

Online Townhall: Developing the UK SKA Regional Centre (UKSRC)



A warm welcome to today's meeting.

Agenda

- Introduction
- SKA landscape and ongoing activities
- The UK Square Kilometre Array Regional Centre open call
- UKSRC Community Engagement & Proposal Development
- Q&A session

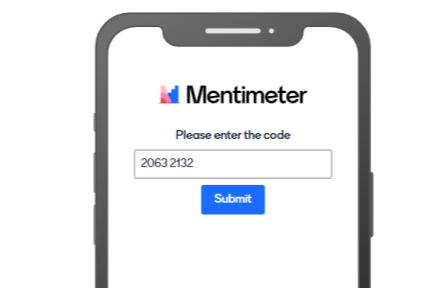
Preliminaries

- This will be recorded, if you do not want to feature please keep your video off
- Please mute your microphones
- Please submit questions through Zoom Q&A function

Preliminaries

- Please observe the SKAO Code of Conduct for meetings,
<https://www.skatelescope.org/ska-organisation/ska-organisation-code-of-conduct-for-meetings/>
- We will be using mentimeter later on:

Go to
www.menti.com



Enter the code
2063 2132



Or use QR code

An important moment

The UK SKA science community is very strong and active - excellent engagement in **pathfinder science** and **SKA science working groups**.

Great opportunities for **science leadership**.

To get the most out of SKAO, scientists will need **support**, regarding compute power, data, and technical training.

An important moment

The current call is a key step for the development of **UK SKA Regional Centre**, providing digital research infrastructure for the science community.

This is going to be **crucial to your SKA-related science effort** for the next decade and beyond.

The aim is to **build capacity within UK** for undertaking and leading a wide range of research using SKA data – via computing resources, data products and archives, software, and skills training.

Interaction with the community is central

So please do **engage** with the call (through discussion, workshops, and proposal development).

The UKSRC seeks to support the **whole science community**.

Please provide your views (now and iteratively) about how the UKSRC can **enable world leading science** using SKA data.

Science questions will **help to define** design and deployment of software and hardware.

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Science and
Technology
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UK SKA Regional Centre - Open Call

UK SRC Town Hall – 4th May 2022

George Madden (Head of SKA Project)



REGIONAL
CENTRE
NETWORK



The Square Kilometre Array

- The SKA Observatory entered into force as an Intergovernmental Organisation on the 15th January 2021
- The SKAO Council approved the start of construction in June 21, including:
 - The Observatory Establishment and Delivery Plan
 - The Construction Proposal
 - The Construction and Operations Funding Schedule
- UK contributing 15% of the total cost (€2bn) of Construction and initial Operations from 2021 to 2030
- Today: over 35 construction contracts worth over €130m awarded
- The aim: An observatory that delivers the science objectives
 - To maximise the impact of the SKA programme
 - To enhance the UK as a destination of choice for Astronomy
 - To enable the greatest possible return to the UK from its investment in the SKA

UK SKA Regional Centre Strategy

- To provide the direction of UK involvement in the SKA Regional Centres
- UKSRC Forum developed the UKSRC Strategy
 - Approved by Programme Board 3rd March
- Centres around three pillars:
 - SRC Network
 - UK SKA Regional Centre
 - UK Science Community
- Proposals must detail how they will deliver each strategic objective

UK SRC Open Call

- STFC invites Proposals to deliver the objectives of the UKSRC Strategy
 - Open: 21st April 2022
 - Close: 28th July 2022
- Aim: to identify a single Consortium to undertake the work
- Proposals will request support for an initial three-year period
 - Start between October 2022 and April 2023
- Funding envelope of £2.3M p.a. (80% FEC) for resource costs
- Funding envelope of £100k p.a. (100% FEC) for capital costs
- Computing hardware provision through STFC IRIS
 - Coordination with STFC IRIS must be demonstrated

Submissions

- All proposals should be submitted online using the Je-S login screen
- A lead institute must be identified, each institute will submit a Je-S form (excluding STFC Labs)
- The following options should be selected in the system when putting the Proposal together:

Council:	STFC
Doc Type:	Standard Proposal
Scheme:	Standard (FEC)
Call:	SKA Regional Centre 2022
Peer Review Preference:	Other

- The following documents must be uploaded and classified correctly as attachments to the Je-S proposal
 - Case for Support
 - Finance Tables (to be included as an annexe to the case for support)
 - Data Management Plan
- Further information can be found on the UKRI website

Case for Support

- No more than 50 pages, excluding annexes
- Should be clear and concise, and cover the full request for support, including an explicit analysis of costs, risks and benefits.
- The Case for Support could include the following sections:
 - Aims and Objectives
 - Project Description
 - Strategic Fit and Relevance
 - Awareness and Context
 - Track Record
 - Project Management
 - Finance
 - Demonstrator Cases
 - Impact

Review of Proposals

- A Review Panel will be convened to review proposals
- Membership likely to include:
 - Programme Board
 - Oversight Committee
 - Science Committee
 - PPRP
 - Experts from the Community
 - SKAO (observer)
- Review Panel to meet at the end of August
 - Presentations received from Consortia
 - Additional meetings will be arranged if required
 - Outcome by mid-September
- Review Panel asked to comment on the following areas
 - Strategic value within the STFC Programme
 - Alignment to UKSRC Strategy
 - Planning and Project Management
 - Social and Economic Impact



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Thank you

Enquiries can be directed to the following:

- George Madden (Head of SKA Project): george.madden@stfc.ukri.org
- Kim Burchell (Head of Astronomy Awards): kim.burchell@stfc.ukri.org
- Simon Haynes (SKA Assistant Programme Manager): simon.Haynes@stfc.ukri.org
- Enquiries: JeSHelp@je-s.ukri.org



