DEPARTMENT OF SCIENCE AND TECHNOLOGY

ANNUAL PERFORMANCE PLAN

2016 - 2017 Fiscal Year

science & technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

CONTENTS

FOREWORD

The National Development Plan (NDP) recognises the crucial importance of science, technology and innovation (STI) in accelerating South Africa's socio-economic development. To make South Africa a more globally competitive economy, both government and industry will need to scale up innovation radically.

The NDP also recognises that advances in technological innovation, the production of new knowledge, the application of knowledge through teaching, and research collaboration are vital for a thriving economy.

It is in this context that the Department undertook its planning for the 2016/17 financial year. The strategic outcome-orientated goals expressed in its 2015-2020 Strategic Plan are aligned to the NDP and government priorities set out in the Medium Term Strategic Framework, the New Growth Path, the Industrial Policy Action Plan and the Nine-Point Plan.

STI, along with water, transport, infrastructure, and information and communication technologies, cut across the Nine-Point Plan. The Department steers the national system of innovation to contribute to specific areas of this plan. Examples are the revitalisation of the agriculture and agroprocessing value chain; increasing the impact of the Industrial Policy Action Plan; the beneficiation of mineral wealth; unlocking the potential of small businesses, cooperatives, and rural and township enterprises; growing the oceans economy through Operation Phakisa; resolving the energy challenge by advancing alternative energy sources, and scaling up private-sector participation in research and development.

The Department's 2015-2020 Strategic Plan highlights several specific strategic interventions that are intended to increase the capacity and contribution of the national system of innovation to South Africa's economic growth.

With the budget for the 2016/17 financial year at R7,4 billion , the Strategic Plan identifies human capital development, knowledge generation, infrastructure, and global and African collaboration as priority focus areas over the Medium Term Expenditure Framework period.

The Department will continue to focus its investments on research and development, promoting innovation, and building the country's knowledge economy to improve productivity, health systems, education and infrastructure. This will include research infrastructure grants to researchers and institutions across the innovation value chain (e.g. for pilot plants, technology demonstrators and specialised facilities); the establishment of new technology service platforms, such as a bioinformatics service platform

to service the life science sector, and agro-innovation hubs to connect researchers and rural communities.

The Department will continue to deploy STI in the fight against poverty, inequality and unemployment. One of its initiatives in this regard is a partnership with the Eastern Cape Department of Education, the Department of Water and Sanitation, and the Bill & Melinda Gates Foundation, to provide innovative and appropriate off-grid sanitation technologies for rural and peri-urban areas.

Sustainable growth in South Africa will require a transformed and fully utilised human capital base. To this end the Department will ensure that at least 80% of postgraduate students receiving support through the National Research Foundation bursary programme are black, 55% are women, and 4% are people with disabilities. Guidelines are in place to achieve this through the bursary and research support programmes, and the efficacy of these guidelines will be monitored and evaluated annually to ensure the realisation of these goals.

Nurturing the human capital pipeline requires that society appreciates the benefits STI can bring, and that learners and students are attracted to pursue careers in related fields. The Department's Science Engagement Framework provides an outline for the alignment of the efforts of all its entities and partners to maximise the impact of efforts to raise awareness. In the period ahead, the Department will be exploring the feasibility of establishing a flagship national institution to support science engagement and promotion.

Achieving these strategic goals in a global scientific environment requires the Department to continue developing and exploiting its diverse and vibrant portfolio of international STI partnerships. The Department will therefore seek to expand this portfolio appropriately, aiming for greater geographic diversity and deeper partnerships, with a greater focus on innovation and market-orientated research. The Department will continue to promote more active participation by historically disadvantaged institutions in its international STI partnership portfolio, for example through Science Forum South Africa.

The Department will continue to prioritise support for the development of STI capacity in Africa and the implementation of the Science, Technology and Innovation Strategy for Africa.

The Department will also carry on working with its entities to implement policies such as the National Research and Development Strategy, the Ten-Year Innovation Plan, and the Bio-economy Strategy, with the aim of taking South Africa further towards becoming a knowledge economy.

Mrs Naledi Pandor, MP
Minister of Science and Technology

KETAPELE

Lenaneohlabollo la Bosetšhaba (NDP) le amogela bohlokwa bja saense, theknolotši le tlhamo ye mpsha go akgofiša tlhabollo ya leago le ekonomi ya Afrika Borwa. Go dira gore Afrika Borwa e be le ekonomi ye e phadišanago maemong a lefase go feta peleng, bobedi mmušo le intasteri di tla swanela ke oketša tlhamo ye mpsha (STI) ka maatla.

Gape NDP e amogela gore dikgatelopele ka tlhamo ye mpsha ya theknolotši, tšweletšo ya tsebo ye mpsha, tirišo ya tsebo ka go ruta, le go šomišana nyakišišong di bohlokwa go ekonomi ye e šomago botse.

Mo maemong a Kgoro e dirile peakanyo ya yona ya ngwaga wa ditšhelete wa 2016/17. Diphegello tše maano a a dikametsego go dipoelo tše di laeditšwego ka Lenanong la yona la Maano a 2015-2020 di sepelelana le NDP le dintlha tše bohlokwa tša mmušo tše di laeditšwego ka gare ga Tlhako ya Maano a Paka ya Magareng, Mokgwa wa Kgolo wo Moswa, Lenaneotiro la Pholisi ya Intasteri le Lenaneo la Dintlha tše Senyane.

Mmušo, intasteri le tlhamo ye mpsha, gotee le meetse, dinamelwa, mananeokgoparara, le ditheknolotši tša kgokagano le tshedimošo, di akaretša Lenaneo la Dintlha tše Senyane. Kgoro e eta pele mokgwa wa bosetšhaba wa tlhamo ye mpsha go ba le seabe ka makaleng a itšeng a lenaneo le. Mehlala ke tsošološo temo le phetošo ya boleng bja ditšweletšwa tša temo; go oketša khuetšo ya Lenaneotiro la Pholisi ya Intasteri; kholo ya lehumo la diminerale; go bulela bokgoni bja dikgwebopotlana, dikgwebo tše nyenyane, dikgwebo tša dinagamagaeng le makheišeneng; go godiša ekonomi ya mawatle ka Operation Phakisa; go rarolla tlhohlo ya enetši ka go kaonafatša methopo ye mengwe ya enetši, le go oketša go kgatha tema ga lekala la praebete ka gare ga dinyakišišo le tlhabollong.

Lenaneo la Maano la Kgoro la 2015-2020 le laetša magato a itšeng a maano a mmalwa ao a ikemišetšago go oketša bokgoni le seabe sa mokgwa wa bosetšhaba wa tlhamo ye mpsha go kgolo ya ekonomi ya Afrika Borwa.

Ka tekanetšo ya R7, 4 bilione mo ngwageng wa ditšhelete wa 2016/17, Lenaneo la Maano le hlaola tlhabollo mekgwa ya batho, tšweletšo ya tsebo, mananeokgoparara, le tšhomišano ya lefase le Afrika bjalo ka makala a bohlokwa a a šeditšwego mo lebakeng la Tlhako ya Ditshenyegalelo tša Paka ya Magareng.

Kgoro e tla tšwela pele go šetša dipeeletšo tša yona go dinyakišišo le tlhabollo, go godiša tlhamo ye mpsha, le go aga ekonomi ya tsebo ya naga go kaonafatša tšweletšo, mekgwa ya maphelo, thuto le mananeokgoparara. Se se tla akaretša dithušo tša mananeokgoparara a dinyakišišo go banyakišiši le diinstitšhušene go akaretša boleng bja phetošo ya tlhamo ye mpsha ka moka (mohlala: ya dimela tša teko, bahlahli ba theknolotši le ditlabela tša go ikgetha); tlhomo ya dipolatefomo tša tirelo ya theknolotši ye mpsha, bjalo ka polatefomo ya tirelo ya lekala la tlhamo ye mpsha le didiriša go šomela lekala la saense ya maphelo, le mafelo a tlhamo ya temo go kgokaganya banyakišiši le dinagamagae.

Kgoro e tla tšwela pele go šomiša saense, theknolotši le tlhamo ye mpsha go lwantšha bohloki, go se lekalekane le tlhokego ya mešomo. Ye nngwe ya diprotšeke tša yona mabapi le se ke tšhomišano le Kgoro ya Kapa Bohlabela ya Thuto, Kgoro ya Meetse le Kelelatšhila, le Setheo sa Bill & Melinda Gates, go abela dinagamagae le seka-motsesetoropo dithekholotši tša kelelatšhila ya ka ntle ga keriti tše e lego tša maleba le tša tlhamo ye mpsha.

Kgolo ya go swarelela ka Afrika Borwa e tla nyaka motheo wa tsebo ya batho ye e šomišwago ka botlalo le ye e fetogilego. Go fihla fa Kgoro e kgonthišiša gore bonnyane 80% ya baithuti ba dialoga ba ba amogelago thekgo ka lenaneo la pasari la Setheo sa Bosetšhaba sa Dinyakišišo ke bathobaso, 55% ke basadi, gomme 4% ke bagolofadi. Dihlahli di lokišitšwe go fihlelela se ka pasari le mananeo a thekgo a dinyakišišo, gomme go šoma botse ga dihlahli tše e tla lekolwa le go sekasekwa ngwaga ka ngwaga go kgonthišiša phethagatšo ya diphegello tše.

Go thekga kgato ya tsebo ya batho go nyaka gore setšhaba se amogele dikholego tše saense, theknolotši le tlhamo ye mpsha di ka di tlišago, le gore barutwana le baithuti ba a goketšwa go tšwela pele ka mešomo ya ka Makaleng a go sepelelana. Tlhako ya Peakanyo ya Saense ya Kgoro e fa lenaneo la maemo a magato a dihlongwa ka moka le bašomišane go oketša gagolo khuetšo ya maiteko a temošo. Mo lebakeng le le tlago, Kgoro e tla šomiša kgonagalo ya go hloma institšhušene ya bosetšhaba ya ketapele go thekga peakanyo le kgodišo ya saense.

Go fihlelela diphegello tše tša leano ka tikologong ya saense ya lefase ka bophara go nyakega gore Kgoro e tšwelepele go hlabolla le go šomiša dikamano tša yona tša boditšhabatšhaba tša saense, theknolotši le tlhamo ye mpsha tša go fapana le potfolio ye e šomago botse. Ka go realo Kgoro e tla nyaka go katološa potfolio ye ka tshwanelo, ka maikemišetšo a go laetša phapano ye kgolo ya lefelo le dikamano tša go tsenelela, ka tšhetšo ye kgolo go dinyakišišo tše di sekametšego go mmaraka le tlhamo ye mpsha. Kgoro re tla tšwela pele go godiša go kgatha tema ka mafolofolo a magolo ka diinstitšhušene tše go ya ka histori di bego di tingwa dibaka ka go potfolio ya yona ya kamano ya botšhabatšhaba ya saense, theknolotši le tlhamo ye mpsha, mohlala ka Foramo ya Saense ya Afrika Borwa. .

Kgoro e tla tšwela pele go fa šedi ye kgolo go thekgo ya tlhabollo ya bokgoni bja saense, theknolotsi le tlhamo ye mpsha ka Afrika le phethagatšo ya Leano la Saense, Theknolotši le Tlhamo ye Mpsha ya Afrika.

Gape Kgoro e tla tšwela pele go šomišana le dihlongwa tša yona go phethagatša dipholisi tše bjalo ka Leano la Bosetšhaba la Dinyakišišo le Tlhabollo, Lenaneo la Tlhamo ye Mpsha la Mengwaga ye Lesome, le Leano la Payo-Ekonomi, ka maikemišetšo a go dira gore Afrika Borwa e be ekonomi ya tsebo.

Mohumagadi Naledi Pandor, Moleloko wa Palamente
Tona ya Saense le Theknolotši

ISINGENISO

UHlelo lweNtuthuko lukaZwelonke (i-NDP) lwazisa ukubaluleka kwesayensi, ezobuchwepheshe kanye nezindlela ezintsha zokwenza izinto (STI) ekuqinisekiseni ukukhula komnotho waseNingizimu Afrika okusheshayo. Ukuze izwekazi laseNingizimu Afrika libe ngeliqophisana namanye amazwe angaphandle kwezomnotho, uhulumeni kanye nezimboni kumele zikhuphule amazinga okwenza izinto ngezindlela ezintsha.

I-NDP yazisa futhi ukuthi inqubekelaphambili kwezobuchwepheshe, ukukhiqizwa kolwazi olusha, ukusetshenziswa kolwazi nokufundisa, kanye nokuhlanganyela ucwaningo kubaluleke kakhulu emnothweni osakhula.

Kukulesi sizinda-ke lapho uMnyango uthathele khona uhlelo lwawo lonyaka wezezimali ka-2016/17. Imigomo egxile emiphumeleni eyaziswa Ohlelweni Lwamasu luka-2015-2020 ilakaniswe ne-*NDP* kanye nemisebenzi kaHulumeni ebhalwe ku-*Medium Term Strategic Framework,* i-*New Growth Path,* i-*Industrial Policy Action Plan* kanye noHlelo lwamaPhuzu ayiSishiyagalolunye.

I-*STI,* amanzi, ezokuthutha, ingqalasizinda kanye nezobuchwepheshe bokuxhumana zesekwe phezu koHlelo lwamaPhuzu ayiSishiyagalolunye. UMnyango uqondisa uhlelo lukazwelonke lokwenza izinto kabusha ukuze lunikele ezindaweni ezithize zalolu hlelo. Izibonelo sibala kuzo ukuvuswa kabusha kwezolimo kanye nokugaywa kwempahla yezolimo; ukukhushulwa kwezinga lokusebenza kwe-*Industrial Policy Action Plan;* ukuhlomuliswa komcebo womhlaba, ukuvuleleka kwamathuba kumabhizinisi amancane, ama-*cooperatives,* kanye namabhizinisi asemaphandleni nawasemalokishini; ukukhuliswa komnotho wasolwandle nge-*Operation Phakisa;* ukuxazululwa kwenkinga yamandla kagesi ngokuthuthukisa eminye imithombo yamandla kagesi, kanye nokukhuphula izinga lokubandakanyeka kwezinkampani zangasese ocwaningweni nasentuthukweni.

Uhlelo lwamasu loMnyango luka-2015-2020 luveza amasu ambalwa okulamula amiselwe ukwengeza amandla kanye nokunikezela kwezindlela ezintsha zokwenza izinto zikazwelonke ezibhekene nokukhula komnotho waseNingizimu Afrika.

Ngesabelomali sika ka R7,4 wamabhiliyoni ngonyaka ka 2016/17, Uhlelo lwamasu lubheke ukuthuthukiswa kwamathuba abantu, ukukhiqizwa kolwazi, ingqalasizinda, kanye nokubambisana kwamazwe kanye ne-Afrika njengezindawo okumele kugxilwe kuzona esikhathini se-*Medium Term Expenditure Framework*.

UMnyango uzoqhubekela phambili ngokutshala imali ocwaningweni nasentuthukweni, ekuxhaseni izindlela ezintsha zokwenza izinto, kanye nokwakha ulwazi lwezomnotho wezwe ukuze kuthuthukiswe ukukhiqiza, izikhungo zezempilo, ezemfundo kanye nengqalasizinda. Lokhu kuzombandakanya izimali zokubonelela ingqalasizinda yocwaningo ezinikezwa labo abenza ucwaningo kanye nezikhungo ezibhekene nokwenziwa kabusha kwezinto (isib. Izikhungo zokucwaninga, abakhangisa ngezobuchwepheshe kanye nezindawo zokusebenzela ezikhethekile); ukusungulwa kwezindawo zokusebenza kwetheknoloji entsha, ezifana ne-*bioinformatics service platform* yona enikezela ngezinsiza embonini yesayensi yezempilo, kanye namahabhu e-agro-innovation ukuxhumanisa abacwaningi kanye nemiphakathi yasemaphandleni.

UMnyango uzoqhekela phambili ngokuphaka ama-STI ukulwisana nobumpofu, ukungalingani kanye nokwentuleka kwemisebenzi. Enye yemizamo esisunguliwe uhlelo lokubambisana noMnyango weZemfundo waseMpumalanga neKapa, uMnynago weZamanzi nokuThuthwa kweNdle, kanye ne-Bill & Melinda Gates Foundation, ukubonelela ngobuchwepheshe obufanele bokuthuthwa kwendle ezindaweni zasemaphandleni nezingaphandle kwamadolobha.

Ukukhula okusimeme lapha eNingizimu Afrika kuzodinga abantu abashintshile futhi amakhono abo asetshenziswa ngokuphelele. Ukwenza lokhu, uMnyango uzoqinisekisa ukuthi okungenani u-80% wabafundi basezikhungweni zemfundo eziphezulu abathola usizo lwezimali kusuka ku-*National Research Foundation* bansundu, u-55% wabo ngabesifazane bese kuthi u-4% wabo kube ngabakhubazekile. Imigomo isibekiwe ukwenza lokhu ngokubonelela ngezimali zokufunda kanye nokunikeza usizo, kanti

ukusebenza kahle kwale migomo nako kuzobhekwa ngeso elibukhali futhi kubuyekezwe unyaka nonyaka ukuqinisekisa ukuthi kufinyelelwa kulokho okuphokophelelwe.

Ukunakekela amandla abantu kudinga ukuba umphakathi wamukele ubuhle obungalethwa ama-STI, nokuthi abafundi nezitshudeni zibe nothando lokufunda kuleyo mikhakha. I-*Science Engagement Framework* yoMnyango inikeza isithombe sokuhlanganisa yonke imizamo yamalunga ukuze kuphakanyiswe amandla emizamo yokuletha ulwazi. Esikhathini esizayo, uMnyango uzobe ubheka isikhungo sikazwelonke esizokweseka ukubandakanyeka kwesayensi.

Ukuze kufinyelelwe kule migomo ezweni lonke kumele uMnyango uqhubeke njalo ngokuthuthusa iphothifoliyo yayo yobudlelwano nama-***STI*** omhlaba. UMnyango-ke uzozama ngazo zonke izindlela ukwengeza iphothifoliyo ngokufanele, ibheke ukwenaba kanye nokubambisana, futhi ibheke nezindlela ezintsha zokwenza izinto kanye nezindlela zokudayisa ezihlolisisiwe. UMnyango uzoqhubeka njalo weseke izikhungo zabantu ababecwasiwe ngokohlanga kuphothifoliyo yayo ye-*STI*, isibonelo nge-*Science Forum South Africa*.

UMnyango uzoqhubeka njalo ngokubeka phambili ukwesekwa kokuthuthukiswa kwamandla okusebenza ama-*STI* e-Afrika kanye nokusungulwa kweSayensi, i*Technology and Innovation Strategy for Africa*.

UMnyango uzophinde uqhubeke njalo ngokusebenza ukwendlala amapholisi afana ne-*National Research and Development Strategy, i-Ten-Year Innovation Plan, kanye ne-Bio-economy Strategy,* ngenhloso yokumukisa iNingizimu Afrika phambili ibe wumnotho wolwazi.

Unkosikazi Naledi Pandor, MP
UNgqongqoshe weSayensi neTheknoloji

OFFICIAL SIGN OFF

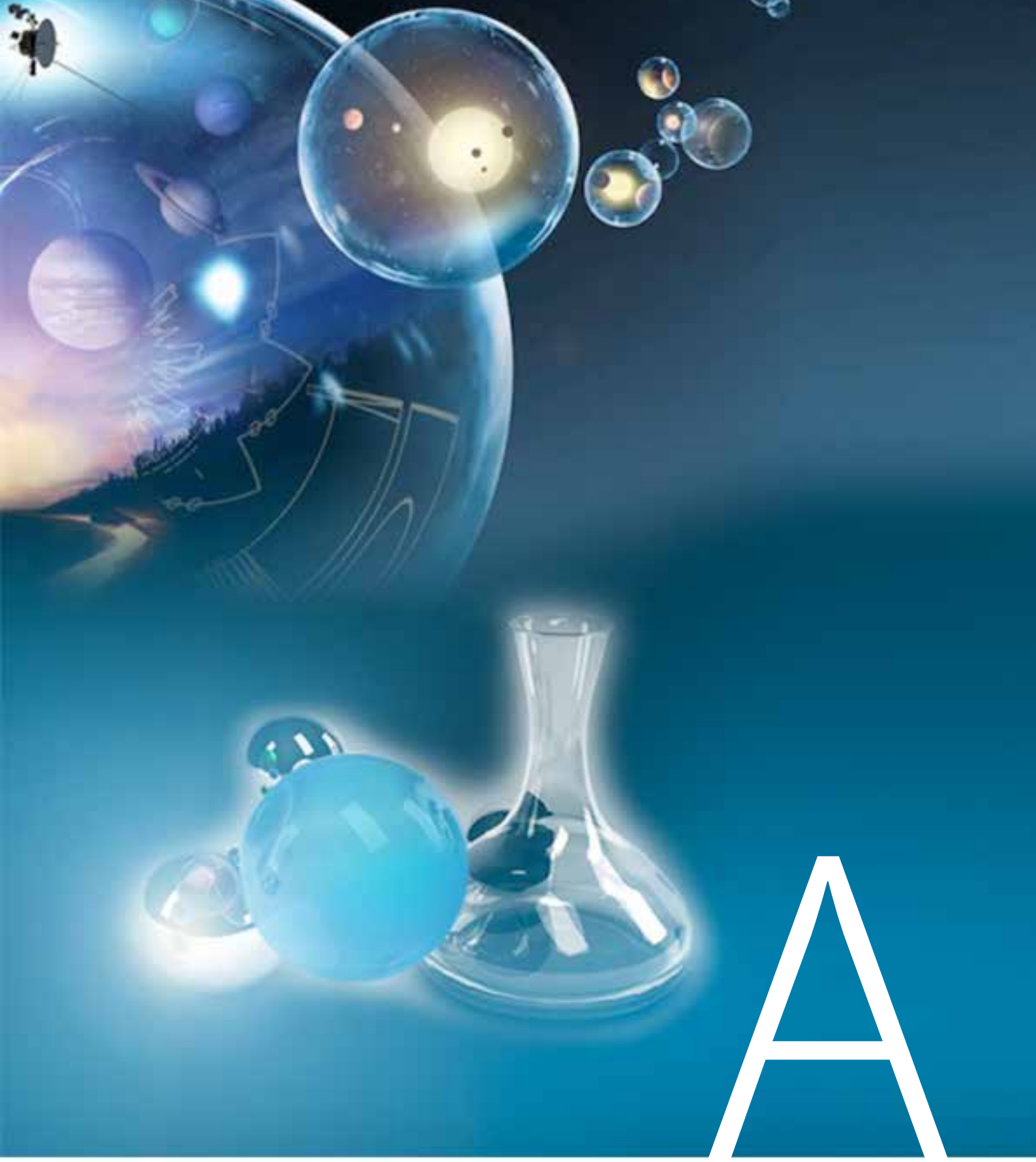
Acting Chief Financial Officer
Mr Robert Shaku

Head official responsible for planning
Mr David Mmakola

Accounting Officer
Dr Phil Mjwara

Executive Authority
Mrs Naledi Pandor, MP

STRATEGIC OVERVIEW



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STRATEGIC OVERVIEW

PART A: STRATEGIC OVERVIEW

1. VISION

Increased well-being and prosperity through science, technology and innovation.

2. MISSION

To provide leadership, an enabling environment, and resources for science, technology and innovation in support of South Africa's development.

3. VALUES

Professionalism

The Department is professional and delivers high-quality performance to both internal and external stakeholders.

Innovation

The Department is innovative in solving problems and enhancing effectiveness and efficiency.

Ethical behaviour

The Department and its employees are consistent in their actions, and accountable and transparent in dealing with public funds and other resources.

Knowledge sharing

The Department and its employees share and use knowledge constructively to ensure it contributes to the building of a robust and productive knowledge economy.

4. LEGISLATIVE AND OTHER MANDATES

4.1. Legislative mandates

Academy of Science of South Africa Act, 2001

This Act establishes the Academy of Science of South Africa (ASSAf) to promote common ground in scientific thinking across all disciplines, including the physical, mathematical and life sciences, as well as human, social and economic sciences; to encourage and promote innovative and independent scientific thinking; to promote the optimum intellectual development of all people; to advise and facilitate appropriate action in relation to the country's needs, opportunities and challenges; and to link South Africa with high-level scientific communities within the Southern African Development Community, the rest of Africa and internationally.

Astronomy Geographic Advantage Act, 2007

This Act provides for the preservation and protection of areas in South Africa uniquely suited to optical and radio astronomy, and for intergovernmental cooperation and public consultation on matters concerning such areas.

Human Sciences Research Council Act, 2008

This Act provides for the continued existence of the Human Sciences Research Council (HSRC), which carries out research that generates critical and independent knowledge relative to all aspects of human and social development.

Income Tax Act, 1962

Section 11D of the Income Tax Act gives the Minister of Science and Technology authority to approve scientific and/or technological research and development (R&D) undertaken or funded in South Africa by the private sector for a 150% tax deduction on qualifying R&D expenditure.

Intellectual Property Rights from Publicly Financed Research and Development Act, 2008

This Act provides for the more effective use of intellectual property emanating from publicly financed R&D through the establishment of the National Intellectual Property Management Office, the Intellectual Property Fund, and offices of technology transfer at higher education institutions and science councils.

National Advisory Council on Innovation Act, 1997

This Act establishes the National Advisory Council on Innovation to advise the Minister of Science and Technology and, through the Minister, the Cabinet, on the role and contribution of science, mathematics, innovation and technology in achieving national objectives.

National Research Foundation Act, 1998

This Act establishes the National Research Foundation (NRF) to promote basic and applied research, as well as the extension and transfer of knowledge in the various fields of science and technology.

Natural Scientific Professions Act, 2003

This Act establishes the South African Council for Natural Scientific Professions and legislates the registration of professional natural scientists, scientists-in-training, technologists and technologists-in-training.

Scientific Research Council Act, 1988

This Act refers to the activities of the Council for Scientific and Industrial Research (CSIR), which undertakes R&D for socio-economic growth.

South African National Space Agency Act, 2008

This Act establishes the South African National Space Agency (SANSA) to promote space science research, cooperation in space-related activities, and the creation of an environment conducive to industry's development of space technologies.

Technology Innovation Act, 2008

This Act establishes the Technology Innovation Agency (TIA) to promote the development and exploitation of discoveries, inventions, innovations and improvements in the public interest.

4.2. Policy mandate

The Department of Science and Technology (DST) derives its mandate from the 1996 White Paper on Science and Technology, which introduced the concept of the national system of innovation (NSI) – a set of interacting organisations and policies through which a country creates, acquires, diffuses and puts into practice new knowledge to help achieve individual and collective goals. A coordinated and efficient NSI would help achieve the country's national development priorities by promoting change through innovation, enabling all South Africans to enjoy the economic, socio-political and intellectual benefits of STI.

The Department supports the NSI in a number of ways for instance by-

- coordinating the development and implementation of country-level policies and strategies, such as the National Research and Development Strategy (NRDS) and the Ten-Year Innovation Plan (TYIP), which identify specific priority areas for the country where STI-related support is required;
- creating systems and structures to coordinate the STI-related work of government departments and agencies;
- developing measurement systems, and undertaking analyses to create an evidence base for improving the performance of the NSI;
- optimising the governance of publicly funded STI institutions to support government's priority outcomes;
- funding research, development and innovation (RDI) infrastructure;
- funding human capital development (HCD) at postgraduate level;
- unlocking STI resources through partnerships with international, continental and multilateral agencies;
- supporting the technological competitiveness of firms and industry sectors through focused R&D programmes.

4.3. Relevant court rulings

None

4.4 Policy context

Changes in the policy environment

In response to the need for an increased rate of economic growth in South Africa, the government has focused on a number of interventions collectively referred to as the "Nine-Point Plan" (announced in the 2015 State of the National Address). As is discussed in Section 5 below, the DST supports this plan to diversify and stimulate the economy through a number of initiatives.

However, the DST, along with the rest of government, faces fiscal constraints. Given the current low-growth environment, principally caused by a global slowdown in the demand for resources, as well as a number of domestic factors, the outlook for a significant increase in public and private sector investment in research and development over the medium term remains relatively poor. Adjustments were therefore necessary, and this APP makes provision for budget cuts communicated to the DST by the National Treasury. If the funding outlook deteriorates even further, more adjustments will be required.

The National Development Plan and science, technology and innovation

South Africa's National Development Plan (Vision 2030) highlights the importance of science, technology and innovation (STI) in national development. The National Development Plan (NDP), published in 2012, notes that developments in STI fundamentally alter the way people live, communicate and transact, with profound effects on economic growth and development. STI are key to equitable economic growth, underpinning economic advances and improvements in health systems, education and infrastructure. The NDP argues that countries that are able to tackle poverty effectively by growing their economies are characterised by strong capabilities in STI.

The NDP acknowledges that economic development takes time and that innovation should grow in importance in years to come. In the first phase (2012-2017), the focus should be on "intensifying research and development spending, emphasising opportunities linked to existing industries". In the second phase (2018-2023), the "country should lay the foundations for more intensive improvements in productivity", and "innovation across state, business and social sectors should start to become pervasive". As 2030 approaches, "the emphasis should be on consolidating the gains of the second phase, with greater emphasis on innovation, improved productivity, more intensive pursuit of a knowledge economy, and better utilisation of comparative and competitive advantages in an integrated continent".

The NDP acknowledges the role that STI can play in addressing the triple challenge of poverty, unemployment and inequality. Internationally, STI and related discoveries are recognised as future sources of economic growth, with the potential to create new types of jobs, and provide new solutions to problems trapping people in poverty, such as poor health and water shortages.

The Department has therefore sharpened its focus on the ways in which its work and the work of the broader NSI could contribute to the reduction of inequality, poverty and unemployment. Some of the DST's initiatives are mentioned in the text that follows (with more detail given in Table 1 below).

Economic growth is critical for employment. From a macro-economic perspective, the initiatives to develop new R&D-led industries could help improve South Africa's exports, reduce South Africa's current deficit, and improve the growth prospects of the economy. The work around building a titanium industry for South Africa falls in this category, as does the Fluorochemical Expansion Initiative. Because of the potential of STI to stimulate industrialisation, the Department is also actively involved in the implementation of the Industrial Policy Action Plan (IPAP) – for instance, the Department is working to harmonise the instruments to attract private-sector investment in R&D in South Africa.

At the level of the firm, both technological and financial support for private-sector companies could lead to increased competitiveness and turnover, and hence higher employment. The Technology Innovation Agency's Technology Stations Programme and the Technology Localisation Programme provide technology support to a range of small and large firms, and are also aimed at increasing the turnover of small and medium enterprises (SMEs), and enabling SMEs to secure better contracts with large private-sector companies.

An example of the work done by the Department to address inequality and poverty is its involvement in initiatives to enhance the standard of living in previously marginalised communities. The DST works with the Department of Basic Education, using innovative technologies to improve access to basic education for children who are visually or hearing impaired. The Department also has a partnership with the Eastern Cape Department of Education, the Department of Water and Sanitation and the Bill &

Melinda Gates Foundation to provide innovative and appropriate off-grid sanitation technologies for rural and peri-urban areas.

Local economic development is needed to address the triple challenge, especially in the rural poverty-stricken areas of the country. The DST champions innovation-enabled local economic development and runs pilot projects to optimise the role of STI in the creation of sustainable livelihoods. Pilot projects include the community-based processing of traditional medicines, cosmeceuticals and nutraceuticals, a number of which are scheduled for completion by the end of the 2015/16 financial year.

These initiatives demonstrate the potential of the NSI to help address poverty, unemployment and inequality. Further detail on STI's direct and indirect contribution to addressing these challenges is set out in Table 1 below.

The DST adds value to the efforts of the rest of government and industry to implement the NDP through enabling effective decision-making by, for example, influencing policy on the safety of activities involving genetically modified organisms (GMOs), providing technically sound methodologies to evaluate future investments in the commercialisation of R&D (as part of the DST Commercialisation Framework), providing geospatial information to be used in local planning (via the South African Earth Observation Strategy (SAEOS) portal, as well as the work of the South African National Space Agency), and helping municipalities to build a business case for bio-energy production based on the information provided in the Bio-energy Atlas.

Table 1: Contribution of STI to the reduction of poverty, inequality and unemployment

STI CONTRIBUTION	POVERTY	INEQUALITY	UNEMPLOYMENT
Direct	*Innovation-enabled local economic development:* ▪ Pilot three community-based agroprocessing plants (traditional medicines, cosmeceuticals and nutraceuticals) by 2016 ▪ Ensure that STI poverty-alleviation initiatives are demand driven and informed by local economic development priorities in at least three provinces *Mainstream applied indigenous knowledge-based R&D (traditional medicines, cosmeceuticals and nutraceuticals), including innovation and local manufacturing to support commercialisation models for sustainable livelihoods*	*Transformation of scientific workforce in terms of race and gender* *Innovations to enhance standards of living:* ▪ In partnership with the Department of Basic Education, leverage innovative technologies to improve access to basic education for children with special needs, prioritising the visually or hearing impaired ▪ In partnership with the Eastern Cape Department of Education, the Department of Water and Sanitation, and the Bill & Melinda Gates Foundation, provide innovative and appropriate off-grid sanitation technologies for rural and peri-urban areas	*Internships.* *Researchers.* *Postdoctoral support.* *Economic growth:* ▪ Help grow companies' turnover ▪ Reduce the contribution of technology balance of payments to current account deficit ▪ Support SMEs through technology localisation initiatives and the Technology Stations Programme ▪ Help increase technological competitiveness through R&D partnerships at sector and firm levels ▪ Grow new local industries through the Emerging Industries Action Plan *Initiatives to improve the technology-based competitiveness of the established primary economic sectors* *New research and development-led industry development initiatives such as Hydrogen South Africa, the Fluorochemicals Expansion Initiative, the Titanium Beneficiation Initiative and the Advanced Manufacturing Technology Strategy*
Indirect	*Postgraduate bursaries, the South African Research Chairs Initiative and the centres of excellence* *Providing and packaging information to enhance policy decision-making*	*Targeted postgraduate bursaries (for black people and women) and funding to support young and emerging researchers* *Using technology to improve service delivery and demonstrate better living standards, such as the use of wireless mesh networks to bridge the digital divide*	*Postgraduate bursaries, the South African Research Chairs Initiative and the centres of excellence.* *R&D infrastructure:* ▪ Manufacture, assembly, integration and testing, and launch Earth observation satellite (EOSat1), in addition to ZACUBE2 satellite ▪ Manufacture and launch South Africa's first indigenous CubeSat constellation to provide automatic identification system services to Operation Phakisa (ocean economy) and Africa ▪ MeerKAT/Square Kilometre Array radio astronomy telescope

5. UPDATED SITUATIONAL ANALYSIS

5.1 DST performance environment

The Department of Science and Technology (DST) is currently implementing its 2015-2020 Strategic Plan, which was tabled in Parliament on 12 March 2015. In order to position STI within the framework of the NDP, the 2015-2020 DST Strategic Plan is structured around five strategic outcome-oriented goals that will drive the work of the Department and its entities over the next five years. These goals are as follows:

- To build on previous gains to create a responsive, coordinated and efficient NSI (a responsive, coordinated and efficient NSI).
- To maintain and increase the relative contribution of South African researchers to global scientific output (increased knowledge generation).
- To increase the number of high-level graduates and improve their representivity (human capital development).
- To derive a greater share of economic growth from R&D-based opportunities and partnerships (using knowledge for economic development).
- To accelerate inclusive development through scientific knowledge, evidence and appropriate technology (knowledge utilisation for inclusive development).

The efforts of the DST's various programmes and the Department's funding (including funding provided to its entities as Parliamentary grants) are now directed towards the achievement of the above strategic outcome-oriented goals. The most important general factors that might impede performance are insufficient public funding and the suboptimal coordination of STI efforts across government, as well as the worsening economic climate, which is constraining private-sector R&D activity.

For each of these goals, the DST has defined a number of proxy indicators to measure progress over the period of the Strategic Plan (that is, up to 2019). Table 2 below shows how the Programme strategic objectives are linked to the strategic outcome-orientated goals (and the proxy indicators).

