images

espSRC as a SRCNet node

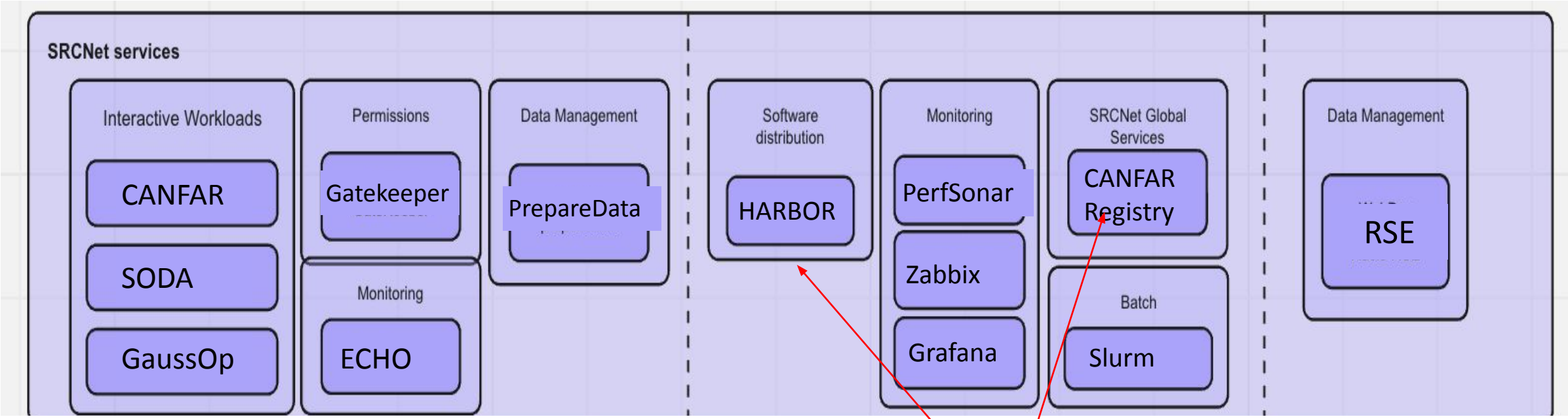
Services

Orchestration

Infrastructure



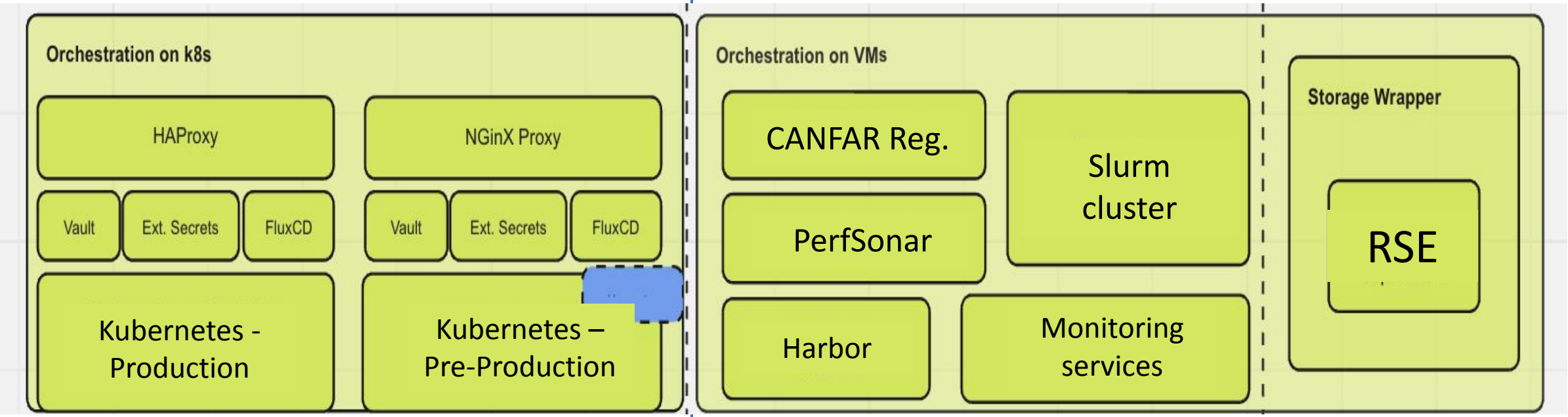
espSRC as a SRCNet node: Services



SRCNet Local services
+ Monitoring

Global services

espSRC as a SRCNet node: Orchestration



Orchestration via Kubernetes:

