Science and Technology Facilities Council

Scientific Computing

Updates from STFC

- Designing the AAI for SKA
- Toward a UK National AAAI Infrastructure

Tom Dack & Ian Collier

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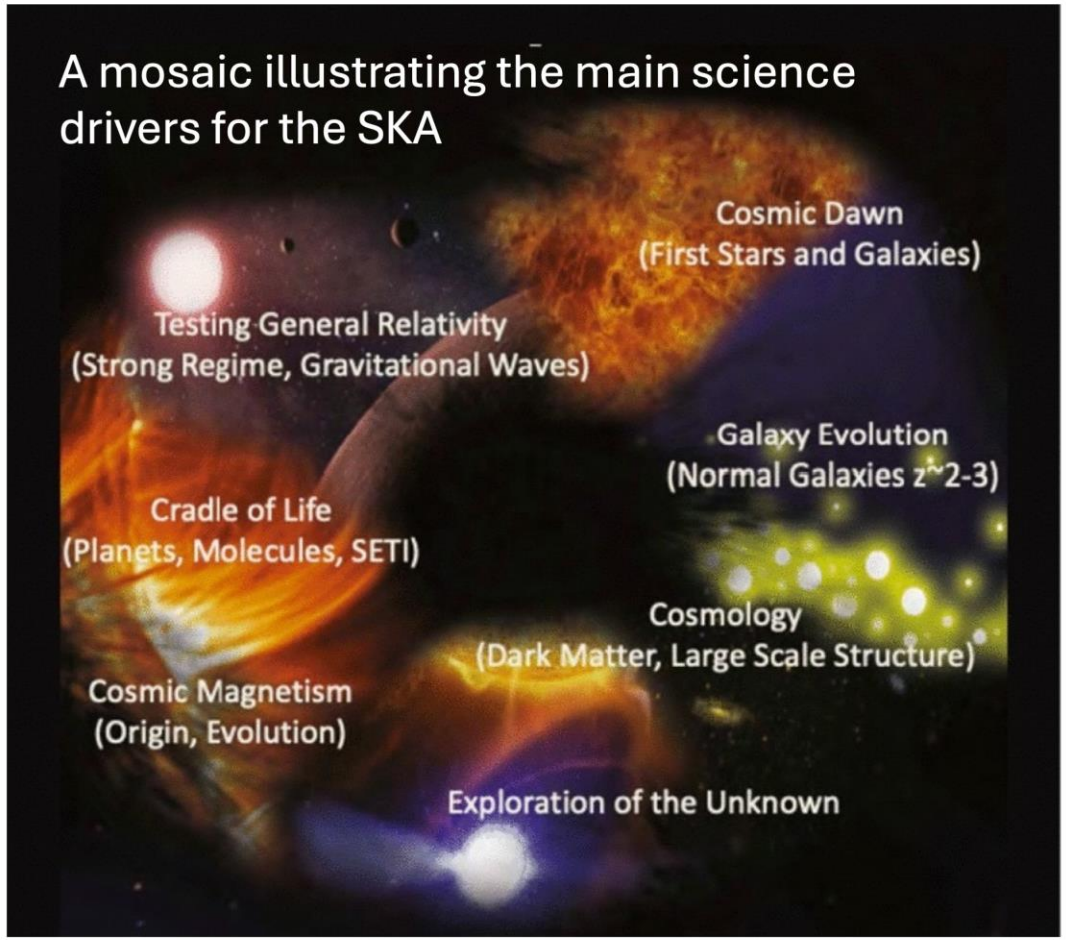
Designing the AAI for SKA

Square Kilometer Array: Transforming radio astronomy

The Square Kilometer Array (SKA) Observatory (SKAO) is a next-generation radio astronomy facility which will cover the frequency range from 50 MHz to 15 GHz.