Table 2: Strategic outcome-oriented goals, proxy indicators and Programme strategic objectives

STRATEGIC OUTCOME-ORIENTED GOAL	A RESPONSIVE, COORDINATED AND EFFICIENT NSI	PROGRAMME STRATEGIC OBJECTIVES SUPPORTING STRATEGIC OUTCOME-ORIENTED GOALS
Strategic outcome-oriented goal statement	Over the next five years, build on previous gains to create a responsive, coordinated and efficient NSI	▪ To enhance that understanding and analysis which support improvements in the functioning and performance of the NSI ▪ To introduce and manage interventions and incentive programmes that increase the level of private-sector investment in scientific research and technological R&D ▪ To secure international funds to complement South Africa's national investments in STI, including resources for DST initiatives requiring external investment
Proxy indicators	▪ **Proxy Indicator 1**: Cabinet approval secured for the first comprehensive decadal plan for STI aligned with the NDP by 2019 ▪ **Proxy Indicator 2**: Budget coordination and legislative instrument for coordination finalised by 2019 ▪ **Proxy Indicator 3**: Improved systems in place by 2019 for a more rational and strategic deployment of public funding for STI activities ▪ **Proxy Indicator 4**: By 2019, a 300% increase in the rand value of government and private-sector investment in R&D partnerships when compared with 2013 (MTSF outcome 4, sub-outcome 10)	

STRATEGIC OUTCOME-ORIENTED GOAL	INCREASED KNOWLEDGE GENERATION	PROGRAMME STRATEGIC OBJECTIVES SUPPORTING STRATEGIC OUTCOME-ORIENTED GOALS
Strategic outcome-oriented goal statement	Over the next five years, maintain and increase the relative contribution of South African researchers to global scientific output	▪ To support and promote research that develops basic sciences through the production of new knowledge and relevant training opportunities ▪ To ensure the availability of and access to internationally comparable research and innovation infrastructure in order to generate new knowledge and train new researchers ▪ To identify, grow and sustain niche high-potential STI capabilities for sustainable development and the greening of society and the economy ▪ To identify, grow and sustain niche high-potential STI capabilities that improve the competitiveness of existing industries with growth potential in aerospace, advanced manufacturing, chemicals, advanced metals, mining, information and communication technologies (ICTs) and sector innovation funds; and that facilitate the development of new industries through targeted R&D ▪ To coordinate and support high-end skills development in the strategic and emerging science and technology (S&T) areas of space science, energy, bio-innovation, nanotechnology, robotics, photonics, synthetic structural biology and functional genomics
Proxy indicators	▪ **Proxy Indicator 1**: 22 032 researchers supported by 2019 ▪ **Proxy Indicator 2**: Publication of at least 33 700 ISI-accredited research articles supported by 2019 ▪ **Proxy Indicator 3**: Number of articles co-published with researchers on the African continent doubled	

STRATEGIC OUTCOME-ORIENTED GOAL	HUMAN CAPITAL DEVELOPMENT	PROGRAMME STRATEGIC OBJECTIVES SUPPORTING STRATEGIC OUTCOME-ORIENTED GOALS
Strategic outcome-oriented goal statement	Over the next five years, increase the number of high-level graduates and improve their representivity	▪ To contribute to the development of representative, high-level human capital able to pursue locally relevant and globally competitive research and innovation activities ▪ To promote public engagement on STI ▪ To coordinate and support high-end skills development in the strategic and emerging S&T areas of space science, energy, bio-innovation, nanotechnology, robotics, photonics, synthetic structural biology and functional genomics ▪ To access international knowledge, capacities and resources so as to enhance South Africa's national STI capabilities, contributing to the attainment of the DST's targets for HCD, especially for international PhD training
Proxy indicators	▪ **Proxy Indicator 1**: 15 209 doctoral students supported by 2019 ▪ **Proxy Indicator 2**: 52 069 pipeline postgraduate students supported by 2019 ▪ **Proxy Indicator 3**: 4 200 graduates and students placed in science, engineering, technology and innovation institutions by March 2019 ▪ **Proxy Indicator 4**: 5 521 160 people reached through science engagement activities by 2019 ▪ **Proxy Indicator 5**: Three times the number of master's and PhDs in priority areas identified in the NRDS and TYIP by 2019 (measured on a 2012 baseline)	

STRATEGIC OUTCOME-ORIENTED GOAL	USING KNOWLEDGE FOR ECONOMIC DEVELOPMENT	PROGRAMME STRATEGIC OBJECTIVES SUPPORTING STRATEGIC OUTCOME-ORIENTED GOALS
Strategic outcome-oriented goal statement	Over the next five years, derive a greater share of economic growth from R&D-based opportunities and partnerships	▪ To facilitate and resource investments in space science, energy, bio-innovation, nanotechnology, robotics, photonics, indigenous knowledge systems, intellectual property management, technology transfer and technology commercialisation ▪ To support, promote, and advocate for the development and translation of scientific R&D outputs into commercial products, processes and services that will contribute towards economic growth and a better quality of life ▪ To identify, grow and sustain niche high-potential STI capabilities that – - improve the competitiveness of existing industries with growth potential in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds - facilitate the development of new industries through targeted R&D ▪ To strengthen cooperation in STI in Africa, to build capacities and support initiatives of SADC and AU, for South Africa's national benefit and advancing Africa's growth and development agenda ▪ To maximise South Africa's strategic interests in international cooperation in STI, in support of the country's foreign policy objectives, and international trade and investment partnerships
Proxy indicators	▪ **Proxy Indicator 1**: By 2019, new commercial and industrial financing of R2 billion secured for a portfolio of R&D-led industrial development initiatives funded by the DST ▪ **Proxy Indicator 2**: By 2019, additional revenue of R500 million generated from firms and companies supported from DST-funded instruments since 2010 ▪ **Proxy Indicator 3**: By 2019, performance of 10 000 SMEs improved through technology interventions	

STRATEGIC OUTCOME-ORIENTED GOAL	KNOWLEDGE UTILISATION FOR INCLUSIVE DEVELOPMENT	PROGRAMME STRATEGIC OBJECTIVES SUPPORTING STRATEGIC OUTCOME-ORIENTATED GOALS
Strategic outcome-oriented goal statement	Over the next five years, accelerate inclusive development through scientific knowledge, evidence and appropriate technology	▪ Through knowledge, evidence and learning, to inform and influence how S&T can be used to achieve inclusive development ▪ To identify, grow and sustain niche high-potential STI capabilities for sustainable development and the greening of society and the economy ▪ To identify, grow and sustain niche high-potential STI capabilities that – - improve the competitiveness of existing industries with growth potential in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds - facilitate the development of R&D-led new targeted industries ▪ To strengthen provincial and rural innovation and production systems through analysis and catalytic interventions
Proxy indicators	▪ **Proxy Indicator 1**: By 2019, decision support provided that improves the delivery of at least 10 government services or functions ▪ **Proxy Indicator 2**: Between 2014 and 2019, contribution of technology-based opportunities for local economic development introduced or strengthened in at least five distressed municipalities ▪ **Proxy Indicator 3**: By 2019, opportunities for improving the living standard of at least 500 000 people in South Africa and/or 12 communities unlocked through S&T interventions funded by the DST	

5.2 The Medium Term Strategic Framework and STI

The Medium Term Strategic Framework (MTSF) is a "first five-year" implementation plan of the NDP and is based on an "outcomes approach", focusing on 14 key outcomes, with measurable outputs and key activities.

These outcomes are: (1) improved quality of basic education; (2) a long and healthy life for all South Africans; (3) all people in South Africa are safe and feel safe; (4) decent employment through inclusive economic growth; (5) a skilled and capable workforce to support an inclusive growth path; (6) an efficient, competitive and responsive economic infrastructure network; (7) vibrant, equitable and sustainable rural communities with food security for all; (8) sustainable human settlements and improved quality of household life; (9) a responsive, accountable, effective and efficient local government system; (10) environmental assets and natural resources that are well protected and continually enhanced; (11) create a better South Africa and contribute to a better and safer Africa and world; (12) an efficient, effective and development-oriented public service and an empowered, fair and inclusive citizenship; (13) an inclusive and responsive social protection system; (14) transforming society and uniting the country.

The DST contributes to many of these outcomes, as well as sub-outcomes defined under the overall MTSF umbrella (see Table 3 below).

Table 3: Progress on MTSF commitments led by the DST in the 2014-2019 MTSF

OUTCOME	SUB-OUTCOME	ACTION/COMMITMENT	PROGRESS 2015/16	PLANS 2016/17
Outcome 3: All South Africans are safe and feel safe	Sub-outcome 4: Secure cyberspace	Develop R&D capacity	▪ Presented the document on the cybersecurity RDI programme to the Minister for approval ▪ Presented the document on the cybersecurity RDI programme to the Justice, Crime Prevention and Security Cluster ▪ Supported 6 PhD and 16 MSc students through the targeted and DST-funded CSIR Modelling and Digital Science HCD programme	▪ Implementation of the Cybersecurity RDI Programme within the ambit of the National Cybersecurity Policy Framework ▪ Monitor and continue to build a portfolio of cyber/information security projects that have a bias towards technology development and innovation and are endorsed and supported by other government departments, e.g. South Africa Social Security Agency-endorsed research on biometric recognition of children
Outcome 4: Decent employment through inclusive economic growth	Sub-outcome 10: RDI investment supports inclusive growth	▪ Strengthen RDI partnerships between government and the private sector ▪ Align strategies for emerging/ new industries with IPAP and monitor regularly for long-term growth and competitiveness, job creation and export potential ▪ Review existing market-based and state incentives for effectiveness in increasing investment in innovation	▪ Identification and verification of initiatives that constitute an RDI partnership between government and industry in order to calculate the 2013 baseline ▪ A number of the Emerging Industries Action Plan (EIAP) flagship projects are being targeted to meet the Nine-Point Plan objectives of scaling up IPAP, mineral beneficiation and stimulating cross-cutting STI ▪ Progress has been slow owing to a lack of internal capacity	▪ Implement strategy to increase investment in RDI partnerships and continue to monitor progress towards achieving a target of 300% increase on the 2013 baseline by 2018/19 ▪ Additional techno-economic evaluation completed with a fixed commitment for follow-on funding from development finance institutions, if the flagship projects are deemed feasible ▪ A review of incentives (public and private) has been completed. A mechanism for the development of new incentives and the maintenance of existing incentives has been institutionalised

OUTCOME	SUB-OUTCOME	ACTION/COMMITMENT	PROGRESS 2015/16	PLANS 2016/17
Outcome 5: A skilled and capable workforce to support an inclusive growth path	Sub-outcome 3: Increase access to high-level occupational directed programmes in needed areas	▪ Expand access to communication technologies ▪ Bursary support for postgraduate students ▪ Research infrastructure grants to higher education institutions, science councils and national facilities ▪ Increase outputs by researchers funded by the National Research Foundation (NRF) ▪ Increase the number of research grants	**Expand access to communication technologies** About 250 schools and other government centres connected to Internet via wireless mesh network technology; 17 village operators (young, black entrepreneurs) established and supported to maintain and support the network in schools and establish Internet cafes in their communities; 1 ICT SME owned by a young black South African contracted and licensed to continue supporting the village operators and to expand the roll-out of the wireless mesh network project. Support was sought from the Mpumalanga Provincial Government in July 2015 to pay for connectivity at 90 schools in the KwaMhlanga District, which will be revenue for the village operators. **Bursary support for postgraduate students** An additional investment of R300 million was made during the 2015/16 financial year to increase the average bursary values and the number of students awarded bursaries and fellowships.	Continued support to the Mpumalanga and Northern Cape WMN initiative to leverage support from other government initiatives with a view to sustain the network

OUTCOME	SUB-OUTCOME	ACTION/COMMITMENT	PROGRESS 2015/16	PLANS 2016/17
			Increase the number of research grants An additional investment of R100 million was made during the 2015/16 financial year to increase the average research grant values and the number of research grants awarded to researchers. In addition, the Minister awarded 42 additional research chairs to women only	
Outcome 6: An efficient, competitive and responsive economic infrastructure network	Sub-outcome 5: Expansion, modernisation, access and affordability of our Information and communications infrastructure ensured	SIP 16: Square Kilometre Array and MeerKAT	A total of 21 dishes have been installed	All 64 dishes will be installed on site and commissioning will be well under way, with some of the dishes already being used for science
Outcome 10: Protect and enhance South Africa's environmental assets and natural resources	Sub-outcome 2: An effective climate-change mitigation and adaptation response	Undertake research in climate sciences	A review was undertaken to identify the range of programmes and organisations involved in climate change research and the collaborative research between them. A plan for compiling the first biennial report to Cabinet on the state of climate change S&T is being developed	Submission of a report on existing climate change research initiatives and networks A plan for compiling the second biennial report to Cabinet on the state of climate change S&T
	Sub-outcome 3: An environmentally sustainable, low-carbon economy resulting from a well-managed, just transition	Increase investment in RDI to support the transition to a green economy	The DST appointed TIPS to undertake a baseline study to measure investment in RDI in the green economy by the public and private sectors for the year 2011. This baseline document has been received and will guide the work done in 2016/17 and 2017/18	A strategy will be developed to increase the investment in RDI from the baseline determined in 2015/16

5.3 Progress in achieving the Strategic Plan goals

(a) A responsive, coordinated and efficient NSI

The 2015-2020 Strategic Plan identifies significant advances made in the past 15 years in building a responsive, coordinated and efficient NSI. However, the Strategic Plan also identifies continuing challenges that will be the focus of attention over the next five years in building on the gains previously made.

The Minister of Science and Technology has tasked the National Advisory Council on Innovation (NACI) with drafting an NDP-aligned decadal plan for STI. This work started during the 2015/16 financial year.

As part of the five-year programme of work, to put in place RDI budget coordination and a legislative instrument for this purpose, the DST finalised a draft cabinet memorandum setting out a phased process for enhancing the rational and strategic deployment of public funding for STI activities. The intention is to secure Cabinet approval for the DST proposals in the first quarter of the 2016/17 financial year.

Initial steps were taken, together with National Treasury, to improve budget coordination with the creation of an RDI Technical Input Group as part of the 2016 Medium Term Expenditure Framework (MTEF) process. The RDI Technical Input Group, which is co-chaired by the DST and National Treasury, identified a number of analytical studies that would be required to inform funding allocations going forward, for instance on RDI funding trends in critical sectors and on the impact of the current funding regime on science councils.

To inform the possible introduction of a legislative instrument, the DST undertook a survey of how other governments coordinate their RDI activities. During the 2015/16 financial year, the Department furthermore embarked upon a review of the STI institutional landscape by an international panel of experts.

During 2015/16, a DST-National Treasury task team was formed to discuss ways in which to increase South Africa's gross expenditure on R&D to reach a target of 1,5% of GDP by 2019. The current local economic climate is not optimal for business investment in R&D. Furthermore, the fiscus is under strain, precluding significant increases in public investment in R&D for the foreseeable future. Therefore, the DST work around improving the coordination of public funding for RDI will be important to stimulate private investment.

In order to assess progress in the level of investment in R&D partnerships between government and the private sector, the key activity completed in the 2015/16 financial year was the development of a database of partnerships and the calculation of an initial baseline for 2013. This entailed defining R&D partnership, undertaking an audit of all partnership initiatives, and collecting data for previous financial years. The current audit largely covers known and large-scale partnerships funded by the DST and the Department of Trade of Industry. Over the next few years, the data system will be improved with the inclusion of partnership information in the annual science and technology activities report. As information on partnerships is obtained from government departments, the 2013 baseline and trend information will be updated. In terms of the current list of partnerships, the rand value of partnerships was R398 million in the 2013/14 financial year, which increased to R423 million in the 2014/15 financial year.

(b) Increased knowledge generation, HCD and infrastructure provision

Research capacity is the fuel that drives the NSI. Good progress has been made in addressing constraints. In particular, the Minister has approved the Strategy for Human Capital Development for Research, Innovation and Scholarship, for which an implementation plan will be finalised by the end of the 2015/16 financial year. The implementation plan will address, among other things, the resources required to address the country's human capital needs as outlined in the NDP.

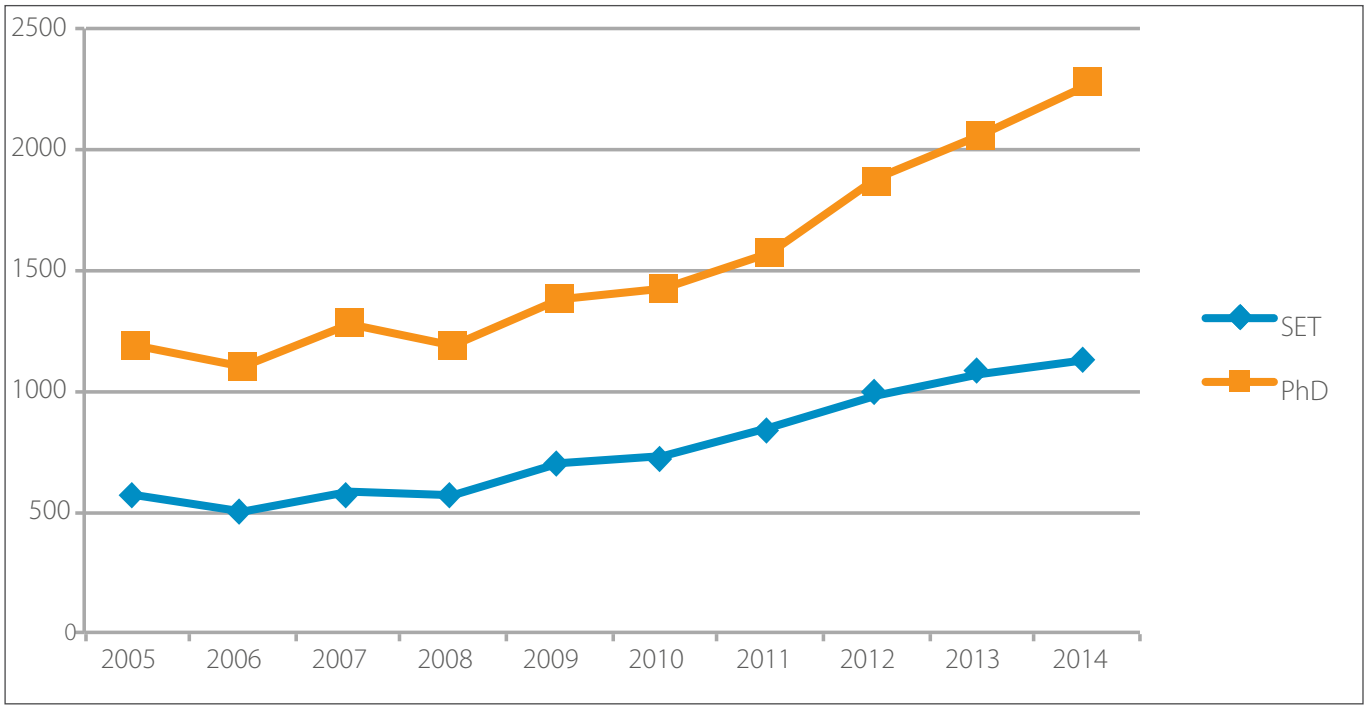
The DST and its public entities have continued to provide funding support for postgraduate research students through the DST-NRF-managed bursary programme. The total number of postgraduate research students supported increased from 7 083 in 2011/12 to 11 335 in 2014/15. The increase in the number of students receiving bursaries between 2010/11 and 2014/15 is shown in Table 4 below.

Table 4: Postgraduate students supported between 2010 and 2015

NUMBER OF POSTGRADUATE STUDENTS SUPPORTED	2010/11	2011/12	2012/13	2013/14	2014/15
Honours students	3 181	1 692	2 846	3 149	3 448
Master's students	2 542	3 478	3 087	3 704	2 845
PhD students	1 259	1 913	1 779	2 265	4 263

Figure 1 below shows a steady increase in the number of doctoral students supported in the past decade, with especially strong growth between 2010 and 2014. However, the number of doctoral graduates in science, engineering and technology (SET) and the rate of increase are still significantly below benchmarks set in the TYIP and the NDP. The rise in scientific output highlighted earlier is linked to the significant increase in the doctoral graduate pool, because these graduates would have been active postgraduate researchers during the four to six years before they obtained their degrees, and would almost certainly have contributed to the output figures.

Figure 1: Doctoral degrees awarded by South African higher education institutions



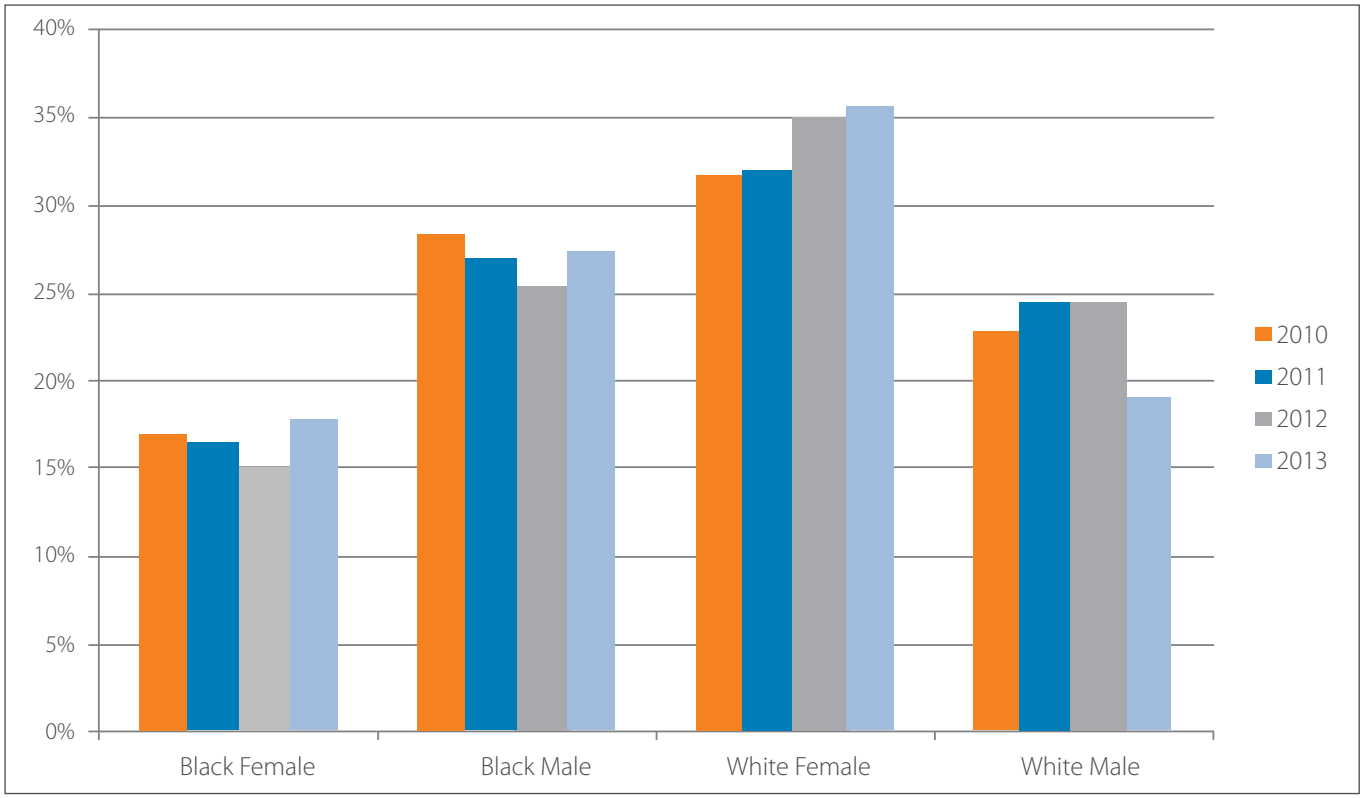
Good progress has also been made in transforming the NSI skills profile. Between 2002 and 2014, the proportion of black students who graduated with honours degrees grew from 62% to 72%, those with a master's from 43% to 59%, and those with a doctorate from 35% to 60%. Growth over the 13-year period has been impressive – 16 percentage points at master's level and 25 percentage points at doctoral level.

In 2012, the proportion of women enrolled at honours level was 63%, at master's level 49%, and at doctoral level 44%. Women made up 45% of total SET enrolment and 51% of total graduations. However, in engineering, only 26% of the 2012 graduates

were women. Women have caught up in many areas, but more needs to be done at doctoral level, particularly in engineering and agriculture.

The DST supports emerging and established researchers. Its backing for emerging researchers has had good results – the proportion of women researchers supported by the NRF increased from 34% in 2012/13 to 41% in 2013/14, and that of black researchers from 26% to 31%. However, Figure 2 shows that black women remain the least represented, both at doctoral level and as researchers.

Figure 2: Demographic profile of emerging researchers



In 2014/15, the DST supported a total of 1 021 graduates and students as interns in the workplace through its DST-funded work preparation programmes. Support provided to researchers has also significantly increased, with the number of researchers receiving grants increasing from 2 886 in 2011/12 to 4 064 in 2014/15.

The Department's investment in knowledge generation has yielded significant results. The number of ISI-accredited publications increased from 4 777 in 2011/12 to 6 470 in 2014/15.

Research and innovation infrastructure

In terms of research and innovation infrastructure, the DST's 2014/15 ring-fenced infrastructure allocation of R551,9 million enabled it to achieve the following:

- Award 69 research infrastructure grants, of which 84% were managed by the NRF through the National Equipment and National Nanotechnology Equipment Programmes for scientific equipment grants to universities, science councils and museums.
- Provide continued support towards the development of a titanium manufacturing pilot plant.
- Establish a national drug development platform at North-West University.
- Provide continued support for the National Recordal System for the capturing, storage and management of indigenous knowledge.

(c) Using knowledge and innovation for economic development

New industry development and economic diversification

A broad agenda for R&D-led industrial development, for 2030 and beyond, is now in place. The DST has made significant investments in industrial R&D, focusing on a range of priority areas identified in the NRDS and the TYIP. To support economic development, the DST implements programmes such as the R&D tax incentive to promote private-sector R&D, action plans for emerging industries, technology assistance packages and sector innovation funds.

Globally, there is an established body of knowledge on how to convert promising technological breakthroughs into full-scale industrialisation and minimise failure. Maturing promising initiatives to higher technology and market readiness can take anything from a few years to more than a decade. The DST and its entities, in particular the CSIR and the Technology Innovation Agency (TIA), have developed a portfolio of technology initiatives (mining, minerals beneficiation, advanced manufacturing, the bioeconomy, nanotechnology, ICTs, waste and energy), which have reached different levels of maturity.

In 2015/16, government adopted the Nine-Point Plan to diversify and enhance the competitiveness of the South African economy. The DST took the opportunity to review its existing R&D-led industrial development interventions and to ensure that they were aligned with the Nine-Point Plan. The DST will continue resourcing and maturing the following medium-to-long-term flagship R&D-led industrial development interventions:

- The commercialisation of a novel process to produce titanium powder.
- The expansion of the fluorochemicals industry in South Africa.
- The development of a composites industry.
- The expansion of the additive manufacturing industry, with a specific focus on opportunities in metals.
- The development of a fuel cell industry in South Africa based on South African technologies.
- The development of the bioeconomy.
- The growth of a nanotechnology industrial sector.
- The development of an industry producing active pharmaceutical ingredients.

In addition to the above flagship initiatives, TIA and the CSIR continue to pursue a range of industrial development opportunities in a range of industrial sectors.

New industry development requires strategic partnerships with other countries, multinationals and the private sector. Over time, the DST has grown its successful international research partnerships into innovation partnerships. South Africa participates in the EUREKA programme (a European network that coordinates RDI funding), and has developed partnerships with ICT firms such as IBM, Cisco, SAP and Microsoft.

In 2015/16, there were a number of positive developments in other government departments and agencies, leading to increased levels of commercial and industrial development financing for R&D-led industrial development opportunities. This includes the establishment of a New Industries Strategic Business Unit in the Industrial Development Corporation (IDC), and the introduction of the National Gazelles programme by the Department of Small Business Development. The DST worked with the IDC to make input into the STI-related aspects of a number of the 18 candidate industries identified by the IDC. The DST will continue to build links with such programmes and facilitate access to them for DST-funded initiatives.

Economic competitiveness of targeted sectors

Although the primary economic sectors have an established technological base, this can be grown by addressing specific challenges (for example, responding to demands for green supply chains and energy and water constraints in mining). Opportunities to improve competitiveness are often linked to ICT, automation and the ability to mine, manufacture or beneficiate products on a smaller scale, while still being economically viable. The DST is working to identify niche improvement areas and, together with industry, to implement new technology building blocks to increase competitiveness.

A start has been made through the establishment of partnership programmes, especially the Sector Innovation Fund initiative. Based on an initial pilot on post-harvest innovation with the Fresh Produce Exporters' Forum in 2009, and a similar partnership in mining and beneficiation in 2012, the DST secured funding through the Economic Competitiveness Support Package to extend the model to other priority sectors. During the 2014/15 financial year, nine sector-specific innovation funds were established. They are running in a co-funding arrangement with a number of identified industry sector associations, including the Fresh Produce Exporters' Forum, Forestry SA, the South African Minerals to Metals Research Institute, the Marine Industry Association of South Africa, the Sugar Milling Research Institute, the Paper Manufacturers' Association of South Africa, and Citrus Research International.

An open, competitive process secured successful proposals from nine industrial sectors, including forestry, sugar, aquaculture and boat-building, for an initial four-year programme. The successful proposals are well aligned with the Industrial Policy Action Plan. Indications are that the DST investment in this initiative will leverage about R53 million. In terms of HCD, the Sector Innovation Fund initiative has also been very successful, with the following estimated outputs: Interns (32), postdoctoral researchers (6), PhD students (39), DTech students (2), MSc students (24), MTech students (3) and honours students (7).

Support for small and medium enterprises

In the past decade the DST has put a range of interventions in place to enhance the technological capabilities of firms and companies, with a major focus on SMEs. In 2015/16, the DST continued to fund these interventions and was able to expand some initiatives as a result of ring-fenced funding from the Economic Competitiveness Support Package. The major initiatives include-

- a network of technology stations and technology platforms (hosted by TIA), based within universities and other research agencies, that provide technological and product development support to firms and companies;
- the Technology Localisation Programme, aimed specifically at enhancing the technological capabilities of companies that can supply to government procurement;
- a range of industry innovation partnership initiatives.

The 15 technology stations and three institutes of advanced tooling under the Technology Stations Programme focus on various sectors across the country. The programme has two-way benefits, with SMEs being able to access specialised equipment, knowledge and innovation support through the technology stations, while students and lecturers are able to stay abreast of industry requirements through exposure to industry needs. In the past five years more than R70 million has been invested in modernising and capacitating the technology stations, which have provided technology support to about 2 000 SMEs each year.

Government has put in place local content requirements for public procurement. SMEs in engineering and manufacturing will be key beneficiaries, but many of these companies need to modernise technologies and processes to meet the local content requirements. The DST, through the CSIR's Technology Localisation Implementation Unit, has benchmarked the technological capabilities of more than 2 000 companies, more than 60% of which were SMEs. Using this data, the unit will have provided targeted technology assistance packages to 200 companies (half of which are SMEs) by the end of March 2016.

Commercialising research results

The TYIP introduced the Intellectual Property Rights from Publicly Funded Research and Development Act, as well as TIA and the National Intellectual Property Management Office (NIPMO) as a policy package to accelerate the conversion of research ideas into marketable products and services.

The achievements of TIA over the past few years include the following:

- TIA received payment of about R57,9 million from Kapa Biosystems Inc. for the selling of its shares in its South African subsidiary, Kapa SA. Kapa SA was established in 2006 with a joint investment from Cape Biotech (later incorporated into TIA) and Kapa Biosystems Inc., registered in the USA. TIA's investment of R24 million was used to establish a research and manufacturing facility in Cape Town for the commercialisation of the company's protein engineering technology platform. Swiss drug maker, Roche, recently announced its intention to buy Kapa Biosystems.
- The Global Cleantech Innovation Programme for SMEs in South Africa has contributed to the pipeline funding of projects through the technology stations and TIA's Technology Development Fund.
- Providing funding support to biotechnology, health and industrial SMEs such as PST Sensors (Pty) Ltd, AgriProtein Technologies (Pty) Ltd and BioDX (Pty) Ltd.

During the 2015/16 financial year, NIPMO has continued to promote, protect and commercialise intellectual property (IP) emanating from publicly funded R&D in higher education institutions and science councils. NIPMO provided funding to eight institutions that applied for offices of technology transport (OTT) support to enable the OTT to appoint highly skilled individuals. Disclosures have continued to increase, with the indicative number of new disclosures received by NIPMO by 31 December 2015 at just more than 250. A further positive development is that previously disadvantaged institutions are appearing on the score board or are consistently adding to their tally. This brings the total disclosures being managed and tracked on NIPMO's database to over 1 200. All 22 institutions that applied for a rebate for the Intellectual Property Fund received the maximum 50% rebate for the IP prosecution and maintenance costs they incurred during the 2014/15 financial year, assisting institutions to obtain statutory protection for their IP.

(d) Using knowledge and innovation for inclusive development

The 2015-2020 Strategic Plan adopted the multidimensional decent standard of living framework of the NDP as the basis for its efforts to accelerate inclusive development through STI. Progress in STI will remain a critical driver in shaping delivery systems for each of the elements of the decent standard of living framework.

The DST works closely with national and local government, providing funds and technical support to demonstrate, customise and assess innovative service-delivery technologies. Demonstration and testing enables the Department to produce evidence-based knowledge products that support decision-making and the systemic roll-out of public services. These knowledge products include policy briefs to enhance decision-making and technical briefs to advise on integrating STI with service delivery. The DST has also provided technology solutions for water, energy and housing.

The DST's interventions in service-delivery improvement include Earth observation for improved spatial planning, equipping decision-makers to understand the risks associated with global change, and improving disaster management. The DST is also piloting a decision-support tool that will assess the innovation potential of people living in marginalised communities. This will, in the long term, help the DST design appropriate interventions to support innovators in these communities and incorporate them into the knowledge economy.

During the 2015/16 financial year, the DST partnered with the Bill & Melinda Gates Foundation to experiment and expedite the process of providing clean water to rural areas. The DST established the Nkowankowa Demonstration Centre as a pilot for creating employment through a local product beneficiation process with funding from the European Union's Sector Budget Support.

The DST continues to cooperate with partners like the European Union in applying STI to unlock wealth and create jobs. The interventions enable and advance socio-economic participation and inclusion, particularly in marginalised areas. Interventions have strengthened cooperation between the formal and informal economies, and developed products for the health, food and cosmetics sectors. This enhances the innovation and job-creation role of indigenous knowledge holders, and improves the NSI's responsiveness to grassroots innovations. South Africa is one of the few countries that have promulgated legislation to promote, develop and protect indigenous knowledge.

Globally, transdisciplinary approaches that involve policy-makers and communities in the research process are gaining in importance. The DST will play a major role in facilitating the establishment of national transdisciplinary programmes on poverty and inequality. The DST will also support South Africa's participation in global programmes such as Future Earth, and in emerging international data partnerships for sustainable development.

With respect to technology-based opportunities for local economic development, the focus in 2015/16 was largely on continued support, and the consolidation and growth of existing initiatives. The DST is working closely with the Department of Cooperative Governance and Traditional Affairs to strengthen the role and contribution of innovation in local economic development.

(e) International partnerships to support the NSI

The Department secured R634,5 million in foreign funding during the 2014/15 financial year for investment in and cooperation with South African research and technology organisations. Human capital was a major focus, with 2 143 South African researchers and students participating in various international training and mobility programmes.

The Department's geographic priority for international partnerships remained Africa, and 18 international partnerships were brokered to support STI capacity-building in Africa. As the custodian of science diplomacy in South Africa, the DST supported 24 international engagements initiated by the Presidency and the Department of International Relations and Cooperation through STI cooperation partnerships with other countries.

March 2015 also saw the signature of the Brazil, Russia, India, China and South Africa (BRICS) Memorandum of Understanding on Cooperation in Science, Technology and Innovation, which created a strategic framework for multilateral partnerships between the BRICS countries. In Africa, new bilateral relations of note include agreements concluded with Ethiopia and Sudan. The Department continued to play a leadership role in multilateral science forums, with several South Africans elected to leadership positions in the International Council for Science (ICSU).

5.4 Organisational environment

Internally, the Department is organised into five budget Programmes in order to deliver on the five strategic outcome-oriented goals outlined above. These are the following:

- Programme 1: Administration.
- Programme 2: Technology Innovation.
- Programme 3: International Cooperation and Resources.
- Programme 4: Research Development and Support.
- Programme 5: Socio-Economic Innovation Partnerships.

To support the Department in executing its mandate, three agencies (the NRF, TIA and SANSA), two science councils (the CSIR and the Human Sciences Research Council), the National Advisory Council on Innovation, the Academy of Science of South Africa, and the South African Council for Natural Scientific Professions, are accountable to the Minister of Science and Technology.

In addition to these bodies, several science councils fall under other line departments, such as the Agricultural Research Council, the Medical Research Council and the Water Research Commission. The DST's coordination of these entities is outlined in the 2004 Strategic Management Model for South Africa's S&T system, with several operational links established. This model was intended to clarify the respective functions of the Department and other line departments and to create a framework for coordinating the NSI.

5.5 Description of the strategic planning process

The DST started its planning process in June 2015. The process was managed by the Department's Executive Committee (Exco), which analysed national and international political, economic and social trends to lend context to the planning exercise. The NDP and the MTSF were also taken into account to identify STI priorities that would contribute to national goals.

The chief executives of the DST-aligned public entities were included in the planning process on a number of occasions (e.g. at the DST mid-year review planning session, and at a workshop hosted by the Director-General). The aim was to communicate the focus areas of the 2015-2020 Strategic Plan, the proposed MTEF 2016 Budget Bid options and the DST contribution to the Nine-Point Plan.

