

ANNUAL PERFORMANCE PLAN 2017-2018

DEPARTMENT OF SCIENCE & TECHNOLOGY



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



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FOREWORD



The Annual Performance Plan maps out the road that the Department of Science and Technology will follow to reach its strategic goals in the 2017/18 financial year. Interventions are aligned to the strategies of the Department and to key government policies, including the Medium Term Strategic Framework 2014-2019, the New Growth Path, the Industrial Policy Action Plan and the National Development Plan.

Performance indicators and targets guide the allocation of the Department's budget and allow the public and its elected representatives in Parliament to monitor the Department's effectiveness in carrying out its mandate. Over the past five years this monitoring has resulted in the Department being recognised as one of the best-performing departments in the country.

The Department's commitment to enabling an environment for the national innovation system and to unlocking the potential for economic growth through science, technology and innovation is addressed in the focus on human capital development (HCD) and the continuous modernisation of scientific infrastructure. These efforts have resulted in enhanced knowledge production, growth and transformation of the pool of knowledge workers, and the exploitation of knowledge for development.

A considerable degree of the work and research that we undertake supports the Medium Term Strategic Framework's Outcome 2 (A long and healthy life for all South Africans) as well as Outcome 4 (Decent employment through inclusive growth). Some of our many successes include advances in research into HIV/Aids prevention and treatment, satellite building, winning the right to co-host the iconic Square Kilometre Array, progress with alternative energy technologies, and technology for improved service delivery.

The Department will pursue the following policy initiatives in 2017/18:

1. Innovation for local inclusive development

Innovation through the creation, diffusion and use of knowledge has become a key driver of economic growth and provides part of the response to many societal challenges, old and new. However, the determinants of innovation performance have changed in a globalising knowledge-based economy, partly as a result of continuing developments in information and communication technologies. Innovation results from increasingly complex interactions at local, national and global levels among individuals, firms and knowledge institutions.

Governments exert a strong influence on the innovation process through the financing and steering of public organisations that are directly involved in knowledge generation and diffusion, and through the provision of financial and regulatory incentives to all actors in the innovation system.

Our inclusive innovation strategy has secured support from the local government sector. A long-term strategic partnership will be taken forward to enable interventions that improve both service delivery and local economic development.

2. Establishment of a sovereign innovation fund

For a number of reasons, too few products, processes and services reach the market from publicly financed intellectual property. Intellectual property leakage, insufficient investment, inadequate local and international roll-out and deployment of proven technologies, and the scarcity of individuals with the skills to take products, processes and services to the market, are all factors.

The Technology Innovation Agency (TIA) continues to play an important role in this regard. Over the past few years it has been effectively repositioned as an agency whose funding instruments enable innovators, entrepreneurs and small and medium enterprises (SMEs) to commercialise their technology innovations.

Technology innovation is inherently high-risk and therefore requires a clearly defined and structured approach. TIA therefore has three innovation funds:

- The Seed Fund, which is aimed at assisting universities, in particular, in bridging financing requirements to translate research outputs into fundable ideas for commercialisation.
- The Technology Development Fund, which is available to organisations, individual entrepreneurs and SMEs to advance technologies along the innovation value chain.
- The Commercialisation Support Fund, which prepares innovators for follow-on funding.

Since 2010 TIA has assisted more than 8130 SMEs to accelerate technical innovation through technology development. This support to SMEs has resulted in a significant improvement in technical skills, product quality, productivity, cost-savings, energy efficiency, waste management and, most important of all, employment creation.

However, it is widely accepted that the public sector alone cannot provide the required capital for the full

commercialisation (i.e. upscaling of local and international deployment) of new technology products and services. This is particularly true for technologies that are aimed at accelerating national responses to global challenges (such as clean energy, climate change mitigation, food security, and human and animal health), and for initiatives aimed at the creation and scaling up of new technology-based enterprises and industries as a catalyst for enhanced national economic growth and development.

The key is to reprioritise and use the limited public sector funds to leverage private capital. The sovereign innovation fund model will incorporate public-private matching, co-investment and/or venture capital funding instruments, to be established in phases as additional resources are identified and mobilised from the public and private sectors over time.

The support and more active participation of the private sector in the commercialisation process will assist not only in increasing the local pool of high-tech investment resources, but also in further addressing the scarcity of skilled individuals to take more products, processes and services to the market.

The fund will be an important complementary intervention in support of the work of TIA and other DST initiatives, such as the Industry Innovation Partnerships Programme, which includes the Sector Innovation Fund initiative, and the implementation of the DST Commercialisation Framework.

3. Hydrogen South Africa programme expansion

A new phase of the HySA programme will focus on changing it from a research initiative into a manufacturing one. Critical to this transition is the deployment of HySA technologies in niche markets in South Africa, in line with government's Programme of Action commitment to deploy 25 hydrogen fuel cell technologies by 2020.

The commercialisation activities of HySA will be implemented by the HySA programme office, which was established in 2016/17. The fuel cell task team will be revived to improve coordination across government, private industry and academia.

4. Review of the IPR Act

In 2016/17 a review of the National Intellectual Property Office and the impact of the Intellectual Property Rights from Publicly Financed Research and Development (IPR) Act was undertaken. The outcome of this review will inform amendments to the IPR Act that will be initiated during the 2017/18 period.

5. Strategy for the uptake of locally developed technologies

Three high-potential short-term opportunities are being explored. These are defence and security technologies, health technologies, and social infrastructure technologies. The implementation of proposals developed by April 2017

will be a major part of the Department's work in 2017/18. In addition to taking short-term opportunities forward, a more comprehensive strategy will be finalised in 2017, setting out measures to accelerate the commercialisation of technologies that can be deployed locally.

The achievement of a knowledge-based economy that is able to realise the aspirations of South Africans will be possible only with the commitment and support of all stakeholders, in government, academia, business, industry and civil society. During the year ahead we will continue to strengthen the strong spirit of cooperation we have established with many partners.



Mrs Naledi Pandor, MP
Minister of Science and Technology

KETAPELE

Thulaganyo ya Ngwaga ka Ngwaga ya Bodiragatši e hlatholla tsela yeo Kgoro ya Saentshe le Theknolotši e tla e latelago go fihlelela dinepokgolo tša yona ngwageng wa ditšhelete wa 2017/18. Ditharollo tše di tsepamišwa le maanopeakanyo a Kgoro ye le a mmušo go akaretšwa le Tlhako ya Leanopeakanyo la Paka ya Magareng la 2014-2019, Mokgwa wo Moswa wa Kgodišo ya Ikonomi, Thulaganyo ya Magato ya Maanomagolo ya Intasteri le Thulaganyo ya Bosetšhaba ya Tlhabollo.

Ditaetši tša bodiragatši le tša dinepo di hlhla kabaganyo ya tekanyetšo ya Kgoro ye le go dumelela bohle setšhabeng le baetapele ba bona bao ba kgethilwego ka Palamenteng go bea leihlo bokgoni bja Kgoro mo phethagatšong ya morero wa yona. Mo mengwageng e mehlano ye fetilego peoleihlo ye e tlišitše dipoelo tša gore Kgoro ye e lemogwe bjalo ka ye nngwe ya dikgoro tše dirago mošomo gabotsebotse mo nageng.

Boikgafo bja Kgoro ye bja go kgontšha tikologo mo peakanyong ya bosetšhaba ya diphetogo le go utolla kgonagalo ya kgolo ya ikonomi ka saentshe, theknolotši le diphetogo e gare e ya sekegelwa go šeditšwe tlhabollo ya methopo ya batho le mpshafatšo ye sa kgaotšego ya mananeokgoparara a saentshe. Maitekelo a a tlišitše dipoelo tša tšweletšo ya tsebo ye kaonafetšego, kgolo le phetogo ya bašomi ba go ba le tsebo, le tlholego ya tsebo go tša tlhabollo.

Bontšhi bja mošomo wo bonagalago le diphatišišo tše re di dirago di thekga poelo ya bobedi ya Tlhako ya Leanopeakanyo la Paka ya Magareng (bophelo bjo botelele bjo bobotse go Mafrika Borwa ka moka) gammogo le poelo ya bone (Mešomo ya go ba le seriti ka kgolo ye akaretšago bohle). Tše dingwe tša dikatlego tša rena tše ntši di akaretša dikgatepelo mo diphatišišong go thibelo le phekolo ya HIV/Aids, go agwa ga disathalaete, go thopa ditokelo tša go ba wo mongwe wa monggae wa tiragalo ya go tuma kudu ya *Square Kilometre Array*, kgatelopele ya mahlale a mangwe a go fehla mohlagase le mahlale a kabo ya ditirelo ye kaonafetšego.

Kgoro ye e tla latela maihlamelao ao a latelago a pholisi ka 2017/18.

1. Diphetogo tša tlhabollo ye akaretšago ya selegae

Diphetogo ka tlholego, phatlalatšo le tšhomišo ya tsebo di bile le khuetšo ye makatšago ya kgolo ya ikonomi ebile di arabela tše ntši tša ditlhotlo tša setšhaba tše diswa le tša kgale. Le ge go le bjalo, mabaka ao a hlalago bodiragatši bja diphetogo a fetogile tšweletšong ya ikonomi yeo e ithekgilego ka tsebo, ye e ka hlolwago ke dikgatelopele tša moragorago mo mahlaleng a tshedimošo le a dikgokagano. Diphetogo di tlišwa ke dikgokagano tše hlatlogago tša mehuthuta mo maamong a selegae, a bosetšhaba le a bofefase magareng ga batho ka o tee ka o tee, difeme le dihlolongwa tše dingwe tša tsebo.

Mebušo e na le khuetšo ye kgolo mo tshepedišong ya diphetogo ka thekgo ya ditšhelete le ka go sepedišwa ga mekgatlo ya setšhaba ye amanago thwi le go hlolwa ga tsebo le phatlalatšo ya yona ka kabo ya diputsaletšo tša ditšhelete le tša taolo go bakgathatema ka moka ba peakanyo ya diphetogo.

Leanopeakanyo la rena la diphetogo le akaretšago bohle le hweditše thekgo go tšwa lefapeng la pušoselegae. Kgwebišano ya leanopeakanyo ya lebaka le le telele e tla išwa pele go kgontšha ditharollo tše kaonafatšago kabo ya ditirelo gotee le tlhabollo ya ikonomi ya selegae.

2. Go hlongwa ga sekhwama sa go ikema sa diphetogo

Ditšweletšwa tše mmalwa, ditshepedišo le ditirelo di fihlelela mebaraka go tšwa dithotong tša dikelelo tša badiradiphetogo tše thekgilwego ke bohle ka ditšhelete ka mabaka a mmalwa ebago: go timelela ga thoto ya bohlale; dipeeletšo tše hlaelelago; phethagatšo ye sa lekanago ya selegae le ya boditšhabatšhaba le tirišo ya mahlale ao a hlatsetšwego goba tlhaelelo ya batho ba go ba le bokgoni bja go iša ditšweletšwa, ditshepedišo le ditirelo mebarakeng.

Kemedi ya Diphetogo tša Mahlale e kgathile tema ye bohlokwa ebile e sa tšwelapele go kgatha tema ye bohlokwa mo tabeng ye. Mo mengwageng ye mmalwa ye fetilego kemedi ye e be e šutišwa gore e be le mohola bjalo ka kemedi yeo didirišwa tša yona tša mašelang di kgontšhago badiradiphetogo, borakgwebo le dikgwebopotlana go ya go dikgwebo tša magareng go gwebafatša diphetogo tša bona tša mahlale.

Diphetogo tša mahlale di na le kgonagalo ye kgolo ya kotsi ka gona di nyaka lemanoga le hlalošitšwego gabotse la go beakanywa ka tsela ya maleba. Go fihlelela se, TIA e na le dikhwama tše tharo tša diphetogo:

- Sekhwama sa badiradiphetogo, seo nepo ya sona e lego go thuša diyunibesithi, kudukudu go fihlelela dinyakwa tša ditšhelete go fetolela dipoelo tša diphatišišo go ba dikgopolo tše ka thekgwago ka ditšhelete bakeng sa kgwebafatšo;
- Sekhwama sa Tlhabollo ya Mahlale, seo se hwetšagalago mekgatlong, borakgwebong ka o tee ka o tee le di-*SME* go tšwetša pele mahlale go bapa le tshepedišo ya kgwebo ya diphetogo; le
- Sekhwama sa Thekgo ya Kgwebafatšo, seo se lokišetšago badiradiphetogo go latišiša thekgo ya mašelang.

Go tloga ka 2010 TIA e thekgile dikgwebo tše 8,130 tše nnyane le tša magareng go potlakiša diphetogo tša setheknini ka tlhabollo ya theknolotši. Ditlamorago tša thekgo ya di-*SME* di tlišitše kaonafalo ye bonagalago go mabokgoni a sethekniki, khwalithi ya ditšweletšwa, botšweletši, tsheketo ya ditšhelete, bokgoni bja enetši, taolo ya dilahlwa le se bohlokwa magareng ga tšona ka moka e bago tlhologo ya mešomo.

Le ge go le bjalo, go a dumelwa lefaseng ka bophara gore lefapha la bohle le noši le ka se kgone go aba didirišwa tše nyakegago bakeng sa kgwebafatšo ka botlalo (go fa mohlala tirišo ya theko ya godimo ya selegae le ya boditšhabatšhaba) ya ditšweletšwa tše diswa tša theknolotši le ditirelo. Gabotsebotse, go no dula go le bjalo mo ditheknolotšing tše nepilego go potlakiša dikarabelo

tša setšhaba mo ditlhotlong tša lefaseng ka bophara (bjalo ka enetši ya go hlweka, phedišo ya phetogo ya seemo sa leratadima, tšhireletšego ya dijo le maphelo a batho le a diphoofolo) gotee le maitlhamelo ao a nepilego go hlola le go iša godimo dikgwebo tše diswa tše di ithekgilego ka theknolotši le diintasteri bjalo ka mohlohleletši wa kgolo ya ikonomi ya bosetšhaba ye kaonafetšego le tlhabollo.

Ka go realo, tabakgolo ke go beakanya ditlapele le go diriša dikhwama tše nnyane tša lefapha la bohle go huetša didirišwa tša praebete. Mmotlolo wa sekhwana se ikemego sa diphetogo o tla tsenyeletša nyalelano ya bohle le ya praebete, go beeletša ka bobedi, le go tsenela dithekggo tša mašelang methopong ya dithoto, go thewa ka dikgato ka ge didirišwa tša tlaletšo di hlaolwa go tšwa mafapheng a mmušo le a praebete nako le nako.

Thekgo le kgathotema ya mafolofolo ya lefapha la praebete mo tshepedišong ya kgwebafatšo e ka se thuše fela ka go hlatloša palo ya lefelo leo ya didirišwa tša dipeeletšo tša maemo a godimo eupša e tla thuša le go rarolla go ya pele tlhaelelo ya batho ba goba le botsebi go iša ditšweletšwa tše ntši, ditshepedišo le ditirelo mebarakeng.

Sekhwama se e tla ba tharollo ye bohlokwa ya tlaletšo mo thekgong ya mošomo wa TIA le maitlhamelo a mangwe a Kgoro ye, bjalo ka Lenaneo la Intasteri la Dikgwebišano tša Diphetogo, leo le akaretšago Sekhwana sa Diphetogo seo se lebeletšego diseptara, le phethagatšo ya Tlhako ya Kgwebafatšo ya DST.

3. Katološo ya lenaneo la HySA

Šedi ya kgato ye mpsha ke go šutiša lenaneo la HySA go tloga diphatišišong go ya maitlhamelong a go dira diphahlo. Se bohlokwahlokwa mo kगतong ye ke tšhutišo ya ditheknolotši tša HySA ka mebarakeng ya tša theknolotši mo Afrika Borwa ka go sepedišana le boikgafo bja Lenaneo la Magato go šutiša ditheknolotši tše 25 tša makhura a disele tša haedrotšene pele ga 2020.

Ditiragalo tša kgwebafatšo tša HySA di tla phethagatšwa ke kantoro ya lenaneo la HySA, yeo e hlomilwego ka 2016/17. Le gona sehlophatšhomo sa makhura a disele se

tla tsošološwa go kaonafatša tshepedišo go ralala dikgoro tša mmušo, intasteri ya praebete le dihlongwa tša thuto.

4. Tshekatsheko ya Molao wa IPR

Ka 2016/17 tshekatsheko ya NIPMO le ditlamorago tša Ditokelo tša Thoto ya Kelelo ya Badiradiphetogo go tšwa Molaong wa Tlhabollo le wa Diphatišišo tše Thekgwago ke Bohle di tšeerwe. Ditlamorago tša tshekatsheko ye di tla bopa diphetogo Molaong wa IPR wo tla thomišwago nakong ya 2017/18.

5. Leanopeakanyo la tlihatlošo ya ditheknolotši tše dirilwego mo nageng

Dibaka tše tharo tše holofetšago kudu tša lebaka le le kopana di gare di ya hlohlomišwa. Tšona ke ditheknolotši tša tšhireletšo le tšhireletšego, theknolotši ya maphelo le ditheknolotši tša mananeokgoparara a leago. Phethagatšo ya ditšhišinyo tše phethilwego ka Matšhe 2017 e tla ba karolo ye kgolo ya mošomo wa DST ka 2017/18. Go

tlaleletša godimo ga go iša pele dibaka tša lebaka le le kopana, leanopeakanyo tšweletša le tla Mopitlo ka 2017. Lona le tlo akaretša magato a go potlakiša kgwebafatšo ya ditheknolotši tše ka dirišwago ka mono nageng.

Sa mafelelo, phihlelelo ya ikonomi ya go ithekga ka tsebo ye kgonago go lemoga dikgahlegelo tša batho ba rena e tla kgonagala fela ka boikgafo le tšhomišano ya bakgathatema ba rena ka moka mo mmušong, dihlongwa tša thuto, dikgwebo, intasteri le mekgatlo ye e le go setšhabeng. Mo nakong ye, re tla tšwelapele go bjala moya wo o tiilego wa tšhomišano wo re ipshinago ka wona le bakgathatema ba rena



Mohumagadi Naledi Pandor, MP
Tona ya Saentshe le Theknolotši

AMAZWI OKWENDLALELA

Uhlelo Lokusebenza Lonyaka lubeka umhlahlandlela ozolandelwa nguMnyango weSayensi nobuchwepheshe ukufeza izinhloso eziyiqhinga zonyaka wezimali we-ka 2017/18. Ukungenelela kuhambisana namasu oMnyango kanye nezinqubomgomo ezibalulekile zikaHulumeni, kuhlanganisa uhloko lokusebenza lwesikhathi esimaphakathi lowe kuka -2014-2019, Inqubomgomo yokuthuthukiswa komnotho weZwe, uhlelo lokusebenza lwenqubomgomo yezimboni kanye nohlelo lokuthuthukiswa kweZwe

Izinkomba zokusebenza kanye nezimpokophelo kusetshenziswa njengomhlahlandlela wokwabiwa kwesabelomali soMnyango futhi kuvumela umphakathi kanye namalungu akhethiwe ePhalamende ukuthi aqaphe ukusebenza ngempumelelo koMnyango ekufezeni igunya (izinhlelo zawo) lawo. Kule minyaka emihlanu edlule lokhu kuqapha kuholele ekutheni uMnyango uhlonishwe njengomunye weminyango esebenza kahle kuleli liZwe.

Ukuzibophezela koMnyango ekwenzeni indawo yokusebenza efanele yohlelo lukaZwelonke lwezokusungula kanye nokuvula amathuba okukhula komnotho ngokusebenzisa isayensi, ubuchwepheshe kanye nokusungula kuyaxazululwa ngokugxila ekuthuthukisweni kwabasebenzi kanye nokwenza ingqalasisinda yesayensi ibe ngeyesimanje ngokuqhubekayo. Le mizamo iholele ekukhiqizweni kolwazi olwenziwe ngcono, ukukhula nokuguqulwa kwesiqhohlo sabasebenzi bolwazi, kanye nokusetshenziswa kolwazi kwezentuthuko.

Ingxenyane enkulu yomsebenzi kanye nocwaningo esilwenzayo lusekela iumphumela ye ka-2 or wesibili yo or wohlaka lokusebenza lwesikhathi esimaphakathi (Impilo ende kanye nesezingeni eliphezulu yabo bonke abantu baseNingizimu Afrika) kanye nomphumela we ka-4 or wesine (imisebenzi ehloniphekile ngokusebenzisa umnotho okhulayo obandakanya wonke umuntu). Ezinye zezimpumelelo zethu eziningi zihlanganisa inqubekela-phambili kucwaningo lokuvimbela nokwelashwa kwe-HIV/AIDS, ukwakhiwa kwesathalayithi, ukuwina ilungelo lokusingatha ngokusebenzisana kwesakhiwo

sodumo i-Square Kilometre Array, inqubekela-phambili kwezobuchwepheshe bezinye izindlela zokukhiqiza amandla, kanye nobuchwepheshe bokwenza ngcono ukulethwa kwezinsizakalo.

UMnyango uzokwenza lemisebenzi ekunqubomgomo elandelayo ngowe ngo-2017/18.

1. Ukusungulwa kwentuthuko yendawo efaka wonke umuntu

Ukusungula ngokusebenzisa ukuhlangiswa, usatshaliswa kanye nokusetshenziswa kolwazi sekube yinto ebalulekile ekukhuleni komnotho futhi kuhlinzeka ingxenyane yesixazululo kuzinselele lo eziningi ezintsha nezindala ezibhekene nomphakathi. Nokho, izimbangela zokusebenza kokusungula zishintshile kumnotho ogxile olwazini olusabalala umhlaba wonke, ngokwengxenyane ngenxa yezehlakalo zakamuva kwezobuchwepheshe bolwazi nezokuxhumana. Ukusungula okusha kuholela ekuxhumaneni emazingeni endawo, kazwelonke nawomhlaba phakathi kwabantu, amafemu kanye nezinye izikhungo zolwazi.

Uhulumeni unomthelela omkhulu ohlelweni lokusungula ngokuxhasa ngemali kanye nokulawula izikhungo zomphakathi ezisebenza ngqo ngokusungula nokusabalalisa ulwazi kanye nangokuhlinzeka imihlomulo yemali neyokulawula kubo bonke ababandakanyeka ohlelweni lokusungula.

Isu lethu lokusungula elibandakanya wonke umuntu selithole ukwesekwa okuvela kumkhakha wohulumeni basekhaya. Ukubambisana okubalulekile kwesikhathi eside ubuzoqhutshezelwa phambili ukuvumela ukungenelela okuzokwenza ngcono ukulethwa kwezinsizakalo kanye nokuthuthukiswa komnotho wendawo.

2. Ukwakhiwa kwesikhwama esizimele samacebo amasha

Imikhiqizo, izinqubo kanye nezinsizakalo ezincane kakhulu ezifinyelela emakethe zisuka empahleni esungulwe ngokuxhaswa nguhulumeni ngenxa yezizathu eziningi:

ukuputshuka (ukuphuma ngokungemthehto) kwe-IP; utshalomali olunganele; ukusatshaliswa okunganele kusukela ngaphakathi ezweni nasemhlabeni jikelele kobuchwepheshe obugunyaziwe; noma ukushoda kwabantu abanamakhono okufaka imikhiqizo, izinhlelo nezinsizakalo ezimakethe.

INhlangano yokusungula ubuchwepheshe, iTIA idlale futhi iyaqhubeka nokudlala indima ebalulekile kulokhu. Eminyakeni embalwa edlule ibe yinhlangano izinsiza zoxhaso lwayo ezisiza abasunguli, osomabhizinisi kanye namabhizinisi amancane naphakathi nendawo ukuze akwazi ukufaka ezimakethe ubuchwepheshe babo ababusungulile.

Kuyingozi kakhulu ukusungula ezobuchwepheshe futhi ngakho-ke kudinga indlela echazwe ngokucacile futhi ehlelekile. Ukufeza lokhu, iTIA inezikhwama ezintathu zokusungula

- Isikhwama sabasunguli, okuhloswe ngaso ukusiza emayunivesithi, ikakhulukazi, ekuvaleni izidingo zezimali ukwenza imiphumela yocwaningo ibe ngamasu axhasekayo ukuze angeniswe emakethe.
- Isikhwama sokuthuthukisa ezobuchwepheshe sokuxhasa izikhungo, osomabhizinisi abazimele kanye namabhizinisi amancane naphakathi nendawo ukuthuthukisa ezobuchwepheshe kuchungechunge lokusungula, kanye
- nesikhwama sokusekela ukufaka imikhiqizo eMakethe, esilungiselela abasunguli ukuthi bathole olunye uxhaso.

Kusukela ngo-2010 iTIA isekele amabhizinisi amancane naphakathi nendawo angaphezu kwe- kuka 8,130 ekusheshiseni ukusungula amacebo amasha anobuchule ngokusebenzisa ezobuchwepheshe obusha. Umthelela wokusekelwa kwamabhizinisi amancane naphakathi nendawo sekuholele ekwenziweni ngcono kwamakhono obuchule, ukukhiqiza, ukuncishiswa kwezindleko, ukusebenza ngempumelelo kwezamandla, ukuphathwa kwemfucuzo futhi okubalulekile kunakho konke ukudalwa kwamathuba emisebenzi.

Nokho-ke, kwamukelekile kakhulu ukuthi umkhakha kahulumeni wodwa ngeke ukwazi ukuhlinzeka imali yokuthi kufakwe emakethe (njengokukhuphula ukusatshaliswa kwemikhiqizo ezweni lonke nasemhlabeni jikelele) imikhiqizo nezinsizakalo ezintsha zezobuchwepheshe. Ikakhulu, lesi yisimo kwezobuchwepheshe okuhloswe ngabo ukusheshisa isixazululo sikazwelonke kuzinselelo zomhlaba (ezifana nezamandla ahlanzekile, ukunqandwa kokuguquka kwesimo sezulu, ukudla okwanele kanye nempilo yabantu kanye neyezilwane), kanye nemizamo okuhloswe ngayo ukusungula kanye nokukhulisa izimboni kanye namabhizinisi ezobuchwepheshe obusha nokuzokokhela inhansi bulethe ukukhula nokuthuthukiswa komnotho kazwelonke owenziwe ngcono.

Ngakho-ke okubalulekile ukubeka phambili kanye nokusebenzisa ingxenye yezimali zomkhakha kahulumeni ukudonsa imali yomkhakha wangasese. Indlelayesikhwama sokusungula amacebo amasha asizimele izohlanganisa umkhakha ozimele nokahulumeni, utshalomali lokuhlanganyela kanye/noma izindlela zokuxhasa ngemali yokuqala amabhizinisi, nokuzosungulwa ngezigaba ngesikhathi kuhlonzwa ezinye izinsiza kumkhakha ozimele nokahulumeni ngokuhamba kwesikhathi.

Ukweseka kanye nokubamba iqhaza okuthe xaxa komkhakha ozimele ohlelweni lokufaka imikhiqizo emakethe luzosiza hhayi kuphela ekwandiseni imithombo yotshalomali kwezobuchwepheshe bendawo, kodwa nasekuxazululeni ukushoda kwabantu abanamakhono okungenisa imikhiqizo, izinqubo kanye nezinsizakalo emakethe.

Lesi sikhwama sizoba insika ebalulekile ekuqhakambiseni ukusekela umsebenzi we-TIA kanye neminye imisebenzi yoMnyango, efana nohlelo lwezimboni lokusungula ngokusebenzisana, olubandakanya isikhwama sokusungula somkhakha okhethekile, kanye nokusetshenziswa kohlaka loMnyango wezobunzululwazi nobuchwepheshe lokufaka imikhiqizo ezimakethe.