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UK SKA Regional Centre

SKA Context

Rev Dr Jeremy Yates – j.a.yates@ucl.ac.uk

Chair, UKSRC Forum
Chair of SRC Network Working Group 5
(Compute and Storage)

UK Representative: SRC Steering
Committee





Overview: UK SKA Regional Centre

This is an engineering development and deployment project to create a facility to help the Community with Precursor data and eventually SKAO data

Please put comments and questions on the Q&A

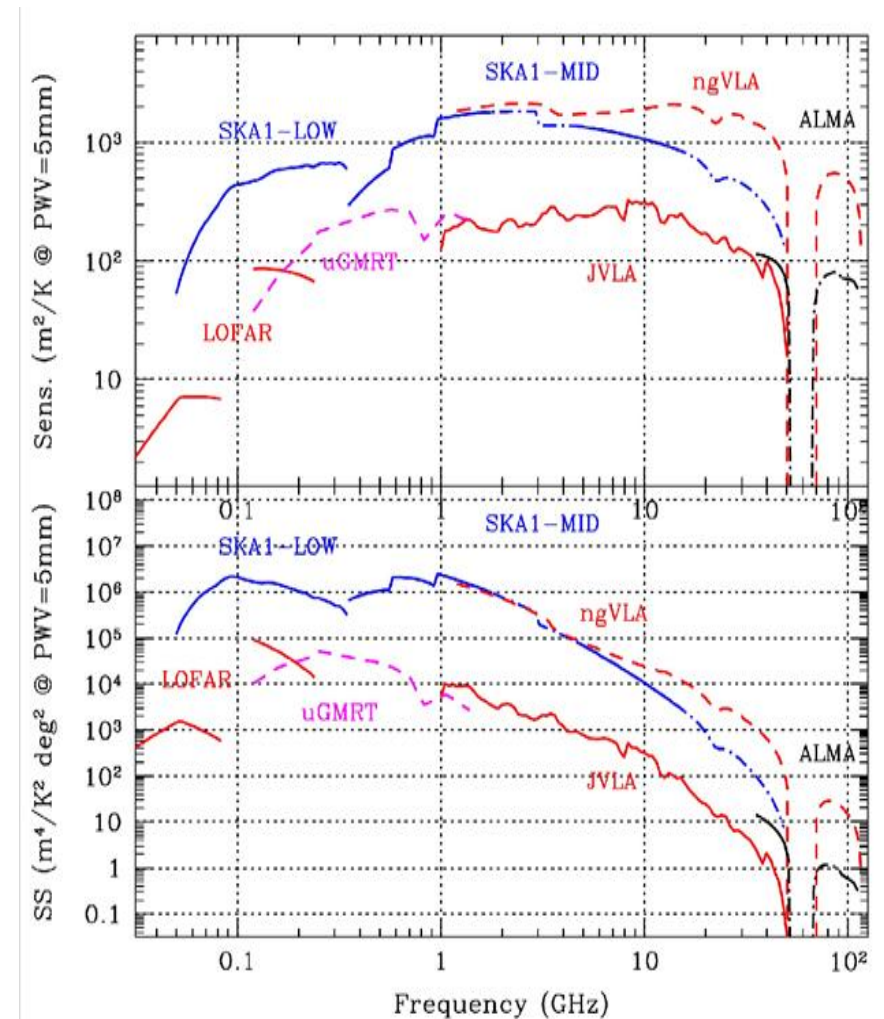
1. The SKA landscape and timeline
2. What is the SKA Regional Centre (SRC) Network
3. What is the UK SKA Regional Centre (UKSRC) Forum
4. What are the objectives of an UKSRC?
5. SRC technical working groups & UKSRC Forum Participation
6. The SRC Prototype Programme
7. SKA precursor facilities and data: Your role in SRCNet and UKSRC development and deployment

The SKA Landscape and Timeline

- The SKA will be the world's largest, most sensitive radio telescope, allowing astronomers to perform transformational science and advancing our understanding of the Universe.
- By 2028, the two instruments of the SKA will see 197 mid-frequency dishes (including the 64 dishes of the MeerKAT telescope) in South Africa and 131,072 low-frequency antennas in Australia
- The operation of the SKA Observatory (SKAO) assumes the existence of a network of SRCs (SRCNet).
- The SRCNet is required to provide the portal for scientists to access the SKA including provision of computing resources and support to enable the user community to analyse SKA data products
- By 2028, the two telescopes will be moving 2PB per day to the SRCNet with a further estimated 4-6PB of Advanced Data products being produced by users.
- It is this huge data movement, processing and curation requirement that requires the SRCNet to be a distributed compute and data facility connected by high-speed networks (100Gbps) and operated by cloud technologies.
- The status of the telescopes, construction and deployment sets the SRCNet timeline.
- The SRCNet has begun a three-year programme of prototyping, implementation, and early commissioning to deliver an operating SRCNet by 2025.
- By 2025, the SRCNet aims to achieve 10% capacity and 80% functionality of what is needed for full operations.