The DST senior management also held a session to review the 2015-2020 Strategic Plan and consider what the Department had promised to deliver over the MTSF period. The DST Programmes were given an opportunity to reflect on their strategic objectives and the performance indicators contained in the 2015-2020 Strategic Plan, and to develop MTEF and 2016/17 annual targets for their performance indicators and outputs.

The DST also consulted oversight government departments such as the National Treasury (for budget alignment) and the Department of Planning, Monitoring and Evaluation in the Presidency (for alignment with the 2014-2019 MTSF).

The first and second drafts of the 2016/17 Annual Performance Plan were developed by DST Programmes for Exco's consideration. The final draft was refined in January 2016 with input from the relevant stakeholders.

6. PLANNED POLICY INITIATIVES

The following policy initiatives will be embarked upon over the MTEF period to implement the Strategic Plan and to achieve the Department's five strategic outcome-oriented goals.

6.1 Coordination of the public budget for RDI across government

The NDP notes that research, development and innovation have a key role to play in improving the competitiveness of the South African economy and in driving employment and development. It is important that all role players engaged in RDI in South Africa work in synergy with one another. Collective long-term planning across government is needed to achieve this synergy and to address the challenges in the NSI.

There is currently no formal mechanism in government to achieve this aim and the Department has therefore embarked on work to establish a research and innovation budget coordination process. This work supports the strategic outcome-oriented goal of a responsive, coordinated and efficient NSI – in particular Proxy Indicator 2: Budget coordination and legislative instrument for coordination finalised by 2019.

The Department will continue to liaise with the National Treasury and relevant RDI-intensive national departments on proposals to implement the proposed budget coordination process. The consultation will include finalising the terms of reference for the MTEF RDI Technical Input Group (co-chaired by the DST and the National Treasury). The Department will seek Cabinet approval for its budget coordination proposals.

The Department will continue with ongoing work around RDI funding. In particular, work will be conducted on tracking public RDI investment in critical sectors, harmonising instruments to attract private sector investment, increasing RDI infrastructure funding, attracting international investment funding, and ensuring appropriate funding for South African public research organisations.

6.2 Towards a bioeconomy

The Bio-economy Strategy aims to coordinate activities with broader government and industry users of technologies, and encourage investments that will take the entire value chain into account. This is in contrast to the National Biotechnology Strategy, where investment-related activities were opportunistic and driven by the DST. As part of developing a vibrant bioeconomy, a network system is needed to bring together researchers, innovators and the private sector. This is ultimately aimed at contributing to the development of a skilled workforce that drives inclusive growth, but is also intended to support the creation of products that improve health and the quality of life of South Africans, with specific emphasis, where possible, on rural areas. One example is the Cape Health Biotechnology Park. Discussions in this regard are aimed at the development of a bankable business plan that will see Biovac, a number of biotechnology service platforms, and key private sector partners co-located to create a vibrant incubation platform.

In terms of vaccines, a mix of active pharmaceutical ingredients and formulation and filling opportunities are under consideration, and involve both technology transfer and product development activities in Biovac. Technology transfer agreements that are being implemented include agreements with Sanofi Pasteur (France) for a hexavalent vaccine, with BioCSL, now Sequirus Australia, for an influenza vaccine, and with Pfizer for their 13-valent pneumococcal vaccine. These partnerships are expected to enable the local production of critical vaccines in a move that will ensure security of supply of essential vaccines to the Department of Health and also create opportunities for exports into the rest of Africa.

6.3 Research and development for energy security

In the energy space, the key focus will be on strengthening public-private partnerships with a view to building innovation-support infrastructure and fast-tracking the uptake of technologies from existing strategic initiatives like the Hydrogen South Africa (HySA) centres of competence (CoCs), and the hubs for renewable energy, advanced battery technology, and energy efficiency and demand-side management. The emphasis will also be on communicating the work done by the Department in the energy space, with other government departments, and increasing public awareness.

The Department seeks to influence long-term energy and mineral policy and decision making. In this regard, critical and reliable data has been made available to the Department of Energy for the finalisation of the Integrated Energy Plan (IEP). Influencing energy policy also involves advocating policy interventions and technologies like hydrogen fuel cells, for example, for inclusion in the IEP, depending on the R&D outcomes.

During 2016/17, the emphasis will be on building strategic funding and commercialisation partnerships for locally developed components and complete products, especially for fuel cell technologies. The aim is to pilot locally developed technologies in preparation for full commercialisation. The programme will also continue to facilitate manufacturing partnerships and opportunities for local deployment of both thin-film photovoltaic technologies and fuel cells.

6.4 National space capabilities for enhanced information management

The coordination role of SANSA for all national space activities will be strengthened over the MTEF period. The development of indigenous satellites will reduce South Africa's dependence on foreign technologies, lower the cost of imagery and allow for real-time, tailor-made solutions for South Africa. This will have societal benefit in areas such as agriculture and food security, the built environment (infrastructure and settlement monitoring), the management of water resources, air quality, natural hazards

and disasters, and forestry, land-cover and land-use mapping. The development of the indigenous satellite programme is also expected to spark the growth and viability of the national space industry.

Rigorous and targeted HCD programmes for satellite engineering and space applications will be pursued to develop critical mass for SANSA, research agencies and the space industry. The Department will also play a critical role in Operation Phakisa (Oceans Economy) by providing support for the establishment of a national oceans and coasts information management system and extending Earth observation capabilities through the development of the CubeSat constellation, with a specific focus on marine domain awareness.

6.5 Commercialisation of publicly financed R&D outputs

In the past decade, the introduction of several laws and policies including the Technology Innovation Agency Act, 2008, and the Intellectual Property Rights from Publicly Financed Research and Development (IPR) Act, 2008, led to the establishment of TIA and NIPMO, respectively. These policies will be strengthened over the next five years in order to accelerate the commercialisation of research outputs, where appropriate. Enhanced interventions to build and support a pipeline for the realisation of publicly funded R&D outputs with socio-economic impact will be carried out. These include a public-private partnership for the establishment of a new Venture Capital Fund as well as exploring a number of models for the roll-out of an enforcement fund to enable publicly financed institutions to ensure that third parties do not infringe on their IP rights. The transition of research along the various technology readiness levels to commercialisation, and the accompanying support measures implemented to achieve this, will be assessed and the information used by the Department towards the development and implementation of a framework/ methodology to fully quantify the actual and potential impact of scientific and technological innovation on economic growth and development.

A key focus will be on strengthening the connections and partnerships between business, government, science councils, higher education institutions and society, to ensure that South African innovations impact the country's citizens positively.

Complementary to public-private initiatives, the implementation of key policy initiatives will be championed and coordinated over the planning period. These policies include the Emerging Industries Action Plan through the implementation of the DST Commercialisation Framework, as well as the DST responsibilities articulated in IPAP.

6.6 Human capital development

The DST's 2015-2020 Strategic Plan highlights several specific strategic interventions to increase the capacity of the research system, accelerate its transformation, and monitor its impact. First, the exact financial and capacity implications of pursuing the NDP targets in respect of a steep increase in the number of PhD graduates need to be quantified. Second, new programmatic interventions need to be conceptualised to ensure a step change in the mostly incremental improvements in racial demographics of postgraduate students and the emerging researcher cohorts. Third, the impact of government's significant investment in doctoral training needs to be monitored through the establishment of a suitable platform that allows doctoral graduates to be tracked after their graduation. Fourth, the DST's science communication will be underpinned by the new Science Engagement Strategy, which requires the establishment of funding and institutional mechanisms.

In 2015/16, the DST worked with the Department of Higher Education and Training (DHET) and the NRF to develop projections of the financial resources required to address the HCD needs of the NDP. This modelling will be further refined in 2016/17, and will be incorporated into the finalisation of the implementation strategy for the DST's Strategy for Human Capital for Research, Innovation and Scholarship. In 2015/16, the Department completed a study to identify why the proportion of black graduates drops at higher postgraduate levels, discussed its findings with DHET and universities, and began formulating relevant policy responses, some of which will be implemented from 2016/17.

In order to determine the socio-economic impact of the DST's investments in postgraduate training and the ways in which the Department could improve the efficiency of its investments in this regard, a postgraduate tracking system project plan was completed and shared with the DHET and NRF in 2015/16. The plan will be tested in 2016/17, and should be rolled out in 2017/18.

It is crucial that awareness about STI and related careers is deeply embedded in communities to maximise the likelihood of school leavers choosing to pursue scientific and research careers. The Department's Science Engagement Strategy provides a framework that aligns efforts across all DST entities and partners to maximise the impact of science communication efforts. The Department will empower the South African Agency for Science and Technology Advancement (SAASTA) to implement the Science Engagement Strategy and ensure that science communication activities are prioritised and coordinated across all DST entities. The Department will also explore the feasibility of establishing a flagship national institution to support science engagement and promotion. A rural science centre planned for development in the Cofimvaba schools district of the Eastern Cape will be constructed over two financial years (2015/16 and 2016/17). In 2016/17, approval for an implementation plan for the four strategic objectives of the Science Engagement Strategy will be sought. The plan will list indicators of success (including baselines and targets), and provide for the management of the centralised science engagement budget. In 2016/17, approval will be sought for a detailed plan to top-slice the DST's funds to enable SAASTA to carry out specific functions, which still need to be finalised.

The NDP has highlighted the massive social challenge of youth underemployment and unemployment. The Department supports several effective interventions that provide opportunities to unemployed graduates, placing them in internships across a wide range of research-intensive organisations, both public and private. These interns make important contributions to the work of their host organisations, and the Department will seek resources to expand this programme.

6.7 Research and development infrastructure

The NDP sees the high domestic cost of broadband Internet connectivity as a major hindrance to development. The institutional management of the ICT environment needs to be well structured to close the digital divide. ICT is a key component of economic infrastructure such as transport, energy and water resources, and can be used to fight poverty and unemployment, and facilitate education and entrepreneurship.

The defined outputs and targets in the MTSF and the NDP outcomes include the construction and commissioning of 64 MeerKAT antennas under Strategic Infrastructure Project (SIP) 16: The Square Kilometre Array (SKA) and the MeerKAT project. The DST is also contributing to the aim of 100% broadband penetration by 2020 under SIP 15: Expanding access to communication technology.

The Department will continue to grow access to research infrastructure across the NSI by focusing on the initiatives below.

Research infrastructure grants

The target for the next MTEF period (2016/17 to 2018/19) is to award 210 research infrastructure grants to researchers and institutions across the innovation value chain. The grants will include support for innovation infrastructure in the form of pilot plants, technology demonstrators and specialised facilities.

MeerKAT/SKA radio astronomy telescope

On 25 May 2012, the SKA Organisation announced that Africa (South Africa and eight African partner countries) and an Australia-New Zealand consortium would share the hosting of the SKA. South Africa has also attracted other radio astronomy initiatives from abroad, namely the C-Band All Sky Survey and the Precision Array for Probing the Epoch of Reionization. The Department will invest about R724,9 million to complete the MeerKAT, the 64-dish demonstrator telescope of the SKA. The construction of phase 1 of the SKA is expected to start in the 2017/18 financial year.

Satellite programme infrastructure

The focus will be on the development of South Africa's nascent satellite technology platforms and infrastructure. In particular, this will see the manufacture, assembly, integration and testing of the EOSat1 Earth observation satellite. South Africa's first indigenous satellite (CubeSat) constellation will also be manufactured and launched with the objective of providing automatic identification system services to Operation Phakisa (Ocean Economy) and the broader African continent. Also key to the development of South Africa's launch capability is the need to ensure that a fully operational assembly, integration and testing facility is in place. This is expected to result in the Houwteq assembly, integration and testing facility being fully migrated to SANSA and upgraded gradually to world-class standard. However, this will only occur once ongoing, long-term negotiations with the Department of Public Enterprises have been concluded.

Through the SAEOS portal, the Department will strive to ensure that satellite imagery, products and services are made available to assist decision-making and service delivery at national, provincial and local government level.

National preclinical infrastructure facilities

The newly established national preclinical platform at North-West University is a world-class facility capable of conducting preclinical work in accordance with good laboratory practice (GLP) and good manufacturing practice (GMP). These two international quality standards are necessary for drug and vaccine production. A key priority will be to get the facility accredited for GLP and GMP, which will automatically give the facility international standing. The American multinational pharmaceutical company Pfizer has signed an agreement to perform some of the required rodent research once the facility has been fully accredited.

High-end infrastructure

The DST will focus on increasing the rate of development and the deployment of low-carbon technologies in the South African market. The work done through existing and new RDI initiatives is expected to result in pilot plants in the fields of lignocellulose, battery cell manufacturing, high-temperature membrane electrode assembly, algae-based biofuels, lithium ion battery precursor materials, metal hydrides, low temperature membrane electrode assembly catalysts, and multipurpose centrifuge. This will directly contribute towards MTSF Outcome 6: An efficient, competitive and responsive economic infrastructure network.

The Department will continue to fund projects that can unlock existing/new products and markets. A number of projects have been identified with economic potential provided R&D or technological development continues.

The high-end infrastructure funding allocation is essential to scaling up and maturing technology to unlock the market potential of leading R&D-led industry development projects. On the basis of the current portfolio of projects, the DST envisages an investment of about R80 million per year to-

- enable technology maturation of at least three projects that qualify for funding from the EIAP;
- expedite the development and maturation of at least five technology demonstrators derived from local IP;
- expedite and enable joint science, engineering and technology programmes with at least five projects that involve the private sector and three more involving foreign partners;
- help establish a follow-on pilot plant/technology demonstrator, financed predominantly by private industry.

Cyberinfrastructure

In terms of broadband capacity, the roll-out of a gigabit per second (Gbps) capacity broadband network through the South African National Research Network will continue to enable data transmission to all research and academic institutions. The national backbone and its points of presence will be upgraded to increase the average bandwidth per South African National Research Network site per year from 3 500 megabits per second (Mbps) in 2016/17 to 8 000 Mbps in 2018/19. The achievement of this

target will also increase the number of network users, contributing to the goal of expanding access to communication technology (SIP 15) to 100% broadband penetration by 2020.

In terms of data storage and management, two petabytes of data storage, shared between the primary Centre for High Performance Computing site in Cape Town and the disaster recovery site at the CSIR in Pretoria, are available through the Data Intensive Research Initiative South Africa (DIRISA) initiative. This capacity is used to host a CERN (European Organisation for Nuclear Research) Tier 2 data node, an international astronomy data mirror site and data from the Applied Centre for Climate and Earth Systems Science. It has become necessary to expand the DIRISA initiative so that it can store, curate and manage the growing data from these projects and new ones, especially the radio-astronomy data that will soon be generated at MeerKAT. During the next MTEF period it is envisaged that at least two Tier 2 regional data nodes will have been established, and a big data strategy finalised.

Towards the long-term provision of research infrastructure

The DST expects the South African Research Infrastructure Roadmap to be completed by the end of 2015/16. The roadmap will guide the strategic development, acquisition and deployment of research infrastructure as a necessary enabler for RDI.

It will include at least 10 research infrastructures with a focus on five scientific domains: humans and society; health, biological and food security; Earth and the environment; energy; and materials and manufacturing. Over the next five years a significant portion of infrastructure investment will be used to implement the roadmap. The DST will approach the National Treasury for a dedicated research infrastructure fund to support the implementation.

6.8 International cooperation and resources

To achieve its strategic goals, the DST will continue to develop and exploit a diverse and vibrant portfolio of international STI partnerships, seeking appropriate expansion, greater geographic diversity, and deeper partnerships with a greater focus on innovation and market-orientated research. The DST will continue to conduct world-class science diplomacy and, in a step change, seek to position South Africa as a leader in global STI governance to influence international decision-making according to South African interests. The Department will also promote more active participation by historically disadvantaged institutions in its international STI partnership portfolio.

In keeping with South Africa's foreign policy agenda, supporting the development of STI capacities in Africa will remain a strategic priority. The Department will strive to secure support and investment for African STI initiatives from international partners, through, for example, trilateral partnerships with development partners. National efforts will be made to support the implementation of the African Union's new Science, Technology and Innovation Strategy for Africa. The step change in approach will see a more strategic engagement with STI partnerships in Africa, which will seek to maximise South Africa's national interests.

Efforts to promote international STI partnerships will always be guided by the broader goal of harnessing STI to fight poverty, inequality and unemployment. These partnerships are not pursued as objectives in their own right, but must contribute directly to key DST strategies such as the TYIP, the Bio-economy Strategy, the ICT RDI Implementation Roadmap and the Strategy for Human Capital Development for Research, Innovation and Scholarship. The focus will also be on accessing international resources for flagship programmes such as Africa's hosting of the SKA and the DST's thematic priorities, including climate science, health innovation and minerals beneficiation.

Step changes in the Department's work will see the DST becoming more strategic in leveraging international resources that directly supplement or complement DST national investments in both knowledge generation and exploitation, as well as in developing international HCD programmes with a more ambitious and strategic focus, especially for PhD training.

7. OVERVIEW OF 2016/17 BUDGET AND MTEF ESTIMATES AND EXPENDITURE TRENDS

R'000	AUDITED OUTCOME			ADJUSTED APPROPRIATION	MTEF ESTIMATES		
PROGRAMME	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Administration	225,270	257,472	278,412	300,537	303,988	316,355	330,870
Technology Innovation	1,033,186	1,150,396	974,040	1,008,514	1,007,073	1,084,495	1,131,493
International Cooperation and Resources	102,875	104,546	107,589	121,359	124,463	130,026	136,543
Research Development and Support	2,302,770	3,198,833	3,489,837	4,238,825	4,200,596	4,419,879	4,561,395
Socio-Economic Innovation Partnerships	1,309,214	1,458,242	1,539,166	1,796,871	1,792,876	1,611,766	1,596,050
TOTAL	**4,973,315**	**6,169,489**	**6,389,044**	**7,466,106**	**7,428,996**	**7,562,521**	**7,756,351**
Compensation of employees	221,767	241,621	276,001	295,288	309,156	319,036	331,404
Goods and services*	164,991	160,974	169,849	199,703	200,547	210,278	221,233
Transfers and subsidies	4,580,045	5,703,875	5,936,872	6,968,806	6,916,984	7,030,789	7,201,156
Payments for capital assets**	6,490	63,019	6,230	2,309	2,309	2,418	2,558
Payments for financial assets***	22	-	92	-	-	-	-
TOTAL	**4,973,315**	**6,169,489**	**6,389,044**	**7,466,106**	**7,428,996**	**7,562,521**	**7,756,351**

Notes

* Included in goods and services for 2012/13 is a amount of R376 000 for interest and rent on land.
** The budget underpayments for capital assets are for machinery and equipment only.
*** The Department does not budget for payments for financial assets. Virements are effected to cover the spending on the item when necessary.

The expenditure trends of the DST are given below (reproduced from Table 30.2 of the Estimates of National Expenditure).

Vote expenditure trends by Programme and economic classification (excerpt from the ENE)

Programmes

1. Administration
2. Technology Innovation
3. International Cooperation and Resources
4. Research Development and Support
5. Socio-Economic Innovation Partnerships

Programme	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Revised estimate	Outcome/Annual budget average (%)	Outcome/Adjusted appropriation average (%)
R million	2012/13			2013/14			2014/15			2015/16			2012/13 - 2015/16	
Programme 1	202.7	229.4	225.3	268.2	245.7	257.5	291.0	291.9	278.4	299.8	300.5	297.1	99.7%	99.1%
Programme 2	1 156.4	1 142.8	1 156.8	1 627.1	1 653.6	1 669.7	991.6	1 008.9	974.0	1 008.8	1 008.5	1 008.0	100.5%	99.9%
Programme 3	141.2	139.3	136.5	148.4	145.4	139.8	119.7	119.3	107.6	122.0	121.4	120.9	95.0%	96.1%
Programme 4	2 035.9	2 064.7	2 039.0	2 476.8	2 475.8	2 462.7	3 503.8	3 496.9	3 489.8	4 247.1	4 238.8	4 238.5	99.7%	99.6%
Programme 5	1 419.8	1 423.4	1 415.7	1 677.6	1 677.6	1 639.8	1 564.1	1 562.8	1 539.2	1 804.5	1 796.9	1 796.7	98.8%	98.9%
Total	**4 955.9**	**4 999.6**	**4 973.3**	**6 198.2**	**6 198.2**	**6 169.5**	**6 470.2**	**6 479.9**	**6 389.0**	**7 482.1**	**7 466.1**	**7 461.1**	**99.5%**	**99.4%**
Change to 2015 Budget estimate											(16.0)			

Programme	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Revised estimate	Outcome/Annual budget average (%)	Outcome/Adjusted appropriation average (%)
R million	2012/13			2013/14			2014/15			2015/16			2012/13 - 2015/16	
Economic classification														
Current payments	**393.5**	**409.3**	**386.8**	**454.1**	**414.1**	**402.6**	**486.7**	**494.5**	**445.9**	**496.4**	**495.0**	**490.0**	**94.2%**	**95.2%**
Compensation of employees	242.3	247.6	221.8	260.7	251.4	241.6	283.8	284.9	276.0	291.3	295.3	295.3	96.0%	95.9%
Goods and services	151.2	161.7	164.6	193.3	162.7	161.0	202.9	209.6	169.8	205.1	199.7	194.7	91.7%	94.1%
of which:														
Advertising	*3.2*	*4.2*	*15.0*	*13.6*	*3.9*	*3.9*	*15.0*	*16.5*	*23.2*	*17.2*	*17.2*	*17.2*	*121.0%*	*141.9%*
Agency and support/ outsourced services	*18.4*	*14.9*	*22.0*	*16.6*	*11.7*	*11.7*	*17.7*	*14.4*	*8.1*	*16.9*	*14.5*	*14.5*	*80.8%*	*101.3%*
Travel and subsistence	*4.7*	*4.3*	*6.1*	*5.2*	*5.2*	*5.2*	*48.3*	*47.4*	*41.6*	*47.9*	*42.0*	*38.8*	*86.4%*	*92.6%*
Venues and facilities	–	–	*1.9*	–	–	–	*23.5*	*30.4*	*12.1*	*25.0*	*25.0*	*24.4*	*79.2%*	*69.4%*
Interest and rent on land	–	–	0.4	–	–	–	–	–	–	–	–	–		
Transfers and subsidies	**4 559.0**	**4 587.7**	**4 580.0**	**5 741.9**	**5 754.4**	**5 703.9**	**5 981.2**	**5 983.1**	**5 936.9**	**6 983.4**	**6 968.8**	**6 968.8**	**99.7%**	**99.6%**
Departmental agencies and accounts	2 823.8	2 811.0	3 042.6	4 174.9	4 179.4	3 762.9	4 409.3	4 393.7	4 011.0	5 466.0	5 457.1	5 433.9	96.3%	95.5%
Higher education institutions	33.6	33.6	124.2	–	–	156.2	21.4	38.9	228.0	114.6	114.6	114.6	367.4%	333.0%
Foreign government and international organisations						0.5								
Public corporations and private enterprises	972.6	1 015.7	1 329.0	1 034.2	1 034.2	1 698.0	1 140.8	1 145.5	1 573.1	1 253.3	1 249.8	1 249.8	132.9%	131.6%
Non-profit institutions	728.9	727.3	83.6	532.8	540.8	84.7	409.7	405.0	120.3	149.6	147.3	170.5	25.2%	25.2%
Households	–	–	0.6	–	–	1.7	–	–	4.4	–	–	–		

Programme	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Revised estimate	Outcome/Annual budget average (%)	Outcome/Adjusted appropriation average (%)
R million	2012/13			2013/14			2014/15			2015/16			2012/13 - 2015/16	
Payments for capital assets	**3.4**	**2.6**	**6.5**	**2.2**	**29.7**	**63.0**	**2.3**	**2.3**	**6.2**	**2.3**	**2.3**	**2.3**	**764.1%**	**211.7%**
Machinery and equipment	3.4	2.6	6.5	2.2	2.2	8.2	2.3	2.3	6.2	2.3	2.3	2.3	227.0%	247.4%
Software and other intangible assets	–	–	–	–	27.5	54.9	–	–	–	–	–	–		199.5%
Payments for financial assets	**–**	**–**	**0.0**	**–**	**–**	**–**	**–**	**–**	**0.1**	**–**	**–**	**–**	**–**	**–**
Total	**4 955.9**	**4 999.6**	**4 973.3**	**6 198.2**	**6 198.2**	**6 169.5**	**6 470.2**	**6 479.9**	**6 389.0**	**7 482.1**	**7 466.1**	**7 461.1**	**99.5%**	**99.4%**

- The 2016/17 budget and MTEF allocations are linked to the achievement of the Department's targets as shown in the detailed programme-based planning tables in Section B.
- The Department has indicated in the Situational Analysis that fiscal consolidation and potential budget cuts may impact on how the Department gives effect to its strategic goals.
- The low-growth climate may also impact on e.g. private-sector companies conducting research and development, and therefore on the degree to which these companies may access funding instruments such as the Research and Development Tax Incentive (which is a target for Programme 5). It is, however, not possible to predict the effect of these environmental factors.
- Currently, only Programmes 2 and 4 have modified their performance targets based on funding constraints – these implications are described in more detail in the relevant sections in Part B.
- In general, the Department will continue to pursue reprioritisation and greater efficiencies as ways of ameliorating the impact of funding constraints on the attainment of its strategic goals.

PROGRAMME AND CHIEF DIRECTORATE PLANS

B

PROGRAMME AND CHIEF DIRECTORATE PLANS

PART B: PROGRAMME AND CHIEF DIRECTORATE PLANS

(NOTE: Where numbers are given for 2015/16, please note that these have yet to be audited.)

PROGRAMME 1: ADMINISTRATION

Purpose: To provide strategic policy and planning alignment, ensure effective governance, risk management, and monitoring and evaluation, and provide strategic science communication with stakeholders about the activities of DST and the NSI.

Strategic overview

The Department's efforts to ensure sound administration practices and effective operational systems over the past five years have yielded positive results, including recognition through the Management Performance Assessment Tool (MPAT) administered by the Department of Planning, Monitoring and Evaluation. In the 2014/15 financial year, the DST and its entities received recognition from the Office of the Auditor-General for attaining clean audits. The focus over the ensuing period will be to improve on these established practices and explore continuous areas for improving operational efficiency, good governance practices and streamlined administrative processes. To enhance support from Programme 1 to the rest of the Department in achieving the DST's strategic objectives, a repositioning and redefinition of the administrative function in the Department will be required.

Informed by the NDP and the need to build an effective and capable developmental state that is transparent and accountable, over the next five years the DST will develop new areas of strategic intervention for operational systems and administration processes. The objective is to remain engaged, proactive and innovative to build on previous gains and establish new areas of growth and improvement. This will be done as follows:

(a) Efficient IT-driven operational and management functions

The Department needs to invest in the provision of reliable technology infrastructure that will help create a seamless administration capability. This will help to increase efficiency, provide access to information, and add value to productivity and performance. Modern, high-quality administration support needs to be built for the entire organisation. Part of the modernisation process should focus on the development and adoption of IT-based solutions for the Department. This will require investment in a robust and capable IT unit that is able to respond to modernisation and change.

(b) Strategic role for human resource management

The role of human resource management (HRM) has evolved from a functional and transactional one to a strategic one. It is important that the DST adopts a value-building and strategic approach to HRM. The Department aims to optimise organisational capacity by actively sourcing the best skills to support service delivery, and investing in the development of its employees to maximise their productivity. The transactional and functional nature of the current human resources function has limited organisational ability to work towards creating an enterprise that is built to perform and adaptable to change.

A strategic approach to HRM will assist the DST to initiate and sponsor change management through, among other things, the introduction of HRM technologies that are suitable and relevant to advancing organisational performance and efficiency. It will also become a reliable source of information on HCD, and trends related to talent management, performance and productivity. Through a considered talent management plan, the DST will consolidate its position by recruiting a combination of high-level technical and professional skills for relevant fields and components.

(c) Effective finance, audit and risk management functions

The finance, audit and risk management functions will enhance the integrity of the DST's operations by ensuring that they are ethical, efficient and compliant with legislation. In the past five years, the Department has established functional and effective finance and supply chain management, audit and risk management units. It is important that the scope and function of these components continues to be managed efficiently in the next five years, with clear improvements in the audit status of the Department. Specifically, there needs to be a focus on supply chain management processes, and effective and integrated IT systems. The strategic focus of the Internal Audit Activity is to achieve a greater level of maturity in the pursuit of a common strategy for improved risk management, governance, internal controls and internal audit. The Directorate: Enterprise Risk Management drives the Department's risk management process, by ensuring that the Department has appropriate policies, frameworks and guidelines, and supporting the Department in the identification, analysis, assessment and monitoring of risks.

(d) A team-based, high-performing and client-centred organisation

It is necessary to build an organisational culture that is team-based, but sets high standards for and expectations of all its employees. The DST is an organisation whose values are based on the Batho Pele principles. New service standards need to be designed and implemented so that internal and external clients will be confident that the Department will support their needs for service in a proactive, consistent and cooperative manner.

(e) Effective planning, monitoring and evaluation

The DST is a medium-sized organisation, but has a large mandate, which is to coordinate the work of the NSI. It has been organising all planning activities in a directorate with limited capacity and resources. In the next five years the DST will design a new planning unit that is well resourced and has adequate skills to (a) serve as a strategic planning unit for the DST and the STI; (b) serve as a knowledge repository for the DST and the STI; (c) conduct evidence-based research to provide current information for executive decision making; (d) communicate on STI research trends; and (e) assist the DST to plan for the STI through forecast studies on issues such as talent management in the STI, and the identification of knowledge gaps and policy challenges.

(f) An effective governance and compliance function

The DST has five public entities and three institutions that implement its various strategic goals. Approximately 92% of the DST budget is transferred to them. The DST requires a central unit to monitor the entities' regulatory compliance and accountability, and the implementation of the agreed objectives in their strategic plans, annual performance plans and shareholder compacts. This is in alignment with the Public Finance Management Act, 1999, and recommended in the NDP. The Directorate: Governance needs increased capacity and resources to manage the diverse interests of these public entities and institutions. In the next five years the DST will build a governance and advisory unit with the required capacity and skills. The unit will provide the public entities and institutions with sound and valid governance advisory services, and will play an oversight function while enabling accountability in the implementation of government's policy objectives. The component will add value by, among other things, the promotion of best practice and the design of standardised reporting tools for all entities.

(g) Strategic direction for NSI research and interventions

Since the 1996 White Paper on Science and Technology, the coordination of the NSI has been the DST's key function. However, the need for South Africa to increase economic growth rapidly and address poverty, unemployment and inequality requires a new strategic focus for the NSI. The DST needs to explore ways to coordinate the NSI better through for example, legislation or budget coordination mechanisms.

Strategic objectives

- To coordinate the identification, formulation and implementation of strategic initiatives, and ensure that the priorities of the DST and its entities are aligned to national priorities.
- To develop and maintain good corporate governance systems for the Department and its entities.
- To provide strategic communication for the DST and its entities through marketing, media and branding initiatives, and the Science Engagement Strategy.
- To make the DST an employer of choice, and acquire and retain appropriately skilled personnel.
- To provide an efficient and effective information technology service.
- To ensure efficient and effective financial and procurement services.

Chief directorates

Programme 1 is organised around two focus areas, namely, administration, and policy and planning functions. The Programme consists of the following components:

(a) **The Ministry and Office of the Director-General** support the Minister, Deputy Minister and Director-General by providing professional and executive support. This component is responsible for the development of systems and mechanisms for handling Parliamentary questions and replies, Cabinet matters, correspondence, submissions and memoranda. It also coordinates activities within the Department to assist in steering the NSI towards the development of a knowledge-intensive economy with higher productivity levels.

(b) **Enterprise Risk Management** drives and provides an enabling environment in support of creating and embedding an effective and adequate identification, management and oversight of risks across strategic, tactical and operational levels of the Department. This role includes ensuring that countering fraud and/or corruption is made an integral part of strategy, operations and administration in the Department.

(c) **Policy, Planning, Governance, Monitoring and Evaluation** supports the DST leadership in steering the NSI by facilitating the coordination of selected cross-cutting issues in the Department, strategic and operational planning, monitoring and evaluation for the Department and its public entities, and governance of the public entities, in order to assist the Department and its public entities to contribute to the realisation of departmental and national priorities.

(d) **Internal Audit Activity** is a primary assurance tool that supports stewardship and accountability in the spending of departmental funds and plays a key role in governance of the Department. It focuses on assessing the effectiveness of controls and advice to improve compliance with governance and accountability prescripts.

(e) **Human Resources** ensures that the Department is able to (a) provide a professional service through accurate, consistent and best employment practices in all its activities, which are aimed at supporting the achievement of the DST's strategic and operational objectives; (b) attract and retain employees who share the organisational vision; (c) champion change and transition, with a view to being a catalyst in the transition of people and the organisation to embrace and implement change; (d) set performance standards and manage performance against them; (e) promote an environment that supports the personal and career development of all employees so that they can reach their full potential and contribute better to the achievement of the Department's strategic objectives; and (f) instil a culture of service excellence.

As part of implementing the step changes in the 2015-2020 Strategic Plan of the Department, HRM will focus on capacitating employees through relevant interventions to ensure the required competence. The step change reflects on the strategic direction that the Department is taking for the next five years. Competence will be measured in terms of how well employees perform their tasks, as well as the cognitive and technical behavioural traits that they display.

(f) **Finance** ensures the effective, efficient and economic use of financial resources in line with financial prescripts through the development and implementation of financial systems, policies, frameworks and procedures. This includes budget planning and expenditure monitoring, and the management of procurement, acquisition, logistics, assets, and financial transactions.

(g) **Information Systems and Knowledge Management** is responsible for the delivery of services that support the Department's Strategic Plan and individual units' objectives through the effective use of IT. The component's purpose is to align the IT strategy with the business strategy to ensure that the Department uses its resources optimally.

(h) **Science Communication** provides strategic communication support to raise local and international awareness of the objectives and activities of the Department, its entities and the NSI, as well as to ensure effective communication among DST and NSI stakeholders. This is done through print, broadcast and online media, speeches, public participation programmes and other events. The component also supports science engagement programmes by SAASTA and others, and ensures the alignment of the DST communication strategy with the Government Communication Framework.

(i) **Legal Services** is responsible for ensuring that the interests of the Department are protected against any legal risk. The component ensures that the Department complies with relevant legislation and takes a proactive approach to dealing with matters that have the potential to give rise to conflict or legal challenges.

