

ANNUAL PERFORMANCE PLAN 2019-2020



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



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MINISTER'S FOREWORD



The 2019/20 Annual Performance Plan will conclude the 2015-2020 Strategic Plan implementation. The adoption of the new White Paper on Science, Technology and Innovation will moving forward guide the national system of innovation (NSI). A new decadal plan for South Africa, which is under development, will set out more specific areas in which government will focus its efforts to use science, technology and innovation to deliver equitable social and economic advancement for the South Africans people.

The new implementation plans will be significant, particularly as the world grapples with the technologies of the Fourth Industrial Revolution (4IR). To ensure that our people are not left behind, we must as a country respond decisively, in order to exploit the pivotal role of

information and communication technology so as to ensure that our economy becomes more technology-driven. Thereby fostering greater efficiency in production, and the provision and access of services. To this end, the Department will continue to intensify its focus and investment in building capacity in our country in order to respond to and drive the 4IR. While 4IR holds many opportunities, we must also acknowledge the challenges that it presents. It is in understanding the opportunities and challenges of the 4IR that policy formulation in this regard can be structured in a manner that adequately prepare South Africans for the far reaching implications of the technological changes that are unfolding.

Over the years, the Department has sharpened its focus on ways in which its portfolio of work and of the broader NSI can contribute to the reduction of inequality, poverty and unemployment. As such, the implementation of the policy imperatives of the National Development Plan (Vision 2030) will continue to take precedence. This means that the Department will continue to support the amplification of the role of science, technology and innovation in various production processes within the South African economy. This effort will continue to ensure that the Department plays its role in growing the South African economy in a manner that addresses the triple challenges of unemployment, poverty and inequality.

The Department will also continue to play its role in driving and advocating for increases in

gross investment in research and development as a percentage of Gross Domestic Product with the aim of achieving the National Development target of 1, 5%. This will be carried out in a manner that places greater emphasis on innovation, improved productivity, more intensive pursuit of a knowledge that also takes into account the commercialisation of locally produced technologies, and improved usage of our comparative and competitive advantages in respective sectors of our economy in an integrated continent and world as 2030 approaches. This will continue to be accompanied by the implementation of our tax incentives in investment in research and development.

With the budget for 2019/20 estimated to increase to R8,150 billion from the R7,790 billion allocated in 2018/19, the 2019/20 Annual Performance Plan identifies initiatives to develop new research and development of industries that could help improve South Africa's value addition in what we produce and export, thereby playing an important role in improving the country's trade balance, and there by improving the prospects of increasing economic growth through stimulating the demand side of our economy.

The Department is thus funding a number of initiatives that are expected to contribute towards this goal; for example, the launch of the Mandela Mining Precinct, a project established to facilitate the coordination of mining research, development and innovation activities and collaboration among stakeholders. The precinct is the culmination of government's partnership with the Minerals Council South

Africa in implementing the South African Mining Extraction Research, Development and Innovation (SAMERDI) programme, which is aimed at materially improving the technological base of mining in South Africa. SAMERDI focuses on six themes – the longevity of current mines, mechanised drilling and blasting, non-explosive rock-breaking, advanced ore-body knowledge there by increasing opportunities for the beneficiation of our mineral resources, real-time information management systems, and the application of people-centred technology.

The Department's commitment to improve and advance the well-being of South Africans is demonstrated in various projects aimed at unlocking economic development opportunities for marginalised and excluded communities. To this end, the DST is taking its grassroots innovation programme to the next level of scale-up, following a successful pilot phase that generated the required learnings on how best to design and deliver support to grassroots innovators. During the new phase, the programme will be expanded to support at least 100 beneficiaries.

Research capacity is central to the objectives that drive the NSI, and good progress has been made in addressing constraints. The DST and its public entities have continued to provide funding support for postgraduate research students, and one of the objectives going forward is to award no less than 22 000 annual research grants to researchers in universities by March 2020.

The Department launched and celebrated the completion of the 64-dish MeerKAT, the world's

largest radio telescope and a precursor to the Square Kilometre Array (SKA). The mega infrastructure project continues to generate new findings that are adding to the global body of radio astronomy knowledge. The 2019/20 period will see the continuation of this work, as scientists around the world have demonstrated prodigious enthusiasm to use the MeerKAT facility to generate knowledge. The Department also celebrates and commends the great work done by respective members of the international engineering consortia, of which South Africa forms part through various institutions, that has led to the completion of the design phase of the SKA. The completion of this phase deals with getting the look and functionality of various intricate elements of the SKA to function as a whole in a manner that meets Science Goals.

As we progress towards narrowing the inequality gap and growing technology-based job opportunities for South Africans, the Department continues to test and apply technology to improve service delivery in a manner that is aimed at improving the standard of living of our people.

During the 2018/19 financial year, South Africa successfully launched the ZACube-2 satellite. Described as the most advanced satellite on the continent, ZACube-2 provides cutting-edge remote sensing and communication services to South Africa and the region. The launch represents a significant milestone in the nation's drive to become a key player in the innovative utilisation of space science and technology in responding to government priority areas.

The Department also celebrates the selection by the International Civil Aviation Organization (ICAO) of the South African National Space Agency (SANSA) as a regional centre to provide space weather services to the global aviation sector for the African region. This designation means that SANSA will play an important role in the improvement of aviation safety, and the mitigation of potential costs to the aviation sector that may result from adverse space weather conditions. This designation brings with it opportunities of expanding scarce skills in the area of space science, and the opportunity to leverage of the capacity through partnership with the Pan-European Consortium for Aviation Space Weather User Services, which has global space weather centre designation with the ICAO.



Dr Blade Nzimande

MINISTER OF SCIENCE AND TECHNOLOGY

KETAPELE KA TONA 2019/20

Leano la Phethagatšo la Ngwaga ka ngwaga la 2019/20 le tla akanya phethagatšo ya Leanotshepetšo la Togamaano la 2015-2020. Kamogelo ya Pampiritšhweu ye mpsha ka tša Saense, Theknolotši le Maithomelo e tla tšwela pele go hlhla mokgwatshepedišo wa bosetšhaba wa maithomelo (NSI). Leano le leswa la go amana le ngwagasome la Afrika Borwa, leo le lego ka fase ga tlhabollo, le tla beakanya mafapha a itšego moo mmušo o tla lebišago maitapišo a wona mo go šomišeng saense, theknolotši le maithomelo, go tšwetša pele tekatekano ya setšhaba le ya ekonomi go batho ba Afrika Borwa.

Maano a maswa a phethagatšo a tla ba bohlokwa, gagolo ge lefase le le gare le katana le ditheknolotši tša Diphetogo tša Intasteri ya Bone (4IR). Go netefatša gore batho ba gaborena ga ba šalele morago, bjalo ka naga re swanetše fetola ka maikarabelo, ka nepo ya go diriša tema ye bohlokwa ya theknolotši ya tshedimošo le ya kgokagano e le go netefatša gore ekonomi ya rena e laolwa kudu ke theknolotši. Ka gona go matlafatša bokgoni bja godimo ka tšweletšo, le tlhagišo gammogo le phihlelelo ya ditirelo. Go fihla gabjale, Kgoro e tla tšwela pele go matlafatša nepo ya yona le peeletšo ka go aga bokgoni ka nageng ya gaborena gore re kgone go arabela le go tšwetša pele 4IR. Mola 4IR e na le menyetla ye mentši, re swanetše go amogela ditlhohlo tšeo e di hlagišago. Ke ka kwešišo ya dibaka le ditlhohlo tša 4IR gore tlhamo ya leanotshepedišo mabapi le se e ka hlangwago ka mokgwa woo o ka beakanyago gabotse

Maafrika Borwa go dikamano tše bohlokwa tša diphetogo tša theknolotši tšeo di tšwelelago.

Momengwagengyementši, Kgoro e kaonafaditše nepišo ya yona ka ga mekgwa yeo potfolio ya yona ya go šoma le ya NSI e ka bago le seabe go phokotšo ya go hloka tekatekano, bohloki le tlhokego ya mešomo. Ka fao, phethagatšo ya dihlokwa tša melawanatshepetšo ya Leano la Bosetšhaba la Tlhabollo (Ponelopele ya 2030) e tla tšwela pele go tla pele. Se se ra gore Kgoro e tla tšwela pele go thekga koketšo ya tema ye e kgathwago ke saense, theknolotši le maithomelo ka ditshepedišo tša go fapana tša tšweletšo ka gare ga ekonomi ya Afrika Borwa. < Maiteko a a tla tšwela pele go netefatša gore Kgoro e kgatha tema ya yona ka go godiša ekonomi ya Afrika Borwa ka tsela yeo e rarollago ditlhohlo tše tharo tša tlhokego ya mešomo, bohloki le tlhokego ya tekatekano.

Kgoro e tla tšwela pele gape go kgatha tema ya yona ka go tšwetša pele le go thekga koketšo ya peeletšo ya palomoka ka dinyakišišo le tlhabollo ka Ditšweletšwabontši tša gae/ Bolengkakaretšo bja Dithoto le Ditirelo ka nepo ya go fihlelela nepišo ya Tlhabollo ya Bosetšhaba ya 1, 5%. Se se tla dirwa ka tsela yeo e beago kgatelelo ye kgolo ya maithomelo, go lwela kudu tsebo ye e tseneletšego yeo e tlogo hlokomela papatšo ya ditheknolotši tšeo di tšweleditšwego ka nageng, le tšhomišo ye e kaonafaditšwego ya mehola ya papetšo le ye e nago le bokgoni ka mafapheng a tša ekonomi ka kontinenteng ya rena ye e kopantšwego le lefase bjalo ge 2030 e fihla. Se se tla tšwela pele go ba le phethagatšo ya motšhelo ya dipeeletšo tša rena ka go dinyakišišo le tlhabollo.

Ka tekanyetšo ya 2019/20 ye e akantšwego go oketšega go R8.150 bilione go tšwa go R7.790 bilione ye e abetšwego 2018/19, Leanophethagatšo la Ngwaga ka ngwaga la 2019/ 20 le laetša maithomelo a go hlabolla dinyakišišo le tlhabollo ya diintasteri tše mpsha tšeo di ka thušago go kaonafatša boleng bja Afrika Borwa godimo ga se re se tšweletšago le go romelwa ntle, ka gona re tla kgathago tema ye bohlokwa ka go kaonafatša papetšo ya kgwebo ya naga, ka go kaonafatša

kgonagalo ya go oketša kgolo ya ekonomi ka go hlohleletša lehlakore ka nyakego ya ekonomi ya rena.

Ka gona Kgoro e thekga ka ditšhelete masolo a mmalwa ao go holofelwago gore a tla tsenya letsogo go nepo ye; go fa mohlala, thakgolo ya Lefelo la Meepo la Mandela, protšeke ye e hlomilwego go nolofatša kgokaganyo ya dinyakišišo tša meepo, tlhabollo le mešomo ya maithomelo le tšhomišano magareng ga bakgathatema. Lefelo leo ke phihlelelo ya tirišanommogo ya mmušo le Khansele ya Afrika Borwa ya Diminerale go phethagatša lenaneo la Dinyakišišo tša go Rafa Meepo, Tlhabollo le Maithomelo (SAMERDI), leo le ikemišeditšego go thuša go kaonafatša theknolotši ya meepo ka Afrika Borwa. SAMERDI e lebeletše kudu merero ye e seelago - bophelo bjo botelele bja meepo ya bjale, go bora ka metšhene le go pšhatla, go thuba maswika e sego ka dithunyi, tsebo ye e tseneletšego ya go borale ya go oketša dibaka tša kaonafatšo ya boleng bja methopo ya diminerale tša rena, ditshepedišo tša taolo ya tshedimošo ya nako ya kgonthe, le tirišo ya theknolotši ye e theilwego godimo ga batho.

Maikemišetšo a Kgoro a go kaonafatša le go tšwetša pele go phela gabotse ga Mafrika Borwa a laeditšwe ka diprotšeke tša go fapafapana tšeo di ikemišeditšego go utolla tlhabollo ya ekonomi ya ditšhaba tše o di hlokomologilwego le go kgethollwa. Go fihla gabjale, DST e iša lenaneo la yona la maithomelo la setšhaba maamong a a latelago a katlego, ka morago ga kgato ya teko ya yeo e hlagišitšego dithuto tše di hlokagalago mabapi le ka moo o ka kgonago ka gona go hlama le go fa thekgo ye kaone ya baithomedi ba maemo a tlase. Nakong ya kgato ya mpsha, lenaneo le tla katološwa go thekga bonnyane baholegi ba 100.

Bokgoni bja go dira dinyakišišo bo bohlokwa maikemišetšong a go laola NSI, gomme kgatelopele ye kaone e šetše e dirilwego ka go rarolla mathata. DST le dihlongwa tša yona tša setšhaba di tšwetše pele go aba thušo ya mašelang go thekga dinyakišišo tša baithuti ba dithuto tša ka morago ga grata, gomme a mangwe a maikemišetšo a a go ya pele ke go abela ditšhelete tša thušo tša se be ka tlase ga 22 000 go banyakišiši diyunibesithing ka Hlakola 2020.

Kgoro e thakgotše le go keteka phethagatšo ya diši ya 64 ya MeerKAT, thelekoupo ya radio ye kgolokgolo lefaseng ka bophara le mohlatlami wa thelekoupo ya maphoto goba yona Arei ya Sekwerekhilometara (SKA) Protšeke ye kgolo ya maneokgoparara e tšwela pele go tšweletša dipihlelelo tše mpsha tšeo di tlaleletšago go mokgatlo wa lefase ka bophara wa tsebo ya bonepadinaledi ka radio. Paka ya 2019/20 e tla bona tšwelopele ya mošomo wo, bjalo ka ge boradisaense lefaseng ka bophara ba bontšhitše phišegelo ye kgolo ya go šomiša

senolofatši sa MeerKAT go tšweletša tsebo. Kgoro gape e keteka le go leboģiša mošomo wo mogolo wo o dirilwego ke tša maloko a mekgatlo ya boditšhabatšhaba ya boentšenerere, yeo Afrika Borwa e bopago karolo ya dihlolongwa tše di fapanego, yeo e hlodilego go phethagatšwa ga kgato ya tlhamo ya SKA. Phethagatšo ya kgato ye e šogana le go lebelela le go šoma ga dintlha tša go fapafapana tša SKA go šoma ka botlalo ka tsela yeo e tlogo fihlelela Dinepo tša Saense.

Ge re tšwela pele go fokotša sekgoba sa go lekalekane le dibaka tša mešomo ye e theilwego godimo ga theknolotši ya Mafrika Borwa, Kgoro e tšwela pele go leka le go dira kgopelo ya go kaonafatša kabo ya ditirelo ka tsela yeo e ikemišeditše go kaonafatša maemo a bophelo bja batho ba gabo rena.

Nakong ya ngwaga wa ditšhelete wa 2018/19, Afrika Borwa e thakgotše ka katlego sathalaete ya ZACube-2. E hlalošwago bjalo ka sathalaete ya maemo a godimo ka kontinenteng, ZACube-2 e fana ka ditirelo tša maemo a godimo a kgoboketšo ya tshedimošo ya tšhupakgole le dikgokagano go Afrika Borwa le selete. Thakgolo e emela motheo wo bohlokwa go lesolo la setšhaba go ba mokgathatema yo bohlokwa ka go tšhomišo ya boithomelo ya saense ya sebakabakeng le theknolotši ka go araba makala a bohlokwa a mmušo.

Kgoro gape e keteka go kgethwa ke Mokgatlo wa Boditšhabatšhaba wa Bofofane (ICAO) ga Sehlolongwa sa Bosetšhaba sa Afrika Borwa sa Lefaufau (SANSA) bjalo ka senthara ya go aba ditirelo tša boso ya lefase ya lefaufau la difofane tša selete sa Afrika. Maemo a a ra go re SANSA e tla kgatha tema ye bohlokwa

ya kaonafatšo ya polokego ya bofofane, le phokotšo ya kgonagalo ya ditshenyegelo go lekala la bofofane yeo e ka bakwago ke maemo a mabe a boso a go tšwa lefaufaug. Sephetho se se tliša dibaka tša katološo ya bokgoni bjo bo hlokegago mafapheng a saense ya lefaufau, le menyetla ya go matlafatša bokgoni ka tirišano le Mokgatlo wa Dinaga tša Yuropa ka moka wa Ditirelo tša Bašomiši ba tša Boso tša Dibaka tša Bofofane, woo o nago le maemo a senthara ya sebaka sa tša boso lefaseng ka bophara le ICAO



Dr Blade Nzimande

TONA YA SAENSE LE THENKOLOTŠI

ISANDULELO SIKANGQONGQOSHE 2019/20

Uhlelo Lokwenziwa Komsebenzi Wonyaka ka-2019/20 luzophetha ukusetshenziswa koHlelo Lwesu luka-2015-2020. Ukwamukelwa koMthetho Odingidwayo omusha weSayensi, Ubuchwepheshe kanye Nokwenza Ngendlela Entsha kuzoqhubela phambili umhlahlandlela wohlelo lukazwelonke lokwenza ngendlela entsha (national system of innovation (NSI)). Uhlelo olusha lweminyaka eyishumi lweNingizimu Afrika, olusenziwa, luzoyisho ngqo imikhakha uhulumeni azogxilisa kuyo imizamo yakhe yokusebenzisa isayensi, ubuchwepheshe kanye nokwenza ngendlela entsha ukuletha inhlalo yomphakathi kanye nentuthuko yezomnotho enobulungiswa kubantu baseNingizimu Afrika.

Izinhlelozokusetshenziswaokushazizobaluleka, ikakhulukazi lapho umhlaba ushukashukana nobuchwepheshe be-Fourth Industrial Revolution (4IR). Ukuze siqiniseke ukuthi abantu bakithi abasaleli emuva, kufanele njengezwe siphendule ngokwenza izinqumo ezibonakalayo, ukuze sikwazi ukusebenzisa iqhaza elibalulekile lobuchwepheshe bezokwazisa nokuxhumana ukuze siqiniseke ukuthi umnotho wethi uba ngoqhutshwa kakhulu wubuchwepheshe. Ngokwenzenjalo sithuthukisa ukusebenza ngempumelelo kakhulu ekukhiqizeni, ekuhlinzekeni kanye nasekufinyeleleni ezinsizakalweni. Ukufeza lokhu, Umnyango uzoqhubeka nokuqinisa ukugxila kwawo nokutshala ezinhlelweni zamakhono ezweni lethu ukuze siphendule futhi siqhube i-4IR. Nakuba i-4IR inamathuba amaningi, kufanele

sizivume izinselele ezilethayo. Kusekuqondeni amathuba kanye nezinselele ze-4IR okungenza ukuthi kuhlelwe ukwakhiwa kwenqubomgomo maqondana nalokhu ngendlela elungiselela abantu baseNingizimu Afrika ngokwanele ngemiphumela esebenza ngokubanzi yezinguquko zobuchwepheshe ezivelayo.

Eminyakeni eminingi, Umnyango ucije ukugxila kwawo ezindleleni iphothifoliyo yawo yomsebenzi kanye ne-NSI ngokubanzi engafaka ngayo isandla ekunciphiseni ukungalingani, ubuphofu kanye nokungabi bikho komsebenzi. Ngokunjalo, ukuqala ukusetshenziswa kwezinto ezidingwa yinqubomgomo yoHlelo Lwentuthuko Kazwelonke (Umbono 2030) kuzoqhubeka nokubaluleka kakhulu. Lokhu kusho ukuthi Umnyango uzoqhubeka nokweseka ukukhuliswa kweqhaza lesayensi, ubuchwepheshe kanye nendlela entsha yokwenza ezinhlelweni ezahlukeneyo zokukhiqiza emnothweni waseNingizimu Afrika. Lo mzamo uyoqhubeka nokuqinisekisa ukuthi Umnyango udlala indima yawo ekukhuliseni umnotho waseNingizimu Afrika ngendlela ebhekana nezinselele eziphindwe kathathu zokungabi bikho komsebenzi, ubuphofu nokungalingani.

Umnyango uzoqhubeka futhi nokubamba iqhaza lokuqhuba nokweseka ukukhula ekutshalweni kwemali okukhulu ocwaningweni nasentuthukweni njengephesenti loMkhiqizo Wasekhaya Omkhulu (Gross Domestic Product) ngenhloso yokuthola okuhloswe yiNtuthuko Kazwelonke okuwu-1, 5%. Lokhu kuzokwenziwa ngendlela ebeka ukugcizelela okukhulu endleleni entsha yokwenza, ukukhiqiza okwenziwe ngcono, ukulandelwa okujule kakhulu kolwazi nalo olubhekela ukuhweba ngobuchwepheshe

obukhiqizwe ekhaya, kanye nokusetshenziswa okwenziwe ngcono kwezinto zethu ezinhle eziqhathanisekayo futhi zincintisane nezinye ezingxenyeni ezifanele zomnotho wethu ezwenikazi elihlangene kanye nomhlaba lapho kusondela u-2030. Lokhu kuzoqhubeka nokuphelekezelwa wukuqalisa kokusebenza kwezikhuthazi zentela yethu ekutshaleni ocwaningweni nasentuthukweni.

Ngesabiwomali sika-2019/20 esilinganiselwe ku-R8,150 bhiliyoni sisuka ku-R7,790 bhiliyoni esasinikezelwe ngo-2018/19, Uhlelo Lokwenza Umsebenzi Lonyaka ka-2019/20 lukhomba imizamo yokwenza ucwaningo olusha nentuthuko yezimboni okungasiza ukwenza ngcono ukwengeza inani leNingizimu Afrika kulokho ekukhiqizayo nekuyisa emazweni angaphandle, ngokwenzenjalo idlale indima ebalulekile ekwenzeni ngcono ibhalansi yohwebo yezwe, bese yenza ngcono amathuba okwandisa ukukhula komnotho ngokuvuselela uhlangothi lokufuneka komnotho wethu.

Umnyango uxhasa ngemali imizamo eminingana okulindeleke ukuthi ifake isandla kule nhloso; ukwethulwa kwe-Mandela Mining Precinct, iphrojekthi eyenzelwe ukusiza ekuphathweni kocwaningo lwasemayini, imisebenzi yentuthuko kanye nendlela entsha yokwenza nangokuhlanganyela phakathi kwababambiqhaza. Le ndawo wumphumela wobambiswano lukahulumeni ne-Minerals Council South Africa ekuqaliseni ukusebenza kohlelo lwe- South African Mining Extraction Research, Development and Innovation (SAMERDI), okuhloswe ngalo ukwenza ngcono isizinda sobuchwepheshe bokumba izimayini eNingizimu Afrika. I-SAMERDI igxila ezindimeni

eziyisithupha – ukuphila isikhathi eside kwezimayini zamanje, ukumeshendayizwa kokumba kanye nokuqhumisa, ukuphula amadwala okungaqhumi, ulwazi lwesisindo sensimbi ngokwenzenjalo kwandiswe amathuba okwenza ngcono umnotho wezimbiwa zethu, izinhlelo zokuphatha ulwazi lwesikhathi samanje, kanye nokusebenzisa ubuchwepheshe obugxile kubantu.

Ukuzimisela koMnyango ukwenza ngcono kanye nokuthuthukisa ukuphila kahle kwabantu baseNingizimu Afrika kukhonjiswa ngamaphrojekthi ahlukene ahlose ukuvula amathuba okuthuthukisa umnotho emphakathini owawuncishwe amathuba nowawukhishelwe ngaphandle. Ukufeza lokhu, i-DST ithatha uhlelo lwayo lokwenza uguquko kubantu abasemazingeni aphantsi iluse ezingeni elilandelayo lokulwandisa, kulandela isigaba sokuvivinya esenza ukuthi kutholakale ulwazi olwaludingeka lokuthi zingenziwa kahle kanjani futhi luhanjiswa kahle kanjani usizo kwabaleta izinguquko kubantu abasemazingeni aphantsi. Ngesikhathi sesigaba esisha, uhlelo luzokwandiswa ukuthi lusize okungenani abanatu abazuzayo kulo abayi-100.

Ubukhulubocwaningo bubalulekile ezinjongweni eziqhuba i-NSI, futhi sekwenziwe inqubekela phambili enhle ekubhekeleni imikhawulo. I-DST kanye nezinhlangano zayo zomphakathi iqhubekile nokunikeza usizo lokuxhasa ngemali kuzitshudeni ezenza ucwaningo ezisemazingeni angaphezu kweziqu zokuqala, kanti enye yezinhloso ngokuqhubeka kwesikhathi wukunikeza izibonelelo zocwaningo zonyaka ezingengaphansi kuka-22 000 kubacwaningi abasemanyuvesi ngoMashi ka-2020.

Umnyango wethula futhi wagubha ukuqedwa kwe-64-dish MeerKAT, itheleskopu yomsakazo enkulu kunazo zonke emhlabeni neyandulela i-Square Kilometre Array (SKA). Iphrojekthi eyingqalasizinda enkulu iyaqhubeka nokuthola izinto ezintsha ezengeza kumgwamanda womhlaba jikelele wolwazi lommsakazo ngokusesibhakabhakeni. Isikhathi sika-2019/20, sizoqhuba lo msebenzi, njengoba ososayensi emhlabeni jikelele bekhombise ugqozi lokusebenzisa indawo ye-MeerKAT ukuthola ulwazi. Umnyango ugubha futhi uncoma umsebenzi omkhulu owenziwe ngamalungu ezinhlangotho zobunjiniyela zamazwe omhlaba, iNingizimu Afrika eyingxenywe yazo ngokusebenzisa izikhungo ezahlukeni, okuholele

ekuqedweni kwesigaba sokudizayinwa kwe-SKA. Ukuphethwa kwalesi sigaba kubhekene nokuthola ukubukeka kanye nokusebenza kwezingxenywe ezahlukeni eziyindida ze-SKA ukuthi zisebenze njengento ephelile ngendlela ehlangabezana neZinhloso Zesayensi.

Lapho siqhubeka nokuvala igebe lokungalingani kanye nokukhulisa amathuba emisebenzi ancike ebuchwephesheni kubantu baseNingizimu Afrika, Umnyango uyaqhubeka nokuhlola kanye nokusebenzisa ubuchwepheshe ukwenza ngcono ukulethwa kwezinsizakalo ngendlela okuhloswe ngayo ukwenza ngcono izinga lokuphila labantu bethu.

Ngonyaka wezimali ka-2018/19, iNingizimu Afrika yethula ngempumelelo isathelayithi i-ZACube-2. Ichazwa njengesathelayithi eletha izinguquko ezintsha kakhulu ezwenikazi, i-ZACube-2 ihlinzeka ngezinsizakalo

zokuzwa izinto ezikude ngendlela eholayo ekuletheni izinguquko ezintsha kanye nezokuxhumana eNingizimu Afrika nasesifundeni. Ukwethulwa kwayo kumelele igxathu elibalulekile emkhankasweni wesizwe wokuba ngumbambiqhaza obalulekile ekusetshenzisweni kwendawo ngendlela eletha izinguquko ezintsha kusayensi yasemkhathini kanye nobuchwepheshe ekuphenduleni emikhakheni ehamba phambili ohlwini lukahulumeni.

Umnyango futhi ugubha ukukhethwa yi-International Civil Aviation Organization (ICAO) kwe-South African National Space Agency (SANSA) njengesikhungo sesifunda sokuhluzeka imisebenzi yesimo sezulu emkhathini engxenyeni yezindiza emhlabeni jikelele esifundeni sase-Afrika. Ukukhethwa kusho ukuthi i-SANSA izodlala indima ebalulekile ekwenzeni ngcono ukuphepha kwezindiza, kanye nokunciphisa izindleko ezingaba khona engxenyeni yezindiza ezingaholela ezimweni zesimo sezulu esibi emkhathini. Lokhu kuqokwa kuletha amathuba okwandisa amakhono ayindlala emkhakheni wesayensi yasemkhathini, kanye nethuba lokusebenzisa amandla ngokusebenzisa ukusebenzisana ne-Pan-European Consortium for Aviation Space Weather User Services, enesikhundla sesikhungo sesimo sezulu emkhathini ezweni lonke ne-ICAO.



Dr Blade Nzimande
UNGOQONGQOSHE WEZESAYENSI
NOBUCHWEPHESH

DEPUTY MINISTER'S STATEMENT



As the 2015-2020 Strategic Plan period comes to an end, it is good to know that key policy and legislative initiatives to improve the lives of South African people are on track, and that the Department of Science and Technology will continue to play a leading role in enhancing productivity, economic growth and socio-economic development through science, technology and innovation (STI).

In the past four years, progress has been made towards the enactment of the Protection, Promotion, Development and Management of Indigenous Knowledge Bill. The Bill puts in place mechanisms to facilitate economic growth through the protection of intellectual property related to indigenous cultural heritage. Ensuring the fair and equitable sharing of economic

benefits arising from the use of indigenous knowledge will help to uplift communities. It is expected that the Bill will be enacted in the 2019/20 financial year.

On the macro-economic front, there are initiatives to develop new research and development-led industries and support existing industries through the application of new technologies. Various initiatives funded by the Department are expected to contribute towards the Industrial Policy Action Plan, including projects to develop a titanium industry, additive manufacturing, the Fluorochemicals Expansion Initiative and Hydrogen South Africa (HySA).

The Department's commitment to contribute to the reduction of inequality, poverty, unemployment and financial exclusion is demonstrated in various initiatives aimed at improving access to and delivery of basic services, and unlocking and supporting economic development opportunities through the innovative application of technologies. The Department will continue to invest in technology demonstration and transfer initiatives in support of advancing local economic development and sustainable livelihoods, especially in poverty-stricken rural areas.

The DST continues to fund community-based projects piloting the processing of traditional medicines, cosmeceuticals and nutraceuticals, and some are already

showing potential for strengthening local systems of innovation, job creation and enterprise development. Technology transfer is assisting some communities to move beyond primary agriculture and participate in the agroprocessing value chain.

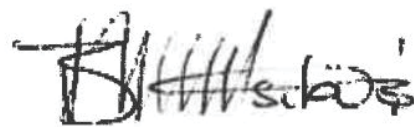
In pursuit of a more inclusive national system of innovation, initial progress was made in the design and implementation of a pilot grassroots innovation programme. This will be accelerated in 2019/20, with the intention of a further scale-up during the 2020-2025 Strategic Plan cycle.

In line with the National Development Plan objective of integrating innovation in the delivery of basic services, the Department is providing decision-support tools to improve service delivery decision making and practice using STI. These tools contribute to spatial planning, disaster management, 21st century education, energy options, nutrition and food security, economic planning and management, and the capacity of municipalities to manage service delivery challenges through more efficient incident management.

Other DST work supporting decision making includes influencing policy on the safety of genetically modified organisms, and providing technically sound methodologies for evaluating future investments in the commercialisation of research and development (as part of the DST Commercialisation Framework). The Department also provides geospatial

information for use in local planning (through the South African Earth Observation Strategy portal, and the work of the South African National Space Agency), and is helping municipalities to build a business case for bioenergy production based on information provided in the Bioenergy Atlas.

In these, and many other ways, the Department will continue to contribute to South Africa's socio-economic well-being.



Buti Manamela
DEPUTY MINISTER OF SCIENCE
AND TECHNOLOGY

REMARKS BY THE DIRECTOR-GENERAL



The 2019/20 financial year is the last under the 2015-2020 Strategic Plan. The past four financial years have seen the Department make significant strides in all five of its strategic outcome-oriented goals, and the fifth year of the Strategic Plan term will culminate in the adoption of a new policy to replace the 1996 White Paper on Science and Technology. The new White Paper on Science, Technology and Innovation will be the overarching policy for the national system of innovation, guiding government, the private sector and civil society.

The new White Paper entrenches government's commitment to the role of science, technology and innovation (STI) in economic and social development, and emphasises the core themes of inclusivity, transformation and partnerships.

The development of the draft White Paper is as a result of an assessment of the national system of innovation (NSI) on the progress of the 1996 White Paper on Science and Technology. Since the implementation of the 1996 White Paper, significant advances in transformation has taken place, publications has increased three-fold, and development programmes aimed at translating knowledge into products and services has been implemented. The new White Paper proposes a scale-up of these initiatives and an acceleration of transformation within the NSI.

NACI will also be reviewing the National Research and Development Strategy of 2002 and the Ten-Year Innovation Plan (2008-2018). These reviews, and the roadmap responding to the Science, Technology and Innovation Institutional Landscape (STIIL) Review Report, will also contribute towards the decadal plan.

Sound corporate governance and internal controls remain central to the Department's efficient and responsible use of its budget allocation. In 2017/18, the Department obtained a clean audit outcome. Furthermore, its performance when measured against predetermined objectives was kept at 89%.

In 2017, as in the previous three years, the Department of Science and Technology was one of the top performers in terms of the Management Performance Assessment Tool.

In 2018/19, the Department concluded a business process mapping project and now has a draft service delivery model, an outline of the key business processes necessary for the execution of its mandate and functions, as well as staffing norms and standard operating procedures.

Poverty, unemployment and inequality remain a challenge. South Africa's economic growth has not exceeded 1% since 2015, and the first half of 2018 saw the country enter a recession. Growth in traditional sectors with high employment potential such as agriculture has been hindered by drought, a symptom of climate change. Science, technology and innovation enable the exploration of alternative, research-based support for and opportunities in agriculture, manufacturing, education and health provision.

In September 2018, President Ramaphosa announced a stimulus package which included the establishment of an infrastructure fund. The financial contribution from government will be used to leverage additional finance, technical know-how and oversight from development finance institutions, and private lenders and investors. An innovative financing mechanism will allow the private sector to participate more innovatively in the funding of public infrastructure, and foster closer partnerships between government and financial institutions, and oversight to ramp up investment. The DST will consider how it can exploit the potential of this fund for the next phase of STI capital projects like the Square Kilometre Array (SKA), one of South Africa's flagship infrastructure projects.

The budget for 2019/20 is R8, 150 billion. This is an increase from the R7, 790 billion allocated in 2018/19. Approximately 36% of the allocation consists of parliamentary grants that will be transferred to the entities reporting to the Minister of Science and Technology. The remaining allocation will be used for transfer payments for strategic projects within entities, and the compensation of employees and acquisition of goods and services for the Department's operations. The Department prides itself in keeping its operational costs in the range of 8 to 10% of its budget vote.

The Department is committed to delivering on its objectives, thus contributing to government efforts to create a prosperous and equitable society.



