



Science and Technology



The Department of Science and Technology (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.

Research, Development and Innovation

Government has set a target of raising gross expenditure on research and development to 1,5% of gross domestic product by 2019, from the level of 0,75% by end of 2015. The National Development Plan (NDP) recognises the crucial importance of science, technology and innovation in accelerating South Africa's socio-economic development.

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.

The SKA African partner countries include Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia. 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.

At least 75% of the components making up the MeerKAT dish will be manufactured in South Africa.

Hydrogen fuel-cell technology

Local Hydrogen Fuel Cell Technology (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, bioinnovation 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.

Council for Scientific and Industrial Research (CSIR)

The CSIR, one of the leading science and technology research, development and implementation organisations in Africa, celebrated its 70th birthday in 2015. The CSIR's main site is in Pretoria, Gauteng, and it is represented in other provinces of South Africa through regional offices.

The generation and application of knowledge reside at the core of the CSIR. This takes place in domains such as biosciences; the built environment; defence, peace, safety and security; materials science and manufacturing; and natural resources and the environment.

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.

SANSA was expected to launch the first remote-sensing atlas for the country in 2016. The 40-pages atlas covers broad areas such as history of space technology in South Africa, South African satellites, application of satellite images, geology, mining, agriculture, woody-cover mapping, water quality, urban planning, urban development, and post-floods analysis.

Satellite remote sensing imagery has many applications in mapping land-use and cover, agriculture, soils mapping, vegetation, urban planning, and water and disaster management, among other uses.

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, is one of the world's leading technology organisations specialising in mineral processing, extractive metallurgy and related areas.

Council for Geoscience

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. The ASSAf celebrated its 20th year in the service of society in 2015.

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 the Women's Month in August, to reward excellence among women scientists and researchers.

The theme for the 2015 WISA was "Science for a sustainable future", highlighting the contribution made by women researchers towards the achievement of the Millennium Development Goals (MDGs). The year 2015 marked the target date for achieving the MDGs.

The 2015 WISA were held at the Hilton Sandton Hotel in Johannesburg on 13 August 2015.

The top awards went to:

- **Prof Maureen Coetzee** – Distinguished Woman Scientist (Life Sciences): Recognised for her outstanding work in the field of medical entomology. Her research interests include insecticide resistance in the major African malaria

vector mosquitoes, biodiversity within the genus *Anopheles*, novel methods for controlling malaria vectors, and vector-parasite interactions.

- **Prof Marla Trindade** – Distinguished Woman Scientist (Life Sciences): She is the Director of the Institute for Microbial Biotechnology and Metagenomics, an internationally recognised research centre in the Department of Biotechnology at the University of the Western Cape, comprising a team of over 45 researchers and staff, and is leading the country in the area of mining microbial genomes for novel biotechnologically relevant enzymes and products. She is also the Vice President of the South African Society for Microbiology.
- **Prof Lindiwe Zungu** – Distinguished Woman Researcher (Humanities and Sciences): She is a full Professor of Health Studies at the University of South Africa. Her research outputs have contributed to workers' health and safety, for instance, guidelines for the redesign of safety clothing for women in mining. Her guidelines have been accepted as a national standard for the mining sector, and she continues to receive invitations to make presentations on the guidelines to stakeholders such as the Safety in Mines Research Advisory Committee and other key stakeholders like the Chamber of Mines.
- **Dr Gina Ziervogel** – Distinguished Woman Researcher (Humanities and Sciences): Her work has contributed to MDG 7 (ensure environmental sustainability), where she has situated environmental concerns within the broader development paradigm, helping to address MDG 1 (eradicating poverty and hunger) as well. Her work has focused on adaptation to the impacts of climate change, from household level up to village and municipal level. Dr Ziervogel is a senior lecturer in the Department of Environmental and Geographical Science and a research fellow in the African Climate and Development Initiative at the University of Cape Town.