Table 5: Programme risk management - Administration

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To coordinate (the identification, formulation and implementation of strategic initiatives) and ensure that the priorities of the DST and its entities are aligned to the national priorities	Non-adherence to the strategic planning cycle	▪ Ongoing implementation and monitoring of the Policy, Planning and Procedure Manual ▪ Skills upgrade of the planning team (linked to personal development plans) ▪ Develop change management capabilities ▪ Schedule workshops with DDGs on planning process
To develop and maintain good corporate governance systems for the Department and its entities	Inaccurate, unreliable and incomplete reporting of actual achievements against predetermined objectives as indicated in the Annual Performance Plan (APP) (qualified audit opinion on non-financial performance)	▪ Develop a proposal for the introduction of a project management system (A project report template has been developed by the unit. The PPGME project management cycle has five phases: 1. Initiation, 2. Planning, 3. Implementation, 4. Evaluation, 5. Completion.) ▪ Improve the use of baselines for planning (use past performance to set current target standards). Attend the Programmes' planning sessions and advise them on how to formulate targets ▪ Develop a new reporting framework, including the following: Programme reporting; overall assessments (of policies, DST goals and objectives and outcomes), and data quality ▪ PPGME to participate in Programme meetings and give feedback from Exco to the directorates
To develop and maintain good corporate governance systems for the Department and its entities	Misalignment of entity objectives with DST objectives	DST and entities hold meetings at different levels throughout the year to communicate the DST priorities. The DST provides feedback on content and alignment issues regarding entity plans (strategic plans, annual performance plans and shareholder compacts) between August and January.
To develop and maintain good corporate governance systems for the Department and its entities	The occurrence of incidents of fraud and corruption	▪ Implementation of the 2016/17 approved Fraud Prevention and Detection Implementation Plan ▪ Quarterly verification of gift registers (as per the Fraud Prevention and Detection Plan) ▪ Process requests from employees to conduct remunerated work outside of Public Service
To provide strategic communication for the DST and its entities through marketing, media and branding initiatives, and the Science Engagement Strategy	Stakeholders (public) misinformed and/or uninformed of DST activities	▪ Develop an annual media, marketing and communication strategy strengthened by event-specific strategies to promote the government and Department message for the specific financial year ▪ Develop a template of event needs with deadlines outlined for each event indicated ▪ Implement and monitor the Communication Strategy

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To ensure effective and efficient legal services	Civil claims (litigation) against the DST by third parties (e.g. public, DST staff, contractors)	▪ Finalise contract management module on Alfresco to enable Programmes and project owners and project owners to monitor the performance of contractual obligations ▪ Interim measures are in place pending the final roll-out of the contract management module ▪ Implement the compliance management system
To build a harmonious and conducive working environment through effective security and facilities management	Unauthorised access to DST building	▪ Development of a daily inspection checklist ▪ Installation of additional cameras inside the building ▪ Continuous quarterly security awareness sessions ▪ Continuous access control at all access points ▪ Continuous provision of 24-hour guarding services ▪ Biometrics security system to be implemented to replace the card readers ▪ Implementation of security measures at the canteen and minister's boom gate parking entrances/exits by appointing dedicated security officer to control access, and by acquiring metal detectors ▪ Training and awareness sessions for DST employees on a quarterly basis ▪ Enforcing of vetting strategy ▪ Appointment of the service provider for the maintenance of security equipment
To provide an efficient and effective information technology service	Unauthorised access to DST data/information/ network (logical access)	▪ Copying of information to USB devices will be encrypted with the use of password protection ▪ Mobile device management solution for smart devices to be implemented to control devices with access to DST resources. This will enable IT to remotely control devices (part of the action plan is to develop a bring your own device policy) ▪ Sharing of the DST's own cloud with DST staff ▪ Conduct awareness sessions on IT policies

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To provide seamless service to all customers to ensure efficiency and effectiveness in service delivery	Inability of DST staff to continue with operations	▪ Annually review the IT Service Continuity Plan ▪ Annual review of the DST Emergency Response Plan ▪ Annual review of the IT Continuity Plan ▪ Validation of IT systems ▪ Water tanks to be installed to ensure availability during water interruptions at the DST ▪ Implementation of the Preventative Maintenance Plan ▪ Increase/expand current IT structure/capacity ▪ Corporate Services awareness sessions throughout the year will include IT and KIRMU awareness sessions
To provide seamless service to all customers to ensure efficiency and effectiveness in service delivery	Loss of institutional memory	Finalisation of the Knowledge Sharing Policy
To make the DST an employer of choice and retain appropriately trained personnel	Turnover of staff at the DST	▪ Development and implementation of DST Retention Strategy ▪ Enhanced implementation of capacity-building initiatives (roll-out of departmental programmes), which include leadership/management programmes (the Emerging and Advanced Management Development Programmes, Executive Development Programme, Global Leadership Programme, mentoring and coaching, job rotation and bursary programme) ▪ Implementation of the Head of Department Eight Principle Implementation Plan ▪ Reporting of the results of the 270-degree survey (performance enhancement tool aimed at identifying developmental needs of SMS members and implement developmental interventions)
To ensure effective and efficient financial and procurement services	Under/overspending of DST budget.	▪ Continuous one-on-one and ad-hoc sessions to be provided as and when required ▪ Monthly and quarterly submission of expenditure reports to Opco, Exco, the Enterprise Risk Management Committee, Audit Committee and MMM on the analysis of the monthly expenditure (a monitoring tool to ensure that risk remains within an acceptable range) ▪ Finance awareness sessions to educate officials on new and existing legislation and regulations and amendments to existing legislation and regulations ▪ Continuous one-on-one, ad-hoc sessions ▪ Awareness sessions will be provided as and when required

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To ensure effective and efficient financial and procurement services	Non-compliance with Supply Chain Management (SCM) policies and procedures by the DST staff	▪ Consistent application of the procurement document checklist by SCM practitioners ▪ Training of relevant staff on roles and processes ▪ Provision of briefing sessions to Bid Evaluation Committee members prior to the bid evaluation ▪ Raising DST staff awareness of new policies and guidelines. ▪ Programmes must draft an SCM demand (internal) and procurement plan (to be sent to National Treasury). Both documents must be sent to SCM unit by 31 March each year

Programme performance indicators and annual targets for 2016/17

Table 6: Programme performance indicators and targets for 2016/17

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To coordinate the identification, formulation and implementation of strategic initiatives and ensure that the priorities of the DST and its entities are aligned to national priorities									
DST planning documents (Strategic Plan, APP, Estimates of National Expenditure (ENE)	Percentage alignment of DST planning documents (APP aligned to Strategic Plan, and ENE aligned to APP) submitted to Parliament	Minimum of 90% alignment of DST planning documents for 2018/19 (APP aligned to Strategic Plan) submitted to Parliament by 31 Mar. 2019	DST planning documents not aligned	APP submitted to Parliament; ENE Chapter input submitted to Finance.	Minimum of 100% alignment between the 2015/16 APP and 2015-2020 Strategic Plan was achieved. APP and Strategic Plan submitted to Parliament on 12 March 2015	Minimum of 90% alignment[1] of DST planning documents for 2016/17 (APP aligned to Strategic Plan) submitted to Parliament by 31 Mar. 2016	Minimum of 90% alignment of DST planning documents for 2017/18 (Strategic Plan aligned to APP) submitted to Parliament by 31 Mar. 2017	Minimum of 90% alignment of DST planning documents for 2018/19 (APP aligned to Strategic Plan) submitted to Parliament by 31 Mar. 2018	Minimum of 90% alignment of DST planning documents for 2018/19 (APP aligned to Strategic Plan) submitted to Parliament by 31 Mar. 2019
		100% alignment between 2017 DST ENE and 2017/18 APP by 31 Mar. 2019	No baseline	100% alignment between DST ENE and APP (performance indicators)	71,4% alignment between APP and ENE	90% alignment between the 2016 DST ENE and 2016/17 APP by 31 Mar. 2016	90% alignment between the 2016 DST ENE and the 2016/17 APP by 31 Mar. 2017	90% alignment between 2017 DST ENE and 2017/18 APP by 31 Mar. 2018	100% alignment between 2018 DST ENE and 2018/19 APP by 31 Mar. 2019

1 90% is considered a more realistic target given shifts in the policy environment (e.g. funding cuts) that might require amendment of plans and budgets.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
DST public entities' strategic plans, APPs and shareholder compacts	DST public entities' strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards	DST public entities' 2019/20 strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 Mar. 2019	Approved APPs (HSRC, NRF, SANSA, ASSAf and the African Institution of South Africa (AISA)) and strategic plans tabled in Parliament: AISA, NRF, HSRC, TIA, SANSA and ASSAf Signed shareholder compacts: CSIR, AISA, NRF, SANSA and HSRC	The APPs of entities for the 2014/15 and shareholder compacts were approved by the Minister prior to the start of the 2014/15 financial year. They were tabled in Parliament on 12 March 2014.	Strategic plans and APPs for DST public entities (HSRC, SANSA, TIA, ASSAf, NRF, CSIR and NACI) were approved by the Minister by 5 March 2015 and shareholder compacts were signed	DST public entities' 2016/17 strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 Mar. 2016	DST public entities' 2017/18 strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 Mar. 2017	DST public entities' 2018/19 strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 Mar. 2018	DST public entities' 2018/19 strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
	Percentage alignment of the planning documents of entities with those of the DST as an indicator of the contribution of entities towards national imperatives	100% alignment of DST strategic priorities and entities' APPs by 31 Mar. 2019	-	-	-	New indicator	90% alignment in DST strategic priorities and entities' APPs by 31 Mar. 2017	90% alignment in DST strategic priorities and entities' APPs by 31 Mar. 2018	90% alignment in DST strategic priorities and entities' APPs by 31 Mar. 2019
Strategic objective: To develop and maintain good corporate governance systems for the Department and its entities									
In-year monitoring reports	Number of DST performance reports (quarterly reports and annual report) approved by Exco and signed by DG (quarterly reports approved and signed within 60 days after the end of each quarter)	12 DST quarterly performance reports approved by Exco and signed by the DG within 60 days after the end each quarter	Approved DST performance reports	4 DST 2013/14 quarterly performance reports approved and signed by the DG within 60 days after each quarter	4 DST 2014/15 quarterly performance reports approved by Exco and signed by the DG within 60 days after each quarter	4 DST 2015/16 quarterly performance reports approved by Exco and signed by the DG within 60 days after the end of each quarter	4 DST 2016/17 quarterly performance reports approved by Exco and signed by the DG within 60 days after the end of each quarter	4 DST 2017/18 quarterly performance reports approved by Exco and signed by the DG within 60 days after the end of each quarter	4 DST 2018/19 quarterly performance reports approved by Exco and signed by the DG within 60 days after the end of each quarter

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
		3 DST 2017/18 annual reports approved by Exco and signed by the DG by 31 May 2018	1 DST 2011/12 annual report approved by Exco and signed by the DG	1 DST 2012/13 annual report approved by Exco and signed by the DG	1 DST 2013/14 annual report approved by Exco and signed by the DG by 31 May 2014	1 DST 2014/15 annual report approved by Exco and signed by the DG by 31 May 2015	1 DST 2015/16 annual report approved by Exco and signed by the DG by 31 May 2016	1 DST 2016/17 annual report approved by Exco and signed by the DG by 31 May 2017	1 DST 2017/18 annual report approved by Exco and signed by the DG by 31 May 2018
	Number of Exco-approved reports on DST MPAT scores submitted to the Accounting Officer and DPME	Six Exco-approved reports on DST MPAT scores submitted to the Accounting Officer and DPME by 31 Mar. 2017	-	-	-	New indicator	Two Exco-approved reports on DST MPAT scores submitted to the Accounting Officer and DPME by 31 Mar. 2017	Two Exco-approved reports on DST MPAT scores submitted to the Accounting Officer and DPME by 31 Mar. 2018	Two Exco-approved reports on DST MPAT scores submitted to the Accounting Officer and DPME by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Combined assurance model	Number of combined assurance model[2] performance reports presented to audit and risk committees	Combined Assurance Model and Plan for the DST approved by audit and risk committees by 31 Mar. 2017	-	-	-	New indicator	2 combined assurance model performance reports presented to the audit and risk committees by 31 Mar. 2017	2 combined assurance model performance reports presented to the audit and risk committees by 31 Mar. 2018	2 combined assurance model performance reports presented to the audit and risk committees by 31 March 2019
Strategic objective: To provide strategic communication for the DST and its entities through marketing, media and branding initiatives, and the Science Engagement Strategy									
Media articles	Number of media articles written to raise the DST's public profile	48 media articles written to raise the DST's public profile by 31 Mar. 2019	No baseline	No baseline	New target	16 media articles written to raise the DST's public profile by 31 Mar. 2016	16 media articles written to raise the DST's public profile by 31 Mar. 2017	16 media articles written to raise the DST's public profile by 31 Mar. 2018	16 media articles written to raise the DST's public profile by 31 Mar. 2019
Public participation programmes	Number of public participation programmes held	30 public participation programmes held by 31 Mar. 2019	10 public participation programmes conducted	13 public participation programmes conducted	7 public participation programmes conducted by 31 Mar. 2015	10 public participation programmes held by 31 Mar. 2016	10 public participation programmes held by 31 Mar. 2017	10 public participation programmes held by 31 Mar. 2018	10 public participation programmes held by 31 Mar. 2019

2 An assurance model for the Department that integrates and aligns assurance processes within the Department to maximise risk and governance oversight, control efficiencies, and optimise overall assurance presented to the audit and risk committees.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To make the DST an employer of choice and recruit and retain appropriately skilled personnel									
Suitable skills and competencies for the DST	Turnaround time to fill vacancies	90 days to fill a vacancy after date of advertisement by 31 Mar. 2019	90 days to fill a vacancy after date of advertisement	90 days to fill a vacancy after date of advertisement	73 days to fill a vacancy after date of advertisement	90 days to fill a vacancy after date of advertisement by 31 Mar. 2016	90 days to fill a vacancy after date of advertisement by 31 Mar. 2017	90 days to fill a vacancy after date of advertisement by 31 Mar. 2018	90 days to fill a vacancy after date of advertisement by 31 Mar. 2019
	Vacancy rate reduced to a set rate	Vacancy rate retained at 7% by 31 Mar. 2019	10,63% vacancy rate	Vacancy rate reduced to 6%	Vacancy rate reduced to 5,6%	Vacancy rate retained at 6% by 31 Mar. 2016	Vacancy rate retained at 6% by 31 Mar. 2017	Vacancy rate retained at 6% by 31 Mar. 2018	Vacancy rate retained at 7% by 31 Mar. 2019
Strategic objective: To provide an efficient and effective information technology service									
Enterprise architecture for the DST	Number of enterprise architecture development life cycle steps developed and implemented	Future state enterprise architecture implemented by 31 Mar. 2019 (Architecture Development Model Phase H)	No baseline	2 enterprise architecture development life cycle steps developed and implemented	2 enterprise architecture development life cycle steps were developed and implemented by 31 Mar. 2015	2 enterprise architecture development life cycle steps developed and implemented by 31 Mar. 2016	Future state enterprise architecture implemented by 31 Mar. 2017	Future state enterprise architecture implemented by 31 Mar. 2018	Future state enterprise architecture implemented by 31 Mar. 2019 (Architecture Development Model Phase H)
Strategic objective: To ensure effective and efficient financial and procurement services									
Sound procurement process	Turnaround time to pay suppliers	Suppliers paid within 30 days of receipt of invoice	No baseline	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Unqualified audit report on financial matters issued by the Auditor-General	Unqualified audit report on financial matters issued by the Auditor-General	Clean audit report on financial matters issued by the Auditor-General by 30 Sept. 2018	Unqualified audit report issued by the Auditor-General	Unqualified audit report on financial matters issued by the Auditor-General	Unqualified audit report on financial matters issued by the Auditor-General	Unqualified audit report on financial matters issued by the Auditor-General by 30 Sept. 2015	Unqualified audit report on financial matters issued by the Auditor-General by 30 Sept. 2016	Clean audit report on financial matters issued by the Auditor-General by 30 Sept. 2017	Clean audit report on financial matters issued by the Auditor-General by 30 Sept. 2018

Table 7: Quarterly targets for the 2016/17 financial year

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Percentage alignment of DST planning documents (APP aligned to Strategic Plan, and ENE aligned to APP) submitted to Parliament	Quarterly	Minimum of 90% alignment of DST planning documents for 2017/18 (APP aligned to Strategic Plan) submitted to Parliament by 31 Mar. 2017	No target	First draft of 2017/18 APP submitted to National Treasury and DPME by 31 Aug. 2016	Second draft of 2017/18 APP submitted to National Treasury and DPME by 30 Nov. 2016	Minimum of 90% alignment of DST planning documents for 2017/18 (APP aligned to Strategic Plan) submitted to Parliament by 31 Mar. 2017
		90% alignment between 2017 DST ENE and 2017/18 APP by 31 Mar. 2017	No target	No target	First draft ENE input (performance information) submitted to Finance by 15 December 2016	Second draft ENE chapter input (performance information) submitted to Finance by 31 Dec. 2016 90% alignment between 2017 DST ENE and 2017/18 APP by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
DST public entities' strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards	Quarterly	DST public entities' 2018/19 strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 Mar. 2017	No target	First draft strategic plans and APPs for DST public entities (HSRC, SANSA, TIA, ASSAf, NACI and NRF) submitted to NT and DPME by 31 Aug. 2016	Second draft strategic plans and APPs for DST public entities (HSRC, SANSA, TIA, ASSAf, NACI and NRF) submitted to NT and DPME by 30 Nov. 2016	DST public entities' 2017/18 strategic plans and APPs approved by the Minister (HSRC, SANSA, TIA, ASSAf, NACI and NRF) by 28 Feb. 2017 Shareholder compacts signed by the Minister and chairpersons of the boards by 31 Mar. 2017 (CSIR, HSRC, SANSA, TIA, NRF and ASSAf)
Percentage alignment of the planning documents of entities with those of the Department as an indicator of the contribution of entities towards national imperatives	Quarterly	90% alignment in DST strategic priorities and entities' APPs by 31 Mar. 2017	No target	No target	Assessment report on level of alignment between the 1st draft entities' APPs to DST strategic objectives by 31 Dec. 2016	Assessment report on level of alignment between the entities' APPs to DST strategic objectives by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of DST performance reports (quarterly reports and annual report) approved by Exco and signed by DG (quarterly reports approved and signed within 60 days after the end of each quarter)	Quarterly and annually	4 DST 2016/17 quarterly performance reports approved by Exco and signed by the DG 60 days after the end of each quarter	1 DST quarterly performance report (2015/16 quarter 4) approved by the Exco and signed by the DG after the end of the quarter	1 DST quarterly performance report (2016/17 quarter 1) approved by the Exco and signed by the DG after the end of the quarter	1 DST quarterly performance report (2016/17 quarter 2) approved by the Exco and signed by the DG after the end of the quarter	1 DST quarterly performance report (2016/17 quarter 3) approved by the Exco and signed by the DG after the end of the quarter
		1 DST 2015/16 Annual Performance Report approved by Exco and signed by the DG by 31 May 2016	1 DST 2015/16 Annual Performance Report approved by Exco and signed by the DG by 31 May 2016	No target	No target	No target
Number of Exco-approved reports on DST MPAT scores submitted to the Accounting Officer and DPME	Biannually	Two Exco-approved reports on DST MPAT submitted to the Accounting Officer and DPME by 31 Mar. 2017	No target	One Exco-approved report on DST MPAT submitted to the Accounting Officer and DPME by 30 Sept. 2016	No target	One Exco-approved report on DST MPAT submitted to the Accounting Officer and DPME by 31 Mar. 2017
Number of combined assurance model performance reports presented to the audit and risk committees	Annually	2 combined assurance model performance reports presented to the audit and risk committees by 31 Mar. 2017	No target	1 combined assurance model performance report presented to the audit and risk committees by 30 Sept. 2016	No target	1 combined assurance model performance report presented to the audit and risk committees by 31 Mar. 2017
Number of public participation programmes held	Quarterly	10 public participation programmes held by 31 Mar. 2017	2 public participation programmes held by 30 June 2016	2 public participation programmes held by 30 Sept. 2016	3 public participation programmes held by 31 Dec. 2016	3 public participation programmes held by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of media articles written to raise the DST's public profile	Quarterly	16 media articles written to raise the DST's public profile by 31 Mar. 2017	4 media articles written to raise the DST's public profile by 30 June 2016	4 media articles written to raise the DST's public profile by 30 Sept. 2016	4 media articles written to raise the DST's public profile by 31 Dec. 2016	4 media articles written to raise the DST's public profile by 31 Mar. 2017
Turnaround time to fill vacancies	Quarterly	90 days to fill vacancy after date of advertisement by 31 March 2017	90 days to fill vacancy after date of advertisement by 30 June 2016	90 days to fill vacancy after date of advertisement by 30 Sept. 2016	90 days to fill vacancy after date of advertisement by 31 Dec. 2016	90 days to fill vacancy after date of advertisement by 31 Mar. 2017
Vacancy rate reduced to a set rate	Quarterly	Vacancy rate retained at 6% by March 2017	Vacancy rate retained at 6% by 31 Mar. 2017	Vacancy rate retained at 6% by 31 Mar. 2017	Vacancy rate retained at 6% by 31 Mar. 2017	Vacancy rate retained at 6% by 31 Mar. 2017
Number of enterprise architecture development life cycle steps developed and implemented	Quarterly	Future state enterprise architecture implemented by 31 Mar. 2017	Implementation and migration projects (Phase 1 of 4) developed by 30 June 2016	Implementation and migration projects (Phase 2 of 4) developed by 30 Sept. 2016	Implementation and migration projects (Phase 3 of 4) developed by 31 Dec. 2016	Implementation and migration projects (Phase 4 of 4) developed by 31 Mar. 2017
Turnaround time to pay suppliers	Quarterly	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice	Suppliers paid within 30 days of receipt of invoice
Unqualified audit report on financial matters issued by the Auditor-General	Annually	Unqualified audit report on financial matters issued by the Auditor-General by 30 Sept. 2015	No target	Unqualified audit report on financial matters issued by the Auditor-General by 30 Sept. 2015	No target	No target

Reconciling performance targets with the budget and MTEF

Table 8: Administration expenditure estimates

R'000 PROGRAMME	EXPENDITURE OUTCOME			ADJUSTED APPROPRIATION 2015/16	MEDIUM-TERM EXPENDITURE ESTIMATES		
	2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Ministry	2 790	3 403	3 972	4 252	4 369	4 510	4 687
Management	65 852	78 510	81 736	101 608	105 426	109 593	114 545
Corporate Services	146 897	164 571	183 897	181 009	180 325	187 798	196 515
Governance	6 594	7 828	7 550	8 952	9 307	9 670	10 090
Office Administration	3 137	3 160	1 257	4716	4 561	4 784	5 033
TOTAL	**225 270**	**257 472**	**278 412**	**300 537**	**303 988**	**316 355**	**330 870**
Compensation of employees	111 328	122 972	140 072	143 922	149 820	154 426	160 413
Goods and services	108 232	112 175	122 121	141 510	138 999	146 008	153 613
Transfers and subsidies	930	14 287	10 222	12 796	12 860	13 503	14 286
Payments for capital assets	4 526	8 038	5 964	2 309	2 309	2 418	2 558
Payments for finacial assets	11	-	33	-	-	-	-
TOTAL	**225 270**	**257 472**	**278 412**	**300 537**	**303 988**	**316 355**	**330 870**

PROGRAMME 2: TECHNOLOGY INNOVATION

Purpose

To enable R&D in space S&T, energy security and the bioeconomy, and in the emerging and converging areas of nanotechnology, robotics, photonics and indigenous knowledge systems (IKS), and to promote the realisation of commercial products, processes and services from these R&D initiatives. In addition, through the implementation of enabling policies and interventions along the entire innovation value chain, to promote the protection and utilisation of IP, technology transfer and technology commercialisation.

Strategic overview

Programme 2 contributes to all five of the Department's strategic outcome-oriented goals in the 2015-2020 Strategic Plan, namely, (1) a responsive, coordinated and efficient NSI; (2) increased knowledge generation; (3) human capital development; (4) using knowledge for economic development; and (5) knowledge utilisation for inclusive development.

The Programme's resources are targeted at initiatives that aim to generate products, processes and/or services that will assist in addressing the burden of disease, energy security and food security, and creating skills and knowledge to enhance industrial and economic competitiveness. These contributions therefore have both a direct and an indirect impact on the triple challenge of unemployment, poverty and inequality, as is indicated in further detail below.

Various initiatives that Programme 2 implements and supports contribute to decision-making processes in government. These are elaborated upon further in the document.

Strategic Outcome-Oriented Goal 1: A responsive, coordinated and efficient NSI

In line with Strategic Outcome-Oriented Goal 1 on building a responsive, coordinated and efficient NSI, the coordination of various role players – including government, industry, science councils and academia – continues to receive specific attention.

In an effort to strengthen the NSI, the coordination of key stakeholders – in government and in private or public sector institutions – is being undertaken to ensure optimal contributions across the value chain. The Programme continues to ensure that the institutional capacity of key agencies such as SANSA and TIA is strengthened and geared towards improved service delivery. The Programme also ensures that the DST contributes to the development and implementation of government policies where for example, STI has a role to play, such as in improving energy security for the country; alleviating poverty; contributing to health care; and promoting local innovation. These interventions are aligned with the priorities of sector departments such as Trade and Industry (IPAP); Agriculture, Forestry and Fisheries (the Agricultural Policy Action Plan); Energy (IEP); Environmental Affairs (Operation Phakisa: Oceans Economy); and Mineral Resources (Operation Phakisa: Mining). This is done through DST-led strategies such as the Energy Security Grand Challenge, the Bio-economy Strategy (for the "Farmer to Pharma" or Bio-Economy Grand Challenge), Space S&T Grand Challenge and National Nanotechnology Strategy, and legislative frameworks, namely, the Intellectual Property Rights from Publicly Financed Research and Development Act (IPR Act) and the Technology Innovation Agency Act.

Under Strategic Outcome-Oriented Goal 1, there will be a concerted effort to support ongoing work in relation to the activities of the Executive Council established in terms of the Genetically Modified Organisms Act, 1997 (Act No.15 of 1997). In this regard, the Programme will continue to lead and make recommendations that will influence policy on the safety of activities involving GMOs, as part of the process of contributing to effective decision making in the sector.

Energy security is a serious challenge for South Africa, which needs to meet the country's medium-term energy supply requirements while using STI in the long term to support the development of clean coal technologies, renewable energy and the

promise of the "hydrogen economy" to ensure a safe, clean, affordable and reliable energy supply for the country. The Programme will focus on ensuring that the three fuel cell technology centres leverage each other's strengths to support the Department of Trade of Industry-led National Fuel Cell Task Team. The work supported through the CSIR and TIA in the implementation of renewable energy programmes (solar and biofuels) will promote the integration of local technologies into the Renewable Energy Independent Power Producer Procurement Programme and Biofuels Industrial Strategy.

Strategic Outcome-Oriented Goals 2 and 3: Increased knowledge generation and human capital development

In support of Strategic Outcome-Oriented Goals 2 and 3, the Programme focuses on key strategic research areas, namely, space science, energy security, emerging research areas and bio-innovation. The Programme provided funding support to more than 250 postgraduate students (MSc and PhD) by the end of December 2015 through structured HCD programmes. The number of postgraduate students supported is expected to increase to 392 in 2016/17. Furthermore, the Programme supported a number of strategic RDI programmes related to government priorities. By the end of December 2015, the Programme had provided support for three such programmes, and this number is expected to increase to 25 in the 2016/17 financial year. These innovation-enabling programmes also respond to Strategic Outcome-Oriented Goals 2 and 3, by contributing to HCD efforts in designated areas. Programme 2 will continue to work in collaboration with Programme 4 to strengthen the existing complementarities in the broader HCD space.

Programme 2's innovation-enabling programmes also contribute to knowledge products such as patents and publications. This is important to track, as an increase/decrease in the number of these outputs corresponds to an increase/decrease in the translation of scientific R&D outputs into commercial products, processes and services, which are crucial to developing a knowledge-based economy. By the end of December 2015, 65 knowledge products had been generated as a result of the Programme's initiatives. This number is expected to increase to 119 in the 2016/17 financial year.

Strategic Outcome-Oriented Goal 4: Knowledge utilisation for economic development

The introduction of new R&D products into the market presents multiple challenges that require government to create the necessary regulatory/policy frameworks, develop appropriate skills (including expert knowledge in the discipline and relevant to the technology, but also translational and technology commercialisation skills) and infrastructure to enable RDI, support the demonstration and piloting of new technologies, and ensure that appropriate IP protection and support mechanisms are in place.

In this regard, the development and assessment of technically sound methodologies and procedures for objective evaluation of the proposed DST investments to support decision making in respect of future investments on the part of the DST and its commercialisation partners will continue in 2016/17. These actions are part of the implementation of the DST Commercialisation Framework.

The Commercialisation Framework is also a precursor to the EIAP, which will serve as a mechanism to enable partnerships across government with industry partners in order to increase market access (local and foreign), and to improve funding certainty by leveraging commitments from development finance institutions. Programme 2 initiatives that have been selected for assessment and possible support as part of the EIAP include hydrogen fuel cells (under HySA), active pharmaceutical ingredients (under Ketlaphela) and vaccines (under Biovac). It is anticipated that these initiatives will be integrated into the Nine-Point Plan to diversify and grow the economy. These programmes, and others identified by the Department, will be subject to the methodology developed as part of the Commercialisation Framework.

The DST's Centres of Competence (CoC) Framework was aimed at conceptually positioning CoCs as a mechanism in the NSI to close the gaps along the innovation and technology development value chains; provide support for technology development and systems integration; develop technology-enhanced production capabilities; develop productive human capacity; and facilitate technology commercialisation. A CoC development and evaluation programme was consequently conceptualised, refined and

implemented. It comprises-

- an assessment of the CoC Framework assumptions with a view to deriving policy-relevant research for the possible design of a national CoC programme;
- the establishment, incubation and evaluation of the Biomedical Translational Research Initiative and the Synthetic Aperture Radar Initiative over a period of three years, with a view to deriving key lessons learnt for the operationalisation and sustainability of future CoC programmes.

Support will be provided in 2016/17 as part of the year 2 roll out of these initiatives.

In addition, the Programme will put measures in place to articulate the Department's investment focus in nanotechnology for the next 10 years. The intent is to create an environment enabling nanotechnology innovation and commercialisation, guided by a roadmap for nanotechnology innovation and commercialisation (Nanotechnology Vision 2025). Activities in the 2016/17 financial year are geared towards its development and finalisation. Furthermore, support and efforts towards leveraging outputs from R&D investments in ongoing nanotechnology programmes are anticipated to realise commercialisable products in the near future.

A specific effort is being made to harness indigenous knowledge to create new products (traditional medicines, cosmeceuticals, and nutraceuticals) and to develop new markets (for indigenous plant and animal species) that will support the creation of employment in communities where the knowledge originates.

The Programme will also continue to support the inclusion of R&D outputs from DST-supported initiatives such as thin-film photovoltaic technology (PTiP) and solar thermal technology (Helio 100) into the broader government energy programmes. Work on hydrogen fuel cell technologies will focus on the validation of locally developed components and their integration into imported technologies in order to increase local content.

The National Intellectual Property Management Office (NIPMO), which is the implementing office for the IPR Act, stimulates greater economic and social returns resulting from IP generated through R&D activities conducted using public funds, through a number of interventions including financial support through the Offices of Technology Transfer (OTT) Support Fund and the IP Fund. By the end of 2014/15, NIPMO had supported the creation of 66 posts for highly skilled individuals through the OTT Support Fund and provided resourcing for at least another 19 posts in the 2015/16 financial year. Furthermore, financial support for prosecution and maintenance of IP rights has exceeded R61 million over the last four years. Both areas of support will continue in the 2016/17 financial year. These interventions are all aimed at equipping institutions to increase knowledge utilisation for advanced economic and social development. Furthermore, enhanced interventions to build and support a pipeline for the realisation of publicly funded R&D outputs with socio-economic impact will be implemented. This will include an assessment of modalities and the feasibility of establishing a new venture capital fund based on a public-private partnership, as well as exploring a number of models for the roll-out of an enforcement fund to enable publicly financed institutions to ensure that third parties do not infringe on their IP rights.

Strategic Outcome-Oriented Goal 5: Knowledge utilisation for inclusive development

A number of tools have been established in support of Strategic Outcome-Oriented Goal 5 (knowledge utilisation for inclusive development).

The SAEOS portal was established to give the Earth observation community the opportunity to access data and eventually analyse Earth observations and geospatial datasets according to the priority applications of the users. The tools translate user enquiries into instructions to access data from the contributing databases residing with their custodians, and return such data promptly enough to meet user requirements, and in a format and language that users can understand. The SAEOS portal ensures that satellite imagery, geospatial datasets, products and services are made available to assist decision-making and service delivery at national, provincial and local government level.

In particular, the provision of Earth observation and geospatial information through the SAEOS portal and the development of satellite applications in land cover and land use will provide decision-support tools and information for policy formulation in government, and therefore contribute to the protection of environmental assets; human settlement planning and development; rural connectivity; and monitoring and evaluation of government infrastructure projects. The tools continue to be improved to respond to user requirements and government priorities, and to support other tools required by decision-makers in various spheres of government.

Work towards manufacturing of South Africa's first indigenous satellite (CubeSat) constellation will also commence, with the objective of providing automatic identification system services to Operation Phakisa (Oceans Economy) and the broader African continent. This constellation will also provide infrastructure for Marine and Maritime Domain Awareness, and the Oceans and Coasts Information Management System, which will generate information services and support decision-making in marine protection and governance (marine spatial planning).

Following the launch of the Bio-Energy Atlas in 2015/16, the Programme will focus on supporting its use by different spheres of government. This decision-making tool will allow stakeholders to have a better appreciation of the bioenergy resources geographic spread, proximity to infrastructure (biofuels and electricity) and possible use in improving energy access. In partnership with Programme 5, the focus will be on supporting at least three municipalities to use information provided by the Bio-Energy Atlas to develop bankable business cases for bioenergy production that may be funded by development finance or finance donor institutions.

Programme's contribution to reducing unemployment, poverty and inequality

Programme 2 has a number of initiatives aimed at addressing high-level government priorities, involving all its chief directorates and the entities it works with.

As far as employment creation is concerned, NIPMO has supported the creation of a number of jobs in the past five years through the establishment of OTTs, and is in the process of creating more jobs. The DST's IKS portfolio has a number of community-based programmes focusing on the growing and processing of indigenous knowledge-based crops. These programmes empower communities through benefit-sharing agreements, but most importantly help to create employment for local communities, especially young people and women.

In terms of addressing inequality, the broad-based black economic empowerment imperatives of government are being actively supported. The above IKS projects also address this challenge by establishing community-based cooperatives and SMEs.

In respect of poverty alleviation, Programme 2 supports various initiatives aimed at improving access to quality health care and, therefore, the livelihoods of the country's poor. These include innovations in support of poverty-related diseases such as tuberculosis, HIV/Aids, malaria, as well as diseases that contribute to high child and maternal mortality. The innovations are primarily in the areas of diagnostics – for cost-effective deployment at point of care, specifically developed to suit rural environments.

Programme's contribution to decision-support tools to improve the delivery of government services or functions

Programme 2 implements and supports various initiatives that contribute to decision-making processes in government. Key examples are highlighted below.

Contribution of Earth observation, geospatial information and satellite constellation: The provision of Earth observation and geospatial information through the SAEOS portal, and the development of satellite applications in land cover and land use, will provide decision-support tools and information for policy formulation in government, and therefore contribute to the protection of environmental assets, human settlement planning and development, rural connectivity, and the monitoring and evaluation of government infrastructure projects. In addition, the CubeSat constellation will support decision-making in marine protection and governance (marine spatial planning).

The identification of the geographic spread of bioenergy resources, their proximity to infrastructure (biofuels and electricity) and possible use in improving energy access is integral to the Bio-Energy Atlas. The Bio-Energy Atlas thus constitutes a key decision-making tool for stakeholders, including all sectors of government, in this domain.

In the health domain, the development of the mTriage tablet application provides a decision-support device that assists emergency care hospital staff in providing a better assessment of the status of patients, thereby improving efficiencies in emergency response. The Programme supported the development of a mobile application of the Primary Health Care Standard Treatment Guidelines and Essential Medicines List. This application provides guidelines for the use of essential drugs in primary health care settings. The application was launched by the Department of Health in the 2015/16 financial year.

Strategic objectives

- To facilitate and resource investments in space S&T, energy, bio-innovation, nanotechnology, robotics, photonics, IKS, IP management, technology transfer and technology commercialisation in order to create value chains and an innovation system that is more capable, dynamic and responsive.
- To oversee, monitor and regulate key policy initiatives, including institutions/agencies and support interventions in the key strategic areas of space S&T, energy, bio-innovation, nanotechnology, robotics and photonics.
- To coordinate and support high-end skills development in –
    - the strategic and emerging S&T areas of synthetic biology, structural biology, systems biology and functional genomics (collectively the South African Biodesign Initiative), space S&T, energy, bio-innovation, nanotechnology, robotics, photonics and IKS;
    - IP management, technology transfer and technology commercialisation.
- To support, promote, and advocate the development and translation of scientific R&D outputs into commercial products, processes and services that will contribute towards economic growth and a better quality of life.

From these strategic objectives, it is clear that the work of the Programme cuts across policy, research, development, commercialisation/utilisation of R&D outputs and service delivery support, thus covering the whole spectrum, including policy formulation and implementation, knowledge generation, and activities that convert knowledge into societal and economic value.

The key work of the Programme therefore relates to the following strategic outcome-oriented goals:

- Policy indicators (policy directives): Strategic Outcome-Oriented Goal 1.
- Research indicators (student support and publications): Strategic Outcome-Oriented Goals 2 and 3.
- Technology development indicators (including patent applications, processes, products and services, prototypes, demonstration units and pilot plants): Strategic Outcome-Oriented Goal 4.
- Technology commercialisation indicators (licences, spin-out companies and commercial companies): Strategic Outcome-Oriented Goals 4 and 5.

Chief directorates

The Programme is made up of four chief directorates and one specialised service delivery unit (SSDU).

Bioinnovation[3]

This component leads the implementation of the national Bio-economy Strategy, approved by Cabinet in 2013, which is intended to ensure that the bioeconomy makes a significant contribution to the South African economy. The Strategy focuses on the following:

- Strengthening the research and innovation competencies that form the strategic foundation for the bio-based NSI.
- Developing and/or supporting strategic RDI programmes that provide for new knowledge and innovation outcomes related to the government's priority requirements.
- Coordinating role players across the NSI to ensure that appropriate skills, knowledge and competencies are made available to maximise socio-economic impact.
- Mainstreaming applied IKS-based R&D, inclusive innovation and local manufacturing to support commercialisation models for sustainable livelihoods and improved quality of life.

The chief directorate supports a number of cross-cutting initiatives that support these objectives, including an NRF-based capacity development programme in bio-informatics, technology service platforms (which provide expert services to both the public and private sectors), and a public awareness programme. The Department also participates in the Executive Council established in terms of the GMO Act, providing expert advice and decision-support tools.

Health Innovation

This directorate provides support for the development of health solutions. In the past few years, it has supported initiatives on vaccines, drugs and diagnostics for malaria, tuberculosis and HIV/Aids. The directorate plans to accelerate its contribution to health service delivery challenges in the areas of HIV/Aids, tuberculosis, malaria and non-communicable diseases such as diabetes and cancer. The technological solutions supported include the discovery of new drugs, the development of vaccines and biologicals, new point-of-care diagnostics, and the use of information technologies to strengthen service delivery. .