Dr Phil Mjwara
DIRECTOR-GENERAL

OFFICIAL SIGN-OFF



Chief Financial Officer

Ms Pretty Makukule



Acting-DDG: Institutional Planning and Support

Mr David Mmakola



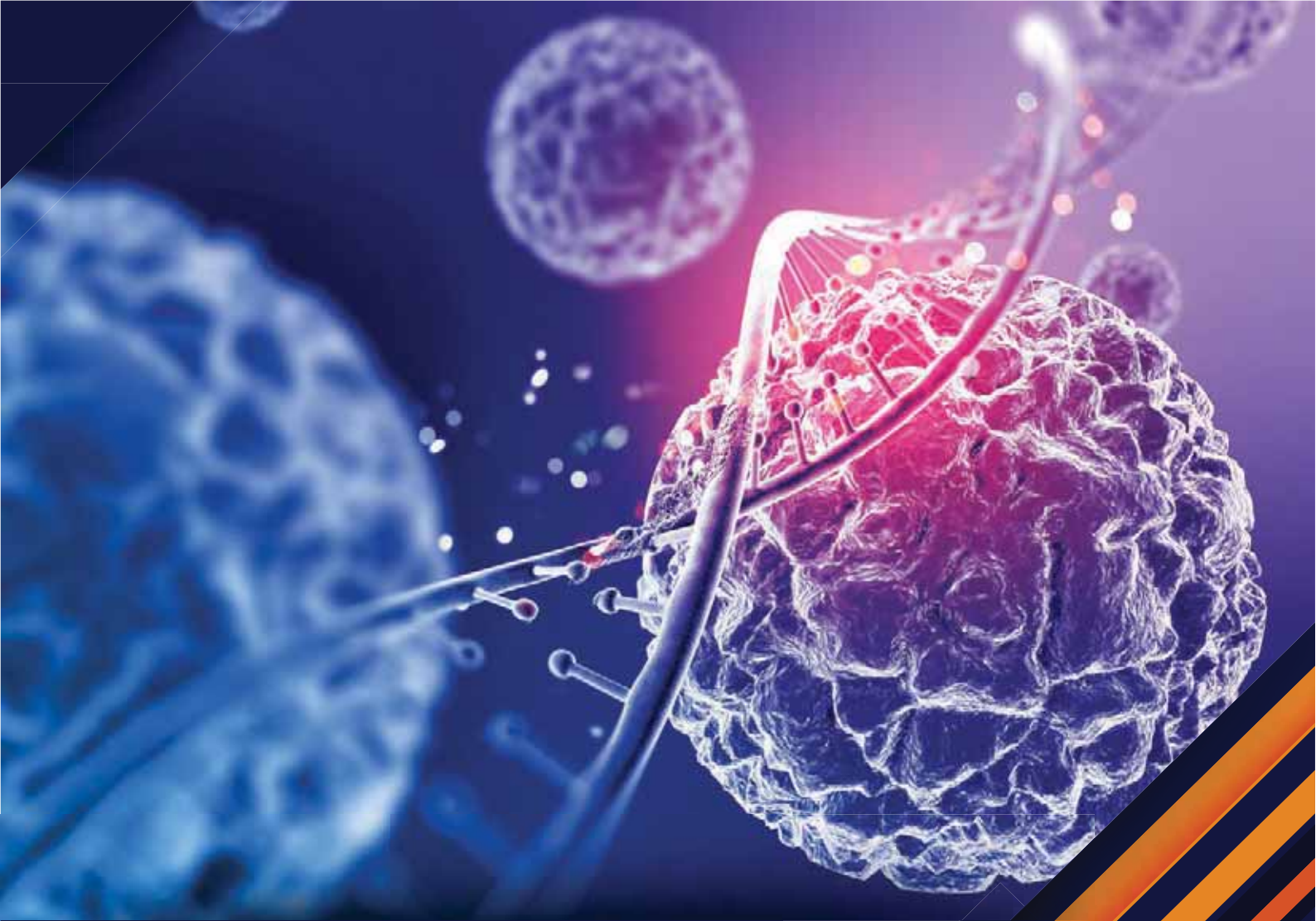
Accounting Officer

Dr Phil Mjwara



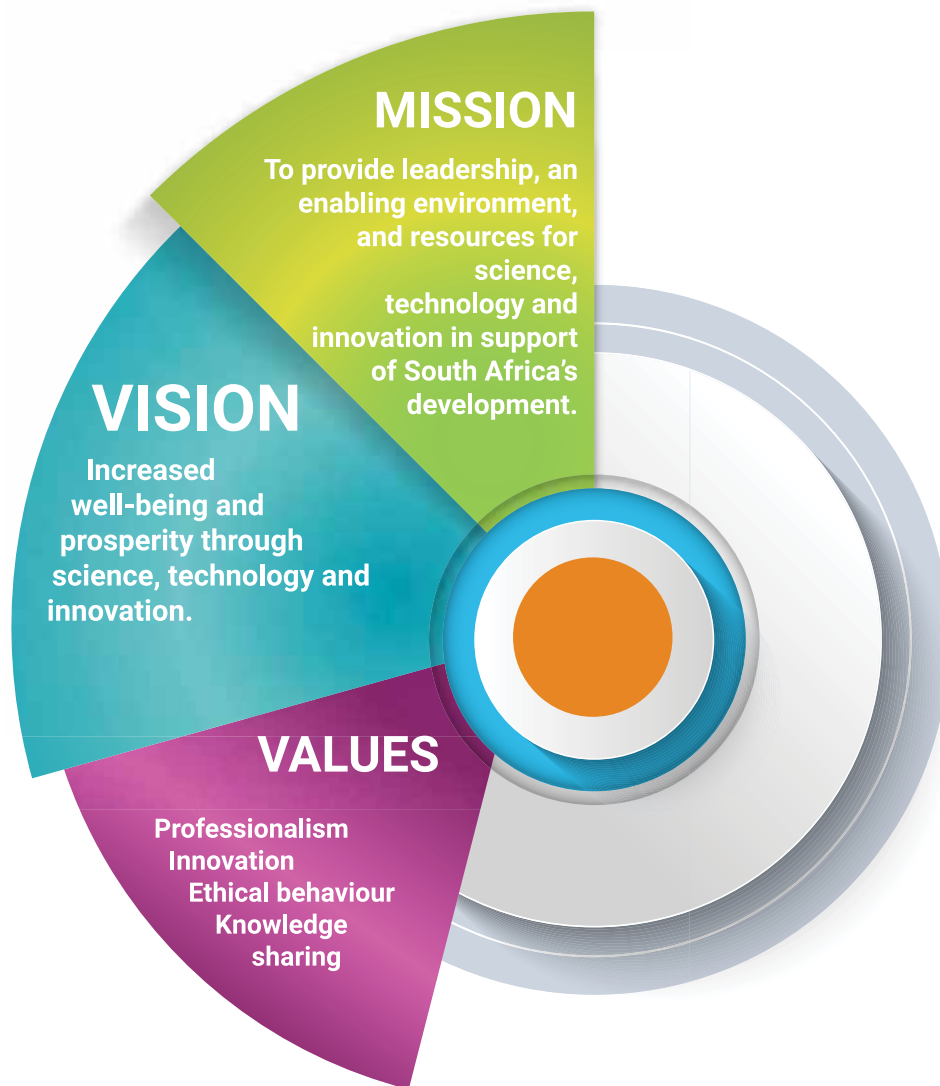
Executive Authority

Dr Blade Nzimande



PART A: **STRATEGIC OVERVIEW**





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 generate 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.

Policy mandate

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 knowledge to help achieve individual and collective goals. A coordinated and efficient NSI will help the country achieve its national development priorities by promoting change through innovation, enabling all South Africans to enjoy the economic, socio-political and intellectual benefits of science, technology and innovation (STI).

The Department supports the NSI in a number of ways, including the following:

- 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.

The 2002 National Research and Development Strategy and the Ten-Year Innovation Plan for South Africa (2008-2018) also outline strategic priorities that the Department strives to promote and implement.

4.3 Relevant court rulings

None.

4.4 Policy context

Changes in the policy environment

In 2017, a review of performance against the 1996 White Paper on Science and Technology was finalised by the National Advisory Council on Innovation (NACI). The findings from 2017 were included in the new draft White Paper on Science, Technology and Innovation, which will be submitted to the Cabinet for approval in 2019.

In 2018/19, the Minister of Science and Technology requested NACI to undertake a review of the 2002 National Research and Development Strategy and the Ten-Year Innovation Plan (2008-2018). These reviews and the key principles of the new draft White Paper, together with the results of a foresight exercise led by NACI in 2018/19, will inform the development of a new decadal plan for STI in South Africa.

In 2017/18 the Science, Technology and Innovation Institutional Landscape (STIIL) Review was finalised. The review established the connections between institutions in the national system of innovation and their collective impact on all aspects of society. A roadmap for implementing the findings of the review and exploring how best to phase in the establishment of new institutions was developed in 2018/19.

The DST has consulted across government about a proposal to introduce a budget coordination instrument to enhance the quality, responsiveness, and impact of public funding of research and development activities. This is intended to underpin a government-wide medium-term research and development investment framework aligned to the economic and social development priorities identified by the government in the National Development Plan (NDP).

Coordinating efforts to grow South Africa's gross expenditure on research and development (GERD) to 1,5% of gross domestic product (GDP) remains a constant focus of the Department. The figures from the 2016/17 survey of national

research and experimental development survey show that GERD in 2016/17 was 0,82%. The 2017/18 survey will be conducted and published in 2019/20.

The National Development Plan and science, technology and innovation



South Africa's National Development Plan (Vision 2030) highlights the importance of STI in national development. The 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 the role that STI can play in addressing the interlinked challenges 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 current DST 2015-2020 Strategic Plan proposed to implement the NDP's three phases of innovation in the following manner. 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 Department has sharpened its focus on the ways in which its portfolio of work and of the broader NSI can contribute to the reduction of inequality, poverty and unemployment.

On the macro-economic front, initiatives to develop new R&D-led industries could help improve South Africa's exports, reduce the country's current deficit, and improve the prospects of economic growth. The DST is funding a number of such initiatives, for example the project to build a South African titanium industry (manufacturing titanium powder and developing the next-generation additive manufacturing Aeroswift machine), the Fluorochemicals Expansion Initiative, and the

hydrogen fuel cell research, development and innovation initiative. In light of the potential of STI to stimulate industrialisation, the Department also actively supports 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, technological and financial support for private-sector companies should lead to increased competitiveness and turnover, and hence higher employment. The Technology Localisation Programme (TLP) and the Technology Stations Programme (TSP) provide technology support to a range of large and small firms, and are also aimed at increasing the turnover of small and medium enterprises (SMEs), and enabling them to secure better contracts with large private-sector companies. The impact of the TLP is considerable, and it is considered one of the more effective interventions in leveraging public procurement activities to increase the level of local production while also creating opportunities for export via foreign original equipment manufacturers (OEMs).

The Department's commitment to contribute to the reduction of inequality, poverty, unemployment and financial exclusion is demonstrated through various initiatives aimed at improving access to and delivery of basic services, and unlocking economic development opportunities for marginalised and excluded communities. The Department has invested in technology demonstration and transfer initiatives to support local economic development and sustainable livelihoods,

especially in poverty-stricken rural areas. The DST is currently funding community-based pilot projects on the processing of traditional medicines, cosmeceuticals and nutraceuticals, and some of these are already strengthening local systems of innovation, job creation and enterprise development. Technology transfer is assisting community-based enterprises to move beyond primary agriculture.

In pursuit of a more inclusive NSI, a grassroots innovation programme has been initiated. This will be accelerated in 2019/20 with the intention of a further scale-up in the 2020-2025 strategic planning cycle.

In line with the NDP objective of integrating innovation in the delivery of basic services, the Department is providing decision-support tools to improve service delivery decision making and practice using STI. DST decision-support includes providing geospatial information to be used in local planning through Earth observation initiatives and the work of the South African National Space Agency.

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

STI contribution	Poverty	Inequality	Unemployment
<p>Direct</p>	<p>Innovation-enabled local economic development</p> <ul style="list-style-type: none"> • Pilot three community-based agroprocessing plants that have the potential to catalyse systematic local development (e.g. traditional medicines, cosmeceuticals, nutraceuticals) by 2017 • Ensure that STI poverty-alleviation initiatives are demand-driven and informed by local economic development priorities and local comparative advantage <p>Mainstream applied indigenous knowledge-based R&D (traditional medicines, cosmeceuticals and nutraceuticals), including innovation and local manufacturing, to support commercialisation models for sustainable livelihoods</p>	<p><i>Transformation of scientific workforce in terms of race and gender</i></p> <p>Innovations to enhance standards of living</p> <ul style="list-style-type: none"> • In partnership with the Department of Basic Education, leverage innovative technologies to improve access to and the quality of 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 • Deployment of the mTriage application in clinics • Deployment of the Primary Health Care Clinical Guide 	<p>Internships</p> <p>Researchers</p> <p>Postdoctoral support</p> <p>Economic growth</p> <ul style="list-style-type: none"> • Help grow companies' turnover • Support SMEs through technology localisation initiatives and the Technology Stations Programme • Help increase technological competitiveness through R&D partnerships at sector and firm level • Grow new local industries through the Emerging Industries Action Plan • Strengthen grassroots innovation programmes <p>Initiatives to improve the technology-based competitiveness of the established primary economic sectors</p> <p>New R&D-led industry development initiatives, such as Hydrogen South Africa, the Fluorochemicals Expansion Initiative, the <i>Titanium Beneficiation Initiative</i> and the Advanced Manufacturing Technology Strategy</p>

STI contribution	Poverty	Inequality	Unemployment
Indirect	<p>Postgraduate bursaries, the South African Research Chairs Initiative and the centres of excellence</p> <p>Providing and packaging information to enhance policy decision-making</p>	<p>Targeted postgraduate bursaries (for black people and women) and funding to support young and emerging researchers</p> <p>Identify and test the use of technology to improve service delivery and demonstrate better standards of living, such as the use of wireless mesh networks to bridge the digital divide</p>	<p>Postgraduate bursaries, the South African Research Chairs Initiative and the centres of excellence</p> <p>R&D infrastructure</p> <ul style="list-style-type: none"> • Manufacture (including assembly, integration and testing) and launch Earth observation satellite (EOSat1), in addition to the ZACube-2 satellite • Manufacture and launch South Africa's first indigenous CubeSat constellation to provide automatic identification system services to Operation Phakisa (Oceans Economy) and Africa • MeerKAT/Square Kilometre Array (SKA) radio astronomy telescope

Nine-Point Plan contribution

The Department has continued to implement its commitments on government's Nine-Point Plan. Notable achievements for 2018/19 include an agreement reached with the National Treasury and the Department of Small Business Development on the implementation approach for the SME Innovation Fund (previously referred to as the Sovereign Innovation Fund), as well as the presentation of an update to Cabinet on the development of a strategy on locally developed technologies.

5. UPDATED SITUATIONAL ANALYSIS

5.1 DST performance environment

The Department has progressed well towards achieving all five of the strategic outcome-oriented goals in the 2015-2020 Strategic Plan. The 2019/20 financial year, the last of the 2015-2020 Strategic Plan period, will culminate in the adoption of a new White Paper on Science, Technology and Innovation, replacing the White Paper that has been the foundation of STI policy since 1996.

The new White Paper will be the principal policy guiding the national system of innovation, committing the country to furthering the role of STI in economic and social development, and emphasising the core themes of inclusivity, transformation and partnerships. It will be implemented through a decadal plan for 2020-2030, which will be aligned to the National Development Plan. The framework for the decadal plan is currently under development.

A foresight exercise carried out by the National Advisory Council on Innovation (NACI) has identified a range of STI domains that could be focused on over the next 10 years. The Minister of Science and Technology, with the Cabinet, will engage with these proposals and adopt those most relevant to socio-economic growth and transformation in the medium to long term. In addition, the Minister of Science and Technology has requested NACI to review the National Research and Development Strategy of 2002 and the Ten-Year Innovation Plan (TYIP) for 2008-2018. The roadmap responding to the STIIL Review will also contribute towards the decadal plan.

External environment

The 2014-2019 Medium Term Strategic Framework (MTSF) concludes in March 2019, coinciding with a review of the 25 years since the advent of democracy, carried out by the Department of Planning, Monitoring and Evaluation (DPME). The 25 year review covers performance in a wide range of areas, and indicates the challenges faced and interventions made since 1994. The preliminary findings of the review indicate significant progress in access to basic education, primary health care and social housing. However, economic performance has not been adequate to effectively address poverty, inequality and unemployment. The final findings will focus efforts to attain the NDP's vision for 2030, as well as inform projections and plans for the next 25 years. The 2019-2024 MTSF will articulate government's contribution towards this vision.

The new draft White Paper on STI aligns with the STI Strategy for Africa (STISA) 2024. To succeed, STISA requires that research infrastructure be built and upgraded, professional and technical competencies enhanced, entrepreneurship and innovation promoted, and an enabling environment for STI development on the African continent provided. South Africa's draft White Paper advocates for a coherent and efficient national system of innovation, an enabling innovation environment, increased human capital, and an expanded knowledge enterprise that draws on STI to respond to the drivers of global change. In line with global commitments to sustainable development, the DST continues to participate in the National Working Group on the Sustainable Development Goals (SDGs). Science, technology and innovation are essential for the attainment of the SDGs, and the Department is active in a variety of forums related to water and sanitation, agriculture and food security, health and well-being, and affordable and clean energy alternatives.

Since 2015, the South African economy has not seen growth exceeding 1, 5%, and the first half of 2018 saw the country lapse into a technical recession. Despite government's efforts, unemployment, inequality and poverty have not been significantly reduced. The performance of traditional sectors with high employment potential such as agriculture has been negatively affected by climate change. Science, technology and innovation enable the exploration of alternative and non-traditional opportunities in agriculture, manufacturing, education and health provision.

The Fourth Industrial Revolution (FIR) has increased the convergence of developments in biological, digital and physical technological innovations, dramatically changing the way in which societies produce, distribute and consume goods and services essential to human existence and development. The FIR presents threats and opportunities for all nations and all of society. The DST serves on a technical-level structure, led by the Department of Telecommunications and Postal Services, which is crafting a national response to the FIR based on South Africa's unique competitive advantages in key technological areas, and the key threats and opportunities for which regulatory and legislative measures would have to be taken, enabling environments created and risk mitigation planned. The response must be effective in the short, medium and long term, and be aligned with the realisation of the objectives of the National Development Plan.

With infrastructure recognised as a key driver of economic growth, the stimulus package announced by President Ramaphosa in September 2018 included the establishment of an infrastructure fund. The fund is intended to reduce the current fragmentation of infrastructure spending and ensure more efficient and effective use of resources, and will include a financing mechanism that will allow the private sector to participate more innovatively in infrastructure development, and facilitate closer partnerships between government, development finance institutions and commercial banks to harness credit, technical know-how and oversight to ramp up investment. The DST must consider how to use the fund to leverage investment for STI capital

projects like the Square Kilometre Array (SKA), one of South Africa's flagship infrastructure projects.

Internal environment

The Department's efficient and responsible use of its budget allocation is centred on sound corporate governance and internal controls. The Department again rated among the top performers in the Department of Planning, Monitoring and Evaluation's most recent Management Performance Assessment Tool (MPAT) process. In 2018/19, the Department progressed with a business process mapping project and now has a draft service delivery model, which sets out the key business processes necessary for the execution of its mandate and functions, as well as staffing norms and standard operating procedures.

In 2017/18 the Department obtained a clean audit outcome, and performance against predetermined objectives was maintained at 89%.

The Audit and Enterprise Risk Management Committees serve as external oversight structures for operational efficiency and continuous improvement in the operations of the Department. The Information Technology and Ethics Committees are fully effective, driving business continuity, enabling a work environment conducive to operational efficiency, and countering fraudulent activities.

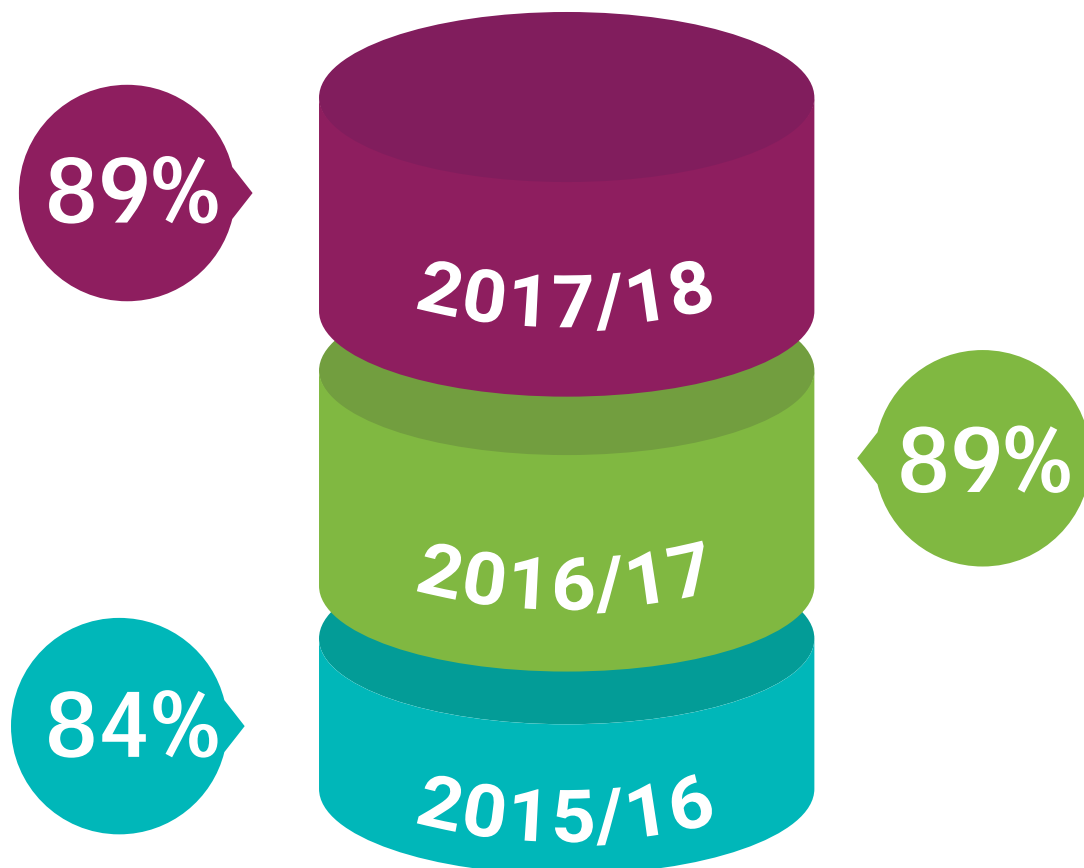
The DST's vacancy rate was 16, 67% as at 28 February 2019. The reduction of its baseline allocation by National Treasury means that the

Department's budget for the compensation of employees is inadequate. In 2019/20 the Department will focus on implementing strategic solutions to mitigate the impact of its human resources challenges on service delivery. The reduction in the number of funded positions has placed additional burdens on existing employees, and the current organisational structure therefore needs to be reviewed. The approval of the new White Paper on Science, Technology and Innovation is another reason to review the organisation of the Department, to ensure that there is sufficient capacity (numbers and skills) to implement the new policy. The DST will develop and execute a recruitment plan to mitigate the impact of vacancies. Other priorities related to human resources include intensifying initiatives to develop skills and create a working environment conducive to productivity and employee wellness.

The budget for 2019/20 is R8,150 billion. This is a nominal increase from the R7,790 billion allocated in 2018/19. Approximately 36% of the 2019/20 allocation consists of parliamentary grants to the entities that report to the Minister of Science and Technology (i.e. the Council for Scientific and Industrial Research, the Human Sciences Research Council, the National Research Foundation, the Technology Innovation Agency, the South African National Space Agency, the Academy of Science of South Africa and the South African Council for Natural and Scientific Professions). The remaining allocation goes on transfer payments to entities for strategic projects and initiatives, and the Department's operations, e.g. compensation of employees, acquisition of goods and services, etc.

The Department prides itself on maintaining an overall operational budget in the range of 8-10% of its vote. The budget for the last year of implementation of the current planning cycle will be directed towards achieving the priorities set out in the strategic plan 2020- 2025.

Graph 1: DST annual performance trend (2015/16 to 2017/18)



The improvements in performance are the result of ongoing efforts to strengthen corporate governance and internal controls in the Department.

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

Strategic outcome-oriented goal	Responsive, coordinated and efficient NSI	Programme strategic objectives supporting strategic outcome-oriented goals
Strategic outcome-oriented goal statement	<p>Over the next five years, build on previous gains to create a responsive, coordinated and efficient NSI</p> <ul style="list-style-type: none"> • Proxy Indicator 1: Cabinet approval secured for the first comprehensive decadal plan for STI aligned with the NDP by 2020 • Proxy Indicator 2: Government-wide, medium-term research and development (R&D) investment framework institutionalised as part of the national budget process by 2020 • Proxy Indicator 3: Between 2015 and 2020, a tenfold increase in the rand value of partnerships between the DST and/or its entities and the private sector when compared to the investment level in partnerships in the 2012/13 financial year 	<p>Programme 1</p> <ul style="list-style-type: none"> • 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 <p>Programme 5</p> <ul style="list-style-type: none"> • To enhance the 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 and technological R&D
Proxy indicators		

Strategic outcome-oriented goal	Increased knowledge generation	Programme strategic objectives supporting strategic outcome-oriented goals ¹
<p>Strategic outcome-oriented goal statement</p>	<p>Over the next five years, maintain and increase the relative contribution of South African researchers to global scientific output</p>	<p>Programme 2</p> <ul style="list-style-type: none"> To coordinate and support high-end skills development in the strategic and emerging science and technology (S&T) areas of space science, energy, bioinnovation, nanotechnology, robotics, photonics, synthetic structural biology and functional genomics
<p>Proxy indicators</p>	<ul style="list-style-type: none"> Proxy Indicator 1: Not less than 22 000 researchers² in universities and DST entities supported annually by DST funds³ by March 2020 Proxy Indicator 2: Not less than 34 000 research articles published by researchers in South Africa between 2015 and 2020 Proxy Indicator 3: Number of articles co-published with researchers on the African continent doubled 	<p>Programme 3</p> <ul style="list-style-type: none"> To ensure the availability of and access to internationally comparable research and innovation infrastructure in order to generate new knowledge and train new researchers <p>Programme 4</p> <ul style="list-style-type: none"> To support and promote research that develops basic sciences through the production of new knowledge and relevant training opportunities <p>Programme 5</p> <ul style="list-style-type: none"> 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 the Sector Innovation Fund initiative; and that facilitate the development of new industries through targeted R&D

¹ Programmes 2, 3, 4 and 5 each have human capital development indicators in support of the strategic outcome-oriented goal.

² "Researchers" is used here as defined in the guidelines for the national survey on research and experimental development (R&D survey).

³ Equivalent to researchers receiving National Research Foundation research grants.

Strategic outcome-oriented goal	Human capital development	Programme strategic objectives supporting strategic outcome-oriented goals
<p>Strategic outcome-oriented goal statement</p> <p>Proxy indicators</p>	<p>Over the next five years, increase the number of high-level graduates and improve their representivity</p> <ul style="list-style-type: none"> • Proxy Indicator 1: Not less than 15 000 doctoral students supported annually through DST funding by 2020 • Proxy Indicator 2: Not less than 54 300 pipeline (honours and master's) postgraduate students supported annually through DST funding by 2020 • Proxy Indicator 3: Not less than 4 200 graduates and students placed in science, engineering, technology and innovation institutions between 2015 and 2020 • Proxy Indicator 4: Not less than 2,1 million people reached annually through science engagement activities by 2020 • Proxy Indicator 5: Three times the number of master's and PhDs in priority areas identified in the NRDS and TYIP by 2020 (measured on a 2012 baseline) 	<p>Programme 2</p> <ul style="list-style-type: none"> • To coordinate and support high-end skills development in the strategic and emerging S&T areas of space science, energy, bioinnovation, nanotechnology, robotics, photonics, synthetic structural biology and functional genomics <p>Programme 3</p> <ul style="list-style-type: none"> • 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 human capital development, especially for international PhD training <p>Programme 4</p> <ul style="list-style-type: none"> • To contribute to the development of representative, high-level human capital able to pursue locally relevant and globally competitive research and innovation activities

Strategic outcome-oriented goal	Using knowledge for economic development	Programme strategic objectives supporting strategic outcome-oriented goals
<p>Strategic outcome-oriented goal statement</p> <p>Proxy indicators</p>	<p>Over the next five years, derive a greater share of economic growth from R&D-based opportunities and partnerships</p> <ul style="list-style-type: none"> • Proxy Indicator 1: Between 1 April 2015 and 31 March 2020, 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: Between 1 April 2015 and 31 March 2020, total additional revenue of at least R2 billion reported by firms and companies who benefitted from DST-funded industrial development instruments since 1 April 2010 • Proxy Indicator 3: Between 1 April 2015 and 31 March 2020, the performance of 5 000 SMEs enhanced through technology interventions funded by the DST and its entities 	<p>Programme 2</p> <ul style="list-style-type: none"> • To facilitate and resource investments in space science, energy, bioinnovation, 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 for all South Africans <p>Programme 3</p> <ul style="list-style-type: none"> • To strengthen cooperation in STI in Africa, to build capacities and support initiatives of the SADC and AU, for South Africa's national benefit and to advance 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 <p>Programme 5</p> <ul style="list-style-type: none"> • To identify, grow and sustain niche high-potential STI capabilities that - <ul style="list-style-type: none"> ◦ 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

Strategic outcome-oriented goal	Knowledge utilisation for inclusive development	Programme strategic objectives supporting strategic outcome-oriented goals
<p>Strategic outcome-oriented goal statement</p> <p style="text-align: center;">Proxy indicators</p>	<p>Over the next five years, accelerate inclusive development through scientific knowledge, evidence and appropriate technology</p> <ul style="list-style-type: none"> • Proxy Indicator 1: Between 1 April 2015 and 31 March 2020, decision support provided by the DST and its entities makes a demonstrable positive impact on at least 12 government services or functions • Proxy Indicator 2: Between 1 April 2015 and 31 March 2020, technology-based investments by the DST strengthen local economic development prospects in 10 municipalities • Proxy Indicator 3: Between 1 April 2015 and 31 March 2020, investments by the DST and its entities improve the standard of living of 200 000 marginalised or neglected citizens, using the multi-dimensional capabilities framework of the National Development Plan 	<p>Programme 5</p> <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> ◦ 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 R&D-led targeted industries • To strengthen provincial and rural innovation and production systems through analysis and catalytic interventions

5.2 The Medium-Term Strategic Framework and STI

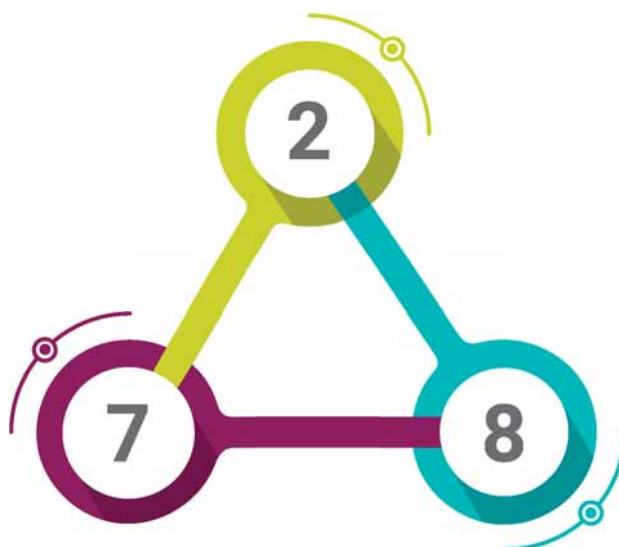
The NDP as the overarching government framework for the socio-economic transformation of South Africa has been divided into five-year implementation plans, the first of which has been the 2014-2019 Medium Term Strategic Framework (MTSF). The 2014-2019 MTSF has 14 Outcomes. Over the MTSF period, the DST will have contributed to and reported on the following Outcomes:



- **Outcome 3:** All people in South Africa are and feel safe.
- **Outcome 4:** Decent employment through inclusive economic growth.
- **Outcome 5:** A skilled and capable workforce to support an inclusive growth path.
- **Outcome 6:** An efficient, competitive and responsive economic infrastructure network.
- **Outcome 10:** Environmental assets and natural resources that are well protected and continually enhanced.

Furthermore, the Department, through various projects and initiatives, provides support for the following Outcomes:

- **Outcome 2:** A long and healthy life for all South Africans.
- **Outcome 7:** Vibrant, equitable and sustainable rural communities and food security for all.
- **Outcome 8:** Sustainable human settlements and improved quality of household life.



The 2014-2019 MTSF period ends on 31 March 2019. In 2019/20 the Department will review and finalise its contribution towards the next MTSF under the guidance of DPME.

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

Outcome	Sub-outcome	Action/commitment	Progress up to 3rd quarter of the 2018/19
<p>Outcome 3: All South Africans are safe and feel safe</p>	<p>Sub-outcome 4: Secure cyberspace</p>	<ul style="list-style-type: none"> Develop R&D capacity 	<ul style="list-style-type: none"> A draft cybersecurity research, development and innovation (RDI) roadmap, covering the South African cybersecurity landscape, has been developed. It will be presented to the DST's Executive Committee (Exco) in early 2019 to request approval for submission to the Social Protection and Community Development Cluster and the Justice, Crime Prevention and Security Cluster.
<p>Outcome 4: Decent employment through inclusive economic growth</p>	<p>Sub-outcome 10: RDI investment supports inclusive growth</p>	<ul style="list-style-type: none"> Strengthen RDI partnerships between government and the private sector Align strategies for emerging/new industries with the IPAP and monitor regularly for long-term growth and competitiveness, job creation and export potential 	<ul style="list-style-type: none"> 50% increase on 2013 baseline (Research, Development, and Innovation (RDI) partnership between government and industries. The evaluation of the initiatives, for implementation to ensure maximum impact is an ongoing activity: <ul style="list-style-type: none"> Fluorochemicals – a continuation R&D plan (till March 2019) has been approved to ensure continuity. A new plan, for maximum industrial impact will be considered from April 2019. Tipowder – the R&T development plan has been revised to reduce technical risk & accelerate the industrialisation pathway.- Aeroswift – plans for building an industrial facility & Aeroswift production machines are being discussed with the IDC, based on concrete market requirements from the aerospace industry.- Fuel cells – reported below Mining – the RDI plan for maximal economic impact and HCD development has been approved by the DST and contracting is to commence soon. In addition, the incorporation of the universities at a more strategic level has been prioritised.
		<ul style="list-style-type: none"> Review existing market-based and state incentives for effectiveness in increasing investment in innovation Establish agroprocessing facilities for indigenous knowledge-based products 	<ul style="list-style-type: none"> 42 (or 40%) out of the 106 applications received from 1 January 2018 to 30 September 2018 received decisions within 90 days. Overall, of all the 106 applications received over the same period, 75 (or 71%) were provided with decisions. Construction of the Agro-Processing facility was started in Makonde, for Mipfa Cooperative (Limpopo). Final renovations were completed for Sedikong (MoNutri) in Tooseng (Limpopo). Tender processes were initiated for Phedisang Technologies (Gauteng) and Honeybush communities in Eastern and Western Cape. Land preparation for construction were initiated for I-Brand Health Infusions in North West and Eastern Cape.

