

Pocket Guide to South Africa 2016/17
Science and Technology



The Department of Science and Technology (DST) is committed to playing a full role in implementing the National Development Plan (NDP) by focussing on initiatives that will ensure that it makes a profound impact on economic growth and development while assisting in the eradication of poverty, unemployment and inequality.

The DST executes its mandate through the implementation of the 1996 *White Paper on Science and Technology*, the national research and development strategy and the 10-Year Innovation Plan. The plan aims to make science and technology a driving force in enhancing productivity, economic growth and socio-economic development.

To build an economy that grows at a sustainable rate and contributes significantly to socio-economic development, as envisaged in the (NDP), South Africa needs a better skilled and more innovative population.

The DST is pivotal to realising this goal, particularly as it relates to innovation for energy and food security, poverty alleviation and healthcare.

Square Kilometre Array (SKA)

The SKA project is an important endeavour for Africa, with huge potential to contribute to and raise the profile of science, technology and innovation. The SKA Project is an international enterprise to build the largest and most sensitive radio telescope in the world, and will be located in Africa and Australia.

Supported by 10 member countries – Australia, Canada, China, India, Italy, New Zealand, South Africa, Sweden, The Netherlands and the United Kingdom – SKA Organisation has brought together some of the world's finest scientists, engineers and policy makers and more than 100 companies and research institutions across 20 countries in the design and development of the telescope. The MeerKAT, a precursor to the SKA Project, was being constructed near Carnarvon in the Northern Cape. The final MeerKAT will comprise 64 antennas, and will be integrated into the mid-frequency component of the SKA Phase 1.

Until the SKA is completed, the MeerKAT will be the most sensitive radio interferometer in the L-Band in the world. The sensitivity is expected to be more than 300 square metre per Kelvin (m^2/K), well above the 220 m^2/K originally specified.

By mid-2017, a total of 45 antennas and 57 pedestals had been installed as part of Meerkat. About 75% of MeerKAT components have been sourced locally.

Hydrogen Fuel Cell Technology (HFCT)

Local HFCT development holds the promise of boosting manufacturing capacity and competitiveness in South Africa.

This forms part of the technologies identified in government's Nine-Point Plan, which seeks to boost the economy and create much-needed jobs. HFCT has been identified as a clean and reliable alternative energy source to fossil fuels.

Titanium metal powder project

The DST supports the Titanium Metal Powder Project, which has a potentially significant economic impact for South Africa.

Titanium is used in industries such as aerospace, medical applications, transport and chemical processing to create high-performance, lightweight parts.

The titanium powder is also used in 3D printing, which is considered an alternative mode of manufacturing.

National Bio-economy Strategy

The DST's Bio-economy Strategy positions bio-innovation as essential to the achievement of government's industrial and social development goals.

The strategy provides a high-level framework to guide biosciences research and innovation investments, as well as decision-making as South Africa adapts to the realities of global transition to a low-carbon economy.

Through the Bio-economy Strategy, bio-innovation would be used to generate sustainable economic, social and environmental development. The DST was aiming to have biotechnology make up 5% of the country's gross domestic product by 2050.

The strategy focused on three sectors namely agriculture, health and industrial applications and is also closely linked to other policies such as the Industrial Policy Action Plan, the NDP and the New Growth Path.

The department seeks to use bio-innovation to contribute to the achievement of government's industrial, health and social development goals, as well as to the development of indigenous knowledge applications.

Council for Scientific and Industrial Research (CSIR)

The CSIR is a world-class African research and development organisation that undertakes directed, multidisciplinary

research and technological innovation that contributes to the improved quality of life of South Africans.

The organisation plays a key role in supporting government's programmes through directed research that is aligned with the country's priorities, the organisation's mandate and its science, engineering and technology competencies.

South African National Space Agency (SANSA)

SANSA was created to promote the use of space and cooperation in space-related activities while fostering research in space science, advancing scientific engineering through the development of South Africa's human capital and providing support to industrial development in space technologies.

SANSA continues to provide state-of-the-art ground-station services to many globally recognised space missions, such as the National Aeronautics and Space Administration (NASA) and Indian Space Research Organisation Mars missions, and NASA's Orbiting Carbon Observatory-2, which is giving scientists a better idea of how carbon is contributing to climate change, answering important questions about where carbon comes from and where it is stored.

On 24 May 2017, South Africa's first privately owned nanosatellite, nSight1, was successfully sent into orbit from the International Space Station. Weighing just 2,5 kg, nSight1 will orbit Earth and capture images with a remote sensing camera.

South Africa has been involved in space research and technology for 50 years. The first locally designed and manufactured satellite, SUNSAT, was launched in 1999.

nSight1's deployment follows the successful launch of South African satellites since the late nineties, including SUNSAT (1999), SumbandilaSat (2009) and the Cape Peninsula University of Technology's ZACUBE-1 satellite (2013). nSight1 was part of a batch of 28 nanosatellites from 23 different countries, launched on 18 April 2017 from Cape Canaveral in Florida, USA.