The SKA Landscape and Timeline: Construction Timeline and Sensitivity

Activity	SKA-LOW		SKA-MID	
	Date	Number of stations	Date	Number of dishes
Start of Construction	Jul 2021		Jul 2021	
Start of major contracts	Aug 2021		Aug 2021	
Finish of Array Assembly 0.5 (AA0.5)	Feb 2024	6	Mar 2024	4
Finish of AA1	Feb 2025	18	Feb 2025	8
Finish of AA2	Feb 2026	64	Dec 2025	64
Finish of AA*	Feb 2027	307	Jun 2026	144
Finish of AA4	Nov 2027	512	Jun 2027	197



What is the SKA Regional Centre Network



- The SRCNet will be made up of SRCs (nodes) distributed around the world in SKA Member countries.
- Each SRC will be required to conform to agreed standards in protocols, data architecture and information management policies to ensure that they appear as a single federated entity to SKA users. The SKAO will formally accredit each SRC.
- Together, the SRCNet nodes will provide a collection of services and infrastructure that will comprise a global capability to distribute, process and curate the data from the SKA telescopes.
- The SRCNet will provide the basic governance and operational model and structures, and the baseline functionality of the SRCNet.
- Seven international Working Groups have been formed to deliver the design and implementation plan for the SRCNet
- **This is a Global Facility**
- The National Stakeholder for the UK is the UKRI-STFC funded UK Square Kilometre Array Regional Centre (UKSRC) Forum.
 - The Chair and co-Chairs are Rev Dr Jeremy Yates (UCL) Dr Robert Beswick (Manchester) and Dr Jeremy Coles (Cambridge) respectively.
 - UKSRC Forum members have been participating fully in the SRCNet Work Package activities as well as constructing the UK's Strategic Case.

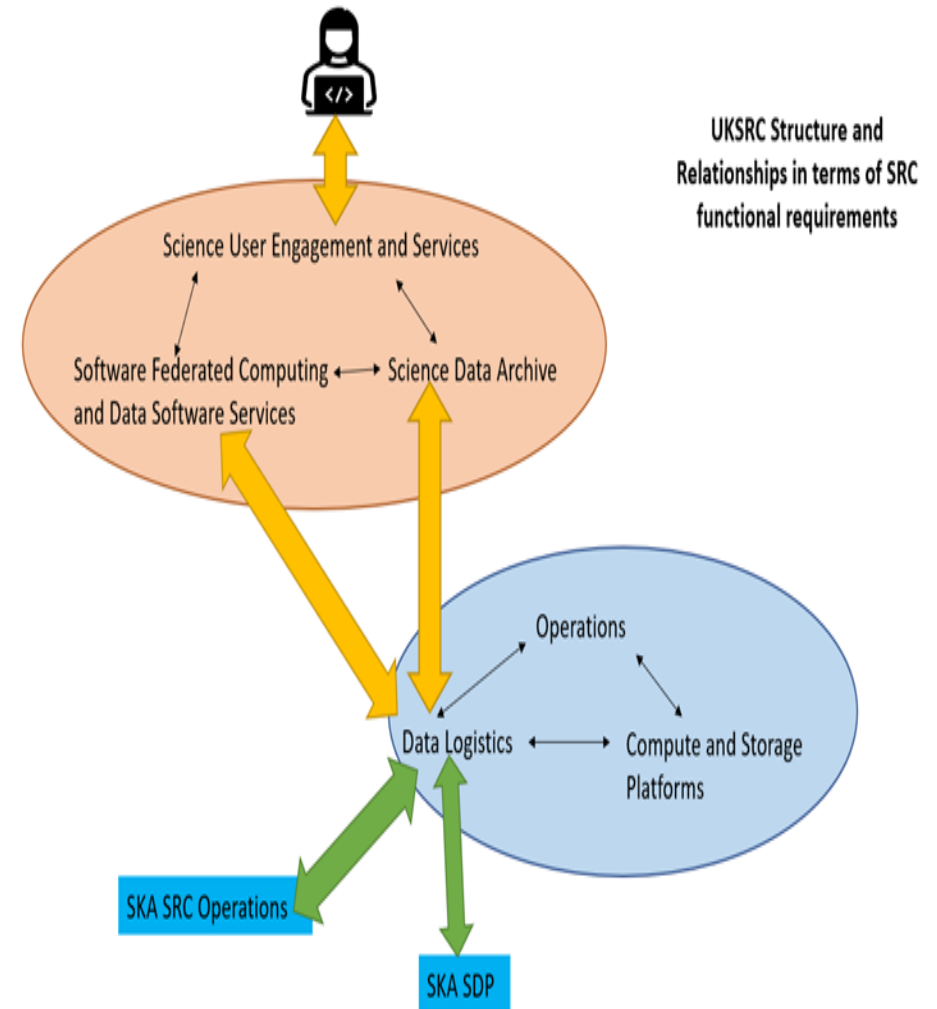
What is the UKSRC Forum?

- The UKSRC Forum, through STFC, has undertaken work in 2020-2022 to shape and take forward the UK's SRC interests.
- A list of Members will be published on our new website soon.
- The UKSRC Forum has:
 - Provided leadership for the technical development of the UK contribution to the international network of SRCs.
 - Contributed to the SRCNet requirements gathering activities.
 - Defined the SRCNet Prototype Programme with our SRCNet Partners
 - All UKSRC Forum members are part of SRCNet Prototype Delivery Teams
 - Worked with STFC IRIS to ensure capital and system resources for UKSRC.
 - This helped de-risk planning in this area to ensure that future UK investment in SRC work is timely and appropriate.
 - An IRIS funded UKSRC-eMERLIN-ALMA IRIS Project now exists and should be ready by early 2023.
 - Began funded digital asset work in the areas of user engagement, repositories and data networking and ingestion in order to prepare for the SRCNet Prototyping Phase.
 - Developed the Outline Strategic Case into a Full Strategic Case, providing direction for the establishment of a UKSRC.
 - The Full Strategic Case has shaped the STFC Open Call to develop a UKSRC.
- To enable our current level of participation a bridging award has been made of 7-8 FTE for the period Apr 2022 to Sep 2022,

What are the Objectives of an UK SRC?