3. Ukhukhuliswa kohlelo lwe-HySA

Okuzogxilwa kukho esigabeni esisha wukususa uhlelo lwe-HySA lusuka esigabeni sokucwaninga luya esigabeni sokukhiqiza. Okubalulekile kulesi sigaba senguquko ukungeniswa kobuchwepheshe be-HySA ezimakethe eNingizimu Afrika ngokuhambisana nokuzibophezela ohlelweni lokusebenza lokuhlinzeka ubuchwepheshe be-*hydrogen fuel cell* obunga-25 ngo-2020.

Ukungeniswa ezimakethe kwemisebenzi ye-HySA kuzoqhutshwa yihhovisi lohlelo lwe-HySA, elasungulwa ngo-2016/17. Kuzophinda kuvuswe ithimba elijutshelwe ukusebenza nge-*fuel cell* ukuze kwenziwe ngcono ukusebenzisana ngaphakathi kukahulumeni, imboni ezimele kanye nezemfundo.

4. Ukubuyekeza koMthetho we-IPR

Ngo-2016/17 ukubuyekeza kwe-NIPMO kanye nomthelela womthetho wamalungelo obunanikaziobunikazi babasunguli avele kucwaningo nentuthuko exhaswe nguHulumeni kwenziwa. umphumela walokhu kubuyekeza uzosetshenziswa njengomhlahlandlela wezichibiyelo kumthetho we-IPR okuzokwenziwa ngesikhathi sowe sika 2017/18.

5. Isu lokusebenzisa ubuchwepheshe obuthuthukiswe kulelizwe.

Njengamanje kubhekwa amathuba amathathu esikhathi esifushane abaluleke kakhulu. Lawa mathuba ngezobuchwepheshe kwezokuvikela nokuphepha, ubuchwepheshe

bezempilo kanye nobuchwepheshe bengqalasizinda yomphakathi. Ukuqaliswa kokusebenzisa iziphakamiso ezithuthukiswe ngoMbaso ka 2017 kuzoba yingxenye enkulu yomsebenzi woMnyango weSayensi nobuchwepheshe ngowe ngo-2017/18. Ngaphezu ngokuqhubezela phambili amathuba esikhathi esifushane, isu eliphelile lizophothulwa ngo-2017. Lizobandakanya izinyathelo zokusheshisa ukuthengiswa kobuchwepheshe obungasetshenziswa ngaphakathi kuleli.

Okokugcina, impumelelo yomnotho ogxile olwazini oluphumelelisa izinhloso zabantu bakithi ungafezeka kuphela ngokuzinikela kanye nokusebenzisana kwabo bonke abasebenzisana nohulumeni, abezemfundo, amabhizinisi, izimboni kanye nomphakathi. Ngalesi sikhathi, sizoqhubeka nokugxilisa umoya wokusebenzisana esinawo nalabo esibambisene nabo.

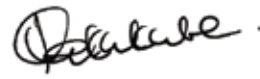


Nkz. Naledi Pandor, MP
uNgqongqoshe weSayensi
Nobuchwepheshe

OFFICIAL SIGN-OFF

Chief Financial Officer

Ms Pretty Makukule



DDG: Institutional Planning and Support

Mr Tommy Makhode



Accounting Officer

Dr Phil Mjwara



Executive Authority

Mrs Naledi Pandor, MP





PART A

STRATEGIC OVERVIEW



PART A: STRATEGIC OVERVIEW

1. Vision

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

2. Mission

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

3. Values

Professionalism

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

Innovation

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

Ethical behaviour

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

Knowledge sharing

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

4. Legislative and other mandates

4.1 Legislative mandates

Academy of Science of South Africa Act, 2001

This Act establishes the Academy of Science of South Africa (ASSAf) to promote common ground in scientific thinking across all disciplines, including the physical, mathematical and life sciences, as well as human, social and economic sciences; to encourage and promote innovative and

independent scientific thinking; to promote the optimum intellectual development of all people; to advise and facilitate appropriate action in relation to the country's needs, opportunities and challenges; and to link South Africa with high-level scientific communities within the Southern African Development Community, the rest of Africa and internationally.

Astronomy Geographic Advantage Act, 2007

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

Human Sciences Research Council Act, 2008

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

Income Tax Act, 1962

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

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

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

National Advisory Council on Innovation Act, 1997

This Act establishes the National Advisory Council on Innovation to advise the Minister of Science and

Technology and, through the Minister, the Cabinet, on the role and contribution of science, mathematics, innovation and technology in achieving national objectives.

National Research Foundation Act, 1998

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

Natural Scientific Professions Act, 2003

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

Scientific Research Council Act, 1988

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

South African National Space Agency Act, 2008

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

Technology Innovation Act, 2008

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

4.2 Policy mandate

The Department of Science and Technology (DST) derives its mandate from the 1996 White Paper on Science and Technology, which introduced the concept of the national system of innovation (NSI) – a set of interacting

organisations and policies through which a country creates, acquires, diffuses and puts into practice new knowledge to help achieve individual and collective goals. A coordinated and efficient NSI 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 -

- 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; and
- optimising the governance of publicly funded STI institutions to support government's priority outcomes.

The National Research and Development Strategy of 2002 and the Ten-Year Innovation Plan (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

As part of the governance and coordination of the NSI, several initiatives have been undertaken to improve its coherence and efficiency. The 1996 White Paper on Science and Technology is the current underlying policy framework for the science and technology sector and continues to guide the DST. The year 2016 marked 20 years since the adoption of the White Paper on Science and Technology. The NSI has undergone significant changes in the past 20 years and is today far larger, more complex, and more interdependent. A review of performance against the 1996 White Paper was finalised by the National Advisory Council on Innovation (NACI) and the findings will inform the development of new White Paper and decadal plan to be finalised in mid-2017.

The 2016/17 financial year also saw the progression of the Ministerial Review of the Science, Technology and Innovation Institutional Landscape. The review sought to establish the inter-linkages of the institutions in the system and their impact (as a collective) on all aspects of society. These and other initiatives, such as the proposed introduction of a budget coordination mechanism approved by Cabinet in February 2017, are necessary elements to ensure appropriate governance of the NSI. The DST has consulted across government about a proposal to introduce a budget coordination mechanism for public funding of STI activities. The mechanism will form a key element of efforts to grow South Africa's gross expenditure on research and development (GERD) to 1,5% percent of gross domestic product (GDP) in the Medium Term Strategic Framework (MTSF). The task team established jointly by the Ministers of Finance and Science and Technology is exploring various ways of increasing GERD from the current level of 0,73% level at which it stagnated until the 2013/14 survey year. These include the possible earmarking of funds at provincial and local government levels to support research into technology-based solutions to service delivery challenges. This is especially important in view of the limitations in

increasing public funding for STI activities at national level. In 2017/18 the DST will continue to coordinate and direct the NSI towards improving the quality of scientific and technological outputs, as well as innovation impacts and outcomes that advance a better life for all citizens of South Africa.

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

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

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

Economic growth is critical for sustainable long-term employment and to address poverty and inequality. From a macro-economic perspective, the initiatives to develop new R&D-led industries could help improve South Africa's exports, reduce South Africa's current account deficit, and improve the prospects of economic growth. The work on building a titanium industry for South Africa falls into this category, as does the Fluorochemicals Expansion Initiative. Because of the potential of STI to stimulate industrialisation, the Department is also actively involved in the implementation of the Industrial Policy Action Plan (IPAP). For instance, the Department is working to harmonise instruments to attract private-sector investment including foreign funding for R&D to 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 and the Technology Innovation Agency's Technology Stations Programme provide technology support to a range of small and large firms, and are also aimed at increasing the turnover of small and medium enterprises (SMEs), and enabling them to secure better contracts with large private-sector companies.

The Department's commitment to contribute to the reduction of inequality, poverty and unemployment is demonstrated in various initiatives that focus on improving access to basic services, improve the delivery of basic services, and unlock economic development opportunities for marginalised and excluded communities. The Department's initiatives are already providing access to basic services to communities, mainly in rural areas, that previously had none. 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. These tools

also contribute to addressing spatial marginalisation and the capacity of municipalities to manage service delivery challenges through more efficient incident management.

To address unemployment and economic exclusion, the Department has invested in technology demonstration and transfer initiatives aimed at supporting and advancing local economic development and sustainable livelihoods, especially in poverty-stricken rural areas. DST-run pilot projects include community-based processing of traditional medicines, cosmeceuticals and nutraceuticals, and some are already showing success in strengthening local systems of innovation, job creation and enterprise development. Technology transfer is assisting community-based enterprises to move beyond primary agriculture and participate in the agroprocessing value chain. The DST's initiatives demonstrate the NSI's potential to contribute to addressing poverty, inequality and unemployment. Further detail on how the direct and indirect contribution of STI to addressing these challenges is set out in Table 1.

The DST adds value to the efforts of the rest of government and industry to implement the NDP through enabling effective decision-making using cutting-edge science and technology. The Department's 2015-2020 Strategic Plan identified the need to provide decision support to improve at least 10 government services or functions. An audit undertaken in 2016/17 has identified at least 19 government services or functions where the investments of the DST and its entities are providing decision support. The areas include spatial planning, 21st century education, disaster management, energy options and policy, nutrition and food security, and economic planning and management.

Other efforts at decision support include influencing policy on the safety of activities involving genetically modified organisms (GMOs), providing technically sound methodologies for evaluating future investments in the commercialisation of R&D (as part of the DST Commercialisation Framework), providing geospatial information to be used in local planning (via the South African Earth Observation Strategy portal, and the work of the South African National Space Agency), and helping municipalities to build a business case for bioenergy production based on the information provided in the Bioenergy Atlas.

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

STI contribution	Poverty	Inequality	Unemployment
Direct	<p><i>Innovation-enabled local economic development</i></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><i>Mainstream applied indigenous knowledge-based R&D (traditional medicines, cosmeceuticals and nutraceuticals), including innovation and local manufacturing, to support commercialisation models for sustainable livelihoods</i></p>	<p><i>Transformation of scientific workforce in terms of race and gender</i></p> <p><i>Innovations to enhance standards of living</i></p> <ul style="list-style-type: none"> In partnership with the Department of Basic Education (DBE), 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><i>Internships</i></p> <p><i>Researchers</i></p> <p><i>Postdoctoral support</i></p> <p><i>Economic growth</i></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 <p><i>Initiatives to improve the technology-based competitiveness of the established primary economic sectors</i></p> <p><i>New R&D-led industry development initiatives, such as Hydrogen South Africa, the Fluorochemicals Expansion Initiative, the Titanium Beneficiation Initiative and the Advanced Manufacturing Technology Strategy</i></p>

STI contribution	Poverty	Inequality	Unemployment
Indirect	<p><i>Postgraduate bursaries, the South African Research Chairs Initiative and the centres of excellence</i></p> <p><i>Providing and packaging information to enhance policy decision-making</i></p>	<p><i>Targeted postgraduate bursaries (for black people and women) and funding to support young and emerging researchers</i></p> <p><i>Using technology to 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</i></p>	<p><i>Postgraduate bursaries, the South African Research Chairs Initiative and the centres of excellence</i></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 ZACUBE2 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

5. Updated situational analysis

5.1 DST performance environment

The growing appreciation of STI's potential to contribute to socio-economic transformation has afforded the DST an opportunity for reflection and better demonstration of its contribution to government imperatives. This has been evidenced through the participation of DST in all government Operations Phakisa¹ to date. The recent (February 2015) inclusion of STI as a cross-cutter in government's Nine-Point Plan shows that, in line with the Department's strategic outcome-oriented goals, STI contributes to socio-economic growth by –

- supporting and directing the NSI and mandating publicly funded STI institutions to support government priority outcomes;
- developing research capacity through funding human capital development at postgraduate level, expanding and transforming research capacity, and providing infrastructure, including cyberinfrastructure, for entities and higher education institutions;
- using research, development and innovation to enhance the productivity of priority sectors such as mining, agriculture and manufacturing;
- using knowledge and innovation for economic development, as well as identifying and piloting projects that have potential for economic development and growth;
- using technology, infrastructure and knowledge in scientific institutions to enhance economic competitiveness;
- identifying gaps and using technology and research to support and grow SMEs;

- supporting the commercialisation of ideas from research;
- using knowledge and innovation for inclusive development;
- using science to inform policy.

The above approaches for STI inclusion have also been leveraged by other departments leading elements of the Nine-Point Plan to advance their own objectives in areas such as growing the oceans economy, implementing a higher impact IPAP, crowding in private sector investment, unlocking the potential of SMEs, cooperatives, and township and rural enterprises, exploring innovative alternatives in water and sanitation, and advancing minerals beneficiation.

While globally economic growth has slowed down, Africa still maintains growth relatively higher than global averages. The continent offers several opportunities for export and markets opportunities for technologies developed and/or piloted by the DST and its entities. In keeping with the broader national economic policies on trade, the DST will explore these opportunities further.

The 2017/18 financial year will be the third year of implementation of the DST's 2015-2020 Strategic Plan. There has been some progress in advancing the targets of the proxy indicators related to the Department's five strategic outcome-oriented goals as set out in the Strategic Plan. Notwithstanding the constraints imposed by the prevailing economic climate and the concomitant budget cuts effected across government, the DST is confident that it will continue to progress against its objectives allowing for modified targets in line with available funding resources.

¹ Operation Phakisa is a South African version of the Malaysian "Big Fast Results" methodology. There have been Operations Phakisa for the mining sector, oceans economy, education, health and ICT sectors, and for agriculture. All Phakisas are facilitated by the Presidency through the DPME and are convened by the relevant lead 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
<p>Strategic outcome-oriented goal statement</p> <p style="text-align: center;">Proxy indicators</p>	<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: Budget coordination and legislative instrument for coordination finalised by 2020 • Proxy Indicator 3: Improved systems in place by 2020 for a more rational and strategic deployment of public funding for STI activities • Proxy Indicator 4: By 2020, a 300% increase in the rand value of government and private-sector investment in R&D partnerships when compared with 2013 (MTSF Outcome 4, Sub-outcome 10) 	<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

Strategic outcome-oriented goal	Increased knowledge generation	Programme strategic objectives supporting strategic outcome-oriented goals ²
Strategic outcome-oriented goal statement	<p>Over the next five years, maintain and increase the relative contribution of South African researchers to global scientific output</p> <ul style="list-style-type: none"> • Proxy Indicator 1: Researchers³ at DST entities or in universities⁴ supported by the DST annually by 2020 • Proxy Indicator 2: At least 35 000 research articles published in the Thomson Reuters Web of Science Citation Database by researchers in DST entities and those supported by the NRF in universities, including PhD and postdoctoral students by 2020 • Proxy Indicator 3: Number of articles co-published with researchers on the African continent doubled 	<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>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
Proxy Indicators		

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

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

4 Equivalent to researchers receiving NRF 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 style="text-align: center;">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 15 840 doctoral students supported by the DST through bursaries per annum by 2020 • Proxy Indicator 2: Not less than 54 392 pipeline (honours and master's) postgraduate students supported by the DST through bursaries per annum by 2020 • Proxy Indicator 3: 4 200 graduates and students placed in science, engineering, technology and innovation institutions by March 2020 • Proxy Indicator 4: 5 521 160 people reached 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 HCD, 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>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: By 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: By 2020, additional revenue of R500 million generated from firms and companies supported through DST-funded instruments since 2010 • Proxy Indicator 3: By 2020, performance of 10 000 SMEs improved through technology interventions 	<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 (IP) 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. <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 South Africa'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
<p style="text-align: center;">Proxy Indicators</p>		

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 MTSF has of 14 Outcomes. Over the MTSF, the DST will have directly contributed to and reported on the following Outcomes:

- Outcome 3: All people in South African 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 provide support to:

- Outcome 7: Vibrant, equitable and sustainable rural communities and food security for all.

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

Outcome	Sub-outcome	Action/commitment	Progress 2016/17	Plans 2017/18
Outcome 3: All South Africans are safe and feel safe	Sub-outcome 4: Secure cyberspace	<ul style="list-style-type: none"> Develop R&D capacity 	<ul style="list-style-type: none"> Cybersecurity research, development and innovation (RDI) programme approved by the DST's Executive Committee (Exco) Presentation of the Cybersecurity RDI Programme to the Minister for approval Presentation of the cybersecurity RDI programme to the Justice, Crime Prevention and Security Cluster for approval Support of 5 PhD and 14 MSc students through the targeted and DST-funded CSIR Modelling and Digital Science HCD programme 	<ul style="list-style-type: none"> Implementation of the Cybersecurity RDI programme within the ambit of the National Cybersecurity Policy Framework Monitoring and continued development of a portfolio of cyber/information security projects that have a bias towards technology development and innovation and are endorsed and supported by other government departments, e.g. South African Social Security Agency-endorsed research on the biometric recognition of children
Outcome 4: Decent employment through inclusive economic growth	Sub-outcome 10: RDI investment supports inclusive growth	<ul style="list-style-type: none"> Strengthen RDI partnerships between government and the private sector Align strategies for emerging/new industries with IPAP and monitor regularly for long-term growth and competitiveness, job creation and export potential Review existing market-based and state incentives for effectiveness in increasing investment in innovation Establishing agroprocessing facilities for indigenous knowledge-based products Work with National Treasury to establish sovereign innovation fund 	<ul style="list-style-type: none"> A number of Emerging Industries Action Plan flagship projects were targeted to meet the Nine-Point Plan objectives of scaling up IPAP, mineral beneficiation and stimulating cross-cutting STI activities Maintained a database of R&D partnerships with the inclusion of 2016/17 data and additional R&D partnerships. Maintained levels of investments in R&D partnerships led by the department including Sector Innovation Funds (SIF's) and Industry Innovation Partnership programmes 	<ul style="list-style-type: none"> Additional techno-economic evaluation completed with a fixed commitment for follow-on funding from development finance institutions, if the flagship projects are deemed feasible Produce a high-level statistical report on R&D partnerships trends between 2013/14 and 2016/17 financial year. Maintain the database of R&D partnerships with the inclusion of 2017/18 data. Secure continued resourcing for successful partnership initiatives of the DST including Sector Innovation Fund and Industry Innovation Partnership fund.

Outcome	Sub-outcome	Action/commitment	Progress 2016/17	Plans 2017/18
Outcome 5: A skilled and capable workforce to support an inclusive growth path	Sub-outcome 3: Increase access to high-level occupational programmes in needed areas	<ul style="list-style-type: none"> • Expand access to communication technologies • Bursary support for postgraduate students • Research infrastructure grants to higher education institutions, science councils and national facilities • Increase outputs by researchers funded by the National Research Foundation (NRF) • Increase the number of research grants 	<p>Bursary support for postgraduate students</p> <p>A new injection of R300 million per annum towards increasing bursary values and the number of students awarded bursaries was implemented in 2015, this resulted in an increase of about 2 000 to 13 307 students funded.</p> <p>Increase the number of research grants</p> <p>An additional investment of R100 million was made during the 2015/16 financial year to increase the average research grant values and the number of research grants awarded to researchers. This resulted in more research grants being awarded (3 805).</p> <p>Research infrastructure</p> <p>Despite a R100 million cut to the research and development infrastructure allocation over the 2016 Medium Term Expenditure Framework (MTEF) period, the number of research infrastructure grants was kept at 70 for the financial year. In addition, the DST was able to start seven new research infrastructures (RIs) falling under the South African Research Infrastructure Roadmap (SARIR) in 2016/17.</p>	<p>Bursary support for postgraduate students</p> <p>A plan to support not less than 3 100 PhD students and not less than 10 800 pipeline postgraduate students annually by 2017/18</p> <p>Increase the number of research grants</p> <p>It is anticipated that no less than 4 500 annual research grants will be awarded in the 2017/18 financial year</p> <p>Research infrastructure</p> <p>Owing to an additional cut of R150 million to the allocation for the 2017 MTEF period, it is necessary to reduce the number of research infrastructure grants from 70 to 60 across all categories of infrastructure provision. The Department will continue the roll-out of the SARIR RIs – at least nine RIs will be established by the end of the 2017/18 financial year</p>

Outcome	Sub-outcome	Action/commitment	Progress 2016/17	Plans 2017/18
Outcome 6: An efficient, competitive and responsive economic infrastructure network.	Sub-outcome 5: Expansion, modernisation, access and affordability of our Information and communications infrastructure ensured	SIP 16: Square Kilometre Array and MeerKAT	The original target was to have all 64 MeerKAT antennas physically erected by 31 March 2017, without them necessarily being operational or science ready. However, with the Minister's approval, this target was amended to having 32 dishes erected and operational. The target for 2017/18 remains unchanged.	64-antenna single polarisation array commissioned by 31 March 2018
Outcome 10: Protect and enhance South Africa's environmental assets and natural resources	Sub-outcome 2: An effective climate-change mitigation and adaptation response	Undertake research in climate sciences	<ul style="list-style-type: none"> The Global Change Science Committee has started a national scan/assessment of climate change research activities and associated research networks and partnerships. Preparation of a report is continuing. ASSAF has been appointed to compile the first biennial report to Cabinet on the State of Climate Change Science and Technology in South Africa, and has begun working on the report. 	<ul style="list-style-type: none"> A functional climate change research network formalised in South Africa through a memorandum of understanding A plan for compiling the second biennial report on the state of climate change science and technology in South Africa
Sub-outcome 3: An environmentally sustainable, low-carbon economy resulting from a well-managed just transition	Sub-outcome 3: An environmentally sustainable, low-carbon economy resulting from a well-managed just transition	Increased investment in research, development and innovation (RDI) to support the transition to a green economy	<ul style="list-style-type: none"> Started with the development of a strategy but identified that the available data and information not adequate, in particular the need for an additional year of data on green economy R&D using the methodology developed in the 2015/16 financial year to inform a longer-term strategy 	<ul style="list-style-type: none"> Add an additional year of data to the statistical report on green economy R&D to support the development of a strategy. Noting the limited opportunities for increasing green economy R&D in the short-term, the strategy to be developed will be for the MTSF period 2020-2025 for inclusion in the next Outcome 10 plan

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. It also makes reference to areas that will be improved over the period 2015-2020.

The NACI review of the 1996 White Paper on Science and Technology initiated in 2015/16 has been finalised, together with an assessment of performance of the system over the last 20 years. The findings of the 1996 White Paper review are being taken into consideration in the drafting of a new White Paper on Science and Technology that is expected to be tabled in Cabinet in 2017/18. The new White Paper will be complemented by a new NDP-aligned decadal plan for STI, also planned for development in 2017/18.

As part of the five-year programme of work identified in 2015/16 to put in place a RDI budget coordination and a legislative instrument for improved governance and coordination of the NSI, the DST secured approval from Cabinet to phase in an STI budget coordination mechanism aligned to existing Medium-Term Expenditure Framework processes. The budget coordination mechanism will be introduced through a phased approach starting in 2017/18 and matured over the next three to four years.

The analysis needed to inform the possible introduction of a STI legislative instrument will continue in 2017/18. Initiatives aligned to this proxy indicator that were initiated in 2016/17 include the Science, Technology and Innovation Institutional Landscape Review commissioned by the Minister.

The current economic climate characterised by low levels of economic growth and competing priorities for public funding impacts on the ability of achieving the MTSF target of growing GERD to 1,5% of GDP by 2019. According to the 2013/14 national survey on research

and experimental development (R&D survey), GERD has remained at an adjusted 0,73% for the past three years. However, efforts continue to engage the private sector and redirect funding from non-conventional areas such as provincial budgets towards STI-based service delivery innovation. The DST-National Treasury task team on RDI funding was actively involved in the 2016/17 Medium Term Expenditure Committee processes.

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. A key undertaking towards the establishment of the fund will be a review of the suite of incentives offered across government and business towards early stage commercialisation and advancing technologies in technology readiness levels 5-9.

(b) Increased knowledge generation, human capital development, and infrastructure provision

HCD (science, engineering, technology and innovation postgraduates, PhDs)

Research capacity is central to the objectives that drive the NSI. Good progress has been made in addressing constraints. In particular, the Minister approved the Human Capital Development Strategy for Research, Innovation and Scholarship (HCD Strategy), the implementation of which is ongoing. In 2016/17, the DST presented the strategy to the Human Resource Development Council, which is chaired by the Deputy President. The modelled cost of implementing the DST's HCD Strategy in support of the NDP benchmarks for HCD with specific focus on the financial implications of delivering the DST's contribution was also presented.

The DST and its public entities have continued to provide funding support for postgraduate research students through the DST-NRF-managed bursary programme. The levels of support for postgraduate bursaries have

significantly improved, with the number of postgraduate students supported almost trebling over seven years (for example, from about 5 000 in 2009 to about 13 545 in 2015), accompanied by above-inflation increases in per capita value, with a long-term view to try and match the

per capita values to entry-level salaries. The total number of postgraduate research students supported increased from 11 335 in 2014/15 to 13 307 in 2015/16. The increase in the number of students receiving bursaries between 2012/13 and 2015/16 is shown in Table 4 below.

Table 4: Postgraduate students supported between 2010 and 2016

Number of postgraduate students supported	2012/13	2013/14	2014/15	2015/16
Honours students	2 846	3 149	3 448	4 225
Master's students	3 087	3 704	2 845	5 120
PhD students	1 779	2 265	4 263	3 404

In 2017/18, a study of postgraduate training in engineering will be completed by ASSAf.

In 2015/16, the DST supported a total of 1 041 graduates and students as interns in the workplace through DST-funded work preparation programmes. Of these, 253 (24%) managed to get employment during or immediately after their internship and another 260 (25%) interns pursued further studies through NRF funding. Owing to budget cuts from the Economic Competitiveness Support Package (ECSP) this number is expected to decrease to 800 in 2017/18.

Knowledge generation (researchers, publications)

In the period 2008/09 to 2014/15, the DST, under the Thuthuka programme, supported 4 713 emerging researchers with research grants. The per capita values of the research grants tripled during the same period. However, investigations conducted by the DST and the NRF revealed that a significant number of researchers and academics at lecturer and senior lecturer levels are not active in seeking funds from the NRF. The DST and the Universities of South Africa have agreed to investigate this issue. The study, 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),⁵ participate poorly in seeking funding opportunities at the NRF, will be completed by the end of 2017/18.

In terms of support for established researchers, the DST intends providing research grants to 4 500 researchers. It is expected that 7 000 ISI-accredited publications will result from these funded researchers.

Research and innovation infrastructure

In terms of research and innovation infrastructure, the DST's 2015/16 ring-fenced infrastructure allocation of R701,087 million enabled it to achieve the following:

- Award 84 research infrastructure grants (44% through the National Equipment and National Nanotechnology Equipment Programmes) for scientific equipment grants to universities, science councils and museums.
- Provide support towards the development of the titanium additive manufacturing project.
- Upgrade Houwteq's Satellite Assembly, Integration and Testing (AIT) facility.
- The acquisition of mobile clinics for the South African National Health and Nutrition Examination Survey (SANHANES) project.
- Provide an average broadband capacity per SANReN site of 3 500 Mbps by the end of the 2015/16 financial year.

⁵ This group is sometimes referred to as the "silent majority".

In 2016/17 the DST 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 research infrastructure necessary for a competitive and sustainable NSI. The establishment of the first seven projects was initiated in the 2016/17 financial year, and another six will be rolled out before the end of 2020/21.

With regard to the implementation of the National Integrated Cyberinfrastructure System (NICIS) programme, the Minister approved (i) the establishment of a regional Tier 2 data node by a University of Cape Town-led consortium and (ii) the development and implementation of a national e-science postgraduate teaching and training platform (with primary focus on the delivery of a structured master's degree) by a University of the Witwatersrand-led consortium. The awards were made on the basis of the outcomes of an adjudication process of national calls for proposals from consortia in the two areas mentioned.