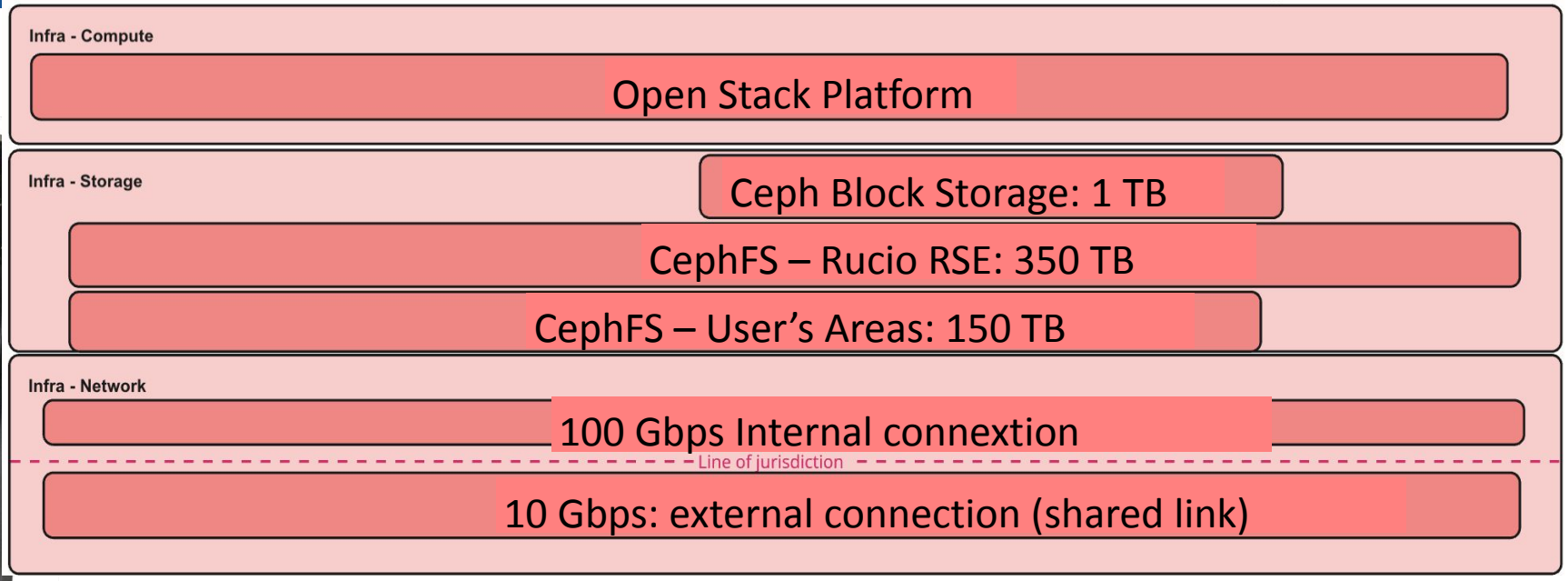
- Production & Pre-Production environment
- Services managed by Gitops

Services in Virtual Machines:

- Some services to be migrated to K8s to benefit from the automatic deployment based on GitOps (e.g. Rucio Storage Element)