- To design, deliver and support a UKSRC that will be compliant with the global SRC architecture and standards, whilst providing local operational infrastructure commensurate with the scientific needs and priorities of the UK Science Community.
- To establish a UKSRC Facility Project Office, led by a Director, to enable the UK to develop and create its own SRC and to contribute to the development of the SRCNet.
- To collaborate with SKAO and Members to ensure components of the SRCNet provide a collection of services and infrastructure that will comprise a global capability to distribute, process and curate the data from the SKA telescopes.
- To engage, utilise and build on the UK expertise and leadership that exists across SKA pathfinders and related data intensive supercomputing, big data and associated areas.



The SRCNet Working Groups and UKSRC participation

SRC Working Group	Responsibility	UKSRC Participants
WG0: The Architecture of the SRCNet	Delivering the SRCNet Design and Implementation Plan	Jeremy Yates (UCL) Robert Beswick (Manc)
WG1: Data Logistics	Deliver data from the Observatory to SRCs	Keith Grainge (Manc) Richard Hughes-Jones (GEANT/Manc)
WG2: Operations	Enabling efficient and collaborative use of the SRCNet computing, storage and communication resources	Ian Collier (RAL) Jeremy Coles (Camb)
WG3: Software Federated Computing and Data Software Services	Programming and federated execution environments, to interact with and analyse the delivered data. This includes data logistics and access across and within the SRCNet nodes	Martin Hardcastle (Herts) Anna Scaife (Manc) Robert Beswick (Manc)
WG4: Science Data Archive	Provide a functional and persistent SKA Science Archive incorporating FAIR and VO services	Paul Harrison (Manc) Rachael Ainsworth (Manc)
WG5: Compute and Storage Platforms	Provide the computational and storage resources and services	Jeremy Yates (UCL)
WG6: Science User Engagement	Engage the Science Community in tuning the requirements for the SRCNet in order to maximize the science return. Guide the scientific community at large towards the new end-to-end procedures that the SKA era will require for performing a scientific program.	Robert Beswick (Manc) Leah Morabito (Durham)

The Prototyping Programme

April 2022 to March 2023

Prototype Activity

Prototype 1a and 1b: Data products replication, distribution, and synchronization across multiple locations (Rucio (1a) and CADC (1b) approaches)

This would include moving data from SDP to the SRCNet and between SRCs. This is the higher priority prototype (to be converted to operational). That could include different aspects like Direct copy and third-party copies (between two SRCs but initiated by a third one) or Advanced data products replication. For these prototypes there is a need of roadmap synchronisation with the SDP roadmap

Prototype 2: Federated Authentication and Authorization API

Definition and adoption of a federated Authentication framework and Authorization API (needed for a secure data access)

Prototype 3: Data Processing Notebooks

Jupyter Notebook (or equivalent) integration for multi-user access, flexible processing and use of computing resources (including GPUs), data access and A&A federated systems.

Prototype 4: Visualization of SKA data with high volume of users and high amount of data

Instantiation and deployment of visualisation services such as CARTA or other visualisers for a high user demand and data volume environment, using flexible local computational resources. This includes storage sharing, data access, federated authentication, and integration with workload manager.

Prototype 5: Distribution of software, tools and services

Provide an infrastructure that allows to centralise (or to distribute) a common base software stack which contains all software, tools, services and documentation, with version control, needed for all SRCNet activities. This scenario provides a marketplace (catalogue), including software (tools, etc.), containers (and their definitions), packages, documentation, etc. for both the SRCNet system (certified/validated) and individual users, for all components of the system. It will be used to deploy services, perform data processing, feed workflows-pipelines, instantiate functions as services on notebooks, etc. at each network site while maintaining provenance information related to software.

SKA precursor facilities and data: Your role in SRCNet and UKSRC development

- It is strategically important that the UK's activities are coordinated and aligned with SKA pathfinder facilities, as well as other multi-wavelength and multi-messenger facilities.
- Connections established between pathfinders and user groups such as e-MERLIN/VLBI, LOFAR, Meerkat and MWA
 - Maintain a close collaborative alliance and coordinate activities with SKA pathfinder and precursor facilities, as well as other multi-wavelength and multi-messenger facilities.
 - need regular dialogue with key multi-wavelength facilities such as LSST/Rubin
 - Use lessons learnt and real data to develop the UKSRC.
- Access to SKA pathfinder data streams will provide the real-world data required to test and develop SRC capabilities.
 - **The SRC is looking to enable users to run workflows directly and we need to find ways to distill the core/common use-cases/steps**
- This will allow early community adoption of SRC services, as well as help to test and develop applications that are used by the community.
- This will expand and prepare the UK Science Community ahead of operations
- Need expertise in areas such as ML/AI, Big Data curation, Hybrid Cloud, Systems, Data Movement, Authentication and Authorisation, Software and workflow (pipeline) development and testing, using remote resources
- **This is an engineering project that needs science demonstrators to support, define and test the engineering components, activities and services**

UKSRC Community Engagement & Proposal Development

Dr Louise Chisholm

UKSRC Project Scientist
UCL eResearch Domain Strategic Coordinator

UCL Centre for Advanced Research Computing
BEAMS Research Coordination Office
UCL Research, Innovation & Global Engagement

l.chisholm@ucl.ac.uk

@Lou_Chisholm



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Overview

1. Why do we need community engagement?
2. What are we aiming for?
3. Engagement Plan
4. Next steps

Why do we need community engagement?