(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 towards deriving a greater share of economic growth from R&D-based opportunities and partnerships is guided by three proxy outcome indicators. These are as follows:

- By 2019, new commercial and industrial financing of R2 billion secured for a portfolio of R&D-led industrial development initiatives funded by the DST.

- By 2019, additional revenue of R500 million generated from firms and companies supported from DST-funded instruments since 2010.
- By 2019, the performance of 10 000 SMEs improved through technology interventions (of the DST).

Specific sector support is outlined below.

Agriculture

The Department has been actively involved in 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, processing and provision, where possible, of energy needs within the agriparks. So far, the DST has embarked on a process to assess some of the agriparks to see how the Department can contribute. 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 laboratories⁶ have just started and the DST's role will be outlined in the "three feet" plans.

Mining

The Mining Phakisa identified several initiatives that needed to be supported in order to address the challenges faced by the mining sector. Platinum-based fuel cells were identified as a technology that could stimulate demand for platinum and provide a platform for 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.

⁶ Operation Phakisa stakeholders collaborate in detailed problem analysis, priority setting and intervention planning. These collaboration sessions are called laboratories (labs).

To date, the following developments have been noted:

- The work done through Hydrogen South Africa (HySA) in the development and commercialisation of local intellectual property. A presentation was made to Cabinet on the progress made by the HySA programme since its inception.
- The inclusion of HySA as a national flagship programme for Climate Change Mitigation.
- The profiling of some of the fuel cell demonstration projects by the DST and the Government Communication and Information System.
- Work done towards the implementation of fuel cell solutions in the local market, particularly in the materials handling and mining vehicles.

In addition, the multi-stakeholder forum on mining has assessed the local landscape, finding the following:

- The local market potential is limited and a global perspective is essential as the country establishes a fuel cell industry.
- Economies of scale will be required to achieve any localisation for fuel cells.
- Currently, South Africa has none of the infrastructure critical to support the local deployment of fuel cells.
- Access to hydrogen and gas as fuel feedstock is currently limited.
- There are logistical challenges and associated transport costs with respect to the distribution of fuel.
- The high capital cost for fuel cells is a huge market barrier.

A prioritisation exercise identified mining vehicles, commercial and industrial combined heat and power, and off-grid power as the leading market segments on which South Africa should focus in the short term (one to four years). However, the country should also position itself to supply components to the global market, particularly the transport sector, in the long term.

The next step will involve a detailed analysis of the value chains required to develop and grow each of the identified market segments, taking into account the key outcomes listed above. It is expected that this work will come up with a stronger value proposition for developing a local fuel cell industry and recommend appropriate policy interventions to government.

A key development in 2016 was the finalisation (as part of an Operation Phakisa process) of proposals to re-energise the mining sector and increase the long-term viability of the sector. A key proposal that the DST began supporting is the development of a mining R&D precinct that would rebuild lost capability in industry-relevant mining R&D.

New industry development

In 2015/16, government adopted the Nine-Point Plan to diversify and enhance the competitiveness of the South African economy. This provided the DST with the opportunity to review existing R&D-led industrial development interventions of the DST and 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:

- The 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.

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. Since 1 April 2015, the DST has continued 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 within universities and other research agencies, that provide technological and product development support to firms and 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 Council for Scientific and Industrial Research. 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 are at an advanced stage of development and will be launched and operationalised in 2017/18.
- Expanding the mLabs and introducing mLabs in under-served areas. The mLabs play a vital role in helping entrepreneurs and SMEs to take advantage of the growing mobile application economy.

Commercialising research results

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

During the 2016/17 financial year, NIPMO has continued 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 this regard, NIPMO provided funding to nine institutions that applied for support with offices of technology transport

(OTT), enabling the appointment of 28 highly skilled individuals in OTTs. Disclosures have continued to increase with the indicative number of new disclosures received by NIPMO by 30 April 2016 at just 115, with further new disclosures due. Historically disadvantaged institutions are providing their OTTs with resources, and are beginning to report disclosures and to claim from the IP Fund. This brings the total disclosures being managed and tracked on NIPMO's database to 1 200. All 21 institutions that applied for a rebate from the Intellectual Property Fund received the maximum 50% rebate for the IP prosecution and maintenance costs they incurred during the 2015/16 financial year, assisting them to obtain statutory protection for their IP.

(d) 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 the systemic roll-out of public services. These knowledge products include policy briefs to enhance decision-making, and technical briefs to advise on the integration of STI into service delivery. The DST has also provided technology solutions for water, energy and housing.

The DST's interventions in service-delivery improvement include Earth observation (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 DST design appropriate interventions to support innovators in these communities and incorporate them into the knowledge economy.

Over the past three years, the DST has partnered with the Bill & Melinda Gates Foundation to experiment and to expedite the process of providing new sanitation solutions to rural areas. The DST established the Nkowankowa Demonstration Centre as a pilot for creating employment through a local product beneficiation.

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

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

With respect to technology-based opportunities for local economic development, the focus in 2015/16 was largely on continued support, through the redesign and growth of existing initiatives, as well as the closure of unsustainable

initiatives. The DST is working closely with the Department of Cooperative Governance and Traditional Affairs to foreground STI in local economic development.

(e) International partnerships to support the NSI

During the 2015/16 financial year the Department secured R619 million in foreign funding coming directly into South Africa to support STI cooperation. Similarly, international partners have invested R2 198 billion in their own research organisations, but for specific cooperation with South Africa. Human capital development remains a major focus, and 169 students from South Africa participated in international programmes offering a postgraduate qualification.

The Department managed a rich and diverse portfolio of international partners, including active collaboration with 585 international partner organisations in 2015/16. 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 63 dedicated technical engagements that allowed South Africa to share experience and expertise with its partners, in science policy areas of crucial importance to South Africa.

The Department's priority focus on international partnerships with Africa resulted in 61 jointly funded STI projects with African partners. On the African multilateral front, the Department worked to advance continental and regional cooperation and integration, with 13 African Union and Southern African Development Community (SADC) initiatives actively supported. The Department also leveraged its broader international partnerships portfolio to secure R113 million of foreign funding in capacity-building initiatives elsewhere on the African continent. These initiatives include the development and implementation of an SADC cyberinfrastructure framework, a SADC STI climate change framework, a South African response plan to the SADC Industrialisation Strategy and Roadmap, and a Pan African university on space science, which is to be hosted in South Africa.

As the custodian of science diplomacy in South Africa, the DST influenced six decisions in multilateral organisations in support of South African priorities and was successful in facilitating the appointment of five South Africans in leadership positions in international governance structures such as multilateral organisations relevant to the 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. In December 2015 the Department hosted the first Science Forum South Africa (SFSA), a global platform for discussion and debate on the science and society interface that attracted more than 1 500 participants from more than 50 countries. Another SFSA was successfully hosted in December 2016, and there are plans to make this a regular event.

5.4 Organisational environment

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

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

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, the Medical Research Council and the Water Research Commission.

5.5 Description of the strategic planning process

In line with the National Treasury Framework on Strategic Plans and Annual Performance Plans, the DST commenced its planning in June 2016. Led by Exco and coordinated by the Department's Directorate: Strategy and Planning, the review of the strategic plan and development of the 2017/18 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 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. The 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. The performance against the 2015/16 APP also was reviewed to inform the revision of indicators and targets where applicable.

6. Planned policy initiatives

The following policy initiatives will be embarked on and/or intensified in 2017/18 to implement the Strategic Plan in support of the Department's five strategic outcome-oriented goals.

6.1 Innovation for Inclusive Development

An innovation for inclusive development strategy has now been finalised. In 2017/18, the focus will be on advancing the key elements of the strategy.

Firstly, the strategy has secured support and buy-in from the local government sector. A long-term strategic partnership will be taken forward to enable interventions that improve service delivery as well as local economic development.

Secondly, a small-scale pilot project to support grassroots innovators will have advanced significantly by 2017/18. The results of the pilot will inform plans for the medium to long-term to enable greater support and the development of successful grassroots innovators.

Finally, interactions that have been facilitated with business over the past two years will be consolidated.

6.2 Sector Innovation Fund

No significant new funding was secured for the Sector Innovation Fund (SIF) over the next three years. The focus in 2017/18 will be on consolidating the seven existing SIFs and to ensure that funded projects are delivering as proposed. In parallel, strategic engagements will continue with National Treasury and other relevant departments to secure partnerships and co-funding to broaden the range of SIFs and scale up current SIFs.

6.3 Establishment of a sovereign innovation fund

The establishment of a sovereign innovation fund was endorsed at the July 2015 Cabinet lekgotla and was included as a DST action item under the Nine-Point Plan.

In 2016 the development of the fund was affirmed as a national imperative when the President, in his State of the Nation Address, announced that the DST would "finalise the sovereign innovation fund, a public-private funding partnership aimed at commercialising innovations that are from ideas from the public and the private sectors"⁷.

Too few products, processes and services reach the market from publicly financed intellectual property (IP) for a number of reasons, including the following:

- IP leakage (i.e. offshore movement and publications).
- Insufficient investment towards driving the progression of technologies through the technology readiness levels, including investment for pilots and prototypes to test the technology.
- Inadequate local and international roll-out and deployment of proven technologies.
- The scarcity of individuals with the skills to take products, processes and services to the market.

For the most part, the first challenge will be addressed through the work of the National Intellectual Property Management Office (NIPMO) with the impending establishment of an IP enforcement fund (as a parallel, but complementary, process to the establishment of the sovereign innovation fund). To address the remaining challenges, it is recommended that government assists in the deployment of locally developed technologies, and invests in funds dedicated to providing such support.

It is, however, widely accepted that the public sector alone cannot provide the required capital for the full commercialisation (i.e. upscale local and international deployment) of new technology products and services. In particular, this is the case for technologies that are aimed at accelerating national responses to global challenges (such as clean energy, climate change mitigation, food security, and human and animal health), as well as initiatives aimed at the creation and scaling up of new technology-based

⁷ 2016 State of the Nation Address. <http://www.gov.za/speeches/President-Jacob-Zuma-State-Nation-Address-2016-11-feb-2016-0000> Accessed on 27 June 2016

enterprises and industries as a catalyst for enhanced national economic growth and development. The key, therefore, is to reprioritise and use the limited public sector funds to leverage private capital.

It is envisaged that the sovereign innovation fund model will incorporate public-private matching, co-investment and/or venture capital funding instruments, to be set up in phases as additional resources are identified and mobilised from the public and private sectors over time. It is therefore proposed that the sovereign innovation fund be initiated by leveraging co-investments from across government. The public component of the fund will be used to enhance the technology development stage, including R&D and early demonstration, of a pipeline of national priority projects. For the later stage technology roll-out and scalable deployment of these projects and initiatives in local and global markets (i.e. where it is found that funding gaps persist in the South African NSI), public-private partnerships will be leveraged/created.

The use of public sector funds in this manner is aimed at covering specific risks, such as financial risk for high-tech investments, as well as geopolitical and/or other national and international regulatory matters. In some cases, the public funds component may also be used to cover the potential "first loss" from investments, which is intended to instil greater confidence in institutional investors to draw significant levels of funding for later stage and full commercialisation activities.

It is envisaged that the support and more active participation of the private sector in the commercialisation process will assist not only in increasing the local pool of high-tech investment resources, but also in further addressing the scarcity of skilled individuals to take more products, processes and services to the market.

The fund will be an important complementary intervention in support of the work of TIA and other initiatives of the Department, such as the Industry Innovation Partnerships Programme, which includes the Sector Innovation Fund, and the implementation of the DST Commercialisation Framework.

During 2017/18, the Department will continue working towards the establishment of the sovereign innovation fund.

6.4 HySA programme expansion

The focus of the second phase is to transition the HySA programme from an RDI initiative into a manufacturing initiative. Critical to this transition is the deployment of HySA technologies into niche markets in South Africa in line with government's Programme of Action commitment to deploy 25 hydrogen fuel cell technologies by 2020. The commercialisation activities of HySA will be implemented by the HySA programme office, which was established in 2016/17. Also the fuel cell task team will be revived to improve coordination across government, private industry and academia.

6.5 Review of the Intellectual Property Rights from Publicly Financed Research and Development Act

In 2016/17 a review of NIPMO and the impact of the Intellectual Property Rights from Publicly Financed Research and Development Act (IPR Act) was undertaken. The outcome of this review will inform amendments to the IPR Act that will be initiated in 2017/18.

6.6 Strategy for the uptake of locally developed technologies

In August 2016, the Cabinet requested the DST, in partnership with the Department of Trade and Industry, to develop a strategy to increase the uptake of locally developed technologies. The first phase, focusing on measures required to incorporate ready-to-deploy technologies, will be concluded by April 2017. Three high-potential short-term opportunities are being explored. These are defence and security technologies, health technologies, and social infrastructure technologies. The implementation of proposals finalised by March 2017 will be a major part of the work of the DST in 2017/18. In addition to taking forward short-term opportunities, a more comprehensive strategy will be finalised in 2017. It will include measures to accelerate the commercialisation of technologies that can be deployed locally.

7. Overview of 2017/18 budget and MTEF estimates and expenditure trends

R'000	Audited outcome			Adjusted appropriation	MTEF estimates		
	2013/14	2014/15	2015/16		2016/17	2017/18	2018/19
Administration	257 472	278 412	301 996	345 142	383 720	401 613	349 267
Technology Innovation	1 150 396	974 040	1 063 297	1 005 418	1 073 621	1 129 364	1 195 030
International Cooperation and Resources	104 546	107 589	114 968	124 463	128 705	135 169	144 425
Research Development and Support	3 198 833	3 489 837	4 218 854	4 170 997	4 348 859	4 467 126	4 756 959
Socio-Economic Innovation Partnerships	1 458 242	1 539 166	1 738 347	1 782 976	1 622 324	1 782 753	1 745 670
TOTAL	6 169 489	6 389 044	7 437 462	7 428 996	7 557 229	7 916 025	8 191 351
Compensation of employees	241 621	276 001	301 087	313 793	315 527	327 690	352 671
Goods and services	160 976	169 849	163 723	218 541	260 242	283 647	231 586
Transfers and subsidies	5 703 873	5 936 872	6 956 058	6 872 197	6 960 482	7 292 494	7 604 421
Payments for capital assets	63 019	6 230	16 467	24 465	20 978	12 194	2 673
Payments for financial assets	-	92	127	-	-	-	-
TOTAL	6 169 489	6 389 044	7 437 462	7 428 996	7 557 229	7 916 025	8 191 351

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	2013/14					2014/15					2015/16					2016/17					2013/14-2016/17 Budget average	2013/14-2016/17 Outcome/ Adjusted appropriation average
	Annual budget	Adjusted appropriation	Audited outcome	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						
1. Administration	268,2	245,7	257,5	291,0	291,9	278,4	299,8	300,5	302,0	304,0	345,1	345,1	345,1	345,1	101,7%	100,0%						
2. Technology Innovation	1 627,1	1 653,6	1 150,4	991,6	1 008,9	974,0	1 008,8	1 008,5	1 063,3	1 007,1	1 005,4	1 005,4	1 005,4	1 005,4	90,5%	89,7%						
3. International Cooperation and Resources	148,4	145,4	104,5	119,7	119,3	107,6	122,0	121,4	115,0	124,5	417,1	417,1	417,1	87,8%	88,4%							
4. Research Development and Support	2 476,8	2 475,8	3 198,8	3 503,8	3 496,9	3 489,8	4 247,1	4 238,8	4 218,9	4 200,6	4 171,0	4 171,0	4 171,0	104,5%	104,8%							
5. Socio-economic Innovation Partnerships	1 677,6	1 677,6	1 458,2	1 564,1	1 562,8	1 539,2	1 804,5	1 796,9	1 738,3	1 792,9	1 783,0	1 783,0	1 783,0	95,3%	95,6%							
Total	6 198,2	6 198,2	6 169,5	6 470,2	6 479,9	6 389,0	7 482,1	7 466,1	7 437,5	7 429,0	7 429,0	7 429,0	7 429,0	99,4%	99,5%							
Change to 2016 Budget estimate																						
(16,0)																						
Economic classification	454,1	414,1	402,6	486,7	494,5	445,9	496,4	495,0	464,8	509,7	523,3	523,3	523,3	94,8%	95,3%							
Current payments	260,7	251,4	241,6	283,8	284,9	276,0	291,3	295,3	301,1	309,2	313,8	313,8	313,8	98,9%	98,9%							
Compensation of employees	193,3	162,7	161,0	202,9	209,6	169,8	205,1	199,7	163,7	200,5	218,5	218,5	218,5	88,9%	90,2%							
Goods and services	13,6	3,9	16,5	15,0	16,5	23,2	17,2	17,2	22,7	17,7	17,7	17,7	17,7	126,3%	145,0%							
of which:	16,6	11,7	13,5	17,7	14,4	8,1	16,9	14,5	8,1	16,2	16,2	16,2	16,2	68,1%	80,8%							
Advertising																						
Agency and support/ outsourced services																						

Programme	2013/14		2014/15		2015/16		2016/17		2013/14-2016/17		
	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											
Venues and facilities	-	-	1,2	25,0	25,0	3,1	25,7	25,7	25,7	60,2%	55,1%
Interest and rent on land	-	-	-	-	-	-	-	-	-	-	-
Transfers and subsidies	5 741,9	5 754,4	5 703,9	5 981,2	5 983,1	5 936,9	6 983,4	6 968,8	6 872,2	99,4%	99,6%
Departmental agencies and accounts	4 174,9	4 179,4	3 762,9	4 409,3	4 393,7	4 032,6	5 466,0	5 457,1	5 311,4	93,6%	93,8%
Higher education institutions	-	-	88,6	21,4	38,9	167,3	114,6	114,6	-	238,7%	211,5%
Foreign governments and international organisations			452								
Public corporations and private enterprises	1 034,2	1 034,2	1 698,0	1 140,8	1 145,5	1 573,1	1 253,3	1 249,8	1 299,4	129,8%	130,0%
Non-profit institutions	532,8	540,8	152,2	409,7	405,0	159,5	149,6	147,3	261,4	62,0%	62,2%
Households	-	-	1,7	-	-	4,4	-	-	-	-	-
Payments for capital assets	2,2	29,7	63,0	2,3	2,3	6,2	2,3	2,3	24,465	1210,1%	187,5%
Machinery and equipment	2,2	2,2	8,2	2,3	2,3	6,2	2,3	2,3	24,465	607,6%	177,0%
Software and other intangible assets	-	27,5	54,9	-	-	-	-	-	-	-	-
Payments for financial assets	-	-	92	-	-	127	-	-	-	-	-
Total	6 198.2	6 198.2	6 169.5	6 470.2	6 479.9	6 389.0	7 482.1	7 466.1	7 429.0	99.4%	99.5%

- The 2017/18 budget and MTEF allocations are linked to the achievement of the Department's targets as shown in the detailed Programme-based planning in Part B.
- The impact of the current fiscal environment for South Africa and the concomitant budget cuts imposed by the National Treasury have been outlined in the situational analysis.
- Programmes 2, 4 and 5 have amended their performance targets on the basis of budget cuts or reprioritisation that have been made to their allocations. The details and implications of the budget cuts are set out in the sections for each Programme.
- The budget cuts to compensation of employees places added pressure on the Department's human resources. Within its allocated budget, the Department will continue to reprioritise funding to address the attainment of its strategic goals and the negative impact on funding for STI activities in general.



PART B

PROGRAMME AND CHIEF DIRECTORATE PLANS



Programme 1: Administration

Purpose

To provide strategic policy and planning alignment, ensure effective governance, risk management, and monitoring and evaluation (M&E), and provide strategic science communication with stakeholders about the activities of the DST and the NSI.

Strategic overview

The Department maintains its efforts to ensure sound administration practices and effective operational systems. The audit outcomes for the 2015/16 financial year for the DST and its entities were favourable, with the Department obtaining an unqualified audit. The DST continues to be one of the top-performing departments as assessed through the Management Performance Assessment Tool administered by the DPME. The cuts across government in an effort to manage the government wage bill will inevitably affect the DST's ability to maintain a favourable vacancy rate and to meet the set time frames for filling vacancies. The focus in 2017/18 will be on the strategic use of resources to continue to meet performance imperatives and deliver on the Department's strategic outcome-oriented goals.

In keeping with the ambitions of the NDP to build an effective and capable developmental state that is transparent and accountable, the DST will continue its efforts to improve operational systems and administration processes. A key deliverable in 2017/18 will be the finalisation of the business process mapping exercise. Through this initiative and effective use of management structures such as the Department's Operational Committee (Opco) and Exco, the objective is to remain engaged, proactive and innovative to build on previous gains and establish new areas for growth and improvement.

(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. This will help to increase efficiency, provide access to information, and add value to productivity and performance. Modern, high-quality administrative support will be continued for the entire organisation. Part of the modernisation process should 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 response to modernisation and change.

(b) Strategic role for human resource management

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

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

Given the constraints in the compensation budget for the 2017/18 and 2018/19 financial years, the Chief Directorate: Human Resources will focus on filling critical and strategic

positions that will assist the Department to achieve its strategic objectives. The current state of affairs requires a different manner of using resources. It will be necessary to promote multi-tasking and upskilling to ensure that the Department is able to use its human resources optimally, without compromising the health and wellness of its employees. Human Resources will explore and introduce ways to capacitate management and employees by helping them with stress management techniques and work-life balance.

In appreciating the current challenges facing the Department, a study will be conducted focusing on two objectives, namely, to determine the current DST culture, and to explore and implement ways of improving the current culture. This initiative will assist in increasing employee engagement and institutionalise the DST values.

(c) Effective finance, audit and risk management functions

The finance, audit and risk management functions will enhance the integrity of the DST's operations by ensuring that they are ethical and efficient, and compliant with legislation. The Department has functional and effective finance, supply chain management, audit and risk management units. It is important that the scope and function of these components continues to be managed efficiently in the next three years, with clear improvements in the effectiveness of internal controls. There is a need for continuous focus on the enhancement of supply chain management processes, effective and integrated IT systems, and capacity building. The strategic focus of the Internal Audit Activity is to achieve a greater level of maturity in the pursuit of a common strategy for improved risk management, governance, internal controls and internal audit. The Directorate: Enterprise Risk Management drives the Department's risk management process, by ensuring that the Department has appropriate policies, frameworks and guidelines, and by 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 will continue to be confident that the Department will support their needs for service in a proactive, consistent and cooperative manner.

(e) Improved strategic planning

The practice of strategic planning is well entrenched in the Department. However, the increased recognition of the role of STI in socio-economic transformation warrants improvement in the definition of the role and contribution of the DST and its entities and the broader NSI in addressing the poverty, inequality and unemployment that continue to plague 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. The unit needs to be reconfigured to (a) serve as a strategic planning unit for the DST and the STI; (b) serve as a knowledge repository for the DST and the STI; (c) conduct evidence-based research to provide current information for executive decision making; (d) communicate on STI research trends; and (e) assist the DST to carry out foresight studies in response to areas identified by various ministerial panels, and to direct the system's contribution to achieving the NDP vision for 2030. The feasibility of this will be explored further in 2017/18.

(f) An effective governance and compliance function

The DST has five public entities and three institutions that implement its various strategic goals. Approximately 92%

of the DST budget is transferred to them. The DST 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 needs increased capacity and resources to manage the diverse interests of these public entities and institutions.

The unit provides the public entities and institutions with sound governance advice, and plays an oversight function to ensure accountability in the implementation of government's policy objectives. In addition to overarching government prescripts, the Department's oversight and governance function is regulated by a Governance Framework, which was developed in collaboration with and agreed to by its entities.

Strategic objectives and strategic statements

Strategic objectives	Strategic statements
Alignment across various planning documents of the Department and its entities	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
Sound corporate governance, including M&E	To develop and maintain good corporate governance systems for the Department and its entities
Adequate and appropriately skilled personnel	To make the DST an employer of choice, and acquire and retain appropriately skilled personnel
Efficient and effective information technology services	To provide an efficient and effective information technology service
Equitable and sound financial and procurement services	To ensure efficient and effective financial and procurement services
Science communication	To provide strategic communication for the DST and its entities through marketing, media and branding initiatives, and the Science Engagement Strategy

Chief directorates

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

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

(b) **Enterprise Risk Management** provides and drives an enabling environment in support the effective and adequate 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 in the Department.

(c) **Policy, Planning, Governance, Monitoring and Evaluation** supports the DST leadership in steering the NSI by facilitating the coordination of selected cross-cutting issues in the Department, strategic and operational planning, M&E 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.

(d) Internal Audit Activity is a 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.

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

As part of implementing the step changes in the DST's 2015-2020 Strategic Plan, Human Resources focuses on capacitating employees through relevant interventions to ensure the required competence. Competence will be measured by how well employees perform their tasks, as well as the cognitive, technical and behavioural traits that they display.

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

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

(h) Science Communication provides strategic communication support to raise local and international awareness of the objectives and activities of the Department, its entities and the NSI, as well as to ensure effective communication among DST and NSI stakeholders. 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. In addition, it is important for this chief directorate to ensure that information to the public is accessible. 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.