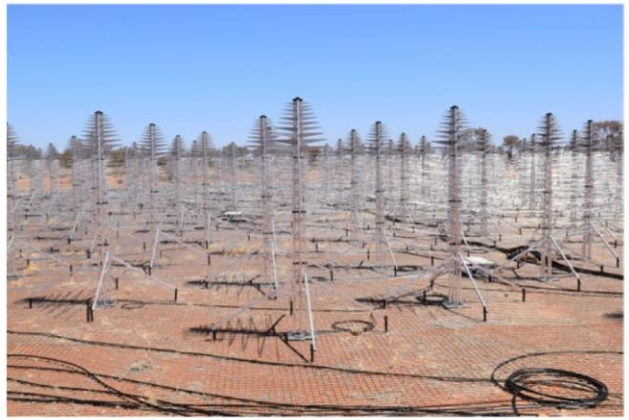
Composite image of the SKA telescopes, blending real hardware already on site with artist's impressions. credit: SKA Observatory

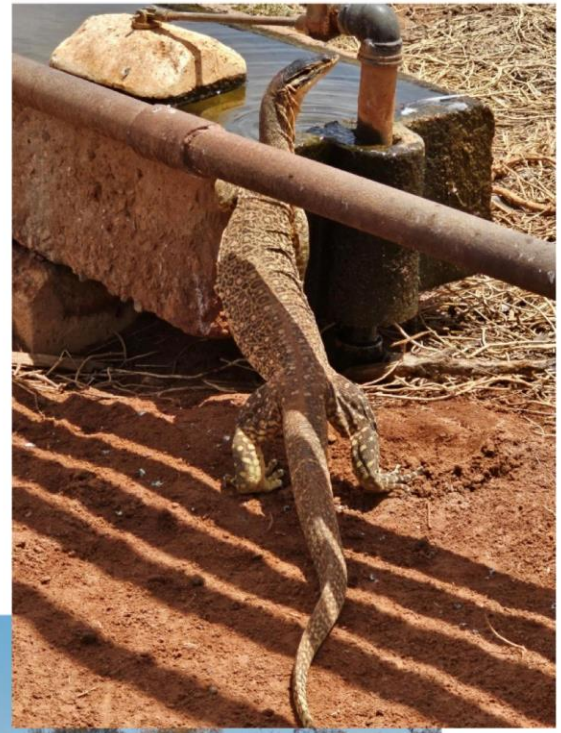


Credit: SKA Observatory

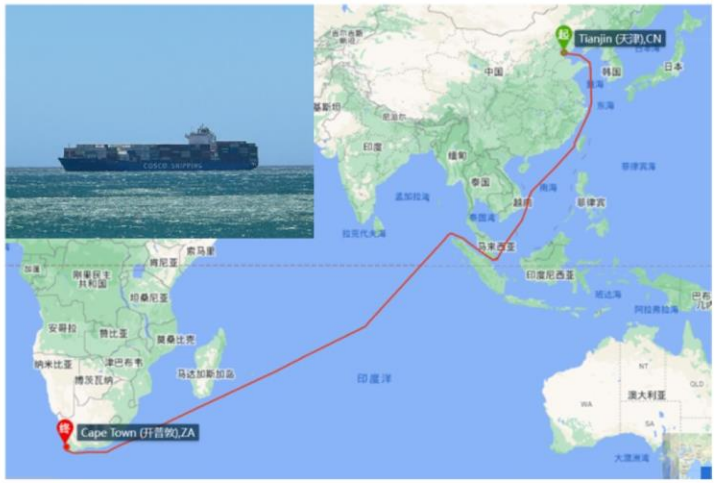
uk | SRC

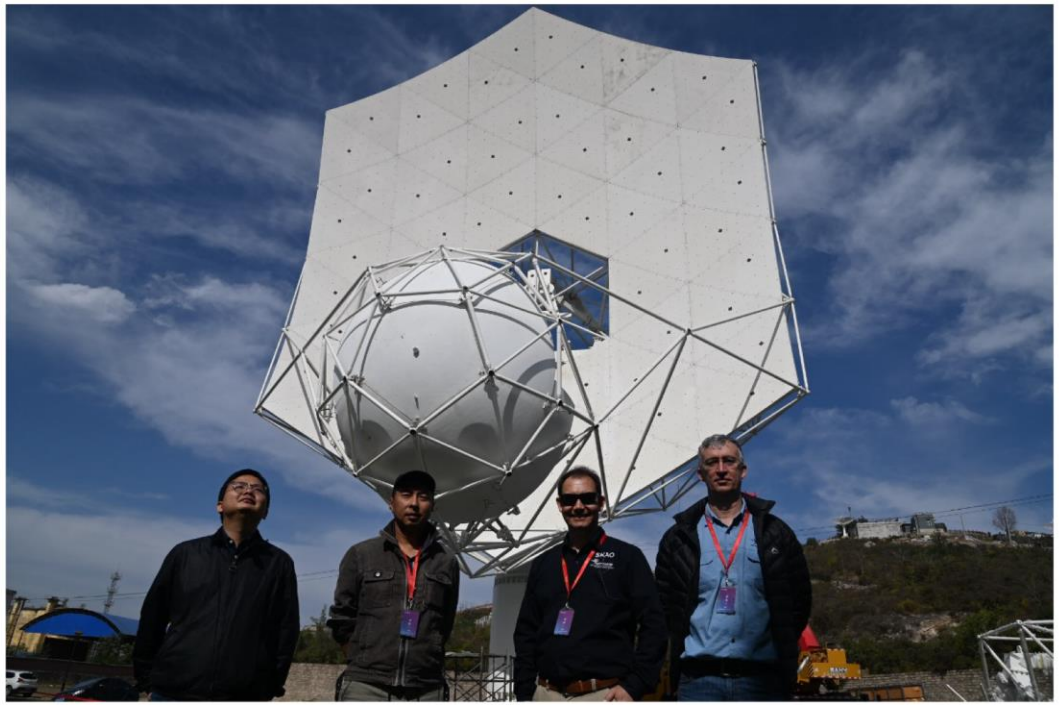
Construction steaming ahead! - Low





Construction steaming ahead! - Mid





Construction Strategy

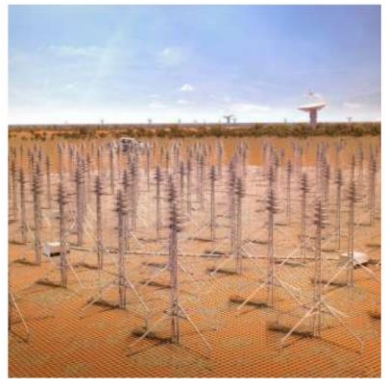
- **Target**: build the SKA Baseline Design (197 Mid dishes; 512 Low stations: AA4)
- Not all funding yet secured, therefore following Staged Delivery Plan (AA*)