1. To understand what flavour of SRC the UK needs to enable the highest return from the UK investment in the SKA project
2. Required for the funding call STFC UK Square Kilometre Array (SKA) Regional Centre: 2022
3. Develop content for the proposal




How does this fit with ongoing work?

Global SRCNet



- SKA Science working groups
- WG6: Science User Engagement

UKSRC node

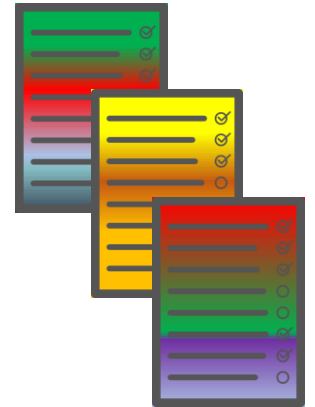


- UK radio astronomy research priorities
- Technical and data science innovation priorities
- Leverage existing digital research infrastructure

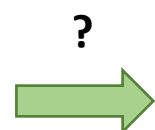
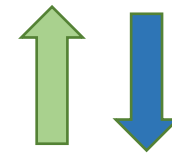


Global requirements

- Compute and Data Infrastructure
- Data products and archives
- Software, workflows and visualisation
- Training and user support

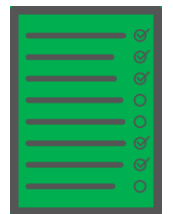


How does the UKSRC want to contribute?



UK node requirements

- Compute and Data Infrastructure
- Data products and archives
- Software, workflows and visualisation
- Training and user support



?

Digital Research Infrastructure

- Digital research infrastructure underpins the research and innovation ecosystem and is a critical system for researchers, policymakers and innovators.
- It enables researchers, policy makers and innovators to solve problems, and to analyse and understand complex topics on any subject.
- This is possible because digital research infrastructure allows us to work with data and computation efficiently and securely, at scale.
- The ecosystem includes: computers, data, software, tools, techniques, and skills

It is **not** for a specific/single research project or programme.

Examples of digital research infrastructure:

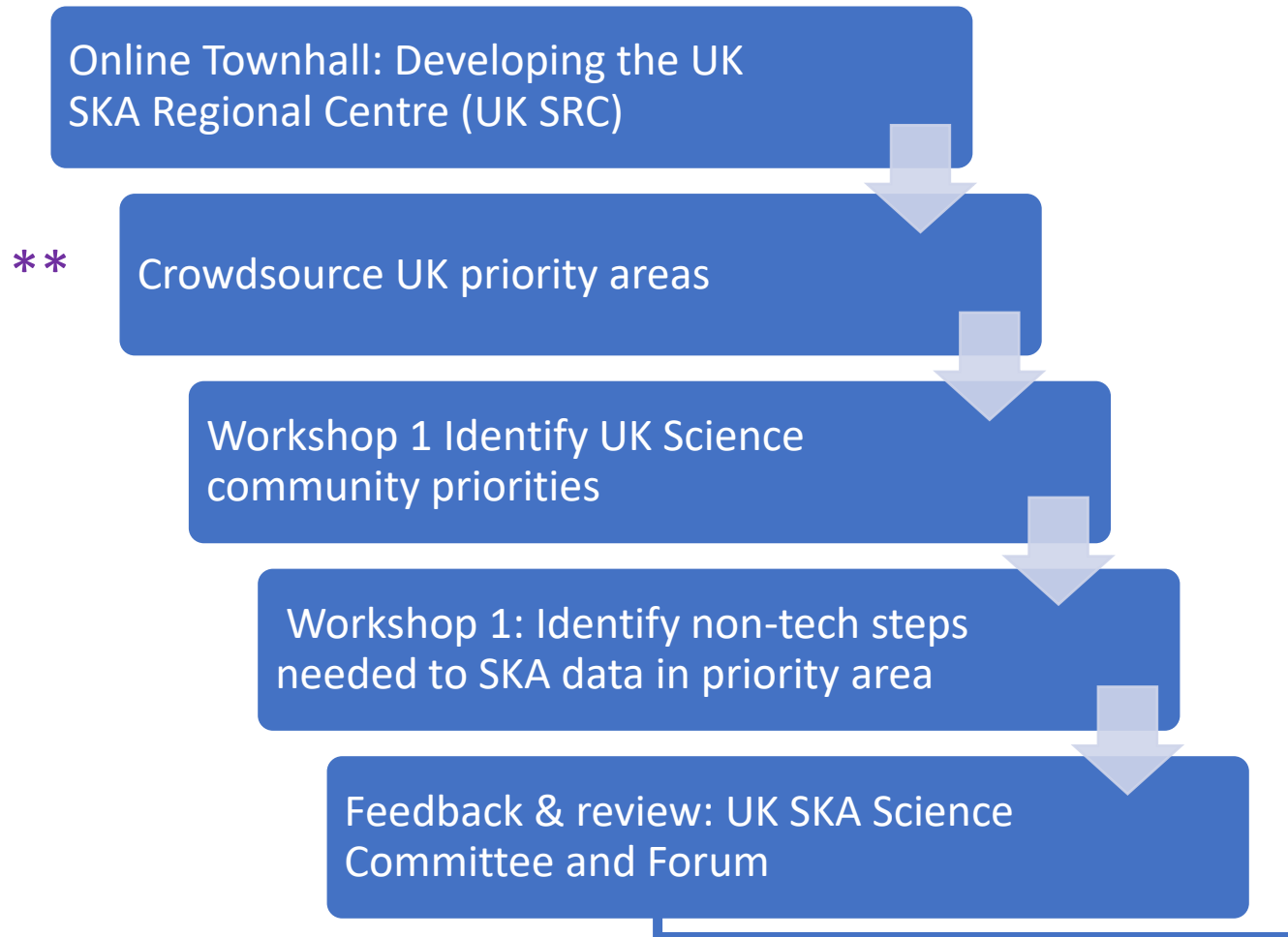
- [DiRAC](#), [GridPP](#), [IRIS](#), [JISC](#),