Outcome	Sub-outcome	Action/commitment	Progress up to 3rd quarter of the 2018/19
		<ul style="list-style-type: none"> Work with the National Treasury to establish a sovereign innovation fund 	<ul style="list-style-type: none"> Engagements with the National Treasury and the Department of Small Business Development on a sovereign innovation fund has resulted in the establishment of the SME Innovation Fund. The establishment of the fund was announced in the 2018 Budget Speech and the State of the Nation Address. Since the announcement, the DST has been working with the National Treasury and the Department of Small Business Development to develop a plan for the fund to start operating in 2019/20. The amount for the fund is currently R1,2 billion over a three-year period.
<p>Outcome 5: A skilled and capable workforce to support an inclusive growth path</p>	<p>Sub-outcome 3: Increase access to high-level occupational directed programmes in needed areas</p>	<ul style="list-style-type: none"> Expand access to communication technologies Provide bursary support for postgraduate students Provide research infrastructure grants to higher education institutions, science councils and national facilities Increase outputs by researchers funded by the NRF Increase the number of research grants 	<ul style="list-style-type: none"> No target was set for the third quarter of 2018/19 rather it is expected that 3 400 Gbps broadband total capacity will be available by the 31 March 2019. 8 745 pipeline students (BTech/honours and master's) and 2 951 PhD students were awarded bursaries by 30 September 2018. Calls for proposals (external and internal) on the awarding of research infrastructure grants were issued by 30 September 2018, and by 31 December 2018 10 research infrastructure grants were issued. Figures for researchers' outputs will be available in the 4th quarter (annual target). 4 101 researchers were awarded research grants through NRF-managed programmes by 31 December 2018.
<p>Outcome 6: An efficient, competitive and responsive economic infrastructure network</p>	<p>Sub-outcome 5: Expansion, modernisation, access and affordability of information and communications infrastructure ensured</p>	<ul style="list-style-type: none"> Strategic Infrastructure Project 16: Square Kilometre Array and MeerKAT radio telescope 	<ul style="list-style-type: none"> The 64 ultra-high frequency (UHF) receiver installation was completed during the 2nd quarter. The UHF digitiser design qualification is under way, and UHF digitiser production has started.

Outcome	Sub-outcome	Action/commitment	Progress up to 3rd quarter of the 2018/19
<p>Outcome 10: South Africa's environmental assets and natural resources protected and enhanced</p>	<p>Sub-outcome 2: An effective climate-change mitigation and adaptation response</p>	<ul style="list-style-type: none"> Undertake research in climate sciences 	<ul style="list-style-type: none"> The second biennial report on the state of climate change science and technology in South Africa was submitted to the DST in December 2018 for approval and submission to Cabinet before 31 March 2019. On 3 October 2018, ASSAF made a presentation to the DST's Science Missions Management unit on the progress made towards the finalisation of the second biennial report. A final report was submitted in December 2018.
		<ul style="list-style-type: none"> Increase investment in research, development and innovation to support the transition to a green economy 	<ul style="list-style-type: none"> The data on green R&D will be extracted from the 2016/17 national survey on research and experimental development in January 2019. The DST is currently reviewing the methodology/framework and codes for green R&D with the Centre for STI Indicators (CeSTII) and Trade and Industrial Policy Strategies (TIPS). The revised green R&D framework that will be used to monitor investment by the public and private sectors in the green economy will be extracted from the R&D survey datasets.

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, as well as areas for improvement.

A new White Paper on Science, Technology and Innovation is expected to be tabled in Cabinet during 2019. The new White Paper will be complemented by a new NDP-aligned decadal plan for STI, which should be submitted for approval in 2019/20.

As part of the five-year programme of work identified in 2015/16 to establish an RDI budget coordination and legislative instrument for improved governance and coordination of the NSI, the DST secured approval from Cabinet to phase in an STI budget coordination framework aligned to existing Medium-Term Expenditure Framework processes. This process will be matured over the next three to four years.

The current economic climate, characterised by low levels of economic growth and competing priorities for public funding, means that it will not be possible to achieve the MTSF target of growing gross expenditure on research and development (GERD) to 1,5% of GDP by 2019. Data released in October 2018 for the period 2016/17 shows that GERD was at 0,82% of GDP. However, the Department is continuing its efforts to engage the private sector and redirect funding from previously underutilised sources such as provincial budgets towards

STI-based service delivery innovation. The DST has also been in discussion with the National Treasury and the Department of Planning, Monitoring and Evaluation on how to interface the operationalisation of the Research and Development Budget Coordination process with the Budget Prioritisation Framework of the Mandate Paper process.

The establishment of a sovereign innovation fund as a public-private partnership is envisaged as another strategic intervention to enhance the level of investment further along the innovation value chain. Key decisions were taken in April 2018 towards operationalisation of the Sovereign Innovation/ Small Business Innovation Fund. The Fund is expected to be activated in 2019/20 once details are finalised between the Departments of Small Business Development, Science and Technology and National Treasury.

b. Increased knowledge generation, human capital development, and infrastructure provision

In the Strategic Plan, the contribution of the DST and its entities to increasing knowledge generation, human capital development (HCD) and provision of infrastructure is guided by the following proxy outcome indicators:

- Not less than 22 000 annual research grants awarded to researchers in universities and DST entities supported by DST funds by March 2020.
- Not less than 34 000 research articles published by researchers in South Africa between 2015 and 2020.
- Number of articles co-published with

researchers on the African continent doubled.

- Not less than 15 000 annual bursaries awarded to doctoral students supported through DST funding by 2020.
- Not less than 54 300 pipeline postgraduate students awarded annual bursaries through DST funding by 2020.
- Not less than 4 200 graduates and students placed in science, engineering, technology and innovation institutions between 2015 and 2020.
- Not less than 2,1 million people reached annually through science engagement activities by 2020.
- Three times the number of master's and PhDs in priority areas identified in the NRDS and TYIP by 2020 (measured on a 2012 baseline).

made in addressing constraints. The Minister approved the Human Capital Development Strategy for Research, Innovation and Scholarship in 2016, and the DST continues to implement it. The modelled cost of implementing the Department's HCD Strategy in support of the NDP benchmarks for HCD, with a specific focus on the financial implications of delivering the DST's contribution, was also presented to the Minister in 2017.

The DST and its public entities have continued to provide funding support for postgraduate research students through the Department's NRF-managed bursary programme. The total number of postgraduate students supported increased from about 12 700 in 2015/16 to about 14 200 in 2017/18. This increase is presented in Table 4.

Human capital development (science, engineering, technology and innovation postgraduates, PhDs)

Research capacity is central to the objectives that drive the NSI. Good progress has been

Table 4: Postgraduate students supported between 2015 and 2018



Number of postgraduate students supported	2015/16	2016/17	2017/18
Honours students	4 225	5 083	4 956
Master's students	5 120	5 185	5 645
PhD students	3 404	3 454	3 621
Total	12 749	13 722	14 222

The Department commissioned ASSAf to undertake a study of postgraduate research training in engineering to increase its understanding of the reasons for low participation rates in doctoral engineering programmes, and whether there was an industrial demand for doctoral-level skills in engineering. ASSAf completed the study in 2018/19, and its policy recommendations are to be incorporated into relevant interventions in 2019/20.

In 2017/18, the DST supported a total of 1 019 graduates and students as interns in the workplace through its work preparation programmes. This number was, however, affected by Economic Competitiveness Support Package (ECSP) budget cuts – from R51 million in 2017/18 to R13 million in 2018/19.

Knowledge generation (researchers, publications)

In the three-year period between 2015/16 and 2017/18, the DST, under the Thuthuka programme, supported 1 135 emerging researchers with research grants. In 2017/18, 83% of Thuthuka grant holders were black and 63% were women. All new Thuthuka grant awards for 2018/19 went to black applicants thus the equity target of blacks of 80% for new grant awards was exceeded by 20 percentage points. However, it was found that a significant number of black and women researchers and academics at lecturer and senior lecturer levels (dubbed the “silent majority”⁴) were not seeking research funding from the NRF. The DST and Universities South Africa agreed to investigate this issue.

This study was completed in 2018/19, and policy interventions have been recommended for incorporation into relevant programmes in 2019/20.

In terms of support for established researchers, the DST provided research grants to 4 707 researchers through the DST/NRF-managed programmes, 35% of the overall total was allocated to black researchers (with the majority being African at 60.7%, Indian at 22.6% and Coloured at 16.7%) and 38% overall to women researchers.

Embedded in these research grants are funds that will enable researchers to identify, recruit and support excellent postgraduate students with bursaries, research running costs and funds to procure small research equipment. Between 1 April 2017 and 31 March 2018, a total of 8 384 research articles were published and cited in the Thomson Reuters Web of Science citation indexing service.

Through collaborative effort, the DST increased the number of co-funded research chairs in strategic scientific domains from 199 in 2016 to 226 by 31 March 2018. This was done in partnership with the Department of Higher Education and Training, Nedbank, the Department of Agriculture, Forestry and Fisheries, the South African Medical Research Council, the Sugar Milling Research Institute, the CSIR and Namibia’s National Commission for Research, Science and Technology.

⁴The study is aimed at understanding why the majority of black and women researchers with PhDs and at the level of emerging researchers (lecturer and senior lecturer levels at universities) do not participate in seeking funding from the NRF.

Research and innovation infrastructure

In 2016/17 the Department launched the country's first research infrastructure roadmap for the provision of medium to large research infrastructure across five scientific domains, namely, (i) humans and society, (ii) health, biological and food security, (iii) earth and environment, (iv) materials and manufacturing, and (v) energy. The overall objective of the South African Research Infrastructure Roadmap (SARIR) is to provide a strategic, rational, medium to long-term framework for planning, implementing, monitoring and evaluating the provision of the research infrastructure necessary for a competitive and sustainable NSI. The implementation of seven of the 13 research infrastructures that constitute the SARIR was initiated in the 2016/17 financial year. In 2017/18 an eighth infrastructure was added as part of the implementation. The readiness of the research infrastructures was determined by various factors, such as steering committee reviews, cost to implement, extent of return on investment, alignment with DST and other national priorities, state of readiness and affordability.

Regarding the implementation of the National Integrated Cyberinfrastructure System (NICIS), the South African National Research Network (SANReN) and the Tertiary Education and Research Network of South Africa completed the implementation of the first 10 Gbps Global Network Architecture (GNA) pathfinder link on the West African Cable System (WACS) from South Africa to Europe. This 10 Gbps capacity provides a crucial Africa-to-Europe leg of the GNA broadband cable ring in the Atlantic

Ocean, and will become the channel through which all MeerKAT/SKA and CERN-related data will be carried, at low latency and nearly cost-free, between Europe and South Africa and the global community. By adding and upgrading sites on the national backbone and upgrading WACS, SANReN has increased its total available broadband capacity to about 3 292 Gbps by the end of 2017/18 financial year.

c. Using knowledge and innovation for economic development

Research, development and innovation in support of existing sectors

For the period 2015-2020, the contribution of the DST and its entities to increasing economic growth through R&D-based opportunities and partnerships is guided by the following proxy outcome indicators in the strategic plan:

- Between April 2015 and 31 March 2020, new commercial and industrial financial commitments of R2 billion secured for a portfolio of R&D-led industrial development initiatives funded by the DST.
- Between April 2015 and 31 March 2020, total additional revenue of at least R2 billion generated by companies that benefited from DST-funded industrial development support instruments introduced after April 2010.
- Between April 2015 and 31 March 2020, the performance of 5 000 SMEs enhanced through technology interventions funded by the DST and its entities.

Details of support for specific sectors is outlined below.

Agriculture

The DST, in collaboration with the Technology Innovation Agency (TIA), established the Agricultural Bioeconomy Innovation Partnership Programme (ABIPP) to facilitate agricultural initiatives, encourage local collaboration on national priorities, and promote global competitiveness in the agricultural sector. The Department has been actively involved in supporting the agriparks initiative under the leadership of the Department of Rural Development and Land Reform.

The DST will facilitate the use of technologies to support cultivation and agroprocessing and, where possible, the provision of energy needs within the agriparks. The Department had been in engagements with other government departments and research institutes for the implementation and exploitation of niche commodity crops. This culminated in the crafting of feasibility assessments for select indigenous crops. Marula (*Sclerocarya birrea*), hone bush (*Cyclopia genistoides*) and cape aloe (*Aloe ferox*) have been prioritised for addressing value chain challenges towards unlocking the value chain for inclusive economic participation. Alongside these identified commodity crops, agro-processing of indigenous crops is prioritised for stimulation and catalysing of technology innovation as well as addressing critical capability and capacity constraints for inclusive economic participation.

In addition the Department, supports the Grain SA Farmer Development Programme in the EC and KZN provinces that assists small-

holder farmers with conservation agriculture practices for soybean, maize cultivation as well as technologies such as cob-cages & harvesters to minimize contamination by certain diseases; and nixtamalisation technologies for processing maize to a more nutritious form for the local communities. The DST is also part of the Agriculture, Rural Development and Land Reform Operation Phakisa, which is intended to stimulate growth, foster job creation and bring about transformation along the agriculture and rural development value chain.

Activities in related Phakisa laboratories⁵ have just started, and the DST's role will be outlined in the "three feet" plans. A portfolio of six agriculturally focused Sector Innovation Funds, a partnership between government and industry, has demonstrated meaningful improvement in the competitiveness of these sectors.

Finally, the DST has supported efforts aimed at using ICT-based platforms and technologies such as mobile applications, drones, and web-based decision-support systems to enhance productivity.

Mining

The Mining Phakisa identified several initiatives that need to be supported in order to address the challenges faced by the mining sector. A major development that will yield long-term support for next generation mining was the re-purposing of an existing CSIR facility in Johannesburg into the Mandela Mining Precinct, a partnership between government, the mining

⁵Operation Phakisa stakeholders collaborate in detailed problem analysis, priority setting and intervention planning. These collaboration sessions are called laboratories (labs).

sector, mining equipment manufacturers and other stakeholders. The precinct was launched in September 2018.

Platinum-based fuel cells were identified as a technology that could stimulate demand for platinum and provide a platform for the local beneficiation of platinum group metals. A number of activities are being undertaken by both government and the private sector to develop a local market for hydrogen fuel cells in South Africa.

The following are some of the developments to date:

- Hydrogen South Africa (HySA) has been included as a national flagship programme under climate change mitigation efforts.
- A 2,5 kW hydrogen fuel cell unit based on HySA intellectual property (membrane electrode assembly and catalyst) was deployed at Poelano Secondary School in a rural community of the North West in April 2018.
- Some HySA programme initiatives were profiled at the Energy Expo held in Kazakhstan in August/September 2017.
- Work was done towards the implementation of fuel cell solutions in the public bus sector using HySA technology, in support of the Department of Trade and Industry programme to roll out hydrogen fuel cell buses in metropolitan areas.

New R&D-led industrial development

In 2015/16, government adopted the Nine-Point Plan to diversify and enhance the competitiveness of the South African economy.

The DST reviewed its existing R&D-led industrial development interventions to ensure that these were aligned to the Nine-Point Plan. The DST continues to resource and mature the following medium to long-term flagship R&D-led industrial development interventions and to secure the necessary industrial and commercial financing to take them to full commercialisation:

- 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 establishment of a spin-off company for manufacturing cube satellite components, subsystems, systems and application products.
- The establishment of lithium ion battery manufacturing capabilities.

Support for small and medium enterprises

Since 2006, the DST has put in place a range of interventions to enhance the technological capabilities of firms and companies, with a major focus on SMEs. The DST continues to fund these interventions and, where possible, to facilitate expansion. The key initiatives that continue to improve the technological capabilities of firms, resulting in increased company revenue, include the following:

- A network of technology stations and technology platforms, based at universities and other research agencies, that provide technological and product development support to companies.

- A technology localisation programme specifically aimed at enhancing the technological capabilities of companies so that they can supply government procurement programmes.
- A range of industry innovation partnership initiatives. This includes the industry development centres at the CSIR. Two centres supporting nanomaterial and biotechnology industrial development have been operationalised and have supported the development of at least 25 SMEs in these areas. Two further industrial development centres were launched and operationalised in 2017/18.
- The DST will continue with the expansion of the mLab initiative beyond Gauteng and the Western Cape. The mLabs play a vital role in helping entrepreneurs and SMEs take advantage of the growing mobile application economy. The regional expansion aims to empower more young people in the ICT and entrepreneurship sector by providing them with opportunities to gain new and highly sought-after coding skills, participate in industry innovation and R&D, and establish new businesses based on innovative and impactful mobile data or Internet of Things solutions.

Commercialising ideas from research results

The Intellectual Property Rights from Publicly Funded Research and Development Act, the National Intellectual Property Management Office (NIPMO) and the Technology Innovation Agency (TIA) are a policy package intended to accelerate the conversion of research ideas into marketable products and services.

NIPMO will continue to enable the promotion, protection and utilisation of intellectual property (IP) emanating from publicly funded R&D in higher education institutions and science councils, and increasingly in other agencies and SMEs. In 2017/18 it actively supported 17 institutions with the establishment, consolidation and growth of their offices of technology transfer (OTTs). 2018/19 saw a new call for support to the recently established institutions, and the National Health Laboratory Service. Disclosures have stabilised, with 240 new disclosures received by NIPMO as at 14 February 2018, slightly short of the 2018/19 APP target. All 22 institutions that applied to the Intellectual Property Fund received a rebate for the IP prosecution and maintenance costs they incurred during the 2016/17 financial year, assisting them to obtain statutory protection for their IP.

Support for grassroots innovators

The DST intends to scale up its grassroots innovation work following a pilot phase that showed how best to design and deliver support to grassroots innovators. The grassroots innovation programme was introduced to enable the Department and its entities to support innovations emanating from outside formal research and development institutions. During the next stage, the programme will be grown to support at least 100 beneficiaries. This will be achieved by establishing stronger programmes that will be expanded through partnerships with provincial structures, in line with the goal of strengthening provincial systems of innovation. The programme will continue to develop a national database of grassroots innovations.

d. International partnerships to support the

NSI

On the international front, in support of the Department's strategic outcome-oriented goals and the national system of innovation, the Department secured R448 million in foreign funding during the 2017/18 financial year. This has come direct to South Africa in support of STI cooperation. International partners have invested R1 199 million in their own research organisations for specific cooperation with South Africa. Human capital development remains a major focus, and 241 students from South Africa participated in international programmes offering a postgraduate qualification.

The Department managed a diverse portfolio of international partners, including active collaboration with 678 international partner organisations, in 2017/18. Significant progress was made in strengthening South-South cooperation, especially within the Brazil, Russia, India, China and South Africa (BRICS) grouping. The portfolio of global partnerships leveraged 67 dedicated technical engagements that allowed South Africa to share experience and expertise with its partners in science policy areas of crucial importance to the country.

The Department's priority focus on international partnerships with Africa resulted in 76 jointly funded STI projects with African partners. On the African multilateral front, the Department worked to advance continental and regional cooperation and integration, with 15 African Union and Southern African Development Community (SADC) initiatives actively supported. The Department also leveraged its broader international partnerships portfolio to secure R477 million of foreign funding for capacity-

building initiatives elsewhere on the continent. These initiatives include the development and implementation of a SADC cyberinfrastructure framework, a SADC STI climate change framework, a South African response plan to the SADC Industrialisation Strategy and Roadmap, and the Pan African University Institute for Space Sciences, which is to be hosted in South Africa.

As the custodian of science diplomacy in South Africa, the DST influenced four decisions by multilateral organisations in support of South African priorities, and successfully facilitated the appointment of four South Africans to leadership positions in international governance structures such as multilateral organisations relevant to South African priorities. The promotion of South Africa as a preferred international partner for STI collaboration remained a major aspect of the DST's international engagement focus. The Science Forum South Africa (SFSA) was hosted again in December 2018. It has been held annually since 2015, in 2018 attracted over 3 000 participants from more than 79 countries. The plan is to expand the SFSA footprint in the country.

e. Using knowledge and innovation for inclusive development

The 2015-2020 Strategic Plan adopted the NDP's multidimensional "decent standard of living framework" as the basis for its efforts to accelerate inclusive development through STI. 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 enhance the systematic roll-out of public services. These knowledge products include policy briefs, case studies and research reports to enhance decision-making, and technical briefs that provide advice on the integration of STI in service delivery. The DST has also provided technology solutions for water resource management, sanitation, energy access and resource management.

The DST's interventions in service-delivery improvement include Earth observation (EO) for improved spatial planning, equipping decision-makers to understand the risks associated with global change, and improving disaster management. Space technologies (telecommunications and EO) will contribute to unlocking the potential of SMEs through the global cover of remote areas, which will empower township and rural communities, businesses and entrepreneurs by providing information through their mobile phones, independent of ground-based infrastructure. The DST is also piloting a decision-support tool that will assess the innovation potential of people living in marginalised communities. This will assist the Department to design appropriate interventions to support innovators in these communities and incorporate them into the knowledge economy.

Over the last three years, the DST has collaborated with the Bill & Melinda Gates Foundation on pilot projects to expedite the process of providing new sanitation solutions in South Africa, with priority being given to marginalised communities and water-scarce rural areas.

The DST continues to cooperate with partners like the European Union in applying STI to unlock wealth and create jobs. The interventions are enabling and advancing socio-economic participation and inclusion, particularly in marginalised areas. Cooperation between the formal and informal economies has been strengthened, and products for the health, food and cosmetics sectors have been developed. This enhances the innovation and job-creation role of indigenous knowledge holders, and improves the NSI's responsiveness to grassroots innovations.

Transdisciplinary approaches that involve policy-makers and communities in the research process are gaining in importance globally, and the DST has supported national transdisciplinary programmes on poverty and inequality. The Department will also support South Africa's participation in global programmes such as Future Earth, and in emerging international data partnerships for sustainable development.

5.4 Organisational environment

Internally, the Department is organised into five budget Programmes to deliver on the five strategic outcome-oriented goals discussed 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.

The DST is supported in the execution of its

mandate by the following agencies/science councils and entities:

- The National Research Foundation (NRF).
- The Technology Innovation Agency (TIA).
- The South African National Space Agency (SANSA).
- The Council for Scientific and Industrial Research (CSIR).
- The Human Sciences Research Council (HSRC).
- The National Advisory Council on Innovation (NACI).
- The Academy of Science of South Africa (ASSAf).
- The South African Council for Natural Scientific Professions (SACNASP).

The Strategic Management Model adopted in 2002 outlines how the DST interacts with and to some extent coordinates the work of science councils that fall under other line departments, such as the Agricultural Research Council (Department of Agriculture, Forestry and Fisheries, DAFF), the Medical Research Council (Department of Health, DoH) and the Water Research Commission (Department of Water and Sanitation, DWS).

5.5 Description of the strategic planning process

In line with the National Treasury Framework on Strategic Plans and Annual Plans, the DST commenced its planning in April 2018. Led by the Executive Committee (Exco) and coordinated by the Department's Directorate: Strategy and Planning, the review of the 2015-2020 Strategic Plan and development of the 2019/20 Annual

Performance Plan (APP) has been informed by external factors such as budget cuts as a result of reprioritisation of resources by the Treasury, as well as internal developments resulting from various reviews (see section 5.1) and from what has been learnt from the implementation of sectoral policies and instruments.

The planning process for both the first and second drafts of the APP was undertaken through a multi-tier process, which saw the adoption of the process to develop the APP by Exco, followed by bilateral meetings between Strategy and Planning and the Programmes, and an extended Exco meeting. This meeting focused on a review of performance against the 2015-2020 Strategic Plan, and the consideration of observations and findings by the Department of Planning, Monitoring and Evaluation (DPME) and the Auditor-General on the DST's performance against predetermined strategic objectives and in-year monitoring reports. In addition, the Minister convened a session in November 2018 to refine the first draft that was submitted to the DPME in August 2018.

6. PLANNED POLICY

INITIATIVES

6.1 Human capital development

Two evidence-based studies were completed in the course of 2018/19. The first study, on the “silent majority”, investigated the large number of academics at lecturer and senior lecturer levels in South Africa’s university system who are not active in applying for research funding from the NRF or publishing. The study sought reasons for this inactivity and proposed policy interventions to make the group research active and productive. The study was conducted by the Centre for Research on Evaluation, Science and Technology and managed on behalf of the DST by Universities South Africa. In 2019/20, the DST will work with the Department of Higher Education and Training to distil the policy options emanating from the study and, at a later stage, to implement them.

The second study, carried out by the Academy of

Science of South Africa, looked at postgraduate research training in engineering with a view to establishing individual, institutional and systemic factors hindering the production of master’s and PhD graduates in engineering. In 2019/20, the focus will be on integrating policy options into relevant programmes and interventions that support engineering training at postgraduate level.

The Department commissioned the NRF to establish a platform for tracking the postgraduate students that it funds and has funded over the years. The first preliminary results of this digital platform are expected to be made known in the course of 2019/20.

6.2 Support for basic sciences

In 2019/20 the process for the development of national open science policy based on the framework of guidelines and principles will be initiated.

7. Overview of 2019/20 budget and MTEF estimates and expenditure trends

R'000	Audited outcome			Adjusted appropriation	MTEF estimates		
	2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
Programme							
Administration	279 121	311 815	320 971	366 714	380 282	342 877	359 921
Technology Innovation	1 067 391	1 019 783	1 117 980	1 135 423	1 224 305	1 293 162	1 355 008
International Cooperation and Resources	124 352	125 838	135 184	141 899	149 008	158 137	165 047
Research Development and Support	4 223 472	4 157 538	4 299 293	4 533 892	4 572 935	4 900 891	5 155 375
Socio-economic Innovation Partnerships	1 734 3126	1 768 620	1 616 117	1 780 460	1 824 439	1 928 175	1 867 874
Total	7 437 462	7 383 594	7 489 545	7 958 388	8 150 969	8 623 242	8 903 225
Compensation of employees	301 087	319 037	323 806	352 880	380 466	408 444	434 993
Goods and services	163 739	188 876	190 347	249 775	254 805	207 631	214 291
Transfers and subsidies	6 956 058	6 860 077	6 954 524	7 343 539	7 513 025	8 004 347	8 251 030
Payments for capital assets	16 467	15 478	20 649	12 194	2 673	2 820	2 911
Payments for financial assets	111	126	219	-	-	-	-
Total	7 437 462	7 383 594	7 489 545	7 958 388	8 150 969	8 623 242	8 903 225

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

Table 30.2 Vote expenditure trends by Programme and economic classification														
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	2015/16	2016/17	2017/18	2018/19	2015/16-2018/19									
Programme 1	290,8	300,5	279,1	304,0	345,1	311,8	308,7	376,0	321,0	383,8	379,5	379,5	94,2%	92,2%
Programme 2	1 008,8	1 008,5	1 067,4	1 007,1	1 005,4	1 019,8	1 073,6	1 075,1	1 118,0	1 131,7	1 131,7	1 131,7	102,7%	102,8%
Programme 3	122,0	121,4	102,4	124,5	124,5	125,8	128,7	132,4	135,2	136,4	137,9	137,9	102,3%	101,4%
Programme 4	4 247,1	4 238,8	4 223,5	4 200,6	4 171,0	4 157,5	4 348,9	4 350,1	4 299,3	4 360,3	4 531,0	4 531,0	100,3%	99,5%
Programme 5	1 804,5	1 756,9	1 743,1	1 792,9	1 783,0	1 768,6	1 622,3	1 623,6	1 616,1	1 778,3	1 778,3	1 778,3	98,7%	98,5%
Total	7 842,1	7 466,1	7 437,5	7 429,0	7 429,0	7 383,6	7 557,2	7 557,2	7 489,5	7 790,5	7 958,4	7 958,4	100%	99,5%
Change to 2018 Budget estimate														
											167,9			
Economic classification														
Current payments	496,4	495,0	464,8	509,7	532,3	507,9	575,8	570,7	514,2	603,3	602,7	602,7	95,6%	94,9%
Compensation of employees	291,3	295,3	301,1	301,2	313,8	319,0	315,5	326,8	323,8	339,8	339,8	339,8	102,2%	100,6%
Transfers and subsidies	6 983,4	6 968,8	6 956,1	6 917,0	6 872,2	6 860,1	6 960,5	6 964,5	6 954,5	7 175,0	7 343,5	7 343,5	100,3%	99,9%

Table 30.2 Vote expenditure trends by Programme and economic classification

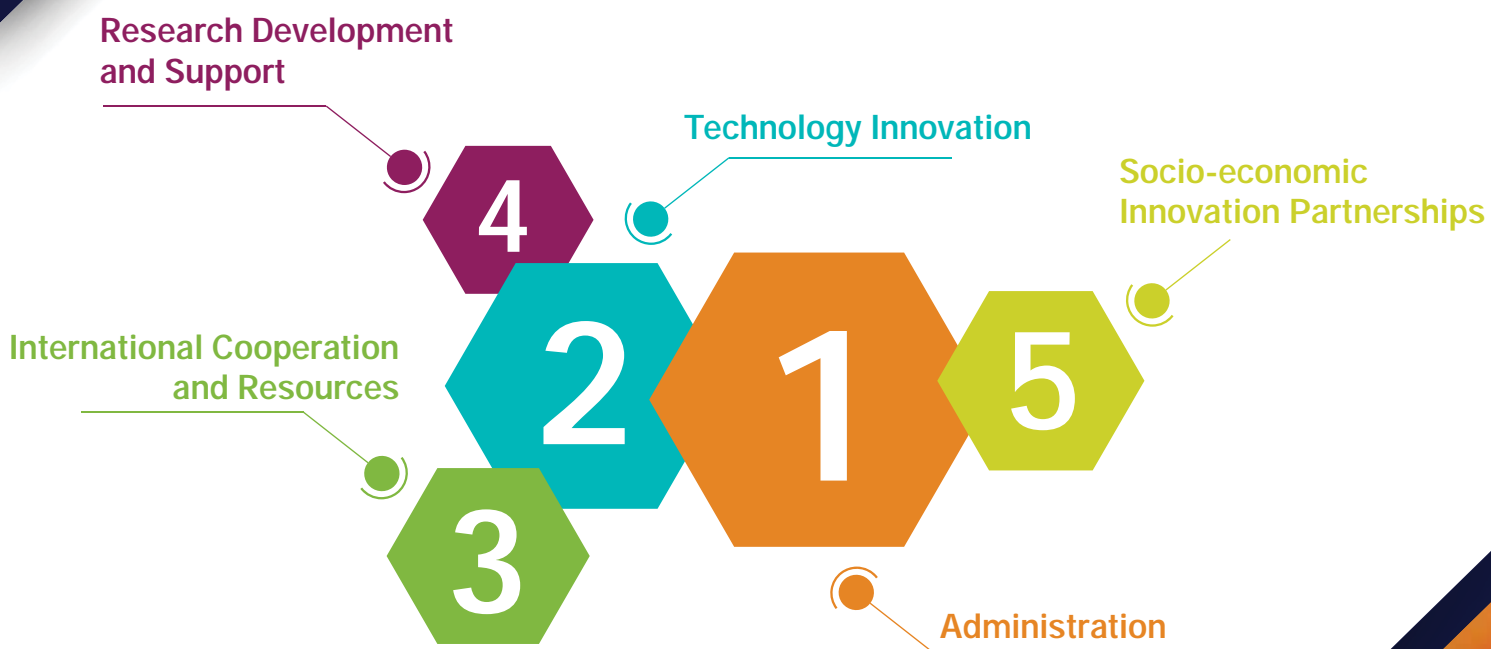
Programmes															
1. Administration															
2. Technology Innovation															
3. International Cooperation and Resources															
4. Research Development and Support															
5. Socio-economic Innovation Partnerships															
Programme	Annual budget	Adjusted appropriation	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	2015/16	2016/17	2017/18	2018/19	2015/16-2018/19	2018/19	2017/18	2016/17	2017/18	2016/17	2017/18	2018/19	2015/16-2018/19	2015/16-2018/19	
Programme 1	290,8	300,5	279,1	304,0	345,1	311,8	308,7	304,0	311,8	308,7	376,0	379,5	379,5	94,2%	
Programme 2	1 008,8	1 008,5	1 067,4	1 007,1	1 005,4	1 019,8	1 073,6	1 007,1	1 019,8	1 073,6	1 075,1	1 131,7	1 131,7	102,7%	
Programme 3	122,0	121,4	102,4	124,5	124,5	125,8	128,7	124,5	125,8	128,7	132,4	137,9	137,9	102,3%	
Programme 4	4 247,1	4 238,8	4 223,5	4 200,6	4 171,0	4 157,5	4 348,9	4 200,6	4 157,5	4 348,9	4 350,1	4 531,0	4 531,0	100,3%	
Programme 5	1 804,5	1 756,9	1 743,1	1 792,9	1 783,0	1 768,6	1 622,3	1 792,9	1 768,6	1 622,3	1 623,6	1 778,3	1 778,3	98,7%	
Total	7 842,1	7 466,1	7 437,5	7 429,0	7 429,0	7 383,6	7 557,2	7 429,0	7 383,6	7 557,2	7 557,2	7 958,4	7 958,4	100%	99,5%
Departmental agencies and accounts	5 566,0	5 457,1	4 758,4	5 344,7	5 311,4	4 695,1	5 204,3	5 344,7	4 695,1	5 204,3	5 204,3	5 496,5	5 496,5	93,3%	92,7%
Higher education institutions, foreign governments and international organisations	114,6	114,6	225,7	-	-	204,3	-	-	204,3	-	-	-	-	375,3%	375,3%
Public corporations and private enterprises	1 253,3	1 249,8	1 833,1	1 307,4	1 299,4	1 793,8	1 447,1	1 307,4	1 793,8	1 447,1	1 447,1	1 504,8	1 504,8	124,0%	124,6%

Table 30.2 Vote expenditure trends by Programme and economic classification

Programmes												
1. Administration												
2. Technology Innovation												
3. International Cooperation and Resources												
4. Research Development and Support												
5. Socio-economic Innovation Partnerships												
Programme	2015/16	2016/17	2017/18	2018/19	2015/16-2018/19	Annual budget	Audited outcome	Adjusted appropriation	Revised estimate	Outcome/Annual budget (%)	Outcome/Adjusted appropriation average (%)	Outcome/Adjusted appropriation average (%)
R million												
Programme 1	290,8	304,0	308,7	383,8	379,5	321,0	376,0	379,5	379,5	94,2%	92,2%	92,2%
Programme 2	1 008,8	1 007,1	1 073,6	1 131,7	1 131,7	1 118,0	1 075,1	1 131,7	1 131,7	102,7%	102,8%	102,8%
Programme 3	122,0	124,5	128,7	136,4	137,9	135,2	132,4	137,9	137,9	102,3%	101,4%	101,4%
Programme 4	4 247,1	4 200,6	4 348,9	4 360,3	4 531,0	4 299,3	4 350,1	4 531,0	4 531,0	100,3%	99,5%	99,5%
Programme 5	1 804,5	1 792,9	1 622,3	1 778,3	1 778,3	1 616,1	1 623,6	1 778,3	1 778,3	98,7%	98,5%	98,5%
Total	7 842,1	7 466,1	7 557,2	7 790,5	7 958,4	7 489,5	7 557,2	7 958,4	7 958,4	100%	99,5%	99,5%
Non-profit institutions	149,6	147,3	309,1	342,8	341,6	462,5	313,1	341,6	341,6	103,9%	104,2%	104,2%
Households	-	-	-	-	0,7	1,2	-	0,7	0,7	-	584,8%	584,8%
Payments for capital assets	2,3	2,3	21,0	12,2	12,2	20,6	22,0	12,2	12,2	171,4%	106,2%	106,2%
Machinery and equipment	2,3	2,3	21,0	12,2	12,2	20,6	22,0	12,2	12,2	171,4%	106,2%	106,2%
Payments for financial assets	-	-	-	-	-	0,2	-	-	-	-	-	-
Total	7 482,1	7 466,1	7 437,5	7 429,0	7 429,0	7 383,6	7 557,2	7 429,0	7 958,4	100,0%	99,5%	99,5%

Table 30.2 Vote expenditure trends by Programme and economic classification

Programmes															
1. Administration															
2. Technology Innovation															
3. International Cooperation and Resources															
4. Research Development and Support															
5. Socio-economic Innovation Partnerships															
Programme	2015/16	2016/17	2017/18	2018/19	2015/16-2018/19	Annual budget	Audited outcome	Adjusted appropriation	Annual budget	Audited outcome	Adjusted appropriation	Annual budget	Revised estimate	Outcome/Annual budget average (%)	Outcome/Adjusted appropriation average (%)
R million	2015/16	2016/17	2017/18	2018/19	2015/16-2018/19										
Programme 1	290,8	304,0	308,7	383,8	376,0	321,0	379,5	379,5	379,5	321,0	376,0	383,8	379,5	94,2%	92,2%
Programme 2	1 008,8	1 007,1	1 073,6	1 131,7	1 075,1	1 118,0	1 131,7	1 075,1	1 131,7	1 118,0	1 075,1	1 131,7	1 131,7	102,7%	102,8%
Programme 3	122,0	124,5	128,7	136,4	132,4	135,2	137,9	132,4	136,4	135,2	132,4	136,4	137,9	102,3%	101,4%
Programme 4	4 247,1	4 200,6	4 348,9	4 360,3	4 350,1	4 299,3	4 531,0	4 350,1	4 360,3	4 299,3	4 350,1	4 360,3	4 531,0	100,3%	99,5%
Programme 5	1 804,5	1 756,9	1 622,3	1 778,3	1 623,6	1 616,1	1 778,3	1 623,6	1 778,3	1 616,1	1 623,6	1 778,3	1 778,3	98,7%	98,5%
Total	7 842,1	7 429,0	7 557,2	7 790,5	7 557,2	7 489,5	7 958,4	7 557,2	7 790,5	7 489,5	7 557,2	7 790,5	7 958,4	100%	99,5%



PART B: **PROGRAMME AND CHIEF DIRECTORATE PLANS**

STRATEGIC OVERVIEW

In keeping with the NDP vision of an effective and capable developmental state that is transparent and accountable, the Department strives to maintain sound administrative practices and enhance its operational systems and processes. A business process mapping exercise was initiated in 2018/19 that will map out key processes in the Department, establish staffing norms for specific functions, and inform the service delivery charter.