- Develop the earliest possible working demonstration of the architecture and supply chain (AA0.5).
- Then maintain a continuously working and expanding facility that demonstrates the full performance capabilities of the SKA Design.

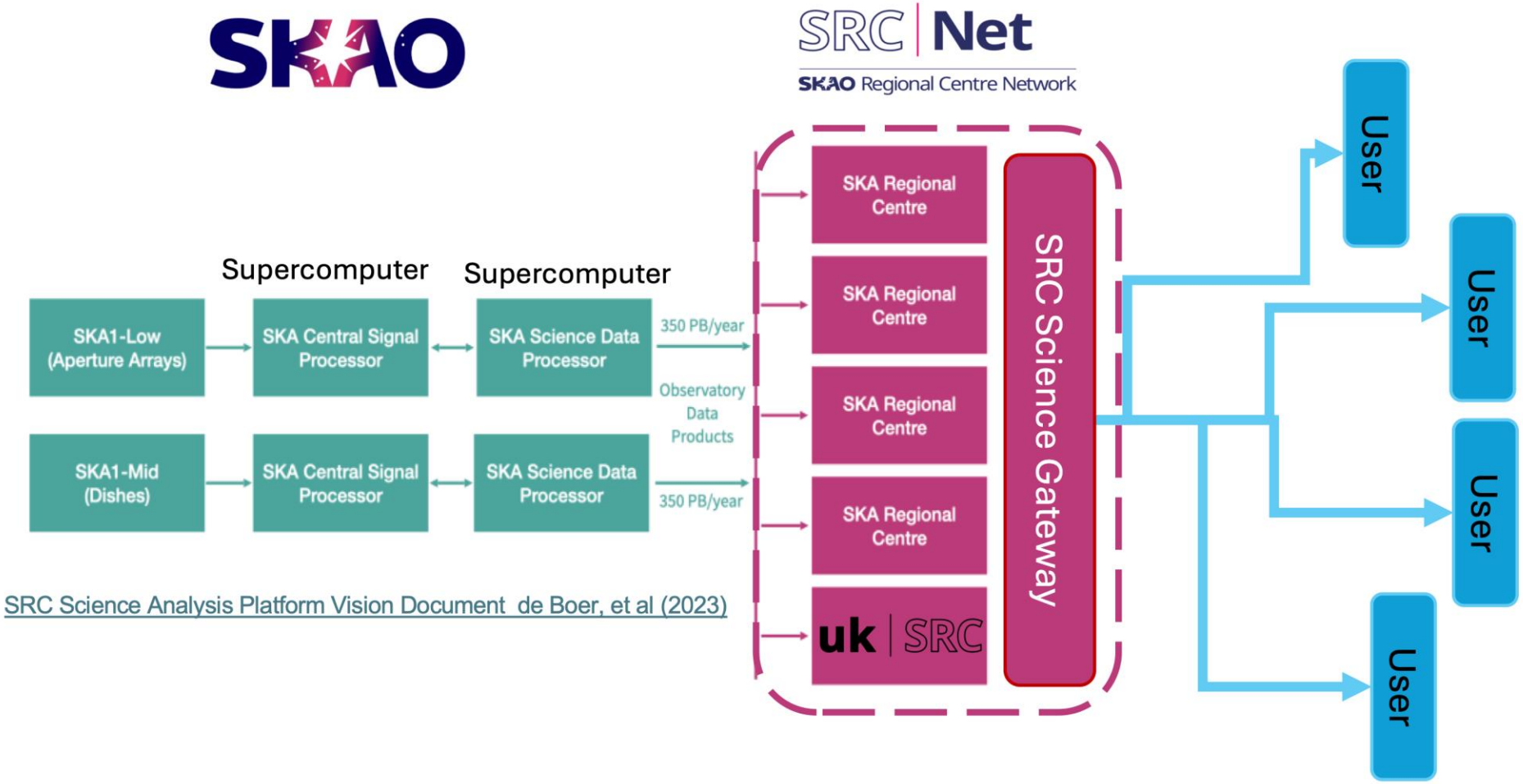
Milestone event (earliest)		SKA-Mid (end date)	SKA-Low (end date)
AA0.5	4 dishes 6 stations	2025 May	2024 Nov
AA1	8 dishes 18 stations	2026 Apr	2025 Nov
AA2	64 dishes 64 stations	2027 Mar	2026 Oct
AA*	144 dishes 307 stations	2027 Dec	2028 Jan
Operations Readiness Review		2028 Apr	2028 Apr
AA4	197 dishes 512 stations	TBD	TBD