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

Table 5: Programme risk management 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"> • Communication of the set priorities through continuous meetings with DST entities (at different levels) between July and January to deal with content and alignment issues regarding strategic and annual performance plans
Sound corporate governance, including monitoring and evaluation	The occurrence of incidents of fraud and corruption	<ul style="list-style-type: none"> • Implementation of 2017/18 fraud prevention and detection plan • Quarterly verification of gift registers (as per the fraud prevention and detection plan) • Review of the ethics and integrity management policy • Processing of requests from employees to conduct remunerated work outside the Public Service
	The 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"> • Development of common definition, to standardise reporting • Improvement of the use of baselines as a basis for planning • The advising and training of Programmes to develop internal performance reports before submitting them to the Directorate: Monitoring and Evaluation
Science communication	Stakeholders (public) misinformed and/or uninformed of DST activities	<ul style="list-style-type: none"> • Strengthening of the three-year marketing, communication and media strategy (which is reviewed on an annual basis) by event-specific strategies to promote the government and the DST • Population by Programmes of template of event-related needs, with deadlines indicated for each event • Adherence to marketing, communication and media strategy implementation plans, and the allocated budget

Strategic objective	Risk description	Mitigation action
Efficient and effective information technology services	Unauthorised access to DST data/information/network (logical access)	<ul style="list-style-type: none"> Continued hardening of critical services, including detection and prevention procedures Awareness raising/education of DST users on how to protect DST information from external sources Implementation of management solution for smart mobile devices with access to DST resources, which will enable IT to control devices remotely (this will include the development of a "bring your own device" policy) Sharing of the DST Own Cloud with DST staff
	The inability of DST staff to continue with operations	<ul style="list-style-type: none"> Annual review of the IT Service Continuity Plan (Disaster Recovery Plan) Implementation of intrusion detection and prevention system as a monitoring tool Refreshment of IT hardware, including the disaster recovery site and data centre revamp High availability of all critical systems (email, Alfresco and transversal systems) Annual review of the DST Emergency Response Plan Validation of IT systems Implementation of the Preventive Maintenance Plan Holding IT and knowledge, information and records management awareness sessions as part of Corporate Services awareness sessions during the year Increase/expand the current IT structure/capacity
	Loss of institutional memory	<ul style="list-style-type: none"> Development and implementation of knowledge sharing procedure Continuous provision of awareness sessions
Adequate and appropriately skilled personnel	Increased vacancy rate	<ul style="list-style-type: none"> Implementation of the Retention Policy Enhanced implementation of capacity-building initiatives Roll-out of departmental programmes, i.e. Leadership/Management Programmes (Emerging and Advanced Management Development Programmes, Executive Development Programme, Global Leadership Programme, and Mentoring and Coaching Programme) Continuous awareness sessions provided to employees

Strategic objective	Risk description	Mitigation action
Equitable and sound financial and procurement services	Under/overspending of the DST budget	<ul style="list-style-type: none"> • Provision of continuous one-on-one, ad-hoc awareness sessions as and when the need arises • Weekly, monthly and quarterly submission of the expenditure report to Opco, Exco, the ERM Committee, the Audit Committee and MMM on the analysis of monthly expenditure (a monitoring tool to ensure that risk remains within the acceptable parameters) • Reprioritisation of funding and/or the request of additional funding • Quarterly CFOs' Forum with the entities • Provision of advice on financial matters during planning sessions • Finance awareness sessions to educate officials on new and existing legislation/regulations as well as updates to existing legislation/regulations • Continuous monitoring by the Directorate: Finance of all transfer payment transactions to detect non-compliance and overspending
Equitable and sound financial and procurement services	Non-compliance with the Supply Chain Management policies and procedures by DST staff	<ul style="list-style-type: none"> • Provision of continuous one-on-one, ad-hoc awareness sessions as and when the need arises • Consistent application of the procurement document checklist by Supply Chain Management practitioners • Briefing of the Bid Specification Committee members prior to bid specification approval • Approval of the Bid Evaluation Committee recommendation for the Bid Assessment Committee • Submission of performance reports to Supply Chain Management by the project owners • Continuous updating of the contract registers • Submission of procurement plan and reports to the Bid Assessment Committee and National Treasury to monitor the status of the procurement plan • Submission of progress on the procurement plan to Opco and the CFO • Approval of Bid Evaluation Committee recommendations to Bid Assessment Committee

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)

Strategic objectives	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
1 Alignment across various planning documents of the Department and its entities	DST public entities' strategic and annual performance plans and annual reports approved by the Minister and CSIR shareholder compact signed by the Minister and chairperson of the board by 31 March 2020	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 2014.	Strategic plans and APPs for DST public entities (HSRC, SANSA, TIA, ASSAF, NRF, CSIR and NACI) were approved by the Minister by 5 March 2015 and shareholder compacts were signed.	DST public entities' 2016/17 strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 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 approved by the Minister and CSIR shareholder compact signed by the Minister and chairperson of the board by 31 March 2018	DST public entities' 2019/20 strategic and annual performance plans and annual reports approved by the Minister and CSIR shareholder compact signed by the Minister and chairperson of the board by 31 March 2019	DST public entities' 2019/20 strategic and annual performance plans and annual reports approved by the Minister and CSIR shareholder compact signed by the Minister and chairperson of the board by 31 March 2020
2 Adequate and appropriately skilled personnel	Vacancy rate retained at 6% by 31 March 2020	Vacancy rate reduced to 6%	Vacancy rate reduced to 5,6%	Vacancy rate reduced to 5,47%	Vacancy rate retained at 6% by 31 March 2017	Vacancy rate capped at 10% by 31 March 2018	Vacancy rate reduced to 6% to 10% by 31 March 2019	Vacancy rate retained to 6% by 31 March 2020
3 Science communication	104 media articles written to raise the DST's public profile by 31 March 2020	No baseline	No baseline	21 media articles written to raise the DST's public profile by 31 March 2016	32 media articles written to raise the DST's public profile 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	80 media articles written to raise the DST's public profile 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
4 Equitable and sound financial and procurement services	50 public participation programmes held by 31 March 2020	13 public participation programmes conducted by 31 March 2014	7 public participation programmes conducted by 31 March 2015	16 public participation programmes held by 31 March 2016	20 public participation programmes held between 1 April 2015 and 31 March 2017	30 public participation programmes held between 1 April 2015 and 31 March 2018	40 public participation programmes held between 1 April 2015 and 31 March 2019	50 public participation programmes held between 1 April 2015 and 31 March 2020
	Unqualified audit ⁸ (clean audit) opinion with no financial matters in the audit report 30 September 2020	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 report on financial matters issued by Auditor-General by 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 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 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 2017/18

Output	Performance indicator	Five-year Strategic Plan target		Audited/actual performance			Estimated performance	Medium-term targets							
		2013/14	2014/15	2015/16	2016/17	2017/18		2018/19	2019/20						
<p>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</p>															
DST public entities' APPs	DST public entities' annual performance plans and annual reports approved by the Minister and the CSIR shareholder compact signed by the Minister and the chairperson of the board	DST public entities' 2020/21 annual performance plans and annual reports approved by the Minister	DST public entities' 2017/18 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 2017	Strategic plans and APPs for DST public entities (HSRC, SANSa, TIA, ASSAF, NRF, CSIR and NAC) were approved by the Minister by 5 March 2015 and shareholder compacts were signed by 31 March 2016	The APPs of 2014/15 and shareholder compact were approved by the Minister prior to the start of the 2014/15 financial year. They were tabled in Parliament on 12 March 2014	Approved APPs (HSRC, NRF, SANSa, ASSAF and the Africa Institute of South Africa (AISA) and strategic plans tabled in Parliament: AISA, NRF, HSRC, TIA, SANSa and ASSAF	Signed shareholder compacts: CSIR, AISA, NRF, SANSa and HSRC	DST public entities' 2020/21 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2020	DST public entities' 2019/20 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2019	DST public entities' 2018/19 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2018	DST public entities' 2017/18 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2017	DST public entities' 2016/17 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2016	DST public entities' 2015/16 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2015	DST public entities' 2014/15 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2014	DST public entities' 2013/14 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2013
<p>Objective statement: To make the DST an employer of choice and recruit and retain appropriately skilled personnel</p>															
Suitable skills and competencies for the DST	Vacancy rate retained at 6% by 31 March 2020	Vacancy rate reduced to 6%	Vacancy rate retained at 6% by 31 March 2015	Vacancy rate was reduced to 5,47 % by 31 March 2016	Vacancy rate retained at 6% by 31 March 2015	Vacancy rate reduced to 5,6%	Vacancy rate reduced to 6%	Vacancy rate capped at 10% by 31 March 2018	Vacancy rate reduced to 6% by 31 March 2019	Vacancy rate retained at 6% by 31 March 2020	Vacancy rate retained at 6% by 31 March 2020	Vacancy rate retained at 6% by 31 March 2020	Vacancy rate retained at 6% by 31 March 2020	Vacancy rate retained at 6% by 31 March 2020	Vacancy rate retained at 6% by 31 March 2020

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2013/14	2014/15	2015/16		2016/17	2017/18	2018/19
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	Not a strategic indicator	-	-	-	1 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
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 media articles written to raise the DST's public profile by 31 March 2020	No baseline	New target	21 media articles written to raise the DST's public profile by 31 March 2016	16 media articles written to raise the DST's public profile by 31 March 2017	24 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
Public participation programmes held	Number of public participation programmes held	50 public participation programmes held by 31 March 2020	13 public participation programmes conducted	7 public participation programmes conducted by 31 March 2015	16 public participation programmes held	10 public participation programmes held by 31 March 2017	10 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

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance	Medium-term targets		
			2013/14	2014/15	2015/16		2016/17	2017/18	2018/19
Objective statement: To ensure effective and efficient financial and procurement services									
Unqualified audit opinion with no financial matters in the audit report	Unqualified audit ⁹ (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 on financial matters issued by 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 (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 (clean audit) opinion with no financial matters in the audit report

9 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 2017/18 financial year

Performance indicator	Reporting frequency	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
DST public entities' annual performance plans and annual reports approved by the Minister and the CSIR shareholder compact signed by the Minister and the chairperson of the board	Quarterly	DST public entities' 2018/19 annual performance plans and CSIR shareholder compact signed by the Minister and the Chairperson of the board and annual reports approved by the Minister by 31 March 2018	No target	First draft APPs for DST public entities submitted to NT and DPME by 31 August 2017 Annual reports of public entities tabled in Parliament by 30 September 2017	Second draft APPs for DST public entities submitted to NT and DPME by 30 November 2017	Final draft APPs for DST public entities submitted approved by Minister by 28 February 2018 Submission of the CSIR shareholder compact to National Treasury
Vacancy rate reduced to a set rate	Quarterly	Vacancy rate capped at to 10% by March 2018	Vacancy rate capped at to 10%	Vacancy rate capped at 10%	Vacancy rate capped at 10%	Vacancy rate capped at 10%
Combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees	Annually	1 combined assurance annual report on the status of combined assurance presented to the Risk and Audit Committees by 31 March 2017	No target	No target	No target	1 combined assurance annual report on the status of combined assurance presented to the Risk 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 2018	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 2018	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 2016/17	Medium-term expenditure estimates		
	2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Ministry	3 403	3 972	4 332	4 369	4 461	4 634	4 988
Management	78 510	81 736	90 072	105 426	108 623	113 566	121 170
Corporate Services	164 571	183 897	200 057	221 479	256 278	268 388	207 115
Governance	7 828	7 550	7 535	9 307	9 574	9 992	10 679
Office Administration	3 160	1 257	-	4 561	4 784	5 033	5 315
TOTAL	257 472	278 412	301 996	345 142	383 720	401 613	349 267
Compensation of employees	122 972	140 072	151 744	154 457	152 729	158 621	170 709
Goods and services	112 175	122 121	118 799	153 360	196 510	216 512	160 799
Transfers and subsidies	14 287	10 222	14 874	12 860	13 503	14 286	15 086
Payments for capital assets	8 038	5 964	16 467	24 465	20 978	12 194	2 673
Payments for financial assets	-	33	112	-	-	-	-
TOTAL	257 472	278 412	301 996	345 142	383 720	401 613	349 267

Programme 2: Technology Innovation

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 IP, technology transfer and technology commercialisation.

Strategic overview

Programme 2 contributes to all five of the Department's strategic outcome-oriented goals in the 2015-2020 Strategic Plan, namely, (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 an 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, 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 regarding building a responsive, coordinated, and efficient NSI, the coordination of various role players (including government, industry, science councils and academia) will continue to receive specific attention, in 2017/18 and beyond. This will include work towards the establishment of a sovereign innovation fund and building strategic partnerships with the private sector, in particular with business associations.

In an effort to strengthen the NSI, the coordination of key stakeholders (in government and in private or public sector institutions) is being undertaken to ensure optimal contributions across the value chain. With respect to the public sector, the Programme continues to ensure that the institutional capacity of key agencies such as SANSa and TIA is strengthened and geared towards improved service delivery.

The Programme also ensures that, with respect to the role of STI, the DST contributes to the development and implementation of government policies, including the areas of improving energy security for the country; alleviating poverty; improving health care; and enabling and, where possible, promoting local innovation. These interventions are aligned with the priorities of sector departments such as Trade and Industry (IPAP), Agriculture, Forestry and Fisheries (the Agricultural Policy Action Plan), Energy (the Integrated Energy Plan), Environmental Affairs (Operation Phakisa: Oceans Economy) and Mineral Resources (Operation Phakisa: Mining). This is done through DST-led strategies such as the Energy Security Grand Challenge, the Bio-economy Strategy (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.

A concerted effort will be made to support ongoing work in relation to the activities of the Executive Council established in terms of the Genetically Modified Organisms Act, 1997 (Act No.15 of 1997). In this regard, the Programme will continue to lead and make recommendations that will influence decisions on the uptake of GMOs in South Africa, as well as enhancing biosafety policy involving GMOs, as part of the process of contributing to effective decision making in the sector.

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, including nuclear energy, in the long-term using STI 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 (CoCs) 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.

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

In support of Strategic Outcome-Oriented Goals 2 and 3, the Programme focuses on key strategic research areas, namely, space science, energy security, emerging and converging research areas, and bioinnovation. This Programme provided funding support to more than 402 postgraduate students (MSc and PhD) by the end of March 2016 through structured HCD programmes. 355 postgraduate students is expected to be supported in 2017/18. Furthermore, the Programme supported a number of strategic RDI programmes related to government priorities. The Programme plans to grow the

number of programmes it supports to 28 in the 2017/18 financial year. These programmes contribute to HCD efforts in designated areas.

Programme 2's innovation-enabling initiatives also contribute to the development of knowledge products such as such as intellectual property outputs (including patent applications/patents and publications). By the end of March 2016, 156 knowledge products had been generated as a result of the Programme's initiatives. It is anticipated that 148 knowledge products will be produced in the 2017/18 financial year.

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

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 (including expert knowledge in the discipline and relevant to the technology, but also translational and technology commercialisation skills) and infrastructure to enable RDI, to support the demonstration and piloting of new technologies, and to ensure that appropriate IP protection and support mechanisms are in place.

In this regard, the development and assessment of technically sound methodologies and procedures for the objective evaluation of current and future DST investments to support decision making in respect of potential investments on the part of the DST and its commercialisation partners will continue in 2017/18. These actions are part of the implementation of the DST's Commercialisation Framework.

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

evaluation programme has been conceptualised, refined and implemented. It comprises the following:

- Ongoing assessment of the CoC Framework assumptions with a view to deriving policy-relevant research on public-private engagements and partnerships.
- The establishment, incubation and evaluation of the Biomedical Translational Research Initiative and the Synthetic Aperture Radar Initiative over a period of three years, with a view to using key lessons learnt for the operationalisation and sustainability of future CoC programmes.

In addition, the Programme will put measures in place to articulate the Department's investment focus in nanotechnology for the next 10 years. The intent is to create an environment enabling nanotechnology innovation and commercialisation, guided by a roadmap for nanotechnology innovation and commercialisation. Activities in the 2017/18 financial year will support efforts towards leveraging outputs from R&D investments in ongoing nanotechnology programmes so as to realise commercialisable products.

Specific effort is being made to harness indigenous knowledge to create new products (traditional medicines, cosmeceuticals, and nutraceuticals) that benefit knowledge holders and to develop new markets (for indigenous plant and animal species) that will support the creation of employment in communities where the knowledge originates. To date, the Programme has facilitated the signing of benefit-sharing agreements between knowledge holders and commercial partners, and supported the construction of agroprocessing facilities. Work will continue to leverage additional investment and support from other tiers of government while the number of people trained/being trained in business skills to support the sustainability of indigenous knowledge-based enterprises is increased.

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.

The National Intellectual Property Management Office (NIPMO), which is the implementing office for the IPR Act, stimulates greater economic and social returns resulting from IP emanating from R&D conducted using public funds, through a number of interventions, including financial support through the Offices of Technology Transfer Support Fund and the IP Fund. By the end of 2016/17, NIPMO had provided financial support in excess of R140,3 million for, among other things, the creation of 104 posts for highly skilled individuals through the OTT Support Fund, and resourcing for at least another 28 posts. Furthermore, financial support for the prosecution and maintenance of IP rights has exceeded R101,5 million over the last five years. Both areas of support will continue in the 2017/18 financial year. These interventions are all aimed at equipping institutions to increase knowledge utilisation for advanced economic and social development.

Furthermore, enhanced interventions to build and support a pipeline for the realisation of publicly funded R&D outputs with socio-economic impact will be implemented. This will include exploring models for the roll-out of an enforcement fund to ensure publicly financed institutions can prevent third parties 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 in an effort to establish a best practice, simple guide to IP valuation. This work will continue during 2017/18 and, once finalised, will be presented to National Treasury for consideration and to assess the appetite for support.

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

In particular, the provision of Earth observation and geospatial information through the SAEOS portal, and the development of satellite applications in land cover and land use, will provide decision-support tools and information for policy formulation in government, in this way contributing to the protection of environmental assets, human settlement planning and development, rural connectivity, and the 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.

Work towards manufacturing South Africa's first indigenous satellite (CubeSat) constellation has also commenced with

the objective of providing automatic identification system services to Operation Phakisa (Oceans Economy) and the African continent. This constellation will also provide infrastructure for marine and maritime domain awareness, and the Oceans and Coasts Information Management System, which will generate information and support decision-making in marine spatial planning.

Following the launch of the web-based Bioenergy Atlas in 2016/17, the Programme will focus on supporting its use by different spheres of government. This decision-making tool will allow stakeholders to have a better appreciation of bioenergy resources' geographic spread, proximity to infrastructure (biofuels and electricity) and possible use in improving energy access.

The DST is leading the development of the National Space Programme (NSP) Economic Case, which will outline the direct and indirect socio-economic benefits and return on investment of the NSP. The Economic Case will be finalised in 2017/18. The National Space Strategy outlines the national goals and objectives for the development of space science and technology. It also provides guiding principles for a formal and operational NSP. The NSP defines the vision and programmatic roadmaps for South Africa's 20-year space programme. SANSa has developed a technical document outlining detailed programmes for the space programme. These benefits include commercial income; quantifiable return from space services and products; applications in natural resource management and human settlements; knowledge generation; and human capital development.

Programme's contribution to reducing unemployment, poverty and inequality

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

As far as employment creation is concerned, NIPMO has supported the creation of a number of jobs in the past five years through the establishment of OTTs, and is in

the process of creating more jobs. The initial results of the IP and technology transfer surveys indicate that start-up/spin-outs from institutions have created in excess of 300 jobs, based on IP emanating from publicly financed R&D. The DST's IKS portfolio has a number of community-based programmes focusing on the growing and processing of indigenous knowledge-based crops. These programmes empower communities through benefit-sharing agreements, but most importantly help to create employment for local communities, especially young people and women. To date, IK-based initiatives have created more than 200 direct jobs.

In terms of addressing inequality, the broad-based black economic empowerment (BBBEE) imperatives of government are being actively supported. The above IKS projects also address this challenge by establishing community-based cooperatives and SMEs. Furthermore, the IPR Act provides that, in the granting of non-exclusive licences of IP emanating from publicly financed IP to SMEs and BBBEE entities should receive preferential treatment. These numbers are being actively tracked and to date such parties have been granted 36 licences from publicly funded institutions.

In respect of poverty alleviation, Programme 2 supports various initiatives aimed at improving access to quality healthcare and, therefore, the livelihoods of the country's poor. These include innovations in support of 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 areas of diagnostics for cost-effective deployment at point of care, specifically developed to suit rural environments.

Programme 2 also supports the innovation within the agriparks initiative being led by the Department of Rural Development and Land Reform, which responds to national priorities in terms of poverty reduction, job creation, addressing inequality and promoting sustainable rural development.

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

In the health domain, the development of the mTriage tablet application provides a decision-support device that assists emergency care hospital staff in providing a better assessment of the status of patients, thereby improving the efficiency of emergency responses. The Primary Health Care Standard Treatment Guidelines and Essential Medicines List application, developed with financial support from the DST, has been adopted by the Department of Health, and continues to be used by health care professionals to report medication shortages and stock-outs directly to the Department of Health.

Strategic objectives and strategic statements

Strategic objectives	Strategic statements
Facilitate and resource R&D in strategic STI areas	To facilitate and resource investments in space S&T, energy, bioinnovation, nanotechnology, robotics, photonics, IKS, IP management, technology transfer and technology commercialisation in order to create value chains and an innovation system that is more capable, dynamic and responsive
Oversee relevant departmental agencies and initiatives	To oversee, monitor and regulate key policy initiatives in the key strategic areas of space S&T, energy, bioinnovation, nanotechnology, robotics and photonics, including oversight of agencies (TIA and SANSA)
Coordinate and support high-end skills development	To coordinate and support high-end skills in – <ul style="list-style-type: none"> • the strategic and emerging S&T areas of synthetic biology, structural biology, systems biology and functional genomics (collectively the South African Biodesign Initiative), space S&T, energy, bioinnovation, nanotechnology, robotics, photonics and IKS • IP management, technology transfer and technology commercialisation
Support the development and translation of scientific R&D outputs into commercial products, processes and services	To support, promote, and advocate the development and translation of scientific R&D outputs into commercial products, processes and services that will contribute towards economic growth and a better quality of life

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

Chief directorates

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

Bioinnovation¹⁰

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

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

The chief directorate supports a number of cross-cutting initiatives aimed at achieving these objectives, including an NRF-based capacity development programme in bioinformatics, technology service platforms (which provide expert services to both the public and private sectors), strategic science programmes, and a public

¹⁰ This chief directorate was previously called "Bioeconomy", and was referred to as such in the 2015-2019 Strategic Plan.

awareness programme. The Department also participates in the Executive Council established in terms of the GMO Act, providing expert advice and decision-support tools.

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

Hydrogen and Energy

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

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

The focus of the chief directorate will be to ensure an environment to enable world-class R&D while speeding up the process of moving products from the laboratory to the market. The chief directorate will implement the HySA hydrogen fuel cell deployment plan, which details the areas most suitable for the deployment of hydrogen fuel cells on the basis of socio-economic and techno-economic parameters, such as the distance from the grid. The large-scale deployment of hydrogen fuel cells (including the integration of components developed through the HySA programme into fuel cell units, which will be deployed at selected schools and clinics for technology testing and validation) will be a critical step in moving the HySA programme from a RDI initiative to a manufacturing initiative.

The chief directorate will also work toward strengthening relationships with national, provincial and local government departments through the re-establishment of the Hydrogen Fuel Cell Task Team. Working closely with departments at the coal-face of service delivery will ensure that technological innovation both speeds up and improves the provision of basic services to the people of South Africa. The chief directorate will start efforts to increase the regional footprint of its programme by strengthening partnerships with historically disadvantaged universities and technical and vocational education and training institutions located close to the rural areas in which the technologies are expected to be deployed. It will also continue to monitor the Cofimvaba energy solution intervention until it is handed over to the DBE, and will expand it to other sectors such as health and local government.

With respect to technology commercialisation, discussions will be held with relevant stakeholders in order to ensure that commercialisation partnerships are structured in a manner that supports the development of new industries as well as transformation. It is hoped that these partnerships will make additional financial support of R100 million available for the technology demonstration and validation phase. Specific components such as membrane electrode assemblies containing the HySA catalyst and metal hydride hydrogen storage material will be tested and validated in the market. In this regard, HyPlat, a spin-out company from the University of Cape Town and Mintek (which completed its first commercial sales of membrane electrode assemblies in the first quarter of the 2016/17 financial year to a foreign original equipment manufacturer), will continue to explore strategic partnerships to increase its market share.

A 2,5 kW hydrogen fuel cell unit developed in partnership by the three HySA CoCs will be launched in 2017/18 at a rural school in the North West, as will a pilot plant to support the development of lithium-ion battery precursor material in Nelspruit. The latter initiative will enable the local production of lithium-ion batteries, which will

facilitate the deployment of renewable energy and may be used in other applications, such as e-mobility.

In the biofuels space, the chief directorate will support the Department of Energy in implementing the biofuels regulatory regime and continue to commercialise late-generation technologies that reduce potential fuel insecurity. In this regard, the Coalgae™ product, which is a mix of coal discards and algae, will be scaled up to one hectare in 2017/18 if funding can be leveraged through key partnerships. This pilot plant will require a capital investment of R60 million and an operational budget of R20 million per annum in order to bring the product to commercial readiness. On the policy front, the chief directorate will maintain decision-support tools through resource quantification and provide data on the performance of alternative energy supply options. The Bioenergy Atlas, which was launched in 2016/17, will continue to be supported to ensure that key stakeholders at local government level have access to data that has already informed decisions made by state-owned enterprises.

The Heliostat 100 (Helio 100) technology for concentrating solar power plants will continue to be demonstrated, with the aim of piloting in partnership with commercial players in 2017/18, and possible commercialisation in subsequent years. The commercialisation options of the thin-film photovoltaic technology will be further explored with local government and National Treasury (within energy regulatory frameworks). The technology development will be supported through piloting and further testing as a solution for existing embedded generation in live environments such as on rooftops in Gauteng. In addition, the focus will be on supporting the Renewable Energy Independent Power Producer Procurement Programme by ensuring that the local content of the solar technologies is increased significantly to improve the technology balance of payments.

The Centre for Energy Systems Analysis and Research will continue to focus on completing policy studies analysing the use of alternative technologies such as hydrogen fuel cells as well as solar systems with energy storage for rural households, clinics and schools. These will inform the roll out of off-grid electricity to areas where the cost of grid electricity is a barrier.

Space Science and Technology

The government recognises the potential role of space science and technology to deliver on a wide spectrum of 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 and 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 also 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 was established to give the Earth observation community the opportunity to access data and eventually analyse Earth observations and geospatial datasets according to the priority applications of the users. This portal and the Earth Observation Data Centre will be maintained to ensure that satellite imagery, geospatial datasets, products and services are made available to assist decision-making and service delivery at national, provincial and local government level.

The envisaged outputs of space infrastructure and technological advancement would be (i) the establishment of the world-class data processing infrastructure that will contribute significantly to the big data analytics and sciences and to SAEOS; (ii) the design and manufacture of the CubeSat constellation that will support and contribute to Operation Phakisa: Oceans Economy through provision of decision support tools and information services for maritime domain awareness and marine spatial planning; (iii) the design and manufacture of ZA-ARMC1 (EOSat1), an operational Earth-observing satellite that will provide data for natural resource management and human settlement planning, as well as strengthening the satellite build programme and industry stimulation; (iv) the upgrade of the Houwteq Assembly, Integration and Testing facility, making it a world-class, operational AIT facility for the satellite build programme and international customers; (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 in the thematic areas of 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 towards the research and development of products, goods and services that respond to South African user needs and requirements. Space-based products will be derived through the integration of various datasets from the thematic areas, such as satellite maps; and decision-support tools to assist evidence-based policy making and decisions about environmental resources management and disaster management, among other things.

The chief directorate and SANSA will position and represent South Africa at the Group on Earth Observations (GEO), the Committee on Earth Observation Satellites, the United Nations Committee on the Peaceful Uses of Outer Space, the International Telecommunication Union,

the International Astronautical Conference and other key international gatherings, in order to position the country as a user of space for peaceful purposes. In response to GEO, the component has established SA-GEO which will drive South Africa's contribution to AfriGEOSS through the National Earth Observation and Space Secretariat.

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

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

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

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

Innovation Priorities and Instruments

Innovation Priorities and Instruments supports and strengthens the innovation policy package (and related interventions) aimed at creating and sustaining an enabling environment for innovation, technology development, and the commercialisation of publicly funded R&D

initiatives. It does this by identifying, developing, creating and supporting policy instruments 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.

Over the next three years, the transition of research along the various technology readiness levels to commercialisation and the support measures to achieve this will be assessed, and the information used towards the development and implementation of a framework/methodology by the Department to support technology development and commercialisation funding decisions. The chief directorate will also assess what would be needed for the possible establishment of the sovereign innovation fund, an envisaged public-private technology commercialisation (venture capital) funding mechanism.

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

- The Innovation Bridge technology showcase and matchmaking event and the complementary portal a key action emanating from the drive to enhance partnerships with the private sector.
- Mentorship programmes, based primarily on partnerships between the public and private sectors.

The implementation of the Commercialisation Framework as a key policy initiative will be championed, implemented and coordinated over the MTEF. In addition, the chief directorate will contribute to the development and implementation of the DST's actions under IPAP.

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

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

National Intellectual Property Management Office

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

- To facilitate the establishment of OTTs at institutions (29 higher education institutions and 10 Schedule 1 institutions, which are mostly science councils) and associated capacity development.
- To ensure compliance with the IPR Act and Regulations by recipients of publicly financed R&D.

- To provide funding through the IP Fund for the protection and maintenance of IP emanating from publicly financed R&D.
- To provide incentives for IP creators to encourage them to disclose, protect and commercialise their creations.

By providing incentives, support, capacity development, funding and compliance services, NIPMO is expected to contribute towards increasing the rate of knowledge utilisation from publicly funded R&D, thereby contributing towards faster economic development in South Africa. In particular, as a result of NIPMO's interventions, six OTTs will be supported for capacity development, a total of 180 candidates will be trained in IP and specialised technology transfer skills, 100% of eligible claims from institutions will be awarded a rebate from the IP Fund in line with the requirements of the IP Fund Guideline, and a total of 280 new disclosures will be received from publicly funded institutions. These disclosures will be monitored biannually through the innovation value chain steps of evaluation, protection, pre-commercialisation and commercialisation (where revenue is received by an institution).