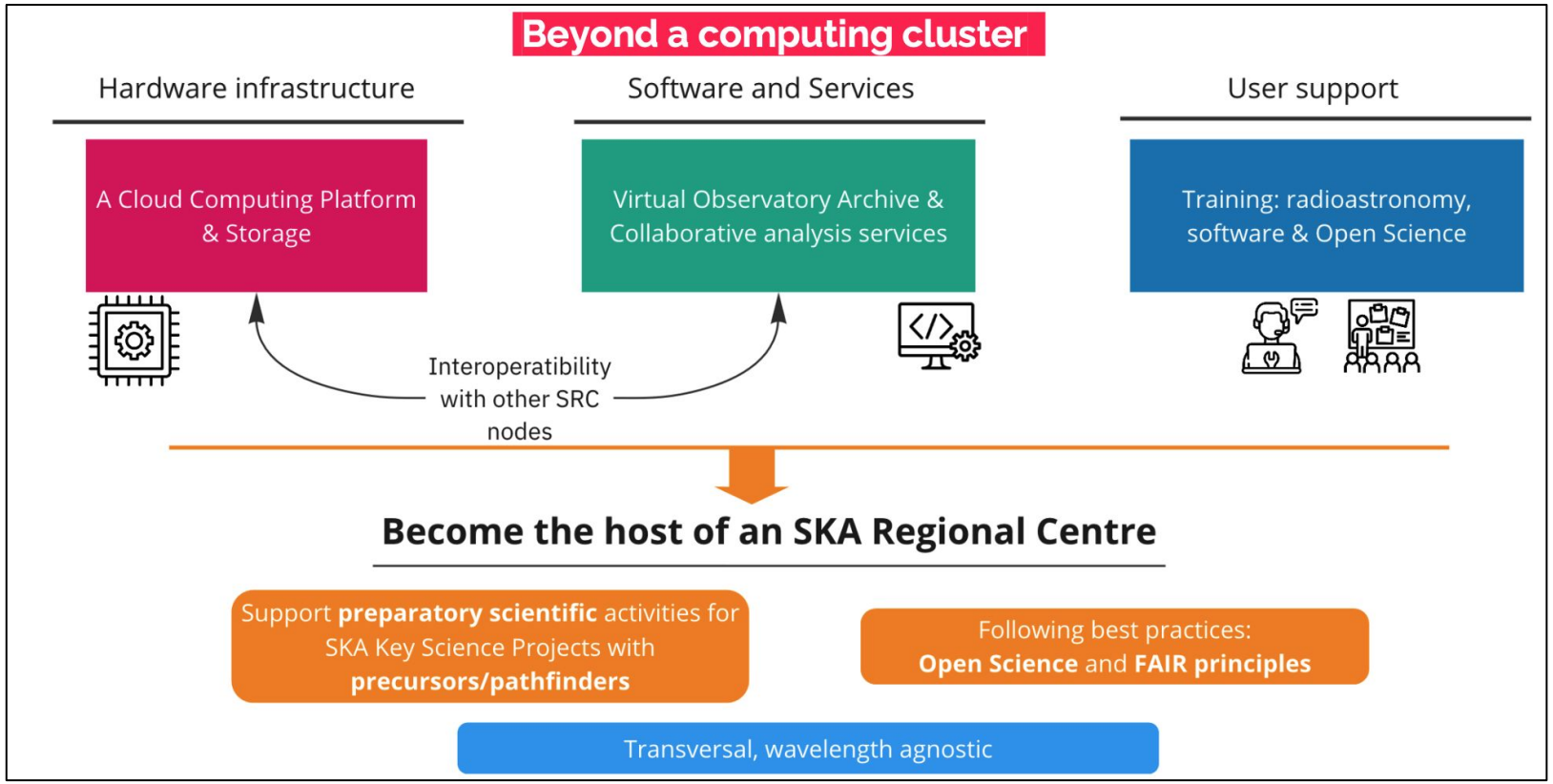
espSRC as a SRCNet node: Infrastructure





- 10 computing nodes (9 CPU + 1 GPU)
  - Intel: 6 nodes with 40 cores (80 w/HT)
  - AMD: 3 nodes with 128 cores
  - Nvidia L40
- ~ 3 PB of RAW data storage

The espSRC as a project



- **2018:** Initiative launched with support from the Severo Ochoa (SO) Programme.
- **2020:** Hardware operational, funded by EQC2019-005707-P (MICIU), SO + Junta de Andalucía.
- **2025:** Hardware expansion funded by PPCC.
- **Current team: 10 people** — 4 CSIC staff, 2 SO contracts, 1 PTA, 1 INFRA24023 contract, and 2 PhDs.

