Annual Performance Plan 2021/2022

Making sure it's possible

science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

2030 NDP

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EXECUTIVE AUTHORITY STATEMENT

We come from a dark and painful past and in our efforts to create a new, just and equitable society, we recognise the need to align public institutions with the post-1994 democratic project, and have introduced policy interventions to achieve our vision of a democratic, non-racist and non-sexist society.

We are also alive to the reality that, because of its apartheid past, our country is characterised by the endemic and interconnected challenges of inequality, unemployment and poverty. Therefore, in addition to achieving institutional effectiveness in the new dispensation, our public institutions need to respond to our country's most urgent social and economic challenges. For this, we will require high-end skills and expertise.

We need to continue building a robust national system of innovation that serves all South Africans, regardless of race, sex or creed. Since the 1996 White Paper on Science and Technology, we have been working towards a national system of innovation that will improve the lives of all South Africans through science, technology and innovation (STI).

This was to be achieved by using STI to progressively increase economic growth and enhance participation in the economy, and to ensure the innovative capacity of the country is fully exploited. The 2019 White Paper on Science, Technology and Innovation aims to strengthen policy intent in areas where the Department has encountered challenges in implementation. It gives the Department a greater opportunity for using STI in support of South Africa's inclusive development.

Furthermore, the 2019 White Paper and the decadal plan for STI currently under development, provide the impetus for an organisational restructuring towards a leaner, more agile organisation with concentrated capability in critical areas. The adoption of the new White Paper was informed by the continued evolution of STI policy, and various reviews of the STI landscape.

The reviews assessed performance against the vision, high-level goals and various specific initiatives set out at the time, such as resource allocation, regulatory policy, performance level, human resource development, and research infrastructure. The reviews found that much improvement had been made, but that more needed to be done in some areas.

When the COVID-19 pandemic began in 2020, we and our entities were well prepared to play our part in fighting it. For instance, the South African Radio Astronomy Observatory provided systems engineering and project management support for the design and manufacture of ventilators. Other entities in the national system of innovation responded to the pandemic by developing continuous positive airway pressure solutions under the guidance of the National Ventilator Project, deploying DSI-funded infrastructure to expand testing facilities, and the manufacturing of molecular biology enzymes, reagents and testing kits, as well as assisting with data modelling and analysis to track the spread of the pandemic. The Human Sciences Research Council carried out surveys to measure the public response to COVID-19 and the effects of lockdown.

Looking ahead, efforts to stimulate employment as part of economic recovery include various platforms and programmes established or supported by the Department. We intend to employ about 1 000 health promotion agents, 300 Enviro Champs through the Duzi Umngeni Conservation Trust, a Water Graduate Employment Programme with 450 beneficiaries (to be implemented by the Water Research Commission) and an experiential learning programme with 150 beneficiaries to be implemented by the CSIR. We are also working to support the Presidential Youth Employment Initiative with funding from the Presidency.

The Department plays a critical role in the science diplomacy arena, and as a facilitator of the STI agenda across Africa

South Africa participates in large international institutions and projects, including the Group on Earth Observations, the International Centre for Genetic Engineering and Biotechnology, and the Square Kilometre Array

As part of its expanded mandate, the DSI is championing several strategic initiatives on behalf of government. One example is the South African Affiliate of the World Economic Forum's Centre for the Fourth Industrial Revolution, which aims to address technology governance challenges that prevent innovation and the effective deployment of technologies for development.

In spite of the extraordinary challenges that have been occasioned by the COVID-19 pandemic, the Department is proud to have maintained its reputation as a department that is responsive to national priorities. The Department has achieved over 80% of its predetermined objectives

Science in the past four years. In November 2020, the Auditor-General of South Africa gave the Department yet another award for a clean audit finding for the 2019/20 financial year, and the Director-General Phil Mjwara received an award for the best performing Accounting Officer.

I would like to thank him, Deputy Minister Manamela, and all the Department's employees, for making these achievements possible.

Dr BE Nzimande, MP
MINISTER OF HIGHER EDUCATION, SCIENCE AND INNOVATION

MATSENO KA TONA (MORERO WA MOŠOMO WA NGWAGA LE NGWAGA)

Re tšwa nakong ye thata gape ye bohloko gomme maitekong rena a go aga setšhaba se seswa, sa toka le tekatekano, re lemoga nyakego ya go bapiša diinstitšhušene tša setšhaba ka protšeke ya temokrasi ka morago ga 1994, gomme re tsebagaditše magato a pholisi a go fihlelela pono ya rena ya setšhaba sa temokrasi, sa go hloka semorafe le go se kgetholle ka bong.

Gape re phela ka nnete ya gore, ka lebaka la dinako tša yona tša kgatelelo, naga ya rena e na le ditlhohlo tše di atilego le tše di kopantšwego tša tlhokego ya tekatekano, tlhokego ya mešomo le tša bohloki. Efela, go tlaleletša go phihlelelo ya go šoma botse ga institšhušene mo peakanyong ye mpsha, diinstitšhušene tša rena tša setšhaba di swanela go šogana le ditlhohlo tša tšhoganetšo tša ikonomi le leago tša naga ya rena. Go se, re tla nyaka tsebo le mabokgoni a maemo a godimo.

Re swanela go tšwelapele go aga sestemo ya bosetšhaba ye maatla ya boithomelo yeo e lego ya Maafrika Borwa ka moka, go sa lebelelwe morafe, bong goba tumelo. Go tloga mola go bago le Pego ya go Tsebiša ya Saense le Theknolotši ya 1996, re be re šogana le go aga sestemo ya bosetšhaba ya boithomelo yeo e tlogo kaonafatša maphelo a Maafrika Borwa ka moka ka saense, theknolotši le boithomelo (STI).

Se se be se swanela go fihlelelwa ka go šomiša STI go oketša kgolo ya ikonomi kgato ka kgato le go godiša bokgathatema ka ikonoming, le go kgonthiša gore bokgoni bja boithomelo bja naga bo šomišitšwe ka botlalo. Pego ya go Tsebiša ya Saense, Theknolotši le Boithomelo ya 2019 maikemišetšo a yona ke go matlafatša maikemišetšo a pholisi mo makaleng ao Kgoro e itemogetšeng ditlhohlo phethagatšong. Go fa Kgoro monyetla wa go šomiša STI go thekga tlhabollo ya go akaretša ya Afrika Borwa.

Gape, Pego ya go Tsebiša ya 2019 le peakanyo ya ngwagasome ya STI ye gabjalo e lego ka fase ga tlhabollo, go fa tlhohleletšo ya peakanyoleswa ya mokgatlo go ba le mokgatlo wo o nago le bophelo go feta pele, go lekanela le go ba le bokgoni bjo bontši ka makaleng a bohlokwa. Kamogelo ya Pego ya go Tsebiša ye mpsha e bakilwe ke ebolušene ye e tšwetšego pele ya ya pholisi ya STI, le ditshekatsheko tša go fapana tša ponagalo ya STI.