First data release to the community expected in 2026/27 (for science verification)

SKA Regional Centre Network

SRCNet will provide a portal for scientists to access SKA data – an exabyte data challenge!





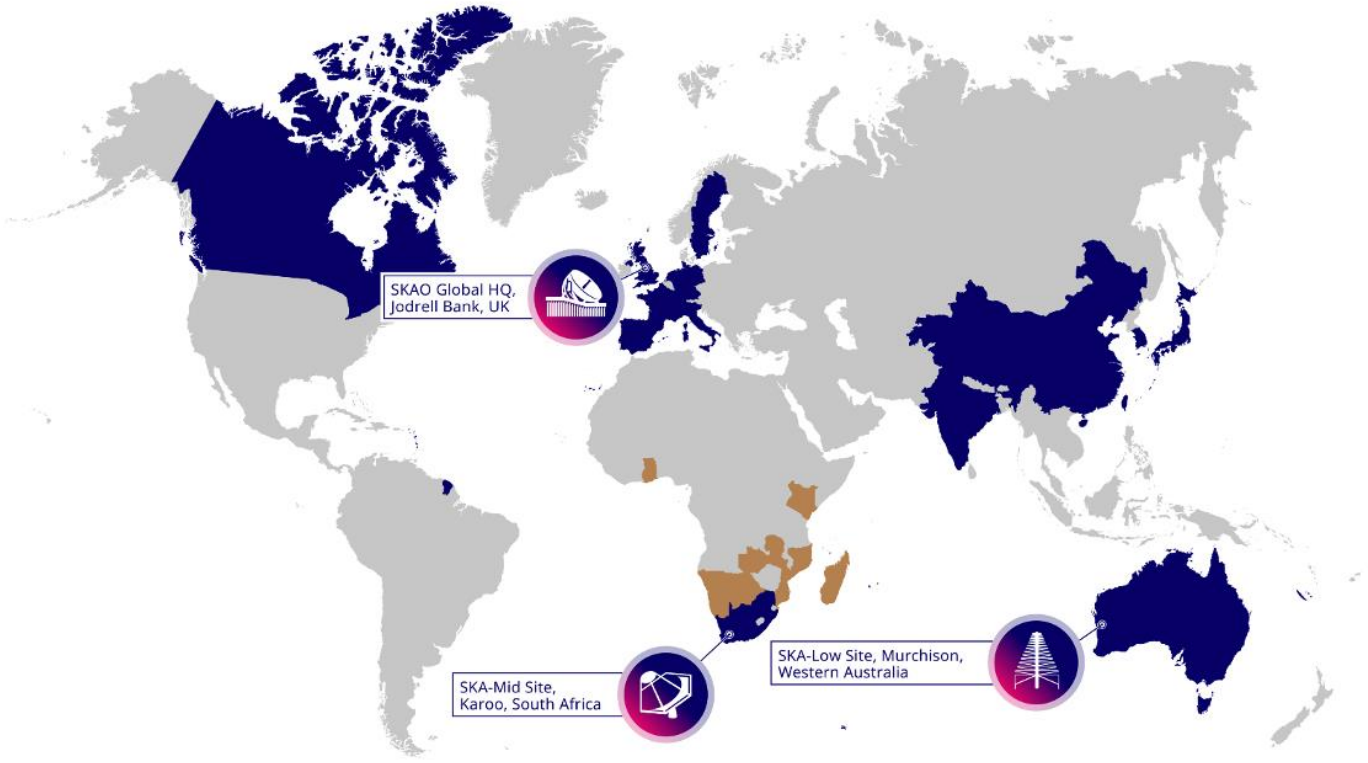
SRC Science Analysis Platform Vision Document de Boer, et al (2023)