Engagement plan



UK Science community priorities, demonstrators and engagement



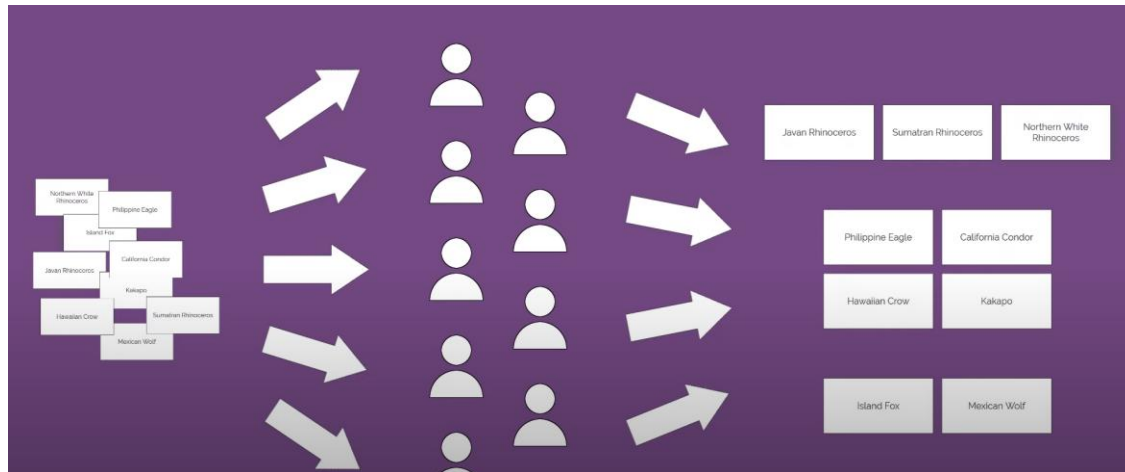
Outputs:

- Aims & Objectives
- Science Summary
- 6-8 demonstrator science-user cases

- It will inform
 - Workshop 2 technical discussions
 - Workshop 3 Impact
 - Workshop 4 Project management

Crowdsourcing the UK's priorities

Community submits their ideas



Well Sorted is an online tool designed to help you organise a set of ideas into small number of thematically similar groups in a democratic and open way. It does this by utilising the power of the crowd,

UK Astro priorities for SKA-MID

'What are your top 2 scientific priorities/interests for using data from the SKA and pathfinder facilities using MID frequencies?'

The UK SKA Regional Centre (UKSRC) will enable scientists access SKA data products and to use them to make discoveries. This includes providing tools, computational infrastructure and user support to enable UK researchers to analyse SKA data products. The UK SRC's activities need to be guided by the scientific interests of the UK Astronomy community.

To help us understand the pathfinder facilities in the UKSRC capabilities a

At a later date you will be the UK Science community details about community

We encourage all membe

Please note: Well Sorted

UK Astro priorities for SKA-LOW

'What are your top 2 scientific priorities/interests for using data from the SKA and pathfinder facilities using LOW frequencies?'

The UK SKA Regional Centre (UKSRC) will enable scientists access SKA data products and to use them to make discoveries. This includes providing tools, computational infrastructure and user support to enable UK researchers to analyse SKA data products. The UK SRC's activities need to be guided by the scientific interests of the UK Astronomy community.

To help us understand the requirements for the UKSRC, please share your top two scientific priorities for using data from the SKA pathfinder facilities in the form below. Access to SKA pathfinder data streams will provide the real-world data to test and develop the UKSRC capabilities and applications that are used by the research community.

At a later date you will be asked to sort the submissions into thematically similar groups. This information will be used to develop the UK Science community priorities, demonstrators and engagement activities which will be discussed in workshop 1. [Further details about community engagement activities for the STFC UK Square Kilometre Array \(SKA\) Regional Centre: 2022 call](#)

We encourage all members of the UK Astronomy community to contribute, including early career researchers.

Please note: Well Sorted is not responsible for the content of external websites. Tread with caution!

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First Description:

