



## SKA REQUEST FOR PROPOSALS

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**ORGANISATION DETAILS**

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## 1 Scope

With this document the SKA Organisation invites research organisations and industry in the member countries to participate in the design of the SKA telescope.

This document describes the request for proposals (RfP) package for the SKA telescope development at Element level, the expected response by consortia, and the evaluation process. It also provides a broad description of the work flow expected.

In case of conflicts, the statement of work associated with each Element request for proposal supersedes this document.

## 2 Reference Documents

- [1] Schilizzi, R., et al, Project Execution Plan Pre-Construction Phase for the Square Kilometre Array (SKA) MGT-001.005.005-MP-001Rev J

## 3 Introduction

The SKA Organisation is proceeding with the design phase for the SKA telescope described in the Project Execution Plan (PEP) [1]. Two stages are identified in the preconstruction phase: stage 1 is a requirements analysis and preliminary design stage and stage 2 is a detailed design stage. The RfP covers both stages although consortia are free to propose for stage 1 only.

The purpose of the design activities is to prepare the SKA project at element level to proceed with the construction of the first phase of the SKA telescope (SKA1). The design activities undertaken by the consortia shall not restrict future competitive procurement of Elements. The SKA intellectual property policy requires that consortia ensure that the SKA has unrestricted access to any foreground IP generated within the design phase for the purpose of the construction and operation of the SKA telescope.

The value of the design effort in stage 1 and 2 for each element is assigned by the SKA Board. ***All work to respond to this call and to undertake the work is to be funded by the consortia responding to the call. There exists no provision for financial support by the SKA Organisation to the consortia.***

***In establishing the scale of the effort anticipated in the design of each element guidance can be found in the project execution plan. The consortia are free to propose justified modifications.***

Following the earlier work and taking inputs broadly from the community and the precursors and pathfinders, the SKA project office has developed a baseline design for the telescope. This baseline design is considered the starting point for the preliminary design phase. ***The baseline design aims to provide interpretation to the requirements for the SKA telescope as a system and does not imply a decision by the SKA Organisation to proceed with a particular solution or technology.***

The telescope is broken down into Elements that largely follow a traditional radio telescope work breakdown structure and these are described in the documentation associated with this call. These Elements are applicable across the two sites; their scope, where applicable, includes both of the

Elements required at the South Africa Site and the Australia site, incorporating any necessary differences.

Based on past SKA Board decisions certain elements of the baseline design are firmly established. The telescope sites are selected; as are the basic parameters of the telescope configurations in the South Africa and Australian sites.

This document provides details regarding the RfP process, deliverables etc.

## 4 RfP

The design activities as described in the Statement of Work are split into two stages briefly outlined below. Where a consortium proposal is for stage 1 work only, the response needs only address stage 1 activities as described in the statement of work.

### 4.1 The Elements

The Elements of the SKA1 programme as reflected in the SKA work breakdown structure and described in the SKA baseline design are:

- Dish (including phased array feeds)
- Low frequency aperture array
- Telescope manager
- Science data processor
- Central signal processor
- Signal and data transport (including synchronization)
- Assembly Integration Verification
- Infrastructure (including power)

For the Elements, the SKA office is soliciting, from the SKA community, proposals to undertake the following design activities:

- I. derive the functional & performance requirements (stage 1)
- II. elaborate the Element preliminary designs (stage 1)
- III. develop stage 1 designs into the detailed designs and procurement specifications necessary for the construction of the SKA telescope (stage 2)

***For the main elements stage 1 is planned to conclude in mid-2014 with the work of the consortia being consolidated into a revised baseline design; this design will progress to stage 2, a detailed design phase to conclude in mid-2016.***

### 4.2 The Advanced Instrumentation programme

The advanced instrumentation programme in the context of SKA1 contains the following Elements

- Mid-frequency aperture array
- Wide-band single pixel feed

For the advanced instrumentation programme the design activities are:

- I. Perform the necessary Research and Development to bring the Element to the appropriate level of technological readiness. (stage 1)
- II. Derive the functional & performance requirements (stage 2)
- III. Elaborate the Element preliminary designs (stage 2)

For the advanced programme stage 1 is planned to conclude in mid-2015. The stage 2 preliminary design for the advanced programme components will conclude in mid-2016.

## 5 The RfP package

The RfP package contains the following documents.

- SKA Statement of work for stage 1 and stage 2
- SKA Work Breakdown structure at level 4.
- SKA baseline design
- SKA document requirements description
- SKA interface management plan
- SKA change management procedure
- SKA document numbering scheme
- SKA product assurance plan
- SKA consortium agreement draft
- Request for proposals (this document).

Additional information provided for reference purposes includes

- SKA System engineering management plan
- SKA project execution plan.
- SKA IP policy

### 5.1 Scope of the documentation package

The documentation package provides the necessary information for the preparation of the proposals. The statement of work identifies the deliverables and milestones for the design phase and the formal interactions between the consortia and the SKA office. The baseline design is provided in lieu of a detailed system specification, which at element level is an output of stage 1. Similarly the work-breakdown structure provides an outline of the components of the system and establishes the element structure that individual proposals should address.