In 2016/17 a guideline on IP Enforcement was produced and presented to DST's Exco for consideration. In addition, a presentation on NIPMO's role in curbing IP leakage in general, including through an IP enforcement fund, was made to the Minister. International benchmarking of an IP leakage fund has been completed and a number of models for the roll-out of an enforcement fund to enable publicly financed institutions to ensure that third parties do not infringe their IP rights were identified. 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. On the basis of international comparison, the insurance model seems the most acceptable means of protecting IP against third-party infringement. However, this model presents its own challenges, as it relies on valuation of IP as a tool for determining the insurance value and hence premiums. Advice has been sought through numerous engagements with the World Intellectual Property Organisation in an effort to establish a best practice, simple guide to IP valuation. These consultations will be finalised in 2017/18.

Table 10: Programme risk management and identification – Technology Innovation

Strategic objective	Risk description	Mitigation action
Facilitate and resource R&D in strategic STI areas	Ineffective implementation of the Intellectual Property Rights from Publicly Financed Research and Development Act	<ul style="list-style-type: none"> Continued implementation of the three-year strategy for NIPMO (including financial support to institutions, incentives required, skill development and awareness initiatives) MTEF submission – engagements with DST's HR, Finance and IT directorates Finalise the development and implementation of the NIPMO Business Intelligence Management Information System Formalised NIPMO training initiatives
Oversee relevant departmental agencies and initiatives	Public institutions deviating from their policy mandate	<ul style="list-style-type: none"> Formal delegations of authority (in writing) for oversight monitoring and regulation (including roles, responsibilities and standard operating procedures) Development and implementation of DST ring-fenced funding protocols Customised reporting template for financial and non-financial reporting Recommend approval of entity APP and shareholder compacts for 2018/19 Quarterly M&E of entity performance
Coordinate and support high-end skills development	Private sector aversion to investment risk taking in technology development sectors and early commercialisation	<ul style="list-style-type: none"> Development of high-end skills in strategic areas to address the inadequate human resource capacity and capability within the NSI (in terms of both numbers and relevant skills)
Support the development and trans-lation of scientific R&D outputs into commercial products, processes and services	<p>Environment that is not conducive to innovation and commercialisation of technology (for socio-economic impact)</p> <p>Suboptimal utilisation and commercialisation of R&D outputs</p>	<ul style="list-style-type: none"> Continued implementation of the Commercialisation Framework Development and implementation of the EIAP Programme Development and implementation of DST IP Policy Continued implementation of the Commercialisation Framework Development of high-end skills in strategic areas Development and implementation of the Emerging Industries Action Plan Programme Development and roll-out of the Bio-economy Strategy Implementation Plan. Review of the South African Earth Observation Strategy Implementation of IPWise™ advocacy and awareness sessions Annual assessment of level of alignment between innovation incentives
Misaligned strategic direction among NSI stakeholders	Misaligned strategic direction among NSI stakeholders	<ul style="list-style-type: none"> Hosting of appropriate meetings to ensure convergence of similar initiatives, and a multidisciplinary and interdisciplinary approach where necessary (e.g. include issue-based and ad-hoc meetings between the officials of Programme 2 and Programmes 1, 3, 4 and 5, and the relevant entities)

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)

Strategic objective	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		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	No baseline	3 instruments funded in support of knowledge utilisation	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	7 knowledge outputs generated	11 knowledge outputs generated	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
	25 strategic policy directives in designated areas in support of economic sectors by 31 March 2020	No baseline	3 policy directives approved by Exco	3 technology policy directives approved by Exco between 1 April 2015 and 31 March 2016	8 policy directives approved by Exco between 1 April 2015 and 31 March 2017	15 strategic policy directives in designated areas in support of economic sectors between 1 April 2015 and 31 March 2018	20 strategic policy directives in designated areas in support of economic sectors between 1 April 2015 and 31 March 2019	25 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	No baseline	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
	108 regulatory recommendations for decision support by government by 31 March 2020	No baseline	No baseline	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	81 regulatory recommendations for decision support by government between 1 April 2015 and 31 March 2019	108 regulatory recommendations for decision support by government between 1 April 2015 and 31 March 2020

Strategic objective	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
2. Oversee relevant departmental agencies and initiatives	1 405 new disclosures reported by publicly funded institutions by 31 March 2020	197 new disclosures received from publicly funded institutions	250 new IP status and commercialisation reports received	279 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	1 789 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2020	326 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives	517 postgraduate students (MSc, PhD) supported through DST-funded research and development initiatives	382 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives 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
4. Support the development and translation of scientific R&D outputs into commercial products, processes and services	1 180 trainees attending training initiatives in designated areas by 31 March 2020	145 trainees supported in strategic and emerging research areas	340 trainees supported in key strategic areas	257 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
	29 knowledge application products funded in designated areas by 31 March 2020	4 new technology innovation products, processes and/or services developed	6 new technology innovation products, processes and/or services developed	8 new technology innovation products, processes and/or services developed 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	15 new technologies commercialised in strategic areas	1 new technology commercialised in key strategic areas	6 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 2017/18

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets			
			2013/14	2014/15		2015/16	2017/18	2018/19	2019/20
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 ¹¹ funded in support of knowledge utilisation	90 instruments funded in support of knowledge utilisation by 31 March 2020	No baseline	3 instruments funded in support of knowledge utilisation by 31 March 2015	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
Knowledge outputs	Number of knowledge outputs ¹³ generated	683 knowledge outputs generated by 31 March 2020	7 knowledge outputs generated	11 knowledge outputs generated	156 knowledge outputs generated	119 knowledge outputs generated by 31 March 2017	148 knowledge outputs generated by 31 March 2018	149 knowledge outputs generated by 31 March 2019	149 knowledge outputs generated by 31 March 2020
Policy directives developed in science and technology	Number of strategic policy directives ¹⁴ in designated areas in support of economic sectors	25 strategic policy directives in designated areas in support of economic sectors by 31 March 2020	No baseline	3 policy directives approved by Exco	3 technology policy directives approved by Exco	5 policy directives approved by Exco by 31 March 2017	7 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	5 strategic policy directives in designated areas in support of economic sectors by 31 March 2020

¹¹ Instrument means a formally established (by contract) entity/initiative (also virtual) that is used towards support for increased localisation, competitiveness, R&D-led industry development and service delivery support.

¹² Instruments funded in support of knowledge utilisation are inclusive of the initiatives that were included in the 2015/16 APP under the "number of innovation-enabling programmes" indicator, namely, the hosting of the Innovation Bridge technology showcase and matchmaking event, the implementation of the Innovation Bridge portal, the implementation of public-private sector initiatives such as the industry internship programme, the implementation of the Commercialisation Framework (and any associated strategies that emerge as a consequence), the EIAP and initiatives in support of offices of technology transfer activities. The target has increased because the scope has been broadened to include other initiatives.

¹³ Knowledge outputs include filings/applications or registration/granting of intellectual property rights (IPRs) and peer-reviewed scientific articles published in scientific publications and journals, books, book chapters and community-reviewed articles in space science, energy, emerging research areas, and the bioeconomy. (IPRs include the categories of IPR that were included in the 2014/15 APP, namely, patents and trademarks. The concept has been broadened to include other IPRs, such as copyright, designs, plant breeders' rights or geographical indications.)

¹⁴ Policy directives include policy briefs, implementation plans, concept documents, position papers, strategies, policy recommendations, cabinet memoranda and chapter contributions towards key policy documents.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Decision-support interventions	Number of decision-support interventions ¹⁵ developed and maintained	8 decision-support interventions maintained by 31 March 2020	No baseline	No baseline	No baseline	2 decision-support interventions maintained by 31 March 2017	2 decision-support interventions maintained by 31 March 2018	2 decision-support interventions maintained by 31 March 2019	2 decision-support interventions maintained by 31 March 2020
Regulatory recommendations for decision support	Number of regulatory recommendations for decision support by government	108 regulatory recommendations for decision support by government by 31 March 2020	No baseline	No baseline	No baseline	27 regulatory recommendations for decision support by government by 31 March 2017	27 regulatory recommendations for decision support by government by 31 March 2018	27 regulatory recommendations for decision support by government by 31 March 2019	27 regulatory recommendations for decision support by government by 31 March 2020
Strategic statement: To oversee, monitor and regulate¹⁷ key policy initiatives, including institutions/agencies and support interventions¹⁸ in the key strategic areas of space science, energy, bioinnovation, nanotechnology, robotics, photonics and IKS									
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	197 new disclosures received from publicly funded institutions	250 new IP status and commercialisation reports received	279 new disclosures reported by publicly funded institutions by 31 March 2016	275 new disclosures reported by publicly funded institutions by 31 March 2017	280 new disclosures reported by publicly funded institutions by 31 March 2018	285 new disclosures reported by publicly funded institutions by 31 March 2019	290 new disclosures reported by publicly funded institutions by 31 March 2020

¹⁵ Decision-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 deliberate about options, independently or in collaboration with others, 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.

¹⁶ Regulatory recommendations are recommendations made to support the work of other government departments as mandated by specific laws, regulations, guidelines and specifications.

¹⁷ This 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

¹⁸ Support interventions are institutional arrangements such as coordinating committees, partnerships, joint ventures and other strategic arrangements undertaken to drive the implementation of national, and specifically DST policies and strategies.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
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 designated areas ¹⁹	1 789 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2020	326 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives	517 postgraduate students (MSc, PhD) supported through DST-funded research and development initiatives	402 postgraduate students (master's and doctoral) supported through DST-funded R&D initiatives by 31 March 2016	392 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2017	355 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	320 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2020
Trainees attending training initiatives in designated areas	Number of trainees ²⁰ attending training initiatives in designated areas	1 180 trainees attending training initiatives in designated areas by 31 March 2020	145 trainees supported in strategic and emerging research areas	340 trainees supported in key strategic areas	257 trainees supported in strategic and emerging research areas by 31 March 2016	280 trainees attending training initiatives in designated areas by 31 March 2017	240 trainees attending training initiatives in designated areas by 31 March 2018	240 trainees attending training initiatives in designated areas by 31 March 2019	240 trainees attending training initiatives in designated areas by 31 March 2020
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	4 new technology innovation products, processes and/or services developed	6 new technology innovation products, processes and/or services developed	8 new technology innovation products, processes and/or services developed by 31 March 2016	4 knowledge application products funded in designated areas by 31 March 2017	6 knowledge application products funded in designated areas by 31 March 2018	6 knowledge application products funded in designated areas by 31 March 2019	5 knowledge application products funded in designated areas by 31 March 2020

¹⁹ Designated areas include space science, energy, bioinnovation, emerging research areas, IP management, technology transfer and technology commercialisation.

²⁰ Trainees include interns, technicians, mentors, academics, researchers, innovators, entrepreneurs and IP candidates.

²¹ Training initiatives include: internships, workshops, conferences, seminars, webinars and work integrated programmes.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Commercial outputs ²² in designated areas ²³	Number of commercial outputs in designated areas	21 commercial outputs in designated areas by 31 March 2020	15 new technologies commercialised in strategic areas	1 new technology commercialised in key strategic areas	3 new technology products, processes and/or services commercialised by 31 March 2016	8 commercial outputs in designated areas by 31 March 2017	4 commercial outputs in designated areas by 31 March 2018	3 commercial outputs in designated areas by 31 March 2019	3 commercial outputs in designated areas by 31 March 2020

22 Commercial outputs: These include licences, assignments, options, new companies, products, processes and services.

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

Table 13: Quarterly targets for the 2017/18 financial year

Performance indicator	Reporting period	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of instruments funded in support of knowledge utilisation	Biannually	19 instruments funded in support of knowledge utilisation by 31 March 2018	No target	7 instruments funded in support of knowledge utilisation	No target	12 instruments funded in support of knowledge utilisation
Number of knowledge outputs generated	Annually	148 knowledge outputs generated by 31 March 2018	No target	No target	No target	148 knowledge outputs generated
Number of strategic policy directives ²⁴ in designated areas in support of economic sectors	Annually	7 strategic policy directives in designated areas in support of economic sectors by 31 March 2018	No target	No target	No target	7 strategic policy directives in designated areas in support of economic sectors
Number of new disclosures reported by publicly funded institutions	Biannually	280 new disclosures ²⁵ reported by publicly funded institutions by 31 March 2018	140 new disclosures reported by publicly funded institutions	No target	140 new disclosures reported by publicly funded institutions	No target
Number of regulatory recommendations for decision support by government	Quarterly	27 regulatory recommendations for decision support by government by 31 March 2018	6 regulatory recommendations for decision support by government	8 regulatory recommendations for decision support by government	9 regulatory recommendations for decision support by government	4 regulatory recommendations for decision support by government
Number of decision-support interventions developed or maintained	Annually	2 decision-support interventions maintained by 31 March 2018	No target	No target	No target	2 decision-support interventions maintained

²⁴ Policy directives include policy briefs, implementation plans, concept documents, position papers, strategies, policy recommendations, cabinet memoranda and chapter contributions towards key policy documents.

²⁵ IP7 Form - IP Status and Commercialisation Report. Although 6 monthly reporting, (Q1 and Q3) is required, provision is made for reports received late to be accounted for in Q4.

Performance indicator	Reporting period	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of postgraduate students (master's and doctoral) funded in designated areas	Annually	355 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2018	No target	No target	No target	355 postgraduate students (master's and doctoral) funded in designated areas
Number of trainees attending training initiatives in designated areas	Biannual (Reporting in Q3 and Q4)	240 trainees attending training initiatives in designated areas by 31 March 2018	No target	No target	160 trainees attending training initiatives in designated areas	80 trainees attending training initiatives in designated areas
Number of knowledge application products funded in designated areas	Biannual (Reporting in Q3 and Q4)	6 knowledge application products funded in designated areas by 31 March 2018	No target	No target	3 knowledge application products funded in designated areas	3 knowledge application products funded in designated areas
Number of commercial outputs in designated areas	Annually	4 commercial outputs in designated areas by 31 March 2018	No target	No target	No target	4 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 2016/17	Medium-term expenditure estimates		
	2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Space Science	230 621	168 464	209 103	166 916	173 402	161 911	161 466
Hydrogen and Energy	139 861	143 848	156 551	152 226	156 785	167 187	178 491
Bioeconomy	139 439	150 109	127 187	138 067	156 088	177 690	193 194
Innovation Priorities and Instruments	608 776	447 412	518 056	521 424	540 522	572 305	608 613
NIPMO	31 699	64 207	52 400	26 785	46 824	50 271	53 266
TOTAL	1 150 396	974 040	1 063 297	1 005 418	1 073 621	1 129 364	1 195 030
Compensation of employees	30 940	35 571	39 844	43 543	44 443	46 157	49 676
Goods and services	14 334	16 183	11 721	20 841	21 408	22 550	23 777
Transfers and subsidies	1 050 141	922 205	1 011 717	941 034	1 007 770	1 060 657	1 121 577
Payments for capital assets	54 981	81	-	-	-	-	-
Payments for financial assets	-	-	15	-	-	-	-
TOTAL	1 150 396	974 040	1 063 297	1 005 418	1 073 621	1 129 364	1 195 030

Programme 3: International Cooperation and Resources

Purpose

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

Strategic overview

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

Science, technology and innovation, as evidenced by their prominent role in the Sustainable Development Goals, are recognised globally as essential instruments to combat 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 the 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.

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

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

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

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

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

The Programme is the custodian for the South African government's science diplomacy, i.e. the use of international STI cooperation to advance South Africa's foreign policy, including 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.

In this context, 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. The focus will be specifically on Strategic Outcome-Oriented Goals 4 and 5. The Programme will pursue strategic targets related to the number of African Union and SADC initiatives it supports, as well as the amount of foreign funding it leverages for strengthening Africa's STI capacities. Bilateral cooperation with other African partners is also a priority, and will be measured using a target related to the number of projects in which it co-invests with continental partners.

The Programme's horizontal policy priorities 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

Strategic objectives	Strategic statements
Access international funds to support the growth and development of the NSI	To secure international funds to complement South Africa's national investments in STI, including resources for DST initiatives requiring external investment
Enhance South Africa's national STI capabilities through access to international knowledge capacities and resources	To access international knowledge, capacities and resources, to enhance South Africa's national STI capabilities, and to contribute to the attainment of the DST's targets for HCD, especially for international PhD training
Strengthen STI cooperation in Africa	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 both South Africa and Africa
Support South Africa's foreign policy through science diplomacy	To maximise South Africa's strategic interests in international cooperation in STI in support of South Africa's foreign policy objectives, and international trade and investment partnerships

Chief directorates

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

Multilateral Cooperation and Africa advances and facilitates South Africa's participation in bilateral STI

cooperation initiatives with other African partners, in African multilateral programmes, especially SADC and AU programmes, and in broader multilateral STI partnerships, with a strategic focus on South-South cooperation.

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

Table 15: Programme risk management and identification: International Cooperation and Resources

Strategic objective	Risk description	Mitigation action
<p>Access international funds to support the growth and development of the NSI</p>	<ul style="list-style-type: none"> Negative country investment profile, which discourages foreign investment in South Africa Insufficient investment by international partners in specific STI cooperation initiatives with South Africa 	<ul style="list-style-type: none"> Marketing of South Africa as a preferred destination for STI-oriented foreign investment Proactive engagement to sensitise international partners to potential benefits of cooperation with South Africa
<p>Enhance South Africa's national STI capabilities through access to international knowledge capacities and resources</p>	<ul style="list-style-type: none"> Lack of interest or willingness of international partners to share STI expertise with South Africa Insufficient national South African funds to support South African students studying abroad Accessing of inappropriate or irrelevant international experience and expertise not aligned with South African needs 	<ul style="list-style-type: none"> Targeted formation of mutually beneficial strategic partnerships with partners of priority interest to South Africa Design of co-investment schemes with national and international partners to support South African students studying abroad Involvement of South African technical expertise in all phases of planning and execution of international capacity-building initiatives designed to assist South Africa
<p>Strengthen STI cooperation in Africa</p>	<ul style="list-style-type: none"> Reluctance of partners in other African countries to co-invest in STI programmes with South Africa Mistrust of South Africa's role enabling international support for STI in Africa, especially as part of trilateral initiatives Institutional paralysis at continental or regional level delaying the progress of AU or SADC initiatives 	<ul style="list-style-type: none"> Proposal to partners of cooperation programmes providing for investment according to their capacity and aligned with their strategic objectives Careful consultation with international partners and beneficiaries in Africa, highlighting value addition of South African contribution Implementation of initiatives to advance continental and regional agenda not constrained by institutional frameworks
<p>Support South Africa's foreign policy through science diplomacy</p>	<ul style="list-style-type: none"> External geopolitical factors negatively affecting South African influence on international STI decision-making Mistrust of South African leadership in international STI forums, including concerns with regard to disproportionate representation 	<ul style="list-style-type: none"> Close cooperation with the Department of International Relations and Cooperation in multilateral engagements, including in the exploitation of support from regional and other strategic alliances Early identification of leadership positions of strategic interest to South Africa and diplomatic engagements to promote South African candidates for them

Table 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)

Strategic objective	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets			
		2013/14	2014/15		2015/16	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	No baseline	No baseline	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 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	No baseline	No baseline	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 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	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
2. Enhance South Africa's national STI capabilities through access to international knowledge capacities and resources	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	No baseline	No baseline	169 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
	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	No baseline	No baseline	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 between 1 April 2015 and 31 March 2016	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	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
	100 international technical ex-changes 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	No baseline	No baseline	63 international technical ex-changes 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 ex-changes 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 ex-changes 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 ex-changes 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 ex-changes 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	No baseline	No baseline	61 research, innovation and STI HCD cooperation projects initiatives co-funded or supported in kind by the DST and at least one other African government 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	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		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	No baseline	No baseline	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 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
	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	No baseline	No baseline	10 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by 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

Strategic objective	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
		4. Support South Africa's foreign policy through science diplomacy	No baseline	No baseline		6 formally recorded decisions made in inter-governmental 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 inter-governmental 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 inter-governmental 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
	No baseline	No baseline	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 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 2017/18

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets			
			2013/14	2014/15		2015/16	2017/18	2018/19	2019/20
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	R2 120bn in international funds invested in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 March 2020	No baseline	No baseline	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	R400m in international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 March 2017	R420m in international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 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

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets			
			2013/14	2014/15		2015/16	2017/18	2018/19	2019/20
Funds invested by internal 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 internal 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 internal partners as part of cooperation initiatives implemented by the DST by 31 March 2020	No baseline	No baseline	R2 198bn invested by internal 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	R230m invested by internal 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	R250m invested by internal 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 internal 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 internal 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

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15		2015/16	2017/18	2018/19
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								
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	No baseline	No baseline	150 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	350 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
Sharing of experience and expertise by international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST	Number of international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST	2 500 international partner organisations collaborating with South African partners as part of cooperation initiatives facilitated by the DST by 31 March 2020	No baseline	No baseline	450 international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 March 2017	500 international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI HCD projects as part of cooperation initiatives facilitated by the DST by 31 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

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15		2015/16	2017/18	2018/19
Dedicated international technical ex-changes 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, undertaken with the support of international partners facilitated by the DST	Number of international technical ex-changes (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 ex-changes 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	No baseline	A total of 56 specialist or joint technical workshops, policy dialogues, symposia or conferences accessed, hosted, facilitated, or contributed to for participation by South African researchers and students	15 international technical ex-changes 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	20 international technical ex-changes 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 ex-changes 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 ex-changes 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
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 at least one 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	No baseline	No baseline	30 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner by 31 March 2017	50 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the 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 the 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 the DST and at least one other African partner by 31 March 2020

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
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 and continental research, 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	No baseline	No baseline	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	R70m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 March 2017	R80m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 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
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	No baseline	No baseline	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 the DST by 31 March 2016	10 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by the 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 the 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 the 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 the DST by 31 March 2020

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets			
			2013/14	2014/15		2015/16	2017/18	2018/19	2019/20
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 supporting the priorities of government's Programme of Action (PoA) 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 PoA 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 PoA following specific DST intervention by 31 March 2020	No baseline	No baseline	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 PoA 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 PoA following specific DST intervention by 31 March 2017	4 formally recorded decisions made in intergovernmental STI forums, such as multilateral organisations, with a direct bearing on resource allocation to support priorities of government's PoA 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 PoA 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 PoA following specific DST intervention by 31 March 2020
South African occupying leadership positions in international STI governance structures such as multilateral organisations relevant to influencing resource allocation to support priorities of government's Programme of Action (PoA) 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 PoA 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 PoA following specific DST intervention by 31 March 2020	No baseline	No baseline	5 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's PoA 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 PoA following specific DST intervention by 31 March 2017	4 leadership positions occupied by South Africa in international STI governance structures relevant to influencing resource allocation to support priorities of government's PoA 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 PoA 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 PoA following specific DST intervention by 31 March 2020

Table 18: Quarterly targets for the 2017/18 financial year

Performance indicator	Reporting frequency	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Amount (expressed in rand millions) of international funds directly invested in research, innovation and STI HCD programmes as well as research infrastructure investments in South Africa as part of cooperation initiatives implemented by the DST	Quarterly	R420m 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 2018	No target	R50m 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	R110m 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	R260m 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	Quarterly	R250m invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST by 31 March 2018	R40m invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST	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	R60m invested by international partners in their own organisations and initiatives but targeted at cooperation in research, innovation and STI HCD with South African partners as part of cooperation initiatives implemented by the DST	R100m 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
Number of South African students accepted into international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	Quarterly	350 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	No target	20 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	20 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	310 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST

Performance indicator	Reporting frequency	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
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 counted as part of cooperation initiatives facilitated by the DST	Quarterly	500 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects counted as part of cooperation initiatives facilitated by the DST by 31 March 2018	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 counted as 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 counted as part of cooperation initiatives facilitated by the DST	100 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects counted as part of cooperation initiatives facilitated by the DST	340 international partner organisations (i.e. legal entities) collaborating with South African partners within the formalised framework of collaborative research, innovation or STI HCD projects counted as part of cooperation initiatives facilitated by the DST
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	20 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 2018	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	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
Number of research, innovation and STI HCD cooperation projects, co-funded or supported in kind by the DST and at least one other African partner	Quarterly	50 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner by 31 March 2018	2 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner	No target	10 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner	38 research, innovation and STI HCD cooperation projects co-funded or supported in kind by the DST and at least one other African partner

Performance indicator	Reporting frequency	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Amount (expressed in rand millions) of international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation	Quarterly	R80m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation by 31 March 2018	No target	R5m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation	R15m in international funds directly invested in African regional and continental research, innovation, STI HCD or research infrastructure programmes as a result of DST facilitation	R60m 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 programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by the DST	Quarterly	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 the DST by 31 March 2018	5 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	5 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	3 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by the DST	3 AU or SADC STI initiatives, including programmes, projects or governance frameworks, endorsed at AU or SADC ministerial level supported (financially or in kind) by the DST
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 2018	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 2018	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 2016/17	Medium-term expenditure estimates		
	2013/14	2014/15	2015/16	2016/17		2017/18	2018/19	2019/20
Multilateral Cooperation and Africa	25 281	22 167	25 668	28 697	29 617	31 017	33 159	
International Resources	50 402	54 021	56 635	57 459	59 481	62 613	66 896	
Overseas Bilateral Cooperation	28 863	31 401	32 665	38 307	39 607	41 539	44 370	
TOTAL	104 546	107 589	114 968	124 463	128 705	135 169	144 425	
Compensation of employees	33 205	36 762	41 275	46 150	47 300	49 122	52 866	
Goods and services	20 028	16 587	14 366	16 959	17 628	18 572	19 584	
Transfers and subsidies	51 313	54 127	59 327	61 354	63 777	67 475	71 975	
Payments for capital assets	-	113	-	-	-	-	-	
TOTAL	104 546	107 589	114 968	124 463	128 705	135 169	144 425	

Programme 4: Research Development and Support

Purpose

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

Strategic overview

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

The Programme contributes towards building a responsive, coordinated, and efficient NSI (Strategic Outcome-Oriented Goal 1). In this regard, the Department has enjoyed a strong collaboration with the Department of Higher Education and Training (DHET) in research development and support. DHET provided its own funds to the NRF to award postgraduate bursaries to the value of R254 million in 2016/17. In 2017/18, DHET plans to fund a minimum of six research chairs in its priority areas. In addition, better alignment has been achieved between DHET's Staffing South Africa's Universities Framework (SSAUF) and the DST/NRF HCD offerings. Alongside existing tracks in the Thuthuka programme, the NRF has established a track to support emerging researchers in order to complement the DHET Next Generation of Academics Programme (nGAP), which has been established under the SSAUF. Through the NRF's nGAP track, a number of nGAP post-holders from the 2015 cohort were supported with research development grants of R1 million each. The Department of Health is co-funding a centre of excellence in HIV prevention. The DST remains active in the Human Resource Development Council, which is the advisory body for HCD countrywide.

During 2016/17, the Department undertook several engagements with historically disadvantaged institutions,

including historically black universities and universities of technology. During these visits the need for a new institutional research capacity development intervention by the DST was explored, and several good ideas emerged. During 2017/18, the DST will further develop a concept for a new programme in this respect, in conjunction with the NRF and DHET.

Programme 4 plays a leading role in increasing knowledge generation (Strategic Outcome-Oriented Goal 2). Without research, no knowledge generation can take place. In conjunction with the NRF, Programme 4 is the key source of research funding for higher education institutions. This Programme directly addresses this imperative through researcher support (Proxy Indicator 1), the provision of research infrastructure, and the promotion of research priority areas. In respect of research grant support, knowledge generation is promoted through a number of instruments that are designed to strengthen research capacity at universities, including the research chairs and centres of excellence programmes, both managed by the NRF. Special attention will be paid to enhancing the impact of these programmes. In both cases, many of the researchers supported (chairs and centres of excellence) constitute a significant brains trust whose scientific input on relevant policy matters could add significant value to the development of such policy; using instruments like communities of practice, the DST will seek to enhance their contribution to national policy development in this respect.