Presented at IBERGRID2023 by M.Parra

The espSRC as a project

espSRC-SUR: Infraestructura y servicios de Ciencia Abierta en Andalucía para el nodo español de la red de Centros Regionales del SKAO.

FEDER P.O. ESFRI_GIC . Execution period 2026-2030

- Expand espSRC capacity in compute and storage and enable the services required for integration into future SRCNet versions.
- Provide advanced computing infrastructure to support the Spanish community in preparing for SKAO scientific exploitation.

- **2018**: Initiative started with the support of the SO2021 programme.
- **2020** Hardware in operations with funds from the SO2021 + Junta
- **2025**: Hardware expansion with funds from PPCC
- **Current team**: 10 people: 4 CSIC staff, 2 SO contracts, 1 PTA, 1

Presented at IBERGRID2023 by M.Parra

El CSIC recibe 6 millones de euros para desarrollar un centro de análisis de datos de la mayor red de radiotelescopios del mundo

España ha sido pionera en el desarrollo de la red de centros regionales del observatorio del SKA al ser el primer país en certificar su nodo nacional, coordinado por el Instituto de Astrofísica de Andalucía (CSIC)

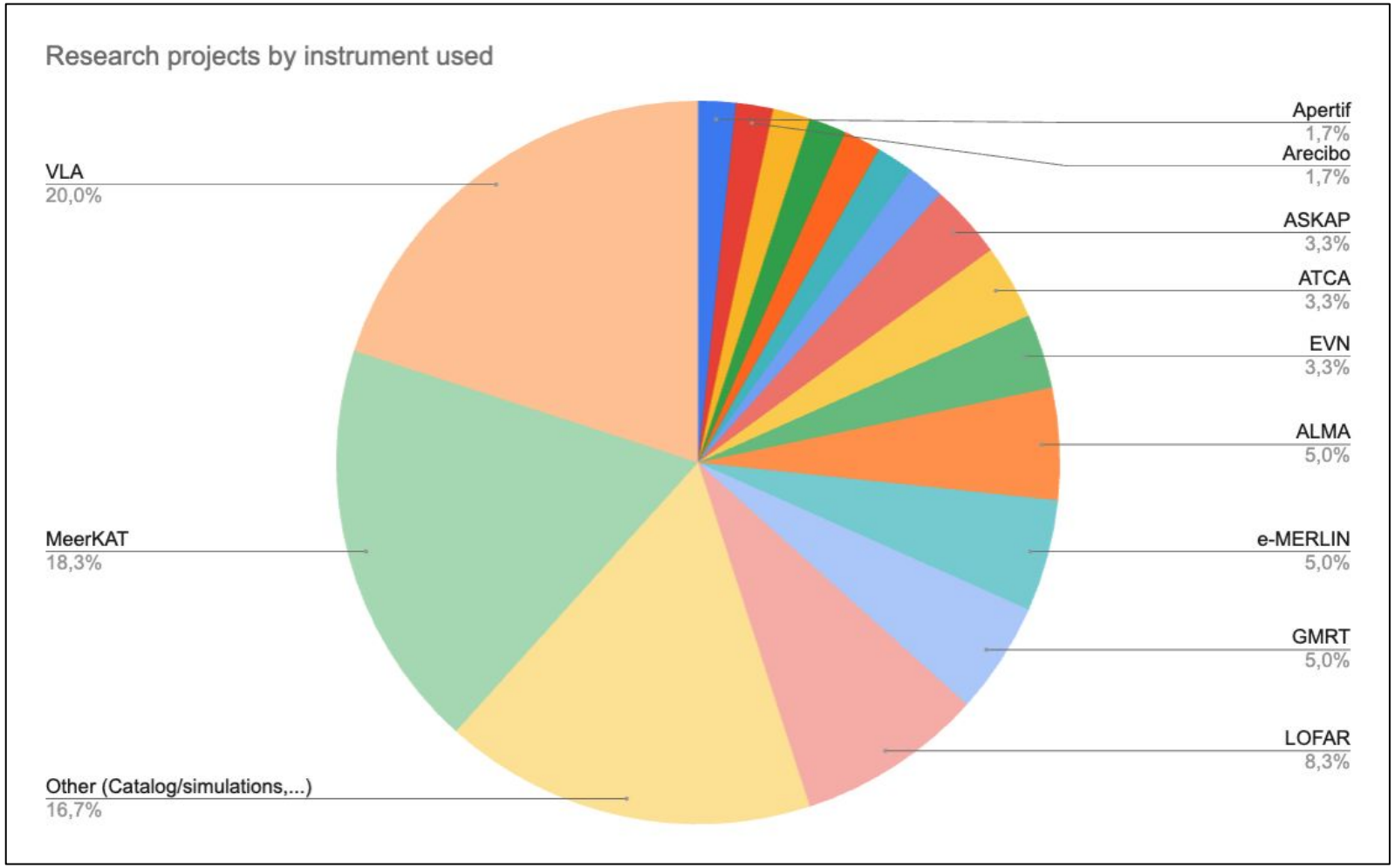
Fecha de noticia:
Jueves, 22 Octubre, 2026