The draft consortium agreement is provided to support consortia in their formation. The draft consortium agreement can be modified to match national or other constraints that members of consortia operate under and the SKA office shall be available for clarifications and, if necessary, guidance on this matter during the proposal process (see below).

The SKA IP policy is provided in final draft form. The policy document is currently being approved by the SKA board and will be provided to recipients of this call that have advised on intent to respond (see below) when approved.

The document requirements description, interface management plan, change management procedure, numbering scheme and product assurance plan are provided to facilitate the consortia in preparing for their work with the SKA office. Deliverables to the SKA office will need to comply with the documentation standards.

The interfaces between consortia shall be managed according to the interface management plan.

## **6 RfP response from consortia**

Respondents to the request for proposals may address more than one Element but may not merge Elements into a single response. In cases of consortia, there is no restriction in how many consortia a particular institution/organization or industrial/commercial entity may participate in.

The leading institute/organization or industrial/commercial entity in all proposals should be based in a member of the SKA organisation. There are no restrictions placed by this RfP on the other partners of a consortium nor in any of the subcontracting.

The respondents shall address in their proposal all aspects of the statement of work.

In responding to the call for proposals the respondents shall provide the following information.

- In the case of a consortium, a consortium agreement to undertake the work, explicitly nominating a lead organisation and a consortium leader from that organisation who will be the single point of contact from the consortium for clarifications and negotiations.
- In the case of a consortium, a clear undertaking by the underwriting organizations that the resources necessary for the work are committed for the duration of the design study, including if necessary a resource/funding profile for those resources.
- A technical description at conceptual level of the proposal addressing the baseline design requirements.
- A management plan for the execution of the work. As a minimum the distribution of tasks within the consortium, the work packages and estimated manpower and resource allocations for each task shall be presented.
- Curriculum vitae of key personnel. As a minimum the project manager, system engineer, configuration control manager and key subsystem engineers shall be identified. In case of planned recruitments these shall be included in the project schedule.
- Past experience of the respondent/consortium in the field and examples of past work. Where relevant, examples of engineering processes followed in the execution of past projects.
- A system engineering plan for the consortium work, including interface management, requirements management and configuration control as a minimum.
- A product assurance, safety and quality assurance plan. Where relevant, an example of past experience in product assurance, safety and quality assurance activities.
- Proposal for Integrated Logistics management by the consortium.
- A schedule for the design work, with key milestones and tasks as a minimum at one level below the Element. The schedule shall reflect the statement of work in terms of key milestones or provide rationale for variations.

- A prototyping plan if applicable.
- A verification plan.
- A budgetary estimate for the construction and delivery on site of the Element.

## 7 RfP process

The RfP process starts with the release to the community of the RfP package.

### 7.1 Intent to respond

The respondents are asked, but not required, to register their intent to submit a proposal within two weeks of the release of this call by email to [rfp@skatelescope.org](mailto:rfp@skatelescope.org) or letter to the Director General of the SKA organization. This will allow any clarifications or critical updates arising during the proposal period to be communicated to all interested parties and will allow the SKA office to plan for the forthcoming work.

### 7.2 Requests for additional information

Registered respondents may ask for clarifications during the proposal preparation period. In case the SKA project office deems the question and answer to be more broadly applicable then all respondents shall be advised of the question and answer without disclosure of the initiating respondent. Only respondents that have indicated intent will receive such communications.

The clarification process is **not** envisaged to address cost or performance concerns raised by the baseline design. The clarification process aims to address factual errors in the documents or areas where the expected contents of the response are not evident.

### 7.3 Date and place of delivery of the response

The proposals are to be submitted to the SKA Organisation by 17:00 UT on June 10<sup>th</sup> 2013. One electronic copy on portable media (e.g. memory stick or usb disk) and two printed copies of the proposal, provided in a sealed package, shall be delivered to:

SKA Organisation  
Jodrell Bank Observatory  
Lower Withington  
Macclesfield, Cheshire SK11 9DL  
UK

If acknowledgement of receipt is required, the respondent should organize the delivery through a courier service providing such a service.

The responses will not be opened before the 9:00 UT on June 12<sup>th</sup>, 2013. Responses postmarked, or equivalent, by **June 9<sup>h</sup> 2013**, that arrive at the SKA Organisation address before June 17<sup>th</sup> shall be considered valid as long as an electronic copy has been submitted by the 17:00 UT June 10<sup>th</sup> deadline. A suitable electronic system for submission shall be provided to respondents who have expressed intent and who request this facility. The printed copy of the proposal shall form the unique valid response.



Respondents are allowed to replace their previous submissions until the submission deadline condition that only complete submissions shall be accepted as updates.