The audit outcomes for the DST and its entities for the 2017/18 financial year were favourable, with the Department obtaining an unqualified audit. The DST remains one of the top-performing departments in terms of the Management Performance Assessment Tool (MPAT) administered by the Department of Planning, Monitoring and Evaluation (DPME). Monitoring and evaluation are to be strengthened, particularly in relation to entity oversight, financial management and project implementation going forward.

The budget cuts made to manage the wage bill across government have inevitably affected the DST's ability to fill its vacancies, and the targeted time frames for doing so. The focus in 2019/20 will be on the strategic use of resources to continue to meet performance imperatives and deliver on the Department's strategic outcome-oriented goals. The employee wellness programme will be used to support employee well-being.

a. **Efficient, IT-driven operational and management functions**

The Department needs to continue to invest in the provision of reliable technology infrastructure that will help create a seamless administration capability, increasing efficiency, providing access to information, and adding value to productivity and performance. Modern, high-quality IT support will be continued for the entire organisation. Part of the modernisation process will focus on the development and adoption of IT-based solutions for the Department. Continued investment in a robust and capable IT unit will enable appropriate responses to modernisation and change.

b. **Strategic role for human resource management**

The Department aims to optimise its organisational capacity by actively sourcing the best skills to support service delivery and investing in the development of its employees to maximise their productivity. A strategic approach to human resource management will assist the DST to provide effective human resource management that is suitable and relevant to advancing organisational performance and efficiency, and ensure effective change management.

Given the limited budget for the 2018/19 and 2019/20 financial years, the Chief Directorate: Human Resources will implement a review of the approved organisational establishment to ensure that scarce and critical posts are prioritised and filled. The Department has been consistent in ensuring the capacitation of employees through the Workplace Skills Plan. In 2019/20, greater

emphasis will be placed on the quality and relevance of training, particularly in anticipation of the implementation of the new White Paper on Science, Technology and Innovation.

A positive organisational culture is critical for employee wellness and productivity, and the Department is committed to implementing the recommendations made following an organisational culture survey conducted through questionnaires and focus group engagements.

c. Effective finance, audit and risk management functions

The Department has functional and effective finance, supply chain management, audit and risk management units, which will continue to enhance the integrity of the DST's operations by ensuring that they are ethical and comply with legislation. It is important that the scope and function of these components continues to be managed efficiently, to facilitate clear improvements in the effectiveness of internal controls. A continued focus on enhancing supply chain management processes, effective and integrated IT systems, and capacity building is needed. The strategic focus of 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, 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 continue 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 are confident that the Department will support their service requirements in a proactive, consistent and cooperative manner.

e. Improved strategic planning

The practice of strategic planning is entrenched in the Department. However, the increased recognition of the role of STI in socio-economic transformation calls for improvement in the definition of the role and contribution of the DST and its entities and the broader NSI in addressing poverty, inequality and unemployment in South Africa. While the DST is a medium-sized organisation, its mandate to coordinate the work of the NSI towards socio-economic development is large.

To date, the work of the Directorate: Strategy and Planning has focused mainly on delivering on the compliance requirements of planning documents, i.e. strategic plans, annual performance plans and operational plans. The unit is repositioning its work to (a) serve as a strategic planning unit for the DST and the NSI, complementing the role envisaged for NACI in the draft White Paper; (b) serve as a knowledge repository for the DST and the broader STI system; (c) conduct evidence-based research

to provide current information for executive decision-making and inform future planning; (d) communicate on STI research trends; and (e) assist the DST to carry out foresight studies in response to areas identified by various reviews, and direct the system's contribution to achieving the NDP vision for 2030.

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 Department's budget is transferred to these entities. The DST has 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, as well as NDP recommendations. The Directorate: Governance provides the public entities and institutions with sound governance advice and plays an oversight function to ensure accountability in the implementation of government policy. In addition to overarching government prescripts, the DST's oversight and governance function is regulated by a Governance Framework, which was developed in collaboration with and agreed to by the Department's entities.



STRATEGIC OBJECTIVES AND STRATEGIC STATEMENTS



CHIEF DIRECTORATES

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

The Ministry and Office of the Director-General

Supports the Minister, Deputy Minister and Director-General by providing professional and executive support. This component is responsible for the 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.

Enterprise Risk Management

Provides and drives an enabling environment in support of the identification, management and oversight of risks across strategic, tactical and operational levels in the Department. This role includes ensuring that countering fraud

and/or corruption is made an integral part of strategy, operations and administration within the Department.

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 entities to contribute to the realisation of departmental and national priorities.

Internal Audit Activity

Serves as the primary assurance tool for improving the Department's governance, risk management and management controls by providing insight and recommendations based on the analysis and assessment of data and business processes.

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; (b) attract, retain and motivate 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; (f) instil a culture of service excellence; and (g) provide an environment that promotes health, wellness and safety, and embraces the value of diversity.

Finance

Ensures the effective, efficient and economical 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.

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.

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. Its overall focus is to create public awareness and brand the Department

as a custodian of developments, benefits and opportunities in publicly funded STI initiatives across the country's science system. This is done through print, broadcast and online media, speeches and events, including public participation programmes. The component also supports science engagement programmes by the South African Agency for Science and Technology Advancement (SAASTA) and others, and ensures the alignment of the DST communication strategy with the Government Communication Framework.

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 all 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 and identification – Administration

Strategic objective	Risk description	Mitigation action
Alignment across various planning documents of the Department and its entities	Misalignment of entities' objectives with DST objectives.	<ul style="list-style-type: none"> No action plans required as all controls are effective.
Sound corporate governance, ⁶ including monitoring and evaluation	Inaccurate, unreliable and incomplete reporting of actual achievements against predetermined objectives as indicated in the APP (qualified audit opinion on non-financial performance).	<ul style="list-style-type: none"> Conduct awareness sessions with Programme managers on the technical indicator descriptors matrix (A step-by-step training to the user on how to capture the indicator as indicated in the APP using the Technical Indicator Descriptive standard template prescribed by National Treasury). Implementation of the approved Department of Science and Technology Performance Information Reporting Guidelines.
Science communication	Stakeholders (public) uninformed and/or unaware of the work of the DST.	<ul style="list-style-type: none"> Development of the Brand Management Strategy and the Brand Management Implementation plan. Conduct a bi-annual review and update of the approved Annual Events Calendar. SMS (Chief Directorate: Science Communications) to conduct quarterly engagement sessions with Programmes. Conduct quarterly information gathering sessions with entity communications teams.
Efficient and effective information technology services	Unauthorised access to DST data/information/network (logical access)	<ul style="list-style-type: none"> Continue to strengthen critical services, including detection and prevention procedures Procure intrusion prevention/detection system Continue providing awareness to educate DST users on how to protect DST information from external sources Procure a phishing awareness tool Implement smart host for email filtering Control devices with access to DST resources remotely using mobile device management solution Develop a bring-your-own-device policy Activation of Computer trace system on all laptops Provision of awareness sessions

⁶ The Programme performance indicators for this strategic objective are in the 2019/20 operational plan.



Strategic objective	Risk description	Mitigation action
Adequate and appropriately skilled personnel	Increased vacancy rate	<ul style="list-style-type: none"> Finalise and implement the Retention Policy Finalise and obtain approval for the Secondment Policy Finalise the guidelines for appointment of temporary employment services Enhance the implementation of capacity building initiatives by rolling out leadership/management programmes (emerging and advanced management development programmes, executive development programme, global leadership programme, mentoring and coaching, and internal capacity building workshops)
Equitable and sound financial and procurement services	Over and material underspending of the DST budget.	<ul style="list-style-type: none"> Awareness sessions to be provided for the following areas: <ul style="list-style-type: none"> Budget planning and expenditure monitoring New and existing legislation. Monitoring by Finance Unit of all transfer payment transactions to detect non-compliance and overspending of the budget.

Table 6: Strategic objectives with five-year Strategic Plan targets (the targets are reflected as cumulative numbers for every year of implementation over the Strategic Plan term)

The ensuing sections of the Annual Performance Plan (APP) should be read in conjunction with Annexure D of the 2018/19 APP which reflects the changes made to the 2015-2020 Strategic Plan.

Strategic objectives	Planned targets over the five-year strategic planning horizon				
	2015/16	2016/17	2017/18	2018/19	2019/20
1. Alignment across various planning documents of the Department and its entities	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 March 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 March 2017	DST public entities' 2018/19 strategic and annual performance plans and annual reports approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 March 2018	DST public entities' 2019/20 strategic and annual performance plans and annual reports approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 March 2019	DST public entities' 2020/21 annual performance plans and annual reports submitted to Parliament by 31 March 2020
2. Adequate and appropriately skilled personnel	Vacancy rate retained at 6% by 31 March 2020	Vacancy rate retained at 6% by 31 March 2017	Vacancy rate capped at 10% by 31 March 2018	Vacancy rate capped at 20% by 31 March 2019	Vacancy rate capped at 23% by 31 March 2020
3. Science communication	104 media articles written to raise the DST's public profile by 31 March 2020 50 public participation programmes held by 31 March 2020	32 media articles written to raise the DST's public profile between 1 April 2015 and 31 March 2017 20 public participation programmes held between 1 April 2015 and 31 March 2017	56 media articles written to raise the DST's public profile between 1 April 2015 and 31 March 2018 30 public participation programmes held between 1 April 2015 and 31 March 2018	80 media articles written to raise the DST's public profile between 1 April 2015 and 31 March 2019 40 public participation programmes held between 1 April 2015 and 31 March 2019	104 media articles written to raise the DST's public profile between 1 April 2015 and 31 March 2020 50 public participation programmes held between 1 April 2015 and 31 March 2020

⁷ The Department has placed a moratorium on the filling of vacancies due to compensation budget constraints. This has negatively affected the annual vacancy rate, the target for which was initially a maximum of 6%.



Strategic objectives	Five-year Strategic Plan target	Planned targets over the five-year strategic planning horizon				
		2015/16	2016/17	2017/18	2018/19	2019/20
4. Equitable and sound financial and procurement services	Unqualified audit ⁸ (clean audit) opinion with no financial matters in the audit report by 30 September 2020	Unqualified audit opinion with no financial matters in the audit report	Unqualified audit report on financial matters issued by the Auditor-General by 30 September 2017	Unqualified audit (clean audit) opinion with no financial matters in the audit report by 30 September 2018	Unqualified audit (clean audit) opinion with no financial matters in the audit report by 30 September 2019	Unqualified audit (clean audit) opinion with no financial matters in the audit report by 30 September 2020

⁸ An unqualified or clean audit opinion is an audit report that is issued when an auditor determines that each of the financial records provided by the institution is free of any misrepresentation. In addition, an unqualified opinion indicates that the financial records have been maintained in accordance with the standards known as Generally Accepted Accounting Principles (GAAP).

Table 7: Strategic statements, performance indicators, and annual and MTEF targets for 2019/20

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance	Medium-term targets		
			2015/16	2016/17		2017/18	2019/20	2020/21
Objective statement: 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 public entities' APPs	DST public entities' annual performance plans and annual reports approved by the Minister and chairpersons of the boards	DST public entities' 2020/21 annual performance plans and annual reports approved by the Minister	The APPs of entities for 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 2016	The 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 by 31 March 2017	DST public entities' 2019/20 annual performance plans and annual reports approved by the Minister by 31 March 2019	DST public entities' 2020/21 strategic and annual performance plans and annual reports approved by the Minister by 31 March 2020	DST public entities' 2021/22 annual performance plans and annual reports approved by the Minister by 31 March 2021	DST public entities' 2022/23 annual performance plans and annual reports approved by the Minister by 31 March 2022

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18		2018/19	2019/20	2020/21
Objective statement: To develop and maintain good corporate governance systems for the Department and its entities									
Combined assurance annual report	Combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees	9		2 combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees by 31 March 2017	1 combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees by 31 March 2018	1 combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees by 31 March 2019	1 combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees by 31 March 2020	1 combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees by 31 March 2021	1 combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees by 31 March 2022
Objective statement: 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	104	21 media articles written to raise the DST's public profile by 31 March 2016	47 media articles written to raise the DST's public profile by 31 March 2017	77 media articles written to raise the DST's public profile by 31 March 2018	24 media articles written to raise the DST's public profile by 31 March 2019	24 media articles written to raise the DST's public profile by 31 March 2020	24 media articles written to raise the DST's public profile by 31 March 2021	24 media articles written to raise the DST's public profile by 31 March 2022
Public participation programmes	Number of public participation programmes held	50	16 public participation programmes held by 31 March 2016	10 public participation programmes held by 31 March 2017	11 public participation programmes held by 31 March 2018	10 public participation programmes held by 31 March 2019	10 public participation programmes held by 31 March 2020	10 public participation programmes held by 31 March 2021	10 public participation programmes held by 31 March 2022

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18		2018/19	2019/20	2020/21
Objective statement: To ensure effective and efficient financial and procurement services									
Unqualified audit opinion with no financial matters in the audit report	Unqualified audit ¹⁰ (clean audit) opinion with no financial matters in the audit report	Unqualified audit opinion with no financial matters in the audit report	Unqualified audit report on financial matters issued by the Auditor-General by September 2016	Unqualified audit (clean audit) opinion with no financial matters in the audit report	Unqualified audit (clean audit) opinion with no financial matters in the audit report	Unqualified audit opinion with no financial matters in the audit report	Unqualified audit opinion with no financial matters in the audit report	Unqualified audit opinion with no financial matters in the audit report	Unqualified audit opinion with no financial matters in the audit report

¹⁰ Often called a clean opinion, an unqualified opinion is an audit report that is issued when an auditor determines that each of the financial records provided by the institution is free of any misrepresentations. In addition, an unqualified opinion indicates that the financial records have been maintained in accordance with the standards known as Generally Accepted Accounting Principles (GAAP).

Table 8: Quarterly targets for the 2019/20 financial year

Performance indicator	Reporting frequency	Annual target 2019/20	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 annual reports and 2020/21 annual performance plans approved by the Minister by 31 March 2020	No target	First draft APPs for DST public entities submitted to NT and the DPME by 31 August 2019 Annual reports of public entities tabled in Parliament by 30 September 2019	Second draft APPs for DST public entities submitted to NT and the DPME by 30 November 2019	Third and final draft APPs for DST public entities approved by the Minister by 28 February 2020
Combined assurance annual report on the status of combined assurance presented to the Enterprise Risk Management (ERM) and Audit Committees	Annually	1 combined assurance annual report on the status of combined assurance presented to the ERM and Audit Committees by 31 March 2020	No target	No target	No target	1 combined assurance annual report on the status of combined assurance presented to the ERM and Audit Committees
Number of media articles written to raise the DST's public profile	Quarterly	24 media articles written to raise the DST's public profile by 31 March 2020	4 media articles written to raise the DST's public profile	8 media articles written to raise the DST's public profile	8 media articles written to raise the DST's public profile	4 media articles written to raise the DST's public profile
Number of public participation programmes held	Quarterly	10 public participation programmes held by 31 March 2020	2 public participation programmes held	2 public participation programmes held	3 public participation programmes held	3 public participation programmes held
Unqualified audit (clean audit) opinion with no financial matters in the audit report	Annually	Unqualified audit (clean audit) opinion with no financial matters in the audit report	No target	Unqualified audit (clean audit) opinion with no financial matters in the audit report	No target	No target

Reconciling performance targets with the budget and MTEF

Table 9: Administration expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation 2018/19	Medium-term expenditure estimates		
	2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
Ministry	4 332	4 213	4 348	5 145	5 496	5 886	6 072
*Institutional Support	140 700	151 075	141 680	129 127	166 354	168 406	179 822
Corporate Services	134 089	152 146	167 362	227 409	145 117	162 978	168 240
Office Administration	-	4 381	7 548	5 033	63 315	5 607	5 787
TOTAL	279 121	311 815	320 971	366 714	380 282	342 877	359 921
Compensation of employees	135 836	145 046	148 064	161 232	173 998	186 845	199 138
Goods and services	111 850	133 765	135 173	179 002	188 525	137 296	141 639
Transfers and subsidies	14 874	17 474	16 982	14 286	15 086	15 916	16 233
Payments for capital assets	16 467	15 434	20 649	12 194	2 673	2 820	2 911
Payments for financial assets	94	96	103	-	-	-	-
TOTAL	279 121	311 815	320 971	366 714	380 282	342 877	359 921

*Institutional Support: This is as a result of the new approved budget for 2019MTEF and beyond in Programme 1



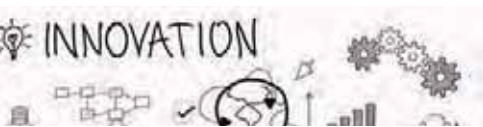
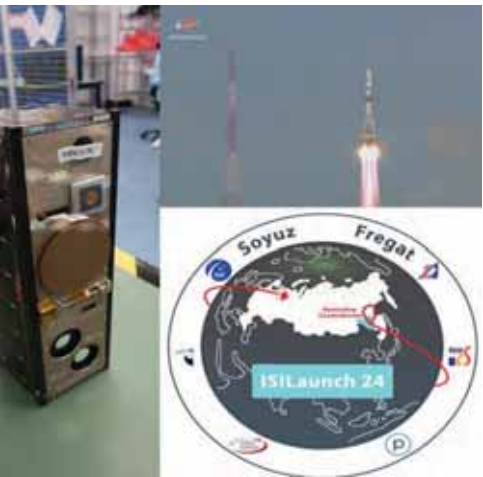
PURPOSE

To drive strategic research, development and innovation (RDI) in space science and technology, energy, the bioeconomy, and 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 RDI initiatives. In addition, through the implementation of enabling policies and interventions along the entire innovation value chain, to promote the protection and utilisation of intellectual property (IP), technology transfer and technology commercialisation.

2

- Chief Directorate Bioinnovation
- Chief Directorate Hydrogen and Energy
- Chief Directorate Space Science and Technology
- Chief Directorate Innovation Priorities and Instruments
- Specialised Service Delivery Unit National Intellectual Property Management

TECHNOLOGY INNOVATION



STRATEGIC OVERVIEW

Programme 2 contributes to all five of the Department's strategic outcome-oriented goals in the 2015-2020 Strategic Plan, namely, (i) a responsive, coordinated and efficient NSI; (ii) increased knowledge generation; (iii) human capital development; (iv) using knowledge for economic development; and (v) 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. The commitment of these resources creates skills and knowledge to enhance industrial and economic competitiveness. These contributions therefore have both a direct and indirect impact on the triple challenge of unemployment, poverty and inequality.

Various initiatives that Programme 2 implements and supports contribute to decision-making processes in government, for example, in energy planning, mapping human settlements for service provision, oceans monitoring as part of Operation Phakisa, and mapping water resources for drought monitoring.

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

In line with Strategic Outcome-Oriented Goal 1, the coordination of various role players (including government, industry, science councils and academia) will continue to receive specific attention in 2019/20 and beyond.

This will include continuing work towards the establishment of a sovereign innovation fund and collaboration with the Department of Small Business Development in the operationalisation of the SME Innovation Fund, as well as building strategic partnerships with the private sector, in particular with business associations. The establishment and operationalisation of the SME Innovation Fund signals the Programme's response to the new White Paper on Science, Technology and Innovation, which identifies the funding of the NSI as needing special attention.

To strengthen the NSI, the coordination of key stakeholders (in government and in private or public sector institutions) is being enhanced to ensure optimal contributions across the innovation value chain, from research and development to commercialisation. With respect to the public sector, the Programme continues to ensure that the institutional capacity of key agencies such as SANSA and the TIA is strengthened in order to be responsive to national priorities. This is to be achieved through ongoing engagements with these entities to ensure that their plans are aligned with government and DST priorities.

The Programme also ensures that the DST contributes to the development and supports the implementation of government policies led by other government departments, including in the areas of improving energy security, alleviating poverty, improving health care and, where possible, promoting local innovation. These interventions are aligned with the priorities of departments such as Trade and Industry (the Industrial Policy Action Plan), Agriculture, Forestry and Fisheries (the

Agricultural Policy Action Plan), Energy (the Integrated Energy Plan), Environmental Affairs (Operation Phakisa: Oceans Economy) and Mineral Resources (Operation Phakisa: Mining (minerals beneficiation)). This is done through DST-led strategies such as the Energy Security Grand Challenge, the Bio-economy Strategy (under the "Farmer to Pharma" or Bioeconomy Grand Challenge), the Space S&T Grand Challenge and the National Nanotechnology Strategy, as well as legislative frameworks, namely, the Intellectual Property Rights from Publicly Financed Research and Development Act (IPR Act) and the TIA Act. This alignment reinforces the Department's commitment in the new White Paper for Science, Technology and Innovation to ensure that STI efforts, especially within government, are coordinated to maximise their impact.

In relation to its work on the bioeconomy, the Programme will support ongoing work in relation to the activities of the Executive Council established in terms of the Genetically Modified Organisms (GMO) Act, 1997 (Act No. 15 of 1997). 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. The Programme's role will include ongoing communication and engagement with all stakeholders, including the general public.

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

The new White Paper on Science, Technology and Innovation calls for building and transforming the NSI's human capital base. In support of Strategic Outcome-Oriented Goals 2 and 3, the Programme supports research in key strategic areas, namely, space science, energy security, emerging and converging research areas, and bioinnovation. This will be central in ensuring that the requisite and relevant skills are developed for the economy. The Programme provided funding support to 266 postgraduate students (MSc and PhD) by the end of March 2018 through structured human capital development programmes. The number of postgraduate students supported in designated areas is expected to drop further to 185 in 2019/20, owing to budget cuts and a shift of focus to critical specialised skills and innovation.

Programme 2's innovation - enabling programmes also contribute to knowledge outputs such as patents/patent applications and publications. By the end of March 2018, 165 knowledge products had been generated as a result of the Programme's initiatives. The number of knowledge products for the 2019/20 financial year is expected to be 120.

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

Energy security remains a serious challenge for South Africa. While it is necessary to meet the country's medium-term energy supply requirements using traditional energy sources, using STI in the long term to support the development of clean coal technologies, renewable energy and the promise of the hydrogen economy will 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 of competence leverage each other's strengths to support the Department of Trade and 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.

The growing global trend towards renewable and clean energy sources has also raised the need for innovations around energy storage. Following the launch of the pilot plant for manufacturing lithium ion battery precursor material in 2017/18, the Programme will engage local and international stakeholders in order to seek investment to upscale and fast-track the development process. The focus will be towards producing precursor materials based on manganese in the early part of the value chain in order to supply original equipment manufacturers that sell lithium ion batteries to the global market.

The Programme will continue to support the incorporation of R&D outputs from DST-supported initiatives such as thin-film photovoltaic technology (PTiP) and solar thermal technology (Helio 100) into 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. Funding partnerships will be sought to achieve this.

The introduction of new R&D-led/based products, processes and/or services into the market requires government to create the necessary enabling frameworks, to develop appropriate skills and infrastructure to enable innovation, to support the demonstration and piloting of new technologies, and to upscale these where and when appropriate. 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. In certain instances, commercialisation partnerships will be sought to fast-track the entry into market of indigenous IP. The Programme has facilitated the signing of benefit-sharing agreements between knowledge holders and commercial partners, and there has been increased interest from new commercial partners. Four organised communities have successfully registered as SMEs (honeybush agribusinesses), and appropriate IP protection and support mechanisms have been put in place.

The construction of agroprocessing facilities is under way and communities are being trained in entrepreneurship. The DST will continue to leverage additional investment and support from other tiers of government while increasing the number of people trained in business skills to support the sustainability of indigenous knowledge-based enterprises. This work will be done as a way of contributing to the transformation of the South African economy, making it more inclusive in terms of young people, women and the marginalised, as well as those in rural communities.

The National Intellectual Property Management Office (NIPMO), which is the implementing office for the IPR Act, stimulates greater economic and social returns from IP generated through R&D activities conducted using public funds. It does this through a number of interventions, including financial support through the Offices of Technology Transfer (OTT) Support Fund and the IP Fund. NIPMO continues to support the creation of posts for highly skilled individuals through the OTT Support Fund, which has to date invested or committed in excess of R178 million. Furthermore, financial support for prosecution and maintenance of IP rights to date stands at almost R110 million. Both areas of support will continue in 2019/20. These interventions are all aimed at capacitating institutions to increase knowledge utilisation for advanced economic and social development. The 2019/20 financial year will also see more focused interventions aimed at creating the right incentives for researchers to engage in innovation activities, and not just academic and publication outputs.

Enhanced interventions to build and support a pipeline for the realisation of publicly funded R&D outputs with socio-economic impact will also be implemented. This will include exploring models for the roll-out of an enforcement fund to enable publicly financed institutions to prevent third parties from infringing their IP rights. In this regard, the modalities explored include state-funded litigation, alternative dispute resolution, contingency fee litigation, licensing, and intellectual property insurance. All forms may be appropriate depending on the circumstances, and not all of them require government support. The insurance model is the most favoured, and has been benchmarked internationally as an acceptable means of protecting IP against third party infringement.

Numerous engagements have been held with the World Intellectual Property Organisation to establish a simple, best practice guide to IP valuation. This is currently being developed through the Standing Committee on Patents, and the work will continue in 2019/20 as part of the DST's contribution to the Nine-Point Plan.

The Department is also working towards establishing a sovereign innovation fund as a public-private partnership to enhance the level of investment in early stage commercialisation and advancing technologies in technology readiness levels 5 to 9.

Furthermore, the DST is collaborating with the Department of Small Business Development in the operationalisation of the SME Innovation Fund. It is envisaged that this fund will include an early stage funding function, conceptualised as part of the sovereign innovation fund,

whereby support is provided to pre-commercial, seed, start-up and fledgling companies and/or large-scale technology development initiatives.

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. The South African Earth Observation Strategy (SAEOS) portal was established to give the Earth observation community the opportunity to access data and 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 this data both promptly enough to meet user requirements, and in a format and language that users can understand. The SAEOS portal ensures that satellite imagery and 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 thereby contribute to the protection of environmental assets, human settlement planning and development, rural connectivity, and monitoring and evaluation (M&E) 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.

ZACube-2, the most advanced satellite South Africa has produced to date, has been completed and was launched in Russia on 26 December 2018. ZACube-2 will serve as a precursor, with the objective of providing automated information services to Operation Phakisa (Oceans Economy) and the African continent. Work on the Maritime Domain Awareness (MDSAT) constellation has also commenced. The Department will mobilise additional funding to manufacture the MDSAT constellation, which will provide information management system services to Operation Phakisa, and the Oceans and Coastal Information Management System, which will generate information and support decision-making in marine spatial planning.

The web-based Bioenergy Atlas was launched in 2016/17. The Programme continues to focus on supporting its use by different spheres of government. The decision-making tool provides stakeholders with a better appreciation of the geographic spread of bioenergy resources, their proximity to infrastructure (biofuels and electricity), and their potential for improving energy access.

The economic case for the National Space Programme will be presented to Cabinet in 2019/20. The National Space Strategy outlines the national goals and objectives for the development of space science and technology in the country. The strategy also provides guiding principles for a formal and operational National Space Programme (NSP). The NSP sets out the vision and programmatic

roadmaps for South Africa's space programme over the next 20 years. SANSA has developed a technical document outlining detailed programmes for the NSP. The economic case will outline the return on investment in space science and technology, including direct and indirect socio-economic benefits such as commercial income, quantifiable returns from space services and products, applications in natural resource management and human settlements, knowledge generation, and human capital development. A service provider was appointed and two reports were produced which are currently under review by the Department.

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 of its chief directorates and entities.

As far as employment is concerned, NIPMO has supported the creation of a number of jobs in the past seven years through the establishment of OTTs, and will continue to do so in 2019/20. Opportunities presented by the OTTs have benefited mainly young black female graduates in fields where capacity to enable technology commercialisation is required.

The DST's indigenous knowledge systems portfolio has a number of community-based programmes focusing on the growing and processing of indigenous knowledge-based (IK-based) crops. These programmes empower communities through benefit-sharing agreements, and help to create employment for local communities, especially young people

and women. To date, IK-based initiatives have created more than 200 direct jobs. In 2018/19, at least one agribusiness facility was supported to enable the commercialisation of IK-based innovations.

In terms of addressing inequality, the broad-based black economic empowerment (BBBEE) imperatives of government are being actively supported. The above IK-based projects also address this challenge by establishing community-based cooperatives and SMEs. Furthermore, the IPR Act provides that SMEs and BBBEE entities receive preference when non-exclusive licences of IP emanating from publicly financed R&D are granted. These numbers are being actively tracked, and to date such parties have been granted 41 licences from publicly funded institutions. In addition, following engagements with the TIA on its disposal of shareholdings in entities it supported, a policy prioritising BBBEE-friendly transactions has been developed.

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

Programme 2 also supports innovation in the agriparks initiative being led by the Department of Rural Development and Land Reform. The initiative responds to national priorities in terms of poverty reduction, job creation, addressing inequality and promoting sustainable rural development. In line with the Bio-economy Strategy's goal of harnessing bioinnovation for alleviation of poverty, unemployment and inequality, the Minister launched the AgriProtein Manufacturing Facility in 2017/18. The AgriProtein initiative uses an environmentally friendly approach to produce feed protein from flies. The facility is based in Philippi, one of the largest and most economically depressed townships in the Western Cape. With DST-TIA co-investment into the start-up, AgriProtein has now secured off-take agreements with key animal manufacturers and international investments to expand into other locations. The initiative has created over 30 jobs in the community, and the number is expected to increase with the upscaling and establishment of additional facilities.

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. Some examples include the SAEOS Earth observation programme, which provides geospatial information on land use, land cover and bioenergy resources (through the Bioenergy Atlas). This can be used to support informed decision-making for policy formulation in government in respect of the protection of environmental assets, sustainable

human settlement planning, marine protection and governance (marine spatial planning), and access to energy.

In the health care domain, various mobile and electronic health applications have been developed to assist the Department of Health with service delivery. The development of appropriate medical devices and diagnostics aimed for use at clinic level are also being developed in collaboration with the Department of Health. In addition, the local manufacture of vaccines and biologics is being addressed in order to provide for a more self-sufficient industry and to narrow the balance of payments for health care products.

2



STRATEGIC OBJECTIVES AND STRATEGIC STATEMENTS



From these strategic objectives, it is clear that the work of the Programme cuts across policy, research, development, the commercialisation/ utilisation of R&D outputs, and service delivery support activities that convert knowledge into something of societal or economic value.

CHIEF DIRECTORATES

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

Bioinnovation¹¹

This component leads the implementation of the national Bio-economy Strategy, which was approved by Cabinet in 2013 and 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.

¹¹ This chief directorate was previously called "Bioeconomy" and was referred to as such in the 2015-2020 Strategic Plan.

The chief directorate has four directorates managing thematic priorities aligned to the focus areas of the Bio-economy Strategy, namely, Agriculture, Indigenous Knowledge-Based Technology Innovation, Industry and Environment, and Health Innovation.

In respect of bioinnovation for agriculture, a new instrument, the Agricultural Bioeconomy Innovation Partnership Programme (ABIPP), was established in 2017/18. The ABIPP funds, co-funds, coordinates, facilitates and actively manages multidisciplinary, multi-institutional research programmes focusing on bioinnovation in the creation of products, processes and services that contribute to increased productivity, food security and sustainable rural development. There will also be alignment and synergy of the initiatives of the ABIPP with the Agri-STA initiatives of the TIA. The new instrument provides an opportunity to harmonise efforts and supports a value chain approach for a pipeline of product support, from early technology readiness levels through to commercialisation. Further measures to strengthen this through the bioeconomy work plan of the TIA will be initiated and the potential for growth of emerging portfolios such as innovation for food and nutrition security in communities will be explored. The component also supports a number of cross-cutting initiatives aimed at achieving these objectives, including technology service platforms (which provide expert services to both the public and private sectors), bioentrepreneur training 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.