In 2015/16, 4 315 researchers were awarded research grants through NRF-managed programmes. This number is expected to grow to at least 4 500 in 2017/18.

Programme 4 is the custodian of high-level human capital development (Strategic Outcome-Oriented Goal 3) for the NSI. In conjunction with the NRF, Programme 4 is the key source of bursary support for postgraduate training in science, engineering and technology (SET) from government for higher education institutions (Proxy Indicators 1-3). Transforming the NSI's human resource base is imperative for the system's sustainable growth,

and the DST will continue to monitor progress in reaching transformation goals and targets, intervening where necessary. 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 economic development.

Through its support for the transformation of the student and researcher cohorts, this Programme makes a fundamental contribution to the transformation of society, directly through its outputs, and indirectly by empowering historically disadvantaged sectors of society to participate at a high level in its development.

In 2015/16, 3 404 doctoral and 9 345 pipeline (honours and master's) students were awarded bursaries through NRF-managed programmes. The number of pipeline students supported is expected to increase to 10 800 in 2017/18.

By the end of the 2015/16 financial year, 84 (against a target of 70) research infrastructure grants were awarded to researchers and institutions across the innovation value chain through direct funding by the Programme (Strategic Outcome-Oriented Goal 2; Proxy Indicator 4). The grants include support for innovation infrastructure in the form of pilot plants, technology demonstrators and specialised facilities. 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 infrastructures is no longer feasible. It has therefore been reduced to 30 per year for the period 2017/18 to 2018/19.

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). By the end of the 2016/17

financial year, the national backbone and its points of presence would have been upgraded to increase (i) the number of research sites connected to 226, and (ii) the average bandwidth per South African SANReN site to 3 500 megabits per second (Strategic Outcome-Oriented Goal 2; Proxy Indicator 5). This translates into giving more than a million users access to broadband connectivity.

Work on SARIR has come to a climax, with its first edition being finalised and published during 2016/17. The SARIR plan envisages the implementation of 13 new, medium to large research infrastructures with a focus on five scientific domains: humans and society; health, biological and food security; Earth and the environment; energy; and materials and manufacturing. Seven infrastructures were initiated in 2016/17; the remaining six are to be rolled out in subsequent years.

During 2015/16 some of the key recommendations of the 2013 NICIS review report were initiated. These include the finalisation of frameworks for (i) a multi-institutional national e-science postgraduate teaching and training platform; (ii) an e-research support programme; (iii) regional Tier 2 data nodes; and (iv) a big data strategy. The Data Intensive Research Initiative of South Africa, the national data management, storage and services platform, was formally established. Through calls for proposals, a multi-institutional national e-science postgraduate teaching and training platform, and a regional Tier 2 data node were successfully launched in 2016/17.

At the level of the NSI, the impact of this Programme's work is reflected in indicators such as –

- the contribution of South Africa's research output to global research output;
- the global impact of South Africa's research output;
- the percentage of postgraduate research students enrolling in SET programmes;
- the annual number of doctoral graduates;
- the number of participants in the DST-supported science awareness and engagement initiatives;
- the development of relevant strategic documents.

Strategic objectives and strategic statements

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

Chief directorates

Human Capital and Science Promotion formulates and implements policies and strategies that address the availability of human capital for STI, and that provide fundamental support for research activities. 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 supporting the development of a society that is scientifically literate and critically engaged with science through public engagement in STI and the enhancement of the youth's access to STI.

In 2017/18, ASSAf will complete a study of postgraduate training in engineering. On equity issues, it has been observed with concern that, while there are a large number of lecturers and senior lecturers with master's and doctoral degrees at higher education institutions, only a relatively small number of them apply to the NRF for support through its emerging researchers' programmes. Universities South Africa has agreed to investigate the matter, and a study will be completed by the end of the 2017/18 financial year. It is envisaged that this work will offer clear recommendations on policies and programmes that will improve the representation of active black researchers (particularly black women).

In 2016/17, the NRF Act Amendment Bill was taken to Cabinet to seek approval for public consultation. Public consultation was concluded, and the inputs received were incorporated. In 2017/18, the Bill will be taken through the parliamentary structures.

The South African Council for Natural Scientific Professions Amendment Bill will also be taken through the parliamentary processes during the 2017/18 financial year.

One of the DST workplace preparation programmes, the DST-NRF Internship Programme (implemented through the NRF) gives recently qualified graduates and postgraduate students an opportunity to 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% women. The DST supports a number of other work preparation programmes. The intention is to grow, streamline and systematise the implementation model for these programmes, and to improve the DST's consolidated reporting on them.

In order to promote public engagement with science the DST undertakes mass participation initiatives such as the annual National Science Week and science festivals. The Science Engagement Framework's implementation plan was completed in 2016/17. In addition to supporting the implementation of the integrated framework for supporting the DBE's National Strategy for Mathematics, Science and Technology Education (jointly adopted by the DST, the DBE and DHET in 2016/17), the DST will enter into collaboration agreements with provincial departments of education to pave the way for the implementation of the structured school-based initiatives to build the culture of science among learners. The DST will sustain support for science centres, which are the key infrastructure for driving science engagement, while carefully monitoring their outputs and ensuring that the operational focus of science centres supported by the DST is aligned with the Science Engagement Framework. In order to enable a structured tracking of science engagement success indicators, a monitoring and evaluation framework will be developed in 2017/18.

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

This chief directorate will support the provision of and access to RDI infrastructure across the entire NSI by awarding 100 research infrastructure grants between 2017/18 and 2019/20 to the research community across the country. Most of the funding will be allocated to higher education institutions, national facilities, science councils and museums through the National Equipment Programme, which is implemented by the NRF. The infrastructure funds will also be used for the development of pilot plants, technology demonstrators and specialised facilities, which are aimed at promoting South Africa's

manufacturing capacity. 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 2017/18 the chief directorate (i) will continue implementation of research infrastructures as part of phase one of the roll-out of SARIR – the roll-out of at least nine RIs will have been initiated by the end of the 2017/18 financial year; and (ii) will have introduced at least three subcomponents of NICIS, namely, a regional Tier 2 data node, an e-research support programme and a national e-science postgraduate teaching and training platform. 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 gigabit per second (Gbps) capacity broadband network through SANReN. Between 2017/18 and 2019/20, the total available broadband capacity provided through the SANReN per annum will be increased from 3 200 Gbps to 3 500 Gbps in 2019/20.

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. A plan of action for the implementation of the Basic Sciences Development and Support Framework will be developed to ensure targeted support for this part of the science system.

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

Having the Protection, Promotion, Development and Management of Indigenous Knowledge Bill passed is a key deliverable in the field of IK. The IK Bill is an enabling framework to ensure mechanisms are in place to address poverty, inequality and unemployment.

Through the implementation of the Marine and Antarctic Research Strategy, the South-South Atlantic Ocean Research Framework will be developed through collaborations with countries in the South Atlantic Ocean from Southern Africa and South America. This framework will be used as a platform for other international engagements. 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.

Programme 4 is responsible for two of the three performance indicators assigned to the DST under Outcome 10 of the Presidency Outcome Framework. These relate to (i) a functional climate change network formalised through memoranda of understanding (MoUs), and (ii) biennial reporting to Cabinet on the state of climate change science and technology in South Africa. A plan for compiling the second biennial report for Cabinet will be finalised and approved by Exco in 2017/18. The findings and recommendations of the Global Change Grand Challenge mid-term review and a new research flagship in Earth systems science will be implemented in 2017/18.

Astronomy is a flagship programme that supports the development of astronomical sciences around a 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 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.

Particular emphasis will 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.

It is expected that the proposed South African Radio Astronomy Observatory (SARAO) will come into effect in 2017/18 and position South Africa and all radio astronomy projects in relation to the SKA Phase 1. Once established, SARAO will be declared a national facility under the control of the NRF.

South Africa will host the SKA Phase 1 mid-frequency telescope (SKA1-MID), which will consist of the 64 MeerKAT dishes and a further 133 dishes. Construction is scheduled to commence in 2018 and continue until 2023. Phase 2 of the telescope, which is scheduled for construction between 2023 and 2030, will consist of up to 3 000 dishes spread across Africa and Australia.

MeerKAT commissioning will be done in phases, so as to allow for early results and the verification of the system, and to pre-empt any problems. Early science can be done with parts of the array as they are commissioned and do not have to await the completion of the full array. Array Release 1 (AR1), which consists of 16 antennas, was launched by the Minister on 16 July 2016. The MeerKAT First Light image produced by AR1, showed unambiguously that MeerKAT has joined the ranks of the world's great scientific instruments. In a small patch of sky covering less than 0,01 per cent of the entire celestial sphere, it shows more than 1 300 radio galaxies in the distant universe, compared to 70 known in the previous best image, obtained with a telescope in Australia.

The MeerKAT radio telescope and associated infrastructure have been classified as a megaproject under the Presidential Infrastructure Coordinating Commission.

The original target was to have all 64 MeerKAT antennas physically erected by 31 March 2017, without necessarily being operational or science ready. However, during 2016/17, the Minister approved a change to the target, to the effect that 32 dishes would be erected and operational by year end. The original MeerKAT target of having completed and commissioned all 64 dishes by the end of 2017/18 remains unchanged.

The key challenge to be addressed is the protection of the astronomy reserves against radio, dust and light pollution. This includes monitoring possible impacts on astronomy activities from hydraulic fracturing in the Northern Cape and from wireless, telecommunication and broadcasting activities. It is expected that the regulations for the Karoo Central Advantage Areas will come into effect in the 2017/18 financial year. This would require the Astronomy Management Authority to be properly resourced to issue the relevant permits and to process compensation applications.

Progress was made in 2016/17 on the implementation of the African Very Long Baseline Interferometry Network (AVN) project, with the first dish in this

network being commissioned in Ghana. Important allied interventions to strengthen African SKA-partner countries' high performance computing and radio astronomy competences have also been made through the provision of a two-dish interferometry system to Botswana, and high performance computer racks to both Botswana and Namibia. These infrastructure initiatives are complemented by thorough training interventions. In 2017/18, the DST anticipates being able to expand the AVN interventions aggressively in partner countries, subject to additional support being secured from the African Renaissance Fund; a proposal in this regard was submitted to the Department of International Relations and Cooperation in 2016/17.

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 locally representative students at higher postgraduate levels, resulting in high attrition rates	<ul style="list-style-type: none"> Monitoring the implementation of the Ministerial Guidelines towards achieving equity in the distribution of bursaries, scholarships and fellowships Minister's approval of the implementation plan for the Human Capital Development Strategy for Research, Innovation and Support Doctoral engineering study by ASSAf completed by 31 March 2018 (research in areas pertaining to postgraduate studies and funding leading to evidence-based decision making) Tracking of postgraduate students supported through the NRF/DST funding
Provision of research and innovation infrastructure	Current research infrastructure base is not adequately renewed and/or maintained	<ul style="list-style-type: none"> Implementation of the approved RIs as per the approved SARIR implementation plan Development of plans to solicit co-investment from other government departments for the development and implementation of DST-supported research infrastructures Preparation of annual infrastructure bids according to the DST infrastructure framework in July/August for the National Treasury MTEF process Engagement with NRF to introduce targeted interventions (institution development programmes)
Production of new knowledge	Reduction in the research output from basic sciences	<ul style="list-style-type: none"> Development of action plan for the implementation of the Basic Sciences Development and Support Framework
Development of priority science areas	Stagnant scientific output from geographic advantage and knowledge areas	<ul style="list-style-type: none"> Implementation of the Earth systems science flagship programme The IK Bill will be finalised into legislation by March 2017. IK mutates into a SSDU (the function of the SSDU will be to coordinate government departments activities) Coordination of DDG forums Assessment of human resources needs for the Chief Directorate: Science Missions (subject to the approval of the list of critical posts by Exco) Development of programmes of action for scientific collections (ships, robotics, aircrafts, etc.)
Inadequate support for emerging and established researchers	Inadequate support for emerging and established researchers	<ul style="list-style-type: none"> Minister's approval of the implementation plan for the Human Capital Development Strategy for Research, Innovation and Support NRF commitment to funding research proposal development of nGAP post-holder cohorts with a master's degree or above
Ineffective regulation of radio frequency interference (RFI) at the Karoo SKA site	Ineffective regulation of radio frequency interference (RFI) at the Karoo SKA site	<ul style="list-style-type: none"> Promulgation of regulations for the Karoo Central Astronomy Advantage Area Implementation Government Technical Advisory Centre recommendation to establish Astronomy Management Authority as a government component Signing of the DST-NRF/SKA SA co management agreement to provide technical services for analysis and monitoring of RFI
Promote science engagement	Inadequate management of public engagement	<ul style="list-style-type: none"> Amendment of the NRF Act to incorporate the science engagement coordinating role of SAASTA Development of a joint proposal and establish a formal collaboration with a local university on the establishment of a science communication qualification (focusing on the development of basic science communication skills)

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)

Strategic objective	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
1. Contribute to human capital development	No fewer than 15 840 PhD students awarded bursaries as reflected in the reports from the NRF and relevant entities by 31 March 2020	2 265 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	2 845 PhD students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports	3 404 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 2016	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	No fewer than 9 640 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	No fewer 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 31 March 2019	No fewer than 15 480 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
	No fewer than 54 392 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project reports by 31 March 2020	6 853 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project report	7 711 pipeline postgraduate students awarded bursaries through NRF and DST-managed programmes as reflected in the NRF and DST project report	9 345 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 2016	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	No fewer 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	No fewer 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	No fewer than 54 392 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

Strategic objective	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
	3 440 graduates and students placed in DST-funded work preparation programmes in science, engineering, technology and innovation (SETI) institutions by 31 March 2020	1 010 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2014 (568 in DST-NRF Internship Programme and 442 in the National Youth Service programme)	1 021 number of graduates and students placed in DST-funded work preparation programmes	1 044 graduates and students placed in DST-funded work preparation programmes in SETI institutions between 1 April 2015 and 31 March 2016	1 740 ⁹ graduates and students placed in DST-funded work preparation programmes in SETI institutions between 1 April 2015 and 31 March 2017	2 540 graduates and students placed in DST-funded work preparation programmes in SETI institutions between 1 April 2015 and 31 March 2018	2 990 graduates and students placed in DST-funded work preparation programmes in SETI institutions between 1 April 2015 and 31 March 2019	3 440 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	61 research infrastructure grants awarded by NRF and DST internal processes and as per award letters	69 grants have been awarded in four categories of research infrastructure	79 research infrastructure grants awarded as per award letters between 1 April 2015 and 31 March 2016	130 research infrastructure grants awarded as per award letters between 1 April 2015 and 31 March 2017	160 research infrastructure grants awarded as per award letters between 1 April 2015 and 31 March 2018	190 research infrastructure grants awarded as per award letters between 1 April 2015 and 31 March 2019	220 research infrastructure grants awarded as per award letters between 1 April 2015 and 31 March 2020
	3 500 Gbps total available broadband capacity through SANReN by 31 March 2020	2 200 Mbps average broadband capacity is available per SANReN site	2 820 Mbps average broadband capacity available per SANReN site	3 500 Mbps average broadband capacity available per SANReN site between 1 April 2015 and 31 March 2016	3 500 Mbps average broadband capacity provided by SANReN site between 1 April 2015 and 31 March 2017	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

26 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	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16	2016/17		2017/18	2018/19	2019/20
3. Production of new knowledge	No fewer than 22 578 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2020	3 569 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	4 064 researchers awarded research grants through NRF-managed programmes as reflected in the NRF reports	4 315 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	No fewer 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	No fewer 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	No fewer 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	5 641 ISI-accredited research articles published by NRF funded researchers	6 470 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports	7 158 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports between 1 April 2015 and 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 and 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 and 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 and 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 and 31 March 2020	

Strategic objective	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16	2017/18		2018/19	2019/20	
4. Development of priority science areas	64 antennas commissioned for a single polarisation array by 31 March 2018	1 MeerKAT antenna installed by 31 March 2014	4 MeerKAT antennas installed by 31 March 2015	20 MeerKAT antennas installed by 31 March 2016	32 antennas commissioned for a single polarisation array 31 March 2017	64 antennas commissioned for a single polarisation array by 31 March 2018	No target	No target	No target
	A climate change research network in place by 31 March 2018	No baseline	Submission to the DDG of a report on existing climate change research initiatives and networks	Research capacity of existing networks profiled and research areas that need institutional support identified by 31 March 2016	Submission to the DDG of a report on existing climate change research initiatives and networks by 31 March 2017 (The report will indicate, at the time of reporting, the state of climate change research networks established through MoUs.)	A climate change research network formalised in South Africa through a memorandum of understanding by 31 March 2018	No target	No target	No target
	Two biennial reports on the state of climate change S&T in South Africa submitted for Cabinet approval by 31 March 2019	No baseline	No baseline	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	No target

Strategic objective	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
5. Promote science engagement	Approx. 8 179 000 participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 March 2020	1 054 221 people directly participated in science awareness and engagement programmes	1 247 667 people participated in science awareness and engagement programmes supported by the DST	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	Approx. 2 179 000 participants (learners and members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers between 1 April 2015 and 31 March 2017	Approx. 4 179 000 participants (learners and members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers between 1 April 2015 and 31 March 2018	Approx. 6 179 000 participants (learners and members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers between 1 April 2015 and 31 March 2019	Approx. 8 179 000 participants (learners and members of the public) in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers between 1 April 2015 and 31 March 2020

Table 22: Strategic statements, performance indicators, and annual and MTEF targets for 2017/18

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
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 ²⁷	No fewer than 15 840 PhD students awarded bursaries as reflected in the reports from the NRF and relevant entities by 31 March 2020	2 265 PhD students awarded bursaries through NRF and DST- managed programmes as reflected in the NRF and DST project reports	2 845 PhD students awarded bursaries through NRF and DST- managed programmes as reflected in the NRF and DST project reports	3 404 PhD students awarded bursaries through NRF and DST- managed programmes as reflected in the NRF and DST project reports by 31 March 2016	3 136 PhD students awarded bursaries through NRF and DST- managed programmes as reflected in the NRF and DST project reports by 31 March 2017	No fewer than 3 100 ²⁸ PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2018	No fewer than 3 100 PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2019	No fewer than 3 100 PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2020
Pipeline postgraduate students awarded bursaries and fellowships through NRF and DST	Total number of pipeline ²⁹ postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities	No fewer than 54 392 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities by 31 March 2020	6 853 pipeline postgraduate students awarded bursaries through NRF and DST- managed programmes as reflected in the NRF and DST project report	7 711 pipeline postgraduate students awarded bursaries through NRF and DST- managed programmes as reflected in the NRF and DST project reports	10 996 pipeline postgraduate students awarded bursaries through NRF and DST- managed programmes as reflected in the NRF and DST project reports by 31 March 2016	10 996 pipeline postgraduate students awarded bursaries through NRF and DST- managed programmes as reflected in the NRF and DST project reports by 31 March 2017	No fewer than 10 800 pipeline postgraduate students awarded bursaries annually as reflected in the reports of the NRF and relevant entities by 31 March 2018	No fewer than 10 800 pipeline postgraduate students awarded bursaries annually as reflected in the reports of the NRF and relevant entities by 31 March 2019	No fewer than 10 800 pipeline postgraduate students awarded bursaries annually as reflected in the reports of the NRF and relevant entities by 31 March 2020

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

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

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

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16	2017/18		2018/19	2019/20	
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	3 440 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2020	1 010 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2014 (568 in DST-NRF Internship Programme and 442 in the National Youth Service programme)	1 021 number of graduates and students placed in DST-funded work preparation programmes	1 044 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2016	840 ³⁰ graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2017	800 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2018	450 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2019	450 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2020	
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	220 research infrastructure grants awarded as per award letters by 31 March 2020	61 research infrastructure grants awarded by NRF and DST internal processes and as per award letters	69 grants have been awarded in four categories of research infrastructure	79 research infrastructure grants awarded as per award letters by 31 March 2016	70 research infrastructure grants awarded as per award letters by 31 March 2017	30 ³¹ 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	30 research infrastructure grants awarded as per award letters by 31 March 2020	

30 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.

31 The reduction in the number of research infrastructure grants results from a series of cuts to the Research and Development Infrastructure budget as a consequence of budget cuts by NT in the allocation and necessary prioritisation in the Department. This reductions amount to over R300m over the 2017 MTEF.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16	2017/18		2018/19	2019/20	
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 ³²	2 200 Mbps average broadband capacity is available per SANReN site	2 820 Mbps average broadband capacity available per SANReN site	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	3 200 Gbps total available broadband capacity provided by SANReN by 31 Mar. 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	
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 as reflected in the NRF project reports	Total number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	No fewer than 22 578 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports by 31 March 2020	3 569 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	4 064 researchers awarded research grants through NRF managed programmes as reflected in the NRF reports	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	No fewer than 4 500 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2018	No fewer than 4 500 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2019	No fewer than 4 500 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2020	

32 The 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 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16	2016/17		2017/18	2018/19	2019/20
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	No fewer 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	5 641 ISI-accredited research articles published by NRF funded researchers	6 470 ISI research articles published by NRF-funded researchers as reflected in the NRF project reports	7 158 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 March 2016	7 000 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 March 2017	No fewer 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 2018	No fewer 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	No fewer 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	

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance				Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16	2017/18		2018/19	2019/20	
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										
Single polarisation array	Number of antennas commissioned for a single polarisation array	64 antennas commissioned for a single polarisation array by 31 March 2018	1 MeerKAT antenna installed by 31 March 2014	4 MeerKAT antennas installed by 31 March 2015	20 MeerKAT antennas installed by 31 March 2016	32-antenna commissioned for a single polarisation array by 31 March 2017 ³³	64-antenna commissioned for a single polarisation array by 31 March 2018	No target ³⁴	No target	No target
Climate change research network	A climate change research network in place	A climate change research network formalised in South Africa through MoUs by 31 March 2020	No baseline	Submission to the DDG of a report on existing climate change research initiatives and networks	A report in this regard was approved by the Deputy Director-General: Research Development and Support	Submission to the DDG of a report on existing climate change research initiatives and networks by 31 March 2017 ³⁵	A climate change research network formalised in South Africa through MoUs by 31 March 2018	No target ³⁶	No target	No target
Reports on state of climate change S&T in South Africa	Number of biennial reports on the state of climate change S&T in South Africa submitted to Cabinet	Two biennial reports on the state of climate change S&T in South Africa submitted to Cabinet for approval by 31 March 2020	No baseline	No baseline	A plan for the development biennial report was approved by Deputy Director-General: Research Development and Support	1 (first biennial) report on the state of climate change S&T in South Africa finalised and submitted for Cabinet approval by 31 March 2017	1 plan for compiling second biennial report on the state of climate change S&T in South Africa approved by Exco by 31 March 2018	Second biennial report on the state of climate change S&T in South Africa submitted to Cabinet for approval by 31 March 2019	No target ³⁷	No target

33 Target for 2016/17 was revised to focus on commissioning 32 MeerKAT antennas by 31 March 2017 and all 64 dishes by 31 March 2018, instead of merely constructing all 64 dishes by 31 March 2017. The shift resulted from a faulty component having been identified, which required rectification before the installation of dishes could proceed. Approval for the revision of this 2016/17 target was granted by the Minister.

34 The MeerKAT telescope will be completed in 2018. There are no outputs beyond this date for this specific indicator. A new indicator would have to be developed to measure progress towards SKA Phase 1 and/or the performance of the MeerKAT telescope.

35 The report will indicate, at the time of reporting, the state of climate change research networks established through memoranda of understanding.

36 This is an indicator for the current MTSF (2014-2019). The final output (A climate change research network formalised through MoUs) will have been achieved by 31 March 2018. There is therefore no target for 2018/19.

37 This is an indicator for the current MTSF (2014-2019). The target of two biennial reports (first in 2016/17 and second in 2018/19) will only have been achieved by 31 March 2019. There is therefore no target for 2019/20.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Strategic statement: To promote public engagement on science, technology and innovation									
Participants ³⁸ in science awareness and engagement programmes managed by the NRF and other service providers	Approximate number of participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers	Approx. 8 179 000 participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 March 2020	1 054 221 people directly participated in science awareness and engagement programmes	1 247 667 people participated in science awareness and engagement programmes supported by the DST	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	Approx. 1,2 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 2017	Approx. 2 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 2018	Approx. 2 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	Approx. 2 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

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

Table 23: Quarterly targets for the 2017/18 financial year

Performance indicator	Reporting frequency	Annual target 2017/18	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 ³⁹	Quarterly	No fewer than 3 100 ⁴⁰ PhD students awarded bursaries through Programme 4 funds as reflected in the reports from the NRF and relevant entities by 31 March 2018	No fewer than 1 568 PhD students awarded bursaries through Programme 4 funds	No fewer than 2 352 PhD students awarded bursaries through Programme 4 funds	No fewer than 2 880 PhD students awarded bursaries through Programme 4 funds	No fewer than 3 100 PhD students awarded bursaries through Programme 4 funds
Total number of pipeline ⁴¹ postgraduate students awarded bursaries annually as reflected in the reports from the NRF and relevant entities	Quarterly	No fewer than 10 800 ⁴² pipeline postgraduate students awarded bursaries through Programme 4 funds as reflected in the reports from the NRF and relevant entities by 31 March 2018	No fewer than 5 400 pipeline postgraduate students (BTech and honours, and master's students) awarded bursaries from Programme 4 funds	No fewer than 8 100 pipeline postgraduate students (BTech and honours, and master's students) awarded bursaries from Programme 4 funds	No fewer than 9 720 pipeline postgraduate students (BTech and honours, and master's students) awarded bursaries from Programme 4 funds	No fewer than 10 800 pipeline postgraduate students (BTech and honours, and master's students) awarded bursaries from Programme 4 funds
Total number of graduates and students placed in DST-funded work preparation programmes in SETI institutions	Quarterly	800 graduates and students ⁴³ placed in DST-funded work preparation programmes in SETI institutions by 31 March 2018	533 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	720 graduates and students placed in DST-funded work preparation programmes in SETI institutions	800 graduates and students placed in DST-funded work preparation programmes in SETI institutions
Number of research infrastructure grants awarded per award letters annually	Biannually	30 research infrastructure grants awarded as per award letters by 31 March 2018	No target	Contracting with SARIR hosting entities finalised by 30 September 2017	No target	30 research infrastructure grants awarded as per award letters

³⁹ These are bursaries awarded from Programme 4 funds through the NRF and relevant entities, including CSIR, SANSA and the Agricultural Research Council for Interprogramme bursaries.

⁴⁰ The quarterly figures for this indicator are cumulative to year end.

⁴¹ "Pipeline students" means BTech, honours and master's students.

⁴² The quarterly figures for this indicator are cumulative to year end.

⁴³ The quarterly figures for this indicator are cumulative to year end.

