OFFICIAL GUIDE TO SOUTH AFRICA 2019/20

SCIENCE AND INNOVATION

The Department of Science and Innovation (DSI) derives its mandate from the *1996 White Paper on Science and Technology*, which introduced the concept of the national system of innovation, a set of interacting organisations and policies through which South Africa creates, acquires, diffuses and puts into practice new knowledge to help achieve individual and collective goals.

A coordinated and efficient national system of innovation will help the country achieve its national development priorities by promoting change through innovation, enabling all South Africans to enjoy the economic, socio-political and intellectual benefits of science, technology and innovation.

The National Development Plan identifies science, technology and innovation as primary drivers of economic growth, job creation and socio-economic reform. Central to this identification is the emphasis of the 2019 *White Paper on Science, Technology and Innovation* on the themes of inclusivity, transformation and partnerships.

The White Paper is aimed at improving policy coherence, developing human capabilities, expanding knowledge, improving innovation performance and increasing investment. The work of the DSI is pivotal in realising these goals, particularly the initiatives it champions for innovation in the challenging fields of energy, food security, poverty alleviation and healthcare.

Developing high-end human capital

High-end, innovative human capital are key to the development of a globally competitive, expanded and transformed national system of innovation that is responsive to South Africa's developmental needs, in line with the imperatives articulated in the *2019 White Paper on Science, Technology and Innovation*. To date, the department has established 239 research chairs and 14 centres of excellence.

Generating and exploiting knowledge and innovation

In its efforts to generate and exploit knowledge and innovation that is in line with government's priorities for inclusive economic growth, the department planned to develop industry, particularly in high-potential fields such as aerospace, advanced manufacturing, chemicals, advanced metals, mining and ICT; the creation of instruments to increase the competitiveness of small, medium and micro enterprises (SMMEs), and youth.

The department's research infrastructure roadmap is intended to provide a strategic framework for planning, implementing, monitoring and evaluating the provision of research infrastructure necessary to create and maintain a competitive and sustainable national system of innovation.

A significant portion of investment is earmarked for the ongoing implementation of roadmap projects in the thematic areas of humans and society; health, biological and food security; earth and environment; materials and manufacturing; energy; and physical sciences and engineering.

The national integrated cyberinfrastructure system supports the successful and sustainable implementation of national projects such as the MeerKAT and the Square Kilometre Array, as well as large research infrastructure required for the processing and transmission of large amounts of data dependent on the presence of a robust cyberinfrastructure system.

Technology Stations Programme (TSP)

The TSP continues to be one of the main DSI platforms for providing technological support to firms, especially SMMEs. During the 2019/20 financial year, the 18 technology stations, hosted by 13 universities of technology, provided technological support to 2 162 SMMEs and potential entrepreneurs, of which 1 055 were women-owned.

Square Kilometre Array and Meerkat

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 fastest supercomputers will be needed to process the unprecedented amounts of data that will emanate from the SKA telescope, with some 600 petabytes – the equivalent of over half a million laptops' worth of data – expected to be stored and distributed to the global science community every year.

Given that the SKA will involve hugely data-intensive research, it will provide opportunities to develop significant skills in data processing, storage and applications, which are also critical for South Africa's successful response to the Fourth Industrial Revolution.

The DSI is also collaborating with the Department of Tourism, the Northern Cape Department of Finance, Economic Development and Tourism, and the Kareeberg Municipality to establish the SKA Exploratorium in Carnarvon.

This envisaged R60 million multi-purpose science tourism visitor centre will create jobs and boost tourism in the area, and also serve as an outreach hub. A funding agreement is now being finalised for signature by the relevant parties in order to kick-start the project.

Astronomy in South Africa remains important to its socio-economic landscape. The heritage will further be strengthened through the 64 dish MeerKAT, which has already been able to give us a glimpse into the star-formation history of the universe.

To extend its research area reach, the MeerKAT is to be expanded by 20 dishes at a cost of R800 million.

The expansion will be a partnership between South Africa, Germany and China. The MeerKAT will be further be integrated into SKA Phase 1 (2019-2024) with an additional 133 antennas in the Karoo up to 80 km baseline from the core to make it a 197-dish array mid-frequency telescope. The MeerKAT telescope continues to perform great science and has contributed to several discoveries.

The benefits of hosting these telescopes include a 75% local content component, direct investment of more than R300 million in the Northern Cape SARAO alone, the development of technical skills and big data capabilities, strengthening of university research programmes, opportunities for SMMEs and industry, community upliftment programmes, and investment in the youth.

South Africa also participates in the African Very Long Baseline Interferometry Network project that aims to establish self-sufficient radio telescopes in Africa through the conversion of redundant telecommunications antennae into radio telescopes, "new-build" telescopes or training facilities with training telescopes.

Countries participating in this initiative are Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia.

Titanium metal powder project

Government 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 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.