Under the industrial and environmental components of the bioeconomy, the plan is to establish a strategic industrial bioinnovation partnership programme to facilitate resource investments in support of the implementation of technology flagship initiatives, in response to two strategic thematic areas, namely bio-based industrial applications and environmental management. The longer-term focus of the initiative will be to stimulate bioenterprise start-up development that supports the creation of new industries, and to facilitate access by existing industries to technologies that can enhance their competitiveness.

Hydrogen and Energy

This chief directorate will continue to develop a portfolio of technologies to contribute towards resolving the energy security challenge, increasing local mineral beneficiation, and facilitating 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, minerals beneficiation and climate change mitigation in order to stimulate new industries that can assist in addressing the triple challenge of unemployment, poverty and inequality.

During the 2018/19 financial year, provincial officials in all nine provinces were trained in the use of the Bioenergy Atlas to support regional planning and decision-making. The tool aims to help local and provincial government to exploit bioenergy resource opportunities. The Bioenergy Atlas was also used by other government departments to inform the development of policies. The tool will be continually updated with new data sets to improve the planning process and grow the opportunities for supporting decision-making at local government level. The DST will now focus on developing the necessary capacity in institutions of higher learning in various provinces to support provincial efforts in bioenergy-related initiatives.

Building on the success of the shale gas RDI conference held in 2017 (ASSAf's Shale Gas Industry in South Africa: Toward a Science Action Plan), the chief directorate engaged with the relevant private and public sector stakeholders to develop a science action plan for the shale gas sector in South Africa. The plan builds on the recommendations in ASSAf's report, "South Africa's Technical Readiness to Support the Shale Gas Industry", and the Department of Environmental Affairs report, "Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks". The plan was approved by the DST's Exco for release to the public. The Department will continue supporting the government-established Shale Gas Monitoring Committee by ensuring that a coordinated research programme is developed and implemented in support of the potential shale gas industry.

Space Science and Technology

The government recognises the potential role of space science and technology to deliver on a wide spectrum of South Africa national priorities, creating jobs and reducing poverty and inequality through natural resource management, urban and rural development planning, and infrastructure M&E.

The chief directorate supports the creation of an environment conducive to the implementation of the Space Science and Technology Grand Challenge, the National Space Strategy (NSS) and the South African Earth Observation Strategy (SAEOS), as well as addressing the development of space technologies, innovative solutions and human capital to respond to national priorities and boost socio-economic growth.

The chief directorate will ensure maintenance of the SAEOS portal and the development of the domestic space industry and satellite build programme, as well as contributing to the implementation of Operations Phakisa (Oceans Economy), and providing innovative applications, products and services.

The SAEOS portal and the Earth Observation Data Centre (EODC) will be maintained to ensure that satellite imagery and geospatial datasets, products and services are made available to assist decision-making and service delivery at national, provincial and local government level. In support of the EODC, standards and interoperability requirements have been developed. To date, in support of the SAEOS, various communities of practice have been

established, resulting in improved coordination of national Earth observation activities.

The envisaged outputs of space infrastructure and technological advancement would be (i) the establishment of world-class data-processing infrastructure that will contribute significantly to the big data analytics and sciences and SAEOS; (ii) the manufacturing of the cube satellite constellation that will support and contribute to Operation Phakisa: Oceans Economy through the provision of decision-support tools and information services for maritime domain awareness and marine spatial planning; (iii) the finalisation of the flight model for ZA-ARMC1 (EOSat1), an operational Earth observing satellite that will provide data for natural resource management, human settlement planning, and strengthening the satellite build programme and industry stimulation through the development of new satellite missions; (iv) the upgrade of the Houwteq Assembly, Integration and Testing (AIT) facility, making it a world-class, operational AIT facility for the satellite build programme and international customers, and through this supporting the growth of a local space industry; and (v) the development of flight-ready optical and microwave sensor technology (synthetic aperture radar).

The focus will also be on the development of human capital through targeted programmes on the following thematic areas: Earth observation and satellite engineering; navigation and positioning; space science and exploration; and satellite communication.

Through SANSa, further investment will be made to facilitate coordination with other

government departments, academia, industry and research agencies on the research and development of products, applications and services that respond to South African users' needs, including space-based products derived from the integration of various datasets (space-based data, in-situ observations, socio-economic data) to assist evidence-based policy making, environmental resource management and disaster management, among other societal benefit areas. In this regard, SANSa's central mandate is to coordinate and integrate all national space science and technology programmes, and conduct long-term planning on space-related matters.

The chief directorate represents 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, the International Astronautical Congress and other key international gatherings, in order to position the country as a user of space for peaceful uses. The chief directorate will build on the success of AfriGEOSS as it aims to increase Africa's membership and active participation in the GEO. It will also lead the process of developing, for presentation at the GEO, initiatives that are pro-Africa and the developing world.

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

- Sufficient satellite technology and infrastructure to support satellite development, launching capability that will increase technology know-how, and result in South Africa progressing as an emerging space nation.
- The creation of a viable domestic space

industry, which advances innovation and spin-offs.

- 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 (M&E).
 - South Africa and Africa's contribution to the GEO Work Plan and visible leadership in GEO initiatives.
 - Access by government, especially at provincial and local level to space-based products and services for planning and decision-making.
 - New EO communities of practice to support and inform planning and decision-making.
 - An AfriGEOSS secretariat to coordinate the work of AfriGEOSS and the implementation of the plan in the continent.
 - A broader government-wide space plan that includes telecommunications, navigation and EO.
 - Contribution toward government planning (e.g. infrastructure, human settlements, food security and resources management).

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 to 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: Environmental assets and natural resources that are well protected and continually enhanced.

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 M&E of innovation policy instruments, such as those centred on the Department's Commercialisation Framework, 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.

National Intellectual Property Management

Office

NIPMO, established as the implementing agency for the IPR Act, is currently located in the Department as a specialised service delivery unit. NIPMO's key functions, as set out in the IPR Act, are as follows:

- To facilitate the establishment of OTTs at institutions (27 higher education institutions and 11 Schedule 1 institutions¹², 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 to faster economic development in South Africa. Because of NIPMO's interventions, six OTTs will be supported for capacity development, a total of 230 candidates will be trained in intellectual property (IP) and specialised technology transfer skills, and 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. In 2019/20 a total of 210 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 an institution receives revenue).

¹²Institutions listed in Schedule 1 of the IPR Act.

Table 10: Programme risk management and identification – Technology Innovation

Strategic objective	Risk description	Mitigation action
Facilitate and resource R&D in strategic STI areas	Possible decline in publicly funded research, development and innovation activities	<ul style="list-style-type: none"> Engage with Programme 4 on the revision of the infrastructure model Build and strengthen partnerships (private sector, government, NGOs and foundations and philanthropic organisations) Engage with the NRF on possible amendments to the NRF rating system. Expand the incentive scheme (NIPMO).
Oversee relevant departmental agencies and initiatives	Misalignment in planning instruments and activities between the DST and its Entities	<ul style="list-style-type: none"> Conduct meetings with senior staff of the entities to ensure alignment of objectives Develop a formal mechanism to empower officials to engage with entities
Coordinate and support high-end skills development	The Programme may be unable to improve capacity development in priority areas	<ul style="list-style-type: none"> Identify areas for human capital development to address priority sectors (agreement must be reached between Programme 2 and Programme 4 for HCD support) Proposals relating to HCD to be submitted to Exco and for DG approval
Support the development and translation of scientific R&D outputs into commercial products, processes and services	Possible decline in publicly funded research, development and innovation activities	<ul style="list-style-type: none"> Engage with Programme 4 on the revision of the infrastructure model Build and strengthen partnerships (private sector, government, NGOs and foundations and philanthropic organisations) Engage with the NRF on possible amendments to the NRF rating system. Expand the incentive scheme (NIPMO).

Table 11: Strategic objective with five-year Strategic Plan targets (targets are reflected as cumulative numbers for each year of implementation over the Strategic Plan term)

The ensuing sections of the Annual Performance Plan (APP) should be read in conjunction with Annexure D of the 2018/19 APP which reflects the changes made to the 2015-2020 Strategic Plan.

Strategic objective	Five-year Strategic Plan target	Planned targets over the five-year Strategic Planning Horizon				
		2015/16	2016/17	2017/18	2018/19	2019/20
1. Facilitate and resource R&D in strategic STI areas	90 instruments funded in support of knowledge utilisation by 31 March 2020	6 instruments funded in support of knowledge utilisation between 1 April 2015 and 31 March 2016	31 instruments funded in support of knowledge utilisation between 1 April 2015 and 31 March 2017	50 instruments funded in support of knowledge utilisation between 1 April 2015 and 31 March 2018	71 instruments funded in support of knowledge utilisation between 1 April 2015 and 31 March 2019	90 instruments funded in support of knowledge utilisation between 1 April 2015 and 31 March 2020
	683 knowledge outputs generated by 31 March 2020	156 knowledge outputs generated between 1 April 2015 and 31 March 2016	237 knowledge outputs generated between 1 April 2015 and 31 March 2017	385 knowledge outputs generated between 1 April 2015 and 31 March 2018	534 knowledge outputs generated between 1 April 2015 and 31 March 2019	683 knowledge outputs generated between 1 April 2015 and 31 March 2020
	26 strategic policy directives in designated areas in support of economic sectors by 31 March 2020	4 technology policy directives approved by Exco between 1 April 2015 and 31 March 2016	9 policy directives approved by Exco between 1 April 2015 and 31 March 2017	16 strategic policy directives in designated areas in support of economic sectors between 1 April 2015 and 31 March 2018	21 strategic policy directives in designated areas in support of economic sectors between 1 April 2015 and 31 March 2019	26 strategic policy directives in designated areas in support of economic sectors between 1 April 2015 and 31 March 2020
	8 decision-support interventions maintained by 31 March 2020	No baseline	2 decision-support interventions maintained between 1 April 2015 and 31 March 2017	4 decision-support interventions maintained between 1 April 2015 and 31 March 2018	6 decision-support interventions maintained between 1 April 2015 and 31 March 2019	8 decision-support interventions maintained between 1 April 2015 and 31 March 2020

Strategic objective	Five-year Strategic Plan target	Planned targets over the five-year Strategic Planning Horizon				
		2015/16	2016/17	2017/18	2018/19	2019/20
	100 Percent of regulatory recommendations made to the GMO Executive Council through the Department of Agriculture, Forestry and Fisheries (DAFF) to support decision-making by 31 March 2020	No baseline	27 regulatory recommendations for decision support by government between 1 April 2015 and 31 March 2017	54 regulatory recommendations for decision support by government between 1 April 2015 and 31 March 2018	100% of regulatory recommendations made to the GMO Executive Council through DAFF for decision support by government between 1 April 2015 and 31 March 2019	100% of regulatory recommendations made to the GMO Executive Council through DAFF for decision support by government between 1 April 2015 and 31 March 2020
2.	Oversee relevant departmental agencies and initiatives	275 new IP status and commercialisation reports received between 1 April 2015 and 31 March 2016	550 new disclosures reported by publicly funded institutions between 1 April 2015 and 31 March 2017	830 new disclosures reported by publicly funded institutions between 1 April 2015 and 31 March 2018	1 115 new disclosures reported by publicly funded institutions between 1 April 2015 and 31 March 2019	1 405 new disclosures reported by publicly funded institutions between 1 April 2015 and 31 March 2020
3.	Coordinate and support high-end skills development	382 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives between 1 April 2015 and 31 March 2016	774 postgraduate students (master's and doctoral) funded in designated areas between 1 April 2015 and 31 March 2017	1 129 postgraduate students (master's and doctoral) funded in designated areas between 1 April 2015 and 31 March 2018	1 469 postgraduate students (master's and doctoral) funded in designated areas between 1 April 2015 and 31 March 2019	1 789 postgraduate students (master's and doctoral) funded in designated areas between 1 April 2015 and 31 March 2020
		180 trainees supported in strategic and emerging research areas between 1 April 2015 and 31 March 2016	460 trainees attending training initiatives in designated areas between 1 April 2015 and 31 March 2017	700 trainees attending training initiatives in designated areas between 1 April 2015 and 31 March 2018	940 trainees attending training initiatives in designated areas between 1 April 2015 and 31 March 2019	1 180 trainees attending training initiatives in designated areas between 1 April 2015 and 31 March 2020

Strategic objective	Five-year Strategic Plan target	Planned targets over the five-year Strategic Planning Horizon				
		2015/16	2016/17	2017/18	2018/19	2019/20
4. Support the development and translation of scientific R&D outputs into commercial products, processes and services	29 knowledge application products funded in designated areas by 31 March 2020	8 new technology innovation products, processes and/or services developed between 1 April 2015 and 31 March 2016	12 knowledge application products funded in designated areas between 1 April 2015 and 31 March 2017	18 knowledge application products funded in designated areas between 1 April 2015 and 31 March 2018	24 knowledge application products funded in designated areas between 1 April 2015 and 31 March 2019	29 knowledge application products funded in designated areas between 1 April 2015 and 31 March 2020
	21 commercial outputs in designated areas by 31 March 2020	3 new technologies products, processes and/or services commercialised between 1 April 2015 and 31 March 2016	11 commercial outputs in designated areas between 1 April 2015 and 31 March 2017	15 commercial outputs in designated areas between 1 April 2015 and 31 March 2018	18 commercial outputs in designated areas between 1 April 2015 and 31 March 2019	21 commercial outputs in designated areas between 1 April 2015 and 31 March 2020

Table 12: Strategic statements, performance indicators, and annual and MTEF targets for 2019/20

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2018/19	Medium-term targets			
			2015/16	2016/17		2017/18	2019/20	2020/21	2021/22
Strategic statement: To facilitate and resource investments in space science, energy, bioinnovation, nanotechnology, robotics, photonics, IKS, IP management, technology transfer and technology commercialisation									
Instruments to support knowledge utilisation	Number of instruments funded in support of knowledge utilisation ¹³	90 instruments funded in support of knowledge utilisation by 31 March 2020	6 instruments funded in support of knowledge utilisation	25 instruments funded in support of knowledge utilisation by 31 March 2017	19 instruments funded in support of knowledge utilisation by 31 March 2018	21 instruments funded in support of knowledge utilisation by 31 March 2019	19 instruments funded in support of knowledge utilisation by 31 March 2020	19 instruments funded in support of knowledge utilisation by 31 March 2021	19 instruments funded in support of knowledge utilisation by 31 March 2022
Knowledge outputs	Number of knowledge outputs ¹⁵ generated	683 knowledge outputs generated by 31 March 2020	156 knowledge outputs generated	168 knowledge outputs generated by 31 March 2017	165 knowledge outputs generated by 31 March 2018	149 knowledge outputs generated by 31 March 2019	120 knowledge outputs generated by 31 March 2020	120 knowledge outputs generated by 31 March 2021	120 knowledge outputs generated by 31 March 2022

¹³Instrument 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.

¹⁴Instruments 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.

¹⁵Knowledge outputs include filings/applications or registration/granting of IPRs and peer-reviewed scientific articles published in scientific publications and journals, book chapters and community-reviewed articles and books/book chapters in space science, energy, emerging research areas, and the bioeconomy. (IPRs are inclusive of the categories of IPR that were included in the 2014/15 APP; namely patents and trademarks, but also includes other IPRs, such as copyright, designs, plant breeder's rights and geographical indications).

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
Policy directives developed in science and technology	Number of strategic policy directives ¹⁶ in designated areas in support of economic sectors	26 strategic policy directives in designated areas approved by Exco by 31 March 2020	3 technology policy directives approved by Exco	7 policy directives approved by Exco by 31 March 2017	8 strategic policy directives in designated areas in support of economic sectors by 31 March 2018	5 strategic policy directives in designated areas in support of economic sectors by 31 March 2019	3 strategic policy directives in designated areas in support of economic sectors by 31 March 2020	3 strategic policy directives in designated areas in support of economic sectors by 31 March 2021	3 strategic policy directives in designated areas in support of economic sectors by 31 March 2022
Decision-support interventions	Number of decision-support interventions ¹⁷ developed or maintained	8 decision-support interventions maintained by 31 March 2020	No baseline	3 decision-support interventions maintained by 31 March 2017	3 decision-support interventions maintained by 31 March 2018	2 decision-support interventions maintained by 31 March 2019	2 decision-support interventions developed or maintained by 31 March 2020	2 decision-support interventions developed or maintained by 31 March 2021	2 decision-support interventions developed or maintained by 31 March 2022

¹⁶Policy directives include policy briefs, implementation plans, concept documents, position papers, strategies, policy recommendations and chapter memoranda and cabinet memoranda towards key policy documents.

¹⁷Decision-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.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
Regulatory ¹⁸ recommendations for decision support	Percentage of regulatory recommendations made to the GMO Executive Council through DAFF to support decision-making	100 Percent of regulatory recommendations made to the GMO Executive Council through the Department of Agriculture, Forestry and Fisheries (DAFF) to support decision-making by 31 March 2020	No baseline	33 regulatory recommendations for decision support by government by 31 March 2017	28 regulatory recommendations for decision support by government by 31 March 2018	100% of applications reviewed and recommendations made to DAFF to support decision making	100% of regulatory recommendations made to the GMO Executive Council through DAFF to support decision making by 31 March 2020	100% of regulatory recommendations made to the GMO Executive Council through DAFF to support decision making by 31 March 2021	100% of regulatory recommendations made to the GMO Executive Council through DAFF to support decision making by 31 March 2022

¹⁸Regulatory recommendations are recommendations made to support the work of other government departments as required by specific laws, regulations, guidelines and specifications

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18	2019/20		2020/21	2021/22	
Strategic statement: To oversee, monitor and regulate¹⁹ key policy initiatives, including institutions/agencies and support interventions²⁰ in the key strategic areas of space science, energy, bioinnovation, 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	1 405 new disclosures reported by publicly funded institutions by 31 March 2020	279 new disclosures reported by publicly funded institutions by 31 March 2016	251 new disclosures reported by publicly funded institutions by 31 March 2017	239 new disclosures reported by publicly funded institutions by 31 March 2018	220 ²¹ new disclosures reported by publicly funded institutions by 31 March 2019	210 new disclosures reported by publicly funded institutions by 31 March 2020	200 new disclosures reported by publicly funded institutions by 31 March 2021	200 new disclosures reported by publicly funded institutions by 31 March 2022	
Strategic statement: To coordinate and support high-end and skills development in the strategic and emerging S&T areas of space science, energy, bioinnovation, 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) funded in designa -ted areas ²²	1 789 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2020	402 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives by 31 March 2016	414 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2017	266 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2018	340 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2019	185 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2020	170 ²³ postgraduate students (master's and doctoral) funded in designated areas by 31 March 2021	170 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2022	

¹⁹This includes the monitoring, evaluation, verification, coordination and where applicable the regulation of the performance of institutional arrangements and support interventions in line with various plans and legislations.
²⁰Support 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.

²¹The target number of disclosures has been reduced because increased awareness of what an actionable disclosure is and for which disclosures applicants may be able to get a rebate from the IP Fund has resulted in a trend of fewer disclosures.

²²Designated areas include space science, energy, bioinnovation, emerging research areas, IP management, technology transfer and technology commercialisation.

²³The target has been reduced because of budget cuts and the reallocation of student programmes to Programme 4 (NRF students) and change of focus to R&D and translation of R&D into knowledge application products and commercialisation.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2018/19	Medium-term targets			
			2015/16	2016/17		2017/18	2019/20	2020/21	2021/22
Trainees attending training initiatives in designated areas	Number of trainees ²⁵ attending training initiatives in designated ²⁶ areas	1 180 trainees attending training initiatives in designated areas by 31 March 2020	257 trainees supported in strategic and emerging research areas by 31 March 2016	307 trainees attending training initiatives in designated areas by 31 March 2017	256 trainees attending training initiatives in designated areas by 31 March 2018	240 trainees attending training initiatives in designated areas by 31 March 2019	230 trainees attending training initiatives in designated areas by 31 March 2020	240 trainees attending training initiatives in designated areas by 31 March 2021	240 trainees attending training initiatives in designated areas by 31 March 2022
Strategic statement: 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									
Knowledge application products	Number of knowledge application products funded in designated areas	29 knowledge application products funded in designated areas by 31 March 2020	8 new technology innovation products, processes and/or services developed	8 knowledge application products funded in designated areas by 31 March 2017	13 knowledge application products funded in designated areas by 31 March 2018	6 knowledge application products funded in designated areas by 31 March 2019	10 knowledge application products funded in designated areas by 31 March 2020	5 knowledge application products funded in designated areas by 31 March 2021	5 knowledge application products funded in designated areas by 31 March 2022
Commercial outputs ²⁷ in designated areas ²⁸	Number of commercial outputs in designated areas	21 commercial outputs in designated areas by 31 March 2020	3 new technology products, processes and/or services commercialised by 31 March 2016	8 commercial outputs in designated areas by 31 March 2017	5 commercial outputs in designated areas by 31 March 2018	3 commercial outputs in designated areas by 31 March 2019	8 commercial outputs in designated areas by 31 March 2020	3 commercial outputs in designated areas by 31 March 2021	3 commercial outputs in designated areas by 31 March 2022

²⁵ Trainees include interns, technicians, mentors, academics, researchers, innovators, entrepreneurs and IP candidates.

²⁶ Training initiatives include internships, workshops, conferences, seminars, webinars and work integration programmes.

²⁷ Commercial outputs include licences, assignments, options, new companies, products, processes and services.

²⁸ Designated areas include space science, energy, bioinnovation, emerging research areas, IP management, technology transfer and technology commercialisation.

Table 13: Quarterly targets for the 2019/20 financial year

Performance indicator	Reporting period	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of instruments funded in support of knowledge utilisation	Quarterly (Q2, Q3 and Q4)	19 instruments funded in support of knowledge utilisation by 31 March 2020	No target	8 instruments funded in support of knowledge utilisation	3 instruments funded in support of knowledge utilisation	8 instruments funded in support of knowledge utilisation
Number of knowledge outputs generated	Annually	120 knowledge outputs generated by 31 March 2020	No target	No target	No target	120 knowledge outputs generated
Number of strategic policy directives ²⁹ in designated areas in support of economic sectors	Annually	3 strategic policy directives in designated areas in support of economic sectors by 31 March 2020	No target	No target	No target	3 strategic policy directives in designated areas in support of economic sectors
Number of new disclosures reported by publicly funded institutions	Quarterly (Q1, Q3 and Q4)	210 new disclosures ³⁰ reported by publicly funded institutions by 31 March 2020	100 new disclosures reported by publicly funded institutions	No target	100 new disclosures reported by publicly funded institutions	10 new disclosures reported by publicly funded institutions
Percentage of regulatory recommendations made to the GMO Executive Council through DAFF to support decision-making	Quarterly	100% of regulatory recommendations made to the GMO Executive Council through DAFF to support decision making by 31 March 2020	100% of regulatory recommendations made from applications received to support decision making	100% of regulatory recommendations made from applications received to support decision making	100% of regulatory recommendations made from applications received to support decision making	100% of regulatory recommendations made from applications received to support decision making

²⁹Policy directives include policy briefs, implementation plans, concept documents, position papers, strategies, policy recommendations, cabinet memoranda and chapter contributions towards key policy documents.

³⁰IP7 Form - IP Status and Commercialisation Report.



Performance indicator	Reporting period	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of decision-support interventions developed or maintained	Annually	2 decision-support interventions maintained by 31 March 2020	No target	No target	No target	2 decision-support interventions maintained
Number of postgraduate students (master's and doctoral) funded in designated areas	Annually	185 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2020	No target	No target	No target	185 postgraduate students (master's and doctoral) funded in designated areas
Number of trainees attending training initiatives in designated areas	Quarterly (Q3 and Q4)	230 trainees attending training initiatives in designated areas by 31 March 2020	No target	No target	165 trainees attending training initiatives in designated areas	65 trainees attending training initiatives in designated areas
Number of knowledge application products developed in designated areas	Annually	10 knowledge application products developed in designated areas by 31 March 2020	No target	No target	No target	10 knowledge application products developed in designated areas
Number of commercial outputs in designated areas	Annually	8 commercial outputs in designated areas by 31 March 2020	No target	No target	No target	8 commercial outputs in designated areas

Reconciling performance targets with the budget and MTEF

Table 14: Technology Innovation expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation 2018/19	Medium-term expenditure estimates		
	2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
*Office of the Deputy Director-General	4 094	3 923	5 632	-	4 161	5 316	5 333
Space Science	209 103	167 803	187 990	165 575	189 361	199 565	208 925
Hydrogen and Energy	147 687	143 594	147 468	167 813	178 526	188 520	197 649
Bioeconomy	136 051	220 205	162 464	178 423	193 262	204 194	218 821
Innovation Priorities and Instruments	518 056	442 047	535 581	572 744	605 388	638 805	664 218
NIPMO	52 400	42 211	78 845	50 868	53 607	56 762	60 062
TOTAL	1 067 391	1 019 783	1 117 980	1 135 423	1 224 305	1 293 162	1 355 008
Compensation of employees	42 838	45 785	46 607	53 017	56 744	60 866	65 160
Goods and services	12 821	13 790	13 616	22 550	22 063	23 832	24 588
Transfers and subsidies	1 011 717	960 164	1 057 700	1 059 856	1 145 498	1 208 464	1 265 260
Payments for capital assets	-	44	-	-	-	-	-
Payments for financial assets	15	-	57	-	-	-	-
TOTAL	1 067 391	1 019 783	1 117 980	1 135 423	1 224 305	1 293 162	1 355 008

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.

Chief Directorate

International Resources

Chief Directorate

Multilateral Cooperation and Africa

Chief Directorate

Overseas Bilateral Cooperation

3

INTERNATIONAL COOPERATION AND RESOURCES



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 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 and multilateral bodies, which make resources available to assist 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 major 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 specifically prioritising cooperation with other African partners and emerging economies such as 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 continues to target 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 that the focus and orientation of international partnerships address the needs of other Programmes directly.

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

From the above it is clear that the Programme directly supports Strategic Outcome-Oriented Goal 1 (to develop a responsive, coordinated 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 their relevance. The Programme will therefore secure international funds to complement South Africa's national investment in STI. The

Programme has worked consistently to improve coordination with other DST programmes and will continue to do so. Furthermore, a specific effort will be undertaken to enhance coordination with external South African NSI partners, including the DST entities. This will ensure strategic alignment and improved knowledge management on the broader South African S&T engagement with international partners. To achieve this, the Programme will initiate the implementation of a dedicated international engagement framework sanctioned by the Minister. The framework will be closely informed by South African foreign policy and protocol requirements under the custodianship of the Department of International Relations and Cooperation.

The Programme's strategic targets and indicators are focused on leveraging foreign investment and 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, and 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.

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

Programme 3 also contributes to Strategic Outcome-Oriented Goal 2 (increased knowledge generation) by 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 indicators on 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.

In line with Strategic Outcome-Oriented Goal 3 (human capital development), the Programme focuses on strengthening South Africa's capacity. Other opportunities being pursued include international HCD programmes such as postgraduate training for South Africans abroad, and 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 Strategic Outcome-Oriented Goal 3. The Programme's indicators include the number of South African students accessing postgraduate training opportunities abroad.

Strategic Outcome-oriented Goal 4 and 5: Using knowledge for economic development and using knowledge and innovation for inclusive development

With regard to the fourth goal (using knowledge for economic development) and the fifth goal (using 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 and 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 to 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 its 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. The Department of International Relations and Cooperation has been a critical partner throughout the DST Strategic Plan period, and this relationship has been closely tracked in the Programme's annual operational plan.

The Department will assume an active leadership role in implementing the AU's Science, Technology and Innovation Strategy for Africa, maximising benefits for the NSI and bolstering Africa's development, including the amount of foreign funding it leverages for strengthening Africa's STI capacities. The focus will be specifically on Strategic Outcome-Oriented Goals 4 and 5. The Programme will continue to pursue strategic targets related to the number of African Union and SADC initiatives it supports,

as set out in the Programme operational plan for each financial year, but it has become critical to differentiate between AU and SADC initiatives, and this will be closely tracked.

The interface between science and diplomacy has become a critical policy domain for governments across the world. In order to ensure that the Department leverages South Africa's extensive foreign policy for the optimal benefit of the NSI, at the same time supporting foreign policy objectives through international STI cooperation, a strategic framework for science diplomacy will be developed and implemented.

The Programme's horizontal policy priorities include achieving a greater focus on innovation in international STI partnerships involving South Africa, moving away from relatively small-scale, collaborative academic projects towards market-oriented 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 the DST's international partnership portfolio and are optimally supported to benefit from it.

STRATEGIC OBJECTIVES AND STRATEGIC STATEMENTS



OBJECTIVE
Access international funds to support the growth and development of the NSI

STATEMENT
To secure international funds to complement South Africa's national investments in STI, including resources for DST initiatives requiring external investment

OBJECTIVE
Enhance South Africa's national STI capabilities through access to international knowledge capacities and resources

STATEMENT
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 through international PhD training

STATEMENT
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 in South Africa and Africa

OBJECTIVE
Strengthen STI cooperation in Africa

STATEMENT
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

OBJECTIVE
Support South Africa's foreign policy through science diplomacy



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 foreign investment promotion efforts, and fostering 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 15: Programme risk management and identification – International Cooperation and Resources

Strategic objective	Risk description	Mitigation action
Access international funds to support the growth and development of the NSI	<p>Negative perception by foreign partners of SA as a viable destination for STI investments.</p> <p>Insufficient investment by international partners in their institutions for specific STI cooperation initiatives with South Africa.</p> <p>Lack of interest and/or willingness of international partners to share STI expertise with South Africa</p> <p>Insufficient national South African funds to support South African postgraduate students studying abroad</p> <p>Accessing of inappropriate or irrelevant international experience and expertise not aligned with South African needs.</p> <p>Decline in investment by African partner countries in STI programmes with South Africa</p> <p>International partners no longer value South Africa's role as an enabler and entry point for cooperation initiatives with the rest of the African continent.</p> <p>Institutional paralysis at continental or regional level delaying progress of AU or SADC initiatives.</p> <p>External geopolitical factors negatively mitigating against South African influence of international STI decision-making.</p> <p>Mistrust of South African leadership in international STI forums, including concerns about disproportionate representation.</p>	<p>Continuous dialogue and a joint review with international partners through Strategic engagements at Joint Committee meetings</p> <p>Proactive engagement to sensitize international partners of return on investment in cooperation with South Africa.</p> <p>Targeted formation of mutually beneficial strategic partnerships with partners of priority interest to South Africa.</p> <p>Implementation of Global Knowledge Partnerships Platform, which will offer coordination and other support services as incentives for international partners to co-invest with DST international post-graduate training programmes.</p> <p>Involvement of South African technical expertise in all phases of planning and execution of international capacity-building initiatives designed to assist South Africa.</p> <p>Proposal to partners of cooperation programmes providing for investment according to capacities and aligned with their strategic objectives.</p> <p>Careful consultation with international partners and beneficiaries in Africa, highlighting value addition of South African contribution.</p> <p>Implementation of initiatives to advance continental and regional agenda not constrained by institutional frameworks.</p> <p>Close cooperation with the Department of International Relations and Cooperation to exploit support from regional and other strategic alliances.</p> <p>Early identification and profiling of leadership positions of strategic interest to South Africa and concerted diplomatic engagements to promote South African candidates for them.</p>
Enhance South Africa's national STI capabilities through access to international knowledge capacities and resources		
Strengthen STI cooperation in Africa		
Support South Africa's foreign policy through science diplomacy		





Table 16: Strategic objective with five-year Strategic Plan targets (targets are reflected as cumulative numbers for each year of implementation over the Strategic Plan term)

The ensuing sections of the Annual Performance Plan (APP) should be read in conjunction with Annexure D of the 2018/19 APP which reflects the changes made to the 2015-2020 Strategic Plan.