Ditshekatsheko di lekotše tiro kgahlanong le pono, diphegello tša boemo bja godimo le maiteko a mangwe a o laeditšwego nako yeo, go swana le kabo ya methopo, pholisi ya taolo, boemo bja tiro, tlhabollo ya mothopo ya bomotho, le mananeokgoparara la dinyakišišo. Ditshekatsheko di hweditše gore kaonafatšo ye ntši e dirilwe, eupša tše dingwe gape di swanela go dirwa ka makaleng a mangwe.

Ge COVID-19 e thoma ka 2020, rena le dihlongwa tša rena re be re itokišitše gabotse go bapala karolo ya go e lwantšha. Mohlala, Setiši sa Astronomi ya Radio ya Afrika Borwa se fane ka thekgo ya mekgwa ya boentšenere le taolo ya protšeke ya popego le tšweletšo ya dibenthileita. Dihlongwa tše dingwe ka sestemong ya bosetšhaba ya boithomelo di ikarabetše go leuba ka go tšweletša ditharollo tša kgatelelo ya tsela ya moya ye botse ye e tšwelagopele ka fase ga tlhahlo ya Protšeke ya Bosetšhaba ya Dibenthileita, go phethagatša mananeokgoparara a go thekgwa ka ditšhelete ke DSI go oketša mafelo a go direla diteko, le go tšweletša diensime tša payolotši tša molekule, ditswaki le dikhiti tša diteko, gape le go thuša ka go dira mmotlolo wa datha le phetleko go lota mohlala wa phatlalalo ya leuba. Lekgotla la Dinyakišišo tša Disaense tša Bomotho le dirile dinyakišišwana go ela karabo ya setšhaba go COVID-19 le dikhuetšo tša tswalelo ya naga.

Ge go lebelelwa pele, maiteko a go hlohleletša mešomo bjalo ka karolo ya tsošološo ya ikonomi a akaretša dipolatefomo tša go fapana le mananeo ao a hlomilwego goba thekgilwego ke Kgoro. Re ikemišeditše go thwala dietšente tša kaonafatšo ya maphelo tše 1000, Dithwadi tša Tikologo tše 300 ka go šomiša Trasete ya Pabalelo ya Umngeni Duzi, Lenaneo la Meetse la Mešomo ya Dialoga la go ba le baholegi ba 450 (go tla go phethagatšwa ke Khomišene ya Dinyakišišo tša Meetse) le lenaneo la go ithuta boitemogelo la go ba le baholegi ba 150 leo le tlogo phethagatšwa ke CSIR. Gape re šogana le go thekga Protšeke ya Bopresidente ya Mešomo ya Baswa ya go thekgwa ka ditšhelete go tša Kantorong ya Bopresidente.

Kgoro e bapala karolo ye bohlokwa tikologong ya maano ya saense, gomme bjalo ka mosepediši wa lenaneo la STI go kgabaganya Afrika, Afrika Borwa e kgathatema ka diprotšekeng le diinstitšhušeneng tše kgolo tša boditšhabatšhaba, go akaretšwa Group on Earth Observations, Sentha ya Boditšhabatšhaba ya Boentšenere bja Leabela le Payotheknolotši, le Square Kilometre Array.

Bjalo ka taelo ye e katološitšwego, DSI e etile pele diprotšeke tše mmalwa tša maano legatong la mmušo. Mohlala wo motee ke Boleloko bja Afrika Borwa bja Sentha ya Rebolušene ya Intasteri ya Bone ya Foramo ya Ikonomi ya Lefase, yeo maikemišetšo a yona e lego go šogana le ditlhohlo tša pušo tša theknolotši tšeo di thibelago boithomelo le tšhomišo ye botse ya ditheknolotši tša tlhabollo.

Ka ntle ga ditlhohlo tša go makatša tšeo di hlotšwego ke leuba la COVID-19, Kgoro e ikgantšha ka go ba e bolokile seriti sa yona bjalo ka kgoro yeo e arabago dintlhakgolo

tša bosetšhaba. Kgoro e fihleletše ka godimo ga 80% ya dinepo tša yona tšeo di beakantšwego peleng tša Saense mo mengwageng ye mene ya go feta. Ka Nofemere 2020, Molekodipharephare wa Dipuku wa Afrika Borwa o file Kgoro sefoka se sengwe gape sa kutullo ya tekolo ya dipuku ya go hlweka sa ngwaga wa ditšhelete wa 2019/20, gomme Molaodipharephare Phil Mjwara o amogetše sefoka sa Mohlankedi wa Matlotlo wa go šoma botse.

Ke rata go mo leboga, Motlatšatona Manamela, le bašomi ba Kgoro ka moka, go dira gore diphihlelelo tše di kgonagalo.

Ngaka BE Nzimande, MP
TONA YA THUTO YA GODIMO, SAENSE LE BOITHOMELO

ISANDULELO SIKANGQONGQOSHE (UHLELO LOKUSEBENZA KONYAKA)

Siqhamuka esikhathini esimnyama nesibuhlungu kakhulu. Emizamweni yethu yokusungula umphakathi omusha, siphawule isidingo sokuhlela ngokuqondile izikhungo zomphakathi kanye nephrojekthi yango-1994 yentando yeningi futhi sethule ukungenelela kwenqubomngomo ukuze sifinyelele umgomo wethu womphakathi ongacwasi ngokohlanga nangokobulili.

Kanti futhi siphila esikhathini lapho sizibonela khona ukuthi ngenxa yobandlululo olwabakhona esikhathi esedlule, izwe lethu linenkinga yokuxhumana ngenxa yokungalingani, ukuntuleka kwemisebenzi kanye nendlala. Ngakho, ngaphezu nje kokufinyelela ukusebenza ngendlela efanele kwezikhungo kule nkathi entsha, izikhungo zethu zomphakathi kufanele zisabele ngokushesha ezidingweni eziphuthumayo ezweni lethu, izinselele zezenhlalo nezomnotho. Ukuze sifinyelele lokho, silindele amakhono nobuchwepheshe okusezingeni eliphezulu.

Kudingeka siqhubeke sisungula uhlelo oluqinile oluhlanganisa zonke izikhungo oluzosebenzela bonke abantu baseNingizimu Afrika, kungakhathaliseki uhlanga, ubulili noma inkolo. Kusukela ephepheni Elimhlophe leSayensi, Ezobuchwepheshe lango-1996, besilokhu sisebenzela ekufinyeleleni uhlelo oluhlanganisa zonke izikhungo oluzothuthukisa izimpilo zabo bonke abantu baseNingizimu Afrika ngokusebenzisa isayensi, ezobuchwepheshe kanye nokusungula (i-STI).
Lokhu bekufanele kufezwa ngokusebenzisa i-STI ukuthuthukisa kancane kancane ezomnotho, kukhulise ukuhlanganyela kwezomnotho futhi kuqinisekise ukuthi amandla amasha ezwe asetshenziswa ngokuphelele. IPhepha Elimhlophe leSayensi, Ezobuchwepheshe kanye Nokusungula lihloselwe ukuqinisa inqubomgomo egxile kakhulu ezindaweni lapho uMnyango obe nezinkinga khona ekwenzeni ngokoqobo okushiwo inqubomgomo. Kunikeza uMnyango ithuba elihle kakhulu lokusebenzisa i-STI ekusekeleni intuthuko ebandakanya wonke umuntu eNingizimu Afrika.