....SRCNet is the gateway for the science user communities to access the SKAO data and do science...

The SRC Network (SRCNet)

- The need for a network of SKA Regional Centres (SRCs) formed around ~ 2016:
  - Distributed compute, storage and expertise to store, process and disseminate data to the communities

We will develop and deploy a collaborative and federated network of SKA Regional Centres, globally distributed across SKA partner countries, to host the SKA Science Archive. The SRC Network will make data storage, processing and collaboration spaces available, while supporting and training the community, ***to maximise the scientific productivity and impact of the SKA.***



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SRC Network global capabilities

Collectively meet the needs of the global community of SKA users

Anticipate heterogeneous SRCs, with different strengths

SRC Network is critical to SKA Science

Science Analysis Platform

Creation of Project-Level and Advanced Data Products

Public Science Archive

Execute pipelines/workflows on the SRC Network

Access to SKAO data for project users

Single Sign-on and Secure, Federated AAI

Monitoring of performance against pledges

Monitor SRC availability

User support and community training

Replica management

Receive data from SKAO

SRCNet Timeline

- SRCNet timeline as mapped to the construction roadmap.
  - Increased capabilities; then scale out

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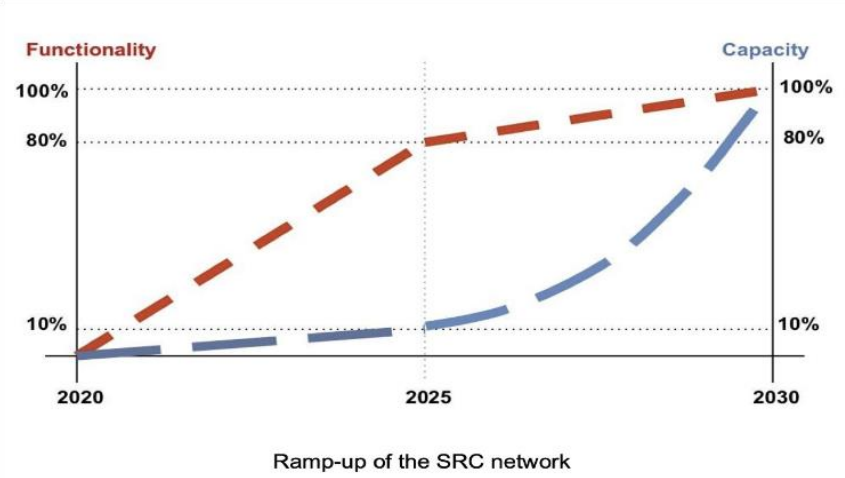
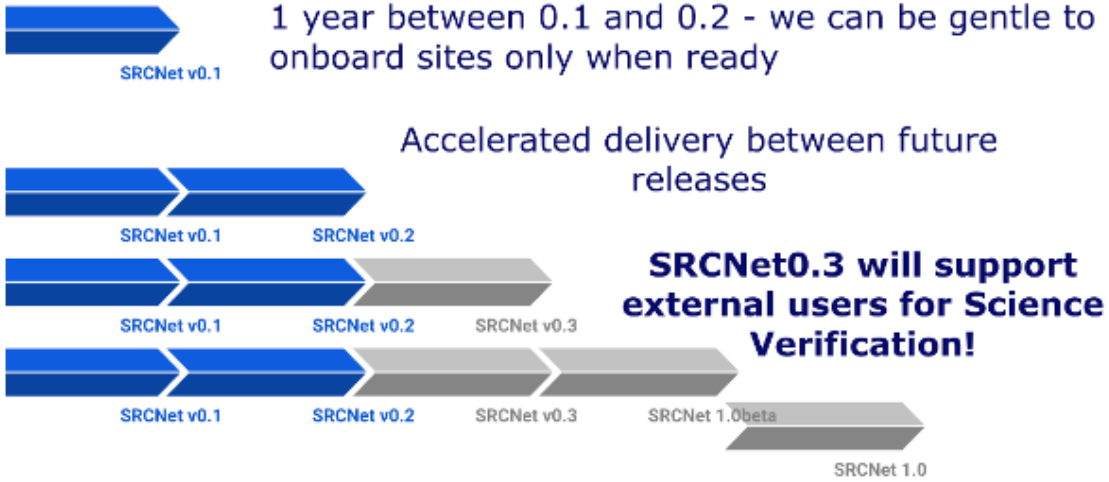