For example, a tuberculosis diagnostic test developed by the DST-funded Preclinical Drug Development Platform at North-West University (NWU) was validated in the 2015/16 financial year and a prototype is ready for commercialisation. The test can detect tuberculosis in less than two hours and can be used in resource-limited settings to provide quick and accurate diagnosis at a very low cost. The Department will be working with NWU to investigate the possibility of commercialising the test.

The Seq2Res product is an easy-to-use web-based programme that facilitates routine HIV drug-resistance testing in South Africa. The analysis of data generated from the pooling of samples from multiple patients lowers the cost of HIV drug-resistance testing by as much as two-thirds (from $150 per patient for a conventional resistance test to as little as $40). A spin-out company, Hydrax, was formed to commercialise the product.

While many technologies focus on disease impacts, some also address inequality and unemployment challenges. For example, the Umbiflow device allows primary health care practitioners to medically assess pregnant women's placental function. This supports healthcare, particularly in remote and low-resource settings. The mainstreaming and interfacing of African traditional medicines also plays a critical role in the development of safe, efficacious and affordable medicines, while providing employment opportunities for the knowledge-holding communities.

3 This chief directorate was previously called "Bioeconomy", and was referred to as such in the 2015-2019 Strategic Plan.

The 2016/17 financial year will see the introduction of a nanomedicine platform spanning several universities and science councils, which is expected to apply, in the health sector, the expertise developed through the activities of the chief directorate. A precision medicine initiative will also be established, focusing on cancers and auto-immune diseases prevalent in Africa. This initiative will be developed as a partnership between academia and the industry.

Furthermore, at least one drug candidate for malaria will enter Phase 2 clinical trials, and one medical device that will provide point-of-care diagnostics in HIV/Aids and tuberculosis will enter the final phase of R&D. The establishment of a vaccine and biologics manufacturing facility (that will be accredited for Good Laboratory Practice and Good Manufacturing Practice standards) will be facilitated during the 2016/17 financial year. Support for Ketlaphela will also continue with a view to building a state-owned local manufacturing capacity to help meet the needs of the healthcare system and reduce reliance on foreign imports. These initiatives are expected to contribute directly to Outcome 2 in terms of a long and healthy life for all South Africans by focusing on Sub-outcome 8 (HIV/Aids and tuberculosis prevented and successfully managed) and Sub-outcome 9 (Maternal, infant and child mortality reduced).

Agriculture

In terms of agriculture, the two main themes at present are crop/plant improvement and animal health. Previously, the DST supported the sequencing of the gum tree (*Eucalyptus spp.*), which industry indicates has led to significant cost reductions in their breeding programmes (allowing them to remain globally competitive). The development with DST support of sterile insect technology for the citrus industry has reduced pest infestation and increased the profitability of the sector.

Under crop improvement, the wheat-breeding platform (a partnership between DST, academia, and industry) will be targeting five new cultivars in support of increased productivity and food security by 2020 (this includes the local production of cultivars with improved yields, drought tolerance, or pest and disease resistance). The focus will be on supporting existing initiatives in the wheat-breeding platform, expanding the government-wide soybean improvement programme with a focus on breeding (inbound technologies), and pest and disease management.

The ongoing feasibility studies for agroprocessing will be monitored and new opportunities for investment identified. The ongoing aquaculture study will be supported to refine bio-innovation opportunities aligned with the ocean economy. In the animal health arena, there is ongoing work on foot-and-mouth disease to support the development of a point-of-care diagnostic. Both contribute to the Agricultural Policy Action Plan. Commercial opportunities for agroprocessing for a variety of indigenous species will be prioritised. The DST is working closely with the Department of Rural Development and Land Reform to position agricultural innovation, e.g. through the agricultural parks initiative. The aim is to provide increased agricultural competitiveness, leading to employment opportunities and (in the case of wheat and soybean) reduced trade balances.

Industry and the environment

Under the industrial and environmental components of the bioeconomy, the longer-term focus will be to stimulate bioenterprise start-up development that supports the creation of new industries, and to enable existing industries' access to technologies that can enhance their competitiveness. The support of a variety of technology start-ups by the DST led to the generation, by the end of 2014, of revenue of nearly a billion rand, and has created a number of skilled jobs.

The work that will be undertaken in the coming year on enzyme and protein reagents will form a strong research foundation for the creation of start-ups, and will be accelerated over the MTEF period. The component will also continue to support technology-based interventions for the forestry sector to improve efficiencies and competitiveness. In the sugar sector, the component will support the development of skills and technologies that can be applied to strengthen the biorefinery approach to generate new product streams, improving the sector's competitiveness. Feasibility studies on biochemicals will be undertaken to identify new opportunities for investment.

Indigenous knowledge-based technology innovation

The harnessing of indigenous knowledge in the creation of useful products, empowerment, and job creation in communities will continue. The many advantages of this include the development of new health products that can improve quality of life and create wealth for knowledge holders, and through the development of crop management, post-harvest handling, and agroprocessing capabilities, create jobs in communities. To date, 20 communities have been involved and an estimated 650 jobs have been created.

The IKS programmes supported in 2015/16 provide opportunities for mainstreaming IK-based technology innovation in traditional medicines, cosmeceuticals, nutraceuticals and indigenous beverages. These programmes resulted in the commercialisation of three products in 2015/16, contributing to sustainable livelihoods and improved quality of life. During 2015/16, two pilot agroprocessing facilities were at different phases of establishment. These will be finalised in 2016/17, and four new prototype products will be ready for commercialisation. The process will involve the establishment of two agroprocessing/manufacturing plants, training opportunities for community members, the facilitation of market access, and community beneficiation of IP.

Hydrogen and Energy

The chief directorate is developing a portfolio of technologies to contribute towards resolving the energy security challenge, to increase local mineral beneficiation, and to facilitate South Africa's transition towards a knowledge-driven economy.

In line with the NDP, the MTSF and the Nine-Point Plan, the chief directorate seeks to facilitate the achievement of economic development and social equity by including locally developed cleaner energy technology solutions in South Africa's energy system. This will be done by, among other things, supporting key government initiatives like Operation Phakisa, mineral beneficiation and climate change mitigation to stimulate new industries that may assist in addressing the triple challenge of unemployment, poverty and inequality.

The focus of the chief directorate will be to ensure that an environment exists to enable world-class R&D, with outputs that support inclusive development. For example, the chief directorate will facilitate the integration of components developed through the HySA programme into fuel cell units, which will be deployed at selected schools and clinics for technology testing and validation.

With respect to technology commercialisation, discussions will be held with relevant stakeholders in order to ensure that commercialisation partnerships are structured in a manner that supports the development of new industries as well as transformation. These partnerships will target additional financial support of R100 million per annum for the technology demonstration and validation phase. Specific components such as membrane electrode assemblies containing the HySA catalyst and metal hydride hydrogen storage material will be tested and validated in the market. In this regard, HyPlat, a spin-out company from the University of Cape Town and Mintek, is expected to make its first commercial sales of the catalyst and possibly also membrane electrode assemblies towards the end of the 2016/17 financial year. A hydrogen-powered forklift integrated with a metal hydride hydrogen storage extension tank with associated fuelling developed by HySA Systems, will be launched during 2016/17 at the Impala Platinum Refinery located in Springs. The metal hydride hydrogen storage material plant at the University of the Western Cape is now fully operational and will produce sufficient material for validation. A pilot plant to support the development of lithium-ion battery precursor material will be launched in Nelspruit in 2016/17. This initiative will enable the local production of lithium-ion batteries, which will facilitate the deployment of renewable energy and address other applications such as e-mobility.

In the biofuels space, the component will support the DoE in finalising the biofuels regulatory regime and continue to commercialise late-generation technologies that reduce potential fuel insecurity. In this regard, the Coalgae™ product, which is a mix of coal discards and algae, would be subject to independent testing. If successful, this will be followed by piloting at 1 hectare scale in 2017/18. This pilot plant will require a capital investment of R60 million and an operational budget of R20 million per

annum in order to bring the product to commercial readiness. In addition, the focus will be on supporting the Renewable Energy Independent Power Producer Procurement Programme by ensuring that the local content of the solar technologies is increased significantly to improve the technology balance of payments.

The Heliostat 100 (Helio 100) technology for concentrating solar power plants will be demonstrated, with the aim of piloting in partnership with commercial players in 2016/17, and possible commercialisation in subsequent years. The commercialisation options of the thin-film photovoltaic technology will be further explored with local government and National Treasury within the energy regulatory frameworks. The technology development will be supported through piloting and further testing as a solution for existing embedded generation in live environments such as the Scientia (CSIR) Campus and in the uMkhanyakude District. The battery packs manufactured in the pilot plant at the University of the Western Cape containing locally developed materials will be integrated with renewable energy sources like solar and wind for technology testing and demonstration in 2017/18.

On the policy front, the chief directorate will develop decision-support tools through resource quantification and provide data on the performance of alternative energy supply options. In this regard, the bioenergy and solar energy atlases will be launched, while the feasibility of both ocean and geothermal energy will be confirmed by 2017/18. The Centre for Energy Systems Analysis and Research will focus on getting energy data on the heavy industries in order to define departmental interventions in energy efficiency and demand-side management. The possible use of solar energy as a supply option for the free basic energy and use of existing solar water heater systems to address space heating and displace other risky options will be completed by 2017/18. This work directly enhances government initiatives to increase access and facilitate the transition to cleaner energy for all households, regardless of socio-economic status. In an effort to consolidate the DST research support to shale gas exploration, the Department will table a shale gas technical readiness report with Cabinet. This will be followed by an international conference that will provide an opportunity to leverage international expertise to inform the country's shale gas RDI plan.

The third focus area will involve ensuring that public awareness of energy outputs and offerings is improved, by demonstrating how the technologies assist in solving socio-economic challenges, and using the media to publicise this. The chief directorate will develop a booklet on the work it is doing, the contents of which may be used to strengthen the Department's website content. The chief directorate will also continue to monitor the Cofimvaba energy solution intervention until it is handed over to the Department of Basic Education, and will expand into other sectors such as health and local government.

Space Science and Technology

Space S&T supports the creation of an environment conducive to the implementation of the National Space Strategy (NSS) and SAEOS, as well as addressing the development of innovative applications and human capital to respond to national priorities and boost socio-economic growth. The NSS and SAEOS are informed by the policy principles of the National Space Policy, developed by the Department of Trade and Industry, which identified three primary goals for the National Space Programme:

- To capture a global market share for small to medium-sized space systems in support of the establishment of a knowledge economy, by fostering and promoting innovation and industrial competitiveness.
- To empower better decision-making through the integration of space-based and ground-based systems, so that the correct products can be provided at the right time.
- To use space S&T to develop applications for the provision of geospatial, telecommunication, timing and positioning products and services.

The TYIP identified the following key goals for the South African space S&T sector:

- Ensuring that independent Earth observation high-resolution satellite data (information) is available for Africa from a constellation of satellites designed and manufactured in Africa.
- Specifying and co-building a domestic/regional communications satellite and securing a launch slot and an International Telecommunication Union slot for its operations.

There is a deficit of engineers in the space sector, and black and female engineers are under-represented. Although this is a serious problem, it presents an opportunity for more rigorous and targeted HCD initiatives in satellite engineering, remote sensing and applications development programmes. The component will facilitate the establishment of an HCD programme that improves the absorptive capacity of the space industry to ensure that students are taken up by SANSA and the broader industry.

The chief directorate and SANSA will position and represent South Africa at the Group on Earth Observations (GEO), the Committee on Earth Observation Satellites, the United Nations Committee on the Peaceful Uses of Outer Space, the International Telecommunication Union and other key international gatherings, in order to position the country as a user of space for peaceful uses. In response to GEO, the component has established SA-GEO, a voluntary group of South African Earth observers, organised around communities of practice, whose activities are administered by the National Earth Observation and Space Secretariat (NEOSS). NEOSS was established to implement the objectives of SAEOS and NSS, by serving as a vehicle to encourage collaboration and data sharing, and by coordinating Earth observation user needs across a number of societal benefit areas.

The outcomes of the space S&T activities can be divided into the following categories:

- Sufficient satellite technology and infrastructure to support satellite development, which will increase technology know-how, and result in South Africa progressing as an emerging space nation.
- The creation of a viable domestic space industry.
- The wide use of space-based goods, products and services. This will lead to an increase in innovation; economic growth and investment; and access to information for better decision-making in natural resource management, spatial planning and enhanced service delivery (monitoring and evaluation).

The satellite technology platforms and infrastructure in space S&T will play an important role in decision-making processes in both the public and private sectors, and will contribute towards the following:

- Outcome 7: Vibrant, equitable rural communities contributing towards food security for all.
- Outcome 9: Responsive, accountable, and efficient developmental local government system.
- Outcome 10: Protect and enhance South Africa's environmental assets and natural resources.

Innovation Priorities and Instruments

Innovation Priorities and Instruments supports and strengthens the innovation policy package (and related interventions) aimed at creating and sustaining an enabling environment for innovation, technology development, and the commercialisation of publicly funded R&D initiatives. It does this by identifying, developing, creating and supporting policy and institutional structures that facilitate technology development and its progression into national and international markets.

This includes the conceptualisation, piloting, and monitoring and evaluation of innovation policy instruments, such as those centred on the Department's Commercialisation Framework and, related to the Framework, the EIAP, and supporting the development and implementation of emerging and converging technologies that have the potential to influence and affect social and economic development positively, in areas such as synthetic biology, structural biology, systems biology and functional genomics (collectively comprising the South African Biodesign Initiative), nanotechnology, photonics and robotics.

Over the next three years, the transition of research along the various technology readiness levels to commercialisation, and the support measures to achieve this, will be assessed and the information used towards the Department's development and implementation of a framework/methodology to support technology development and commercialisation funding decisions. The chief directorate will also initiate the assessment of the requirements towards the possible establishment of a public-private technology commercialisation (venture capital) funding mechanism.

There will be a focus on driving public-private partnerships, with initiatives such as the following-

- The Innovation Bridge (IB) showcasing and matchmaking event and the complementary portal, a key action emanating from the drive to enhance partnerships with the private sector.
- Internship and/or mentorship programmes, based primarily on partnerships between the public and private sectors.

The following key policy initiatives will be championed, implemented and coordinated over the MTEF period:

- The EIAP, as part of the implementation of the DST Commercialisation Framework.
- The Commercialisation Framework.
- Contributions to the development and implementation of DST actions under IPAP.

For emerging research areas, there will be a greater focus on innovation, including the following:

- The HCD base developed to date will be consolidated in support of researchers and postgraduate students in the emerging research areas of nanotechnology, photonics, robotics and synthetic biology, with postgraduates, peer-reviewed publications, and technology prototypes and demonstrators being produced.
- The development and maintenance of core capacity and capability, through ongoing support for the nanotechnology innovation centres, with associated world-class R&D infrastructure, leading to the advancement of current and new industries, and the increased competitiveness of South African companies.
- The articulation of the emerging research and technology activities as part of the implementation of the advanced manufacturing associated roadmaps being conducted under the stewardship of Programme 5, as well as the implementation of the Bio-economy Strategy.

National Intellectual Property Management Office

NIPMO is the implementing agency established in terms of the IPR Act, and is currently located in the Department as a specialised service delivery unit. NIPMO was established to provide for the more effective utilisation of IP emanating from publicly financed R&D. NIPMO's key functions, as set out in the IPR Act, are as follows:

- To facilitate the establishment of OTTs at institutions (29 higher education institutions and 10 Schedule 1 institutions, which are mostly science councils) and associated capacity development.
- To ensure compliance with the IPR Act and Regulations by recipients of publicly financed R&D.
- To provide funding through the IP Fund for the protection and maintenance of IP emanating from publicly financed R&D.
- To provide incentives for IP creators to encourage them to disclose, protect and commercialise their creations.

By providing incentives, support, capacity development, funding and compliance services, NIPMO is expected to contribute towards increasing the rate of knowledge utilisation from publicly funded R&D, thereby contributing towards faster economic development in South Africa. In particular, as a result of NIPMO's interventions, six OTTs will be supported for capacity development, a total of 180 candidates will be trained in IP and specialised technology transfer skills, 100% of eligible claims from institutions will be awarded a rebate from the IP Fund in line with the requirements of the IP Fund Guideline, and a total of 275 new disclosures will be received from publicly funded institutions. These disclosures will be monitored biannually through the innovation value chain steps of evaluation, protection, pre-commercialisation and commercialisation (where revenue is received by an institution).

Table 9: Programme risk management and identification - Technology Innovation

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To facilitate and provide resource investments in space S&T, energy, bio-innovation, nanotechnology, robotics, photonics, IKS, IP management, technology transfer and technology commercialisation in order to create value chains and an innovation system that is more capable, dynamic and responsive	Ineffective implementation of IPR Act	▪ Continue with the implementation of the three-year strategy for NIPMO (including financial support to institutions, incentives required, skills development and awareness initiatives) ▪ Determine the effectiveness of the awareness sessions in line with the NIPMO Strategy ▪ MTEF submission, engagements with the Human Resources, Finance and IT units ▪ Finalise the development and implementation of the NIPMO Business Intelligence Management Information System ▪ NIPMO formalised training initiatives ▪ Evaluation and implementation of short learning programmes
To oversee, monitor and regulate key policy initiatives, including institutions/agencies and support interventions in the key strategic areas of space S&T, energy, bio-innovation, nanotechnology, robotics and photonics	Public institutions deviating from their policy mandate	▪ Formal delegation of authority (in writing) for oversight monitoring and regulation (including roles, responsibilities and standard operating procedures) ▪ Customised reporting template for financial and non-financial reporting ▪ Recommend approval of entities' APPs and shareholder compacts for 2017/18 (the dates must be aligned to the DST planning cycle) ▪ Quarterly monitoring, and evaluation of entity performance
To support, promote and advocate the development and translation of scientific R&D outputs into commercial products, processes and services that will contribute towards economic growth and a better quality of life	Environment that is not conducive to innovation and the commercialisation of technology (for socio-economic impact)	▪ Continue with the implementation of the Commercialisation Framework ▪ The development and implementation of the EIAP
To support, promote and advocate the development and translation of scientific R&D outputs into commercial products, processes and services that will contribute towards economic growth and a better quality of life	Suboptimal utilisation and commercialisation of R&D outputs	▪ Develop and implement DST IP policy ▪ Implement the Commercialisation Framework Implementation Plan ▪ High-end skills developed in strategic areas ▪ EIAP implemented ▪ Bio-economy Strategy implementation plans implemented ▪ Review the Earth Observation strategy ▪ Strengthen the operationalisation of the memorandum of agreement between NIPMO and the Companies and Intellectual Property Commission ▪ Assess the level of alignment between innovation incentives

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To support, promote and advocate the development and translation of scientific R&D outputs into commercial products, processes and services that will contribute towards economic growth and a better quality of life	Misaligned strategic direction amongst NSI stakeholders	Host appropriate forums to ensure the convergence of similar initiatives, and a multidisciplinary and interdisciplinary approach where necessary (e.g. include issue-based and ad-hoc meetings between the relevant DST officials and entities)
To coordinate and support high-end skills development in- ▪ the strategic and emerging S&T areas of synthetic biology, structural biology, systems biology and functional genomics (collectively the South African Biodesign Initiative), space S&T, energy, bio-innovation, nanotechnology, robotics, photonics and IKS ▪ IP management, technology transfer and technology commercialisation	Insufficient professionals with adequate high-end skills	High-end skills developed in strategic areas to address the inadequate human resource capacity and capability (in terms of numbers and relevant skills) in the NSI

Table 10: Programme performance indicators and targets for 2016/17

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To facilitate and resource investments in space science, energy, bio-innovation, nanotechnology, robotics, photonics, IKS, IP management, technology transfer and technology commercialisation									
Instruments to support knowledge utilisation	Number of instruments[4] funded in[5] support of knowledge utilisation	84 instruments funded in support of knowledge utilisation by 31 Mar. 2019			3	7	25 instruments funded in support of knowledge utilisation by 31 Mar. 2017	30 instruments funded in support of knowledge utilisation by 31 Mar. 2018	29 instruments funded in support of knowledge utilisation by 31 Mar. 2019
Knowledge products	Number of knowledge products[6] generated	360 knowledge products generated by 31 Mar. 2019	7 knowledge products generated	7 knowledge products generated	11 knowledge products generated	118 knowledge products generated by 31 Mar. 2016	119 knowledge products generated by 31 Mar. 2017	120 knowledge products generated by 31 Mar. 2018	121 knowledge products generated by 31 Mar. 2019
Policy directives developed in science and technology	Number of policy directives[7] developed and adopted by government[8]	17 technology development and innovation policy directives developed and adopted by government by 31 Mar. 2019	No baseline	No baseline	3 technology development and innovation policy directives developed and adopted by government	4 technology development and innovation policy directives developed and adopted by government by 31 Mar. 2016	5 technology development and innovation policy directives developed and adopted by government by 31 Mar. 2017	8 technology development and innovation policy directives developed and adopted by government by 31 Mar. 2018	4 technology development and innovation policy directives developed and adopted by government by 31 Mar. 2019

4 Instrument means a formally established (by contract) entity/initiative (also virtual) that is used towards support for increased localisation, competitiveness, R&D-led industry development and service delivery support.

5 Instruments funded in support of knowledge utilisation are inclusive of the initiatives that were included in the 2015/16 APP under the Number of innovation-enabling programmes indicator, namely the hosting of the Innovation Bridge Technology Showcase and Matchmaking Event, the implementation of the Innovation Bridge Portal, the implementation of public-private sector initiatives such as the industry internship programme, the implementation of the Commercialisation Framework Programme (and any associated strategies that emerge as a consequence), the Emerging Industries Action Plan Programme and initiatives in support of OTT activities. The scope has been broadened to include other initiatives resulting in an increase in the target.

6 Knowledge products refer to filings/applications or registration/granting of IPRs and publications generated in space science, ERAs, energy and the bioeconomy. IPRs are inclusive of the categories of IPRs that were included in the 2014/15 APP, namely patents and trade marks.

7 Policy directives include policy briefs, implementation plans, concept documents, position papers, strategies, policy recommendations, cabinet memoranda and chapter contributions towards key policy documents.

8 Government includes the DST, other government departments, clusters and the Cabinet.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Decision-support interventions	Number of decision-support interventions[9] developed and maintained	6 decision-support interventions maintained by 31 Mar. 2019	No baseline	No baseline	No baseline	No baseline	2 decision-support interventions maintained by 31 Mar. 2017	2 decision-support interventions maintained by 31 Mar. 2018	2 decision-support interventions maintained 31 March 2019
Regulatory[10] recommendations	Number of regulatory recommendations for decision support by government	85 regulatory recommendations for decision support by government by 31 Mar. 2019	No baseline	No baseline	No baseline	No baseline	27 regulatory recommendations for decision support by government by 31 Mar. 2017	28 regulatory recommendations for decision support by government by 31 Mar. 2018	30 regulatory recommendations for decision support by government by 31 Mar. 2019

9 Decision-support interventions help people think about choices they face; they describe where and why choice exists, and provide information about options, including, where reasonable, the option of taking no action. These interventions aim to help people to deliberate, independently or in collaboration with others, about options by considering relevant attributes to help them consider short, intermediate and long-term outcomes with relevant consequences. Decision-support interventions assist the process of constructing preferences and eventual decision making in a particular situation.

10 Regulatory recommendations are recommendations made to support the work of other government departments as mandated by specific laws, regulations, guidelines and specifications.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To oversee, monitor and regulate[11] key policy initiatives, including institutions/agencies and support interventions[12] in the key strategic areas of space science, energy, bio-innovation, nanotechnology, robotics, photonics									
New disclosures reported by publicly funded institutions in terms of the development and translation of R&D outputs into products, processes and services	Number of new disclosures reported by publicly funded institutions	900 new disclosures reported by publicly funded institutions by 31 Mar. 2019		No baseline 197 new disclosures received from publicly funded institutions	250 new IP status and commercialisation reports received	275 new disclosures reported by publicly funded institutions by 31 Mar. 2016	275 new disclosures reported by publicly funded institutions by 31 Mar. 2017	300 new disclosures reported by publicly funded institutions by 31 Mar. 2018	325 new disclosures reported by publicly funded institutions by 31 Mar. 2019
Evaluation and assessment reports	Number of evaluation and assessment reports[13] developed and approved by Exco	36 evaluation and assessment reports developed and approved by Exco by 31 Mar. 2019	7 evaluation and assessment reports submitted for approval	7 evaluation and assessment reports submitted for approval	8 evaluation and assessment reports submitted for approval	9 evaluation and assessment reports developed and approved by Exco by 31 Mar. 2016	12 evaluation and assessment reports developed and approved by Exco by 31 Mar. 2017	12 evaluation and assessment reports developed and approved by Exco by 31 Mar. 2018	12 evaluation and assessment reports developed and approved by Exco by 31 Mar. 2019

11 This includes the monitoring, evaluation, verification and coordination of the performance of institutional arrangements and support interventions in line with strategies, annual performance plans and implementation plans, as well as relevant legislative requirements.

12 Support interventions are institutional arrangements such as coordinating committees, partnerships, joint ventures and other strategic arrangements undertaken to drive the implementation of national, and specifically DST, policies and strategies.

13 Evaluation and assessment reports refer to reports on the performance of institutional arrangements and support interventions in line with strategies, annual performance plans and implementation plans, as well as regulatory actions in line with relevant legislative requirements.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To coordinate and support high-end skills development in the strategic and emerging S&T areas of space science, energy, bio-innovation, nanotechnology, robotics, photonics , synthetic biology, structural biology, systems biology and functional genomics (collectively the South African Biodesign Initiative), IP management, technology transfer and technology commercialisation									
Postgraduate research students	Number of postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives	1 183 postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives by 31 Mar. 2019	274 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives	326 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives	517 postgraduate students (MSc, PhD) supported through DST-funded research and development initiatives	382 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives by 31 Mar. 2016	392 postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives by 31 Mar. 2017	395 postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives by 31 Mar. 2018	396 postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives by 31 Mar. 2019
Trainees in the strategic and emerging research areas	Number of trainees[14] supported[15] in strategic and emerging research areas	960 trainees supported in strategic and emerging research areas by 31 Mar. 2019	90 trainees supported in strategic and emerging research areas	145 trainees supported in strategic and emerging research areas	340 trainees supported in key strategic areas	180 trainees supported in strategic and emerging research areas by 31 Mar. 2016	280 trainees supported in strategic and emerging research areas by 31 Mar. 2017	320 trainees supported in strategic and emerging research areas by 31 Mar. 2018	360 trainees supported in strategic and emerging research areas by 31 Mar. 2019

14 Trainees include students, interns, technicians, mentors, academics, researchers, innovators, entrepreneurs and IP candidates.

15 Support includes bursaries, internships, high-end skills development initiatives (including the provision of facilities, resources and equipment), conferences and workshops. Most of the support is provided by entities reporting to the DST.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To support, promote, and advocate for the development and translation of scientific R&D outputs into commercial products, processes and services that will contribute towards economic growth and a better quality of life									
New technology products, processes and/or services developed	Number of new technology products, processes and/or services developed	17 new technology products, processes and/or services developed by 31 Mar. 2019	37 new technology innovation products, processes and/or services developed	4 new technology innovation products, processes and/or services developed	6 new technology innovation products, processes and/or services developed	8 new technology innovation products, processes and/or services developed by 31 March 2016	4 new technology innovation products, processes and/or services developed by 31 Mar. 2017	6 new technology innovation products, processes and/or services developed by 31 Mar. 2018	7 new technology innovation products, processes and/or services developed by 31 Mar. 2019
Commercial outputs[16] in designated areas[17]	Number of commercial outputs in designated areas	26 commercial outputs in designated areas by 31 Mar. 2019	58 new technology products/ processes/ services developed for commercial-isation and 3 commercial-ised and 2 licensed	15 new technology commercialised in strategic areas	1 new technology commercial-ised in key strategic areas	3 new technology products, processes and/ or services commercialised by 31 Mar. 2016	8 commercial outputs in designated areas by 31 Mar. 2017	8 commercial outputs in designated areas by 31 Mar. 2018	10 commercial outputs in designated areas by 31 Mar. 2019

16 Commercial outputs: These include licences, assignments, options, new companies, products, processes and services.
17 Designated areas: These include space science, energy, bio-innovation, ERAs, IP management, technology transfer and technology commercialisation

Table 11: Quarterly targets for the 2016/17 financial year

INDICATOR	REPORTING PERIOD	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of instruments funded in support of knowledge utilisation	Biannually	25 instruments funded in support of knowledge utilisation by 31 Mar. 2017	No target	12 instruments funded in support of knowledge utilisation by 30 Sept. 2016	No target	13 instruments funded in support of knowledge utilisation by 31 Mar. 2017
Number of knowledge products generated	Annually	119 knowledge products generated by 31 Mar. 2017	No target	No target	No target	119 knowledge products generated by 31 Mar. 2017
Number of new disclosures reported by publicly funded institutions	Quarterly	275 new disclosures[18] reported by publicly funded institutions by 31 Mar. 2017	120 new disclosures reported by publicly funded institutions by 30 June 2016	No target	100 new disclosures reported by publicly funded institutions by 31 Dec. 2016	55 new disclosures reported by publicly funded institutions by 31 Mar. 2017
Number of evaluation and assessment reports developed and approved by Exco	Quarterly	12 evaluation and assessment reports developed and approved by Exco by 31 Mar. 2017	2 evaluation and assessment reports developed and approved by Exco by 30 June 2016	4 evaluation and assessment reports developed and approved by Exco by 30 September 2016	2 evaluation and assessment reports developed and approved by Exco by 31 December 2016	4 evaluation and assessment reports developed and approved by Exco by 31 March 2017
Number of regulatory recommendations for decision support by government	Quarterly	27 regulatory recommendations for decision support by government by 31 Mar. 2017	6 regulatory recommendations for decision support by government by 30 June 2016	8 regulatory recommendations for decision support by government by 30 Sept. 2016	9 regulatory recommendations for decision support by government by 31 Dec. 2016	4 regulatory recommendations for decision support by government by 31 Mar. 2017
Number of decision-support tools developed or maintained	Annually	2 decision-support interventions maintained by 31 Mar. 2017	No target	No target	No target	2 decision-support interventions maintained by 31 Mar. 2017

18 IP7 Form - IP Status and Commercialisation Report

INDICATOR	REPORTING PERIOD	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of policy directives developed and adopted by government	Annually	5 technology development and innovation policy directives developed and adopted by government by 31 Mar. 2017	No target	No target	No target	5 technology development and innovation policy directives developed and adopted by government by 31 Mar. 2017
Number of postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives	Biannually	392 postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives by 31 Mar. 2017	No target	40 postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives by 30 Sept. 2016	No target	352 postgraduate students (master's and doctoral) supported through DST-funded research and development initiatives by 31 Mar. 2017
Number of trainees supported in the strategic and emerging research areas	Quarterly	280 trainees supported in the strategic and emerging research areas by 31 Mar. 2017	No target	No target	190 trainees supported in the strategic and emerging research areas by 31 Dec. 2016	90 trainees supported in the strategic and emerging research areas by 31 Mar. 2017
Number of new technology products, processes and/or services developed	Quarterly	4 new technology products, processes and/or services developed by 31 Mar. 2017	No target	No target	2 new technology products, processes and/or services developed by 31 Dec. 2016	2 new technology products, processes and/or services developed by 31 Mar. 2017
Number of commercial outputs in designated areas	Annually	8 commercial outputs in designated areas by 31 Mar. 2017	No target	No target	No target	8 commercial outputs in designated areas by 31 Mar. 2017

Reconciling performance targets with the budget and MTEF

Table 12: Technology Innovation expenditure estimates

R'000 PROGRAMME	EXPENDITURE OUTCOME			ADJUSTED APPROPRIATION 2015/16	MEDIUM-TERM EXPENDITURE ESTIMATES		
	2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Space Science	170 269	230 621	168 464	167125	166 916	173 515	152 831
Hydrogen and Energy	131 881	139 861	143 848	152 245	152 611	160 047	169 162
Bioeconomy	125 728	139 439	150 109	137 677	138 151	159 726	182 838
Innovation Priorities and Instruments	574 128	608 776	447 412	526 143	523 079	544 288	576 290
NIPMO	31 180	31 699	64 207	25 324	26 316	46 919	50 372
TOTAL	**1 033 186**	**1 150 396**	**974 040**	**1 008 514**	**1 007 073**	**1 084 495**	**1 131 493**
Compensation of employees	30 086	30 940	35 571	41 995	43 543	44 937	46 681
Goods and services	19 013	14 334	16 183	19 438	20 841	21 589	22 713
Transfers and subsidies	983 489	1 050 141	922 205	947 081	942 689	1 017 969	1 062 099
Payments for capital assets	568	54 981	81	-	-	-	-
Payments for financial assets	-	-	-	-	-	-	-
TOTAL	**1 033 186**	**1 150 396**	**974 040**	**1 008 514**	**1 007 073**	**1 084 495**	**1 131 493**

Because of funding considerations, the following Programme 2 targets will not show an increase:

1. New technology products, processes and/or services developed

The figures will decline in 2016 and subsequent years as the indicator is crafted so that each target can only be counted in a single financial year despite the fact that financial support may continue for a number of years thereafter. If funding does not increase, this therefore limits the number of new products, processes and services that the Programme will be reporting on.

2. New technology products, processes and/or services commercialised

These are portfolio and pipeline dependant. Activities need to move through the value chain so as to have new offerings for each indicator. There is no consistent upward or downward trend in targets in this regard; it is portfolio dependent. Decrease in support to initiatives will also mean that it will take longer to see actions arrive at the stage where the targets for these indicators will increase.

PROGRAMME 3: INTERNATIONAL COOPERATION AND RESOURCES

Purpose

To strategically develop, promote and manage international partnerships that strengthen the NSI and enable an exchange of knowledge, capacity and resources between South Africa and its international partners, with a focus on supporting STI capacity-building in Africa, and to support South African foreign policy through science diplomacy.

Strategic overview

International cooperation that strengthens the NSI by increasing access to global knowledge, capacity and resources is essential for the DST to achieve its strategic objectives in support of the implementation of the NDP. The Programme is therefore actively promoting such partnerships, not as objectives in their own right, but aligned with and in support of the rest of the Department's efforts to fight poverty, inequality and unemployment.

Science, technology and innovation, as evidenced by their prominent role in the Sustainable Development Goals, are recognised globally as essential instruments to combat the triple challenge of poverty, inequality and unemployment. This globally shared policy perspective enables the Programme to foster a range of partnerships, for example with development cooperation agencies, philanthropic organisations and foundations, or multilateral bodies, which will make available resources towards the Department's efforts to put STI at the service of South African society.

The Programme's efforts therefore contribute to the attainment of all five of the Department's strategic outcome-oriented goals, and the Programme's strategic targets all speak directly to these goals. The explicit focus on harnessing the Programme's efforts as point of departure to support the work of the rest of the Department represents a step change in approach and strategic orientation.

Complementary to this national context and aligned with the NDP's vision of a new positioning for South Africa in the world and the orientation of South Africa's foreign policy objectives, the DST is, thus, in its promotion of international partnerships, specifically prioritising cooperation with other African partners, as well as emerging economies such Brazil, Russia, India and China. The objective is to integrate African continental and regional partnerships as a cross-cutting priority across the work of the Department, not only contributing to capacity-building, but also reinforcing and leveraging South Africa's trade and investment partnerships.

The point of departure for the Department's promotion of international cooperation is a response to national priorities, and the Programme is targeting international support for the building of strategically relevant national STI capabilities, including for knowledge-based decision-support to government. This step change in approach will see an intensified and enhanced coordination with other DST Programmes to ensure the focus and orientation of international partnerships address the needs of other Programmes directly.

From the above it is clear that the Programme directly supports Strategic Outcome-Oriented Goal 1 (to develop a coordinated, responsive and efficient NSI). The focus on government imperatives will be more explicit than before and no new international partnerships will be initiated without a critical evaluation of its relevance. Responding to the first strategic outcome-oriented goal, the Programme will secure international funds to complement South Africa's national investment in STI.

The Programme's strategic targets and indicators are focused on the leveraging of foreign investment as well as on increasing the funding made available by international partners for cooperation with South Africa, related to national priority themes such as the bioeconomy, hydrogen and fuel cell technology, space S&T, or innovation for inclusive development. The foreign funds

leveraged and international cooperation accessed will be aligned with the Department's priorities through, for example, sector budget support programmes.

In order to strengthen South Africa's capacities, other opportunities being pursued include international HCD programmes such as postgraduate training for South Africans abroad, or schemes for South African researchers to access global research infrastructure. Such initiatives will always be aligned with the requirements of the NSI and respond directly to the Strategic Outcome-Oriented Goal 3 (human capital development). The Programme's indicators include the number of South African students accessing postgraduate training opportunities abroad.

The Programme is enhancing its coordination efforts with other DST Programmes to ensure that international experience and expertise is accessed in response to South African capacity-building requirements. This is aligned with the Strategic Outcome-Oriented Goal 2 (increased knowledge generation). Indicators with regard to increasing the number of international partner organisations and enabling technical exchanges with these partners ensure that the Programme's efforts speak directly to the goal.