Ngaphezu kwalokho, iPhepha Elimhlophe lango-2019 kanye nohlelo oseluneminyaka engu-10 lwe-STI okwamanje okusasetshenzelwa kukho ukuhlinzekela ngomfutho wokwakhiwa kabusha kwenhlangano esheshayo ngokwengeziwa enekhono ekugxileni ezindaweni ezibucayi. Ukwamukelwa kwePhepha Elimhlophe elisha kwaziswa ngokuqhubeka kwenqubomngomo ye-STI kanye nokubuyekezwa okuhlukahlukene kwe-STI.

Ukubuyekezwa kuhlolwe ukusebenza kuqhathaniswa nomgomo, izinhloso ezisezingeni eliphakeme kanye nezinhlelo ezahlukahlukene ezibekiwe ngaleso sikhathi, ezinjengokwabiwa kwezinsizakusebenza, inqubomgomo yokulawula, izinga lokusebenza, ukuthuthukiswa kwabasebenzi kanye nengqalasizinda yocwaningo. Ukubuyekezwa kutholakale ukuthi sekwenziwe ngcono kakhulu, kodwa kuningi okusamele kwenziwe kwezinye izindawo.

Lapho kuqala ubhubhane lwe-COVID-19 ngo-2020, thina kanye nezinhlangano besikulungele kahle kakhulu ukudlala indima yethu ekulweni nayo. Ngokwesibonelo, i-South African Radio Astronomy Observatory yanikeza uhlelo lobunjiniyela kanye nokubhekela iphrojekthi ebisekela ukusungulwa kanye nokukhiqizwa kwemishini yokuphefumula. Ezinye izinhlangano ohlelweni lukazwelonke lokusungula izinto ezintsha zaphendula kulo bhubhane ngokwenza izixazululo eziqhubekayo zemishini yokusiza ukuphefumula ngaphansi kokuqondiswa yi-National Ventilator Project, zisebenzisa ingqalasizinda exhaswe yi-DSI ukukhulisa izindawo zokuhlola, kanye nokwenziwa kwama-enzyme ama-molecular biology, ama-reagents kanye namakhithi okuhlola kanye nokusiza ngokufaniswa kwemininingwane yabantu nokuhlaziywa ukulandelela ukusabalala kobhubhane. I-Human Sciences Research Council yenze ucwaningo ukukala lokho okushiwo umphakathi ku-COVID-19 kanye nemiphumela yokuvaleleka ezindlini.

Uma sibuka phambili, imizamo yokukhuthaza ukuqashwa njengengxenye yokuvuselelwa komnotho ifaka phakathi izinkundla nezinhlelo ezahlukahlukene ezisungulwe nezasekelwa nguMnyango. Sihlose ukuqasha ama-ejenti okukhuthaza ezempilo abalelwa ku-1 000, ama-Enviro Champs angu-300 ngokusebenzisa i-Duzi Umngeni Conservation Trust, i-Water Graduate Employment Programme enabangu-450 abazohlomula kuyo (ezosetshenziswa yiKhomishini Yezocwaningo Lamanzi) kanye nohlelo lokufunda ngamava oluzozuzisa abantu abangu-150 okufanele lusungulwe yi-CSIR. Okunye esisebenzela kukho ukuxhasa uHlelo lukaMongameli Lokuqashwa Kwentsha ngezimali ezivela eHhovisi likaMongameli.

UMnyango udlala indima ebaluleke kakhulu emkhakheni wezesayensi wezokuxhumana, njengomgqugquzeli we-ajenda ye-STI e-Afrika yonkana, iNingizimu Afrika ibamba iqhaza ezikhungweni ezinkulu nasemisebenzini yamazwe omhlaba, okubandakanya i-Group on Earth Observations, i-International Center for Genetic Engineering, i-Biotechnology kanye ne-Square Kilometre Array

Njengengxenye yegunya layo elandisiwe, i-DSI iqhuqhuzela imizamo eminingi yamasu egameni likahulumeni. Esinye sezibonelo, i-South African Affiliate of the World Economic Forum's Centre for the Fourth Industrial Revolution, ehlose

ukubhekana nezinkinga zokuphatha ezobuchwepheshe ezivimbela ukusungulwa kanye nokusatshalaliswa kahle kwentuthuko kwezobuchwepheshe.

Naphezu kwezinkinga ezinkulu ezibangelwe ubhubhane lwe-COVID-19, uMnyango uyaziqhenya ngokugcina isithunzi sawo njengomnyango ophendula izinto ezisemqoka kuzwelonke. Umnyango usuzuze ngaphezu kuka-80 wamaphesenti wezinhloso zawo ezinqunywe kusengaphambili iSayensi eminyakeni emine edlule. NgoNovemba 2020, uMcwaningimabhuku-Jikelele waseNingizimu Afrika wanikeza uMnyango omunye umklomelo wokutholwa kwamabhuku awo ezimali onyaka ka-2019/20 ungenacala, kwathi uMqondisi-Jikelele uPhil Mjwara wathola umklomelo wesiphathimandla esisebenza kahle kakhulu.

Ngithanda ukumbonga kakhulu, IPhini LikaNgqongqoshe uManamela kanye nabo bonke abasebenzi boMnyango ngokwenza lokhu esikufinyelele kube impumelelo.

UDr BE Nzimande, MP
UNGQONGQOSHE WEZEMFUNDO EPHAKEME, ISAYENSI KANYE NEZOKUSUNGULWA

REMARKS BY DEPUTY MINISTER

If the national system of innovation (NSI) is to grow its contribution to achieving South Africa's national priorities, it is necessary to focus on enabling the modernisation of key sectors of the economy, such as manufacturing, agriculture and mining, to ensure that these sectors are competitive and can contribute to higher GDP growth.

The NSI has to exploit new industries based on new sources of growth, e.g. the Fourth Industrial Revolution and the circular economy, increase the NSI contribution to exports by putting in place measures to accelerate the conversion of research ideas and knowledge into products and services and supporting grassroots innovators.

It has to accelerate inclusivity and support new entrants into the economy, by among others, supporting SMMEs and co-operatives via targeted research, development and innovation (RDI) instruments and using technological advancement to contribute to an STI-enabled capable state for improved service delivery and decision making.

Building on existing work, the Department will enhance its contribution to the development of human capabilities and skills for the economy by continuing to expand the transformation agenda in all its strategic STI focus areas over the medium term. In this regard, transformation is viewed in six dimensions: (i) demographic transformation; (ii) transdisciplinary transformation; (iii) institutional transformation; (iv) transformation through the translation of science and innovation into societal benefit and fundamental economic transformation; (v) transformation through citizen science (public engagement); and (vi) the digital transformation of the NSI.

