

The Square Kilometre Array: a Global Science Opportunity

For a developing country, prioritising science is very difficult. We want to attract young people into science and engineering. We want to keep the best of them in these subjects and in our countries. This means we have to provide them with exciting and challenging projects. The most exciting science projects of all are generally the very expensive, multi-national science infrastructure projects. It is possible to participate in these projects through broadband connections. But having a project located in your country creates a centre of science and engineering, which stimulates technology in local industry and science and technology in universities. Bringing the most respected and most creative scientists and engineers to the centre creates a stimulating environment for local scientists and students.

But there is an opposing point of view that says developing countries should only do science that is immediately relevant to their socio-economic development. Although there is nothing wrong with focusing on the most appropriate science for local nutrition, health and energy, arguably the most likely citizens to solve these problems are those who have had their minds stretched by being involved at the global cutting edge. If the big projects are located only in the developed countries, the developing countries will never progress in the hard sciences and technology, because the best students and researchers (and engineers) will be attracted elsewhere.

These policy questions underpin South Africa's participation in the Square Kilometre Array (SKA) project, an international effort to build the world's largest radio telescope. The scale of the SKA represents a huge leap forward in both engineering and research & development. As one of the largest scientific endeavours in history, the SKA brings together a wealth of the world's finest scientists, engineers and policy makers. The SKA will use thousands of dish antennas and up to a million dipole antennas that will enable astronomers to monitor the sky in unprecedented detail and survey the entire sky much faster than any system currently in existence. South Africa's Karoo and Western Australia's Murchison Shire were chosen as co-hosting locations for many scientific and technical reasons, from the atmospheric conditions above the desert sites, through to the radio quietness, which comes from being some of the most remote locations on Earth.

Organisations from fourteen countries are members of the SKA Organisation – Australia, Canada, China, France, Germany, India, Italy, New Zealand, Portugal, South Africa, Spain, Sweden, the Netherlands and the United Kingdom. Seven of these countries signed the founding Treaty in Rome in March 2019. The SKA is headquartered at the Jodrell Bank Observatory, near Manchester in the United

Kingdom. Approximately 100 organisations and companies from 20 countries are participating in the design and development. Eight other African countries were part of South Africa's successful hosting bid. Involvement of these countries enables extension of the maximum baseline to about 3000 kilometres. These partner countries are Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia.

The SKA is being built in several phases. South Africa already built the MeerKAT array which was launched in July 2018. Construction of phase 1 of the SKA will begin in 2021 and MeerKAT will be integrated into it after its completion in 2026. Thereafter phase 2 will commence.