Strategic objective	Five-year Strategic Plan target	Planned targets over the five-year Strategic Planning Horizon				
		2015/16	2016/17	2017/18	2018/19	2019/20
1. Access international funds to support the growth and development of the NSI	R2,120bn in international funds invested in South Africa accounted for as part of cooperation initiatives implemented by the DST between 1 April 2015 and 31 March 2020	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 between 1 April 2015 and 31 March 2016	R780m 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 between 1 April 2015 and 31 March 2017	R1,200bn 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 between 1 April 2015 and 31 March 2018	R1,640bn 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 between 1 April 2015 and 31 March 2019	R2,120bn 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 between 1 April 2015 and 31 March 2020
	R1,280bn invested by international partners as part of cooperation initiatives implemented by the DST between 1 April 2015 and 31 March 2020	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 between 1 April 2015 and 31 March 2016	R450m 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 between 1 April 2015 and 31 March 2017	R700m 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 between 1 April 2015 and 31 March 2018	R980m 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 between 1 April 2015 and 31 March 2019	R1,280bn 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 between 1 April 2015 and 31 March 2020

Strategic objective		Planned targets over the five-year Strategic Planning Horizon				
		2015/16	2016/17	2017/18	2018/19	2019/20
2. Enhance South Africa's national STI capabilities through access to international knowledge capacities and resources	Five-year Strategic Plan target	150 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST between 1 April 2015 and 31 March 2016	200 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST between 1 April 2015 and 31 March 2017	550 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST between 1 April 2015 and 31 March 2018	1 200 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST between 1 April 2015 and 31 March 2019	1 880 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST between 1 April 2015 and 31 March 2020
	1 880 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST between 1 April 2015 and 31 March 2020	2 500 international partner organisations collaborating with South African partners as part of cooperation initiatives facilitated by the DST between 1 April 2015 and 31 March 2020	850 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 between 1 April 2015 and 31 March 2017	1 350 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 between 1 April 2015 and 31 March 2018	1 900 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 between 1 April 2015 and 31 March 2019	2 500 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 between 1 April 2015 and 31 March 2020



Strategic objective	Planned targets over the five-year Strategic Planning Horizon					
	Five-year Strategic Plan target	2015/16	2016/17	2017/18	2018/19	2019/20
	100 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 between 1 April 2015 and 31 March 2020	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 between 1 April 2015 and 31 March 2016	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 between 1 April 2015 and 31 March 2017	45 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 between 1 April 2015 and 31 March 2018	70 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 between 1 April 2015 and 31 March 2019	100 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 between 1 April 2015 and 31 March 2020
3. Strengthen STI cooperation in Africa	300 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner between 1 April 2015 and 31 March 2020	20 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African government partner between 1 April 2015 and 31 March 2016	50 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner between 1 April 2015 and 31 March 2017	100 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner between 1 April 2015 and 31 March 2018	180 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner between 1 April 2015 and 31 March 2019	300 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner between 1 April 2015 and 31 March 2020

Strategic objective	Planned targets over the five-year Strategic Planning Horizon					
	Five-year Strategic Plan target	2015/16	2016/17	2017/18	2018/19	2019/20
	R380m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation between 1 April 2015 and 31 March 2020	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 between 1 April 2015 and 31 March 2016	R120m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation between 1 April 2015 and 31 March 2017	R200m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation between 1 April 2015 and 31 March 2018	R290m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation between 1 April 2015 and 31 March 2019	R380m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation between 1 April 2015 and 31 March 2020

Strategic objective	Planned targets over the five-year Strategic Planning Horizon					
	Five-year Strategic Plan target	2015/16	2016/17	2017/18	2018/19	2019/20
	70 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 the DST between 1 April 2015 and 31 March 2020	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 the DST between 1 April 2015 and 31 March 2016	17 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by the DST between 1 April 2015 and 31 March 2017	33 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by the DST between 1 April 2015 and 31 March 2018	50 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by the DST between 1 April 2015 and 31 March 2019	70 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by the DST between 1 April 2015 and 31 March 2020
4. Support South Africa's foreign policy through science diplomacy	20 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 March 2020	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 between 1 April 2015 and 31 March 2016	8 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 between 1 April 2015 and 31 March 2017	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 between 1 April 2015 and 31 March 2018	16 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 between 1 April 2015 and 31 March 2019	20 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 between 1 April 2015 and 31 March 2020

Strategic objective	Planned targets over the five-year Strategic Planning Horizon					
	Five-year Strategic Plan target	2015/16	2016/17	2017/18	2018/19	2019/20
	18 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 between 1 April 2015 and 31 March 2020	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 between 1 April 2015 and 31 March 2016	6 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 between 1 April 2015 and 31 March 2017	10 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 between 1 April 2015 and 31 March 2018	14 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 between 1 April 2015 and 31 March 2019	18 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 between 1 April 2015 and 31 March 2020



Table 17: Strategic statements, performance indicators, and annual and MTEF targets for 2019/20

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17		2017/18	2019/20	2020/21
Strategic statement: 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 by 31 March 2020	R2,120bn in international funds invested in South Africa for as part of cooperation initiatives implemented by the DST by 31 March 2020	R619m 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 March 2016	R689m 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 March 2017	R448m 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 March 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 March 2019	R480m 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 March 2020	R500m 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 March 2021
			R500m 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 March 2022					

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
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	R1,280bn invested by international partners as part of cooperation initiatives implemented by the DST by 31 March 2020	R2,198bn 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 March 2016	R1,253bn 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 March 2017	R1,199bn 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 March 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 March 2019	R300m 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 March 2020	R320m 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 March 2021	R320m 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 March 2022



Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2018/19	Medium-term targets			
			2015/16	2016/17		2017/18	2019/20	2020/21	2021/22
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	1 880 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 March 2020	169 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 March 2016	210 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 March 2017	241 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 March 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 March 2019	680 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 March 2020	700 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 March 2021	700 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 March 2022
Strategic statement: 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									

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18	2019/20		2020/21	2021/22	
Sharing of experience and expertise by 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	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	2 500 international partner organisations collaborating with South African partners as part of cooperation initiatives facilitated by the DST by 31 March 2020	585 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 March 2016	668 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 March 2017	678 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 March 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 March 2019	600 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 March 2020	650 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 March 2021	680 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 March 2022	



Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
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	100 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 March 2020	63 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 March 2016	51 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 March 2017	67 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 March 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 March 2019	30 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 March 2020	35 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 March 2021	40 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 March 2022

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance					Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18	2019/20	2020/21		2021/22		
Strategic statement: 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 the DST and other African partners	Number of research, innovation and STI HCD cooperation projects, co-funded or supported in kind, by the DST and other African partner	300 research, innovation and STI HCD cooperation projects, co-funded or supported in kind by the DST and at least one other African government by 31 March 2020	61 research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African partner by 31 March 2016	54 research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African partner by 31 March 2017	76 research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African partner by 31 March 2018	80 research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African partner by 31 March 2019	120 research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African partner by 31 March 2020	140 research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African partner by 31 March 2021	140 research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African partner by 31 March 2022		
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	R380m 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 March 2020	R113m 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 March 2016	R388m 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 March 2017	R447m 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 March 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 March 2019	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 March 2020	R100m 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 March 2021	R100m 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 March 2022		



Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18	2019/20		2020/21	2021/22	
AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported by the 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 the DST	70 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 the DST by 31 March 2020	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 March 2016	15 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 March 2017	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 March 2018	17 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 March 2019	20 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 March 2020	23 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 March 2021	23 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 March 2022	

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
Strategic statement: 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, with a direct bearing on 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	20 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 March 2020	6 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 March 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 March 2017	5 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 March 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 March 2019	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 March 2020	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 March 2021	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 March 2022



Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18	2019/20		2020/21	2021/22	
South African 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	18 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 March 2020	5 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 March 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 March 2017	7 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 March 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 March 2019	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 March 2020	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 March 2021	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 March 2022	

Table 18: Quarterly targets for the 2019/20 financial year

Performance indicator	Reporting frequency	Annual target 2019/20	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	Biannually (Q3 and Q4)	R480m 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 March 2020	No target	No target	R80m 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	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
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	Biannually (Q3 and Q4)	R300m 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 March 2020	No target	No target	R50m 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	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

Performance indicator	Reporting frequency	Annual target 2019/20	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	Biannually (Q3 and Q4)	680 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST by 31 March 2020	No target	No target	80 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	600 South African students participating in international training programmes offering a postgraduate qualification 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 formalised framework of collaborative research, innovation or STI HCD projects accounted as part of cooperation initiatives facilitated by the DST	Quarterly	600 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects part of cooperation initiatives facilitated by the DST by 31 March 2020	10 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects part of cooperation initiatives facilitated by the DST	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 part of cooperation initiatives facilitated by the DST	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 part of cooperation initiatives facilitated by the DST	490 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects part of cooperation initiatives facilitated by the DST

Performance indicator	Reporting frequency	Annual target 2019/20	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	30 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 March 2020	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	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	10 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	10 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
Number of research, innovation and STI HCD cooperation projects, co-funded or supported in kind by DST and at least one other African partner	Biannually (Q3 and Q4)	120 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African partner by 31 March 2020	No target	No target	20 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African partner	100 research, innovation and STI HCD cooperation projects co-funded or supported in kind by DST and at least one other African partner



Performance indicator	Reporting frequency	Annual target 2019/20	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	Annually	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 March 2020	No target	No target	No target	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
Number of AU or SADC STI initiatives, including projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST	Biannually (Q3 and Q4)	20 AU or SADC STI initiatives, including projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST by 31 March 2020	No target	No target	5 AU or SADC STI initiatives, including projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST	15 AU or SADC STI initiatives, including projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by DST

Performance indicator	Reporting frequency	Annual target 2019/20	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	Biannually	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 March 2020	No target	2 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	No target	2 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
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	Biannually	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 March 2020	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	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



Reconciling performance targets with the budget and MTEF

Table 19: International Cooperation and Resources expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation 2018/19	Medium-term expenditure estimates		
	2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
*Office of the Deputy Director-General	9 384	7 372	5 186	-	5 603	5 692	5 710
Multilateral Cooperation and Africa	25 668	30 408	30 753	36 867	32 724	34 875	36 057
International Resources	56 635	54 204	61 481	63 005	66 883	70 937	74 160
Overseas Bilateral Cooperation	32 665	33 854	37 764	42 027	43 798	46 633	49 120
TOTAL	124 352	125 838	135 184	141 899	149 008	158 137	165 047
Compensation of employees	46 636	48 889	50 360	54 352	58 456	62 724	65 823
Goods and services	18 389	16 052	20 617	19 422	18 577	19 480	20 083
Transfers and subsidies	59 327	60 897	64 214	68 125	71 975	75 933	79 141
Payments for financial assets	-	-	3	-	-	-	-
TOTAL	124 352	125 838	135 184	141 899	149 008	158 137	165 047

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.

Chief Directorate
Human Capital and Science Promotion

Chief Directorate
Basic Sciences and Infrastructure

Chief Directorate
Science Missions

Chief Directorate
Astronomy

RESEARCH DEVELOPMENT AND SUPPORT



STRATEGIC OVERVIEW

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

Strategic Outcome-Oriented Goal 1:

A responsive, coordinated and efficient NSI

The Department has enjoyed strong collaboration with the Department of Higher Education and Training (DHET) in research development and support. The DHET provided its own funds to the NRF for awarding postgraduate bursaries to the value of R265 million in 2017/18, R205 million in 2018/19 and the amount will be decreased to R151 million in 2019/20. In 2017/18, through own funding, the DHET established four research chairs in its priority areas, contributing to the increase in the number of research chairs to 226. In 2019/20, joint implementation plans will be developed in support of the DHET's University Capacity Development Programme (UCDP). Alongside existing tracks in the Thuthuka programme, the NRF will establish an additional track to support DHET Next Generation of Academics Programme (nGAP) post holders. In the interim, the NRF has supported a total of 54 nGAP post holders with research development grants. This needs to be scaled up to cover a significant portion of nGAP post holders, especially those with PhDs. The DST remains active in the Human Resource Development Council and its subcommittees, which is the advisory body for HCD countrywide.

Strategic Outcome-Oriented Goal 2:

Increased knowledge generation

Programme 4 plays a leading role in this strategic outcome-oriented goal. Without research, no knowledge generation can take place. Through the NRF, Programme 4 is the key source of research funding for higher education institutions. The Programme directly addresses this imperative through researcher support on proxy indicator number 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 such as the South African Research Chairs Initiative (SARChI) and Centres of Excellence (CoE) that are designed to strengthen research capacity at universities, including research in priority or geographic advantage areas.

Concerted efforts will be made to strengthen research and increase research outputs in these priority areas. Special attention will be paid towards enhancing the impact of these programmes. In both cases, many of the researchers supported through SARChI and the CoE's constitute a significant brains trust that provides scientific input towards the development of evidence-based instruments such as the Communities of Practice.

By the end of the 2017/18 financial year, 4 707 researchers were awarded research grants through NRF-managed programmes. This number is expected to be maintained in 2019/20. Included in the research grants are funds that enable researchers to identify, recruit and support excellent postgraduate students

with bursaries, research running costs and funds to procure small research equipment.

By the end of the 2017/18 financial year, 28 (against a planned target of 30) research infrastructure grants were awarded to researchers and institutions across the innovation value chain through direct funding by the Programme and as an indirect contribution to strategic outcome-oriented goal 2 and proxy indicator number 4. The grants include support for innovation infrastructure in the form of pilot plants, technology demonstrators and specialised facilities. Owing to significant budget cuts and the need to initiate the implementation of the first group of research infrastructures of the South African Research Infrastructure Roadmap (SARIR), a target of 70 research infrastructure grants per year is no longer feasible, and has been reduced to 30 grants in 2018/19 and 20 grants per year for the period 2019/20 to 2020/21.

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. In the 2017/18 financial year, the total available broadband capacity (TABC) on the SANReN network was increased to 3 200 gigabits per second (Gbps) through the addition of several new network links, upgrading of existing links, upgrading of transmission equipment, addition of new sites and the activation of additional West Africa Cable System (WACS) international capacity. This is an indirect contribution to proxy indicator number 5, and translates into giving more than a million users access to broadband connectivity.

The implementation of the South African Research Infrastructure Roadmap continued in 2017/18, with a total of eight research infrastructures being implemented and the remaining five to be rolled out in subsequent years.

In 2017/18, the implementation of the following projects of the National Integrated Cyberinfrastructure System (NICIS) continued: (i) a multi-institutional national e-science postgraduate teaching and training programme; (ii) an e-research support programme; (iii) a regional Tier 2 data node; and (iv) a big data strategy. The second intake of students for the e-Science master's degree programme was in January 2019.

The UCT-led consortium (which includes the University of the Western Cape, Stellenbosch University and Cape Peninsula University of Technology, and MeerKAT/SKA and Sol Plaatje University as associate members) started the implementation of the Western Cape Tier 2 Data Node in 2017/18. Management and operational structures were set up, and cloud-based software systems and services in support of data processing, analytics and visualisation of radio astronomy data were installed. Significant progress was made to establish the research data management programme under the leadership of the Cape Peninsula University of Technology. Multi-institutional collaborative projects include the processing of optical astronomy observations, cloud-based visual analytics for large radio astronomy imagery, and the fusion of multi-wavelength data for scientific analysis.

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;
- participants in the DST-supported science awareness and engagement initiatives; and
- the development of relevant strategic documents.

Strategic Outcome-Oriented Goal 3:

Human capital development

Programme 4 is the custodian of high-level human capital development for the NSI. In conjunction with the NRF, Programme 4 is the key source of bursary support for postgraduate training in SET from government for higher education institutions through proxy indicators 1, 2 and 3. Transforming the NSI's human resource base is imperative for the system's sustainable growth, and the DST will continue to monitor progress in reaching transformation goals and targets, intervening where necessary. The focus will be on achieving transformation goals in higher postgraduate studies (at PhD level), as the transformation goals (mainly in terms of race and gender) have consistently been met at lower postgraduate studies. The NRF will work with the NSFAS to identify NSFAS-funded students (poor and academically deserving) that are to be funded for postgraduate studies. Postgraduate funding in engineering will receive a specific focus, in line with the

recommendations of the recently completed postgraduate research training in engineering study. 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.

The Programme drives transformation at three levels, namely, demographic, transdisciplinary, and institutional. The Programme, guided by the Ministerial Guidelines on Transformation, has mainstreamed demographic and gender transformation in all its instruments under NRF oversight and management. The instruments include strategic programmes- the South African Research Chairs Initiative, the Centres of Excellence, established researchers programmes, emerging researches programme such as Thuthuka research funding, and next generation of researchers, internship, and special instruments such as the University Capacity Development Programme in collaboration with the Department of Higher Education and Training, and the Indigenous Knowledge System DST/NRF Research Grant Framework. Additionally, the DST together with strategic partners has developed special vehicles for demographic and gender transformation, such as the Phuhlisa Programme under the auspices of the African Coelacanth Ecosystems Programme, which partners with historically black universities to attract postgraduate students in marine sciences. The Habitable

Earth Programme under the Alliance for Collaboration on Climate and Earth Systems (ACCESS) introduces black students to the concept of Earth Systems Science. Instruments such as Women in Science are also drivers of demographic transformation.

In the second area, of transdisciplinary transformation, all the chief directorates have mainstreamed the theme in research grants covering all knowledge fields. The Indigenous Knowledge Systems unit promotes transdisciplinary transformation through three unique instruments, namely, the Biennial Interface Conference that brings research grant holders, knowledge holders and students together under specific themes, the Biennial International Conference that benchmarks IKS transdisciplinary approaches in the region and globally, and the IKS Biennial Conference that showcases innovation across the fields of IKS. In the Earth Systems Science Platform, instruments such as ACCESS, the Foundation for Biodiversity Foundation Information, the South African Environmental Observation Network, the CSIR and the ARC also promote transdisciplinary transformation. The new flagship initiatives, the Earth Systems Science Research Programme and the Global Change Science and Society Research programme, are anchored on the promotion of transdisciplinary transformation. The Marine, Polar Research and Palaeosciences areas also use research instruments that promote transdisciplinary transformation, and the South African Research Infrastructure Roadmap is a strategic instrument that earmarks multidisciplinary and transdisciplinary access to research infrastructure.

At institutional level, the South African Research Chairs Initiative (SARChI) has been used to create new chairs to address the gender imbalance in the NSI. The institutionalisation of HCD instruments such as the Women in Science Awards has been a strategic institutional intervention. The science engagement campaign is aimed at building a society that is knowledgeable about science, able to form independent opinions about science, and scientifically literate. The adoption of the Science Engagement Strategy (2015) to guide the campaign has ushered in an era of improved campaign coordination, as well as effective tracking of the change brought about by investment in the campaign. This is enhanced by the implementation of the Science Engagement Strategy through the science centres and the DST entities' response to common key performance indicators.

Programme 4 envisages continued, expanded and targeted development of transformation tools in all its strategic science areas at the three levels discussed above. Over and above competitive support for postgraduate students across various science fields, targeted postgraduate bursaries are provided in priority and geographic advantage areas, with the aim of strengthening research capabilities in these specialised areas.

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STRATEGIC OBJECTIVES AND STRATEGIC STATEMENTS



CHIEF DIRECTORATES

Human Capital and Science Promotion

This chief directorate formulates and implements policies and strategies that address the availability of human capital for STI, and that provide fundamental support for research activities. The chief directorate 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 enhancing youth access to STI.

In the 2018/19 financial year, ASSAf completed a study of postgraduate training in engineering, and policy recommendations emanating from this study will be implemented in the course of 2019/20. 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. In 2016/17, the DST and NRF drew up terms of reference for a study which looked at the unexploited pool of researchers

(at lecturer and senior lecturer levels) who are neither publishing nor actively seeking research funds from the NRF. The study was completed and clear recommendations on policies and programmes to be implemented to address the "silent majority" questions will be finalised and incorporated into various programmes in the course of 2019/20.

The SARChI and Centres of Excellence Programme have been successful in attracting and retaining established researchers who have reached the pinnacle of their research careers and are recognised locally and internationally. The SARChI has been growing gradually over the years, with new research chairs being established recently. A significant number of these were established through partnerships with industry (specifically the banking sector), science councils, other government departments, and organisations from other countries. This has contributed to the increase of research chairs from 199 in 2016/17 to 226 in 2017/18. While there have been no additions to the 14 centres of excellence established between 2004 and 2015, both programmes are continuing to produce extensive knowledge outputs and provide supervisory capacity for the system, thus increasing human capital development. The NRF Amendment Bill was introduced to Parliament in 2017/18 and taken through the parliamentary structures for approval by the President in 2018/19. The Bill provides for a more comprehensive codification of the NRF's current mandate, clarifies the Minister's authority over the Foundation, and makes explicit the NRF's responsibilities in respect of science engagement.

The DST drafted the South African Council for Natural Scientific Professions (SACNASP) Bill in consultation with the Competition Commission under the Economic Development Department. The draft Bill will be presented to the Economic Sectors, Employment and Infrastructure Development Cluster before the end of the 2018/19 financial year, with parliamentary approval of the Bill planned for 2019/20.

One of the DST's workplace preparation programmes, the DST-NRF Internship Programme (implemented through the NRF), gives recently qualified graduates and postgraduates an opportunity to improve 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 Science Engagement Monitoring and Evaluation Framework (MEF) adopted in 2018/19 will be consolidated by a baseline study in 2019/20 to establish the current status of the performance indicators in the MEF. Further endeavours in 2019/20 in preparation for the implementation of the MEF will be the designing of the Science Engagement Information Management System (SEIMS). A database of raw and processed information of the science engagement programme and related initiatives.

Furthermore a stakeholder consultation forum to establish what would be an appropriate public understanding of science survey for South Africa will be conducted. While existing science engagement initiatives – which include mass participation initiatives such as the annual National Science Week and science festivals, as well as the science centre-based science promotion activities – will be sustained, attention will be given to rationalising these initiatives in line with the Science Engagement Strategy Implementation Plan to improve overall implementation efficiency.

The intergovernmental collaboration endeavours between the DST, DBE and DHET will be maintained to enhance the objectives of the Science Engagement Strategy, the National Strategy for Mathematics, Science and Technology Education, and the Framework for Cooperation in the Provision of Career Development Services in South Africa. On the other hand, the collaboration agreements signed with the Limpopo, Gauteng, Free State, Northern Cape, Mpumalanga and KwaZulu-Natal Departments of Education will see the implementation of structured school-based science engagement initiatives in selected schools in these provinces in 2019/20.

The National Interdepartmental Committee for Early Childhood Development, of which the DST is a member under the Department of Social Development, will contribute to an enabling environment for the DST to follow through the recommendations of a report on the study of STEM activities for young children, which was conducted by the HSRC on behalf of the DST in 2018/19.

In 2019/20 the new Cofimvaba Science Centre, a pilot intergovernmental collaborative development model between the DST, the DBE and the Eastern Cape Department of Education, will be launched.

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.

The chief directorate will support the provision of and access to RDI infrastructure across the entire NSI by awarding 60 research infrastructure grants (2018/19 to 2019/20) to the research community across the country. The infrastructure funds will include the development of pilot plants, technology demonstrators and specialised facilities, which are aimed at promoting South Africa's manufacturing capacity. Among other things, this will contribute to reducing poverty and unemployment. Continued support will also be provided to students and researchers to access global infrastructures 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.



In 2019/20 the chief directorate will continue with the implementation of research infrastructures as part of the roll-out of the SARIR. At least 10 research infrastructures will have been initiated by 31 March 2020. Furthermore, the second cohort of students will have been registered for the e-science master's programme by the beginning of the 2019 academic year. With regard to contributing to the national agenda of broadband provision to close the digital divide (inequality), and supporting the transmission of data to all research and academic institutions, the chief directorate will continue to support the roll-out of a high capacity broadband network through SANReN. Between 2017/18 and 2019/20, the total available broadband capacity provided through SANReN will be increased from 3 200 Gigabits per second (Gbps) to 3 500 Gbps.

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. To ensure ongoing and targeted support for the Basic Sciences, the South African Basic Sciences Development and Support Platform will continue to coordinate and drive the roll-out of the action plan of the Basic Science Development and Support Framework.

Science Missions

Promotes the development of research and 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).

The finalisation of the Bill for the Protection, Promotion, Development and Management of Indigenous Knowledge is a key deliverable in the field. The IK Bill is an enabling framework to ensure mechanisms are in place to address poverty, inequality and unemployment. Once the Bill is enacted, its implementation in 2019/20 will entail the approval of the regulations by the Minister and their subsequent presentation to the Portfolio Committee on Science and Technology. Furthermore, a special services delivery unit will be established. Alongside all of this, an ongoing and robust public awareness programme on the IK Act will be implemented, as requested by the National Council of Provinces.

The implementation of the IK Act will involve ongoing registration of indigenous knowledge through the documentation centres in all nine provinces, implementing the Recognition of Prior Learning initiatives (focused on the pilot on certification of healers and accreditation of institutions to train students in African traditional medicines in KwaZulu-Natal), and facilitation of commercialisation of indigenous knowledge.

Through the implementation of the Marine and Antarctic Research Strategy, coordination of marine research platforms will be set up to ensure that research contributes new knowledge towards generating economic opportunities, which will also assist in tackling

the triple challenge. High emphasis will be placed on implementing the recommendations of the Global Change mid-term review and strengthening the overall implementation of the Global Change Research Plan, through the conceptualisation and introduction of two dedicated research programmes, namely, the Earth Systems Science Programme and the Global Change Science and Society Research Programme.

Programme 4 is responsible for two of the three performance indicators assigned to the DST under Outcome 10 of the 2014-19 MTSF. These relate to a functional climate change network formalised through memoranda of understanding and biennial reporting to Cabinet on the state of climate change science and technology in South Africa. The second biennial report on climate change science and technology in South Africa will be prepared and submitted to Cabinet by 31 March 2019.

Astronomy

This chief directorate supports the development of astronomical sciences around the new Multiwavelength Astronomy (MWA) Strategy. The MWA Strategy highlights the current status of astronomy in South Africa, its importance to the South African socio-economic landscape, the astronomy heritage in South Africa and how this could be further strengthened, and a strategic approach for continued investments in astronomy in South Africa. The strategy sets out strategic objectives and a strategic agenda defined by the key priority areas for astronomy, also outlining relevant cross-cutting support programmes needed to give effect to the shared

vision. Emphasis will also be placed on HCD transformation, so that the demographics of the students supported and graduating from directed astronomy HCD programmes reflect those of the country.

The MeerKAT will be integrated into SKA Phase 1 (2019-2024) with an additional 133 antennas in the Karoo up to 80 km baseline from the core to make it a 197-dish array mid-frequency telescope. On the Australian side, this would entail the construction of a low-frequency dense aperture array of 250 stations up to 180km baseline from the core. The MeerKAT telescope was successfully launched on 13 July 2018 and has already begun producing remarkable preliminary science and implementing the planned science programmes. There are eight approved Large Survey Projects that will be using the MeerKAT observations towards the approved science goals of the project. On the international front, the final document for the Convention establishing the SKA Observatory is well under way under the leadership of the SKA Organisation.

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. As the regulations for the Karoo Central Astronomy Advantage Area (KCAAA) and the Sutherland Central Advantage Areas have now been promulgated, the capacity of the Astronomy Management Authority (AMA) has been further strengthened through secondments of skilled personal from the South African Radio Astronomy Observatory. The AMA is processing a significant number of permits and handling relevant compensation claims by

operators in the protected area in accordance with the regulations.

Good progress is being made on the implementation of the African Very Long Baseline Interferometry Network (AVN) project, as reported in the outcomes of the 5th SKA African Ministerial Forum meetings held in Cape Town from 15 to 17 October 2018. Important allied interventions to strengthen African SKA partner countries' high-performance computing

and radio astronomy competencies have also been made through the piloting of a two-dish interferometry system to Botswana and Mozambique, and high-performance computing infrastructure now deployed in almost all the partner countries. These infrastructure initiatives are complemented through training interventions. In 2019/20 the DST hopes to expand the AVN intervention in partner countries, subject to additional funding being secured.



Table 20: Programme risk management and identification – Research Development and Support

Strategic objective	Risk description	Mitigation action
Contribute to human capital development.	Inadequate support provided to postgraduate students resulting in high attrition rates	<ul style="list-style-type: none"> Conduct the review of the Ministerial Guideline targets towards achieving transformation and equity in the distribution of bursaries, scholarships and fellowships in order to determine the new targets for 2018/19 - 2020/21 (three year strategy) in the ministerial guideline document. Proposal for implementation of the University Capacity Development Programme (UCDP) with the focus on Staffing South Africa University Framework.
Provision of research and innovation infrastructure.	Infrastructure deterioration that might compromise the quality and competitive research output (due to infrastructure base not being adequately replaced, upgraded and/or maintained for future research).	<ul style="list-style-type: none"> Prepare annual infrastructure bids according to the DST infrastructure framework in July/August for the National Treasury MTEF process. Targeted interventions to improve the quality of the proposals submitted for infrastructure funding. Periodic review, evaluation and monitoring on the state of the research infrastructure.
Production of new knowledge.	Inadequate support for emerging and established researchers.	<ul style="list-style-type: none"> Joint DST/ DHET Implementation plan on policy recommendations emanating from the "Silent Majority" study. Provide research proposal development funding to successive annual cohorts of nGAP post holders with a Master's degree and above through the NRF. Establish nGAP track under the Thuthuka Programme by NRF. Finalisation of the University Capacity Development Programme (UCDP) concept document by the DST and the DHET. Develop DST Ministerial policy framework in response to NRF Transformation and Equity Framework. (review at end FY). Support, through the NRF, of the cohorts of nGAP post holders with a Master's degree and above with research proposal development funding.
Development of priority science areas.	Stagnant scientific output from geographic advantage knowledge areas	<ul style="list-style-type: none"> Promulgation of the IK Act. Implementation of the Earth Systems Science (ESS) Flagship Programme. Scope and develop the Global Change Science and Society Research Programme. Development of Regulations for the IK Act. Implementation of the Marine and Antarctic Research Strategy (MARS) through the establishment of the MARS Coordination Committee. To develop and implement co-investment funding plans with other government departments for provision of research infrastructures.

Strategic objective	Risk description	Mitigation action
Promote science engagement.	Fragmented coordination of and inadequate enabling systems for science engagement	<ul style="list-style-type: none"> • Implementation of the Science Engagement Funding Model. • Annual review of the jointly adopted standard operating procedures. • Amendment of the NRF Act to incorporate the science engagement-coordinating role of SAASTA. • Establishment of an accredited science communication qualification in collaboration with University of Limpopo (focusing on the development of basic science communication skills). • Develop a plan to capacitate SAASTA to deliver on its new mandate as a coordinator of science engagement.
	Ineffective regulation of Astronomy Advantage Areas (AAA)	<ul style="list-style-type: none"> • Signing and Implementation of the MoAs at the different levels - in ensuring co-existence of radio Astronomy and other Government activities within the declared KCAAA without causing harmful interference to each other. • Secondment from SKA office to the AMA unit (technical skills posts).
	Suboptimal performance of MeerKAT	<ul style="list-style-type: none"> • Implementation of the Karoo Central Astronomy Advantage Areas (KCAAA) regulations. • Finalise establishment of AMA as a legal entity. • Keep Treasury apprised of project progress and finances, and relevant international developments.

Table 21: Strategic objective with five-year Strategic Plan targets (the targets are reflected as cumulative numbers for every year of implementation over the Strategic Plan term)

The ensuing sections of the Annual Performance Plan (APP) should be read in conjunction with Annexure D of the 2018/19 APP which reflects the changes made to the 2015-2020 Strategic Plan.

Strategic objective	Planned targets over the five-year strategic planning horizon				
	2015/16	2016/17	2017/18	2018/19	2019/20
1. Contribute to human capital development	<p>Not less than 15 840 PhD students awarded bursaries as reflected in the reports from the NRF and relevant entities by 31 March 2020</p>	<p>6 540 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports between 1 April 2015 and 31 March 2017</p>	<p>Not less than 640 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports between 1 April 2015 and 31 March 2018</p>	<p>Not less than 12 740 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports between 1 April 2015 and by 31 March 2019</p>	<p>Not less than 15 840 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports between 1 April 2015 and 31 March 2020</p>
	<p>Not less than 54 300 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2020</p>	<p>21 992 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports between 1 April 2015 and 31 March 2017</p>	<p>Not less than 32 792 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports between 1 April 2015 and 31 March 2018</p>	<p>Not less than 43 592 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports between 1 April 2015 and 31 March 2019</p>	<p>Not less than 54 300 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports between 1 April 2015 and 31 March 2020</p>

Strategic objective	Planned targets over the five-year strategic planning horizon				
	2015/16	2016/17	2017/18	2018/19	2019/20
	4 200 graduates and students placed in DST-funded work preparation programmes in science, engineering, technology and innovation (SETI) institutions by 31 March 2020	2 006 ³¹ graduates and students placed in DST-funded work preparation programmes in SETI institutions between 1 April 2015 and 31 March 2017	2 806 graduates and students placed in DST-funded work preparation programmes in SETI institutions between 1 April 2015 and 31 March 2018	3 596 graduates and students placed in DST-funded work preparation programmes in SETI institutions between 1 April 2015 and 31 March 2019	4 200 graduates and students placed in DST-funded work preparation programmes in SETI institutions between 1 April 2015 and 31 March 2020
2. Provision of research and innovation infrastructure	210 research infrastructure grants awarded as per award letters by 31 March 2020	130 research infrastructure grants awarded as per award letters between 1 April 2015 to 31 March 2017	160 research infrastructure grants awarded as per award letters between 1 April 2015 to 31 March 2018	190 research infrastructure grants awarded as per award letters between 1 April 2015 to 31 March 2019	210 research infrastructure grants awarded as per award letters between 1 April 2015 to 31 March 2020
	3 500 Gbps total available broadband capacity through SANReN by 31 March 2020	3 500 Mbps average broadband capacity provided per SANReN site between 1 April 2015 and 31 March 2016	3 200 Gbps total available broadband capacity provided by SANReN between 1 April 2015 and 31 March 2018	3 400 Gbps total available broadband capacity provided by SANReN between 1 April 2015 and 31 March 2019	3 500 Gbps total available broadband capacity provided by SANReN between 1 April 2015 and 31 March 2020

³¹ 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.

Strategic objective	Planned targets over the five-year strategic planning horizon					
	Five-year Strategic Plan target	2015/16	2016/17	2017/18	2018/19	2019/20
3. Production of new knowledge	Not less than 22 578 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2020	4 539 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports between 1 April 2015 and 31 March 2016	9 078 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports between 1 April 2015 and 31 March 2017	Not less than 13 578 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports between 1 April 2015 and 31 March 2018	Not less than 18 078 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports between 1 April 2015 and 31 March 2019	Not less than 22 578 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports between 1 April 2015 and 31 March 2020
	35 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports by 31 March 2020	7 000 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports between 1 April 2015 to 31 March 2016	14 000 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports between 1 April 2015 to 31 March 2017	21 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports between 1 April 2015 to 31 March 2018	28 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports between 1 April 2015 to 31 March 2019	35 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports between 1 April 2015 to 31 March 2020

Strategic objective	Planned targets over the five-year strategic planning horizon				
	2015/16	2016/17	2017/18	2018/19	2019/20
4. Development of priority science areas	64 antennae commissioned for a single polarisation array by 31 March 2018 and Installation of 2 of 3 Science Modes (UHF; LSP; and S-Band) by 31 March 2020	64 MeerKAT antennae installed by 31 March 2017	64 antennae single polarisation array commissioned by 31 March 2018	64 UHF Science Mode Receivers installed on MeerKAT by 31 March 2019	8 Large Survey Projects (LSP) Science Mode installed on MeerKAT Correlator by 31 March 2020
	1 plan for compiling the first biennial report on the state of climate change in South Africa for Cabinet approval by 31 March 2016	1 (first biennial) report on the state of climate change in South Africa finalised and submitted for Cabinet approval by 31 March 2017	A plan for compiling second biennial report on the state of climate change in South Africa approved by Exco by 31 March 2018	Finalise the second biennial report and submit for Cabinet approval by 31 March 2019	No target
5. Promote science engagement	Not less than 2.1million people reached annually through science engagement activities as reflected in the project reports of the NRF and other service providers by 31 March 2020	Approximately 979 000 participants (588 000 learners and 391 000 members of the public) in science awareness and engagement programmes as reflected in project reports of the NRF and other service providers by 31 March 2016	Approximately 2 179 000 participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers between 1 April 2015 and 31 March 2017	Approximately 4 179 000 participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers between 1 April 2015 and 31 March 2018	Not less than 2,1 million people reached annually through science engagement activities as reflected in the project reports of the NRF and other service providers by 31 March 2020

Table 22: Strategic statements, performance indicators, and annual and MTEF targets for 2019/20

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
Strategic statement: 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	Total number of PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities ³²	Not less than 15 840 PhD students awarded bursaries as reflected in the reports from the NRF and relevant entities by 31 March 2020	3 404 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2016	3 454 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2017	3 621 PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2018	Not less than 3 100 PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2019	Not less than 3 100 ³³ PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2020	Not less than 3 100 PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2021	Not less than 3 100 PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2022
Pipeline postgraduate students awarded bursaries and fellowships through NRF and DST	Total number of pipeline ³⁴ postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities	Not less than 54 300 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2020	10 996 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2016	10 268 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2017	10 601 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2018	Not less than 10 800 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2019	Not less than 10 800 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2020	Not less than 10 800 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2021	Not less than 10 800 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2022

³²These are bursaries awarded from Programme 4 funds through the NRF and relevant entities, including CSIR, SANSa and the Agricultural Research Council for Interprogramme bursaries.