Entities

Academy of Science of South Africa (ASSAf)

The ASSAf links South Africa with scientific communities at the highest levels in the SADC region, the rest of Africa and internationally; promotes common ground in scientific thinking across all disciplines; encourages and promotes innovative and independent scientific thinking; promotes the development of intellectual capacity in all people; provides effective scientific, evidence-based advice; and facilitates appropriate action in the public interest.

Council for Scientific and Industrial Research (CSIR)

The CSIR fosters industrial and scientific development in the national interest through multidisciplinary research and technological innovation to improve the ability of the state to efficiently deliver basic services, in fields such as health, education, social security, energy and shelter, to all South Africans, and in so doing, reduce inequality.

Over the medium term, the council is expected to focus on conducting high-quality and relevant research, pursuing technological innovation to foster industrial and scientific development, and building on industrial development opportunities in fields such as pharmaceutical innovation and agro-processing.

The CSIR's ability to generate revenue directly relates to its ability to attract and retain the requisite expertise to deliver favourable research outcomes. Competitive remuneration is a vital enabling factor for the retention of critical skills.

Human Sciences Research Council (HSRC)

The HSRC is South Africa's statutory research agency and has grown to become the largest dedicated research institute in the social sciences and humanities on the African continent, doing cutting-edge public research in areas that are crucial to development.

Its mandate is to inform the effective formulation and monitoring of government policy; to evaluate policy implementation; to stimulate public debate through the effective dissemination of research-based data and fact-based research results; to foster research collaboration; and to help build research capacity and infrastructure for the human sciences.

The council conducts large-scale, policy-relevant, social-scientific research for public sector users, non-governmental organisations and international development agencies. Research activities and structures are closely aligned with South Africa's national development priorities.

National Advisory Council on Innovation (NACI)

The NACI is a statutory advisory board that advises on the role and contribution of science, mathematics, innovation and technology in promoting and achieving national objectives.

National Research Foundation (NRF)

The NRF is mandated to support research through funding, the development of human resources, and the provision of research facilities to enable knowledge creation, innovation and development in all fields of science and technology. It is also mandated to promote indigenous knowledge.

Over the medium term, the foundation is expected to focus on the implementation of its 10-year strategy: Vision 2030. This will entail interventions to catalyse transformation in the science and technology system through measures such as creating grant-funding instruments that focus on women and black researchers, and fast-tracking black women doctoral graduates towards obtaining their foundation rating.

South African Council for Natural Scientific Professions (SACNASP)

The SACNASP is the legislated regulatory body for natural science practitioners in South Africa. The natural sciences encompass a wide range of scientific fields covering all of the basic sciences and many of their applied derivatives. Its mission is to establish, direct, sustain and ensure a high level of professionalism and ethical conscience amongst our scientists.

South African National Space Agency (SANSA)

SANSA was created to promote the use of space and strengthen cooperation in space-related activities while fostering research in space science, advancing scientific engineering through developing human capital, and supporting industrial development in space technologies.

The research and work carried out at SANSA focuses on space science, engineering and technology that can promote development, build human capital and provide important national services. Much of this work involves monitoring the Earth and the surrounding environment, and using the collected data to ensure that navigation, communication technology and weather forecasting services function as intended.

Technology Innovation Agency (TIA)

TIA is a national public entity that serves as the key institutional intervention to bridge the innovation chasm between research and development from higher education institutions, science councils, public entities, and private sector, and commercialisation.

Research and science bodies

South African Bureau of Standards (SABS)

The SABS provides the platform for quality services and products which is the key differentiator in an increasingly competitive environment. Its strategic objective contributes to the efficient functioning of the economy by developing standards to advance the socio-economic well-being of South Africa in the global economy; delivering relevant conformity assessment services that facilitate access to markets for South African industry, thereby improving its competitiveness in the global trade environment.

The SABS, with its rich history in standardisation, will continue to play a significant role in ensuring that industry is kept abreast of the pace of the dramatic transition of the world economy through standards development and quality assurance services, thereby providing industry with the quality edge.

The SABS is mandated to develop, promote and maintain South African National Standards; promote quality in connection with commodities, products and services, and render conformity assessment services and assist in matters connected therewith.

National Intellectual Property Management Office (NIPMO)

NIPMO is mandated to ensure that intellectual property from publicly financed research and development is identified, protected, utilised and commercialised for the benefit of the people of South Africa, whether it be for social, economic, military or any other benefit.

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.

South African Medical Research Council

The SAMRC 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 SAMRC constantly identifies the main causes of death in South Africa.

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 car ried 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.

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.

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.

South African Astronomical Observatory (SAAO)

The SAAO, based in Cape Town, will be celebrating its bicentenary in October 2020, coinciding with its official unveiling as a declared national heritage site by the South African Heritage Resources Agency.

Founded in 1820, the SAAO is regarded as the first scientific institute to be established in Africa, and serves as the national centre for optical and infrared astronomy in the country. Among the several telescopes that it hosts in Sutherland in the Northern Cape is the iconic Southern African Large Telescope, the largest single optical telescope in the southern hemisphere and among the largest in the world.