Lesedi (meaning light in Sesotho) is the name of South Africa's newest optical satellite. Developed in partnership with a manufacturing and sales facility, APM Telescopes in Rehlingen, Germany, the new telescope is the first South

African optical telescope that will be remotely operated and potentially robotic.

Lesedi will also be a teaching telescope, used mostly by postgraduate astronomy students from South African universities to develop skills in observing, processing images taken using the telescope, where possible writing up results and publishing them in scientific journals, as well as acquiring technical expertise in aspects of operating a telescope.

It will be capable of taking images of areas of the sky 70 times larger than the existing one-metre telescope, and uses the Sutherland High-Speed Optical Camera, which can take 70 images in one second to study rapid changes in stars systems.

Research and science bodies

South African Bureau of Standards (SABS)

The SABS provides standardisation and conformity assessment services to protect the integrity of the South African market, protect consumers, create a competitive advantage for South African industry, and facilitate access by South Africans to local and international markets. The bureau is the sole publisher of South African national standards.

Technology Innovation Agency (TIA)

The TIA was established to promote the development and exploitation of discoveries, inventions, innovations and improvements. The object of the TIA is to support the State in stimulating and intensifying technological innovation in order to improve economic growth and the quality of life of all South Africans by developing and exploiting technological innovations.

National Intellectual Property Management Office (NIPMO)

NIPMO provides support to the offices of technology transfer at publicly funded research institutions, which has led to significantly improved intellectual property management in universities and other research institutions.

Agricultural Research Council (ARC)

The ARC conducts fundamental and applied research with partners to generate knowledge, develop human capital, and foster innovation in agriculture by developing technology and disseminating information.

Mintek

Mintek, South Africa's national mineral research organisation, develops appropriate and innovative technology for transfer to the minerals industry; and provides the industry with test work, consultancy, analytics and mineralogical services.

Council for Geoscience (CGS)

As a scientific research council, the CGS provides for the promotion of research and the extension of knowledge in the field of geoscience as well as the provision of specialised geoscientific services.

Medical Research Council (MRC)

The MRC is an independent statutory body that coordinates health and medical research activities throughout South Africa. The scope of the organisation's research projects includes tuberculosis, HIV and AIDS, cardiovascular and non-communicable diseases, gender and health, and alcohol and other drug abuse.

With a strategic objective to help strengthen the health systems of the country, in line with that of the Department of Health, the MRC constantly identifies the main causes of death in South Africa.

The MRC distinguishes and awards scientific excellence with its annual Scientific Merit Awards Gala Ceremony. These awards acknowledge the contributions of established scientists on the one hand, while recognising fresh scientists with ground-breaking efforts in their individual fields of science, engineering and technology.

National Research Foundation

The NRF provides services to the research community, especially at higher education institutions and science councils, with a view to promote high-level human capital development.

The goal of the NRF is to create innovative funding instruments, advance research career development, increase public science engagement and to establish leading-edge research platforms that will transform the scientific landscape and inspire a representative research community to aspire to global competitiveness.

In the NRF Strategy 2020, the organisation places renewed emphasis on its agency function and its role in influencing and implementing policy within the National System of Innovation.

Human Sciences Research Council (HSRC)

The HSRC conducts large-scale, policy-relevant, social-scientific projects for public-sector users, non-governmental organisations and international development agencies.

National Health Laboratory Service (NHLS)

The NHLS is the largest diagnostic pathology service in South Africa with the responsibility of supporting the national and provincial health departments in the delivery of healthcare.

The NHLS provides laboratory and related public health services to over 80% of the population through a national network of laboratories. Its specialised divisions include the National Institute for Communicable Diseases, National Institute for Occupational Health, National Cancer Registry and Antivenom Unit.

Bureau for Economic Research (BER)

The BER primarily focuses on the South African macro economy and selected economic sectors. It monitors and forecasts macroeconomic economic and sector trends, and identifies and analyses local and international factors that affect South African businesses.

National Institute for Tropical Diseases

The National Institute for Tropical Diseases in Tzaneen, Limpopo, is responsible for the ongoing assessment of malaria-control programmes carried out by various authorities in South Africa. A malaria-reference service is also provided. Malaria tests are carried out by the institute, and statistical analyses of data pertaining to the programme is undertaken.

South Africa's National Energy Development Institute (SANEDI)

The main function of SANEDI is to direct, monitor and conduct applied energy research and development, demonstration and deployment as well to undertake specific measures to promote the uptake of Green Energy and Energy Efficiency in South Africa.

Mine-safety research

The Safety in Mines Research Advisory Committee is a statutory tripartite subcommittee of the Mine Health and Safety Council. It has a permanent research-management office managing the engineering, rock engineering and mine occupational health fields of research.