In the case of consortia, only the lead organisation can update the response.

#### **7.4 Clarifications of offers**

The SKA office may request clarifications from the respondents on particular issues. This clarification period will last for one calendar month following the last day for receipt of responses.

All enquiries regarding the RfP shall be addressed to [rfp@skatelescope.org](mailto:rfp@skatelescope.org)

#### **7.5 Evaluation of the responses**

The response from the suppliers shall be evaluated according to the following criteria.

- Completeness of the response
- Compliance of the response to the technical and managerial requirements
- Past experience of the respondents in relevant work
- **The ability of the consortium to deliver and resource the proposed work**
- The suitability of the proposed technical solution with respect to risk, cost and schedule for both the design and SKA construction phases.

The SKA office shall provide a confidential evaluation report to the evaluation board (see below) within one calendar month of the end of the clarification phase.

A dedicated evaluation board shall be convened to advise the SKA Director General on the outcome of the RfP process. The evaluation board shall be composed of 6 members nominated by the SKA Board ahead of time. It shall be chaired by the SKA Head of Project. The evaluation board will make recommendations to the SKA Director-General in cases of competing proposals and in the case of unacceptable proposals. The options will include re-issuing of the call for proposals for the particular Element.

Under particular circumstances (e.g. sole proposer with an acceptable proposal), the SKA office may request of the SKA Director General, and with the approval of the SKA Board, to shorten the evaluation process and to proceed with negotiations with a consortium.

#### **7.6 Negotiation with selected consortia**

The Board will authorise the SKA office to enter into negotiations with selected respondents in order to fully align plans and deliverables before authorisation to proceed. This negotiation is planned to conclude within 1 calendar month of commencing.

***During the negotiation, the exact milestones and earned value of each deliverable shall be agreed upon between the selected consortia and the SKA office.***

### **8 Detailed information to be included in the responses to the RfP.**

*Within the broad framework defined by the statement of work and the milestones that the project overall has established, the consortia are free to define their development plan and activities.* Significant deviations will need to be resolved during the negotiation phase.

## **8.1 Technical description of the proposal**

The technical proposal for the Element shall provide evidence that the respondent has a full understanding of the scope of work. To this purpose the respondent is requested to provide as a minimum:

- A functional description of the Element
- Key component characteristics
- A performance analysis against the requirements
- Key Element Level requirements

## **8.2 Prototyping plan**

The prototyping plan shall address the reasons for prototyping (e.g. retirement of identifiable risk), the resources and deliverables of the prototypes. If the prototyping ('Verification') programme is ongoing, the key performance requirements being used to drive the design of the prototypes shall be given in the plan.

## **8.3 Verification plan**

The verification plan shall as a minimum address the general philosophy to be followed to demonstrate that the design will (by analysis) or does (by test) meet the requirements. This should provide preliminary information regarding the resources and facilities potentially required by critical steps of verification. These would include, but are not limited to, simulation software, specialised test facilities and the level of integration with the rest of the SKA.

## **8.4 Management plan**

The management plan shall as a minimum address the division of work into work-packages and identify, in case of a consortium, which consortium member will lead each work-package.

For each work-package, the resource allocation shall be shown in units no greater than a man-month.

The respondent will provide evidence of management mechanisms that provide for the tracking and reporting of deliverables (and other forms of earned value) and expended effort.

## **8.5 System engineering plan**

The respondent shall provide a system engineering plan with, as a minimum, proposals for requirements management, interface management, configuration control and performance analysis.

## **8.6 Schedule**

A detailed schedule, at a minimum reflecting the work-breakdown structure, compliant with the overall schedule imposed by the statement of work shall be presented. The schedule, intermediate deliverables and milestones shall be used by the SKA office to monitor progress and to allocate earned value to the respondent.

## **8.7 Budgetary estimate**

A Rough order of magnitude budgetary estimate for the cost of construction/activity for the element, including testing, shipping and assembly, integration and verification at the observing site or equivalent location shall be provided. The budgetary estimate shall include an indication of the main sources of uncertainty and to the extent possible the scale of the uncertainty in the cost.

## **9 Guidance to the respondents regarding the execution of the design work**

The execution of the stage 1 and stage 2 work is not funded by the SKA Organisation. The SKA office will report to the SKA Board on earned value for the work undertaken by the supplier based on the deliverables identified in the statement of work for the design activity.

In case of more than one proposal addressing a single Element the SKA office may choose to follow two or more respondents up to stage 1 or even possibly stage 2.

The SKA office intends to review the output of the requests for proposals and if required update the baseline design based on the input from the respondents. At the end of phase 1, the baseline design will be re-evaluated for stage 2.

Where a consortium response only addresses stage 1, the SKA office may consider opening a new request for proposals or proceeding to the end of stage 1 as per the SOW before requesting new proposals. A response that only addresses stage 1 does not exclude the respondent from submitting a proposal at a new call.