With regard to the fourth goal (using knowledge for economic development) and the fifth goal (promoting knowledge utilisation for inclusive development), the DST's activities will continue to benefit significantly from international partnerships, especially in the context of the priority focus on STI in the Sustainable Development Goals. Actions such as the strategic promotion of joint ventures with international public and private sector partners, which will enable the sharing of costs and expertise, or could make foreign investment and technical assistance available, will continue to be pursued. There will be a committed effort to increase the scale of partnerships with a greater focus on innovation and enhance their impact significantly in order to reinforce the NSI's capabilities.

The Programme is the custodian for the South African government's science diplomacy, i.e. the use of international STI cooperation to advance South Africa's foreign policy, including international trade and investment agenda. The DST's priority focus in this regard will be contributing to the MTSF Outcome: Creating a better South Africa and contributing to a better and safer Africa in a better world, notably by advancing African regional cooperation and integration and South-South cooperation through STI partnerships.

In this context, the Department will assume an active leadership role in implementing the African Union's Science, Technology and Innovation Strategy for South Africa, maximising benefits for the NSI and bolstering Africa's development. The focus will be specifically on Strategic Outcome-Oriented Goals 4 and 5. The Programme will pursue strategic targets related to the number of African Union and Southern African Development Community initiatives it supports, as well as the amount of foreign funding it leverages for strengthening Africa's STI capacities. Bilateral cooperation with other African partners is also a priority, and will be measured using a target related to the number of projects in which it co-invests with continental partners.

The Programme's horizontal policy priorities will include the aim to achieve a greater focus on innovation in international STI partnerships involving South Africa, moving away from relatively small-scale, collaborative academic projects to market-orientated research projects. The focus will be to ensure a far greater participation of South African and international industry, especially SMEs, in the Department's international cooperation initiatives, including through public-private partnerships.

Specific attention will continue to be paid to ensuring that historically disadvantaged institutions participate actively in and are optimally supported to benefit from the DST's international partnership portfolio.

Strategic objectives

- To secure international funds to complement South Africa's national investments in STI, including resources for DST initiatives requiring external investment.
- To access international knowledge, capacities and resources, to enhance South Africa's national STI capabilities, and to contribute to the attainment of the DST's targets for HCD, especially for international PhD training.
- To strengthen cooperation in STI in Africa, to build capacity and to support SADC and AU initiatives for the advancement of the growth and development agenda of both South Africa and Africa.
- To maximise South Africa's strategic interests in international cooperation in STI in support of South Africa's foreign policy objectives, and international trade and investment partnerships.

Chief directorates

International Resources works to increase the flow of international funding into South African STI initiatives as well as African regional and continental programmes, through concerted foreign investment promotion efforts, and the fostering of strategic partnerships with partners such as the European Union, as well as foundations and philanthropic organisations and the multinational private sector.

Multilateral Cooperation and Africa advances and facilitates South Africa's participation in bilateral STI cooperation initiatives with other African partners, in African multilateral programmes, especially SADC and AU programmes, and in broader multilateral STI partnerships, with a strategic focus on South-South cooperation.

Overseas Bilateral Cooperation promotes and facilitates South Africa's bilateral STI cooperation with partners in Europe, the Americas, Asia and Australasia, especially for STI HCD, for collaborative research and innovation, and to secure partners' support for joint cooperation with other African partners.

Table 13: Programme risk management and identification - International Cooperation and Resources

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To secure international funds to complement South Africa's national investments in STI, including resources for DST initiatives requiring external investment	▪ Negative country investment profile, which discourages foreign investment in South Africa ▪ Insufficient investment by international partners in specific STI cooperation initiatives with South Africa	▪ Marketing of South Africa as a preferred destination for STI-orientated foreign investment ▪ Proactive engagement to sensitise international partners of return on investment in cooperation with South Africa
To access international knowledge, capacity and resources, to enhance South Africa's national STI capabilities, contributing to the attainment of the DST's targets for HCD, especially for international PhD training	▪ Lack of interest or willingness of international partners to share STI expertise with South Africa ▪ Insufficient national South African funds to support South African students studying abroad ▪ Accessing of inappropriate or irrelevant international experience and expertise not aligned with South African needs	▪ Targeted formation of mutually beneficial strategic partnerships with partners of priority interest to South Africa ▪ Design of co-investment schemes with national and international partners to support South African students studying abroad ▪ Involvement of South African technical expertise in all phases of planning and execution of international capacity-building initiatives designed to assist South Africa
To strengthen cooperation in STI in Africa, to build capacities and support initiatives of SADC and AU, for the advancement of both South Africa and Africa's growth and development agenda	▪ Reluctance of partners in other African countries to co-invest in STI programmes with South Africa ▪ Mistrust of South Africa's role enabling international support for STI in Africa, especially as part of trilateral initiatives ▪ Institutional paralysis at continental or regional level delaying the progress of AU or SADC initiatives	▪ Proposal to partners of cooperation programmes providing for investment according to capacities and aligned with their strategic objectives ▪ Careful consultation with international partners and beneficiaries in Africa, highlighting value addition of South African contribution ▪ Implementation of initiatives to advance continental and regional agenda not constrained by institutional frameworks
To maximise South Africa's strategic interests in international cooperation in STI in support of South Africa's foreign policy objectives, and international trade and investment partnerships	▪ External geopolitical factors negatively affecting South African influence on international STI decision-making ▪ Mistrust of South African leadership in international STI forums, including concerns with regard to disproportionate representation	▪ Close cooperation with the Department of International Relations and Cooperation in multilateral engagements including to exploit support from regional and other strategic alliances ▪ Early identification of leadership positions of strategic interest to South Africa and diplomatic engagements to promote South African candidates for them

Table 14: Programme performance indicators and targets for 2016/17

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To secure international funds to complement South Africa's national investments in STI, including resources for DST initiatives requiring external investments									
Funds directly invested by international partners in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa as a result of cooperation initiatives implemented by the DST	Amount (expressed in rand millions) of international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa accounted for as part of cooperation initiatives implemented by the DST	R1 260m in international funds invested in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 Mar. 2019	No baseline	No baseline	No baseline	R380m in international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 Mar. 2016	R400m in international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 Mar. 2017	R420m in international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 Mar. 2018	R440m in international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Funds invested by international partners in their own organisations and initiatives, but targeted at cooperation in research, innovation and STI HCD with South African partners as a result of cooperation initiatives implemented by the DST	Amount (expressed in rand millions) of funds invested by international partners in their own organisations and initiatives, but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST	R760m invested by international partners as part of cooperation initiatives implemented by the DST by 31 Mar. 2019	No baseline	No baseline	No baseline	R220m invested by international partners in their own organisations and initiatives, but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 31 Mar. 2016	R230m invested by international partners in their own organisations and initiatives, but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 31 Mar. 2017	R250m invested by international partners in their own organisations and initiatives, but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 31 Mar. 2018	R280m invested by international partners in their own organisations and initiatives, but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To access international knowledge, capacities and resources, to enhance South Africa's national STI capabilities, and to contribute to the attainment of the DST's targets for human capital development, especially for international PhD training									
Participation by students from South African institutions in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	Number of South African students accepted into international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	1 150 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 Mar. 2019	No baseline	No baseline	No baseline	50 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 Mar. 2016	150 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 Mar. 2017	350 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 Mar. 2018	650 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Sharing of experience and expertise by international partner organisations (i.e. legal entities) with South African partners within the framework of collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST	Number of international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST	1 500 international partner organisations collaborating with South African partners as part of cooperation initiatives facilitated by the DST by 31 Mar. 2019	No baseline	No baseline	No baseline	400 international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 Mar. 2016	450 international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 Mar. 2017	500 international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 Mar. 2018	550 international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Dedicated international technical exchanges such as workshops, seminars or training programmes, undertaken to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, with the support of international partners facilitated by the DST	Number of international technical exchanges (such as workshops, seminars or training programmes) to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners facilitated by the DST	60 international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners facilitated by the DST by 31 Mar. 2019	No baseline	No baseline	A total of 56 specialist or joint technical workshops, policy dialogues, symposia or conferences accessed, hosted, facilitated, or contributed to for participation by South African researchers and students	10 international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners facilitated by the DST by 31 Mar. 2016	15 international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners facilitated by the DST by 31 Mar. 2017	20 international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners facilitated by the DST by 31 Mar. 2018	25 international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners facilitated by the DST by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To strengthen cooperation in STI in Africa, to build capacities and support initiatives of the SADC and AU, for the advancement of both South Africa and Africa's growth and development agenda									
Research, innovation and STI HCD cooperation projects, co-funded or supported in kind, by DST and other African partners	Number of research, innovation and STI HCD cooperation projects , co-funded or supported in kind, by DST and at least one other African government	160 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 31 Mar. 2019	No baseline	No baseline	No baseline	20 research, innovation and STI HCD cooperation projects "initiatives co-funded or supported in kind by DST and at least one other African government by 31 Mar. 2016	30 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 31 Mar. 2017	50 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 31 Mar. 2018	80 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Funds directly invested by international partners in African regional and continental research, innovation and STI HCD or research infrastructure programmes as a result of DST facilitation	Amount (expressed in rand millions) of international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation	R240m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 Mar. 2019	No baseline	No baseline	No baseline	R50m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 Mar. 2016	R70m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 Mar. 2017	R80m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 Mar. 2018	R90m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported by DST	Number of approved AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST	39 approved AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 Mar. 2019	No baseline	No baseline	No baseline	7 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 Mar. 2016	10 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 Mar. 2017	13 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 Mar. 2018	16 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To maximise South Africa's strategic interests in international cooperation in STI, in support of South Africa's foreign policy objectives, and international trade and investment partnerships, creating a better South Africa, and contributing to a better and safer Africa in a better world									
Decisions including the adoption of regulations, programmes or resolutions in intergovernmental STI forums such as multilateral organisations supporting the priorities of government's Programme of Action following specific DST intervention	Number of formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention	12 formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2019	No baseline	No baseline	No baseline	4 formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2016	4 formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2017	4 formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2018	4 formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
South Africa occupying leadership positions in international STI governance structures such as multilateral organisations relevant to priorities of government's Programme of Action following specific DST intervention	Number of leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention	12 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2019	No baseline	No baseline	No baseline	2 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2016	4 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2017	4 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2018	4 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2019

Table 15: Quarterly targets for the 2016/17 financial year

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Amount (expressed in rand millions) of international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa as part of cooperation initiatives implemented by the DST	Quarterly	R400m in international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa as part of cooperation initiatives implemented by the DST by 31 Mar. 2017	R60m in international funds directly invested in research, innovation and STI HCD programmes, including research infrastructure investments in South Africa as part of cooperation initiatives implemented by the DST by 30 June 2016	R90m in international funds directly invested in research, innovation and STI HCD programmes, including infrastructure investments in South Africa as part of cooperation initiatives implemented by the DST by 30 Sept. 2016	R100m in international funds directly invested in research, innovation and STI HCD programmes including research infrastructure investments in South Africa as part of cooperation initiatives implemented by the DST by 31 Dec. 2016	R150m in international funds directly invested in research, innovation and STI HCD programmes including research infrastructure investments in South Africa as part of cooperation initiatives implemented by the DST by 31 Mar. 2017
Amount (expressed in rand millions) of funds invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST	Quarterly	R230m invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 31 Mar. 2017	R20m invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 30 June 2016	R40m invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 30 Sept. 2016	R60m invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 31 Dec. 2016	R110m invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of South African students accepted into international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	Quarterly	150 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 Mar. 2017	15 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 30 June 2016	35 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 30 Sept. 2016	50 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 Dec. 2016	50 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 Mar. 2017
Number of international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects accounted as part of cooperation initiatives facilitated by the DST	Quarterly	450 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 Mar. 2017	50 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 30 June 2016	95 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 30 Sept. 2016	110 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 Dec. 2016	195 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of dedicated international technical exchanges such as workshops, seminars or training programmes to reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners and facilitated by the DST	Quarterly	15 dedicated international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners and facilitated by the DST by 31 Mar. 2017	2 dedicated international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners and facilitated by the DST by 30 June 2016	3 dedicated international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners and facilitated by the DST by 30 Sept. 2016	5 dedicated international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners and facilitated by the DST by 31 Dec. 2016	5 dedicated international technical exchanges to build or reinforce South Africa's capacities in key STI domains specifically referenced in the DST Strategic Plan, undertaken with the support of international partners and facilitated by the DST by 31 Mar. 2017
Number of research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African government	Quarterly	30 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 31 Mar. 2017	3 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 30 June 2016	7 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 30 Sept. 2016	10 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 31 Dec. 2016	10 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African government by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Amount (expressed in rand millions) of international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation	Quarterly	R70m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 Mar. 2017	R5m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 30 June 2016	R15m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 30 Sept. 2016	R35m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 Dec. 2016	R15m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 Mar. 2017
Number of AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST	Quarterly	10 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 Mar. 2017	1 AU or SADC STI initiative, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 30 June 2016	3 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 30 Sept. 2016	3 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 Dec. 2016	3 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention	Quarterly	4 formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2017	1 formally recorded decision made in an intergovernmental STI forum, such as a multilateral organisation, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 30 June 2016	1 formally recorded decision made in an intergovernmental STI forum, such as a multilateral organisations, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 30 Sept. 2016	1 formally recorded decision made in an intergovernmental STI forum, such as a multilateral organisation, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Dec. 2016	1 formally recorded decision made in an intergovernmental STI forum, such as a multilateral organisation, with a direct bearing on resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2017
Number of leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention	Quarterly	4 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2017	No target	2 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention by 30 Sept. 2016	No target	2 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's Programme of Action following specific DST intervention by 31 Mar. 2017

Reconciling performance targets with the budget and MTEF

Table 16: International Cooperation and Resources expenditure estimates

R'000 PROGRAMME	EXPENDITURE OUTCOME			ADJUSTED APPROPRIATION 2015/16	MEDIUM-TERM EXPENDITURE ESTIMATES		
	2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Multilateral Cooperation and Africa	24 790	25 281	22 167	27 433	28 697	29 869	31 282
International Resources	44 716	50 402	54 021	56 525	57 459	60 058	63 224
Overseas Bilateral Cooperation	33 369	28 863	31 401	37 401	38 307	40 099	42 037
TOTAL	**102 875**	**104 546**	**107 589**	**121 359**	**124 463**	**130 026**	**136 543**
Compensation of employees	33 934	33 205	36 762	44 327	46 150	47 827	49 679
Goods and services	22 580	20 028	16 587	15 983	16 959	17 777	18 706
Transfers and subsidies	45 707	51 313	54 127	61 049	61 354	64 422	68 158
Payments for capital assets	618	-	113	-	-	-	-
TOTAL	**102 875**	**104 546**	**107 589**	**121 359**	**124 463**	**130 026**	**136 543**

PROGRAMME 4: RESEARCH DEVELOPMENT AND SUPPORT

Purpose

To provide an enabling environment for research and knowledge production that promotes the strategic development of basic sciences and priority science areas, through science promotion, HCD, and the provision of research infrastructure and relevant research support, in pursuit of South Africa's transition to a knowledge economy.

Strategic overview

Programme 4's work contributes to three of the five strategic outcome-oriented goals of the 2015-2020 Strategic Plan.

The Programme contributes towards building a responsive, coordinated, and efficient NSI (Strategic Outcome-Oriented Goal 1). In this regard, the Department has enjoyed a strong collaboration with DHET in research development and support. The DHET provided its own funds to the National Research Foundation for support to postgraduate students to the value of R153 million in 2015. In 2016/17 DHET plans to fund a minimum of six research chairs in its priority areas. In addition, better alignment will be sought between DHET's Staffing South Africa's Universities Framework and the DST/NRF HCD offerings. The Department of Health has expressed interest in co-funding a centre of excellence in HIV prevention.

Programme 4 plays a leading role in increasing knowledge generation (Strategic Outcome-Oriented Goal 2). Without research, no knowledge generation can take place. In conjunction with the NRF, Programme 4 is the key source of research funding for higher education institutions. This Programme directly addresses this imperative through research grant support (Proxy Indicator 1), the provision of research infrastructure, and the promotion of research priority areas. In respect of research grant support, knowledge generation is promoted through a number of instruments that are designed to strengthen research capacity at universities, including the research chairs and centres of excellence programmes, both managed by the NRF. Special attention will be paid to monitoring and promoting these HCD programmes. Programme 4 manages the DST research and innovation infrastructure initiatives, a vital source of financial support for research equipment and facilities for public research institutions and universities.

(In 2014/15, 4 064 researchers were awarded research grants through NRF-managed programmes. This number is expected to grow by approximately 500 in 2015/16 due to an to an injection of R100 million from National Treasury.)

Programme 4 is the custodian of high-level human capital development (Strategic Outcome-Oriented Goal 3) for the NSI. In conjunction with the NRF, Programme 4 is the key source of bursary support for postgraduate training from government for higher education institutions (Proxy Indicators 1 – 3). Transforming the NSI's human resource base is imperative for the system's sustainable growth, and the DST has formulated guidelines for the NRF's bursary programmes to ensure equity and transformation. The DST will ensure that, by 2017/18, at least 80% of postgraduate students receiving support are black, 55% are women and 4% are people with disabilities. The current guidelines for the bursary and research support programmes will be monitored and evaluated annually to ensure the participation of previously disadvantaged institutions and groups, such as African women. The main barrier to stronger growth and transformation in postgraduate enrolment and graduation is the current inadequacy of public financial support. Too few students are supported at too low a financial level. Massive increases in public support for postgraduate studies would make a significant difference, especially if coupled with more communication on the importance of science to social and personal development.

(In 2014/15, 11 335 postgraduate students and postdoctoral researchers were awarded bursaries through NRF-managed programmes. This number is expected to grow by approximately 3 000 in 2015/16 due to an injection of R300 million from National Treasury.)

By the end of the 2015/16 financial year, a minimum of 60 (actual number will only be available at the end of the financial year) research infrastructure grants had been awarded to researchers and institutions across the innovation value chain through direct funding by the Programme (Strategic Outcome-Oriented Goal 2) (Proxy Indicator 4). The grants include support for innovation infrastructure in the form of pilot plants, technology demonstrators and specialised facilities.

An NDP target, under the theme "expanding access to communication technology" is 100% broadband penetration by 2020. The DST is contributing to this target through the roll-out of the South African National Research Network (SANReN) project. By the end of the 2015/16 financial year, the national backbone and its points of presence had been upgraded to increase the average bandwidth per South African SANReN site to 3 500 megabits per second (Mbps) (Strategic Outcome-Oriented Goal 2) (Proxy Indicator 5). This translates into more than 200 research sites connected, giving about a million users access to broadband connectivity.

In order to strategically steer and direct the acquisition and deployment of research infrastructure, a South African Research Infrastructure Roadmap (SARIR) was finalised by the end of 2015/16. SARIR consists of 13 medium to large research infrastructures with a focus on five scientific domains: humans and society; health, biological and food security; Earth and the environment; energy; and materials and manufacturing.

During 2015/16 the key recommendations of the 2013 National Integrated Cyberinfrastructure System (NICIS) review report were implemented. These include the conceptualisation of (i) a multi-institutional national e-science postgraduate teaching and training programme; (ii) an e-research support programme; (iii) regional Tier 2 data nodes; and (iv) a big data strategy. The Data Intensive Research Initiative of South Africa (DIRISA) as the national data management, storage and services was formally established.

At the level of the NSI, the impact of this Programme's work will be monitored through indicators such as –

- the contribution of South Africa's research output to global research output;
- the global impact of South Africa's research output;
- the percentage of postgraduate research students enrolling in SET programmes;
- the annual number of doctoral graduates;
- the development of relevant strategic documents.

Strategic objectives

- To contribute to the development of representative, high-level human capital able to pursue locally relevant, globally competitive research and innovation activities.
- To ensure the availability of and access to internationally comparable research and innovation infrastructure in order to generate new knowledge and train new researchers.
- To support and promote research that develops basic sciences through the production of new knowledge and relevant training opportunities.
- To strategically develop priority science areas in which South Africa enjoys a competitive advantage, by promoting internationally competitive research and training activities and outputs.
- To promote public engagement on science, technology and innovation.

Chief directorates

Human Capital and Science Promotion formulates and implements policies and strategies that address the availability of human capital for STI, and that provide fundamental support for research activities. It provides strategic direction and support to institutions mandated to develop human capital and increase knowledge production, as well as interfacing with relevant

stakeholders in this regard. In addition, the chief directorate is responsible for the development of a society that is scientifically literate and critically engaged with science through public engagement in STI and the enhancement of youth's access to STI.

In 2016/17, a study of postgraduate training in engineering will be conducted by ASSAf. On equity issues, an observation of a large number of lecturers and senior lecturers with master's and doctoral degrees at higher education institutions compared to the small number of applicants to the NRF emerging researchers' programmes is cause for concern. The deputy vice-chancellors for research have agreed to investigate this issue. Terms of reference for a study will be finalised in the 2015/16 financial year, and the study itself should be completed by the end of the 2016/17 financial year.

In 2015 the DHET advertised 125 entry-level positions at local universities for a period of six years. The incumbents will be absorbed by host institutions. In 2016/17 the DHET is planning to advertise 150 more positions. Agreements have been reached on aligning the DST-NRF and DHET funding instruments around the DHET programme and the NRF emerging researcher programmes. In 2016/17, academics from the NRF's career awards programme who qualify for the New Generation of Academics Programme (nGAP) awards will be encouraged to apply for nGAP. Starting from 2016/17, the DST will provide the research support to the nGAP scholars, and is planning to grow these funds. Transformation of the emerging researcher cohort will be driven through existing and new programmes. In 2016/17 a study to investigate the size and shape of the emerging researcher cohort at universities and factors which influence black/women researchers' productivity at this level will be commissioned by Universities South Africa and funded by the DST. It is envisaged that this work will be completed in 2017/18, and offer clear recommendations on policies and programmes that will improve the representation of active black researchers (particularly black women).

In 2016/17, the NRF Act Amendment Bill will be taken through the parliamentary structures. Public inputs will be incorporated into the Bill before it is approved by Parliament. The revised South African Council for Natural Scientific Professions Act will be taken through the parliamentary processes during 2016/17 and 2017/18.

One of the DST workplace preparation programmes, the DST-NRF Internship Programme (implemented through the NRF) gives recently qualified graduates and postgraduate students an opportunity to enhance their employability by placing them at various institutions within the NSI, thus greatly improving their chances of being retained in the science system in the longer term. The internship programme also contributes to government efforts to reduce unemployment and develop skills. The equity targets for the programme have been exceeded, with more than 90% of the interns placed at NSI institutions being black, and 60% being women. The DST supports a number of other work preparation programmes. The intention is to grow, streamline and systematise the implementation model for these programmes, and to improve the DST's consolidated reporting on them.

In order to promote public engagement with science, the DST undertakes initiatives such as the annual National Science Week. It has finalised a Science Engagement Framework, and work on an implementation plan is under way. The DST will continue to support basic education in science in partnership with the Department of Basic Education (DBE) and DHET, with which a joint integrated framework for supporting the DBE's Mathematics, Science and Technology Strategy has been developed. The DBE has presented the framework to the Minister of Basic Education. The DST will grow support for science centres, which are the key infrastructure for driving science engagement, while carefully monitoring their outputs. A rural science centre should be completed in the Cofimvaba district in the next two to three year. The above initiatives will combat inequality and advance transformation by promoting awareness of the importance of science, particularly as a possible career for their children.

Basic Sciences and Infrastructure facilitates the strategic implementation of research and innovation equipment and facilities to promote knowledge production in areas of national priority and to sustain R&D-led innovation. The chief directorate also promotes the development and strengthening of basic or foundational sciences, such as physics, chemistry, mathematics, computer science, biological and life sciences, geographic and geological sciences, and the human and social sciences.

This chief directorate will support the provision of and access to RDI infrastructure across the entire NSI by awarding 210 research infrastructure grants (2016/17 to 2018/19) to the research community across the country. Most of the funding will be allocated to higher education institutions, national facilities, science councils and museums through the National Equipment Programme, which is implemented by the NRF. The infrastructure funds will also be used for the development of pilot plants, technology demonstrators and specialised facilities, which are aimed at promoting South Africa's manufacturing capacity, which, among other things, will contribute to reducing poverty and unemployment. Continued support will also be provided to students and researchers to access global infrastructure such as the Large Hadron Collider at CERN in Switzerland, the Joint Institute for Nuclear Research in Russia, and the European Synchrotron Radiation Facility in France.

The chief directorate will continue to support the roll-out of a gigabit per second capacity broadband network through SANReN as part of closing the digital divide (inequality), supporting the transmission of data to all research and academic institutions. Between 2016/17 and 2018/19, the average bandwidth per SANReN site per annum will be increased from 3 500 Mbps in 2016/17 to 8 000 Mbps in 2018/19.

With regard to the basic sciences, the chief directorate will continue to support about 39 research chairs in the human and social sciences, the National Institute for Theoretical Physics, and the African Institute for Mathematical Sciences. For the 2016/17 to 2018/19 period, a Basic Sciences Development and Support Framework and implementation plan will be developed to ensure targeted support for this part of the science system.

Science Missions promotes the development of research, the production of scientific knowledge, and human capital in science areas in which South Africa enjoys a geographic advantage. These areas include the dynamics of climate change and its impact on earth systems, Antarctic and marine research, the palaeosciences, and indigenous knowledge systems (IKS).

Finalisation of an Act for the protection, promotion, development and management of IKS is a key deliverable in the field of IKS. The IKS Act is an enabling framework to ensure mechanisms are in place to address poverty, inequality and unemployment.

Implementation will begin on the new Marine and Antarctic Research Strategy in conjunction with the Department of Environmental Affairs (DEA). Joint work with DEA will also be undertaken in support of specific DST responsibilities under Operation Phakisa (Oceans Economy). Management of research work in the Oceans Economy area will contribute to generating economic opportunities, which will also assist in tackling the triple challenge.

The findings and recommendations of the Global Change Grand Challenge mid-term review will be implemented, and a new research flagship in Earth systems science should be initiated.

Astronomy supports the development of astronomical sciences around a new multiwavelength astronomy strategy, and provides guidance and support to relevant astronomy institutions in the implementation of strategic astronomy programmes. Of particular relevance are the Southern African Large Telescope, the High Energy Stereoscopic System, the African Very Long Baseline Interferometry Network (AVN), and the MeerKAT and SKA projects.

The construction of phase 1 of the SKA is expected to start in 2017/18. In the period leading up to that point, South Africa is building the MeerKAT, a 64-dish demonstrator telescope. It is anticipated that 21 dishes will be in place by the end of 2015/16. The MeerKAT radio telescope and associated infrastructure have been classified as a megaproject under the Presidential Infrastructure Coordinating Commission. The SKA Carnarvon Science Visitors and Tourism Centre will stimulate tourism in the Carnarvon district, combating the triple challenge and providing opportunities for local SMEs. In addition, SKA commercialisation initiatives (investment in technology development and spin-outs from the MeerKAT and SKA) address industrialisation and the triple challenge.

The AVN initiative will be enhanced by South Africa's partnership with Ghana to set up a radio telescope/observatory in Ghana. A similar initiative is being pursued with Kenya and Zambia, to convert existing 32 m dishes for undertaking radio astronomy and space geodetic observations. Similar initiatives will be pursued with other SKA African partner countries as defunct telecommunications dishes become available for conversion. In countries where no such dishes are available, new dishes may be built.

There will also be a focus on implementing the Multiwavelength Astronomy Strategy to begin consolidating optical, radio and gamma ray astronomy facilities under a single astronomy subagency in the NRF. This strategy will be rolled out over the course of the next 10 years. All astronomy-related HCD initiatives will also be consolidated and contextualised in the strategic framework for multiwavelength astronomy. Particular emphasis will be placed on HCD transformation so that the demographics of the students supported and graduating reflect those of the country. In addition, the success of the National Astronomy and Space Science Programme will be expanded to two other nodes; one at the University of KwaZulu-Natal and the other at North-West University.

The key challenge to be addressed is the protection of the astronomy reserves against radio, dust and light pollution, including monitoring possible impacts on astronomy activities from hydraulic fracturing in the Northern Cape and from wireless, telecommunication and broadcasting activities. The relevant stakeholders and experts will be consulted about preserving the central astronomy advantage areas as new regulations and standards are proposed.

Table 17: Programme risk management - Research Development and Support

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To contribute to the development of representative, high-level human capital able to pursue locally relevant, globally competitive research and innovation activities	Reduction/stagnation in demographically representative local researchers and scientists doing master's and doctoral degrees and going on to undertake research and innovation careers in the South African science system	▪ Exco approval of and consultation with external stakeholders on the implementation plan for the Strategy for HCD for Research, Innovation and Scholarship ▪ Finalising the HCD needs model and presenting it to Exco ▪ Establishing synergies between DST and DHET on research and postgraduate training ▪ Committing the NRF to funding research proposal development of the nGAP postholders with a master's degree and above
To ensure availability of and access to internationally comparable research and innovation infrastructure in order to generate new knowledge and train new researchers	Research infrastructure base is not adequately renewed and/or maintained	▪ The SARIR report presented 17 research infrastructure projects in six scientific domains. In 2015/16, 13 of the 17 projects were ranked in order of implementation. To support the approved research infrastructure as per the approved SARIR implementation plan ▪ To finalise the development of NICIS, which will exploit the enormous synergies that can be derived from integrating the existing national cyberinfrastructure components (Centre for High Performance Computing, SANReN and DIRISA). Roll out of the programmes and projects as per the approved NICIS implementation plan ▪ To develop plans to solicit co-investment from industry and DHET for the development and implementation of DST-supported research infrastructure ▪ Prepare annual infrastructure bids according to the DST infrastructure framework in July/August for the National Treasury MTEF process
To support and promote research that develops basic sciences in South Africa through the production of new knowledge and relevant training opportunities	Reduction in research knowledge output and increase in vulnerability of the basic sciences	▪ Develop a basic sciences (natural sciences) development and support framework to ensure targeted support for this component of the science system

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To support and promote research that develops basic sciences in South Africa through the production of new knowledge and relevant training opportunities	Decrease in production of established researchers in basic sciences	▪ Exco approval of and consultation with external stakeholders on the implementation plan for the Strategy for HCD for Research, Innovation and Scholarship ▪ Committing the NRF to funding research proposal development of nGAP postholders with a master's degree and above ▪ The NRF's Institutional Engagement and Partnership Development directorate will develop plans to strengthen research capacity within universities ▪ Study of black and women emerging researchers inactive in the NSI to be commissioned by Universities South Africa
To strategically develop priority science areas in which South Africa enjoys a competitive advantage, by promoting internationally competitive research and training activities and outputs	Stagnant scientific output from geographic advantage and knowledge areas	▪ Development of Earth systems science flagship ▪ Finalise process of having draft IKS Bill adopted as legislation ▪ Implementation of the Marine and Antarctic Research Strategy ▪ The DST's IKS functions to be made an SSDU that will coordinate the activities of government departments ▪ South African Marine Research and Exploration Forum (a product of Operation Phakisa, intended to assist in attaining space on private vessels for research purposes, and serve as a formal forum that coordinates knowledge activities) ▪ Coordinate biannual DDG forums ▪ Assessment of human resources needs for the chief directorate ▪ Develop programmes of action for scientific collections (ships, robotics, aircrafts, etc.)
To promote public engagement on STI	Inadequate management of public engagement	▪ Reprioritise DST funds and obtain approval for SAASTA concept document ▪ Amend the NRF Act to incorporate a science engagement function or mandate ▪ Develop a joint proposal and establish a formal collaboration with a local university on the establishment of a science communication qualification (focusing on the development of basic science communication skills) ▪ Propose incentive arrangements to encourage NRF grant holders to engage with the public on a voluntary basis

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To strategically develop priority science areas in which South Africa enjoys a competitive advantage, by promoting internationally competitive research and training activities and outputs	Suboptimal delivery of MeerKAT/SKA facilities/ infrastructure	▪ Implement the Astronomy Resourcing Plan, including making appointments in line with the resourcing plan ▪ Finalise and implement the SKA Technology Roadmap ▪ Public engagement plan for corporate social investment ▪ Establish AVN as a continental programme - AVN Science Plan ▪ Develop and implement the SKA HCD Plan

Table 18: Programme performance indicators and targets for 2016/17

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To contribute to the development of representative, high-level human capital able to pursue locally relevant, globally competitive research and innovation activities									
PhD students awarded bursaries through NRF and DST-managed programmes	Total number of PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	No less than 9 408 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2019	2 031 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	2 265 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	2 845 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	3 136 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2016	3 136 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2017	3 136 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2018	3 136 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Pipeline postgraduate students awarded bursaries and fellowships through NRF and DST-managed programmes	Total number of pipeline postgraduate students (BTech and honours, and master's students) awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	No fewer than 32 988 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2019	6 348 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	6 853 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	7 711 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	10 996 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2016	10 996 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2017	10 996 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2018	10 996 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Graduates and students placed in DST-funded work preparation programmes in science, engineering, technology and innovation (SETI) institutions	Total number of graduates and students placed in DST-funded work preparation programmes in SETI institutions	2 440 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Mar. 2019	711 graduates and students placed in DST-funded work preparation programmes in SETI institutions	1 010 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Mar. 2014 (568 in DST-NRF Internship Programme and 442 in the National Youth Service programme)	1021 graduates and students placed in DST-funded work preparation programmes	900 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Mar. 2016	840[19] graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Mar. 2017	800 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Mar. 2018	800 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Mar. 2019
Strategic objective: To ensure availability of and access to internationally comparable research and innovation infrastructure in order to generate new knowledge and train new researchers									
Research infrastructure grants	Number of research infrastructure grants awarded as per award letters	210 research infrastructure grants awarded as per award letters by 31 Mar. 2019	53 research infrastructure grants awarded	61 research infrastructure grants awarded by NRF and DST internal processes and as per award letters	69 grants have been awarded in four categories of research infrastructure	60 research infrastructure grants awarded as per award letters by 31 Mar. 2016	70 research infrastructure grants awarded as per award letters by 31 Mar. 2017	70 research infrastructure grants awarded as per award letters by 31 Mar. 2018	70 research infrastructure grants awarded as per award letters by 31 Mar. 2019

19 Owing to cuts made to the DST-NRF Internship Programme (following Economic Competitiveness Support Package cuts announced on 18 January 2016) the MTEF targets had to be lowered.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
A gigabit per second capacity broadband network providing transmission of data to all research and academic institutions	Average bandwidth per SANReN site per annum	8 000 Mbps average bandwidth capacity available per SANReN site by 31 Mar. 2019	No baseline	2 200 Mbps average bandwidth capacity is available per SANReN site	2 820 Mbps average bandwidth capacity available per SANReN site	3 500 Mbps average bandwidth capacity available per SANReN site by 31 Mar. 2016	3 500 Mbps average bandwidth capacity available per SANReN site by 31 Mar. 2017	5 000 Mbps average bandwidth capacity available per SANReN site by 31 Mar. 2018	8 000 Mbps average bandwidth capacity available per SANReN site by 31 Mar. 2019
Strategic objective: To support and promote research that develops basic sciences through the production of new knowledge and relevant training opportunities									
Researchers awarded research grants through NRF-managed programmes	Total number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	13 617 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 Mar. 2019	3 076 researchers awarded research grants through NRF-managed programmes	3 569 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	4 064 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	4 539 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 Mar. 2016	4 539 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 Mar. 2017	4 539 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 Mar. 2018	4 539 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Internationally accredited research articles from researchers awarded research grants through NRF-managed programmes	Number of research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database (TR database)* as reflected in the NRF project reports	21 000 accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 Mar. 2019	4 273 ISI-accredited research articles published by NRF-funded researchers	5 641 ISI-accredited research articles published by NRF-funded researchers	6 470 ISI research articles published by NRF-funded researchers as reflected in the NRF project reports	7 000 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 Mar. 2016	7 000 research articles published by NRF-funded researchers and cited in the TR database as reflected in the NRF project reports by 31 Mar. 2017	7 000 research articles published by NRF-funded researchers and cited in the TR database as reflected in the NRF project reports by 31 Mar. 2018	7 000 research articles published by NRF-funded researchers and cited in the TR database as reflected in the NRF project reports by 31 Mar. 2019
Strategic objective: To strategically develop priority science areas in which South Africa enjoys a competitive advantage, by promoting internationally competitive research and training activities and outputs									
MeerKAT antennas	Number of MeerKAT antennas installed	64 MeerKAT antennas installed by 31 Mar. 2017	MeerKAT antennas design completed as per SKA specifications	1 MeerKAT antenna installed by 31 Mar. 2014	4 MeerKAT antennas installed as per SKA specification	21 MeerKAT antennas installed by 31 Mar. 2016	64 MeerKAT antennas installed by 31 Mar. 2017	No target	No target

* The Institute for Scientific Information ceased to exist some time ago, and its citation database was incorporated into the Thomson Reuters Web of Science Citation Database.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Climate change research network	A functional climate change research network in place	A functional climate change research network formalised in South Africa through a memorandum of understanding by 31 Mar. 2018	No baseline	No baseline	Submission to the DDG of a report on existing climate change research initiatives and networks	Research capacity of existing networks profiled and research areas that need institutional support identified by 31 Mar. 2016	Submission to the DDG of a report on existing climate change research initiatives and networks by 31 Mar. 2017	A functional climate change research network formalised in South Africa through a memorandum of understanding by 31 Mar. 2018	No target

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Reports on state of climate change S&T in South Africa	Number of biennial reports on the state of climate change S&T in South Africa approved by Cabinet	Two biennial reports on the state of climate change S&T in South Africa submitted for Cabinet approval by 31 Mar. 2019	No baseline	No baseline	No baseline	1 plan for compiling the first biennial report on the state of climate change S&T in South Africa for Cabinet approval by 31 Mar. 2016	1 (first biennial) report on the state of climate change S&T in South Africa finalised and submitted for Cabinet approval by 31 Mar. 2017	1 plan for compiling second biennial report on the state of climate change S&T in South Africa for Cabinet approval by 31 Mar. 2018	Finalise the second biennial report and submit for Cabinet approval by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE 2015/16	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To promote public engagement on science, technology and innovation									
Participants[20] in science awareness and engagement programmes managed by the NRF and other service providers	Approximate number of participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers	Approx. 3 600 000 participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 Mar. 2019	385 000 participants (331 000 learners and 54 000 members of the public) in science awareness and engagement programmes	1 054 221 people directly participated in science awareness and engagement programmes	1 247 667 people participated in science awareness and engagement programmes supported by the DST	Approx. 979 000 participants (588 000 learners and 391 000 members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 Mar. 2016	Approx. 1 200 000 participants (learners and members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 Mar. 2017	Approx. 1 200 000 participants (learners and members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 Mar. 2018	Approx. 1 200 000 participants (learners and members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 Mar. 2019

20 Participants include visitors to sites hosting awareness and engagement activities, or people reached through media.

Table 19: Quarterly targets for the 2016/17 financial year

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Total number of PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	Quarterly	3 136[21] PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2017	1 568 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 30 June 2016	2 352 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 30 Sept. 2016	2 811 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Dec. 2016	3 136 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2017
Total number of pipeline postgraduate students (BTech and honours, and master's students) awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	Quarterly	10 996[22] pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2017	5 498 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 30 June 2016	8 247 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 30 Sept. 2016	9 896 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Dec. 2016	10 996 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 Mar. 2017
Total number of graduates and students placed in DST-funded work preparation programmes in SETI institutions	Quarterly	840[23] graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Mar. 2017	700 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 30 June 2016	750 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 30 Sept. 2016	800 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Dec. 2016	840 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 Mar. 2017

21 Cumulative number of PhD students.
22 Cumulative number of pipeline postgraduate students (BTech, honours and master's).
23 Cumulative number of graduates and students.