³³Targets reduced due to budget cuts for the MTEF period.

³⁴"Pipeline students" means BTEch, honours and master's students.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
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	Not less than 4 200 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2020	1 044 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2016	962 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2017	823 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2018	Not less than 650 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2019	Not less than 650 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2020	Not less than 550 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2021	Not less than 550 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2022
Strategic statement: 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 annually	210 research infrastructure grants awarded as per award letters by 31 March 2020	79 research infrastructure grants awarded as per award letters by 31 March 2016	72 research infrastructure grants awarded as per award letters by 31 March 2017	28 research infrastructure grants awarded as per award letters by 31 March 2018	30 research infrastructure grants awarded as per award letters by 31 March 2019	20 research infrastructure grants awarded as per award letters by 31 March 2020	20 research infrastructure grants awarded as per award letters by 31 March 2021	20 research infrastructure grants awarded as per award letters by 31 March 2022

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
A gigabit per second (Gbps) total available broadband capacity network providing transmission of data to all research and academic institutions	Total available broadband capacity provided by SANReN per annum	3 500 Gbps total available broadband capacity provided by SANReN by 31 March 2020 ³⁵	3 497 Mbps average broadband capacity available per SANReN site by 31 March 2016	3 500 Mbps average broadband capacity provided by SANReN site by 31 March 2017	3 292 Gbps total available broadband capacity provided by SANReN by 31 March 2018	3 400 Gbps total available broadband capacity provided by SANReN by 31 March 2019	3 500 Gbps total available broadband capacity provided by SANReN by 31 March 2020	3 500 Gbps total available broadband capacity provided by SANReN by 31 March 2021	3 500 Gbps total available broadband capacity provided by SANReN by 31 March 2022
Strategic statement: 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	Not less than 22 578 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2020	4 315 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 March 2016	4 539 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 March 2017	4 707 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2018	Not less than 4 500 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2019	Not less than 4 500 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2020	Not less than 4 500 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2021	Not less than 4 500 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2022

³⁵The indicator was revised to give better detail of the work being carried out by the department (as per the Auditor-General's recommendation). SANReN will continue to report only on the capacity availability delivered by the installed equipment, reducing the strategic target from 8 000 Gbps to 3 500 Gbps total available broadband capacity by 31 March 2020.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
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 as reflected in the NRF project reports	Not less than 35 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports by 31 March 2020	7 158 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 March 2016	8 156 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 March 2017	8 384 ISI-accredited research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports by 31 March 2018	Not less than 7 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports by 31 March 2019	Not less than 7 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports by 31 March 2020	Not less than 7 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports by 31 March 2021	Not less than 7 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports by 31 March 2022

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2018/19	Medium-term targets			
			2015/16	2016/17		2017/18	2019/20	2020/21	2021/22
Strategic statement: To strategically develop priority science areas in which South Africa enjoys a competitive advantage, by promoting internationally competitive research and training activities and outputs									
Enhanced science modes capability of MeerKAT through additional receivers and correlator installations	Number of science mode receivers installed on MeerKAT	64 antennae commissioned for a single polarisation array by 31 March 2018 and Installation of 2 of 3 Science Modes (UHF; LSP; and S-Band) by 31 March 2020	20 MeerKAT antennae installed by 31 March 2016	32 antennae single polarisation array commissioned by 31 March 2017	64 antenna array commissioned by 31 March 2018	64 ultra-high frequency science mode receivers installed on Meer-KAT by 31 March 2019	8 large survey projects science mode receivers installed on MeerKAT Correlator by 31 March 2020	64 S-Band science mode receivers installed on MeerKAT by 31 March 2021	No target
Strategic statement: To promote public engagement on science, technology and innovation									

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2018/19	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
Participants ³⁶ in science awareness and engagement programmes managed by the NRF and other service providers	Number of participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers	Not less than 2,1 million people reached annually through science engagement activities as reflected in the project reports of the NRF and their service providers by 31 March 2020	2 718 078 participants reached through National Science Week in 2015, eight DST supported science festivals, the Rand Easter Show, and six events by other stakeholders	2 066 134 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 March 2017	2 575 839 people participated in DST science engagement programmes by 31 March 2018	Not less than 2,1 million 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 March 2019	Not less than 2,1 million 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 March 2020	Not less than 2,1 million 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 March 2021	Not less than 2,1 million 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 March 2022

³⁶ Participants include visitors to sites hosting awareness and engagement activities, or people reached through media.

Table 23: Quarterly targets for the 2019/20 financial year

Performance indicator	Reporting frequency	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total number of PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities	Quarterly	Not less than 3 100 PhD students awarded an annual bursary as reflected in the reports from the NRF and relevant entities by 31 March 2020	Not less than 1 500 PhD students awarded an annual bursary as reflected in the reports from NRF and relevant entities	Not less than 2 300 PhD students awarded an annual bursary as reflected in the reports from NRF and relevant entities	Not less than 2 800 PhD students awarded an annual bursary as reflected in the reports from NRF and relevant entities	Not less than 3 100 PhD students awarded an annual bursary as reflected in the reports from NRF and relevant entities by 31 March 2020
Total number of pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities	Quarterly	Not less than 10 800 pipeline postgraduate students awarded an annual bursary as reflected in the reports from the NRF and relevant entities by 31 March 2020	Not less than 5 400 pipeline postgraduate students (BTech and honours, and master's students) awarded an annual bursary	Not less than 8 100 pipeline postgraduate students (BTech and honours, and master's students) awarded an annual bursary	Not less than 9 500 pipeline postgraduate students (BTech and honours, and master's students) awarded an annual bursary	Not less than 10 800 pipeline postgraduate students (BTech and honours, and master's students) awarded an annual bursary by 31 March 2020
Total number of graduates and students placed in DST-funded work preparation programmes in SETI institutions	Quarterly	650 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2020	500 graduates and students placed in DST-funded work preparation programmes in SETI institutions	550 graduates and students placed in DST-funded work preparation programmes in SETI Institutions	600 graduates and students placed in DST-funded work preparation programmes in SETI institutions	650 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2020
Number of research infrastructure grants awarded per award letters annually	Biannually (Q2 and Q4)	20 annual research infrastructure grants awarded as per award letters by 31 March 2020	No target	Call for proposals on awarding of research infrastructure grants issued by 30 September 2019	No target	20 annual research infrastructure grants awarded as per award letters by 31 March 2020

Performance indicator	Reporting frequency	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total available broadband capacity provided by SANReN per annum	Biannually (Q2 and Q4)	3 500 Gbps total available broadband capacity provided by SANReN by 31 March 2020	No target	New links and upgrade plan finalised by 30 September 2019	No target	3 500 Gbps total available broadband capacity provided by SANReN by 31 March 2020
Total number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	Quarterly	Not less than 4 500 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2020	³⁷ Not less than 2 000 researchers awarded research grants through NRF-managed programmes	Not less than 3 500 researchers awarded research grants through NRF-managed programmes	Not less than 4 000 researchers awarded research grants through NRF-managed programmes	Not less than 4 500 researchers awarded research grants through NRF-managed programmes by 31 March 2020
Number of research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports	Annually	Not less than 7 000 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project reports by 31 March 2020	No target	No target	No target	Not less than 7 000 research articles published by NRF-funded researchers by 31 March 2020
Number of science mode receivers installed on MeerKAT	Biannually (Q2 and Q4)	8 large survey project (LSP) science mode installed on MeerKAT correlator by 31 March 2020	No target	SKA SA Project approved progress report on installation of LSP science modes on MeerKAT correlator provided by 30 September 2019	No target	8 LSP science mode installed on MeerKAT correlator by 31 March 2020

³⁷ The quarterly figures for this indicator are cumulative to year end.

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Performance indicator	Reporting frequency	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of participants in science awareness and engagement programmes annually as reflected in project reports of the NRF and other service providers	Quarterly	Not less than 2,1 million participants (learners and members of the public) in science awareness and engagement programmes annually as reflected in the project reports of the NRF and other service providers by 31 March 2020	Grant funding awarded to organisations implementing the initiatives by 30 June 2019	National Science Week held by 30 September 2019	3 science festivals and 6 science, technology, engineering, mathematics and innovation Olympiads and competitions held by 31 December 2019	4 science festivals conducted and Not less than 2.1 million participants in science awareness and engagement programmes as reflected in project reports of the NRF and other service providers by 31 March 2020

Reconciling performance targets with the budget and MTEF
Table 24: Research Development and Support expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation 2018/19	Medium-term expenditure estimates		
	2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
*Office of the Deputy-Director General	6 418	4 908	2 066	-	3 354	4 485	4 660
Human Capital and Science Promotion	2 331 826	2 354 551	2 384 852	2 460 011	2 608 661	2 739 484	2 869 913
Science Missions	177 004	213 070	201 731	225 755	235 532	248 933	264 315
Basic Science and Infrastructure	986 984	895 536	977 488	1 095 484	993 485	1 048 323	1 103 334
Astronomy	723 040	689 473	733 156	752 642	731 903	859 666	913 153
TOTAL	4 223 472	4 157 538	4 299 293	4 533 892	4 572 935	4 900 891	5 155 375
Compensation of employees	34 734	38 320	36 385	39 111	42 640	45 779	49 020
Goods and services	13 633	14 925	14 513	19 142	15 925	16 779	17 413
Transfers and subsidies	4 175 103	4 104 263	4 248 344	4 475 639	4 514 370	4 838 333	5 088 942
Payments for capital assets	-	-	-	-	-	-	-
Payments for financial assets	2	30	51	-	-	-	-
TOTAL	4 223 472	4 157 538	4 299 293	4 533 892	4 572 935	4 900 891	5 155 375

*This is as a result of the new approved budget for 2019MTEF and beyond

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.

Chief Directorates

Technology Localisation, Beneficiation and Advance Manufacturing

Chief Directorates

Sector Innovation and Green Economy

Chief Directorates

Innovation for Inclusive Development

Chief Directorates

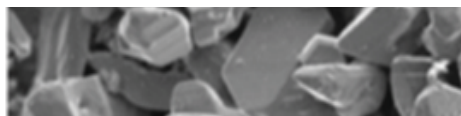
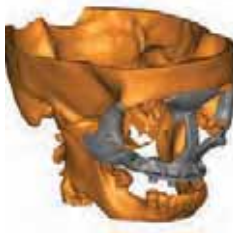
Science and Technology Investment

SOCIO-ECONOMIC INNOVATION PARTNERSHIPS

5



MANDELA MINING PRECINCT
MINDS FOR MINES



STRATEGIC OVERVIEW

Programme 5 contributes to all five of the Department's strategic outcome-oriented goals in the 2015-2020 Strategic Plan, namely, (i) a responsive, coordinated and efficient NSI; (ii) increased knowledge generation; (iii) human capital development; (iv) using knowledge for economic development; and (v) knowledge utilisation for inclusive development. The bulk of the effort and resources support efforts to use knowledge for economic and inclusive development.

Strategic Outcome-Oriented Goal 1:

A responsive, coordinated and efficient NSI

The Programme supports efforts to build an inclusive, responsive, coordinated and efficient NSI in several important ways.

It plays the lead role in guiding and investing in the development of core annual surveys and policy briefs on the nature and performance of the national system of innovation.

In the final year of the Strategic Plan, the focus will be on achieving the five-year target of 29 statistical reports and briefings. Over the remaining period of the Strategic Plan, the focus of the Programme will be on strengthening the capacity of implementing agencies responsible for the collection of data, supporting alignment with international practices, and facilitating the development of additional databases that will provide a deeper understanding of the NSI. This includes further updating of the newly developed database on RDI partnerships between industry and government, a detailed

assessment of the RDI efforts and contribution of state-owned enterprises, and enhancing a data series on green economy R&D. In support of the commitment to strengthen M&E in the new White Paper, there will be a significant focus on planning work to inform priorities and commitments in the 2020-2025 Strategic Plan cycle.

In 2019/20 the Programme will build on work started in the previous year with respect to advancing a transformative innovation policy agenda. A specific new area of work led by the Programme is an exploration of a transformative innovation policy as part of an international consortium.

The Programme has been leading a process over the last three years to introduce more effective budget processes to enable a more rational and strategic deployment of public funding for research and technological innovation. Cabinet approval was secured in the 2016/17 financial year for the introduction of suitable processes over the next three years in partnership with the National Treasury. In 2019/20 the short-term focus will remain on the improvement of databases with detailed information on public investment in research and technological innovation, and the development of a medium-term investment framework for research and technological innovation.

The Department's efforts to strengthen provincial and local innovation systems are led by the Programme. In the past few years there has been a greater appreciation of and focus on innovation at levels below national government. In 2018/19, the programme enhanced the

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approach to supporting the development of provincial and local innovation. This has enabled the DST to enter into more strategic partnerships with local-level innovation initiatives. Four partnership opportunities were selected through an open call for proposals, and this portfolio will be complemented with additional partnerships following a second call for proposals that was launched at the end of the 2018/19 financial year.

The Programme plays a significant role in encouraging increased levels of investment by the private sector. This includes the establishment of research and development partnerships between government and industry. In the current five-year Strategic Plan cycle, major progress has been made in growing seven Sector Innovation Funds with industry, as well as partnerships in mining and information and communication technologies. Donor funding from the European Union has been secured to enable the development of similar partnerships with the manufacturing sector, starting in 2019/20. In support of the emerging policy imperative to enhance South Africa's readiness for the Fourth Industrial Revolution, large-scale partnership opportunities will be prioritised for development in 2019/20 for implementation during the 2020-2025 Strategic Plan cycle.

Another major track is managing and strengthening the R&D tax incentive programme. Good progress has been made in implementing the recommendations of the task team established by the Minister in November 2015 on measures to advance the R&D tax incentive. The changes introduced thus far have addressed the major delays and difficulties

firms experienced in accessing the incentive. Application procedures have been simplified and new effort is directed at optimising the online system of submitting applications. There is also more clarity about the information requirements, as evidenced by the improved quality of applications. In the coming year, the DST will scale up efforts to raise awareness and reach a larger number of firms. A process for an impact evaluation to assess the economic returns of the incentive will be initiated in 2019 and is planned for completion during the financial year 2019/20.

The Programme has invested in the establishment of small but focused project management units (PMUs) to enhance coordination in selected cognate areas through data collection and analysis, catalytic interventions, partnership development and outreach. This includes a water PMU (located at the Water Research Commission), a waste PMU and the Office for Digital Advantage (both managed by strategic implementation units at the CSIR), and an Innovation for Inclusive Development PMU (at the Technology Innovation Agency).

The DST will continue providing strategic support to strengthen and mature the PMUs over the remaining period of the Strategic Plan.

Strategic Outcome-Oriented Goal 2: Increased Knowledge Generation

In line with its responsibility to strengthen socio-economic innovation partnerships, the Programme is a significant investor in knowledge and innovation that broadly supports

economic development. The specific focus has been on knowledge and innovation with industrial development, sustainable development, or inclusive development potential. Key areas of investment include niche areas with high development potential, including advanced metals, advanced manufacturing, chemicals, agroprocessing information and communications technology, government service delivery, mining, water and sanitation, and waste.

Investments by the Programme over the last three years have enabled the development of two innovation partnership portfolios, one supporting industrial development and the other supporting sustainable development. Over the next three years, the Programme will continue working with implementing agencies to enlarge the two portfolios, and support efforts to have the innovation partnerships commercialised, socialised, or introduced within government. This will include further strengthening of partnerships with local and international players.

Strategic Outcome-Oriented Goal 3:

Human Capital Development

The human capital development efforts of the Programme are fully aligned with its knowledge generation efforts. Targeted investment support is provided within knowledge-generation initiatives to support human capital development in technical areas such as design, engineering and manufacturing, as well as to provide postgraduate support (at honours, master's and PhD levels) in niche areas.

Since 1 April 2015, an estimated 668 students have been supported in these priority areas at honours, master's and PhD levels. In addition, the Programme has exceeded its five-year targets for support to interns. As at the end of the 2018/19 financial year, the Department has provided funding and hosting support to more than 500 interns in various technical areas, allowing them to complete their qualifications and gain valuable industry experience.

In the final year of the current five-year Strategic Plan cycle, the Programme will finalise a critical review of its investments aimed at providing targeted investment support that helps to unlock specific industrial, sustainable or inclusive development opportunities. The critical review will explore how to accelerate promising initiatives, drop initiatives that hold limited promise and, most importantly, look at how initiatives can support priority imperatives such as inclusion, transformation and economic transformation. The bulk of the investment support is linked to existing long-term strategic areas that the Programme has been supporting.

A review of existing long-term strategic areas will be complemented by assessing how best to support important new opportunity areas. These are linked largely to areas associated with the next industrial revolution, government service delivery, and sustainable development. The support will include targeted areas in the human and social sciences, such as programmes aimed at understanding the future world of work.

A greater focus on transformation (including individual and institutional) imperatives will underpin future investments in HCD.

Partnerships will be established with labour market information programmes to facilitate a greater alignment between human capital development efforts and the development of long-term research and technology development programmes that can absorb the human capital being supported.

Strategic Outcome-Oriented Goal 4:

Knowledge exploitation for economic development

A significant portion of the focus of staff and investment support by the Programme is aligned to efforts to exploit knowledge for economic development. This is primarily through the Programme's Strategic Objective 2 (sustainable development) and Strategic Objective 3 (R&D-led industry development). In the past three years, the Programme has achieved the following:

- The Technology Localisation Programme, as implemented by the Technology Localisation Implementation Unit (TLIU), has matured into a dynamic support intervention playing a vital role in government efforts to leverage public procurement opportunities. The TLIU has received recognition from the Department of Trade and Industry, the Portfolio Committee on Science and Technology, National Treasury and the Department of Public Enterprises for the level of local production and exports achieved by firms that have received support from the TLIU. These stakeholders are working with the DST to grow and strengthen the programme.
- The Technology Stations Programme (TSP),

located at 13 higher education institutions across the country, has matured as a platform for launching other economic development interventions, in addition to providing technological support to at least 2 000 enterprises (including small and medium enterprises and potential entrepreneurs) per annum. Some of the additional interventions achieved by scaling up the TSP investment include the following:

- Addressing specific areas of concern (e.g. creating opportunities for young black people and expanding the geographical footprint of the TSP) through targeted calls and ring-fenced funding.
- Using the technology stations as incubators, or centres for providing specialised industry support (e.g. casting simulations for the foundry sector), or as partners to other departmental interventions (e.g. the Department of Small Business Development's Centres for Entrepreneurship).
- The establishment of the mining and mining equipment research, technology and innovation (RTI) development programme at the Mining Hub in Carlow Road (now the Mandela Mining Precinct) has been completed and the first collaborative research and technology projects started in 2017/18. The importance of the RTI programme is demonstrated by co-funding from the Minerals Council South Africa amounting to R30 million, resulting in a 1:2 (industry: government) funding ratio.
- The strengthening of a range of other

youth-focused economic development interventions, including scaling up an entrepreneurs development programme, expanding the network of mLabs and idea-to-product labs, strengthening a grassroots innovation programme and a community journalist programme, and interventions aimed at taking advantage of new economy opportunities (for example, mobile IPTV and data science).

In addition to enhancing the momentum and value-add of the existing investments, a specific focus in 2019/20 will be on ensuring greater synergies and alignment between various initiatives supported by the DST, as well as alignment with initiatives championed by other economic sector departments. This will enable greater impact from the DST investments over the 2020-2025 Strategic Plan cycle. Over the next two to three years, the focus will largely be on strengthening initiatives that have proven evidence of success, further maturing long-term technology development interventions aimed at developing new industries and firms, and targeted programmes that advance transformation objectives (race, gender, youth, and spatial). Immediate priorities include the following:

- Further strengthening and expanding the TLIU's activities, including the development of strategic partnerships and securing co-funding from large firms.
- Completion of the technology development of the Aeroswift project and the implementation of the commercialisation plan.
- Further scaling up of the Technology Stations

Programme, including the development of strategic partnerships and co-funding opportunities.

- Expanding partnerships and collaborations for the additive manufacturing programme, mining and mining equipment RTI, the titanium metal powder development programme, fluorspar beneficiation, waste STI, water STI, and ICT.

Under the leadership of the programme and in cooperation with other programmes and the various entities of the DST, work will continue on shaping a targeted and value-adding STI response in response to opportunities and challenges presented by the Fourth Industrial Revolution. Key to the response is the need to continue building on existing initiatives which have started building deep capabilities in the various technological areas that will drive a Fourth Industrial Revolution world including data analytics, artificial intelligence, the internet of things, cybersecurity, additive manufacturing, drones, next generation connectivity, and blockchain. Through the development of a Converging Technologies Platform, the DST will support the integration of various technologies to address challenges in various application areas including health, agriculture, mining, manufacturing, education, and services.

Over the past year, the CSIR underwent a major process of review and reflection aimed at building on its scientific research foundation whilst significantly growing its industrial development portfolio. This has resulted in a new organisational strategy for the CSIR with enhancements to its operational model.

In 2019/20, the Programme will work closely

with the CSIR to ensure that the priorities and plans are factored into the next 5-year strategic plan of the DST as well as the decadal plan. The programme will also assist with the alignment of the plans of the CSIR with the priorities and plans of the incoming administration.

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

The second biggest area of focus for the Programme is facilitating knowledge utilisation for inclusive development.

Over the last three years, the Programme has maintained its innovation for local economic development interventions in selected priority district municipalities, with the specific intention of advancing the integration of innovation into local economic development. Through these interventions, community-based local economic development projects have been able to contribute towards job creation and skills development, and to improve the material well-being of participants. The projects have also enabled access to innovation infrastructure in support of local economic development, mainly in geographically marginalised rural areas.

Starting from the 2018/19 financial year, there was a greater focus on enhancing local systems of innovation at local government level, to ensure that the systems were inclusive and responsive. Among other things, innovation partnerships and networks between local government and higher education institutions, research councils and incubators, among other players, will be strengthened.

The NDP calls for South Africa to "draw on the

energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state and promoting leadership and partnerships throughout society", and strengthening local systems of innovation is a critical part of this.

Investment in grassroots innovation in support of township and rural economies will be expanded, taking into account the lessons learnt over the pilot phase of the grassroots innovation programme, and strengthening links with India.

In recognition of the need to achieve the inclusive development goals of the National Development Plan and the new White Paper, the DST has piloted the Grassroots Innovation Programme with the primary objective of identifying and supporting grassroots innovators in order to enhance their innovative products through a range of interventions, including funding, skills development, prototype development, entrepreneurship and access to markets. Grassroots innovators have been defined as individuals who undertake innovations to solve local challenges using local resources and capabilities, working outside the realm of formal research institutions. The programme has committed to enrolling 100 innovators by March 2020 and to expanding to at least five provinces.

In contributing towards a capable state, the Programme has made significant gains in the past three years. Service delivery planning decision-support tools continued to be maintained and demonstrated in a range of municipalities, with an emphasis on the priority

district municipalities. The DST will continue implementing decision-support tools (including for spatial planning, disaster management and water resource management) to strengthen government capacity to deliver services in key areas.

The development of a framework for measuring the impact of STI on quality of life started in the 2018/19 financial year and will be taken forward. The framework will be relevant not only to South Africa, but also as part of the Sustainable Development Goals agenda.

In using knowledge for inclusive development, the Programme will continue its service delivery innovative technology demonstration portfolio in water and sanitation, basic education, ICT and local economic development, among other areas. Government cluster workshops and seminars will continue to be hosted in the 2019/20 financial year in support of government priorities such as ICT in basic education, Operation Phakisa, integrating innovation in the delivery of basic services, and unlocking economic development opportunities through the delivery of social infrastructure.

The knowledge products that are being prioritised for the 2019/20 financial year will therefore be aligned with government priorities and policy decisions. This will enable the Programme to build on its previous successes and ensure that its knowledge products influence evidence-based policy decisions in government. The Innovation for Inclusive Development Programme includes efforts to build a capable state through decision-support tools and evidence.

Finally, the DST will initiate a new medium-term

innovation for service delivery programme in 2019/20 in partnership with the Department of Cooperative Governance and Traditional Affairs, the South African Local Government Association, the Centre for Public Service Innovation and the National Treasury. The programme will be funded through a new grant secured from the European Union.

The new White Paper on Science and Technology will have a significant impact on the formulation of the strategic objectives and performance indicators that will underpin the work of the Programme over the 2020-2025 Strategic Plan cycle. A major focus in 2019/20 will be on the identification and development of performance indicators in line with the new White Paper, which will inform future investments. Targets for most of the indicators that are unlikely to be carried into the 2020-2025 Strategic Plan have therefore not been defined.

STRATEGIC OBJECTIVES AND STRATEGIC STATEMENTS

OBJECTIVE
Innovation for rural and socio-economic development

STATEMENT
Through knowledge, evidence and learning, to inform and influence how S&T can be used to achieve inclusive development

OBJECTIVE
S&T for sustainable development and a green economy

STATEMENT
To identify, grow and sustain niche high-potential STI capabilities for sustainable development and the greening of society and the economy

OBJECTIVE
Support the development of new and existing R&D-led industries in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds

STATEMENT
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

STATEMENT
To strengthen provincial and rural innovation and production systems through analysis and catalytic interventions

OBJECTIVE
Support provincial and rural innovation

STATEMENT
To enhance understanding and analysis that support improvements in the functioning and performance of the NSI

OBJECTIVE
Facilitate the provision of data on the NSI's performance

STATEMENT
To introduce and manage interventions and incentive programmes that increase the level of private sector investment in scientific or technological R&D

OBJECTIVE
Increased private-sector investment in RDI

5

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 benefits include 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. The Innovation for Inclusive Development portfolio also includes a focus on innovation to strengthen and advance local economic development. This will be done by building and enhancing local STI capabilities, integrating innovation in catalytic local industries, clusters and value-chains, and exploiting technology and innovation for priority sectors such as agriculture, agroprocessing, aquaculture and fisheries.

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, 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 25: Programme risk management and identification – Socio-economic Innovation Partnerships

Strategic objective	Risk description	Mitigation action
Innovation for rural and socio-economic development	<p>Inadequate mechanisms to disseminate relevant knowledge and evidence for informing and influencing decision making by organisations</p> <p>Inadequate uptake and scale-up of solutions by line departments</p>	<p>Continue to engage key stakeholders through various platforms to disseminate information</p> <p>Develop appropriate instruments to enable scale up and uptake of solutions</p>
S&T for sustainable development and a green economy	<p>Due to capacity constraints, the Programme may be unable to keep up with the evolving area for the development of public policies relating to environmental management.</p> <p>The Programme may be unable to fully implement the Water and Waste RDI initiative.</p>	<p>Engage with HRM for appropriate staffing solutions.</p> <ul style="list-style-type: none"> • Increase engagements with the private sector to leverage funding • Request that the Water and Waste RDI Implementation Plan is included in the DST MTEF budget bids • Escalate conflicting priority challenges to the DDG, the DG then the Minister
Support the development of new and existing R&D-led industries in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and the Industry Innovation Programme (incl. SIF)	<p>Having a portfolio of projects that does not have the potential to impact on industrial development.</p> <p>Projects not delivered as planned by implementation entities</p>	<ul style="list-style-type: none"> • Capture and disseminate lessons learned for portfolio of projects. • Identify key flagship projects based on contract value (R30 000 000 and above over three years); time (project duration exceeding three years); or potential socio-political or economic impact • Improve the quality of the reports from the implementing agencies
Support provincial and rural innovation	<p>Provincial and local government may not provide funding or take ownership of catalytic interventions</p> <p>Lack of inclusivity of catalytic interventions</p>	<ul style="list-style-type: none"> • Develop a strategic engagement framework to inform DST's approach to create innovation enabling interventions at provincial level • Develop a strategic engagement framework to inform DST's approach to create innovation enabling interventions at provincial level
Strategic objective	Risk description	Mitigation action

Facilitate the provision of data on the NSI's performance	Statistics and indicators commissioned may not adequately meet policy requirements.	<ul style="list-style-type: none"> • Exco approval of all major changes to existing measurement relating to the Frascati Manual and Oslo Manual, policy requirements, policy dialogue with user community and R&D and Innovation survey review workshops) • Exco approval of all new measurement requirements for S&T measurement instruments (e.g. additional reporting requirements from the new White Paper on STI) • Extract more value from local and international arrangements by ensuring the outcomes and learning of the international engagements are shared with the team members and are properly evaluated and adapted • Engage with Statistics SA and HSRC regarding data access to the R&D survey and Business Innovation survey
Increased private-sector investment in RDI	Production of poor quality (e.g. coverage, accuracy) statistics	<ul style="list-style-type: none"> • Regularly monitor adherence to timelines by Science and Technology Indicators unit and Research and Development Planning unit • Maintain the established benchmarks/ standards for assessing the quality of each statistical report. • Develop, sign and implement a memorandum of agreement with CeSTII to implement the data sharing specifications with NACI
	Administrative and adjudication errors in projects of applicant companies	<ul style="list-style-type: none"> • Monitor the effectiveness of R&D tax incentive guidelines to identify any need for changes • Implement the mechanism for handling non-approved R&D tax incentive applications in line with the Promotion of Administrative Justice Act • Continuous monitoring to ensure alignment of the section 11D of the Income Tax Act with policy on increasing R&D investment in South Africa • Annual meetings with industry to enhance understanding and usage of the R&D tax incentives
	Not achieving the targeted turnaround time in providing a decision to applicant companies	<ul style="list-style-type: none"> • Optimise the online application submission system • Increase the number and improve the management of external experts to adhere to quality and deadlines • Continue to request for capacity for the directorate

Table 26: Strategic objective with five-year Strategic Plan targets (the targets are reflected as cumulative numbers for every year of implementation over the Strategic Plan term)

The ensuing sections of the Annual Performance Plan (APP) should be read in conjunction with Annexure D of the 2018/19 APP which reflects the changes made to the 2015-2020 Strategic Plan.

Strategic objectives	Five-year Strategic Plan target	Planned targets over the five-year Strategic Planning Horizon				
		2015/16	2016/17	2017/18	2018/19	2019/20
1. Innovation for rural and socio-economic development	At least 26 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2020	4 knowledge products on innovation for inclusive development published by 1 April 2015 and 31 March 2016	8 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2017	14 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2018	At least 20 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2019	At least 26 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2020
	At least 10 decision-support systems introduced, maintained and improved between 1 April 2015 and 31 March 2020	5 decision-support systems maintained and improved between 1 April 2015 and 31 March 2016	7 decision-support systems maintained and improved between 1 April 2015 and 31 March 2017	8 decision-support systems introduced, maintained and improved between 1 April 2015 and 31 March 2018	At least 10 decision-support systems introduced, maintained and improved between 1 April 2015 and 31 March 2019	At least 10 decision-support systems introduced, maintained and improved between 1 April 2015 and 31 March 2020
	At least 45 learning interventions (seminars) generated between 1 April 2015 and 31 March 2020	9 learning interventions (seminars) generated between 1 April 2015 and 31 March 2016	18 learning interventions (seminars) generated between 1 April 2015 and 31 March 2017 (Indicator erroneously left out of 2015/16 APP)	27 learning interventions (seminars) generated between 1 April 2015 and 31 March 2018	At least 36 learning interventions (seminars) generated between 1 April 2015 and 31 March 2019	At least 45 learning interventions (seminars) generated between 1 April 2015 and 31 March 2020

Strategic objectives	Planned targets over the five-year Strategic Planning Horizon					
	Five-year Strategic Plan target	2015/16	2016/17	2017/18	2018/19	2019/20
2. S&T for sustainable development and a green economy	375 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 March 2020	50 master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development between 1 April 2015 and 31 March 2016	105 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development between 1 April 2015 and 31 March 2017	195 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development between 1 April 2015 and 31 March 2018	285 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development between 1 April 2015 and 31 March 2019	375 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 1 April 2015 and 31 March 2020
	At least 22 knowledge and innovation products that support sustainable development added to the IP portfolio through fully funded research by 31 March 2020	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 between 1 April 2015 and 31 March 2016	8 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research between 1 April 2015 and 31 March 2017	12 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research between 1 April 2015 and 31 March 2018	At least 16 knowledge and innovation products that support sustainable development added to the IP portfolio through fully funded or co-funded research between 1 April 2015 and 31 March 2019	At least 22 knowledge and innovation products that support sustainable development added to the IP portfolio through fully funded or co-funded research between 1 April 2015 and 31 March 2020

Strategic objectives	Planned targets over the five-year Strategic Planning Horizon				
	2015/16	2016/17	2017/18	2018/19	2019/20
3. Support the development of new and existing R&D-led industries in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and the Industry Innovation Programme (incl. SIF)	1 454 high-level graduates (at least unique 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 March 2020	672 high-level 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) between 1 April 2015 and 31 March 2017	960 high-level 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) between 1 April 2015 and 31 March 2018	1 202 high-level graduates (at least master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, IIP and SIFs) between 1 April 2015 and 31 March 2019	1 454 high-level graduates (at least master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, IIP and SIFs) between 1 April 2015 and 31 March 2020
	590 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2020	440 interns fully funded or co-funded in R&D related to design, manufacturing and product development between 1 April 2015 and 31 March 2017	540 interns fully funded or co-funded in R&D related to design, manufacturing and product development between 1 April 2015 and 31 March 2018	590 interns fully funded or co-funded in R&D related to design, manufacturing and product development between 1 April 2015 and 31 March 2019	710 ³⁸ interns fully funded or co-funded in R&D related to design, manufacturing and product development between 1 April 2015 and 31 March 2020

³⁸The target was intentionally exceeded in order to help increase youth skills.

Strategic objectives	Planned targets over the five-year Strategic Planning Horizon					
	Five-year Strategic Plan target	2015/16	2016/17	2017/18	2018/19	2019/20
	137 industrially relevant knowledge and innovation products added to IP portfolio through fully funded or co-funded research initiatives	25 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 between 1 April 2015 and 31 March 2016	60 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 between 1 April 2015 and 31 March 2017	77 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 between 1 April 2015 and 31 March 2018	103 industrially relevant 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 between 1 April 2015 and 31 March 2019	137 industrially relevant 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 between 1 April 2015 and 31 March 2020
	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2020	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development between 1 April 2015 and 31 March 2016	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development between 1 April 2015 and 31 March 2017	6 ³⁹ instruments funded in support of increased localisation, competitiveness and R&D-led industry development between 1 April 2015 and 31 March 2018	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development between 1 April 2015 and 31 March 2019	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development between 1 April 2015 and 31 March 2020

³⁹ The drop in target is because the ECSP funding that the DST, is drastically reduced after 31 March 2017.

