

LOOKING AHEAD

Answers in the stars

The Karoo could house the powerful Square Kilometre Array (SKA) radio telescope if South Africa beats Australia to host the multibillion-rand undertaking. KEVIN JACOBS spoke to JUSTIN JONAS, associate director of the SKA project

Which way does your team think it will go?
Both South Africa and Australia were deemed to have the characteristics necessary to host the SKA. We're confident our proposal to host it is technically sound and competitive.

What elements might give South Africa's bid a crucial edge?

Our core site in the Karoo is remote enough to provide the necessary isolation from sources of radio interference but is not so remote that construction and operation costs are excessive.

The site is well serviced by existing bulk infrastructure, including roads and utility grid power. The geographic location of South Africa relative to Europe, the Americas and Asia also provides logistical and scientific opportunities.

When do you expect to hear the decision?

The technical committees set up to adjudicate the site selection process are currently scrutinising the proposals and the SKA Organisation is due to make an announcement this February.

Who will own the SKA?

The SKA Organisation will be a not-for-profit company with a board of directors. Contributing countries will be represented on the board.

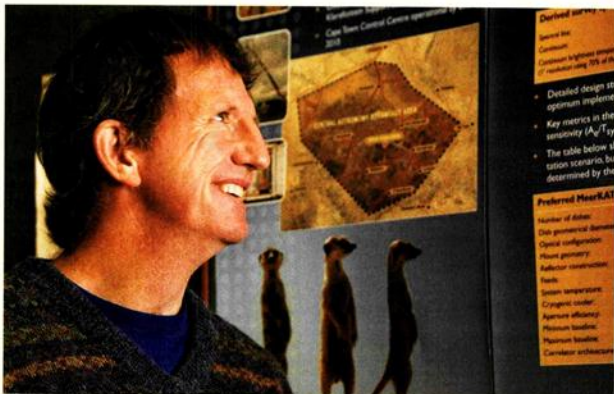
The estimated cost of building the SKA is about R15bn. Who pays?

It will be provided by a consortium of 10 to 20 countries. European countries are expected to contribute substantially to the early phase of the project, with the US joining in the next decade. Contributions will also come from the rest of the world, including Australasia and Africa.

How many antennae will the full array consist of, including those in the eight other African countries likely to co-host them?

The SKA will consist of fully steerable dish antennae that will operate at higher frequencies and static aperture arrays that will cover lower frequencies.

The full SKA will have several thousand dish antennae - the exact number is still being determined (according to cost, available budget and science requirements).



▲ SKA project associate director Justin Jonas thinks SA can host the expensive undertaking.

Broadly, what scientific role will the SKA play?

The SKA has a "science case" with a number of key science objectives that can be achieved only by using a massive radio telescope. They cover outstanding questions in astronomy, cosmology and fundamental physics such as: Was Einstein right about gravity; how were the first stars and galaxies formed and how have they evolved over cosmic timescales; what is the nature of dark matter and dark energy; how did magnetism develop in the universe; and is there evidence for life elsewhere in the galaxy?

Would the SKA and its scientific role have a specified lifespan?

The SKA is envisaged to have a scientific lifetime of more than 40 years. As with most scientific endeavours more questions will arise from the answers provided by the SKA and its useful scientific life may exceed 40 years.

What would be its best possible achievement?

Probably a discovery that was not expected, in other words a serendipitous discovery that is not related to the predefined SKA science case. Many existing radio telescopes have become famous for discoveries that were not part of the science proposal justifying their construction.

The SKA is being designed to maximise the chances of such serendipitous discoveries.

Comparing the cost of the SKA with, say, the FIFA World Cup soccer tournament, which holds greater value for SA's image and future?

These projects are quite different in their scope but both are important to the development of South Africa and the continent. We hope science and technology will develop the same cultural importance and popularity as soccer in Africa.

The SKA will attract outside investment over its projected 40- to 50-year lifetime and the legacy of the SKA will be long-lasting. There's no doubt hosting a major scientific facility will provide an alternative view on Africa and mitigate Afro-pessimism.

So, about those aliens...

There's a good chance the SKA will discover indirect evidence of life elsewhere in the galaxy through the detection of radio emissions from molecules that are the building blocks of life.

The SKA will search for signals that would provide direct evidence of extraterrestrial intelligent life. The chance of a successful detection is very small - but the reward is so high the search must be done. It may also detect evidence of planets that might support life.

Before we go, what's your favourite science-fiction story or alien movie?

It's tough to make a specific choice. But I'd probably have to go with Contact [starring Jodie Foster]. The Star Wars franchise is also a lot of fun.

More about the man behind the SKA

PROFESSOR Justin Jonas emigrated from the UK with his parents when he was seven, attended Muir College in Uitenhage. He started a BSc at Rhodes University in Grahamstown in 1976.

He later worked in their department of physics and electronics, becoming a professor in 2001.

He has been a member of the steering committee for the international SKA project since 2002 and on the executive of the committee since 2008 while maintaining his professorship at Rhodes.