Ramp-up of the SRC network



1 year between 0.1 and 0.2 - we can be gentle to onboard sites only when ready

Accelerated delivery between future releases

SRCNet0.3 will support external users for Science Verification!

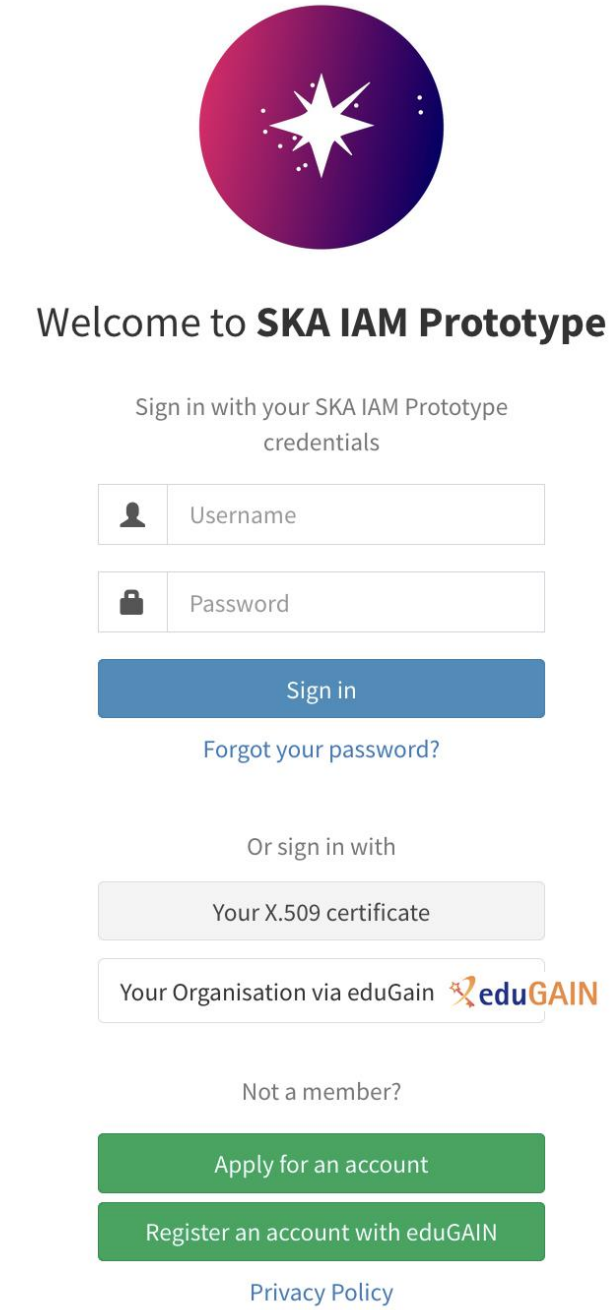
3-6 months between 1.0beta and 1.0 - user support restricted in beta

AAI Design - Prototyping

The AAI design for SRCNet is being led by Tom Dack, Ian Collier, and Jens Jensen, in collaboration with SRCNet Architecture & international SRCNet partners

