



# A BEACON IN THE BUSH BECOMES AN ASTRONOMY POWERHOUSE

*South Africa's University of the Western Cape has exceeded expectations*

BY LINDA NORDLING

The people behind South Africa's apartheid regime never meant for the University of the Western Cape (UWC) on the outskirts of Cape Town to excel at anything. Created in 1960 as a 'bush college' to provide black South Africans with limited training, it was not expected to compete with the country's well-resourced research universities. UWC's squat buildings were erected far from the city's wealthy shopping malls, leafy parks and pristine beaches.

But UWC is not defined by its past. Since the fall of apartheid in 1994, the university has an impressive record, increasing its articles in the Web of Science from 31 that year to 657 in 2015. In 2014 the university ranked fifth in South Africa for the number of staff with PhDs.

But, it is in physical sciences that the university really holds its own with South Africa's elite

institutions. The university's contribution to physical science research in the Nature Index, measured by weighted fractional count (WFC), more than doubled between 2012 and 2015.

Over the same time, the University of Cape Town, which boasts a century of academic excellence, saw its WFC in physical science fall slightly.

UWC's rise in the index is largely due to publications in astronomy, says Roy Maartens, the head of the physics department's astronomy research group. Maartens returned from the United Kingdom to his native South Africa in 2011 to take up UWC's new chair in radio astronomy.

The position was part of the government's push to boost the country's chances of winning its bid to host the Square Kilometre Array (SKA), a giant radio telescope. South Africa was a joint winner with Australia. The

telescope will comprise thousands of radio antennae spread across a vast area, including countries further north in Africa.

## ASTRONOMICAL AMBITIONS

Investments in the SKA have helped expand UWC's astronomy group to six staff, 15 post-doctoral researchers and 13 postgraduate students. The group is leading efforts to turn the SKA into a state-of-the-art cosmology experiment, probing the structure of dark energy and testing Einstein's general theory of relativity.

The achievements of the university's faculty offer great personal satisfaction to staff such as materials science professor Reggie Madjoe, who could only study at UWC. "I have to pinch myself," he says. UWC's students are still mostly non-white, but this makes its academic successes all the more vital for the future of

An impression of the MeerKAT radio telescope which comes online this year. It will be the world's most powerful and a boon for UWC astronomers.



South Africa, Madjoe says. “We are shaking off the shackles of history,” he says. “This is a place for everybody, a place for quality, a place to grow.”

Maarten believes this is just the beginning for UWC and its astronomy group. When a precursor of the SKA, MeerKAT, comes online this year it will be the world's most powerful radio telescope until the SKA is built, says Maartens.

UWC researchers will use MeerKAT to study how galaxies evolve. “It presents a fantastic opportunity,” he says.

Both Maarten and Madjoe acknowledge the university may face tough times. Violent protests suspended classes at campuses all over the country in 2015 and 2016, with protestors demanding an end to tuition fees, which universities have been increasing to offset increasing costs.

There are widespread concerns that extended unrest will threaten research at the country's universities. Projects such as the SKA, which are high national priority, are giving UWC astronomy a buffer for now, says Maartens. “But there's a concern about the future.” ■

## COMMENT

## RESEARCH NEEDS MORE COMPETENCE, LESS ‘EXCELLENCE’

*There is much talk about the need for excellence, but is it really what science needs, asks Adrian Barnett*

It is almost impossible to work in research without hearing the word excellence. Universities use it in their mission statements and funding agencies name programmes after it. The word has of course made its way into a numbing array of institution titles, such as Germany's Clusters of Excellence and the Australian Research Council (ARC) Centres of Excellence.

A recent paper by a group of open access researchers and advocates has taken a sharp look at the science world's pervasive use of the word. They go so far as to call it a fetish and conclude that it's having negative consequences for research. “Excellence is not excellent, it is a pernicious and dangerous rhetoric that undermines the very foundations of good research and scholarship,” write Samuel Moore, Cameron Neylon, Martin Paul Eve, Daniel O'Donnell and Damian Pattinson.

How can a positive term be considered so damaging? For one thing, the term is not well-defined. Excellence could mean working with great teams, achieving the highest standards or producing research that has an immediate real-world impact, such as saving lives.

Even national agencies struggle to define the word. The ARC runs the Excellence in Research Australia (ERA) exercise to benchmark the country's universities. Research quality is rated on a 1-to-5 scale from “well below world standard” to “well above world standard”. Excellence is thus defined in terms of what others are doing.

If excellence in research exists, it should be possible to see it in data. For example, the highest ranked grant applications in either the US National Institutes of Health (NIH) or ARC should yield the most productive projects. But, when researchers examined grants funded by the NIH they found only a weak association between how expert reviewers

ranked the grant and the eventual outcome of the research. The imprecise definition of excellence has diminished its utility. For instance, although negative and positive trials are equally valuable to science, a positive trial is more valuable to a researcher's career as it will be easier to publish in a top journal — a frequently used metric of excellence. When we reward excellence based on journal impact, we are somewhat rewarding luck.

The authors of the excellence paper suggest it would be better to focus on good research practice. For instance, a project would be judged by whether the researchers sought

to answer a worthwhile question, planned and executed the study by defined standards and wrote up the results clearly and honestly. In this kind of system, excellence would be defined chiefly by how results were obtained, rather than by what actually was found.

As more researchers compete for limited

funding some scientists are driven to spin their results to appear more positive. Rewarding research based on competence would take the heat out of a system that is hyper-competitive.

But, celebrating competence over excellence is a hard political sell. Funding agencies and universities want to celebrate ‘excellent’ research that changes lives, and this is welcome. These examples spark the public imagination and provide political capital for science.

Inside the research world, instead of just focusing on positive, if somewhat fortunate, discoveries, we must also recognize that science is a methodical process that sometimes discovers an important failure. ■

**‘SCIENCE IS A METHODOLOGICAL PROCESS THAT SOMETIMES DISCOVERS AN IMPORTANT FAILURE.’**

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