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of research infrastructure grants awarded as per award letters	Quarterly	70 research infrastructure grants awarded as per award letters by 31 Mar. 2017	No target	Call for proposals on awarding of research infrastructure grants issued by 30 Sept. 2016	No target	70 research infrastructure grants awarded as per award letters by 31 Mar. 2017
Average bandwidth per SANReN site per annum	Quarterly	3 500 Mbps average bandwidth capacity available per SANReN site by 31 Mar. 2017	No target	New sites and upgrade plan finalised by 30 Sept. 2016	No target	3 500 Mbps average bandwidth available per SANReN site by 31 Mar. 2017
Total number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	Quarterly	4 539[24] researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 Mar. 2017	2 270 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 30 June 2016	3 405 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 30 Sept. 2016	4 085 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 Dec. 2016	4 539 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 Mar. 2017
Number of research articles published by NRF-funded researchers and cited in the TR database as reflected in the NRF project reports	Annually	7 000[25] research articles published by NRF-funded researchers and cited in the TR database as reflected in the NRF project reports by 31 Mar. 2017	No target	No target	No target	7 000 research articles published by NRF-funded researchers and cited in the TR database as reflected in the NRF project reports by 31 Mar. 2017
MeerKAT antennas installed[26]	Quarterly	64 MeerKAT antennas installed[27] by 31 Mar. 2017	32 MeerKAT antennas installed on site by 30 June 2016	44 MeerKAT antennas installed on site by 30 Sept. 2016	53 MeerKAT antennas installed on site by 31 Dec. 2016	64 MeerKAT antennas installed on site by 31 Mar. 2017

24 Cumulative number of researchers awarded research grants.
25 Cumulative total of internationally accredited research articles.
26 Note that in this context an installed antenna means physical installation has been completed by General Dynamics Satcom Technologies (GDSatcom), but acceptance testing has not been completed. Once acceptance testing on an antenna is completed by GDSatcom, SKA SA fits receivers/digitisers to the antennas and performs single-dish acceptance testing before the antenna is integrated into the rest of the array.
27 Cumulative number of MeerKAT antennas installed.

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
A functional climate change research network in place	Annually	Submission to the DDG of a report on existing climate change research initiatives and networks by 31 Mar. 2017	No target	No target	No target	Submission to the DDG of a report on existing climate change research initiatives and networks by 31 Mar. 2017
Number of biennial reports on the state of climate change S&T in South Africa approved by Cabinet	Annually	1 (first biennial) report on the state of climate change S&T in South Africa finalised and submitted for Cabinet approval by 31 Mar. 2017	No target	No target	No target	1 (first biennial) report on the state of climate change S&T in South Africa finalised and submitted for Cabinet approval by 31 Mar. 2017
Approximate number of participants in science awareness and engagement programmes as reflected in project reports of the NRF and other service providers	Quarterly	Approximately 1 200 000 participants (learners and members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 Mar. 2017	Grant funding awarded to organisations implementing the initiatives by 30 June 2016	National Science Week held by 30 Sept. 2016	3 science festivals and 6 science, technology, engineering, mathematics and innovation Olympiads and competitions held by 31 Dec. 2016	4 science festivals conducted and approximately 1 200 000 participants in science awareness and engagement programmes as reflected in project reports of the NRF and other service providers by 31 Mar. 2017

Reconciling performance targets with the budget and MTEF

Table 20: Research Development and Support expenditure estimates

R'000 PROGRAMME	EXPENDITURE OUTCOME			ADJUSTED APPROPRIATION 2015/16	MEDIUM-TERM EXPENDITURE ESTIMATES		
	2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Human Capital and Science Promotion	1 413 926	1 683 088	1 872 787	2 337 984	2 356 414	2 441 051	2 534 667
Science Missions	83 896	151 318	159 549	165 786	164 335	175 742	185 719
Basic Sciences and Infrastructure	561 350	710 235	783 727	1 009 611	988 306	1 050 543	1 069 203
Astronomy	243 598	654 192	673 774	725 444	691 541	752 543	771 806
TOTAL	**2 302 770**	**3 198 833**	**3 489 837**	**4 238 825**	**4 200 596**	**4 419 879**	**4 561 395**
Compensation of employees	21 179	24 516	29 438	30 465	31 805	32 796	34 065
Goods and services	7 677	7 906	8 258	14 369	14 923	15 656	16 472
Transfers and subsidies	2 273 592	3 166 411	3 452 010	4 193 991	4 153 868	4 371 427	4 510 858
Payments for capital assets	289	-	72	-	-	-	-
Payments for financial assets	11	-	59	-	-	-	-
TOTAL	**2 302 770**	**3 198 833**	**3 489 837**	**4 238 825**	**4 200 596**	**4 419 879**	**4 561 395**

Note: As indicated previously, that owing to cuts made to the DST-NRF Internship Programme (following Economic Competitiveness Support Package cuts announced on 18 January 2016), the MTEF targets had to be lowered.

PROGRAMME 5: SOCIO-ECONOMIC INNOVATION PARTNERSHIPS

Purpose

To enhance the growth and development priorities of government through targeted S&T-based innovation interventions and the development of strategic partnerships with other government departments, industry, research institutions and communities.

Strategic overview

The efforts and investments of Programme 5 contribute to all five of the strategic outcome-oriented goals of the Department's 2015-2020 Strategic Plan.

The Programme plays a supporting role in building a responsive, coordinated, and efficient NSI (Strategic Outcome-Oriented Goal 1). A key support activity is the management of the DST's investments in the collection and interpretation of appropriate and quality statistics on STI through annual surveys and information management systems. Statistical information is a crucial input into process to enhance budget coordination for STI (Proxy Indicator 2) as well as to support a more rational and strategic deployment of public funding for STI (Proxy Indicator 3). Programme 5 also plays a leadership and coordinating role in the development of RDI partnerships between industry and government (Proxy Indicator 4).

In 2015/16, Programme 5, together with Programme 1A, finalised proposals for budget coordination scheduled for tabling in Parliament in 2016. In terms of the budget coordination proposals, a budget coordination process will be rolled out and matured over the next few years and will depend on the availability of good quality information. As part of ongoing efforts to build a statistical information base, Programme 5 finalised the 2013/14 R&D survey and the 2014/15 Science and Technological Activities Survey. Finally, following previous development work on the Research Information Management System, the system was brought into full production in 2015/16.

The Programme is responsible for providing leadership and coordinating efforts in a number of priority focus areas in the NRDS and the TYIP. Economic and social development will be supported through work in advanced manufacturing, resource-based industries, ICT, environmental technologies, and innovation for inclusive development, among other areas. In support of these priority areas, investments made by the Programme contribute to maintaining and increasing the relative contribution of South African researchers to global scientific output (Strategic Outcome-Oriented Goal 2), and support efforts to increase the number and demographic representativity of high-level graduates (Strategic Outcome-Oriented Goal 3).

In addition to the support role played by the Programme in building a responsive, coordinated and efficient NSI, increasing knowledge production, and HCD, the bulk of the Programme's resources are targeted at initiatives that aim to generate a greater share of economic growth from R&D-based opportunities and partnerships (Strategic Outcome-Oriented Goal 4) and to accelerate inclusive development through scientific knowledge, evidence and appropriate technology (Strategic Outcome-Oriented Goal 5).

Strategic investments are made in RDI initiatives in which South Africa has competitive or comparative advantages and which can lead to new industrial development. In 2015/16, a portfolio of existing industry development initiatives were consolidated into the EIAP. These include initiatives in mineral beneficiation (titanium, fluorochemicals and advanced metals) and initiatives aligned to IPAP (composites, additive manufacturing, ICTs). Initiatives have been aligned with the Nine-Point Plan to diversify and grow the economy.

During the consolidation process, Programme 5 began the process of reviewing and validating all initiatives in terms of their ability to attract commercial and industrial financing (Proxy Indicator 1), as well as to generate company revenue (Proxy Indicator 2). In addition, initiatives were reviewed in order to identify opportunities for enhancing their contribution to jobs and exports and to

enhance the impact on key beneficiaries, including black people, women and the youth. The review is being used to enhance the value of outputs outlined in the current APP and to help in identifying improvements that need to be introduced in future APPs.

The Programme also provides leadership and investment support to initiatives whose primary focus is either on enhancing the technological capabilities of existing SMEs or the creation of new SMEs (Proxy Indicator 3). In 2015/16, programmes such as the technology stations, technology localisation and mLab initiatives were reviewed and assessed to see opportunities for enhancing the impact of these programmes over the 2015-2020 planning period.

Finally, the significant overhaul of the innovation for inclusive development portfolio that was started a few years back was largely completed. Existing initiatives were reoriented to align more effectively to the capabilities and living standards approach taken by the NDP. Specifically, the portfolio was enhanced and repositioned to ensure a more targeted focus on decision-support activities that can support meaningful improvements in service delivery (Proxy Indicator 1), sustainable local economic development using innovation and technology (Proxy Indicator 2), or in enhancing capabilities and the standard of living of people in South Africa (Proxy Indicator 3).

The technology development and R&D funded by Programme 5 is aimed at making a difference in industry, improving coordination and impact across government, and addressing the triple challenge of poverty, inequality and unemployment.

The impact of SIP projects on industry

The approach has been to engage with the private sector on a project-by-project basis and assess how the private sector could support the scaling up and successful rollout of the technologies for inclusive development. For example, close collaboration with the private sector (Bill & Melinda Gates Foundation) helped to pilot internationally innovative sanitation technologies. A similar partnership was leveraged to demonstrate the use of hydrogen fuel cells in rural areas.

IID's collaborative technology demonstration projects have a number of private companies participating as service providers in providing technical, professional and specialised services in projects, thus creating skills transfer and employment opportunities for local communities where various technologies are being demonstrated, for example, the low pour flush project used private consulting engineers to design and manage the engineering aspects of the project. In the waste water treatment project an external service provider was used to support capacity building and technical training for municipal technicians working in water treatment plants. Furthermore, the Public Investment Cooperation and other development finance institutions have opportunities to engage at a project level to support business opportunities emanating from sanitation technology demonstrations.

Strategic Objective 3, on R&D-led industry development, is aimed at establishing new industries, or helping existing industries to improve their competitiveness through the application of new knowledge or technologies. DST-funded technology development is therefore aimed directly at enabling industries to increase their turnover, to leverage additional R&D funding, and/or to help improve the competitiveness and sustainability of SMEs. For example, the technology assistance package support instrument directly helps to improve a firm's technological capability in order to increase both the level of local manufacturing and the level of its exports. One illustration of this is a local firm that manufactures axles for trains receiving help to improve their quality accreditation, resulting in increased sales to the original equipment manufacturer of the trains, but also securing substantial new export sales. A sector-wide technology assistance package established a molten metal flow modelling capability at a number of technology stations, resulting in an improvement of the productivity and quality of casting at foundries that can now access the complex production planning method, which would normally be too expensive to house at each individual foundry.

Both the Water and Waste RDI Roadmaps were developed in consultation with industry. The Waste Roadmap Manager provides advice to various waste industry associations, for example by making presentations on strategic matters to the boards of Packaging SA and Plastics SA. The Waste RDI Roadmap Project Management Unit has established a series of "industry meets science" engagements on the priority areas identified in the roadmap. The first such engagement was on organic waste and the

next will be on electronic waste. These engagements are intended to bring researchers and industry together so that researchers can obtain a better understanding of the needs of industry, and so that industry can learn more about the capability of the researchers in their sector.

In efforts to encourage industry companies to invest in ICT RDI in South Africa and position the country as one of the leading destinations for attracting foreign direct investment, the DST established an ICT Multinational Companies Cooperation Programme in 2010. The programme aims to play a critical role in harnessing and ensuring the achievement of the strategic objectives of the ICT RDI Roadmap in a mutually beneficial way with multinational companies that have an operational presence in South Africa.

The programme is guided by the DST ICT Multinational Companies Cooperation Framework. Overall, the collaboration is on four broad areas, namely, establishing RDI platforms and laboratories; HCD (both high-end and technical skills); innovation and technology-based SME development; and the adoption of practices that foster and permit the transfer and rapid diffusion of technology without contravening laws governing IP rights.

The programme has, over a five-year period, established collaborations with multinational ICT companies including Microsoft SA, Nokia, SAP, IBM and Cisco. Innovation platforms and technology incubators such as mLab have also resulted from the programme. In 2013, with the introduction of the ICT Innovation in Industry Partnerships Fund, the programme has attracted investments in R&D from Cisco (R60m at Nelson Mandela Metropolitan University), and IBM (R350m over 10 years under the Department of Trade and Industry-IBM Equity Equivalent Investment Programme. The programme also builds partnerships with ICT user industries, for example a mining subsidence monitoring tool was developed by the CSIR, where DST has invested R8,4 million with potential returns of R48 million over five years from contracts with mining companies.

In addition, the DST manages two key initiatives specifically designed to incentivise the private sector to invest more in RDI. The Industry Innovation Partnership Programme is an initiative comprised of five parts, which includes the DST-CSIR Industry Innovation Parnership Initiative and the Sector Innovation Fund Programme. The former is a partnership with the CSIR that aims to enable the science council to assist industry to become more competitive. It includes the Biomanufacturing Industry Development Centre, the Nanomaterials Industrial Development Facility, and more recently the Biorefinery and Photonics Prototyping Facilities.

The Biomanufacturing Industry Development Centre aims to strengthen and configure the existing bioprocess and product development competence at CSIR Biosciences and to make this affordable and broadly accessible. It has supported more than 10 enterprises to date, mainly through product development and technology incubation services. The Nanomaterials Industrial Development Facility was launched in December 2015, and will make a key contribution in the provision of industry-ready and relevant skills and capabilities. It provides a unique technology and product development capability for South Africa, with respect to nanostructures and nano-applications required for industry. It currently supports one spin-out company and one industry partner in the cosmetics industry. The Biorefinery Facility will integrate biomass conversion processes and equipment to produce fuels, power and chemicals from biomass. The Photonics Prototyping Facility is earmarked as a vehicle for growing the photonics industry in South Africa.

Nine sector innovation funds (SIFs) have been established in partnership with industry associations in the relevant sectors. The SIF initiative is aimed primarily at incentivising private sector investments in RDI, and at broadly addressing the challenges around the economic competitiveness of a particular sector. The intention is to create an enabling environment for an industry to determine and drive its RDI priorities in a co-funding arrangement with government. A comprehensive set of performance indicators has been developed. A vital performance measure for the SIF programme will be the amount of funding an industry sector contributes to the identified RDI programmes or priorities, to match government (DST) funding. It is envisaged that the key long-term outcome measure will be an increased contribution by the relevant sector to GDP based on strengthened RDI-based industrial development. While it is not yet possible to start seeing the long-term effects of the programme, as most of the SIFs were established only in the past two years, to date they have supported 32 interns, six postdoctoral researchers, 39 PhD students,

two DTech students, 24 MSc students, three MTech students and seven honours students. An online information management and reporting system is being developed to optimise the reporting aspects of the initiative. It is currently anticipated that DST will invest about R140m over the MTEF period, and it is estimated that around R53m will be leveraged from industry.

The chief directorate also supports industry indirectly through its support for regional innovation forums in various areas of the country. These are primarily aimed at creating an enabling environment for innovation by building networks and relationships between academia, industry, government and society.

The impact of SIP projects on the activities of other departments

The Programme has partnered with lead departments in the design and implementation of projects that have influenced government thinking. For example, the ICT projects in Cofimvaba have helped shape ideas about best practice and methodologies for rolling out ICT in schools.

The DST's existing partnership agreements with departments include one with the Department of Human Settlements and various municipalities around the implementation of innovative building technologies, for example, the Ekurhuleni Housing Project. Through this partnership project, the DST demonstrated the potential of innovative building technologies to support housing delivery. A decision-support tool for innovative building technology benchmarking was presented by DST at the Department of Human Settlements and the National Home Builders Registration Council Innovative Building Conference in February 2016.

Government cluster policy workshops are often used by the DST to offer access to relevant knowledge, social science concepts, and evidence, for use in public policy formulation, implementation and improvement.

The technology development and new knowledge created through DST funding has a direct impact on the competitiveness of the firms that use the technology. In order to maximise technology development investments, close engagement is maintained with the Department of Trade and Industry and the Department of Public Enterprises during both the planning and the technology maturation phases. A number of the DST programmes, like the Technology Localisation Programme and the Mining R&D Programme have now been recognised by other government departments and are being used to coordinate, maximise and plan industry-support interventions.

The Department of Water and Sanitation (DWS) is using the Water RDI Roadmap as part of implementing the National Water Resources Strategy (NWRS). It is the only response to Chapter 14 of the NWRS2, which is the Research and Innovation Chapter. The Water Research Commission (WRC), which reports to the DWS, has incorporated the Water RDI Roadmap into its corporate plan.

The Waste RDI Roadmap documents are regularly cited by the Minister and Department of Environmental Affairs. In addition, the Waste Branch has regularly used the presentations prepared by the Department and the CSIR on the Waste Roadmap in public forums such as the Waste Summit in 2015.

The DST is leading the development of a National Cybersecurity RDI Agenda in line with the implementation of the National Cybersecurity Policy Framework and the enhancement of the cybersecurity for universities, science councils and industry. In addition, through the DST-supported Information Security RDI Programme, the CSIR's Modelling and Digital Science unit provided technical advice and support to the Department of Home Affairs in developing a secure smart-card system, from concept to a ready-to-manufacture technical specification for the card, as part of the national smart ID roll-out project.

In contributing towards the implementation of the 2004 e-Education White Paper, the DST, in partnership with the DBE, the Eastern Cape Department of Education, the Department of Rural Development and Land Reform (DRDLR) and the CSIR's Meraka Institute initiated the ICT for Rural Education and Development in the Nciba Circuit of the Cofimvaba District. Through the intervention, learners in 26 schools were equipped with tablets and 246 teachers were trained in the use of ICT for teaching in a large-scale

project to learn more about the effective integration of ICTs into teaching and learning in a rural context. An operational model is being transferred to the Eastern Cape Department of Education and the project was used as one of the case studies to inform the DBE e-Education Operation Phakisa plan developed in 2015.

The DST and the CSIR supported the Department of Health in the development of the Health Normative Standards Framework, which was gazetted in April 2014, and which lays the foundation for addressing the critical issue of fragmentation of electronic health systems in South Africa. The Health Patient Registration System was deployed at 38 facilities, with 328 639 registered patients and 274 554 visits from September 2014. The DST participated in the Operation Phakisa health information systems group, helping with the development of a plan for the implementation of an integrated health information system to support processes required for the ideal clinic project.

The impact of SIP projects on local economic development

The DST has funded the development of indigenous knowledge systems products for commercialisation. Programme 5 is implementing a range of local economic development projects, influencing government's approach to the implementation of local economic development initiatives.

In the allocation of firm-level technology assistance packages, care is taken to ensure that firms across the country receive support. In addition, the activities of the Technology Stations Programme, aimed mainly at supporting SMEs, are spread across the country, so assistance for economic development is not limited to only one province.

DST approved the Water and Waste RDI Roadmaps in 2015 and it is therefore too early to report on their economic impact.

Much of the work done in developing regional innovation systems and innovation-driven industry partnerships will capacitate the knowledge economy and will contribute to local economic growth in an indirect manner.

Responding to the triple challenge of poverty, inequality and unemployment

Both the Waste and the Water RDI Roadmaps respond to poverty alleviation and job creation needs by encouraging SME creation. The Waste RDI Roadmap, in particular, highlights that waste is a resource with economic value if it is recycled and reused instead of being dumped in landfills.

The CSIR's Innovation Industry Partnership and Sector Innovation Fund initiatives respond to the triple challenge through the support they provide to technology enterprises and financially stressed sectors such as sugar milling. The SIF in this sector is aimed at investigating technology options that may lead to alternative revenue streams for the industry, thus saving jobs. In addition to the enterprises supported by the Biomanufacturing Industry Development Centre, the SIF has created more than 30 permanent jobs to date.

The implementation of the ICT RDI Roadmap is aligned to national government priorities and responds to the triple challenge through the support provided to technology enterprises through the mLab programme. Employment opportunities are also provided to unemployed youth through the implementation of technology demonstrator projects such as the Broadband For All initiative, which is aimed at using wireless mesh technology to connect rural communities. A total of 95 jobs have been created from the mLab programme and the Broadband For All project.

ICT enables agriculture projects, provides advice and training to young agriculture graduates on how to become entrepreneurs and establish businesses, and offers technical support to small-scale farmers. About 100 graduates are being supported towards this outcome. Sanitation SMEs are being consulted to assess the role they can play in supporting South African Sanitation Technology Demonstration Programme projects in rural areas to expand economic participation opportunities.

The Department's technology demonstration projects, for example in agroprocessing and essential oils, create jobs (particularly for women and young people) and thus also address poverty by creating family income. The district municipalities selected for demonstrations are areas with high poverty levels and many socio-economic challenges. Technology demonstration projects address inequality by facilitating the participation of informal innovators in the NSI. Through partnerships with provincial departments, the DST brings technology infrastructure to enable the use of natural resources and medicinal plants, creating income-generating opportunities for local people.

Projects like the Accelerated Water Service Delivery and the Point of Use initiatives have improved access to water and information, improving beneficiaries' standard of living.

Strategic objectives

- Through knowledge, evidence and learning, to inform and influence how S&T can be used to achieve inclusive development.
- To identify, grow and sustain niche high-potential STI capabilities for sustainable development and the greening of society and the economy.
- To identify, grow and sustain niche high-potential STI capabilities that –
  - improve the competitiveness of existing industries with growth potential in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds; and
  - facilitate the development of R&D-led new targeted industries.
- To enhance understanding and analysis that support improvements in the functioning and performance of the NSI.
- To strengthen provincial and rural innovation and production systems through analysis and catalytic interventions.
- To introduce and manage interventions and incentive programmes that increase the level of private sector investment in scientific or technological R&D.

Chief directorates

Technology Localisation, Beneficiation and Advanced Manufacturing funds technology and innovation development programmes to advance strategic medium and long-term sustainable economic growth and sector development priorities, as well as government service delivery through the following value-adding functions:

- Investing in the medium and long-term knowledge-generation capabilities of the NSI in targeted innovation areas.
- In partnership with other government departments and economic actors, spearheading focused efforts that exploit knowledge capabilities for economic benefit. Economic benefit includes the development of advanced technologies and industries, improved government service delivery, improved productivity and competitiveness, and technology transfer and support to SMEs and manufacturing firms in the supply chains of large-scale public procurement programmes.

Sector Innovation and Green Economy provides policy, strategy and direction-setting support for the R&D-led growth of strategic sectors of the economy and to enhance S&T capacity to support a transition to a green economy. The chief directorate does this through the following:

- Facilitating the implementation of high-impact S&T interventions.
- Identifying and initiating S&T programmes that support the growth of the environmental technologies and services sector in South Africa.
- Facilitating policy and strategy development on R&D interventions that support the growth of the ICT sector (excluding the ICT retail sector).
- Providing innovation policy and planning support to economic actors in priority economic sectors and provincial and local governments.

Innovation for Inclusive Development supports the experimentation of S&T-based innovations for tackling unemployment, poverty and inequality through the creation of sustainable job and wealth opportunities, building sustainable human settlements, and enhancing the delivery of basic services. The component focuses on supporting the widespread adoption and use of promising S&T-based innovation by supporting the demonstration of promising innovative technologies that do not yet have widespread application, but are seen as having the potential to achieve government's broad development objectives. In its interventions, the component prioritises the generation of practical knowledge and insights to support evidence-based policy and decision making, introducing decision-support tools to enhance service delivery, and building capacity in relevant state institutions and communities.

Science and Technology Investment leads and supports the development of indicators and instruments for measuring and monitoring investments in S&T and the performance of the NSI, and ways of strengthening the NSI and innovation policy. This includes an annual R&D survey, innovation measurement, the development of S&T indicators, the development of databases and information systems such as the Research Information Management System and the national S&T expenditure tables, and the implementation of section 11D of the Income Tax Act, 1962, to promote private-sector R&D investment.

Table 22: Programme risk management - Socio-Economic Innovation Partnerships

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
Through knowledge, evidence and learning, to inform and influence how S&T can be used to achieve inclusive development	Inadequate mechanisms to obtain and disseminate relevant knowledge and evidence for informing and influencing decision-making by organisations	▪ Implement the communications and marketing plan developed to ensure the adequate dissemination of information ▪ Incorporate team composition in the project proposal and project reporting templates
	Poor/inadequate planning and implementation of projects by implementation agencies	▪ During the proposal evaluation process, determine the capacity (experience, systems and expertise) of the implementing agencies ▪ Develop project management guidelines for the chief directorate, which will be aligned to the DST project management framework once this has been finalised
	Lack of inclusion in NSI structures by all forms of innovators	▪ Develop the grassroots innovation action plan to address issues of accessibility ▪ Conduct a landscape study to create a sustainable human settlement innovations database
To identify, grow and sustain a portfolio of niche high-potential STI capabilities for sustainable development and the greening of society and the economy	Insufficient number of projects supporting and promoting sustainable development and the greening of society and the economy	▪ Continue to participate in interdepartmental task teams and project steering committees, etc. ▪ Joint planning and implementation of projects shared with other programmes ▪ Facilitate structured meetings between the DST and implementing agencies
	Lack of buy-in for the Water and Waste RDI Roadmaps by the relevant line departments	▪ Leverage funding from sources other than National Treasury ▪ Ensure that the DST contracts include a conflict of interest clause ▪ Ensure that terms of reference for governance structures (e.g. project management units and steering committees) address conflicts of interest ▪ Escalate challenges to ministerial level
	Delay in the implementation of the Water and Waste RDI Roadmaps	▪ Continue with quarterly management committee meetings to discuss operational matters and annual advisory committee meetings to discuss strategic matters

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To enhance understanding and analysis that support improvements in the functioning and performance of the NSI	Statistics and indicators produced by the chief directorate do not adequately meet policy requirements	▪ Adapt and customise international instruments (Frascati Manual) to the local environment. ▪ Formalise and implement mentoring and coaching programmes at more senior levels ▪ Obtain Exco approval for all new measurement requirements and important changes to the scope and focus of existing S&T measurement instruments ▪ Facilitate user workshops and regular meetings with users (DST, other government departments, science councils, policy researchers and universities) to refine measurement instruments ▪ Extract more value from international engagements by ensuring that outcomes and learning are shared with the team members, and properly evaluated and adapted ▪ Extract more value from expert advice by managing consultants to maximise value for the Department
	Production of poor quality statistics (e.g. not timely or accurate)	▪ Regularly monitor adherence to time frames by the Science and Technology Indicators and R&D Planning units ▪ Evaluate the adequacy of the budget against measurement requirements ▪ Maintain the established benchmarks/standards for assessing the quality of each statistic
	Inadequate and ineffective engagement between the DST and other departments in the public sector in enhancing the functioning of the NSI	▪ Implement the framework for coordinating S&T cooperation with other departments ▪ Escalate obstacles to the Minister and/or the Director-General for them to resolve with their counterparts ▪ Implement recommendations from the DST-National Treasury task team on budget coordination and cooperation in the Medium Term Expenditure Committee process
To introduce and manage interventions and incentive programmes that increase the level of private sector investment in RDI	Administrative and adjudication errors in projects of applicant companies	▪ Monitor the effectiveness of R&D tax incentive guidelines and change control procedures when required ▪ DST to appoint or outsource to legal personnel to deal with the interpretation of tax-related matters and to issue legal communications to companies ▪ Continuous monitoring to ensure alignment of section 11D of the Income Tax Act with policy on increasing R&D investment in South Africa ▪ Annual meetings with industry
	Not achieving the targeted turnaround time in providing a decision to applicant companies	▪ Implement the Online Applications Submission System ▪ Implement Exco decision to create permanent internal capacity

STRATEGIC OBJECTIVE	RISK DESCRIPTION	MITIGATION ACTION
To identify, grow and sustain niche high-potential STI capabilities that improve the competitiveness of existing and emerging economic sectors and that facilitate the development of new targeted industries with growth potential in aerospace, advanced manufacturing, chemicals, mining, advanced metals, ICTs and SIFs	Having a portfolio of projects that does not have the potential to impact on industrial development	▪ Retain close interaction with industry member societies and independently follow international R&D developments and achievements ▪ Build and maintain knowledge networks ▪ Capture and disseminate lessons learned for use in the management of other projects ▪ Identify crucial projects based on contract value ▪ Where necessary a tailored stage-gate approach should be implemented ▪ Policy briefing schedule to clusters to incorporate large DST programmes, which have strong interdepartmental linkages ▪ Participation in industry association events ▪ Projects which have had a technological breakthrough, potential impact, or as indicated by economic review, should have long-term plans, or be included in the EIAP portfolio
	Projects not delivered as planned by implementing agencies	▪ Agency delivery targets and reporting requirements need to be clearly defined in the operational plan
To strengthen provincial and rural innovation and production systems through analysis and catalytic interventions	Lack of buy in and/or ownership on the part of provincial and municipal officers to catalytic interventions as an enabler for socio-economic development	▪ Develop a strategic engagement framework to inform the DST's approach to creating innovation-enabling interventions at provincial level ▪ With local and provincial government and relevant stakeholders, develop a draft framework for financing local innovation
	Lack of inclusivity of catalytic interventions	▪ Develop a strategic engagement framework to inform DST's approach to creating innovation-enabling interventions at provincial level

Table 23: Programme performance indicators and targets for 2016/17

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: Through knowledge, evidence and learning, to inform and influence how S&T can be used to achieve inclusive development									
Knowledge products[28]	Number of knowledge products on innovation for inclusive development published	16 knowledge products on innovation for inclusive development published by 31 Mar. 2019	1 knowledge product finalised (but not published)	2 policy briefs published on the DST website	2 knowledge products (two case studies) were completed and published on the DST website	4 knowledge products on innovation for inclusive development published by 31 Mar. 2016	4 knowledge products on innovation for inclusive development published by 31 Mar. 2017	6 knowledge products on innovation for inclusive development published by 31 Mar. 2018	6 knowledge products on innovation for inclusive development published by 31 Mar. 2019

28 Knowledge products include case studies, policy briefs and technology briefs. Different knowledge products may be required to provide the knowledge and evidence required by decision-makers in order to adopt a new technology-based approach. A policy brief is a document that outlines the rationale for selecting a particular policy alternative and aims to convince the target audience that an existing problem can be addressed by adopting an alternative policy or course of action. A case study is a detailed description and exploration of a particular project, with a specific focus on challenges, lessons, and success factors, and is usually targeted at people involved in implementation. A technical brief refers to a range of knowledge products providing performance data, that deal with specifications or which deal with a specific technical challenge that can impact on the adoption of a particular technology. A single project or initiative can support the production of several of the knowledge products described above. Knowledge products can also be supported by a decision-support intervention. A knowledge product has to meet the needs of a particular user community and therefore requires significant interaction to determine what would be of value.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Decision-support interventions[29]	Number of decision-support interventions introduced and maintained	10 decision-support systems maintained and improved by 31 Mar. 2019	No baseline	2 additional decision-support systems for improving sanitation and basic education service delivery introduced; and two existing decision-support systems (Spatial and Temporal Evidence for Planning South Africa, and the Risk and Vulnerability Atlas) maintained	4 decision-support systems maintained and two introduced by 31 Mar. 2015	5 decision-support systems maintained and improved by 31 Mar. 2016	7 decision-support systems maintained and improved by 31 Mar. 2017	8 decision-support systems maintained and improved by 31 Mar. 2018	10 decision-support systems maintained and improved by 31 Mar. 2019

29 Decision-support interventions help people think about choices they face; they describe where and why choice exists, and provide information about options, including, where reasonable, the option of taking no action. These interventions aim to help people to consider options, independently or in collaboration with others, by taking into account relevant attributes, short, intermediate and long-term outcomes, and relevant consequences. Decision-support interventions assist the process of constructing preferences and eventual decision making in a particular situation.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Learning interventions[30] (seminars) generated	Number of learning interventions (seminars) generated	27 learning interventions (seminars) generated by 31 Mar. 2019	9 policy interventions (seminars)	9 learning interventions (seminars) generated by 31 Mar. 2014	11 learning interventions (seminars) generated by 31 Mar. 2015	9 learning interventions (seminars) generated by 31 Mar. 2015 (Erroneously left out of 2015/16 APP)	9 learning interventions (seminars) generated by 31 Mar. 2017	9 learning interventions (seminars) generated by 31 Mar. 2018	9 learning interventions (seminars) generated by 31 Mar. 2019
Strategic objective: To identify, grow and sustain niche high-potential STI capabilities for sustainable development and the greening of society and the economy									
High-level[31] human capital developed in the dedicated niche areas that support the green economy and sustainable development	Number of honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the greening of society and the economy and sustainable development	170 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 31 Mar. 2019	No baseline	No baseline	11 master's and doctoral students fully funded or co-funded in designated niche areas by 31 Mar. 2015	50 master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 31 Mar. 2016	55 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 31 Mar. 2017	60 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 31 Mar. 2018	60 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 31 Mar. 2019

30 In this context a learning intervention refers to a communication tool produced by policy analysts, in the form of a seminar, which serves as an impetus for acting for the policy audience such as the Cabinet or Parliament. The intervention may also be used to support broader advocacy initiatives targeting a wide but knowledgeable audience, e.g. clusters, decision-makers, researchers and administrators.