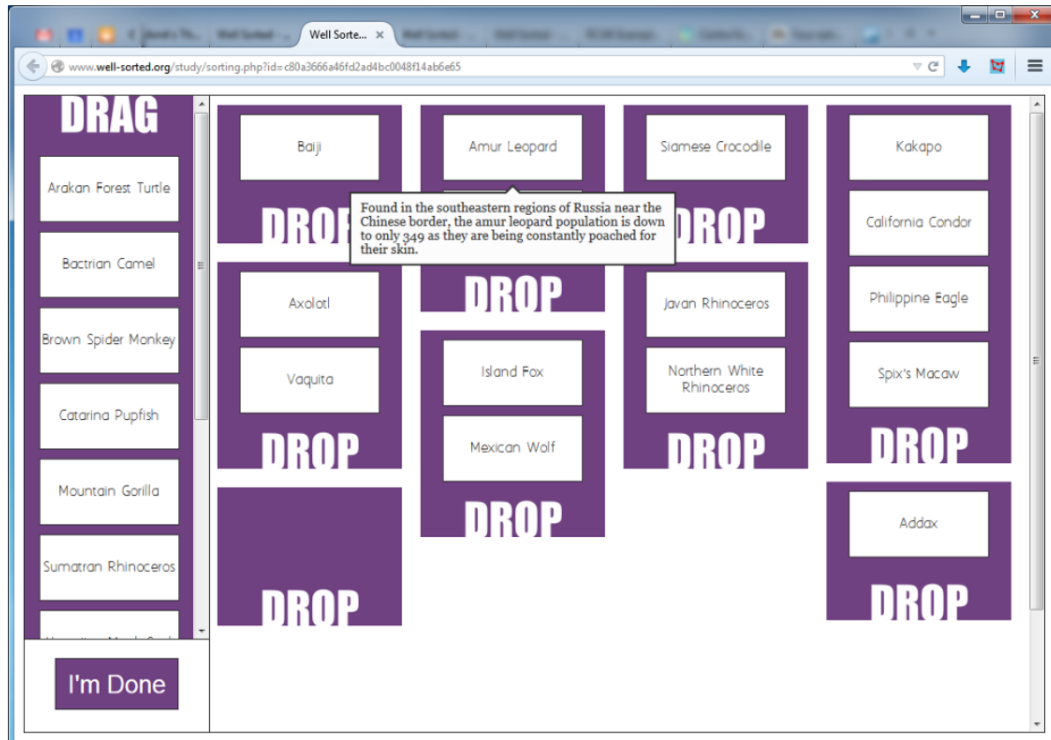
Second Title:

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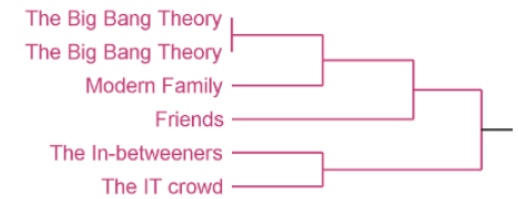
Second Description:

Crowdsourcing the UK's priorities

Community groups similar ideas together



Visualise groups



UK SKA Science Committee & UKSKA Forum

- Sense check results
- Agree breakout groups for workshop 1

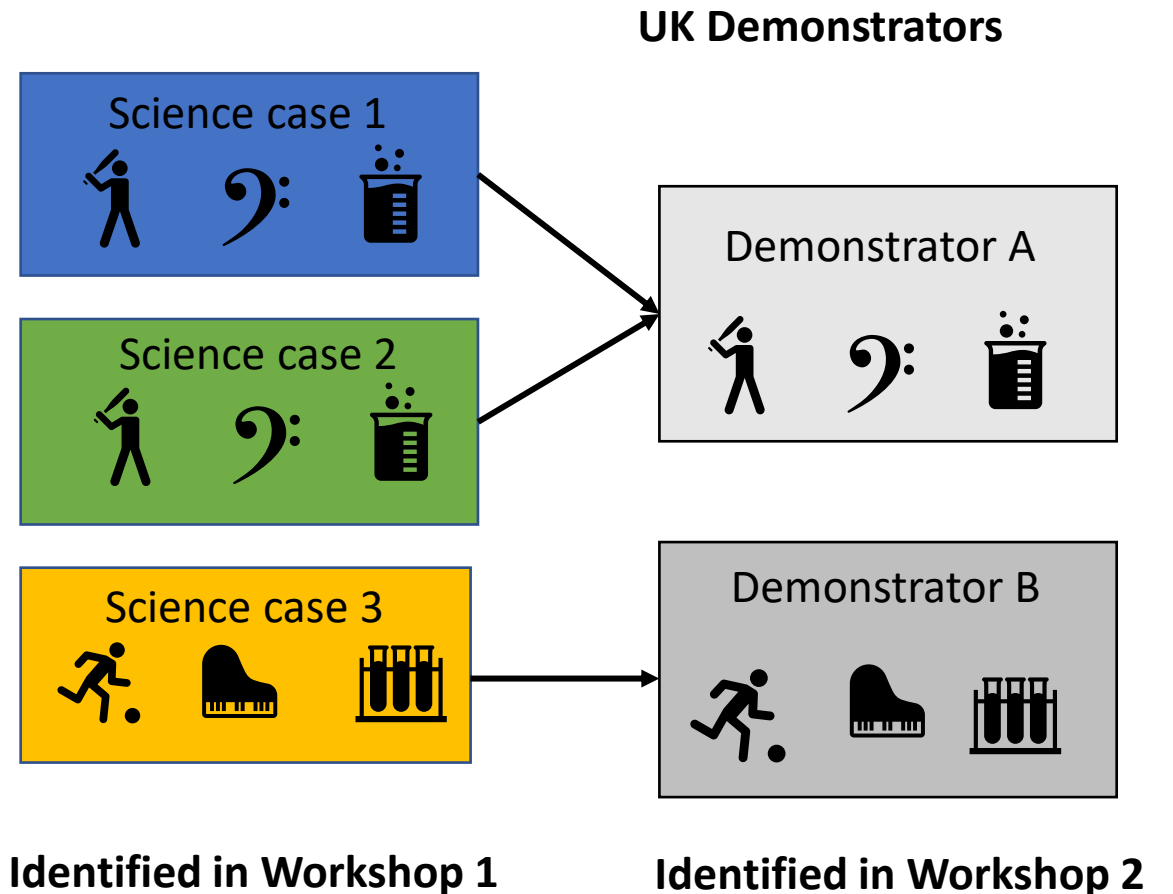
UK priorities will inform development of the demonstrators

SRCNet is required to provide the portal for scientists to access the SKA including provision of computing resources and support to enable the user community to analyse SKA data products.