Further to this, in 2020/21, the Department approved a new postgraduate funding policy that provides for full-cost support for certain groups of students, namely, the financially disadvantaged, students with disabilities, and exceptional academic achievers. The implementation of the policy will commence in 2021/22, with the consequence that comparably fewer postgraduate students will receive funding, but more will receive comprehensive funding.

The Department will also finalise a tracer study on PhDs who graduated between 2001 and 2017/18. The South African Women in Science Awards, the South African Research Chairs Initiative, the centres of excellence, research grants, internships and special programmes such as Thuthuka have contributed to improving female representation, which has increased to 46% of the scientific workforce and, going beyond demographics, has seen a new type of knowledge generated.

Going forward, while maintaining gains achieved on gender transformation, more effort is required to promote participation of black researchers towards achieving a more inclusive NSI.

To enhance its work in increasing knowledge generation and innovation outputs, the Department will focus on investments that are geared towards supporting the translation of publicly financed intellectual property (IP) into social and economic value, using NIPMO's database of disclosures of publicly financed IP as a basis for tracking the utilisation of IP via the conclusion of commercial agreements and the introduction of products and services to the public.

Under the HDI Development Grant, the DSI and the Department of Higher Education and Training (DHET) will develop targeted programmes aimed at ensuring that a critical mass of publishing academics is established at HDIs, and at increasing research outputs per capita. DHET, through its Research Outputs Policy, rewards research outputs produced by researchers in public higher education institutions, while science councils, as public research institutions, do not benefit from the subsidy programme.

An interdepartmental task team has been established to look at a subsidy programme for researchers in the science

councils and other recognised research institutions, and the inclusion of a subsidy for innovation and other creative outputs. The task team will consider the expansion of the Research Output Submission System to include research outputs produced outside the university system. This is in line with the development of regulations that enable the DSI to declare research institutions that are eligible for National Research Foundation funding.

The research chairs established through the South African Research Chairs Programme and the centre of excellence have been instrumental in increasing the country's research outputs. During the MTEF the focus will be on ensuring alignment between the research outputs produced and the national priorities, to ensure that research conducted directly responds to the country's developmental needs.

Using knowledge for inclusive development, the Department will advance its work towards an inclusive and responsive NSI, characterised by equitable access to the knowledge infrastructure. This is a vital part of reimagining the NSI within a broader concept of innovation, in line with the national development profile and social dynamics.

A multi-tiered package to support the commercialisation of grassroots innovations is being implemented. This will include technology development; compliance with industry standards (where applicable); the protection of IP; and mentorship. We will focus on strengthening partnerships with relevant government departments and research institutions, organisations responsible for compliance and setting standards, higher education and post-school institutions, the private sector and non-profit organisations.

The commercialisation of grassroots innovation and access to publicly available IP will be pursued in line with the DSI's commitment to deploying locally developed technology solutions. The instruments used will include technology demonstrations, agroprocessing facilities, and support for entrepreneurs.

The Department recognises that, to build a coherent system addressing the Sustainable Development Goals and the effects of climate change, a digital economy is required. The DSI will contribute to this through focused programmes that enable innovation and build capacity in the post-school system in domains such as data science, artificial intelligence, the Internet of Things and cybersecurity. Capacity to use 5G and other wireless technologies optimally must also be developed, enabling the state and citizens to take advantage of digital economy opportunities.

For all of this to be possible, we will continue to rely on the capable management and staff of the Department and its entities.

Mr B Buti Manamela, MP
DEPUTY MINISTER HIGHER EDUCATION, SCIENCE AND INNOVATION

ACCOUNTING OFFICER STATEMENT

Over the next medium term, the Department of Science and Innovation (DSI) will continue to fund, support and facilitate an STI-enabling ecosystem and set out performance indicators and medium-term targets in support of the six institutional outcomes and 22 outcome indicators.

To achieve a **transformed, inclusive, responsive and coherent national system of innovation** (NSI), the Department will strive to improve the alignment of the NSI's contribution to the National Development Plan (NDP). This will be directed primarily through the decadal plan, though which the 2019 White Paper on Science, Technology and Innovation (STI) will be implemented.

The decadal plan will define critical STI interventions and missions/priorities for the country between 2020 and 2030, taking into account the recommendations of various reviews, and will guide the establishment of new NSI institutions, make proposals for the geospatial location and distribution of the new institutions, and propose new institutional forms to expedite the implementation of missions and critical research areas such as astronomy.

We are of the view that, if the NSI is to grow its contribution to addressing national priorities, it is necessary to focus on, among others, modernising sectors of the economy such as manufacturing, agriculture and mining to ensure that these sectors are competitive and can contribute to higher GDP growth; exploiting new industries based on new sources of growth, e.g. the Fourth Industrial Revolution and the circular economy; increasing the NSI contribution to exports by putting in place measures to accelerate the conversion of research ideas and knowledge into products and services; and supporting grassroots innovators.

Human capabilities and skills for the economy and for development

The 2019 White Paper on Science, Technology and Innovation identifies the lack of transformation in the NSI as a challenge that needs to be addressed urgently. To develop the necessary human capabilities and skills for the economy and for development, the DSI will continue to expand the transformation agenda in all its strategic STI focus areas over the medium term. In our view, transformation is to be considered across six dimensions, namely, demographic transformation; transdisciplinary transformation; institutional transformation; transformation through the translation of science and innovation into societal benefit and fundamental economic transformation; transformation through citizen science (public engagement); and digital transformation of the national system of innovation.

Increased knowledge generation and innovation outputs

To increase knowledge generation and innovation outputs, our interventions will seek to increase South Africa's share of global publication outputs, increase the proportion of prototypes, technology demonstrators and pilot plants that advance industrialisation, and improve the percentage increase in patent and design applications filed from publicly financed research and development (R&D).

To achieve this, the Department will measure and track the number of outputs commercialised as a result of support provided in designated areas, e.g. licences; assignments; options of varying natures (such as directed research and joint ventures); start-ups, spinouts and new companies created; and distribution, manufacturing and sales agreements for products, processes and services.

The commercialisation of products, processes and services may involve other departments, entities and market players, and may therefore fall outside the Department's control.

Knowledge utilisation for economic development

We recognise knowledge as a critical ingredient for economic development. To strengthen the nexus between knowledge production and economic development, the

Department will focus on revitalising existing industries and stimulating R&D-led industrial development. This we will do by, among others, continuing to scale up our network of technology stations and platforms in order to provide cross-cutting, cross-sector technological support for SMMEs, entrepreneurs and co operatives.

We also recognise that access to technological support is essential in new product/process development (or improvement) and in developing prototypes and concept demonstrators. Therefore, the Department will also continue managing a portfolio of projects that have potential for creating new industries or rejuvenating existing industries.

The current projects in this portfolio are the Aeroswift additive manufacturing machine, the Mining Extraction Research, Development and Innovation Programme, the bioeconomy programme, the Hydrogen South Africa (HySA) programme, and the fourth phase of the Fluor Chemicals Expansion Initiative.