Performance indicator	Reporting frequency	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total available broadband capacity provided by SANReN per annum	Biannually	3 200 Gbps total available broadband capacity provided by SANReN by 31 March 2018	No target	New links and upgrade plan finalised by 30 September 2017	No target	3 200 Gbps total available broadband capacity provided by SANReN by 31 March 2018
Total number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	Quarterly	No fewer than 4 500 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2018	No fewer than 2 270 ⁴⁴ researchers awarded research grants through NRF-managed programmes	No fewer than 3 404 researchers awarded research grants through NRF-managed programmes	No fewer than 4 085 researchers awarded research grants through NRF-managed programmes	No fewer than 4 500 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	Annually	No fewer 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 2018	No target	No target	No target	No fewer than 7 000 research articles published by NRF-funded researchers
Number of antennas commissioned for a single polarisation array	Quarterly	64-antenna commissioned for a single polarisation array by 31 March 2018	SKA SA Project Director approved baseline plan finalised by 30 June 2017	SKA SA Project approved progress report with reference to baseline plan provided by 30 September 2017	SKA SA Project approved progress report with reference to baseline plan provided by 31 December 2017	64-antenna commissioned for a single polarisation array by 31 March 2018

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

Performance indicator	Reporting frequency	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
A climate change research network in place	Quarterly	A climate change research network formalised in South Africa through a memorandum of understanding by 31 March 2018 (The report will indicate, at the time of reporting, the state of climate change research networks established through MoUs.)	Generic draft MoU approved by DDG by 30 June 2017	Parties to MoU identified by 30 September 2017	No target	A climate change research network formalised in South Africa through a memorandum of understanding by 31 March 2018
Number of biennial reports on the state of climate change S&T in South Africa submitted to Cabinet	Annually	A plan for compiling the second biennial report on the state of climate change S&T in South Africa approved by Exco by 31 March 2018	No target	No target	No target	1 plan for compiling the second biennial report on the state of climate change S&T in South Africa approved by Exco by 31 March 2018
Approximate number of participants in science awareness and engagement programmes annually as reflected in the project reports of the NRF and other service providers.	Quarterly	Approx. 2 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 2018	Grant funding awarded to organisations implementing the initiatives by 30 June 2017	National Science Week held by 30 September 2017	3 science festivals and 6 science, technology, engineering, mathematics and innovation Olympiads and competitions held by 31 December 2017	4 science festivals conducted and approximately 2 000 000 participants in science awareness and engagement programmes as reflected in project reports of the NRF and other service providers by 31 March 2018

Reconciling performance targets with the budget and MTEF

Table 24: Research Development and Support expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation 2016/17	Medium-term expenditure estimates		
	2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Human Capital and Science Promotion	1 683 088	1 872 787	2 331 826	2 357 414	2 424 804	2 531 227	2 676 546
Science Missions	151 318	159 549	177 004	215 523	212 967	222 281	235 126
Basic Sciences and Infrastructure	710 235	783 727	986 984	906 519	976 604	961 440	1 030 214
Astronomy	654 192	673 774	723 040	691 541	734 484	752 178	815 073
TOTAL	3 198 833	3 489 837	4 218 854	4 170 997	4 348 859	4 467 126	4 756 959
Compensation of employees	24 516	29 438	31 117	31 805	32 435	33 679	36 250
Goods and services	7 908	8 258	12 634	15 527	15 525	16 354	17 243
Transfers and subsidies	3 166 409	3 452 010	4 175 103	4 123 665	4 300 899	4 417 093	4 703 466
Payments for capital assets	-	72	-	-	-	-	-
Payments for financial assets	-	59	-	-	-	-	-
TOTAL	3 198 833	3 489 837	4 218 854	4 170 997	4 348 859	4 467 126	4 756 959

Programme 5: Socio-economic Innovation Partnerships

Purpose

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

Strategic overview

The effort and investments made by Programme 5 contribute, in varying degrees, to all five of the strategic outcome-oriented goals of the Department's 2015-2020 Strategic Plan.

The Programme plays a supporting role in building a responsive, coordinated, and efficient NSI (Strategic Outcome-Oriented Goal 1). Programme 5 manages the investment of the DST into core annual surveys and information management systems to collect and interpret appropriate statistics on STI. The core statistics support efforts to enhance coordination for STI as well as assisting with a more rational and strategic deployment of public funding for STI. The Programme has also introduced a database of RGI partnerships between industry and government policy management purposes.

Since 1 April 2015, the Programme has investigated options and finalised proposals for a budget coordination process that will begin to be piloted during the 2017 Medium-Term Expenditure Framework process. The Programme facilitated a government-industry task team that made recommendations about possible improvements to the R&D tax incentive, and produced statistical reports providing annual trend information on R&D investment, science and technological activities, and on the performance of the R&D tax incentive programme. In addition, with Programme 2, Programme 5 finalised the first survey report on intellectual property and technology transfer in publicly funded institutions.

The Programme plays a role in advancing knowledge production and human capital development in a number of priority areas from the NRDS and TYIP. Focus areas include advanced manufacturing, resource-based industries, ICT, environmental technologies, and innovation for inclusive development. Since 1 April 2015, an estimated 668 students were supported in these priority areas at honours, master's and PhD levels. Investments made by the Programme contribute to maintaining and increasing the relative contribution of South African researchers to global scientific output (Strategic Outcome-Oriented Goal 2) as well as support efforts to increase the number of high-level graduates and their representivity (Strategic Outcome-Oriented Goal 3).

However, the bulk of the investments and resources of the Programme are targeted towards the generation of a greater share of economic growth from R&D-based opportunities and partnerships (Strategic Outcome-Oriented Goal 4) and to accelerate inclusive development through scientific knowledge, evidence and appropriate technology (Strategic Outcome-Oriented Goal 5). The Innovation for Inclusive Development Programme includes efforts to build a capable state through decision-support tools and evidence.

Since 1 April 2015, the Programme has been taking forward initiatives in areas in which South Africa has competitive or comparative advantages and which could lead to new industrial development. This includes initiatives that have been integrated into the Nine-Point Plan for economic recovery and growth. Major initiatives include mineral beneficiation (titanium, fluorochemicals and advanced metals), initiatives aligned to IPAP (composites, additive manufacturing, ICTs), and initiatives that support Operation Phakisa priority areas (aquaculture, mining, agriculture).

The impact of Programme 5 initiatives on industry

The approach has been to engage with the private sector on a project-by-project basis and assess how the private sector could support the scaling up and successful roll-

out of the technologies for inclusive development. For example, close collaboration with the private sector (Bill & Melinda Gates Foundation) helped to pilot internationally innovative sanitation technologies. A similar partnership was leveraged to demonstrate the use of hydrogen fuel cells in rural areas.

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

Strategic objective 3, on R&D-led industry development, is aimed at establishing new industries, or helping existing industries to improve their competitiveness through the application of new knowledge or technologies. DST-funded technology development is therefore aimed directly at enabling industries to increase their turnover, to leverage additional R&D funding, and/or to help improve the competitiveness and sustainability of SMEs. For example, the technology assistance package support instrument directly helps to improve a firm's technological capability in order to increase both the level of local manufacturing and the level of exports. One illustration of this is a local firm that manufactures axles for trains; the firm has received help to improve its quality accreditation, resulting in increased sales to the original equipment manufacturer of the trains, but also securing substantial new export sales. A sector-wide technology assistance package established a molten metal flow modelling

capability at a number of technology stations, resulting in an improvement of the productivity and quality of casting of foundries that can now access the complex production planning method that would normally be too expensive to house at each individual foundry.

Both the Water and Waste RDI Roadmaps were developed in consultation with industry. The Waste RDI Roadmap Project Management Unit (at the CSIR) provides advice to various waste industry associations, for example by making presentations on strategic matters to the boards of Packaging SA and Plastics SA. The Project Management Unit has also established a series of "industry meets science" engagements on the priority areas identified in the roadmap. The initial engagements were on organic waste, plastic waste and electronic waste. The last engagement for 2016/17 was on food waste in partnership with the WWF. The workshops have resulted in better targeted research calls for the waste sector, which are aligned with the needs of industries, the establishment of the Bioplastics SA forum. The organic waste workshop led to the development of the online Biorefinery platform for South Africa. These engagements are intended to bring researchers and industry together so that researchers can obtain a better understanding of the needs of industry, and so that industry can learn more about the capability of the researchers in their sector.

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

Overall, the collaboration is in four broad areas, namely, establishing RDI platforms and laboratories; HCD (both high-end and technical skills); innovation and technology-based SME development; and the adoption of practices

that foster and permit the transfer and rapid diffusion of technology without contravening laws governing IP rights.

The programme has, over a five-year period, established collaborations with multinational ICT companies including Microsoft SA, Nokia, SAP, IBM and Cisco. Innovation platforms and technology incubators such as mLab have also resulted from the programme. In 2013, with the introduction of the ICT Innovation in Industry Partnerships Fund, the programme attracted investments in R&D from Cisco (R60 million at Nelson Mandela Metropolitan University), and IBM (R350 million over 10 years under the Department of Trade and Industry-IBM Equity Equivalent Investment Programme). The programme also builds partnerships with ICT user industries, for example a mining subsidence monitoring tool was developed by the CSIR. The DST invested R8,4 million in this, with potential returns of R48 million over five years from contracts with mining companies.

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

The Biomanufacturing Industry Development Centre aims to strengthen and configure the existing bioprocess and product development competence at the CSIR's Biosciences unit and to make this affordable and broadly accessible. It was launched in May 2016 and has supported more than 10 enterprises to date, mainly through product development and technology incubation services. The Nanomaterials Industrial Development Facility was launched in December 2015, and will make a key

contribution in the provision of industry-ready and relevant skills and capabilities. It provides a unique technology and product development capability for South Africa, with respect to nanostructures and nano-applications required for industry. It currently supports one spin-out and one industry partner in the cosmetics industry. The Biorefinery Facility will integrate biomass conversion processes and equipment to produce fuels, power and chemicals from biomass. The Photonics Prototyping Facility is earmarked as a vehicle for growing the photonics industry in South Africa.

Nine sector innovation funds (SIFs) were established in partnership with industry associations in the relevant sectors. Seven of these are still operational. The SIF initiative is aimed primarily at incentivising private sector investments in RDI, and at broadly addressing the challenges around the economic competitiveness of a particular sector. The intention is to create an enabling environment for an industry to determine and drive its RDI priorities in a co-funding arrangement with government. A comprehensive set of performance indicators has been developed. A vital performance measure for the SIF programme will be the amount of funding an industry sector contributes to the identified RDI programmes or priorities, to match government (DST) funding. It is envisaged that the key long-term outcome measure will be an increased contribution by the relevant sector to GDP, based on strengthened RDI-based industrial development. While it is not yet possible to start seeing the long-term effects of the programme, as most of the SIFs will only start showing outcomes in the 2017/18 year, to date they have supported 32 interns, six postdoctoral researchers, 39 PhD students, 24 MSc students, three MTech students and seven honours students. An online information management and reporting system has been developed to optimise the reporting aspects of the initiative. It is currently anticipated that DST will invest about R132 million over the MTEF period, and it is estimated that around R44 million will be leveraged from industry.

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

The impact of Programme 5 on the activities of other departments

The Programme has partnered with lead departments in the design and implementation of projects that have influenced government thinking. For example, the ICT projects in Cofimvaba have helped shape ideas about best practice and methodologies for rolling out ICT in schools. Lessons learnt in the implementation of the innovative sanitation technology demonstration project were shared with the Department of Water and Sanitation (DWS) and influenced the new national sanitation policy.

The DST continues to partner with various municipalities, mainly with the intention of demonstrating how innovative technology stations maybe used to improve access to and the quality of basic services. These partnerships demonstrate how an enabling policy environment is a critical factor in inentigrating innovative technology service delivery. The DST investment in decision-support tools has contibuted towards achieving some of the NDP priorities, including addressing spartial marginalisation, improving the capacity of the state to manage service delivery better and identifying appropriate technologies for service delivery.

Two DST research projects on innovation in local economic development and a benchmarking study on innovative building technology in South Africa responded to policy priorities of two departments. The innovation in local economic development study strengthened the rationale for the DST and the Department of Cooperative Governance partnership to collectively drive innovation-driven local economic development (LED). In 2015/16 this partnership prioritised distressed rural municipalities to factor innovation into their integrated development

plans and LED strategies in order to promote sustainable local development. The innovative building technology benchmarking study was responding to a Presidential Infrastructure Coordinating Commission Resolution on the use of innovative building technologies in the delivery of social infrastructure. This study highlighted the status quo of innovative building technologies in South Africa and made recommendations on how South African-originated innovations in the human settlements sector could be identified to advance economic development.

The DST hosted a number of innovation for inclusive development seminars to offer access to relevant knowledge, social science concepts and evidence for use in public policy formulation, implementation and improvement. The discussions at some of these seminars contributed to the development of knowledge products that draw on DST demonstration projects. In some instances, these seminars led to new opportunities for DST entities.

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

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

The Waste RDI Roadmap documents are regularly cited

by the Minister and Department of Environmental Affairs. In addition, the the Chemical and Waste Branch at DEA has regularly used the presentations prepared by the Department and the CSIR on the Waste Roadmap in public forums such as the Waste Summit in 2015.

The DST also cooperated with the DWS in drafting the national sanitation policy, which recognises and supports the use of innovative sanitation solutions for the delivery of sanitation.

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

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

The impact of Programme 5 on local economic development

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

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

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

Responding to the triple challenge of poverty, inequality and unemployment

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

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

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

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

The Department has demonstrated technologies for primary production and agroprocessing of essential oils and high-value food crops while creating jobs (particularly for women and young people) and thus also addressing poverty by supporting income generation. The district municipalities selected for demonstrations are areas with high poverty levels and many socio-economic challenges.

Technology demonstration projects address poverty by facilitating the participation in the production of high-end products. Through partnerships with provincial departments, the DST brings technology infrastructure to enable the use of natural resources and medicinal plants and food crops creating income-generating opportunities for 200 local people in the Eastern Cape, Limpopo, KwaZulu-Natal and the Northern Cape. Through the Cofimvaba school nutrition pilot project, 1 800 learners are being provided with a scientifically formulated breakfast drink, nutrition education, cooking and serving facilities in order to improve learning and class participation, while community enterprises are integrated into the value chain.

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

Strategic objectives and strategic statements

Strategic objectives	Strategic statements
Innovation for rural and socio-economic development	Through knowledge, evidence and learning, to inform and influence how S&T can be used to achieve inclusive development
S&T for sustainable development and a green economy	To identify, grow and sustain niche high-potential STI capabilities for sustainable development and the greening of society and the economy
Support the development of new and existing R&D-led industries in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds	<p>To identify, grow and sustain niche high-potential STI capabilities that –</p> <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 R&D-led new targeted industries
Support provincial and rural innovation	To strengthen provincial and rural innovation and production systems through analysis and catalytic interventions
Facilitate the provision of data on the NSI's performance	To enhance understanding and analysis that support improvements in the functioning and performance of the NSI
Increased private-sector investment in RDI	To introduce and manage interventions and incentive programmes that increase the level of private sector investment in scientific or technological R&D

Chief directorates

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

- Investing in the medium and long-term knowledge-generation capabilities of the NSI in targeted innovation areas.
- In partnership with other government departments and economic actors, spearheading focused efforts that exploit knowledge capabilities for economic benefit. Economic 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 (technical interventions) 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 green technologies and environmental services 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. This Innovation for Inclusive Development portfolio also includes a focus on innovation to strengthen and advance local economic development through building and enhancing local STI capabilities and integrating innovation in catalysing local industries, clusters and value-chains by exploiting technology and innovation for priority sectors, e.g. 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, the development of databases and information systems such as the Research Information Management System and the national S&T expenditure tables, and the implementation of section 11D of the Income Tax Act, 1962, to promote private-sector R&D investment.

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

Strategic objective	Risk description	Mitigation action
<p>Innovation for rural and socio-economic development</p>	<p>Inadequate mechanisms to obtain and disseminate relevant knowledge and evidence for informing and influencing decision making by organisations</p>	<ul style="list-style-type: none"> Implementation of the communication and marketing plan developed to ensure the adequate dissemination of information
	<p>Poor/inadequate planning and implementation of projects by implementation agencies</p>	<ul style="list-style-type: none"> Determination of the capacity (experience, systems and expertise) of implementing agencies during the proposal evaluation process Invoking of breach of contract clause where contractors have not performed
<p>S&T for sustainable development and a green economy</p>	<p>Lack of inclusion in the NSI/STI structures by all forms of innovators</p>	<ul style="list-style-type: none"> Development of grassroots innovation action plan to address issues of accessibility Landscaping study to create a database of innovations related to sustainable human settlements
	<p>Misalignment of DST projects to South African priorities for sustainable development and the greening of society and the economy</p>	<ul style="list-style-type: none"> Continued participation in intergovernmental task teams, and project steering committees, etc. Joint planning and implementation of projects by all relevant Programmes/units
<p>Lack of buy-in on Water and Waste RDI Roadmaps by line departments</p>	<p>Lack of buy-in on Water and Waste RDI Roadmaps by line departments</p>	<ul style="list-style-type: none"> Leveraging of funding from sources other than National Treasury Inclusion of Water and Waste RDI Roadmaps in DST MTEF budget bids Escalation of challenges to ministerial level as and when the need arises
	<p>Delay in the implementation of the Water and Waste RDI Roadmaps</p>	<ul style="list-style-type: none"> Continued quarterly management committee meetings to discuss operational matters and annual advisory committee meeting to discuss strategic matters

Strategic objective	Risk description	Mitigation action
<p>Support the development of a new and existing R&D-led industries in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds</p>	<p>Having a portfolio of projects that does not have the potential to impact on industrial development</p>	<ul style="list-style-type: none"> • Continued close interaction with industry member societies and independent following of international R&D developments and achievements • Building and maintenance of knowledge networks • Capture and dissemination of lessons learnt for portfolio of projects • Identification of crucial projects based on contract value • Implementation of a tailored stage-gate approach when necessary • Continued briefing schedule to the Economic Sectors, Employment and Infrastructure Development Cluster to incorporate large DST programmes with strong interdepartmental linkages • Policy briefing schedule to clusters to incorporate large DST programmes with strong interdepartmental linkages • Maintain a schedule for site visits by the Minister, DG and Exco members • Inclusion in the Nine-Point Plan or long-term plans for projects which have resulted in a technological breakthrough, potential impact, or as indicated by economic review
	<p>Projects not delivered as planned by implementation agencies</p>	<ul style="list-style-type: none"> • Clear setting out of agency delivery targets in the operational plan or reporting requirements • More frequent engagements of the next line management in feedback meetings in cases where there is perceived lack of commitment by the entity

Strategic objective	Risk description	Mitigation action
Support provincial and rural innovation	Lack of buy in and/or ownership on the part of provincial and municipal officers to catalytic interventions as an enabler for socio-economic development	<ul style="list-style-type: none"> Development of a strategic engagement framework to inform DST's approach to creating innovation-enabling interventions at provincial level Joint development of a draft framework for financing local innovation
	Lack of inclusivity of catalytic interventions	<ul style="list-style-type: none"> Develop a strategic engagement framework to inform the DST's approach to create innovation enabling interventions at provincial level
Facilitate the provision of data on the NSI's performance	Statistics and indicators produced do not adequately meet policy requirements	<ul style="list-style-type: none"> Adaptation and customisation of international instruments to the local environment (Frascati Manual) Exco approval of all new measurement requirements and important changes to the scope and focus of existing S&T measurement instruments Extraction of greater value from international arrangements by ensuring the outcomes of and experiences gained through international engagements are shared with the team members and are properly evaluated and adapted Extraction of greater value from expert advice through managing consultants to maximise value for the Department
	Production of poor quality statistics (e.g. in respect of coverage, accuracy)	<ul style="list-style-type: none"> Regular monitoring of adherence to time frames by Science and Technology Indicators and Research and Development Planning Evaluation of adequacy of the budget against measurement requirements Maintenance of the established benchmarks/standards for assessing quality of each statistical quality Development and signature of memoranda of agreement for commissioned work, stipulating standards required

Strategic objective	Risk description	Mitigation action
Facilitate the provision of data on the NSI's performance	Inadequate and ineffective engagement between the DST and other departments	<ul style="list-style-type: none"> Implement the Framework for coordinating Science and Technology cooperation with other departments Escalation of hindrances to the Minister and/or the Director-General to resolve with counterparts Implementation of recommendations made by the DST-National Treasury task team on budget coordination and cooperation during the Medium Term Expenditure Committee process
Increased private-sector investment in RDI	Administrative and adjudication errors in projects of applicant companies	<ul style="list-style-type: none"> Monitoring of effectiveness of R&D tax incentive guidelines and changing of control procedures if necessary Dedicated assistance from the Directorate: Legal Services to deal with interpretation of the tax wording and issuing legal communication to companies Continuous monitoring to ensure alignment of section 11D of the Income Tax Act with policy on increasing R&D investment in South Africa Annual meetings with industry
	Not achieving the targeted turnaround time in providing a decision to applicant companies	<ul style="list-style-type: none"> Implementation of Online Applications Submission System

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)

Strategic objectives	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
1. Innovation for rural and socio-economic development	26 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2020	2 policy briefs published on the DST website	2 knowledge products (two case studies) were completed and published on the DST website by 31 March 2015	5 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	20 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2019	26 knowledge products on innovation for inclusive development published between 1 April 2015 and 31 March 2020
	10 decision-support systems introduced, maintained and improved between 1 April 2015 and 31 March 2020	2 additional decision-support systems for improving sanitation and basic education service delivery introduced; and two existing decision-support systems (Spatial and Temporal Evidence for Planning South Africa, and the Risk and Vulnerability Atlas) maintained	4 decision-support systems maintained and two introduced between 1 April 2015 and 31 March 2015	6 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	10 decision-support systems introduced, maintained and improved between 1 April 2015 and 31 March 2019	10 decision-support systems introduced, maintained and improved between 1 April 2015 and 31 March 2020
	45 learning interventions (seminars) generated between 1 April 2015 and 31 March 2020	9 learning interventions (seminars) generated by 31 March 2014	9 learning interventions (seminars) generated by 31 March 2015	9 learning interventions (seminars) generated between 1 April 2015 and 31 March 2016	18 learning interventions (seminars) generated by 31 March 2016 (Indicator erroneously left out of 2015/16 APP)	27 learning interventions (seminars) generated between 1 April 2017 and 31 March 2018	36 learning interventions (seminars) generated between 1 April 2018 and 31 March 2019	45 learning interventions (seminars) generated between 1 April 2019 and 31 March 2020

Strategic objectives	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
2. S&T for sustainable development and a green economy	375 hours, 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	No baseline	11 master's and doctoral students fully funded or co-funded in designated niche areas between 1 April 2015 and 31 March 2015	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 hours, 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 hours, 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 hours, 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 hours, 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
	22 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research by 31 March 2020	No baseline	1 demonstrator or added to the innovation product portfolio between 1 April 2015 and 31 March 2015	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation product 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 innovation product 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 innovation product portfolio through fully funded or co-funded research between 1 April 2015 and 31 March 2018	16 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research between 1 April 2015 and 31 March 2019	22 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research between 1 April 2015 and 31 March 2020

Strategic objectives	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
3. Support the development of new and existing R&D-led industries in aerospace, advanced manufacturing, chemicals, mining, ICTs and sector innovation funds	High-level graduates (1 454 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	High-level graduates (264 master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals and ICTs)	High-level graduates (353 master's and doctoral students) fully funded or co-funded in designated niche areas by 31 March 2015	High-level graduates (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) between 1 April 2015 and 31 March 2016	High-level graduates (563 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	High-level graduates (941 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	High-level graduates (1 153 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 2019	High-level graduates (1 454 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 2020
	590 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2020	190 interns fully funded or co-funded in R&D related to design, manufacturing and product development	358 interns fully funded or co-funded by 31 March 2015	309 interns fully funded or co-funded in R&D related to design, manufacturing and product development between 1 April 2015 and 31 March 2016	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	No target ⁴⁵

45 ECSP funding for the 2017/18 and 2018/19 financial years has been reduced from R211 million to R80 million and to R0,00 for 2019/20.

Strategic objectives	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
	127 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to innovation product portfolio through fully funded or co-funded research initiatives	16 knowledge and innovation products (two in-house invention disclosures, one provisional patent and 13 technology demonstrators) added to the innovation product portfolio through fully funded or co-funded research initiatives	29 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives	38 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product 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 innovation product 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 innovation product portfolio through fully funded or co-funded research initiatives between 1 April 2015 and 31 March 2018	101 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives between 1 April 2015 and 31 March 2019	127 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives between 1 April 2015 and 31 March 2020
4. Support provincial and rural innovation	12 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2020	No baseline	8 instruments funded by 31 March 2015	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	9 ⁶⁵ 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

46 The drop in target is because the ECSP funding that the DST received ends by 31 March 2017.

Strategic objectives	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
5. Facilitate the provision of data on the NSI's performance	29 statistical reports and policy briefs submitted to Cabinet by 31 March 2020	3 reports and policy briefing were approved by the DST and published	<p>The report was approved by Exco on 9 Feb. 2015. Findings were disseminated through a stakeholder workshop on 27 March 2015 and published on the DST website. The 2013/14 Report on the Performance of R&D Tax incentive has been finalised and published on the DST website. Monitoring data on R&D administration was compiled and presented through 4th quarter status update report. The 2012/13 R&D survey report and the cabinet memorandum on R&D expenditure trends were disseminated in quarter three. Draft report/ policy brief on innovation in the manufacturing sector was produced (based on revised annual target) but not yet approved.</p>	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 by 31 March 2018	23 statistical reports and policy briefs submitted to Cabinet by 31 March 20189	29 statistical reports and policy briefs submitted to Cabinet by 31 March 2020

Strategic objectives	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
		2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
6. Increased private-sector investment in RDI	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive by 31 March 2020	No baseline	No baseline	Preapproval decisions provided within 150 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 of application for the R&D tax incentive between 1 April 2015 and 31 March 2019	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 2020

Table 27: Strategic statements, performance indicators, and annual and MTEF targets for 2017/18

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets			
			2013/14	2014/15		2015/16	2017/18	2018/19	2019/20
Strategic statement: Through knowledge, evidence and learning, to inform and influence how S&T can be used to achieve inclusive development									
Knowledge products ⁴⁷	Number of knowledge products on innovation for inclusive development published	26 knowledge products on innovation for inclusive development published by 31 March 2020	2 policy briefs published on the DST website	2 knowledge products (two case studies) were completed and published on the DST website	5 knowledge products on innovation for inclusive development published by 31 March 2016	4 knowledge products on innovation for inclusive development published by 31 March 2017	6 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
Decision-support interventions ⁴⁸	Number of decision-support interventions introduced and maintained	10 decision-support systems maintained and improved by 31 March 2020	2 additional decision-support systems for improving sanitation and basic education service delivery introduced; and two existing decision-support systems (Spatial and Temporal Evidence for Planning South Africa, and the Risk and Vulnerability Atlas) maintained	4 decision-support systems maintained and two introduced by 31 March 2015	6 decision-support systems maintained and improved by 31 March 2016	7 decision-support systems maintained and improved by 31 March 2017	8 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

⁴⁷ Knowledge products include case studies, policy briefs and technology briefs. Different knowledge products may be required to provide the knowledge and evidence required by decision-makers in order to adopt a new technology-based approach. A policy brief is a document that outlines the rationale for selecting a particular policy alternative and aims to convince the target audience that an existing problem can be addressed by adopting an alternative policy or course of action. A case study is a detailed description and exploration of a particular project, with a specific focus on challenges, lessons, and success factors, and is usually targeted at people involved in implementation. A technical brief refers to a range of knowledge products providing performance data, 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.

⁴⁸ Decision-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 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Learning interventions ⁴⁹ (seminars) generated	Number of learning interventions (seminars) generated	45 learning interventions (seminars) generated by 31 March 2020	9 learning interventions (seminars) generated by 31 March 2014	11 learning interventions (seminars) generated by 31 March 2015	9 learning interventions (seminars) generated by 31 March 2016	9 learning interventions (seminars) generated by 31 March 2017	9 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
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 ⁵⁰ 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 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	No baseline	11 master's and doctoral students fully funded or co-funded in designated niche areas by 31 March 2015	50 master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 31 March 2016	55 honours, master's and doctoral students fully funded or co-funded in designated niche areas that support the green economy and sustainable development by 31 March 2017	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 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

49 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.