National Agricultural Research Forum (NARF)

The mission of the NARF is to facilitate consensus and integrate coordination in the fields of research, development, and technology transfer to agriculture in order to enhance national economic growth, social welfare and environmental sustainability.

Water Research Commission (WRC)

The WRC aims to develop and support a water-related knowledge base in South Africa, with all the necessary competencies and capacity vested in the corps of experts and practitioners within academia, science councils, other research organisations and government organisations (central, provincial and local) which serve the water sector.

The WRC provides the country with applied knowledge and water-related innovation, by continuously translating needs into research ideas and, in turn, transferring research results and disseminating knowledge and new technology-based products and processes to end-users.

Institute for Water Research (IWR)

The IWR is a multidisciplinary research department of Rhodes University. The objectives of the IWR are to contribute to the knowledge of and promote the understanding and wise use of natural water resources in southern Africa.

Coastal and marine research

The NRF supports marine and coastal research in partnership with the Department of Environmental Affairs and the South African Network for Coastal and Oceanic Research. Sustainable use and the need to preserve future options in using marine ecosystems and their resources are guiding objectives in the research and advice provided by the chief directorate.

South African Environmental Observation Network (SAEON)

SAEON is a research facility that establishes and maintains nodes (environmental observatories, field stations or sites) linked by an information management network to serve as research and education platforms for long-term studies of ecosystems that will provide for incremental advances in the understanding of ecosystems and the ability to detect, predict and react to environmental change.

Biotechnology

South Africa's research institutions and universities are conducting biotechnology research to understand the nutritional components of food indigenous to South Africa, with the aim of making those with a high nutritional value available and accessible to the majority of people.

Academy of Science of South Africa (ASSAf)

ASSAf is the official national Academy of Science of South Africa and represents the country in the international community of science academies.

Fluorspar industry

South Africa has the world's largest reserves of fluorspar, with estimated reserves of 41 million tons. The country supplies around 10% of the fluoride requirements to the global fluorochemicals industry.

Women in Science Awards (WISA)

The DST hosts the annual WISA during Women's Month in August, to reward excellence among women scientists and researchers.

The theme for the 2017 WISA was 'Women's economic empowerment in the changing world of work', which is the 2017 priority theme for the United Nations Commission on the Status of Women.

The 2017 WISA were held in Sandton, Johannesburg on 13 August 2017.

Winners of the Distinguished Woman Researcher were:

- **Prof Alta Schutte**, North West University – (Natural and Engineering Sciences): She was the first researcher to investigate the correlation between high blood pressure and cardiovascular disease in black African populations. Her work has influenced health policy across the continent. She chairs the South African Research Chairs Initiative (SARChI) Early Detection and Prevention of Cardiovascular Disease programme, funded by the Department of Science and Technology. She is the director of the MRC's Extramural Unit for Hypertension and Cardiovascular Disease and VP of the International Society of Hypertension. Schutte sits on the Expert Advisory Panel of TAG Tobacco, Alcohol and Gambling Advisory, Advocacy and Action Group.
- **Prof Azwihangwisi Mavhandu-Mudzusi**, University of South Africa – (Humanities and Social Sciences): A professor in the Department of Health Studies and a

nurse, Prof Mavhandu-Muduzi's research focuses on new HIV infections and improving the quality of life of HIV-positive students at rural universities. She developed new guidelines for advocacy, care and support for lesbian, gay, bisexual, transgender, intersex and queer students. These new guidelines and the management model she developed have helped to empower HIV-positive women as well as gay and non-gender conforming women in the workplace.

- **Prof Henrietta de Kock**, University of Pretoria – (Research and innovation leading to socio-economic impact): Prof de Kock's research into the sensory properties of food and beverages contributes to the well-being of African consumers. With a growing urban population to feed, her work looks at ways to use Africa's biodiversity to create food that is nutritious and appetising.

Winners of the Distinguished Young Woman Researchers Award were:

- **Dr Philiswa Nomngongo**, University of Johannesburg – (Natural and Engineering Sciences): A lecturer in analytical chemistry, Dr Nomngongo's nanotechnology research focuses on environmental pollution monitoring, desalination and water treatment.
- **Prof Roula Inglesi-Lotz**, University of Pretoria (Humanities and Social Sciences): An associate professor in the Department of Economics, Prof Inglesi-Lotz runs a research methodology course for honours students and has supervised 12 MCom students. She sits on the editorial board of the *Journal of Energy of Southern Africa* and developed the first course on energy and environmental economics at masters level.
- **Dr Tiisetso Lephoto**, University of Witwatersrand (Research and innovation leading to socio-economic impact): In 2016, Dr Lephoto was one of 87 women selected to participate in the TechWomen Emerging Leaders programme. She is also one of the *Mail and Guardian's* 200 Young South Africans to watch. Her research in molecular genetics involves finding insect killing nematodes to naturally control pests in agriculture.