IAA INSTITUTO DE ASTROFÍSICA DE ANDALUCÍA · EXCELENCIA SEVERO OCHOA · CSIC

The espSRC: supporting Astrophysics projects

~45 Research project supported



SKAO Data Challenges

SKA Data Challenge 2:

Spanish (IAA) team: 5th place + Gold Medal on Reproducibility

SKA Data Challenge 3a: EoR

- 33 teams. Spanish one led by IFCA
- espSRC & CESGA supported teams from Spain, South Korea and India

Take away messages

- The Spanish community is a key player in the SKAO and SRCNet projects.
- espSRC is one of the 9 international SRCNet nodes and was the first to be accredited.
- Contributes proven expertise and experience in successfully operating an SRCNet node.
- espSRC aims to become a transversal facility, supporting radio astronomy and beyond.
- Open Science as a core value, with ongoing efforts to enable both SRCNet and espSRC to support open and reproducible science.
- An open vision for collaboration: connecting Spanish computing sites to further strength espSRC
- Well positioned to bring new Spanish sites into SRCNet.

Acknowledgement

This work has financial support from “*FEDER Una manera de hacer Europa*”, “FEDER/UE”

Financiado por la Unión Europea

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

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EXCELENCIA SEVERO OCHOA

It also has financial support from the grant PID2021-123930OB-C21 and PID2024-155817OB-I00 funded by MICIU/AEI/ 10.13039/501100011033 and by ERDF/EU

The SPSRC acknowledges financial support from the Agencia Estatal de Investigación (AEI) through the "Center of Excellence Severo Ochoa" award to the Instituto de Astrofísica de Andalucía (IAA-CSIC) (SEV-2017-0709) and from the grant CEX2021-001131-S funded by MICIU/AEI/ 10.13039/501100011033.

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EXCELENCIA SEVERO OCHOA
CSIC

The espSRC: International Collaborations

AENEAS (2017–2019) – *Advanced European Network of E-infrastructures for Astronomy with the SKA*

→ *nitial exploration of the SKAO Regional Centres as a federated infrastructure*

ESCAPE (2019–2023) – *European Science Cluster of Astronomy & Particle physics ESFRI research infrastructures*

→ *Link to EOSC*

CHEER (Proposal for HORIZON-INFRA-2026-01-DEV-03) - *Collaborative Horizons for European E-Infrastructures in Radio Astronomy*

→ European radio astronomy collab. for data processing in the big data era