Knowledge utilisation for inclusive development

In order to realise the objective of knowledge utilisation for inclusive development, the Department will be advancing its commitment to an inclusive and responsive NSI, characterised by equitable access to knowledge infrastructure. These outcomes are premised on inclusion, and are key to reimagining the NSI as both inclusive and having a broader concept of innovation, in line with the national development profile and social dynamics.

A multi-tiered package will be used to support the commercialisation of grassroots innovations. The key aspects will include technology development, compliance with industry standards (where applicable), protection of intellectual property (IP), and mentorship. These aspects are key to enabling the participation of grassroots innovators, who are often marginalised in technology-based economic development opportunities.

As part of enhancing the use of IP generated from publicly funded research, the DSI will facilitate access to this IP, working with relevant partners. There will be a more deliberate focus on IP related to solutions that enable and improve access to basic services; strengthen the capacity of the state in service delivery; and promote the inclusion of women, young people, and people living with disabilities.

Innovation in support of a capable and developmental state

To achieve the strategic objective of fostering innovation that supports a capable and developmental state, the Department will seek to increase the number of use cases of decision-support systems, of demonstrators that have successfully introduced a new way of delivering a service, and of district/metropolitan municipalities supported with technology-based applications as part of the District Development Model for Service Delivery Improvement, together providing evidence of informed integration of innovation in service delivery.

One of the implementation challenges facing the DSI is that it doesn't have a provincial or local footprint, which can be a challenge in implementing national STI interventions. However, through the Regional Innovation Support Programme, the DSI is contributing to the development of innovation ecosystems and a capable and developmental state.

Furthermore, a concerted effort is being made to increase the spatial footprint of innovation support so that innovation can enable localised socio-economic development. Provincial growth and development and local economic development strategies will be studied to enable the Department to better align its innovation-support interventions with the District Development Model.
In order to address South Africa's climate and Sustainable Development Goal (SDG) obligations, technologies for the circular economy must be included to enable the transition to a low-carbon economy. To build a coherent system to address both the SDGs and climate change effects, a digital economy is also required. The DSI will contribute to this through focused programmes that enable innovation and build capacity in the post-school system in ICT domains such as data science, artificial intelligence, the Internet of things and cybersecurity. South Africa's capacity to use 5G and other wireless technologies optimally must also be developed, enabling the state and citizens to take advantage of digital economy opportunities.

All of these programmes and interventions are aimed at supporting our long-term strategic goal of a transformed, inclusive, responsive and coherent national system of innovation that is able to support a capable and developmental state.

Dr Phil Mjwara
DIRECTOR-GENERAL

OFFICIAL SIGN-OFF

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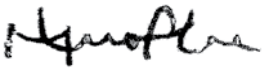
Acting DDG: Institutional Planning and Support

Ms Nombuyiselo Mokoena
DDG: Corporate Services

Dr Mmboneni Muofhe
DDG: Technology Innovation



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Mr Robert Shaku
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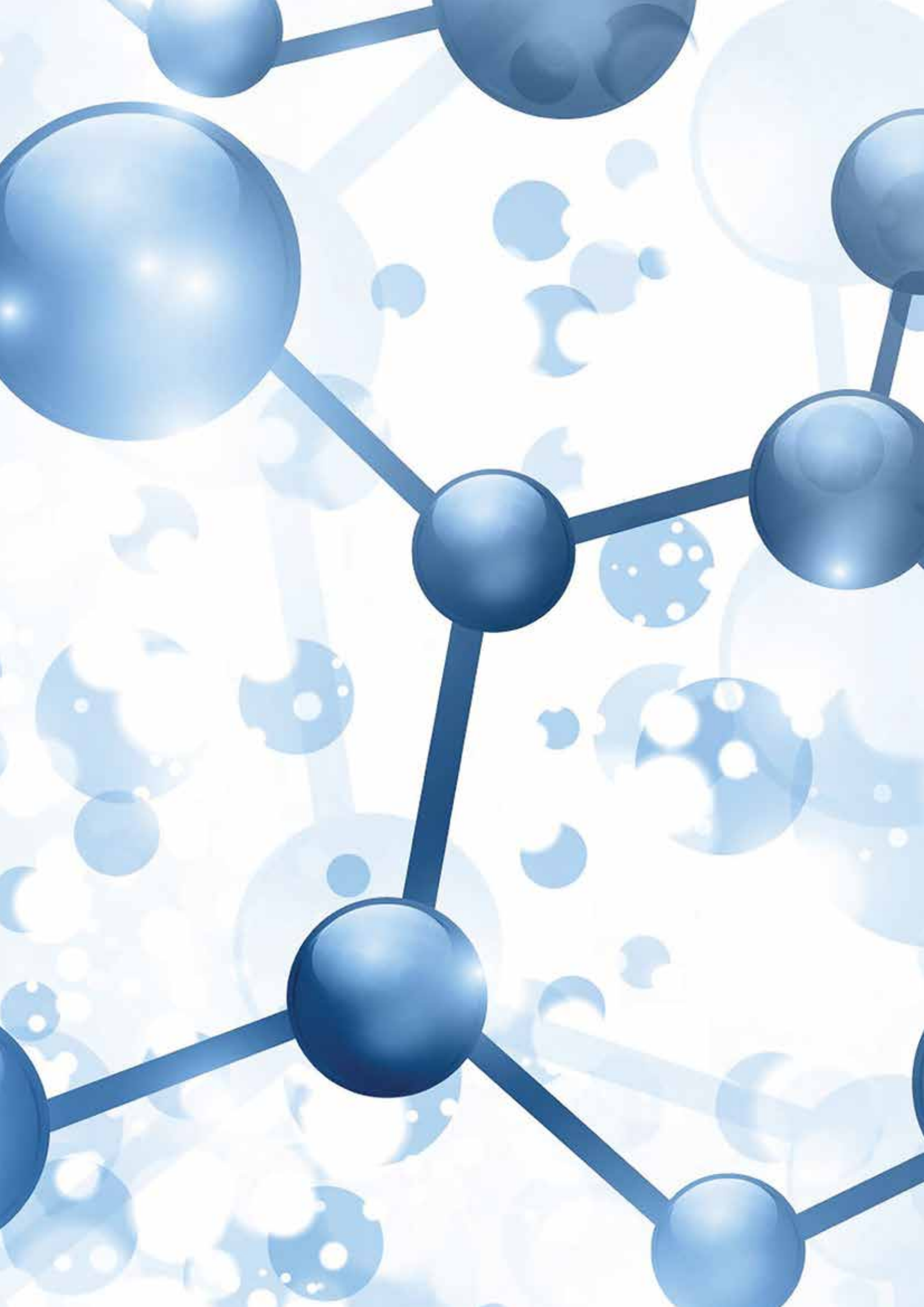


MANDATE

PART A

1. LEGISLATIVE AND OTHER MANDATES

Academy of Science of South Africa Act, 2001

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

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

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

Income Tax Act, 1962

Section 11D of the Income Tax Act gives the Minister responsible for science and innovation 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

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 (NIPMO), the Intellectual Property Fund, and offices of technology transfer at higher education institutions and science councils.