AAI Prototyping

- Exploiting prior experience and established infrastructure, the UK has been running a dedicated SRCNet instance of INDIGO IAM.
  - This has facilitated early adoption of token workflows into service & infrastructure prototyping
  - Also assisted in understanding use cases and needs for the different regional centres
  - SKA-IAM has been assessed to meet the AAI needs of SRCNet-0.1



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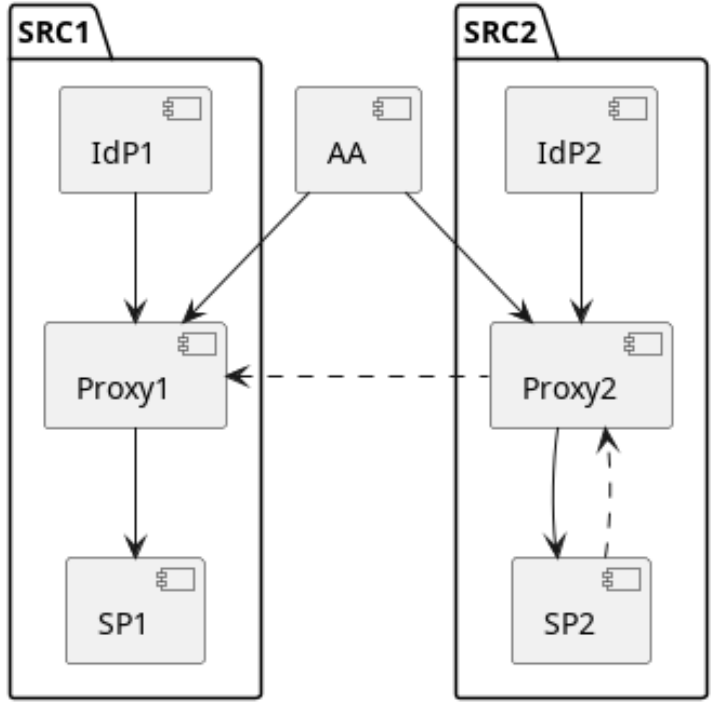
AAI Design – Infrastructure Design

Proposed Design:

Inter-federation of SRCs, which are in turn federations

- Network of (appropriately highly available) IdP/SP (Identity Provider/Service Provider) proxies, (more or less) one per SRC
- The premise relies upon SRCNet having a single Attribute Authority for Group Management and Identities.
- This information is then cached at the SRC level within Community AAIs – maintaining connection to the single SKAO identity
- Proxies equipped to trust one another's tokens
  - Off line verification with trust anchors installed for all the proxies they trust (eg the proxies from all the other SRCs – to support "exchange" of work)
  - Proxy token introspection (calling out to issuer) as fallback
- The SPs only need to know about their "local" proxy and follow their standard OIDC flows
  - SP2 can validate tokens issued by Proxy 1, following the dashed arrows



AAI Design – Next Steps

- Initial discussions to understand hosting and technologies are underway, both with
  - SKAO central IT
  - INFN CNAF (to understand current capabilities of IAM)
- Further socialisation of the AAI Design Principles within SRCNet, in order to communicate requirements and identify user stories
- Group Schemas for SRCNet are under discussion
  - Groups will need to be communicated from AA to Community AAIs
  - Differing group requirements across SRCs

- SRCNet 0.1 will take place using SKA-IAM, but future SRCNet releases should investigate a prototype deployment.

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Questions?

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Toward a UK National AAAI Infrastructure

Toward a UK National AAAI Infrastructure

Vision Statement -
That any eligible and authorised researcher in the UK can:

access any research data, computational or experimental system or other resource, whether in the UK or elsewhere …

in a **straightforward**, controlled and consistent way that enables access …

whether she or he works in **industry, in academe, in the public or the third sector**, or is acting as a private individual; and that this …

provides the **assurance and security** legitimately required by the owners and providers of those resources, in fulfilment of their missions, and in compliance with their legal, contractual and regulatory obligations.

- New opportunity in UK
- Part of UK Research and Innovation's developing idea/ambition for a coherent UK Digital Research Infrastructure

- White paper published in 2019 setting out then state of the art, requirements and benefits

- Tom and Ian "invited" to create a proposal to pick this up ☺
  - Landscape has changed
    - Many services around the world to learn from
      - We will be speaking to you
    - UK user community has changed

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Thank you

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