50 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 post-graduate expertise. The Waste Management Honours will be targeted.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Knowledge and innovation products: patents ⁵¹ , prototypes ⁵² , technology demonstrators ⁵³ and technology transfer packages	Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation portfolio through fully funded or co-funded research	22 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation portfolio through fully funded or co-funded research by 31 March 2020	No baseline	1 demonstrator added to the innovation portfolio by 31 March 2015	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation portfolio through fully funded or co-funded research by 31 March 2016	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation portfolio through fully funded or co-funded research by 31 March 2017	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation portfolio through fully funded or co-funded research by 31 March 2018	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation portfolio through fully funded or co-funded research by 31 March 2019	6 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation portfolio through fully funded or co-funded research by 31 March 2020

51 Patents include formal disclosures (made within an entity), and provisional patent applications.

52 A prototype is a representative model that can perform the required functions of the intended product.

53 A technology demonstrator is a model that demonstrates the functional capability of a specific technology. It is at a lower level of technological maturity than a prototype, as it is aimed at demonstrating the technology functionality only.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets			
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20	
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 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)	1 454 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	264 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals and ICTs)	353 master's and doctoral students fully funded or co-funded in designated niche areas by 31 March 2015	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	290 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFs) by 31 March 2017	288 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	322 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	335 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	No target
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	190 interns fully funded or co-funded in R&D related to design, manufacturing and product development	358 interns fully funded or co-funded by 31 March 2015	309 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2016	200 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2017	100 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2018	50 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2019			

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Knowledge and innovation products; ⁵⁴ patents, technology demonstrators, technology transfer packages or prototypes generated	Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives	127 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2020	16 knowledge and innovation products (two in-house invention disclosures, one provisional patent and 13 technology demonstrators) added to the innovation product portfolio	29 knowledge and innovation products added to the innovation product portfolio	38 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2016	35 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2017	17 ⁵⁵ knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2018	26 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2019	34 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2020
Funding instruments to increase localisation, competitiveness and R&D-led industry development	Number of instruments ⁵⁶ funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2020	No baseline	8 instruments funded by 31 March 2015	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 ⁵⁷ instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds by 31 March 2018	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds by 31 March 2019	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds by 31 March 2020

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

55 The drop in target is because the ECSP funding that the DST received ends by 31 March 2017.

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

57 The drop in target is due to the fact that the ECSP funding that the DST received ends by 31 March 2017.

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance		Estimated performance 2016/17	Medium-term targets			
			2013/14	2014/15		2015/16	2017/18	2018/19	2019/20
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 provincial or rural innovation systems	Number of innovation-support ⁵⁸ 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	No baseline	No baseline	4 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2016	2 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2017	2 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2018	3 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2019	3 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2020
Strategic statement: To enhance understanding and analysis that support improvements in the functioning and performance of the NSI.									
Statistical reports and policy briefs submitted to Cabinet	Number statistical reports and policy briefs submitted to Cabinet	29 reports and policy briefings on the innovation system and innovation policy approved by Exco/ published by 31 March 2020	3 reports and policy briefing were approved by the DST and published	The report was approved by Exco on 9 Feb. 2015. Findings were disseminated through a stakeholder workshop on 27 March 2015 and published on the DST website. The 2013/14 Report on the Performance of R&D Tax incentive has been finalised and published on the DST website.	2 reports/policy briefings approved by Exco/ published by 31 March 2015	6 reports and policy briefings on the innovation system and innovation policy approved by Exco/published by 31 March 2017	6 statistical reports and policy briefs submitted to Cabinet by 31 March 2018	6 statistical reports and policy briefs submitted to Cabinet by 31 March 2019	6 statistical reports and policy briefs submitted to Cabinet by 31 March 2020

58 Innovation support interventions refers to any support provided by the department with the primary intention of helping to strengthen the functioning or performance of a provincial or a local (urban, peri-urban and rural) system of innovation. This includes studies and investigations (for example, on an innovation opportunity), business plan development (for example, on the development of a science park) or enabling local innovation stakeholders to meet (for example, through innovation forums) or to cooperate around a shared objective (for example, improved agricultural performance on the basis of innovation).

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets			
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20	
				Monitoring data on R&D administration was compiled and presented through 4th quarter status update report. The 2012/13 R&D survey report and the cabinet memorandum on R&D expenditure trends were disseminated in quarter three. Draft report/policy brief on innovation in the manufacturing sector was produced (based on revised annual target) but not yet approved						

Output	Performance indicator	Five-year Strategic Plan target	Audited/actual performance			Estimated performance 2016/17	Medium-term targets		
			2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
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 of application for the R&D tax incentive by 31 March 2020	No baseline	No baseline	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.	Preapproval decisions provided within 120 days of date of receipt of application for the R&D tax incentive by 31 March 2017	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive by 31 March 2018	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive by 31 March 2019	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive by 31 March 2020

Table 28: Quarterly targets for the 2017/18 financial year

Performance indicator	Reporting frequency	Annual target 2017/18	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 2018	Through consultation and review, identify the topics and format of the 6 new knowledge products by 30 June 2017	First draft of the 6 identified policy briefs on innovation for inclusive development developed by 30 September 2017	Validation and engagement on the 6 policy briefs concluded by 31 December 2017	6 knowledge products on innovation for inclusive development published
Number of decision-support interventions introduced and maintained	Quarterly	8 decision-support systems introduced, maintained and improved by 31 March 2018	Monitor the implementation of the work plans for the 7 existing decision-support systems and identify one additional decision-support system by 30 June 2017	Monitor the implementation of the work plans for the 7 existing decision-support systems and approval finalised for one additional decision-support system by 30 September 2017	Monitor the implementation of the work plans for the 7 existing decision-support systems and contract finalised for one additional decision-support system by 31 December 2017	8 decision-support interventions introduced and maintained
Number of learning interventions (seminars, briefs, policy papers) generated	Quarterly	9 learning interventions (seminars) generated by 31 March 2018	Conclusion of contract for coordination of the learning interventions by 30 June 2017	2 learning interventions	3 additional learning interventions bringing the total to five for the year	4 additional learning interventions bringing the total to nine for the year
Number of honours, master's and doctoral students fully funded or co-funded in designated niche areas	Quarterly	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 2018	Update and ongoing monitoring of students from the following initiatives by 30 June 2017: <ul style="list-style-type: none"> Waste RDI Roadmap Water RDI Roadmap Sector Innovation Fund Industrial Innovation Partnerships 	Ongoing monitoring of the initiatives by 31 September 2017	Ongoing monitoring of the initiatives by 31 December 2017 Engage implementing agencies to ensure that the required new batch of students will be supported in the following academic year by 31 December 2017	90 honours, master's and doctoral students fully funded or co-funded in designated niche areas

Performance indicator	Reporting frequency	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the IP portfolio through fully funded or co-funded research initiatives	Quarterly	4 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the IP portfolio through fully funded or co-funded research by 31 March 2018	Interactions with various supported initiatives to define two new innovation products by 30 June 2017	Monitoring of progress against 2 new innovation products by 30 September 2017	Monitoring of progress against 2 new innovation products by 31 December 2017	4 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
Number of high-level research graduates (master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and sector innovation funds (SIFs))	Biannually	288 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	248 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFs)	No target	No target	Additional 40 masters and doctoral students funded or co-funded by 31 March 2018 taking the total for the year to 288
Number of interns fully funded or co-funded in R&D related to design, manufacturing and product development	Annually	100 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2018	100 interns fully funded or co-funded in R&D related to design, manufacturing and product development	No target	No target	No target
Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives	Quarterly	17 ⁵⁹ knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2018	Begin negotiations with implementation agencies on proposed knowledge and innovation products to be added to the innovation product portfolio by 30 June 2017	Finalise negotiations with implementation agencies on proposed knowledge and innovation products to be added to the innovation product portfolio by 30 September 2017	5 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives	10 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives

59 The drop in target is because the ECSF funding that the DST received ends by 31 March 2017.

Performance indicator	Reporting frequency	Annual target 2017/18	Quarterly targets			
			Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals and ICTs	Quarterly	6 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2018	6 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals and ICTs	6 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals and ICTs	6 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals and ICTs	6 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals and ICTs
Number of innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems	Quarterly	2 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2018	Through consultation identify the support interventions to be implemented by 30 June 2017	Project proposal and contracting finalised by 30 September 2017	Implementation to commence by 31 December 2017	2 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems
Number statistical reports and policy briefs submitted to Cabinet	Quarterly	6 statistical reports and policy briefs submitted to Cabinet by 31 March 2018	Gather data/evidence from project implementation activities Identify and prioritise topics for policy briefs for the financial year	Produce drafts and gather inputs from/validate with relevant stakeholders per policy brief.	Table drafts of each policy brief at Exco/MMM for approval	Publish and disseminate the policy briefs; hold user consultations; review lessons; and plan for the next round of policy briefs.
Turnaround time for providing preapproval decisions on applications for the R&D tax incentive	Quarterly	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive by 31 March 2018	Preapproval decisions provided within 90 days	Preapproval decisions provided within 90 days	Preapproval decisions provided within 90 days	Preapproval decisions provided within 90 days

Reconciling performance targets with the budget and MTEF

Table 29: Socio-economic Innovation Partnerships expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation 2016/17	Medium-term expenditure estimates		
	2013/14	2014/15	2015/16		2017/18	2018/19	2019/20
Sector Innovation and Green Economy	812 750	875 737	873 866	932 662	982 683	1 041 673	1 103 406
Innovation for Inclusive Development	325 125	340 095	334 479	349 513	356 598	355 906	378 160
Science and Technology Investment	25 377	29 864	32 310	28 508	25 276	26 528	34 318
Technology Localisation, Beneficiation and Advanced Manufacturing	294 990	293 470	497 692	472 293	257 767	258 646	229 786
TOTAL	1 458 242	1 539 166	1 738 347	1 782 976	1 622 324	1 782 753	1 745 670
Compensation of employees	29 988	34 158	37 107	37 838	38 620	40 111	43 170
Goods and services	6 531	6 700	6 203	11 854	9 171	9 659	10 183
Transfers and subsidies	1 421 723	1 498 308	1 695 037	1 733 284	1 574 533	1 732 983	1 692 317
Payments for capital assets	-	-	-	-	-	-	-
Payments for financial assets	-	-	-	-	-	-	-
TOTAL	1 458 242	1 539 166	1 738 347	1 782 976	1 622 324	1 782 753	1 745 670



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 Start End	Project duration
New and replacement assets							
SKA	4	Kareeberg Local Municipality (part of the Pixley ka Seme District Municipality)	Phase 1 of the SKA will include the construction of 64 MeerKAT antennas	The completion of 64 MeerKAT antenna	R3,67bn	R2,034bn	2006/07 2018/19

The DST public entities

The oversight function of the public entities reporting to the executive authority is a requirement by the Public Finance Management Act (PFMA), 1999 (Act No. 1 of 1999). Section 63(2) of the PFMA states that “The executive authority responsible for a public entity under the ownership control of a national or a provincial executive must exercise that executive’s ownership control powers to ensure that the public entity complies with this Act and the financial policies of that executive.”

To fulfil the statutory functions of the Minister, the DST provides support and advice to the Minister on matters regarding the public entities. The DST, in consultation with its public entities, has developed the Governance Framework for the Entities Reporting to the Minister of Science and Technology. The framework guides the relationship between the DST and its entities, and outlines the governance structures, systems and processes put in place to advance matters of national interest.

Table 31: Public entities reporting to the DST

Name of public entity	Mandate	Outputs	Current annual budget (2017/18)	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 	R131,226 million	Ongoing oversight during 2016/17. No institutional review has been undertaken yet.

Name of public entity	Mandate	Outputs	Current annual budget (2017/18)	Institutional review due date
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 	R25,261 million	Ongoing oversight during 2017/18. Last institutional review undertaken in 2016.
National Research Foundation	To support and promote research through funding, human resource development and the provision of the necessary research facilities in order to facilitate the creation of knowledge, innovation and development in all fields of S&T, including indigenous knowledge, and thereby to contribute to the improvement of the quality of 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) 	R925,964 million	Ongoing oversight during 2017/18. Last institutional review undertaken in 2016.
Council for Scientific and Industrial Research	To foster, in the national interest and in the fields which in its opinion should receive preference, industrial and scientific development, either by itself or in cooperation with principals from the public or private sector, and thereby to contribute to the improvement of the quality of life of the people of South Africa, and to perform any other functions that may be assigned to it by or under the Scientific Research Council Act	<ul style="list-style-type: none"> Peer-reviewed publications Research technologies Patents Research reports 	R915,645 million	Ongoing oversight during 2017/18. Last institutional review was undertaken in 2009.

Name of public entity	Mandate	Outputs	Current annual budget (2017/18)	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) 	R304,656 million	Ongoing oversight during 2017/18. Last institutional review was undertaken in 2010.

Name of public entity	Mandate	Outputs	Current annual budget (2017/18)	Institutional review due date
Technology Innovation Agency	To support the state in stimulating and intensifying technological innovation in order to improve economic growth and the quality of life of all South Africans by developing and exploring technological innovation	<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 companies turnover, technology support funding for SMEs) 	R396,732 million	<p>Ongoing oversight during 2017/18.</p> <p>A 5-year economic impact assessment of TIA was conducted in July 2016, but no institutional review has been undertaken yet.</p>

ANNEXURE A: AMENDMENTS TO THE 2015-2020 STRATEGIC PLAN

The Department has reviewed its 2015-2020 Strategic Plan and identified some changes that need to be made. The strategic objectives listed below are contained in the 2015-2020 Strategic Plan, but do not have five-year strategic performance targets. The alignment of annual and MTEF targets to strategic performance targets could therefore not be verified or measured in these cases.

PROGRAMME 1: ADMINISTRATION	
Strategic objective 1	Sound corporate governance, including M&E
Strategic statement	To develop and maintain good corporate governance systems for the Department and its entities
Performance indicator	<ul style="list-style-type: none"> Number of DST performance report (quarterly reports and annual reports) approved by Exco and signed by the Director-General (quarterly reports approved and signed within 60 days after the end of each quarter) – relegated to Operational Plan
5-year target	<ul style="list-style-type: none"> 5 DST annual reports approved by Exco and signed by the DG by 31 May 2019
Strategic Objective 2	Adequate and appropriately skilled personnel
Strategic statement	To make the DST an employer of choice and recruit and retain appropriately skilled personnel
Performance indicator	<ul style="list-style-type: none"> Vacancy rate retained at 6% by 31 March 2020
5-year target	<ul style="list-style-type: none"> Vacancy rate reduced to 6%
Strategic Objective 3	Equitable and sound financial and procurement services
Strategic statement	To ensure effective and efficient financial and procurement services
Performance indicators	<ul style="list-style-type: none"> Unqualified audit report with no financial matters in the audit report issued by the Auditor-General Turnaround time to pay suppliers – relegated to Operational Plan
5-year target	<ul style="list-style-type: none"> 5 unqualified audit (clean audit) opinions with no financial matters in the audit report by 30 September 2019 Suppliers paid within 30 days of receipt of a valid invoice

PROGRAMME 2: TECHNOLOGY INNOVATION	
Strategic Objective 1	Facilitate and resource R&D in strategic STI areas
Strategic statement	To facilitate and resource investments in space science, energy, bioinnovation, nanotechnology, robotics, photonics, IKS, IP management, technology transfer and technology commercialisation
Performance indicators	<ul style="list-style-type: none"> • Number of instruments funded in support of knowledge utilisation • Number of policy directives in strategic designated areas in support of economic sectors • Number of knowledge outputs generated
5 year target	<ul style="list-style-type: none"> • 90 instruments funded in support of knowledge utilisation by 31 March 2020 • 25 policy directives in strategic designated areas in support of economic sectors by 31 March 2020 • 683 knowledge outputs generated by 31 March 2020
Strategic Objective 2	Oversee relevant departmental agencies and initiatives
Strategic statement	To oversee, monitor and regulate key policy initiatives, including institutions/agencies and support interventions in the key strategic areas of space science, energy, bioinnovation, nanotechnology, robotics, photonics
Performance indicators	<ul style="list-style-type: none"> • Number of new disclosures reported by publicly funded institutions • Number of evaluation and assessment reports of DST-established entities, programmes and projects approved by Exco – relegated to Operational Plan
5 year target	<ul style="list-style-type: none"> • 1 405 new disclosures reported by publicly funded institutions by 31 March 2020 • 58 evaluation and assessment reports developed of DST-established entities, programmes and projects approved by Exco by 31 March 2019

Strategic Objective 3	Coordinate and support high-end skills development
Strategic statement	To coordinate and support high end skills development in the strategic and emerging S&T areas of space science, energy, bio-innovation, nanotechnology, robotics, photonics, synthetic biology, structural biology, systems biology and functional genomics (collectively the South African Biodesign Initiative), IP management, technology transfer and technology commercialisation.
Performance indicators	<ul style="list-style-type: none"> • Number of postgraduate students (master's and doctoral) funded in designated areas • Number of trainees supported attending training initiatives in designated areas
5 year target	<ul style="list-style-type: none"> • 1 789 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2020 • 1 180 trainees attending training initiatives in designated areas by 31 March 2020
Strategic Objective 4	Support the development and translation of scientific R&D outputs into commercial products, processes and services
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
Performance indicator	<ul style="list-style-type: none"> • Number of knowledge application products funded in designated areas • Number of commercial outputs in designated areas
5 year target	<ul style="list-style-type: none"> • 29 knowledge application products funded in designated areas by 31 March 2020 • 21 commercial outputs in designated areas by 31 March 2020

PROGRAMME 5 STRATEGIC PERFORMANCE TARGETS AND STRATEGIC PERFORMANCE TARGETS ARE INCORRECT

PROGRAMME 5: SOCIO-ECONOMIC INNOVATION PARTNERSHIPS	
Strategic Objective 3	Support the development of new and existing R&D-led industries in aerospace, advanced manufacturing, chemicals, advanced metals, mining, ICTs and sector innovation funds
Performance indicators	<ul style="list-style-type: none"> Number of high-level graduates (master's and PhD students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and sector innovation funds) Number of interns fully funded or co-funded in R&D related to design, manufacturing and product development Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives Number of instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, ICTs and SIFs
Target	<ul style="list-style-type: none"> 1 204 high-level research graduates (master's and PhD students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and sector innovation funds) 800 interns fully funded or co-funded in R&D related to design, manufacturing and product development 100 knowledge and innovation products added to the innovation product (patents, prototypes, technology demonstrators or technology transfer packages) portfolio through fully funded or co-funded research initiatives 11 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, ICTs and SIFs
Strategic objective 4	Support provincial and rural innovation
Performance indicator	Number of innovation support interventions funded or co-funded that strengthen provincial or rural innovation systems
Targets	Nine innovation support interventions that strengthen provincial or rural innovation systems funded or co-funded
Strategic objective 5	Facilitate the provision of data on the NSI's performance
Performance indicator	Number of reports and policy briefings on the innovation system and innovation policy approved/published
Targets	25 reports and policy briefings on the innovation system and innovation policy approved/published
Strategic objective 6	Increased private-sector investment in RDI
Performance indicator	Turnaround time in providing preapproval decisions on applications for the R&D tax incentive
Targets	Preapproval decisions provided within 90 days of date of receipt of application for the R&D tax incentive

AMENDED/REVISED STRATEGIC PERFORMANCE TARGETS

Programme performance indicator	Current performance target in 2015-2020 Strategic Plan	Revised target	Reason
PROGRAMME 3: INTERNATIONAL COOPERATION AND RESOURCES			
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	R2 billion in international funds invested in South Africa by 31 March 2019	R2 120 billion in international funds invested in South Africa accounted for as part of cooperation initiatives implemented by the DST by 31 March 2020	Alignment of annual and MTEF performance targets to the five-year strategic plan period and not the MTSF period as indicated in the 2015-2020 Strategic Plan.
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 billion invested by international partners by 31 March 2019	R1 298 billion invested by international partners as part of cooperation initiatives implemented by the DST by 31 March 2020	
Number of South African students accepted into international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	900 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	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	
Number of international partner organisations (i.e. legal entities) collaborating with South African partners within the framework of formalised collaborative research, innovation or STI/HCD projects as part of cooperation initiatives facilitated by the DST	1 600 international partner organisations collaborating with South African partners as part of cooperation initiatives facilitated by the DST by 31 March 2019	2 500 international partner organisations collaborating with South African partners as part of cooperation initiatives facilitated by the DST by 31 March 2020	
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	75 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	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	

Programme performance indicator	Current performance target in 2015-2020 Strategic Plan	Revised target	Reason
Number of research, innovation and STI HCD cooperation projects, co-funded or supported in kind, by the DST and at least one other African government	180 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 2019	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	Alignment of annual and MTEF performance targets to the five-year strategic plan period and not the MTSF period as indicated in the 2015-2020 Strategic Plan.
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	R300 million 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	R380 million 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	
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	45 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 2019	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	
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	By 2019, 20 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	
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	By 2019, 15 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	

Programme performance indicator	Current performance target in 2015-2020 Strategic Plan	Revised target	Reason
PROGRAMME 4: - RESEARCH DEVELOPMENT AND SUPPORT			
Total number of graduates and students placed in DST-funded work preparation programmes in SETI institutions	4 200 graduates and students placed in DST-funded work preparation programmes in SETI institutions.	3 440 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2020	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.
Average amount of bandwidth per SANReN site per year	8 000 Mbps average bandwidth capacity available per SANReN site	3 500 Gbps total available broadband capacity through SANReN by 31 March 2020	The indicator was revised to give better detail of the work being carried out by the Department. SANReN will continue to report only on the capacity availability delivered by the installed equipment, reducing the strategic target from 8 000 Mbps to 3 500 Gbps total available broadband capacity by 31 March 2020.
Number of Institute for Scientific Information (ISI)-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports	33 700 accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 March 2019	35 000 accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 March 2020	Alignment of annual and MTEF performance targets to the 5-year Strategic plan period and not the MTSF period as indicated in the 2015-2020 Strategic Plan.
Approximate number of participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers	Approx. 5 500 000 participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers.	Approx. 8 179 000 participants in science awareness and engagement programmes as reflected in the project reports of the NRF and other service providers by 31 March 2020	Number of participants increased.
Number of research infrastructure grants awarded	330 research infrastructure grants awarded	220 research infrastructure grants awarded	Budget cuts
PROGRAMME 5: - SOCIO-ECONOMIC INNOVATION PARTNERSHIPS			
Number of decision-support interventions introduced and maintained	8 decision-support systems maintained and improved by 31 March 2019	10 decision-support systems maintained and improved by 31 March 2020	Alignment of annual and MTEF performance targets to the 5-year Strategic plan period and not the MTSF period as indicated in the 2015-2020 Strategic Plan.
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	300 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	351 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	

Programme performance indicator	Current performance target in 2015-2020 Strategic Plan	Revised target	Reason
Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research	15 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research by 31 March 2019	22 knowledge and innovation products (patents, prototypes, technology demonstrators and technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research by 31 March 2020	Alignment of annual and MTEF performance targets to the 5-year Strategic plan period and not the MTSF period as indicated in the 2015-2020 Strategic Plan.
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)	1 204 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	1 397 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	
Number of interns fully funded or co-funded in R&D related to design, manufacturing and product development	548 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2019	590 interns fully funded or co-funded in R&D related to design, manufacturing and product development by 31 March 2020	
Number of knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio through fully funded or co-funded research initiatives	100 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2019	113 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the innovation product portfolio by 31 March 2020	
Number of instruments funded in support of increased localisation, competitiveness and R&D-led industry development	11 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	The target had to be lowered because the ECSP funding that the DST received ends by 31 March 2017
Number of innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems	9 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2019	12 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2020	Alignment of annual and MTEF performance targets to the 5-year Strategic plan period and not the MTSF period as indicated in the 2015-2020 Strategic Plan.
Number of reports and policy briefings on the innovation system and innovation policy approved by Exco/published	25 reports and policy briefings on the innovation system and innovation policy approved by Exco/published by 31 March 2019	29 statistical reports submitted to Cabinet by 31 March 2020	

AMENDED/REVISED PERFORMANCE INDICATORS

Programme	Performance indicator	Revised performance indicator	Reasons
Programme 1: Administration	DST public entities' strategic and annual performance plans approved by the Minister and shareholder compacts signed by the Minister and chairpersons of the boards by 31 March 2018	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	Combined into 1 indicator with 2 deliverables
Programme 2: Technology Innovation	Number of policy directives approved by Exco	Number of strategic policy directives in designated areas in support of economic sectors	(Revised as per DPME comments on the first draft)
Programme 4: Research Development and Support	Number of trainees supported in strategic and emerging research areas	Number of supported trainees attending training initiatives in designated areas	
	Number of MeerKAT antennas installed	Number of antennas commissioned for a single polarisation array	Change of target is because of a faulty component in the drive mechanism of MeerKAT antennas
	7 000 ISI-accredited research articles published by NRF-funded researchers as reflected in the NRF project reports by 31 March 2017	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	The Institute for Scientific Information ceased to exist some time ago, and its citation database was incorporated into the Thomson Reuters Web of Science Citation Database
Programme 5: Socio-economic Innovation Partnerships	A functional climate change research network in place	A climate change research network in place	As per DPME observation
	Number of biennial reports on the state of climate change S&T in South Africa approved by Cabinet	Number of biennial reports on the state of climate change S&T in South Africa submitted to Cabinet	For Cabinet information
	Number of reports and policy briefings on the innovation system and innovation policy approved by Exco/published	Number of statistical reports submitted to Cabinet	The DPME considers the indicator operational, while the Programme considers the outputs strategic

INDICATORS RELEGATED TO THE OPERATIONAL PLAN

Programme	Performance indicator in Strategic Plan
Administration	<p>Percentage alignment of DST planning documents (APP aligned to Strategic Plan, and ENE aligned to APP) submitted to Parliament</p> <p>Percentage alignment of the planning documents of entities with those of the DST as an indicator of the contribution of entities towards national imperatives</p> <p>Number of Exco-approved reports on DST Management Performance Assessment Tool scores submitted to the Accounting Officer and DPME</p> <p>Number of enterprise architecture development life cycle steps developed and implemented</p> <p>Turnaround time to fill vacancies</p>
Technology Innovation Research Development and Support	<p>Number of evaluation and assessment reports of DST-established entities' programmes and projects approved by Exco</p> <p>Number of science engagement M&E framework documents developed</p>

LIST OF ABBREVIATIONS

APP	Annual Performance Plan
AU	African Union
AVN	African Very Long Baseline Interferometry Network
BBBEE	broad-based black economic empowerment
CoC	centre of competence
CSIR	Council for Scientific and Industrial Research
DBE	Department of Basic Education
DHET	Department of Higher Education and Training
DST	Department of Science and Technology
DWS	Department of Water and Sanitation
EIAP	Emerging Industries Action Plan
ECSP	Economic Competitiveness Support Programme
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
PoA	Programme of Action
R&D	research and development
RDI	research, development and innovation
RFI	radio frequency interference
RI	research infrastructure
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
SARAO	South African Radio Astronomy Observatory
SARIR	South African Research Infrastructure Roadmap
SET	science, engineering and technology
SETI	science, engineering, technology and innovation
SIF	Sector Innovation Fund
SKA	Square Kilometre Array
SME	small or medium enterprise
SSDU	specialised service delivery unit
SSAUF	Staffing South Africa's Universities Framework
STA	science and technology activity
STI	science, technology and innovation
TIA	Technology Innovation Agency
TYIP	Ten-Year Innovation Plan

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