National Advisory Council on Innovation Act, 1997

Establishes the National Advisory Council on Innovation to advise the minister responsible for 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

Establishes the National Research Foundation (NRF) to promote basic and applied research and human capital development in the various fields of science and technology and to coordinate the implementation of the DSI-led science engagement programme.

Natural Scientific Professions Act, 2003

Establishes the South African Council for Natural Scientific Professions (SACNASP) and legislates the registration of professional natural scientists, scientists-in-training, technologists and technologists-in-training.

Protection, Promotion and Protection, Promotion, Development and Management of Indigenous Knowledge Act, 2019

Provides for the protection, promotion, development and management of indigenous knowledge; the establishment and functions of the National Indigenous Knowledge Systems Office; the registration of indigenous knowledge and the management of rights of indigenous knowledge communities; the recognition of prior learning; and the facilitation and coordination of indigenous knowledge-based innovation.

Scientific Research Council Act, 1988

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

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

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

2. UPDATES TO INSTITUTIONAL POLICIES AND STRATEGIES

National Development Plan and science, technology and innovation

The National Development Plan (NDP) is a long-term vision for the country that provides a broad strategic framework to guide key government choices and actions, focusing on the critical capabilities needed to transform the economy and society. The NDP highlights the centrality of science, technology and innovation (STI) in sustainable socio-economic development and addressing societal challenges such as education, health, food security, water shortages and climate change, and in accelerating economic transformation in South Africa. It also acknowledges that the difference between countries that are able to tackle poverty effectively by growing and developing their economies, and those that cannot, is the extent of their ability to grasp and apply insights from STI and use them creatively.

The NDP proposed a phased approach in entrenching the contribution of STI to economic growth. The first phase (2012-2017) focused on intensifying research and development spending, emphasising opportunities linked to existing industries and emerging ones. The second (2018-2023) is focused on laying the foundations for more intensive improvements in productivity, where innovation across state, business and social sectors starts to become pervasive and ultimately part of the third phase (2024-2030), which focuses on consolidating the gains of the second phase with greater emphasis on innovation, improved productivity, more intensive pursuit of a knowledge economy and better exploitation of comparative and competitive advantages in an integrated continent. The current DSI 2020-2025 Strategic Plan covers the end of the second phase and the beginning of the third.

2019 White Paper on Science, Technology and Innovation

The Department of Science and Innovation (DSI) derives its mandate from the 2019 White Paper on Science, Technology and Innovation, which emphasises inclusivity, transformation, partnerships to address policy coherence, the development of human capabilities, knowledge expansion, innovation performance and increased investment that will result in the economic, socio-political and intellectual benefits of STI being enjoyed by all South Africans.

The White Paper draws from what worked in the past and introduces a number of policy shifts, including the following:

- Increasing the focus on inclusivity, transformation and linkages in the national system of innovation (NSI).
- Enhancing the innovation culture in society and government.
- Improving policy coherence and budget coordination across government.
- Developing a more enabling environment for innovation.
- Increasing the spatial footprint of innovation.
- Innovation for inclusive development including a greater focus on social and grassroots innovation.
- Expanding the research system.
- Developing human capabilities.
- Accelerating the implementation of the pan-African STI agenda.
- Increasing investment in the NSI.

The Department is in the process of finalising a decadal plan for STI through which the 2019 White Paper will be implemented.

2019-2024 Medium-Term Strategic Framework

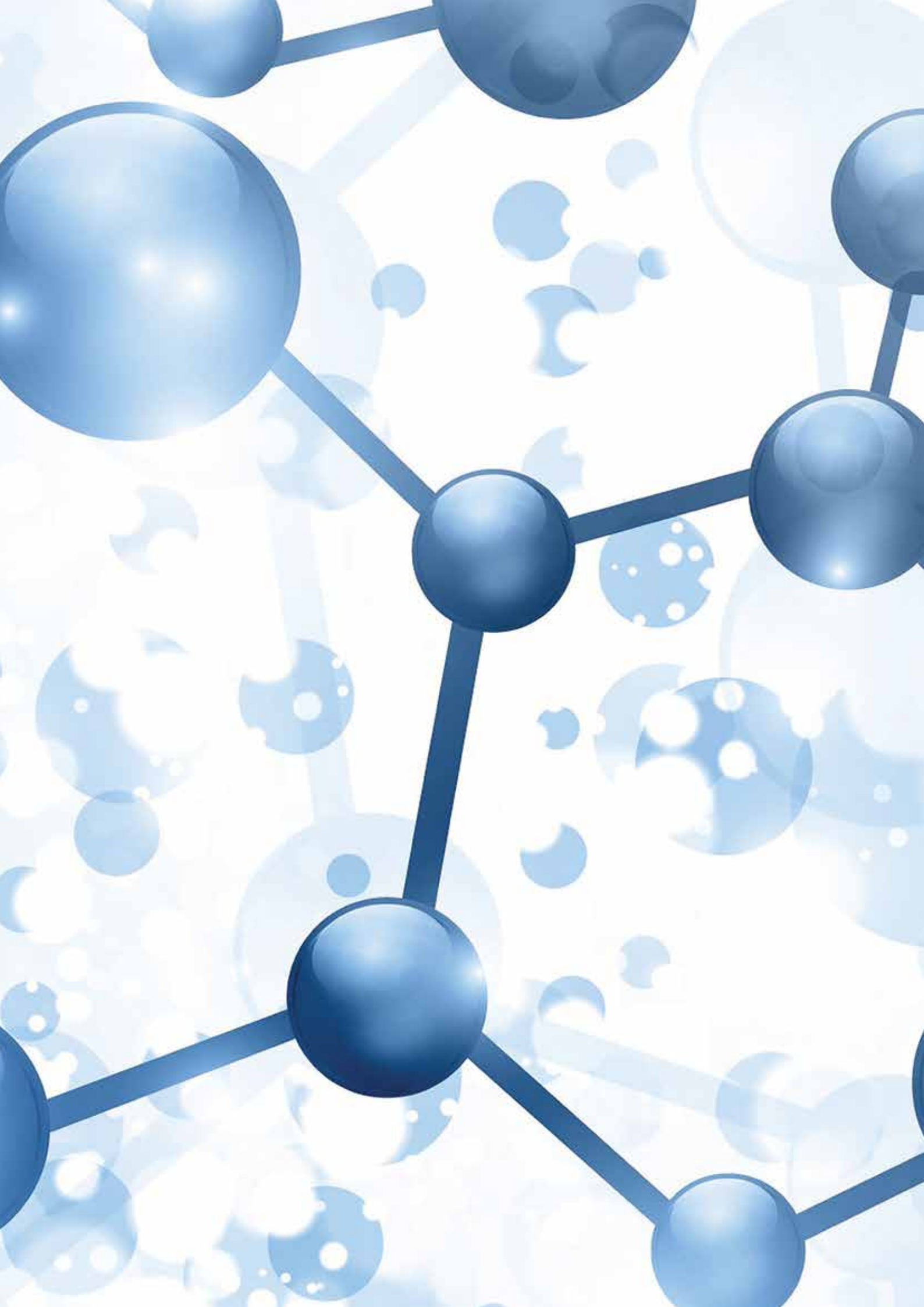
In his State of the Nation Address in June 2019, the President of the Republic of South Africa identified the following seven government apex priorities that will play a catalytic role in achieving the NDP targets:

