A Framework for SKA Key Science Projects
SKA Organisation
v3: 10th March 2017

Introduction

This paper sets out the views of the SKA Office on how the initial set of Key Science Projects (KSPs) might be implemented. It is not intended for wide release; rather, it is the basis for discussion with the science community. It may be amended at any time to reflect ongoing discussions. This paper will eventually form the basis of a KSP Policy document that will be submitted to the SKA Observatory Council for approval and promulgated to the community.

The primary driver in setting out a KSP framework is to maximise the scientific impact of SKA1. This is a *sine qua non*. However a secondary driver is that this should be achieved as efficiently and effectively as possible.

Key Science Projects

Maximising the scientific impact of SKA1 requires carrying out science projects that require very large amounts of observing time; such projects are called KSPs.

A draft SKA Access Policy has been agreed through the treaty negotiation process. It defines KSPs as follows:

> *"Key Science Projects" (KSPs) are observing projects that require large observing time allocations over a period longer than one Time allocation cycle."*

This is not a sufficient definition, since it will also be possible for some PI projects to be granted long-term status. At some point, the Observatory will revise this definition by specifying an observing time threshold, above which an approved project will be considered a KSP.

The key point is that KSPs will be large: they will consume more observatory resources (observing time, signal processing and data reduction) than PI projects. By virtue of this, they warrant different considerations. In particular, duplication (multiple KSPs addressing the same science goals) should be avoided.

Principles

1. Following from the above considerations, the ideal solution is a set of coordinated, community-wide science projects. By "community-wide" it is meant that KSPs must be in some way open to, and representative of, the entire SKA user community. This has the added advantage of encouraging collaboration among the SKA member countries – although this is a bonus rather than a driver.

   The exact mechanism by which this is to be achieved is not yet determined. The Access Policy imposes a requirement that access for each partner, across the entire science programme (KSPs and PI projects), must be proportional to share in the project; this in turn requires some

form of accounting. It follows that the KSPs cannot be completely open for anyone to join, and that some restrictions on team membership will need to be introduced.

A process for implementing this principle within the constraint of the Access Policy will be developed by the Office in consultation with stakeholders. Issues that will need to be considered include:
- achieving proportional access in both membership numbers and leadership roles;
- monitoring and retaining this balance as the KSPs evolve; and
- ensuring that new generations of researchers are able to join and contribute to KSPs.

2. The KSPs must be science-driven; that is, they must have a clearly-articulated and contained scientific case (i.e. not "cosmology" or "imaging"), and they must justify on scientific grounds the request for observing time and the requested data products.

3. Before issuing a Call for Proposals, the Observatory will conduct a preliminary coordination phase consisting of Letters of Intent and a community workshop. The purpose of the workshop will be to encourage collaboration and reduce (and ideally eliminate) duplication.

4. Following the preliminary coordination phase, and roughly 18 months before the KSP observations are expected to commence, the Observatory will issue a Call for Proposals. The time allocation process will be governed by the SKA Access Policy, augmented as necessary given the large amount of observing time. In brief, all KSP proposals will be reviewed by a set of external, independent referees; a Time Allocation Committee (TAC) will assess all KSP proposals, based in part on the external reviews; and the TAC will make recommendations to the Director-General, who will formally allocate the time.

5. Subject to the constraints on team membership described in principle 1 above, KSP teams will be autonomous. The Call for Proposals will specify a set of basic requirements that each proposal must meet in order to be awarded time; some of these will be (a) consortium management plan, (b) data management and processing plan, (c) data products and analysis algorithms release plan, and (d) regular progress reports. A full list of requirements will be developed by the Office in due course in consultation with stakeholders. Within the constraints of these requirements, each KSP team will be free to self-organise as it sees fit.

6. The Observatory will require, as a condition of approval, that higher-order data products generated by the KSP teams be made generally available. We anticipate that an SKA Science Archive capability will be developed within the SRC network for this purpose.

7. Management of the observing programme will be the responsibility of the Observatory. This will include, *inter alia*:
- issuing the call for Letters of Intent;
- coordinating and assessing the responses;
- organising the community workshop;
- issuing the Call for Proposals;
- coordinating and assessing the proposals;
- supporting the Time Allocation Committee;
- identifying and implementing commensality;
- formulating policies regarding scheduling and execution of the KSPs; and

- monitoring and assessing the progress of each KSP.

The Observatory will report on overall progress to the SKA Observatory Council, which will have the ultimate responsibility for oversight of the SKA science programme.