31 High-level human capital refers to honours, master's and doctoral students in this instance, as the niche area of waste management, as part of the green economy, is a very new area that will be targeted to build the pipeline for further postgraduate expertise. Waste Management will target honours level support.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Knowledge and innovation products: patents[32], prototypes[33], technology demonstrators[34] and technology transfer packages	Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio through fully funded or co-funded research	14 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research by 31 Mar. 2019	No baseline	No baseline	One demonstrator added to the Innovation Products (IP) portfolio by 31 Mar. 2015	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research by 31 Mar. 2016	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research by 31 Mar. 2017	5 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research by 31 Mar. 2018	5 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research by 31 Mar. 2019

32 Patents include formal disclosures (made within an entity), and provisional patent applications.
33 A prototype is a representative model that can perform the required functions of the intended product.
34 A technology demonstrator is a model that demonstrates the functional capability of a specific technology. It is at a lower level of technological maturity than a prototype, as it is aimed at demonstrating the technology functionality only.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To identify, grow and sustain niche high-potential STI capabilities that – ▪ **improve the competitiveness of existing industries with growth potential in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds;** ▪ **facilitate the development of R&D-led new targeted industries**									
High-level HCD built for competitiveness and new industry development	Number of high-level research graduates (master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFs)	870 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFS) by 31 Mar. 2019	227 master's and PhD students fully funded or co-funded	264 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals and ICTs)	353 master's and doctoral students fully funded or co-funded in designated niche areas by 31 Mar. 2015	273 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFS) by 31 Mar. 2016	290 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFS) by 31 Mar. 2017	290 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFS) by 31 Mar. 2018	290 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFS) by 31 Mar. 2019
	Number of interns fully funded or co-funded in R&D related to design, manufacturing and product development	272 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 Mar. 2019	No baseline	190 interns fully funded or co-funded in R&D related to design, manufacturing and product development	358 interns fully funded or co-funded by 31 Mar. 2015	240 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 Mar. 2016	200 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 Mar. 2017	36 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 Mar. 2018	36 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Knowledge and innovation products:[35] patents, technology demonstrators, technology transfer packages or prototypes generated	Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio through fully funded or co-funded research initiatives	68 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio by 31 Mar. 2019	16 patents, prototypes, technology demonstrators or technology transfer packages added	16 knowledge and innovation products (two in-house invention disclosures, one provisional patent and 13 technology demonstrators) added to the IP portfolio	29 knowledge and innovation products added to the IP portfolio	25 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio by 31 Mar. 2016	35 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio by 31 Mar. 2017	15[36] knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio by 31 Mar. 2018	18 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio by 31 Mar. 2019
Funding instruments to increase localisation, competitiveness and R&D-led industry development	Number of instruments[37] funded in support of increased localisation, competitiveness and R&D-led industry development	6 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 Mar. 2019	No baseline	No baseline	8 instruments funded by 31 Mar. 2015	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 Mar. 2016	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 Mar. 2017	6[38] instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 Mar. 2018	6 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 Mar. 2019

35 Knowledge generation in the SET domain is normally associated with the performance of R&D. A number of the DST's programmes and activities are aimed at building capacity (knowledge, skills, and science infrastructure) in the general sense, or at the science level, where new knowledge generation is the main aim rather than the industrial application of knowledge. Some programmes and activities, such as those defined in Strategic Objective 4 (R&D-led industry development) are aimed at performing specific R&D activities, jointly identified and based on industry needs, to unlock new markets, products or services. The outcomes of these R&D activities are aimed at innovations and increased competitiveness for the participation firms and industry sectors. The outputs of these R&D activities are therefore aimed at maturing (with the aim of applying) existing knowledge. In the APP these outputs are described as industrially relevant IP and, depending on the nature of the technology development, may consist of technology packages, technology demonstrators, prototypes, or pilot plants, among other things.

36 The drop in target is due to the fact that the Economic Competitiveness Support Programme (ECSP) funding that the DST received is coming to an end by 31 March 2017.

37 An instrument refers to an entity (including a virtual entity) formally established (by contract), which is used in support of R&D-led industrial development.

38 The drop in target is due to the fact that the ECSP funding that the DST received is coming to an end by 31 March 2017.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To strengthen provincial and rural innovation and production systems through analysis and catalytic interventions									
Innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems	Number of innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems	8 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 Mar. 2019	No baseline	No baseline	No baseline	2 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 Mar. 2016	2 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 Mar. 2017	3 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 Mar. 2018	3 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 Mar. 2019

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To enhance understanding and analysis that support improvements in the functioning and performance of the NSI									
Reports and policy briefings[39] on the NSI and innovation policy published	Number of reports and policy briefings on the innovation system and innovation policy approved by Exco/ published	18 reports and policy briefings on the innovation system and innovation policy approved by Exco/ published by 31 Mar. 2019	5 reports and policy briefings approved by Exco/ published	3 reports and policy briefings were approved by DST and published	The report was approved by Exco on 9 Feb. 2015. Findings were disseminated through a stakeholder workshop on 27 March 2015 and published on the DST website. The 2013/14 Report on the Performance of R&D Tax Incentive has been finalised and published on the DST website	5 reports and policy briefings on the innovation system and innovation policy approved by Exco/published by 31 Mar. 2016	6 reports and policy briefings on the innovation system and innovation policy approved by Exco/ published by 31 Mar. 2017	6 reports and policy briefings on the innovation system and innovation policy approved by Exco/ published by 31 Mar. 2018	6 reports and policy briefings on the innovation system and innovation policy approved by Exco/ published by 31 Mar. 2019

39 A policy briefing in this context refers to a communication tool produced by policy analysts, in the form of either a cabinet memorandum or evidence-based report or strategy which serves as an input for action by a defined policy audience such as Cabinet, Parliament, the Portfolio Committee on S&T, the Minister of Science and Technology or another minister, or provincial government. The briefing or report may also be used to support broader advocacy initiatives targeting a wide but knowledgeable audience, e.g. the Economic Sectors, Employment and Infrastructure Development Cluster, decision-makers, researchers and administrators.

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Strategic objective: To introduce and manage interventions and incentive programmes that increase the level of private sector investment in scientific or technological R&D									
					Monitoring data on R&D administration was compiled and presented through 4th quarter status update report. The 2012/13 R&D survey report and the cabinet memorandum on R&D expenditure trends were disseminated in quarter three. Draft report/ policy brief on innovation in the manufacturing sector was produced (based on revised annual target) but not yet approved				

OUTPUT	PERFORMANCE INDICATOR	STRATEGIC TARGET	AUDITED/ACTUAL PERFORMANCE			ESTIMATED PERFORMANCE	MEDIUM-TERM TARGETS		
			2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Companies accessing the R&D tax incentive	Turnaround time in providing preapproval decisions on applications for the R&D tax incentive improved	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive by 31 Mar. 2019	No baseline	No baseline	No baseline	Preapproval decisions provided within 150 days of date of receipt of application for the R&D tax incentive by 31 Mar. 2016	Preapproval decisions provided within 120 days of date of receipt of application for the R&D tax incentive by 31 Mar. 2017	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive by 31 Mar. 2018	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive by 31 Mar. 2019

Table 24: Quarterly targets for the 2016/17 financial year

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of knowledge products on innovation for inclusive development published	Quarterly	4 knowledge products on innovation for inclusive development published by 31 Mar. 2017	Through consultation and review, identify the topics and format of the 4 new knowledge products by 30 June 2016	First draft of the 4 identified policy briefs on innovation for inclusive development developed by 30 Sept. 2016	Validation and engagement on the 4 policy briefs concluded by 31 Dec. 2016	4 knowledge products on technology-led opportunities for sustainable livelihoods published on the DST website by 31 Mar. 2017
Number of decision-support interventions introduced and maintained	Quarterly	7 decision-support systems maintained and improved by 31 Mar. 2017	Monitor the implementation of work plans for the 7 existing decision-support systems by the project teams by 30 June 2016	Monitor the implementation of work plans for the 7 existing decision-support systems by the project teams by 30 Sept. 2016	Monitor the implementation of work plans for the 7 existing decision-support systems by the project teams by 31 Dec. 2016	7 decision-support systems maintained and improved by 31 Mar. 2017
Number of learning interventions (seminars) generated	Quarterly	9 learning interventions (seminars) generated by 31 Mar. 2017	Conclusion of contract for coordination of the learning interventions by 30 June 2016	2 learning interventions generated by 30 Sept. 2016	3 learning interventions generated by 31 Dec. 2016	4 learning interventions generated by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of honours, master's and doctoral students fully funded or co-funded in designated niche areas	Quarterly	55 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 31 Mar. 2017	Update and ongoing monitoring of students from the following initiatives by 30 June 2016: ▪ Waste RDI Roadmap ▪ Water RDI Roadmap ▪ Sector Innovation Fund ▪ Industrial Innovation Partnership	▪ No new intake ▪ Ongoing monitoring of the WRC HCD Contracts, the Waste RDI Roadmap and the Industrial Innovation Programme by 30 Sept. 2016	▪ No new intake ▪ Ongoing monitoring of the WRC HCD Contracts, the Waste Roadmap and the Industrial Innovation Programme by 31 Dec. 2016 ▪ Engage implementation agencies to ensure that the required new batch of students will be supported in the following academic year and that the agencies have planned properly for the funding of new students by 31 Dec. 2016	Monitoring to ensure that all existing students re-register and that, where new students come on board, the database is updated to ensure that the enrolment of 55 students is maintained by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio through fully funded or co-funded research initiatives	Quarterly	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio by 31 Mar. 2017	Update on progress with MyWare and SulphurTech, managed by WADER (Water Technologies Demonstration Programme) Interactions with various programmes to define the two new innovation products to be added to IP portfolio by 30 June 2016	Update on MyWare and SulpherTech and report on progress with implementing 2 new innovation products to be added to IP portfolio by 30 Sept. 2016	Update on MyWare and SulpherTech and report on progress with implementing 2 new innovation products by 31 Dec. 2016	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio by 31 Mar. 2017
Number of high-level research graduates (master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and sector innovation funds)	Biannually	290 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and sector innovation funds) by 31 Mar. 2017	▪ 250 master's and doctoral students fully funded or co-funded in designated niche areas by 30 June 2016 ▪ Confirm student numbers from ongoing R&D programmes and those linked to new projects, in order to confirm the target will be reached by 30 June 2016	Continue monitoring of student numbers, and ensure that implementing entities are engaged to ensure the annual target is reached by 30 Sept. 2016	Ensure that the required new batch of students will be supported in the next calendar year and that the agencies have planned properly to fund the new students by 31 Dec. 2016	Additional 40 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, and sector innovation funds) by 31 Mar. 2017 to ensure that the minimum number of students funded/co-funded exceeds the target of 290 for the financial year 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of interns fully funded or co-funded in R&D related to design, manufacturing and product development	Biannually	200 interns fully funded or co-funded in R&D of design, manufacturing and product development by 31 Mar. 2017	150 interns fully funded or co-funded in designated niche areas of design, manufacturing and product development by 30 June 2016	Continue monitoring the intern numbers, and ensure that implementing entities are engaged to ensure the annual target is reached by 30 Sept. 2016	Continue monitoring the intern numbers, and ensure that implementing entities are engaged to ensure the annual target is reached by 31 Dec. 2016	Additional 50 interns fully funded or co-funded in designated niche areas by 31 Mar. 2017, taking the total for the full financial year to 200 interns
Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio through fully funded or co-funded research initiatives	Quarterly	35 knowledge and innovation products (patents, , technology demonstrators, technology transfer packages or prototypes) added to the IP portfolio by 31 Mar. 2017	Begin negotiations with implementation agencies on proposed knowledge and innovation products to be added to IP portfolio by 30 June 2016	Finalise negotiations with implementation agencies on proposed knowledge and innovation products to be added to IP portfolio by 30 Sept. 2016	▪ Validate the 5 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio by 31 Dec. 2016 ▪ Continue oversight and monitoring of the targeted knowledge and IP products as identified with the implementing agencies by 31 Dec. 2016	Completed the validation of at least another 30 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals and ICTs	Quarterly	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 Mar. 2017	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 30 June 2016	Continue to fund 9 instruments in support of increased localisation, competitiveness and R&D-led industry development by 30 Sept. 2016	Continue to fund 9 instruments in support of increased localisation, competitiveness and R&D-led industry development by 31 Dec. 2016	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 Mar. 2017
Number of innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems	Quarterly	2 innovation support interventions implemented in provinces or priority district municipalities by 31 Mar. 2017	Through consultation identify the support interventions to be implemented by 30 June 2016	Project proposal and contracting finalised by 30 Sept. 2016	Implementation to commence by 31 Dec. 2016	2 innovation support interventions implemented in one or more provinces or rural district municipalities by 31 Mar. 2017

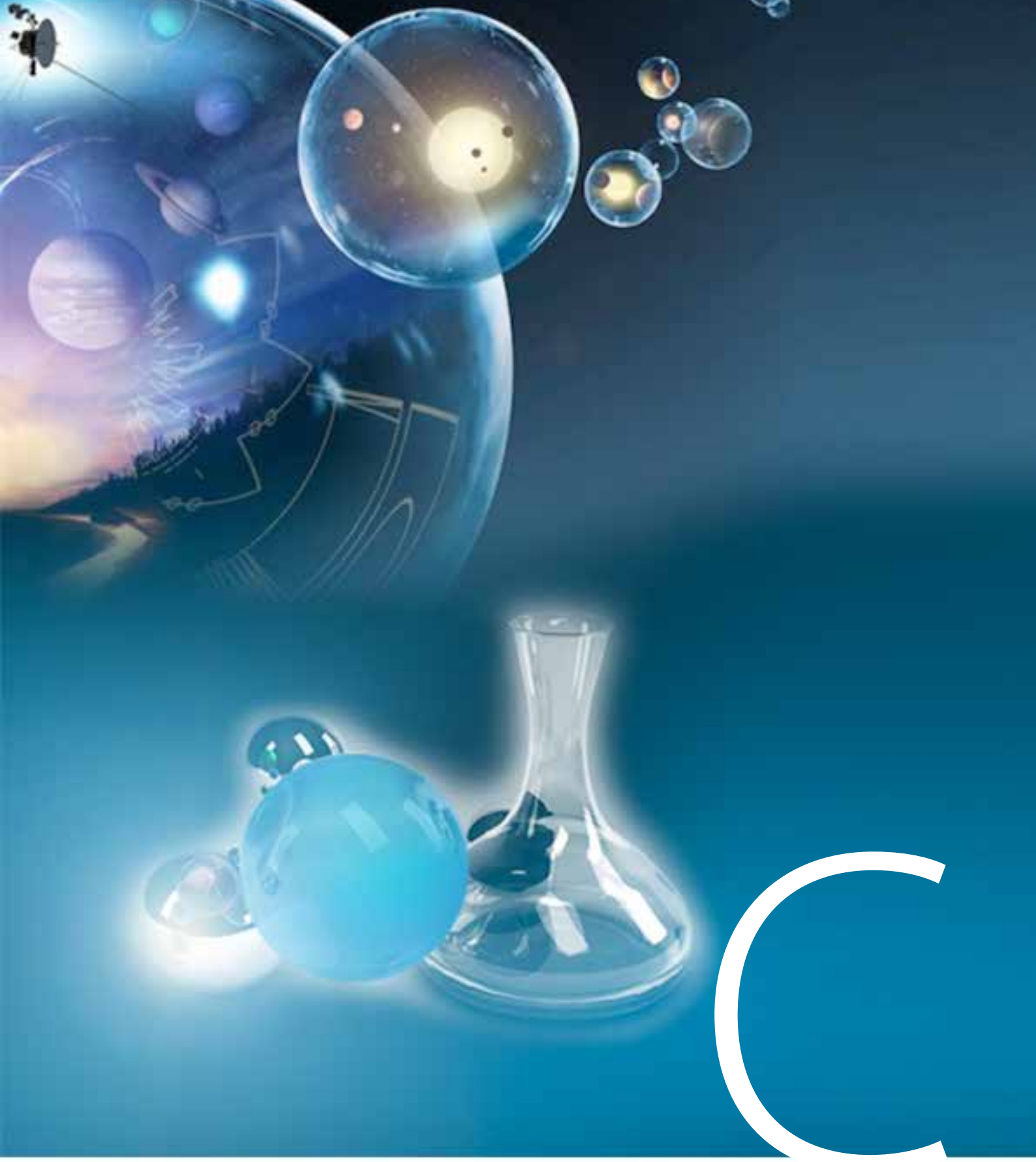
PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Number of reports and policy briefings on the innovation system and innovation policy approved by Exco/ published	Quarterly	Produce 2015/16 report on government funding for scientific and technological activities	Data collection for 2015/16 report on government funding for scientific and technological activities begun by 28 Feb. 2016 and verification and validation of data completed by 31 Mar. 2016	Draft 2015/16 report on Government Funding for scientific and technological activities and policy briefing presented to and approved by Exco by 31 Mar. 2016	Dissemination of findings of the 2015/16 report on Government Funding for Scientific and Technological Activities by December 2016	Dissemination of findings of the 2015/16 report on Government Funding for Scientific and Technological Activities with, user consultations and review of instrument by 31 Mar. 2017
	Quarterly	Produce 2014/15 R&D survey	Finalise 2014/15 R&D survey fieldwork by 30 June 2016	Draft report on the 2014/15 R&D survey and present the report to Exco by 30 Sept. 2016	Final 2014/15 R&D survey report published by 31 Dec. 2016	Dissemination of the 2014/15 R&D survey report and drafting of Cabinet Memo on trends in R&D expenditure completed by 31 March 2017
	Quarterly	Produce 2015/16 report on performance of R&D tax incentive	Data preparation for 2015/16 annual report by 30 June 2016	Draft 2015/16 report on performance of R&D tax incentive presented to Exco by 30 Sept. 2016	2015/16 report on performance of R&D tax incentive finalised and published on DST website by 31 Dec. 2016	Dissemination of 2015/16 report on performance of R&D tax incentive, including a cabinet memorandum, by 31 Mar. 2017
	Quarterly	Fieldwork for the 2016 Business Innovation Survey (2013-2015 data) begun by March 2017	Draft planning/ methodology documents for the 2016 Business Innovation Survey (2013-2015 data) by 31 Mar. 2016	Approved planning/ methodology documents for the 2016 Business Innovation Survey (2013-2015 data) by 30 June 2016	Begin with fieldwork for the 2016 Business Innovation Survey (2013-2015 data) by 30 Sept. 2016	Continue with fieldwork for the 2016 Business Innovation Survey (2013-2015 data) by 31 Mar. 2017

PERFORMANCE INDICATOR	REPORTING FREQUENCY	ANNUAL TARGET 2016/17	QUARTERLY TARGETS			
			QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
Turnaround time in providing preapproval decisions on applications for the R&D tax incentive	Quarterly	Preapproval decisions provided within 120 days from date of receipt of application for the R&D tax incentive by 31 Mar. 2017	Preapproval decisions provided within 150 days from date of receipt of application for the R&D tax incentive by 30 June 2016	Preapproval decisions provided within 150 days from date of receipt of application for the R&D tax incentive by 30 Sept. 2016	Preapproval decisions provided within 120 days from date of receipt of application for the R&D tax incentive by 31 Dec. 2016	Preapproval decisions provided within 120 days from date of receipt of application for the R&D tax incentive by 31 Mar. 2017

Reconciling performance targets with the budget and MTEF

Table 25: Socio-economic Innovation Partnerships expenditure estimates

R'000 PROGRAMME	EXPENDITURE OUTCOME			ADJUSTED APPROPRIATION 2015/16	MEDIUM-TERM EXPENDITURE ESTIMATES		
	2012/13	2013/14	2014/15		2016/17	2017/18	2018/19
Sector Innovation and Green Economy	833 595	812 750	875 737	873 803	937 080	985 109	1 044 918
Innovation for Inclusive Development	315 974	325 125	340 095	365 022	349 970	358 402	358 029
Science and Technology Investment	31 976	25 377	29 864	29 023	29 548	30 837	32 413
Technology Localisation and Advanced Manufacturing	127 669	294 990	293 470	529 023	476 278	237 418	160 690
TOTAL	**1 309 214**	**1 458 242**	**1 539 166**	**1 796 871**	**1 792 876**	**1 611 766**	**1 596 050**
Compensation of employees	25 240	29 988	34 158	34 579	37 838	39 050	40 566
Goods and services	7 113	6 531	6 700	8 403	8 825	9 248	9 729
Transfers and subsidies	1 276 327	1 421 723	1 498 308	1 753 889	1 746 213	1 563 468	1 545 755
Payments for capital assets	489		-		-	-	-
Payments for financial assets	-	-	-	-	-	-	-
TOTAL	**1 309 214**	**1 458 242**	**1 539 166**	**1 796 871**	**1 792 876**	**1 611 766**	**1 596 050**



C

LINKS TO OTHER PLANS

PART C: LINKS TO OTHER PLANS

Table 26: Links to the long-term infrastructure and other capital plans

PROJECT NAME	PROGRAMME	MUNICIPALITY	PROJECT DESCRIPTION	OUTPUTS	ESTIMATED PROJECT COST	EXPENDITURE TO DATE	PROJECT DURATION	
							START	END
New and replacement assets								
SKA	4	Kareeberg Local Municipality (part of the Pixley ka Seme District Municipality)	Phase 1 of the SKA will include the construction of 64 MeerKAT antennae	The completion of 64 MeerKAT antennae	R3,67bn	R1,32bn	2006/7	2018/19

Table 27: Public entities reporting to the DST

NAME OF PUBLIC ENTITY	MANDATE	OUTPUTS	CURRENT ANNUAL BUDGET (2016/17)	DATE OF NEXT EVALUATION[40]
Academy of Science of South Africa	▪ To promote common ground in scientific thinking across all disciplines, including the physical, mathematical and life sciences, as well as the human, social and economic sciences ▪ To encourage and promote innovative and independent scientific thinking ▪ To promote the optimum development of the intellectual capacity of all people ▪ To provide effective advice and facilitate appropriate action in relation to the collective needs, opportunities and challenges of all South Africans ▪ To link South Africa with scientific communities of the highest levels, within the SADC, the rest of Africa and the rest of the world	▪ Collaborations among global science organisations ▪ Promotion of young scientists and women for science activities ▪ STI policy advice for government ▪ Scientific writing for research publishing	23 106	2016
Council for Scientific and Industrial Research	To foster, in the national interest and in the fields which in its opinion should receive preference, industrial and scientific development, either by itself or in cooperation with principals from the public or private sector, and thereby to contribute to the improvement of the quality of life of the people of South Africa, and to perform any other functions that may be assigned to it by or under the Scientific Research Council Act	RDI outputs: ▪ Peer-reviewed publications ▪ Research technologies ▪ Patents ▪ Research reports	1 086 589	2016

40 The DST evaluates the performance of the entities on an annual and quarterly basis (via analyses of the quarterly reports, and the annual report).

NAME OF PUBLIC ENTITY	MANDATE	OUTPUTS	CURRENT ANNUAL BUDGET (2016/17)	DATE OF NEXT EVALUATION[40]
Human Sciences Research Council	▪ To initiate, undertake and foster strategic basic and applied research in the human sciences, and to gather, analyse and publish data relevant to developmental challenges in South Africa, elsewhere in Africa and in the rest of the world, especially by means of projects linked to public-sector oriented collaborative programmes ▪ To inform the effective formulation and monitoring of policy and to evaluate the implementation of policy ▪ To stimulate public debate through the effective dissemination of fact-based research results ▪ To help build research capacity and infrastructure for the human sciences in South Africa and the rest of Africa ▪ To foster and support research collaboration, networks and institutional linkages within the human sciences research community ▪ To respond to the needs of vulnerable and marginalised groups in society by researching and analysing developmental problems, thereby contributing to the improvement of the quality of their lives ▪ To develop and make publicly available new datasets to underpin research, policy development and public discussion of the key issues of development, and to develop new and improved methodologies for use in their development	▪ Public dialogue and publications (dissemination of knowledge) ▪ Research and analysis of developmental problems ▪ Promote African research agenda and collaborative research ▪ Research capacity for human sciences ▪ Policy briefs (inform formulation of government policy and evaluate its implementation)	290 149	2016
National Advisory Council on Innovation	To advise the Minister of Science and Technology, and through the Minister, the government of South Africa, on the role and contribution of innovation in promoting and achieving national objectives	▪ A high-level document providing a framework for a decadal plan ▪ Feedback report on the White Paper on Science and Technology and associated policies review process ▪ A model for a data innovation portal ▪ Rapid policy advice on pertinent innovation topics	NACI is funded from the DST's budget	2016

NAME OF PUBLIC ENTITY	MANDATE	OUTPUTS	CURRENT ANNUAL BUDGET (2016/17)	DATE OF NEXT EVALUATION[40]
National Research Foundation	To support and promote research through funding, human resource development and the provision of the necessary research facilities in order to facilitate the creation of knowledge, innovation and development in all fields of S&T, including indigenous knowledge, and thereby to contribute to the improvement of the quality of life of all the people of South Africa	▪ Provision of research infrastructure and funding (research funding bursaries), research infrastructure grants, and infrastructure investment funding) ▪ National research facilities (students supported by national research facilities, ISI-accredited publications from national research facilities)	2 857 998	2016
South African National Space Agency	▪ To promote the peaceful use of space ▪ To support the creation of an environment conducive to industrial development in space technology ▪ To foster research in space S&T, communications, navigation and space physics ▪ To advance scientific, engineering and technological competence and capabilities through HCD outreach programmes and infrastructure development ▪ To foster international cooperation in space-related activities	▪ Provision of space services and products ▪ Increasing national space research output (sourced researching, publications, student funding) ▪ Develop national human capacity and transformation (funding of students and interns, young people engaged in space science activities) ▪ Competitiveness of South African space industry	124 977	2016
Technology Innovation Agency	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 exploring technological innovation	▪ Technology development funding (technology-based companies, jobs created by companies established through TIA funding) ▪ Enabling environment for technology innovation (jobs created, increased companies turnover, technology support funding for SMEs)	382 364	2016

ANNEXURE A: AMENDMENT TO THE 2015-2020 STRATEGIC PLAN (ANNEXURE D IN THE FRAMEWORK FOR STRATEGIC PLANS AND ANNUAL PERFORMANCE PLANS)

The Department has reviewed its 2015-2020 Strategic Plan. No major policy shifts and changes in the service delivery environment have been identified through this review. However, some of the performance indicators have been refined as indicated below, and a number of new indicators added.

AMENDED INDICATORS

PROGRAMME	CURRENT PERFORMANCE INDICATOR IN THE 2015-2020 STRATEGIC PLAN	REVISED PERFORMANCE INDICATOR	REASONS
PROGRAMME 2: TECHNOLOGY INNOVATION	Number of innovation-enabling programmes implemented	Number of instruments funded in support of knowledge utilisation	The scope has been broadened to include other initiatives resulting in an increase in the target from 7 to 25 in the corresponding year. The instruments funded in support of knowledge utilisation are inclusive of the initiatives that were included in the 2015/16 APP under the Number of innovation-enabling programmes indicator, namely the hosting of the Innovation Bridge Technology Showcase and Matchmaking Event, the implementation of the Innovation Bridge Portal, the implementation of public-private sector initiatives such as the industry internship programme, the implementation of the Commercialisation Framework Programme (and any associated strategies that emerge as a consequence), the Emerging Industries Action Plan Programme and initiatives in support of Offices of Technology Transfer activities.
	Number of technology products, processes and/or services commercialised	Number of commercial outputs in designated areas	The commercialisation of products, processes and services involves other departments, entities and the markets and therefore falls outside the Department's control.The Programme's focus with the "number of commercial outputs in designated areas" indicator will be in areas where the Department has direct control, i.e. on the assessment of commercialisation potential of products, processes and services and funding thereof. As the measurement scope has increased, the target has also increased from 3 to 8 in the corresponding year.

PROGRAMME	CURRENT PERFORMANCE INDICATOR IN THE 2015-2020 STRATEGIC PLAN	REVISED PERFORMANCE INDICATOR	REASONS
PROGRAMME 4: RESEARCH AND DEVELOPMENT	Total number of postgraduate students (BTech and honours, master's and PhD students, and postdoctoral fellows) awarded bursaries using DST funding	Total number of pipeline postgraduate students (BTech, honours, and master's students), awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	The pipeline constitutes BTech, honours and master's studies leading to a PhD. The original indicator was split to be more specific. Now the PhD graduates (included in new indicator - see below) are measured separately from the pipeline, as the conversion rate (from pipeline to PhD) is of strategic importance, as well as the size of the pipeline.
PROGRAMME 4: RESEARCH AND DEVELOPMENT	3 500 Mbps average bandwith capacity available per SANReN site.	8 000 Mbps average bandwidth capacity available per SANReN site.	To correct a mistake in the Strategic Plan
PROGRAMME 5: SOCIO-ECONOMIC INNOVATION PARTNERSHIPS	Number of master's and PhD students fully funded or co-funded in designated niche areas that support the greening of society and the economy and sustainable development	Number of honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the greening of society and the economy and sustainable development	The South African system currently regards honours as postgraduates as these students are already specialising. The niche area of waste, as part of the green economy, is still very new and students are encouraged to study in this field from honours level so as to build a pipeline for further postgraduate expertise. Honours-level support will be targeted in the area of waste management. The target has increased, commensurate with the increase in scope.

NEW INDICATORS

PROGRAMME 2: TECHNOLOGY INNOVATION			
INDICATORS	**STRATEGIC TARGET**	**2016/17 TARGET**	**REASON**
Number of regulatory recommendations for decision support by government	85 regulatory recommendations for decision support by government by 31 March 2019	27 regulatory recommendations for decision support by government by 31 March 2017	With the elevation of decision-support tools as an objective of the DST, it was decided to use the Programme 2 bioenergy atlas, SAEOS Portal and the participation in the Executive Council of the GMO Act to highlight the regulatory recommendations the DST is directly involved in. The recommendations are made to advance South Africa's ability to benefit sustainably from GMO (genetically modified organisms) introductions and also to provide decision support to other government department. This is directly aligned a number of strategies under Programme 2, and the NDP, and hence have been elevated from the Operational Plan.
Number of decision support interventions developed and maintained	6 decision support interventions maintained by 31 March 2019	2 decision support interventions maintained by 31 March 2017	This relates to the SAEOS portal and Bioenergy Atlas motivated for elevation from the Operational Plan discussed in the line above.
PROGRAMME 4: RESEARCH AND DEVELOPMENT			
INDICATORS	**STRATEGIC TARGET**	**2016/17 TARGET**	**REASON**
Total number of PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	Not less than 9 408 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2019	3 136 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2017	The original indicator (which included both the pipeline students and the PhD students) was split to be more specific. Now the PhD graduates are measured separately from the pipeline, as the conversion rate (from pipeline to PhD) is of strategic importance, as well as the size of the pipeline. This is recorded as a new indicator, although it was previously incorporated in the original indicator.
PROGRAMME 5: SOCIO-ECONOMIC INNOVATION PARTNERSHIPS			
INDICATORS	**STRATEGIC TARGET**	**2016/17 TARGET**	**REASON**
Number of learning interventions (seminars) generated	27 learning interventions (seminars) generated by 31 March 2019	9 learning interventions (seminars) generated by 31 March 2017	An editorial correction as it was erroneously left out of the 2015/16 APP. The target was also refined by limiting it to seminars.

STRATEGIC INDICATORS NOT ALIGNED TO THE DRAFT APP

The DST has embarked upon a process of reducing the number of indicators in the APP. The indicators below will instead be taken up in the operational plans of the respective Programmes.

PROGRAMME	PERFORMANCE INDICATOR IN STRATEGIC PLAN
Administration	Number of DST public entities' annual reports submitted to Parliament
	Percentage of DST personnel submitting performance contracts and reviews on time
	Number of IT governance framework components implemented
	Budget planning reports (MTEF and Estimates of National Expenditure) submitted to National Treasury
	Number of DST communication and media plans approved
	Communication strategy and implementation plan approved
	Number of S&T media monitoring reports tabled
Research Development and Support	Number of regulations gazetted
	Number of strategy documents approved

LIST OF ABBREVIATIONS

APP	Annual Performance Plan
AU	African Union
AVN	African Very Long Baseline Interferometry Network
CoC	centre of competence
CoE	centre of excellence
CSIR	Council for Scientific and Industrial Research
DBE	Department of Basic Education
DEA	Department of Environmental Affairs
DHET	Department of Higher Education and Training
DIRISA	Data Intensive Research Initiative South Africa
DRDLR	Department of Rural Development and Land Reform
DST	Department of Science and Technology
DWS	Department of Water and Sanitation
ECSP	Economic Competitiveness Support Programme
EIAP	Emerging Industries Action Plan
Gbps	gigabits per second
GEO	Group on Earth Observations
GLP	good laboratory practice
GMP	good manufacturing practice
HCD	human capital development
HySA	Hydrogen South Africa
ICT	information and communication technology
IDC	Industrial Development Corporation
IEP	Integrated Energy Plan
IKS	indigenous knowledge systems
IP	intellectual property

IPAP	Industrial Policy Action Plan
IPR Act	Intellectual Property Rights from Publicly Funded Research and Development Act
ISI	Institute for Scientific Information
Mbps	megabytes per second
MTEF	Medium Term Expenditure Framework
MTSF	Medium Term Strategic Framework
NACI	National Advisory Council on Innovation
NDP	National Development Plan
NEOSS	National Earth Observation and Space Secretariat
nGAP	New Generation of Academics Programme
NICIS	National Integrated Cyberinfrastructure Systems
NIPMO	National Intellectual Property Management Office
NRDS	National Research and Development Strategy
NRF	National Research Foundation
NSI	National System of Innovation
NSS	National Space Strategy
NWRS	National Water Resources Strategy
R&D	research and development
RDI	research, development and innovation
RFI	radio frequency interference
S&T	science and technology
SAASTA	South African Agency for Science and Technology Advancement
SADC	Southern African Development Community
SAEOS	South African Earth Observation Strategy
SANReN	South African National Research Network
SANSA	South African National Space Agency
SARChI	South African Research Chairs Initiative

SARIR	South African Research Infrastructure Roadmap
SET	science, engineering and technology
SETI	science, engineering, technology and innovation
SIF	sector innovation fund
SKA	Square Kilometre Array
SME	small or medium enterprise
SSDU	specialised service delivery unit
STI	science, technology and innovation
TIA	Technology Innovation Agency
TR database	Thomson Reuters Web of Science Citation Database
TSP	Technology Stations Programme
TYIP	Ten-Year Innovation Plan
WRC	Water Research Commission

Notes

Notes

Notes

AMENDED INDICATORS

PROGRAMME	CURRENT PERFORMANCE INDICATOR IN THE 2015-2020 STRATEGIC PLAN	REVISED PERFORMANCE INDICATOR	REA
PROGRAMME 2: TECHNOLOGY INNOVATION	Number of innovation-enabling programmes implemented	Number of instruments funded in support of knowledge utilisation	The scope has been broadened to includ the target from 7 to 25 in the correspond The instruments funded in support o the initiatives that were included in t innovation-enabling programmes indica Bridge Technology Showcase and M of the Innovation Bridge Portal, the initiatives such as the industry internshi Commercialisation Framework Program emerge as a consequence), the Emergi initiatives in support of Offices of Techno
	Number of technology products, processes and/or services commercialised	Number of commercial outputs in designated areas	The commercialisation of products, departments, entities and the markets ar control.The Programme's focus with t designated areas" indicator will be in area i.e. on the assessment of commercialisa services and funding thereof. As the me has also increased from 3 to 8 in the corr
PROGRAMME 4: RESEARCH AND DEVELOPMENT	Total number of postgraduate students (BTech and honours, master's and PhD students, and postdoctoral fellows) awarded bursaries using DST funding	Total number of pipeline postgraduate students (BTech, honours, and master's students), awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	The pipeline constitutes BTech, honours The original indicator was split to be mor (included in new indicator - see below) a as the conversion rate (from pipeline to P the size of the pipeline.
PROGRAMME 5: SOCIO-ECONOMIC INNOVATION PARTNERSHIPS	Number of master's and PhD students fully funded or co-funded in designated niche areas that support the greening of society and the economy and sustainable development	Number of honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the greening of society and the economy and sustainable development	The South African system currently regar students are already specialising. The nic economy, is still very new and students a from honours level so as to build a pipeli The Waste Management Honours will be commensurate with the increase in scop

NEW INDICATORS

PROGRAMME 2: TECHNOLOGY INNOVATION			
INDICATORS	**STRATEGIC TARGET**	**2016/17 TARGET**	
Number of regulatory recommendations for decision support by government	85 regulatory recommendations for decision support by government by 31 March 2019	27 regulatory recommendations for decision support by government by 31 March 2017	With the elevation of c the DST, it was decided SAEOS Portal and the pa GMO Act to highlight th directly involved in. The South Africa's ability to modified organisms) in support to other govern number of strategies un have been elevated from
Number of decision support interventions developed and maintained	2 decision support interventions maintained by 31 March 2019	2 decision support interventions maintained by 31 March 2017	This relates to the SAEOS Operational Plan discuss

PROGRAMME 4: RESEARCH AND DEVELOPMENT			
INDICATORS	**STRATEGIC TARGET**	**2016/17 TARGET**	
Total number of PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	Not less than 9 408 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2019	3 136 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2017	The original indicator (w and the PhD students) w graduates (included in a separately from the pipe pipeline to PhD) is of stra the pipeline. This is recor previously incorporated

PROGRAMME 5: SOCIO-ECONOMIC INNOVATION PARTNERSHIPS			
INDICATORS	**STRATEGIC TARGET**	**2016/17 TARGET**	
Number of learning interventions (seminars) generated	27 learning interventions (seminars) generated by 31 March 2019	9 learning interventions (seminars) generated by 31 March 2017	An editorial correction a APP. The target was also

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