

The SKA is helping to bring Africa into the knowledge economy

Dr Bernie Fanaroff, Project Director of the South African Square Kilometre Array (SKA) Telescope Project, was the speaker at the annual Hendrik van der Bijl Memorial Lecture held at the University of Pretoria on 17 June 2015. This event, presented in collaboration with the South African Academy of Engineering, has been held since 1963 to commemorate the contribution to the industrial and scientific development of South Africa by Hendrik van der Bijl, Chancellor of the University from 1934 to 1948.

Prof Cheryl de la Rey, Vice-Chancellor and Principal of the University of Pretoria, welcomed Dr Fanaroff, and expressed her pleasure at having someone of his calibre address the audience. The University looks forward to increasing its collaboration with the SKA, and is grateful for the many opportunities it presents for leading research initiatives, particularly in the Faculty of Engineering, Built Environment and Information Technology.

The SKA is a global project to build the world's largest radio telescope. It will revolutionise our understanding of the universe. Approximately 100 organisations and companies from 20 countries are participating in the design and development of the first phase of the SKA (SKA1). This includes the construction of two instruments to observe the universe at different radio frequencies. SKA South Africa, together with industry and university partners, is playing a leading role in the design and development of SKA1.

During SKA1, a core array of 199 mid-frequency dish antennae spread over 150 kilometres will be constructed at the Losberg site in the Karoo. This will incorporate the 64-dish MeerKAT radio telescope. The SKA Organisation will also build 125 000 low-frequency antennae in Western Australia.



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The project, which will be in operation for at least 50 years after its construction, will result in transformational science that will see thousands of dish antennae and up to a million dipole antennae being designed and constructed in the second phase of the SKA (SKA2). This will enable astronomers to monitor the sky in unprecedented detail.

The MeerKAT antennae will generate huge data sets that must be processed and matched to data from other telescopes. By developing the skills needed to analyse such large data sets through the SKA, the project is contributing to the development of skills and capacity to address the problem of processing what is known as Big Data. These skills can then be leveraged to develop scientific communities and knowledge that can be applied to wider challenges in the fields of science, technology and engineering. SKA South Africa subsequently developed the Big Data Africa Programme.

The SKA is the source of significant innovation, including the development of the "industrial" techniques that are required to build an industrial-scale telescope. According to Dr Fanaroff, the greatest challenge to the project is radio interference. As a result, all digital electronic devices need to be well



→ Celebrating the 52nd annual Hendrik van der Bijl Memorial Lecture are (from left): Prof Cheryl de la Rey, Vice-Chancellor and Principal, Dr Bernie Fanaroff, Project Director of the SKA, Mr Bob Pullen, Chairperson of the South African Academy of Engineering, and Prof Sunil Maharaj, Dean of the Faculty of Engineering, Built Environment and Information Technology.

sealed, and a project has been launched to provide farming communities in the surrounding rural areas with satellite equipment for their internet and telephony needs to prevent digital signals from interfering with the radio antennae.

Through its very successful human capital project, the SKA is succeeding in building a representative and vibrant astronomy and instrumentation community in South Africa, which is contributing to socio-economic development. It is also changing attitudes towards skills in Africa by raising the profile of science and technology on the continent and developing world-leading capacity in this field.

In preparation for SKA2, skills, regulations and institutional capacity are being developed in partner countries in Africa. A network of very long baseline interferometry (VLBI)-

capable radio telescopes is also being developed on the African continent. The development of the African VLBI Network (AVN) is aimed at transferring the skills and knowledge necessary for the SKA to the countries that are partnering with South Africa (Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia) in order to develop strong radio astronomy communities in those countries.

SKA South Africa has also launched a Young Professionals Programme and a Bursary and Fellowship Programme, which are attracting young people to science and technology, and creating a critical mass of skills. This is not only beneficial to developing the knowledge economy, but also to future infrastructure development in South Africa, as well as across the entire African continent. ➦



→ Members of the South African Academy of Engineering were captivated by Dr Fanaroff's presentation.



→ Dr Fanaroff provides some interesting statistics about the new radio telescope.