Priority areas will be used to discuss science cases for the Demonstrators. Which aim to

- To **test** the proto-UKSRCs technical functions, components and efficacy.
- Demonstrate the need of the community and test to proposed solution
- Contribute to the design, delivery, and support of UK resources to exploit SKA data, through hosting a UKSRC
- Engagement and developing skills of the UK scientific community for full exploitation of SKA and precursor data

One demonstrator could meet the needs for multiple science cases if they share similar workflows



Note: They are not defining the final UKSRC services

Resources, tools and training needed exploit SKA data

Inputs:

Workshop1



Workshop 2 : Identify UK work flows, infrastructure, support & training to exploit SKA data



Workshop 2 : Identify technical co-design/innovation priority areas and SRCNet



SRCNet global planning meeting: feedback



Feedback & review: UK SKA Science Committee and Forum

Outputs:

- Project Description
- Strategic fit and relevance
- Awareness and Context

Social and Economic Impact

Inputs:

Workshop 1 & 2



Workshop 3 : Identify Outreach and public engagement activities

Workshop 3: Identify Knowledge exchange – IT Industry & other academic disciplines

Workshop 3: Identify training activities beyond researchers

Feedback & review: UK SKA Science Committee and Forum

Outputs:

- Social and Economic Impact

Project Management, Finance, Governance

Inputs:

Workshop
1, 2, 3



**Workshop 4 : Agree
project management,
reporting governance**



**Workshop 4: finalise
finance**



**Feedback & review: UK
SKA Science Committee
and Forum**

Outputs:

- Project Management
- Finance
- Track Record
- Data Management Plan
- Community Organisation
- Governance Structure
- Organograms



Submit to STFC

Next steps:

- Submit your priorities to well sorted & help sort them when asked
- Register for the online workshop 1

Email Contacts:

robert.beswick@manchester.ac.uk

j.a.yates@ucl.ac.uk

j.coles@mrao.cam.ac.uk

- Website:

<https://www.ucl.ac.uk/advanced-research-computing/community/delivering-uk-ska-regional-centre-strategy>

- Slack: UK SKA Science

- Email astrolists@stfc.ac.uk to sign up to the mailing list for updates

Q&A



Ongoing work, committees and governance

- [UKSRC Bridging Project](#): ongoing participation with SRCNet and facilitate proposal development
- [UKSKA Forum](#) currently the National Stakeholder for the UK in SRCNet. The UKSRC Forum members are participating fully in the SRCNet programme Development Phase tasks.
- [UK SKA Science Committee](#) acts as the conduit between the UK-SKA programme and the UK science community. SKA representative at each of the UK's universities
- [UK SKA Oversight Committee](#) provides independent advice, oversight and review of the SKA project on issues of risk and project cost, schedule and scope over the lifetime of the project.
- [UK SKA Programme Board](#) reviews and advises on matters that affect the UK's presence in the project. Such matters may cover policy and technical decisions within the SKA organisation and the UK's contribution to the project.



Activities to co-create the proposal

Workshop 1 : UK Science community priorities, demonstrators and engagement

- Identify scientific priorities of the UK Community
 - Demonstrators to test the proto-SRCs technical functions and efficacy & identify community need
 - collaboration opportunities with SKA pathfinder and precursor facilities
 - alignment with SRCNode & SRCNet science requirements & opportunities to participate in aligned SRC working/steering groups
- Develop UK science community activities:
 - Access to demonstrators & precursor SKA data
 - Engagement of new communities
 - Training needs and skill development opportunities (e.g. technical skills, entrepreneurship, outreach)

Group discussions to understand Science priorities for using SKA data.

Identify the non-technical researcher user journey required.

Activities to co-create the proposal

Workshop 1 : UK Science community priorities, demonstrators and engagement

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Workshop 2: Resources, tools and training needed exploit SKA data

- Identify UK's work flows, infrastructure, user support and training needs to exploit SKA data informed by workshop 1 outputs.
- Identify technical R&D and co-design priority areas to develop the global network of resources to exploit SKA data
 - Identify collaboration opportunities with other UKRI programmes (e.g. ExCALIBUR, IRIS), SKA pathfinder and precursor facilities
 - Identify opportunities for global leadership, participation in aligned SRC working/steering groups & collaborations through SRCNet
 - Identify alignment with SRCNet and SRCNode technical requirements
 - Approach to adopting common SRC architecture and standards
- Identify IT industry engagement opportunities

Activities to co-create the proposal

Workshop 3 : Social and Economic Impact

- Outreach and public engagement activities (collaborating with the UK SKA Outreach Officer)
 - engaging young people in STEM skills and careers
 - two-way interactions between the research community and society
- Knowledge exchange
 - Other academic disciplines
 - IT industry engagement
 - Commercialisation and translation of data-science technologies
- Training
 - training in computing not only for those scientists looking to exploit the SKA, but for work experience students, student interns, apprentices and early career graduates.

Workshop 4: Project Management and Governance

- Informed from activities developed by workshops 1-3
- Discuss proposed governance structure
- Identify project management needs, structure, monitoring and reporting for the project
- Develop Project Office structure
- Evaluation of project risks
- Justification of working allowance and contingency funds



Workshops

- You must include a set of demonstrator cases with particular relevance to the scientific interests and requirements of the UK community, complete with timelines, that define the user requirements (for example, what the researchers do) for working through these demonstrator cases.
- There should be six to eight of these and each should be no more than one page long. These should encompass the UK Science Communities research interests. They will be used to test the proto-SRCs technical functions and efficacy

Stay up to date