Strategic objectives	Five-year Strategic Plan target	Planned targets over the five-year Strategic Planning Horizon				
		2015/16	2016/17	2017/18	2018/19	2019/20
4. Support provincial and rural innovation	At least 12 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2020	2 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2015 and 31 March 2016	4 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2015 and 31 March 2017	6 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2015 and 31 March 2018	At least 12 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2015 and 31 March 2019	At least 12 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2015 and 31 March 2020
5. Facilitate the provision of data on the NSI's performance	At least 29 statistical reports or policy briefs approved by Exco for publication and/ or submission to Cabinet by 31 March 2020	5 reports and policy briefings on the innovation system and innovation policy approved by Exco/ published between 1 April 2015 and 31 March 2016	11 reports and policy briefings on the innovation system and innovation policy approved by Exco/ published between 1 April 2015 and March 2017	17 statistical reports and policy briefs submitted to Cabinet between 1 April 2015 and 31 March 2018	At least 23 statistical reports or policy briefs approved by Exco for publication and/ or submission to Cabinet between 1 April 2015 and 31 March 2019	At least 29 statistical reports or policy briefs approved by Exco for publication and/ or submission to Cabinet between 1 April 2015 and 31 March 2020
6. Increased private-sector investment in RDI	Preapproval decisions provided within 90 days of date of receipt for 80% of applications received for the R&D tax incentive by 31 March 2020	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive between 1 April 2015 and 31 March 2016	Preapproval decisions provided within 120 days of date of receipt of application for the R&D tax incentive between 1 April 2015 and 31 March 2017	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive between 1 April 2015 and 31 March 2018	Preapproval decisions provided within 90 days of date of receipt for 80% of applications for the R&D tax incentive received between 1 January 2018 and 31 December 2018	Preapproval decisions provided within 90 days of date of receipt for 80% of applications for the R&D tax incentive received between 1 January 2019 and 31 December 2019

Table 27: Strategic statements, performance indicators, and annual and MTEF targets for 2019/20

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
Strategic statement: Through knowledge, evidence and learning, to inform and influence how S&T can be used to achieve inclusive development									
Knowledge products ⁴⁰	Number of knowledge products on innovation for inclusive development published	At least 26 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2020	5 knowledge products (two case studies) were completed and published on the DST website 31 March 2017	5 knowledge products on innovation for inclusive development published by 31 March 2017	7 knowledge products on innovation for inclusive development published by 31 March 2018	6 knowledge products on innovation for inclusive development published by 31 March 2019	6 knowledge products on innovation for inclusive development published by 31 March 2020	6 knowledge products on innovation for inclusive development published by 31 March 2021	6 knowledge products on innovation for inclusive development published by 31 March 2022
Decision-support interventions ⁴¹	Number of decision-support interventions introduced and maintained	At least 10 decision-support systems introduced, maintained and improved between 1 April 2015 and 31 March 2020	6 decision-support systems maintained and two introduced by 31 March 2016	7 decision-support systems maintained and improved by 31 March 2017	10 decision-support systems maintained and improved by 31 March 2018	10 decision-support systems maintained and improved by 31 March 2019	10 decision-support systems maintained and improved by 31 March 2020	No target	No target

⁴⁰Knowledge 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, which deal with specifications or specific technical challenges that could affect 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.

⁴¹Decision-support interventions help people think about choices they face; they describe where and why there is a choice, 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	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18		2018/19	2019/20	2020/21
Learning interventions ⁴² (seminars) generated	Number of learning interventions (seminars) generated	At least 45 learning interventions (seminars) generated between 1 April 2015 and 31 March 2020	9 learning interventions (seminars) generated by 31 March 2016	10 learning interventions (seminars) generated by 31 March 2017	13 learning interventions (seminars) generated by 31 March 2018	9 learning interventions (seminars) generated by 31 March 2019	9 learning interventions (seminars) generated by 31 March 2020	9 learning interventions (seminars) generated by 31 March 2021	9 learning interventions (seminars) generated by 31 March 2022
Strategic statement: To identify, grow and sustain niche high-potential STI capabilities for sustainable development and the greening of society and the economy									
High-level ⁴³ 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	375 unique 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 March 2020	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 March 2016	102 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 March 2017	106 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 March 2018	90 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 March 2019	90 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 March 2020	90 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 March 2021	90 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 March 2022

⁴² 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.

⁴³ 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. The Waste Management Honours will be targeted.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance					Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18	2018/19	2019/20		2020/21	2021/22	
Knowledge and innovation products that support sustainable development	Number of knowledge and innovation products that support sustainable development	At least 22 knowledge and innovation products that support sustainable development added to the IP portfolio through fully funded or co-funded research by 31 March 2020	4 knowledge and innovation products (for example, patents, prototypes, demonstrators, methodologies and technology transfer packages) added to the sustainable development IP portfolio through fully funded or co-funded research by 31 March 2016	4 knowledge and innovation products (for example, patents, prototypes, demonstrators, methodologies and technology transfer packages) added to the sustainable development IP portfolio through fully funded or co-funded research by 31 March 2017	5 knowledge and innovation products (for example, patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research by 31 March 2018	4 knowledge and innovation products (for example, patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research by 31 March 2019	4 knowledge and innovation products (for example, patents, prototypes, technology demonstrators and technology transfer packages) added to the sustainable development IP portfolio through fully funded or co-funded research by 31 March 2020	6 knowledge and innovation products (for example, patents, prototypes, technology demonstrators and technology transfer packages) added to the sustainable development IP portfolio through fully funded or co-funded research by 31 March 2021	6 knowledge and innovation products (for example, patents, prototypes, technology demonstrators and technology transfer packages) added to the sustainable development IP portfolio through fully funded or co-funded research by 31 March 2022		

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance	Medium-term targets			
			2015/16	2016/17	2017/18	2018/19		2019/20	2020/21	2021/22	
Strategic statement: To identify, grow and sustain niche high-potential STI capabilities that –											
<ul style="list-style-type: none"> improve the competitiveness of existing industries with growth potential in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs, and the Industry Innovation Programme (incl. Sector Innovation Funds); and 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) by 31 March 2020	1 454 ⁴⁴ 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 March 2020	338 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 March 2016	334 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 March 2017	291 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 March 2018	At least 242 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 March 2019	At least 252 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 March 2020	At least 300 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 March 2021	At least 300 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 March 2022		

⁴⁴This falls within the next five year strategic plan cycle. No target provided taking into account existing efforts to enhance the approach to Human Capital Development in the next five-year cycle.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18		2018/19	2019/20	2020/21
	Number of interns fully funded or co-funded in R&D related to design, manufacturing and product development	590 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2020	309 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2016	216 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2017	195 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2018	At least 126 ⁴⁵ interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2019	120 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2020	No target	No target
Industrially relevant knowledge and innovation products ⁴⁶	Number of knowledge and innovation products added to the IP portfolio through fully funded or co-funded research initiatives	127 Industrially relevant knowledge and innovation products added to the IP portfolio by 31 March 2020	38 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio by 31 March 2016	36 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio by 31 March 2017	38 ⁴⁷ knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio by 31 March 2018	At least 26 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development IP portfolio by 31 March 2019	At least 50 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development IP portfolio by 31 March 2020	At least 50 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development IP portfolio by 31 March 2021	At least 50 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development IP portfolio by 31 March 2022

⁴⁵In alignment with the national priority on your, the DST has utilized the accumulated interest to support an additional 120 interns, despite the fact that the strategic target has been achieved in FY 2017/18.

⁴⁶Knowledge 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.

⁴⁷The target was reduced because the ECSP funding that the DST received was drastically reduced after 31 March 2017.



Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18	2018/19		2019/20	2020/21	2021/22
Funding instruments to increase localisation, competitiveness and R&D-led industry development	Number of instruments funded in support of increased localisation, competitiveness and R&D-led industry development ⁴⁸	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2020	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2016	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2017	6 ⁴⁹ instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2018	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2019	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2020	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2021	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2022	
Strategic statement: To strengthen provincial and rural innovation and production systems through analysis and catalytic interventions										
Innovation support interventions funded or co-funded that strengthen with provincial or rural innovation systems	Number of innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems	12 innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2020	4 innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2016	7 innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems by 1 April 2016 and 31 March 2017	5 innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2016 and 31 March 2018	8 innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2016 and 31 March 2019	12 innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2016 and 31 March 2020	8 innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2020 and 31 March 2021	8 innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2020 and 31 March 2022	

⁴⁸An instrument refers to an entity (including a virtual entity) formally established (by contract), which is used in support of R&D-led industrial development.

⁴⁹The drop in target is due to the fact that the ECSP funding that the DST received ended in March 2017.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18		2018/19	2019/20	2020/21
Strategic statement: To enhance understanding and analysis that support improvements in the functioning and performance of the NSI.									
Statistical reports and policy briefs approved by Exco/ published/ submitted to Cabinet	Number statistical reports and policy briefs approved by Exco for publication and/ or submission to Cabinet	At least 29 reports and policy briefings on the innovation system and innovation policy approved by Exco for publication or submission to Cabinet by 31 March 2020	2 reports/ policy briefings approved by Exco/ published by 31 March 2015 2014/15 report on government-funded science and technology activities (STAs) 2013/14 national survey on research and experimental development published Cab memo tabled to brief Cabinet about the result	6 reports and policy briefings on the innovation system and innovation policy approved by Exco/published by 31 March 2017; 2015/16 STA report. 2014/15 R&D survey report 2015/16 R&D tax incentive report Baseline survey report of Intellectual Property and Technology Transfer of Publicly Funded Research Report on R&D trends of state-owned enterprises DST position document on identified R&D tax incentive policy issues approved and presented to the National Treasury	3 statistical reports or policy briefs submitted to Cabinet by 31 March 2018.	6 statistical reports or policy briefs approved by Exco for publication and/or submitted to Cabinet by 31 March 2019	6 statistical reports or policy briefs approved by Exco for publication and/or submitted to Cabinet by 31 March 2020	6 statistical reports or policy briefs approved by Exco for publication and/or submitted to Cabinet by 31 March 2021	6 statistical reports or policy briefs approved by Exco for publication and/or submitted to Cabinet by 31 March 2021
Strategic statement: To introduce and manage interventions and incentive programmes that increase the level of private sector investment in scientific or technological R&D									



Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2015/16	2016/17	2017/18		2018/19	2019/20	2020/21
Strategic statement: To introduce and manage interventions and incentive programmes that increase the level of private sector investment or technological R&D									
Companies accessing the R&D tax incentive	Turnaround time in providing preapproval decisions on applications for the R&D tax incentive	Preapproval decisions provided within 90 days of date of receipt for 80% of applications received for the R&D tax incentive by 31 March 2020	By 31 March 2016, 255 applications were still to be finalised. Of these, 16 were received before January 2014, 90 were received in 2014; 108 were received in 2015; and 41 were received in 2016.	By 31 March 2017, only 13 applications had received decision letters within 120 days. The average number of days for providing decisions was reduced from 266 days (application received in 2015) to 147 days (applications received in 2016).	Preapproval decisions provided within 101 days (on average)	Preapproval decisions provided within 90 days from date of receipt for 80% of applications received for the R&D tax incentive between 1 January 2018 to 31 December 2018	Preapproval decisions provided within 90 days of date of receipt for 80% of applications for the R&D tax incentive received between 1 January 2019 and 31 December 2019	Preapproval decisions provided within 90 days from date of receipt for 80% of applications for the R&D tax incentive received between 1 January 2020 and 31 December 2020	Preapproval decisions provided within 90 days from date of receipt for 80% of applications for the R&D tax incentive received between 1 January 2021 and 31 December 2021

⁵⁰The applications received in the fourth quarter are excluded from this indicator because not all these applications can be provided with decisions in that quarter, but only in the first quarter of a new financial year. The 20% accounts for a delay, which occurs on complex applications and where a non-approval decision is likely. Applications that require further information or clarification from the applicant take more time to finalise. Where non-approval is likely, applicants are given 15 days to make a submission in accordance with the Promotion of Administrative Justice Act on why such a decision should not be taken.

Table 28: Quarterly targets for the 2019/20 financial year

Performance indicator	Reporting frequency	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of knowledge products on innovation for inclusive development published	Quarterly	6 knowledge products on innovation for inclusive development published by 31 March 2020	1 knowledge product on innovation for inclusive development published between 1 April 2019 and 30 June 2019	2 knowledge products on innovation for inclusive development published between 1 April 2019 and 30 September 2019	3 knowledge products on innovation for inclusive development published between 1 April 2019 and 31 December 2019	6 knowledge products on innovation for inclusive development published on DST website by 31 March 2020
Number of decision-support interventions introduced and maintained	Quarterly	10 decision-support systems maintained and improved by 31 March 2020	Annual work plan approved for at least 2 decision-support systems between 1 April 2019 and 30 June 2019	Annual work plan approved for at least 8 decision-support systems between 1 April 2019 and 30 September 2019	Annual work plan approved for at least 10 decision-support systems between 1 April 2019 and 31 December 2019	10 decision-support systems maintained and improved between 1 April 2019 and 31 March 2020
Number of learning interventions (seminars, briefs, policy papers) generated	Quarterly	9 learning interventions (seminars) generated by 31 March 2020	At least 1 learning intervention (seminars) between 1 April and 30 June 2019	At least 2 learning interventions (seminars) between 1 April and 30 September 2019	At least 5 learning interventions (seminars) between 1 April and 31 December 2019	At least 9 learning interventions (seminars) between 1 April 2019 and 31 March 2020
Number of honours, master's and doctoral students fully funded or co-funded in designated niche areas	Biannual (reporting Q1 and Q4)	90 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 March 2020	50 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development between 1 April 2019 and 30 June 2019	No target	No target	90 honours, master's and doctoral students fully funded in designated niche areas that support the green economy and sustainable development or co-funded between 1 April 2019 and 31 March 2020



Performance indicator	Reporting frequency	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of knowledge and innovation products (for example, patents, prototypes, technology demonstrators, methodologies, and technology transfer packages) added to the sustainable development IP portfolio	Quarterly (reporting Q2, Q3, and Q4)	4 knowledge and innovation products (for example, patents, prototypes, demonstrators, methodologies, and technology transfer packages) added to the sustainable development IP portfolio between 1 April 2019 and 31 March 2020	No target	At least 1 knowledge or innovation products added to the industrial development IP portfolio between 1 April 2019 and 30 September 2019	At least 1 knowledge or innovation products added to the industrial development IP portfolio between 1 April 2019 and 30 December 2019	At least 4 knowledge or innovation products added to the industrial development IP portfolio between 1 April 2019 and 31 March 2020
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, the Industry Innovation Programme and the Sector Innovation Fund)	Biannual (reporting Q1 and Q4)	252 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme and the Sector Innovation Fund) by 31 March 2020	200 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, Industry Innovation Programme and the Sector Innovation Fund)	No target	No target	An additional 52 master's and doctoral students funded or co-funded by 31 March 2020, taking the total for the year to 252
Number of interns fully funded or co-funded in R&D related to design, manufacturing and product development	Biannual (reporting Q1 and Q4)	120 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2020	100 interns fully funded or co-funded in R&D related to design, manufacturing and product development	No target	No target	20 interns fully funded or co-funded in R&D related to design, manufacturing and product development

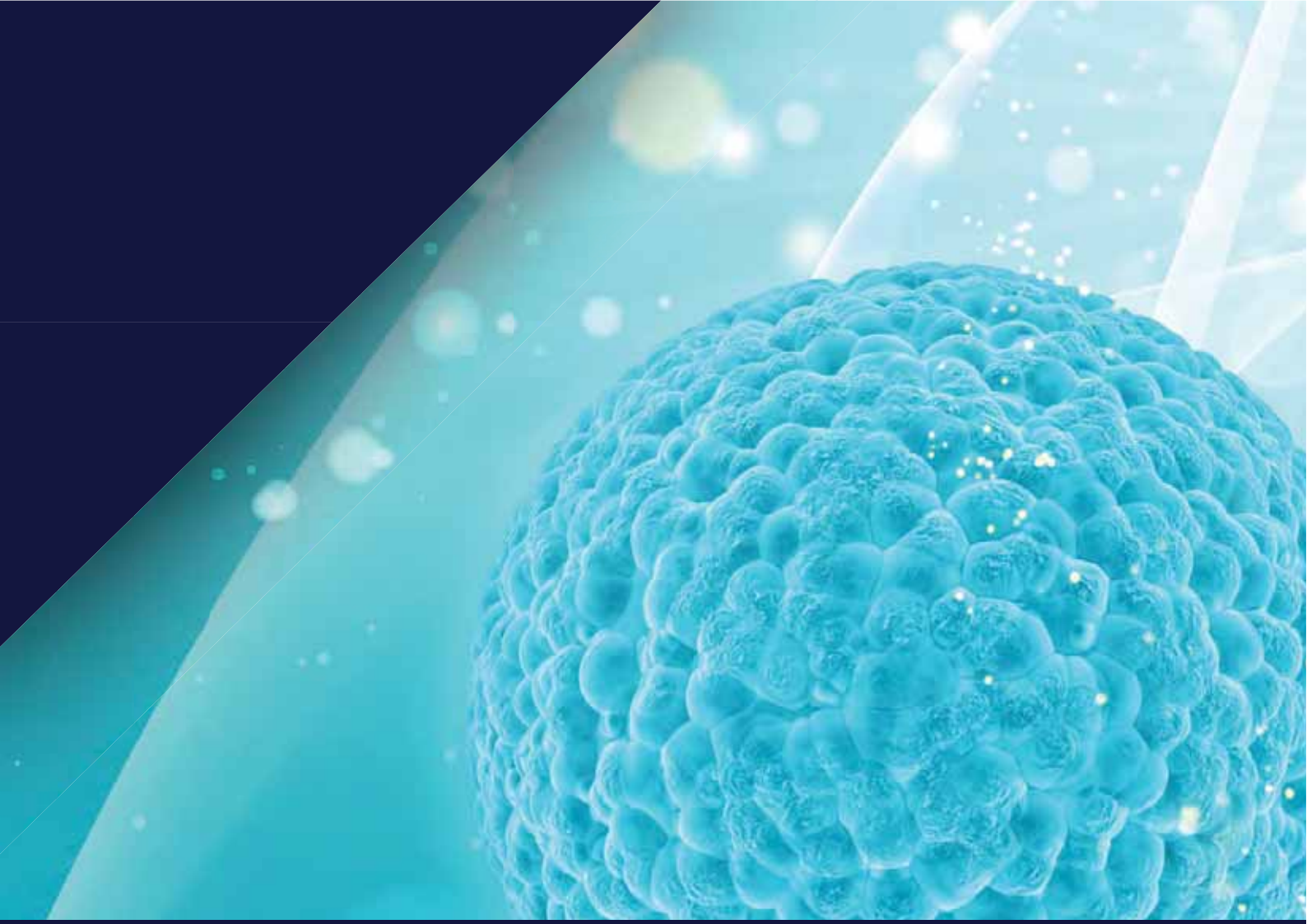
Performance indicator	Reporting frequency	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of industrially relevant knowledge and innovation products added to the Intellectual Property (IP) portfolio through fully funded or co-funded research initiatives	Quarterly	At least 50 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development IP portfolio by 31 March 2020 (cumulative target)	At least 1 industrially relevant knowledge or innovation product added to the industrial development IP portfolio between 1 April 2019 and 30 June 2019	At least 4 industrially relevant knowledge or innovation products added to the industrial development IP portfolio between 1 April 2019 and 30 September 2019	At least 10 industrially relevant knowledge or innovation products added to the industrial development IP portfolio between 1 April 2019 and 31 December 2019	At least 50 industrially relevant knowledge or innovation products added to the industrial development IP portfolio between 1 April 2019 and 31 March 2020
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, Industry Innovation Programme and the sector innovation fund	Biannual (reporting Q1 and Q4)	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2020 (cumulative target)	Annual work plans or contract approved for 6 support instruments	No target	No target	Annual work plans or contract approved for 9 support instruments

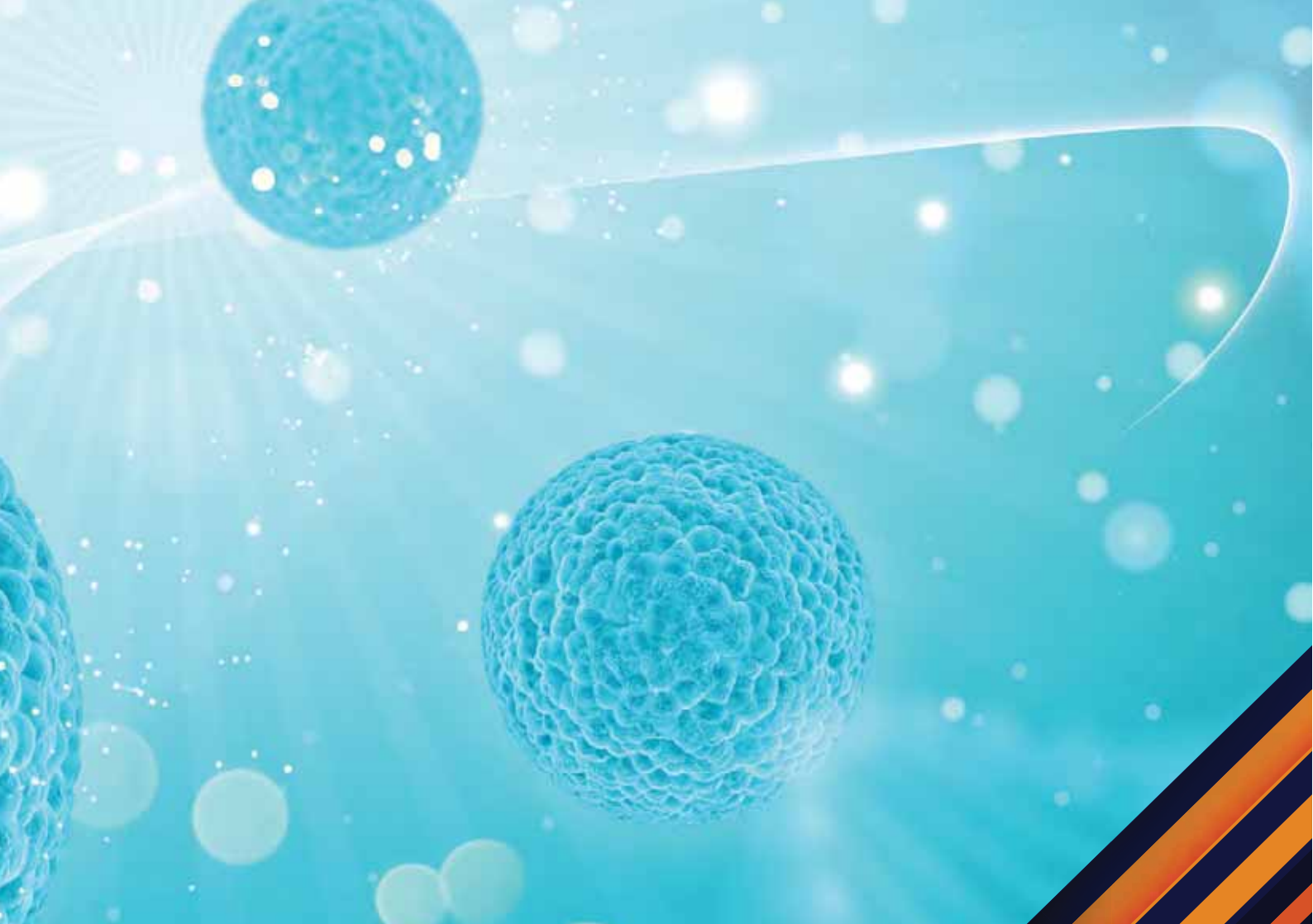
Performance indicator	Reporting frequency	Annual target 2019/20	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems	Quarterly	12 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2020 (cumulative target)	Annual work plan approved for at least 4 innovation support interventions between 1 April 2019 and 30 June 2019	Annual work plan approved for at least 9 innovation support interventions between 1 April 2019 and 30 September 2019	Annual work plan approved for at least 11 innovation support interventions between 1 April 2019 and 31 December 2019	Annual work plan approved for at least 12 innovation support interventions between 1 April 2019 and 31 March 2020
Number statistical reports and policy briefs approved by Exco for publication and/ or submission to Cabinet	Biannual (reporting Q3 and Q4)	6 statistical reports and policy briefs approved by Exco for publication and/ or submitted to Cabinet between 1 April 2018 and 31 March 2020 (cumulative target)	No target	No target	3 statistical reports approved by Exco for publication and/ or submitted to Cabinet between 1 April 2019 and 31 December 2019	6 statistical reports approved by Exco for publication and/ or submitted to Cabinet between 1 April 2019 and 31 March 2020
Turnaround time for providing preapproval decisions on applications for the R&D tax incentive	Quarterly	Preapproval decisions provided within 90 days from date of receipt on 80% of applications for the R&D tax incentive received between 1 January 2019 and 31 December 2019	Preapproval decisions provided within 90 days on 80% of applications received between 1 January 2019 and 31 March 2019	Preapproval decisions provided within 90 days on 80% of applications received between 1 April 2019 and 30 June 2019	Preapproval decisions provided within 90 days on 80% of applications received between 1 July 2019 and 30 September 2019	Preapproval decisions provided within 90 days on 80% of applications received between 1 October 2019 and 31 December 2019

Reconciling performance targets with the budget and MTEF

Table 29: Socio-economic Innovation Partnerships expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation 2018/19	Medium-term expenditure estimates		
	2015/16	2016/17	2017/18		2019/20	2020/21	2021/22
*Office of the Deputy Director-General	4 779	4 691	4 172	-	3 458	3 529	3 641
Sector Innovation and Green Economy	873 866	932 049	996 030	1 038 997	1 046 003	1 103 717	1 145 926
Innovation for Inclusive Development	334 443	344 505	356 729	354 814	367 768	390 746	408 502
Science and Technology Investment	32 309	22 158	22 198	27 327	34 923	37 115	44 166
Technology Localisation and Advanced Manufacturing	497 692	465 297	236 988	359 322	372 287	393 068	265 639
TOTAL	1 742 126	1 768 620	1 616 117	1 780 460	1 824 439	1 928 175	1 867 874
Compensation of employees	41 043	40 497	42 390	45 168	48 628	52 230	55 852
Goods and services	7 046	10 344	6 438	9 659	9 715	10 244	10 568
Transfers and subsidies	1 695 037	1 717 279	1 567 284	1 725 633	1 766 096	1 865 701	1 801 454
Payments for capital assets	-	-	-	-	-	-	-
Payments for financial assets	-	-	5	-	-	-	-
TOTAL	1 742 126	1 768 620	1 616 117	1 780 460	1 824 439	1 928 175	1 867 874





PART C:
LINKS TO OTHER PLANS



Table 30: Links to the long-term infrastructure and other capital plans

Project name	Programme	Municipality	Project description	Outputs	Estimated project cost	Expenditure to date (31 December 2018)	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 installation of 2 of 3 science modes (UHF, LSP and S-Band) by 31 March 2020	Installation of 2 (UHF and LSP) of the 3 science modes	2018/19 Allocation = R709, 412 000.00 2019/20 Allocation = R686, 974 000.00 2020/21 Allocation = R812, 139 000.00 2021/22 Allocation = R856, 807 000.00 Total Allocation = R3,065bn	R445 988million	2018/19	2021/22

Table 31: Public entities reporting to the DST

Name of public entity	Mandate	Outputs	Current annual budget (2019/20)	Institutional review due date
South African National Space Agency	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<p>R143,464 million</p>	<p>Ongoing oversight during 2019/20.</p> <p>No institutional review has been undertaken yet.</p>
Academy of Science of South Africa	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Collaborations among global science organisations Promotion of young scientists and women for science activities STI policy advice for government Scientific writing for research publishing 	<p>R26,983 million</p>	<p>Ongoing oversight during 2019/20.</p> <p>Last institutional review undertaken in 2016.</p>

Name of public entity	Mandate	Outputs	Current annual budget (2019/20)	Institutional review due date
National Research Foundation	<ul style="list-style-type: none"> 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 lives of all the people of South Africa 	<ul style="list-style-type: none"> 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) 	R943,385 million	Ongoing oversight during 2019/20. Last institutional review undertaken in 2016.
Council for Scientific and Industrial Research	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Peer-reviewed publications Research technologies Patents Research reports 	R965 823 million	Ongoing oversight during 2019/20. Last institutional review was concluded in December 2018.

Name of public entity	Mandate	Outputs	Current annual budget (2019/20)	Institutional review due date
Human Sciences Research Council	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Public dialogue and publications (dissemination of knowledge) Research and analysis of developmental problems African research agenda and collaborative research promoted Research capacity for human sciences Policy briefs (inform formulation of government policy and evaluate its implementation) 	R313,855 million	Ongoing oversight during 2019/20. Last institutional review was undertaken in 2018

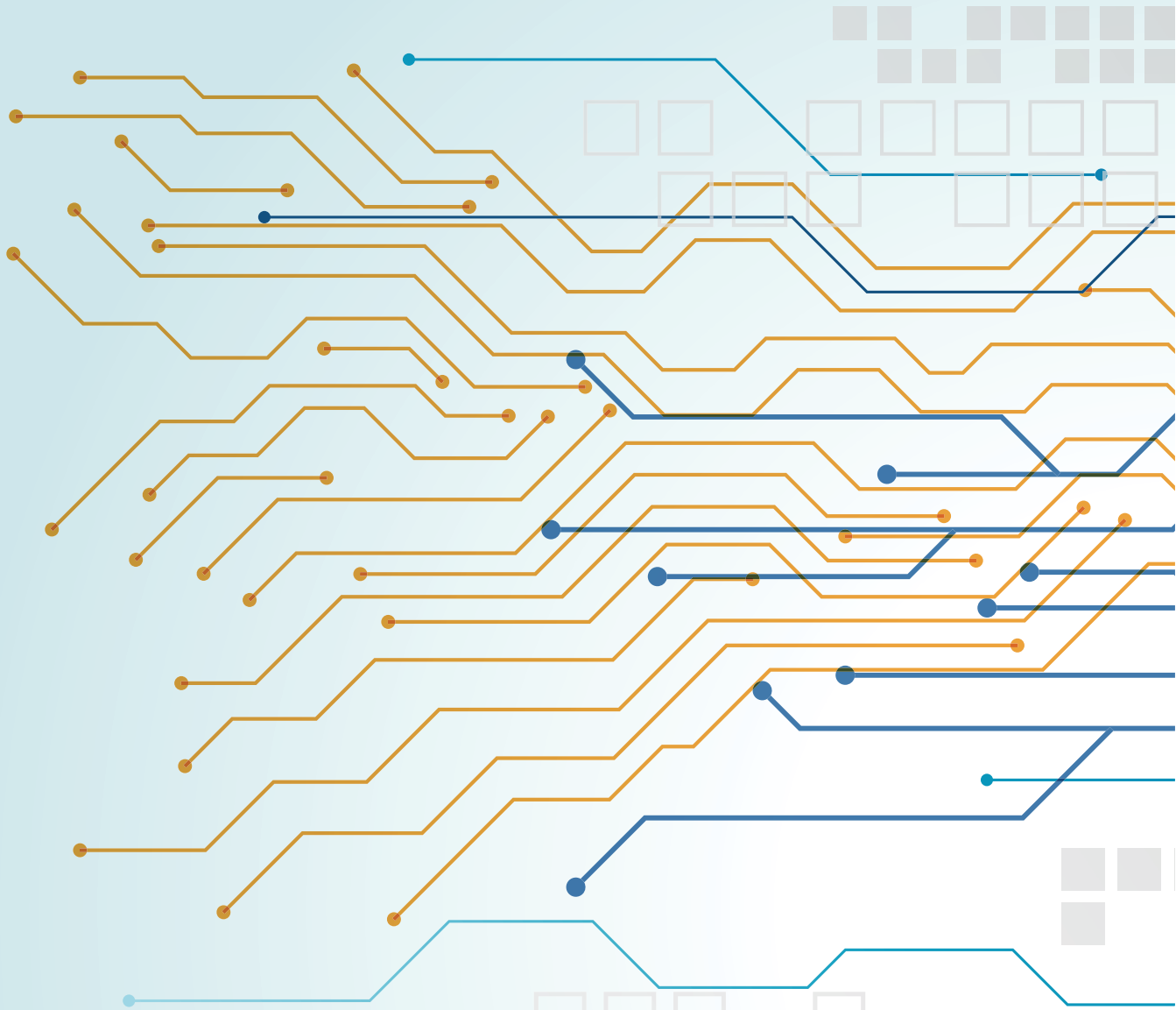
Name of public entity	Mandate	Outputs	Current annual budget (2019/20)	Institutional review due date
Technology Innovation Agency	<ul style="list-style-type: none"> To support the state in stimulating and intensifying technological innovation in order to improve economic growth and the quality of life of all South Africans by developing and exploring technological innovation 	<ul style="list-style-type: none"> Technology development funding (technology-based companies, jobs created by companies established through TIA funding) Enabling environment for technology innovation (jobs created, increased company turnover, technology support funding for SMEs) 	R440,929 million	<p>Ongoing oversight during 2019/20.</p> <p>A five-year economic impact assessment of TIA was conducted in July 2016, but no institutional review has been undertaken yet.</p>
National Advisory Council on Innovation	<ul style="list-style-type: none"> To advise the Minister for Science and Technology and, through the Minister, Cabinet, on the role and contribution of science, mathematics, innovation and technology, including indigenous technologies, in promoting and achieving national objectives, namely, to improve and sustain the quality of life of all South Africans, develop human resources for science and technology, build the economy, and strengthen the country's competitiveness in the international arena. 	<ul style="list-style-type: none"> Annual STI Indicators Booklet and STI Scorecard. Contribution to the development of the NSI Monitoring, Evaluation and Learning Framework, through National STI Information Portal. Review of the current and future White Paper on Science and Technology and other STI strategies and system infrastructure. Conduct a foresight exercise to inform the new decadal plan for STI. 	R 21, 451 million	<p>Ongoing oversight during 2019/20.</p> <p>Last institutional review was undertaken in December 2018.</p>

LIST OF ABBREVIATIONS

ABIPP	Agricultural Bioeconomy Innovation Partnership Programme
APP	Annual Performance Plan
AU	African Union
AVN	African Very Long Baseline Interferometry Network
BBBEE	broad-based black economic empowerment
CeSTII	Centre for STI Indicators
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DBE	Department of Basic Education
DHET	Department of Higher Education and Training
DoH	Department of Health
DST	Department of Science and Technology
DWS	Department of Water and Sanitation
ECSP	Economic Competitiveness Support Package
Exco	Executive Committee of the DST
Gbps	gigabits per second
GEO	Group on Earth Observations
GMO	genetically modified organisms
HCD	human capital development
HySA	Hydrogen South Africa
ICT	information and communication technology
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
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
Opco	Operational Committee of the DST
PMU	project management unit
R&D	research and development
RDI	research, development and innovation
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
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
STA	science and technology activity
STI	science, technology and innovation
STIIL Review	STI Institutional Landscape Review
TIA	Technology Innovation Agency
TLIU	Technology Localisation Implementation Unit
TSP	Technology Stations Programme
TYIP	Ten-Year Innovation Plan
UCDP	University Capacity Development Programme
WACS	West African Cable System



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