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Square Kilometre Array decision bodes well for South Africa

The decision to split the site for the Square Kilometre Array (SKA) radio telescope between South Africa and Australia has been widely welcomed. The world's largest radio telescope, which will use radio waves to study far-distant objects, could investigate how primordial gas formed the first stars and galaxies, how mysterious 'dark energy' has shaped galactic clusters and how earth-like planets form around young stars. Several designs of antennae to receive radio waves of different frequencies are required to build the SKA: the plan is for the steerable high- and mid-frequency dishes to be built in South Africa, while Australia will house the low-frequency antennae, which are stationary and collect signals from the whole sky at once. But over two-thirds of the facility will be on African soil.

South Africa's site, near Carnarvon in the Northern Cape, emerged as the preferred site despite Australia having far more expertise and a longer historical involvement in radio astronomy that dates back to just after the Second World War. South Africa's involvement in radio astronomy began only in the mid-1970s when NASA pulled out of its deep space mission, leaving behind the 26-m dish at Hartebeesthoek which was converted to a radio astronomical observatory under the leadership of George Nicholson. And South Africa won the bid on technical grounds alone, despite Australian Science Minister Chris Evans' proclamations that the site panel was prejudiced in favour of an African bid as a vehicle for development on the continent. After competing so aggressively with each other, it remains to be seen just how well South Africa and Australia will now collaborate.

An awkward but inescapable fact is that there are as yet no indications as to how the SKA will be funded. Getting cash-strapped governments to invest in radio astronomy has so far proved a daunting prospect in the current economic climate. Originally intended as a single facility, the main reason for splitting the site was that, in the absence of funding, it seemed imprudent to ignore the reality that Australia had invested $490 million in its pathfinder facility, ASKAP, at Murchison, north of Perth. The South African project, including its prototype MeerKAT, will cost slightly less at $275 million, but is nonetheless the largest basic science project ever undertaken in this country. These investments aside, only $90 million has been committed from the seven member states: the UK, the Netherlands, Canada, Italy, China, South Africa and Australia.

Up to 20 additional countries are expected to join the initiative within the next year, at which point, as Evans has put it: 'We'll get into the position of having to see the colour of people's money'. The first phase of the project, to be constructed between 2016 and 2020, involves expanding both prototype facilities and only 10% of the original projected cost of $2.1 million. Ironically, the split site is expected to escalate this original cost – by an estimated 10% in Phase 1 and 30% in Phase 2, scheduled to be built between 2020 and 2025.

South Africa's achievement is testimony to the efforts of Bernard Fanaroff, director of the country's SKA bid, who has pursued the project for more than a decade with relentless energy, and has run a tight ship in spending the allocated funds wisely. At the political level, the Minister of Science and Technology, Naledi Pandor, has been a particularly effective ambassador for the project, on account of the personal interest which she has taken in it.

Although 85% of the African facility will be located in the Northern Cape Province of South Africa, the SKA's design involves a spiral layout, with arms of dishes extending up to 5000 km from its centre into Botswana and Mozambique, as well as further afield into Zambia, Kenya, Ghana and the islands of Madagascar and Mauritius. Hosting the SKA will put Africa on the map scientifically as a continent, but more specifically, the project should provide two important sets of benefits. Firstly, it should involve a global influx of investment and expertise, particularly in the field of computing, as the SKA will require thousands of times more processing power than is currently available in the fastest supercomputers. The boundaries of data compression and on-site processing will be pushed to new limits. This likelihood has spurred the interest of companies such as IBM, and will significantly improve South Africa's capability in the field of computing, the benefits of which should trickle-down to other areas of the economy. Secondly, but just as important a boon, could be the project's effects on education. To date, almost 400 students from South Africa and 70 from neighbouring countries have been funded by the SKA project. The trick will be to find a way to ensure that South Africa's ailing education system can benefit from the SKA in a more widespread way.

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