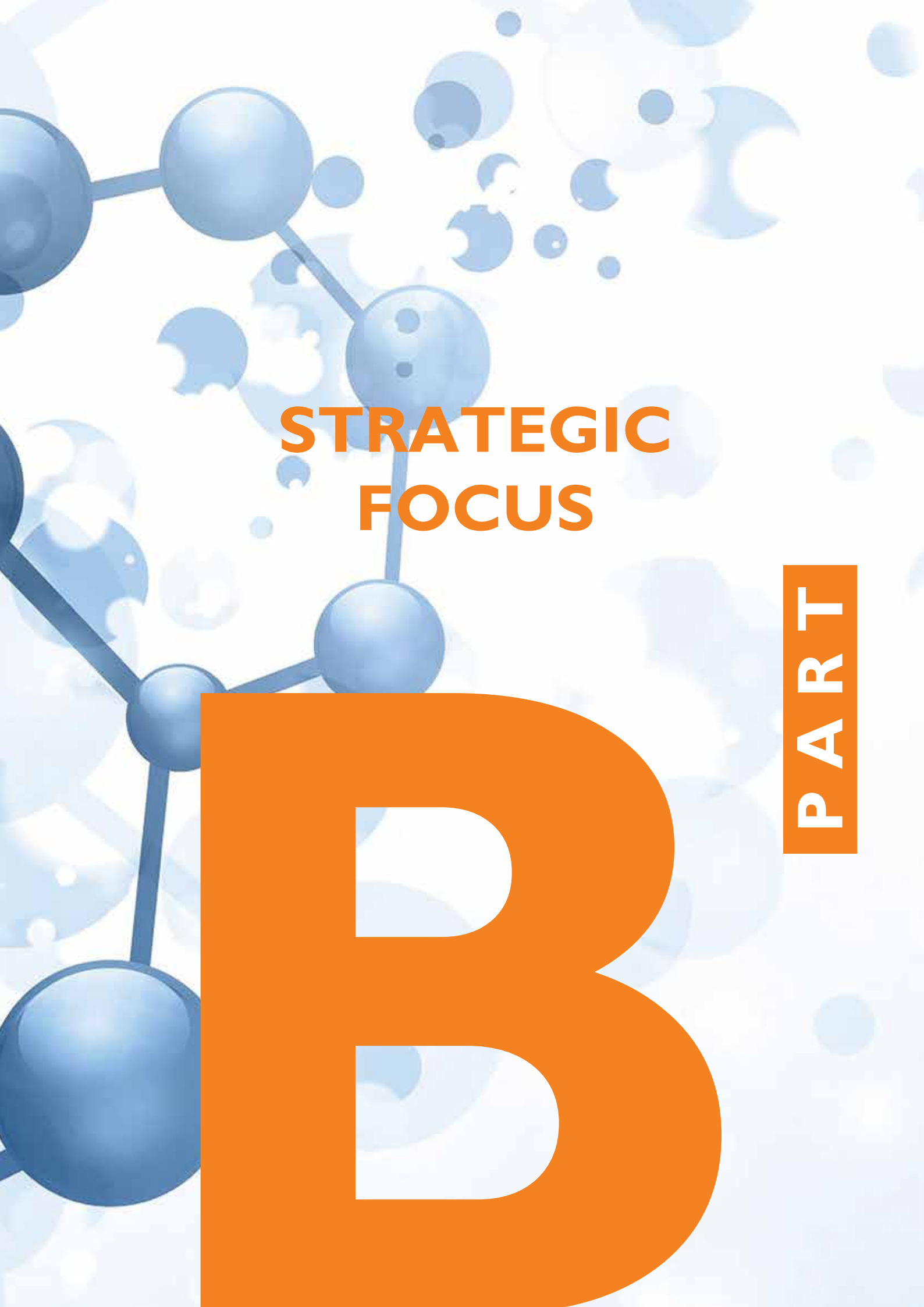
- Priority 1: Building a capable, ethical and developmental state.
- Priority 2: Economic transformation and job creation.
- Priority 3: Education, skills and health.
- Priority 4: Consolidating the social wage through reliable and quality basic services.
- Priority 5: Spatial integration, human settlements and local government.
- Priority 6: Social cohesion and safe communities.
- Priority 7: A better Africa and world.

While the apex priorities are all interrelated, the Department's focus and commitments are mainly on priorities 2 and 3.

3. RELEVANT COURT RULINGS

None.





STRATEGIC FOCUS

PART

B

4. SITUATIONAL ANALYSIS

Discussed below are the salient external and internal environmental shifts influencing the Department's performance and 2021/22 performance plan, including the medium-term targets.

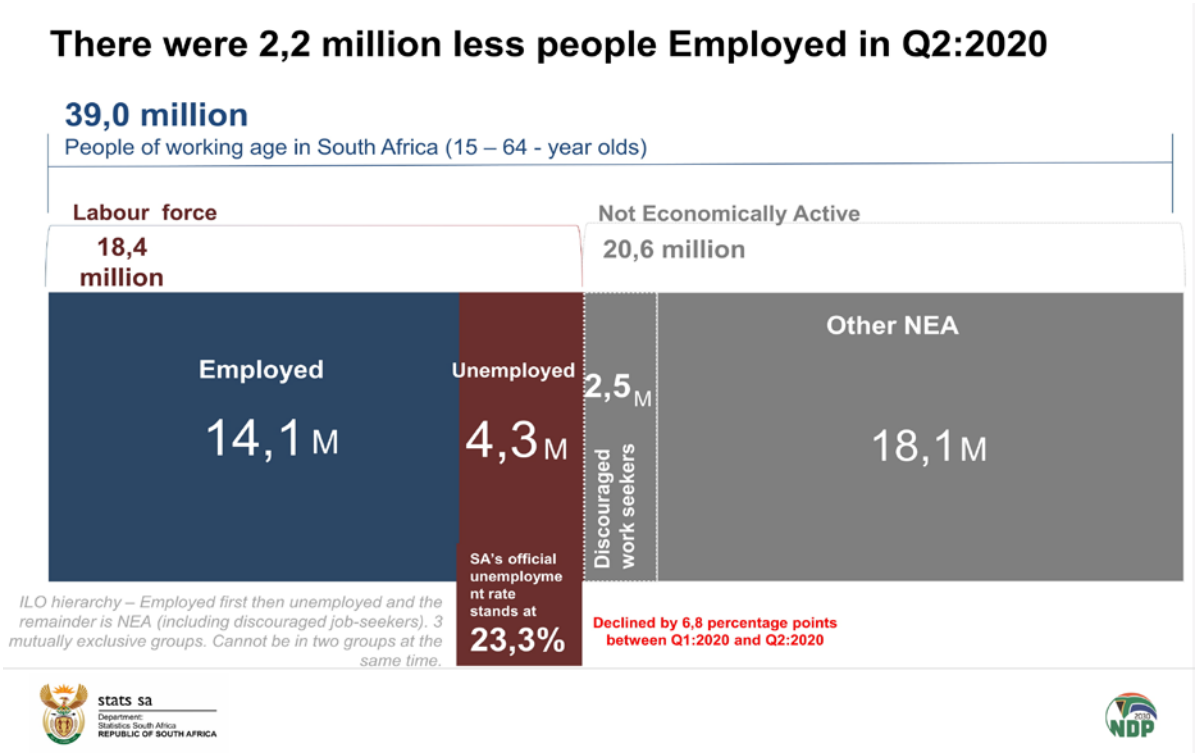
4.1 External environment analysis

South Africa's political transition is known as one of the most remarkable political feats of the past century. The new dispensation in 1994, the South African "negotiated democratic state", inherited an ailing science and technology system, with challenges that included the financial consequences of the termination of apartheid technology missions (such as military dominance in the subcontinent and energy self-sufficiency) by the apartheid government between 1990 and 1994, as well as the strategic risks faced by the Southern African Development Community (SADC) from a human, economic and security perspective.

(a) Triple challenge of inequality, unemployment and poverty

In its systematic country diagnosis report on South Africa in April 2018[1], the World Bank asserts that, although South Africa has made significant progress since 1994, its economic transition from a system of exclusion under segregation remains incomplete. In the period 1994-2018, poverty significantly declined but the extent of inequality remained extremely high. Using different measures, South Africa consistently emerges as one of the most unequal countries in the world. In fact, in the period 1994 to 2006, inequality increased. This is evidenced by findings of widening wealth inequality, the labour market being split into two extremes, with a small number of people in highly paid jobs mainly in the formal sector, but most people getting by through often informal and far lower paying jobs. Income polarisation is distinguishable through the high concentration of low-income earners, very few high-income earners and small number of middle-income earners. Inequality of opportunity is also high and can be measured by the influence of race, parental education and occupation, gender and locality of birth. It is arguable that certain policies introduced by the democratic government have exacerbated the extent of inequality. The World Bank further states that, in its view, lack of skills is one of the key constraints to reducing poverty and inequality in South Africa.

South Africa's high unemployment rate remains its key challenge and the country's economy struggles to create sufficient employment opportunities, the economy shared 2, 2 million jobs in the second quarter of 2020 according to the latest Quarterly Labour Force Survey Quarter two released by Statistics South Africa in September 2020.



[1] *An Incomplete Transition: Overcoming the Legacy of Exclusion in South Africa*. Systematic Country Diagnostic. World Bank, 2018.

The results indicate that the number of employed persons decreased by 2, 2 million to 14, 1 million in the second quarter of 2020 compared to the first quarter of 2020. This unprecedented change is the largest quarter one to quarter two decline since the survey began in 2008.

(b) Sustainable Development Goals

As a member of the United Nations, South Africa is committed to the 2030 Agenda for Sustainable Development, agreed to by all members of the United Nations in 2015, which sets out 17 Sustainable Development Goals (SDGs). The 2030 Agenda recognises the role and contribution of STI in the implementation of all 17 SDGs, with dedicated programmes of support emerging from the STI community. In implementing the 2030 Agenda, the STI community's contribution includes research to strengthen evidence-informed decision making, and providing innovative solutions to ensure that no one is left behind, e.g. equitable access to basic services (water, energy, education and health services). The DSI supports various engagements to help municipalities localise the SDGs.

South Africa has a national working group to develop an integrated and harmonised national approach to the implementation and monitoring of the SDGs. The working group, led by Statistics South Africa, published a self-assessment report, South Africa's Voluntary National Review, in 2019. The report evaluated what has been done and determined the remaining obstacles to ridding South Africa of extreme poverty. The Department has supported the working group by coordinating the NSI to achieve maximum impact from efforts to achieve the SDGs, by identifying strategic partnerships and mobilising resources, assisting in the development of indicators at regional and national level, and crystallising the role of STI in the implementation of the SDGs. The Department hosts an annual STI multi-stakeholder forum and various dialogues to enable engagement and collective planning and implementation of STI activities in support of Agenda 2030. These dialogues engage on responses to the interrelated and complex SDGs, e.g. the food-water-energy nexus (SDGs 2, 6, and 7).

(c) COVID-19 pandemic

On 23 March 2020, the President declared a national disaster and announced measures to combat the spread of the coronavirus in South Africa, including a lockdown, and a R500 billion stimulus package to reignite the economy after the first two levels of lockdown. The social and economic relief package was intended to support various initiatives across the country, and a Special Adjustment Budget to allow for this was tabled by the Minister of Finance in June 2020.

Parts of the package are to be derived from the implementation of budget cuts across government and public entities.The cuts were focused on the compensation of employees, because of the general delay in filling vacant posts under the lockdown, and on spending categories related to activities restricted under the lockdown, such as foreign travel, venues and catering. This created savings that could be used for COVID-19 interventions. For example, the Presidential Youth Employment Initiative (PYEI) was introduced as an employment stimulus based on the allocation of R100 billion for job creation and retention as part of the R500 billion stimulus package.

Initially, the economy was completely locked down, with South Africa's borders closed and restrictions on movement for all citizens to reduce the rate of infections. A risk-based approach saw the initial lockdown adjusted from level 5 in March 2020 to level 1 in September 2020. In December 2020, the President reintroduced a lockdown adjusted to level 3 to mitigate the high rate of infections, averaging 20 000 new cases per day, and in response to the new coronavirus variant identified in South Africa in November 2020.

By the end of January 2021, the total number of COVID-19 cases identified in South Africa was 1 453 761, with 44 164 deaths reported. A new chapter in the country's battle against COVID-19 will began with vaccines from several suppliers to vaccinate about 42 million (67%) of the South Africans population by the end of 2021.

4.2 Internal environmental analysis

The 1996 White Paper on Science and Technology, which introduced the notion of a national system of innovation, was intended to improve the lives of all South Africans through STI. This was to be achieved "through progressively increasing economic growth and enhanced participation in the economy" and "through the innovative and pervasive personal and social development of the nation's people". In June 2019, the name of the Department was changed from the Department of Science and Technology to the Department of Science and Innovation, signifying a leadership role for the Department in advancing overall government policy on innovation (as articulated in the 2019 White Paper on STI).

The 2019 White Paper is intended to strengthen policy intent in areas where the DSI has encountered challenges in implementation. It gives the DSI a greater opportunity for using STI in support of South Africa's inclusive development. The 2019 White Paper and the decadal plan for STI currently under development, also provide the impetus for an organisational restructuring towards a leaner, more agile organisation with concentrated capability in critical areas.

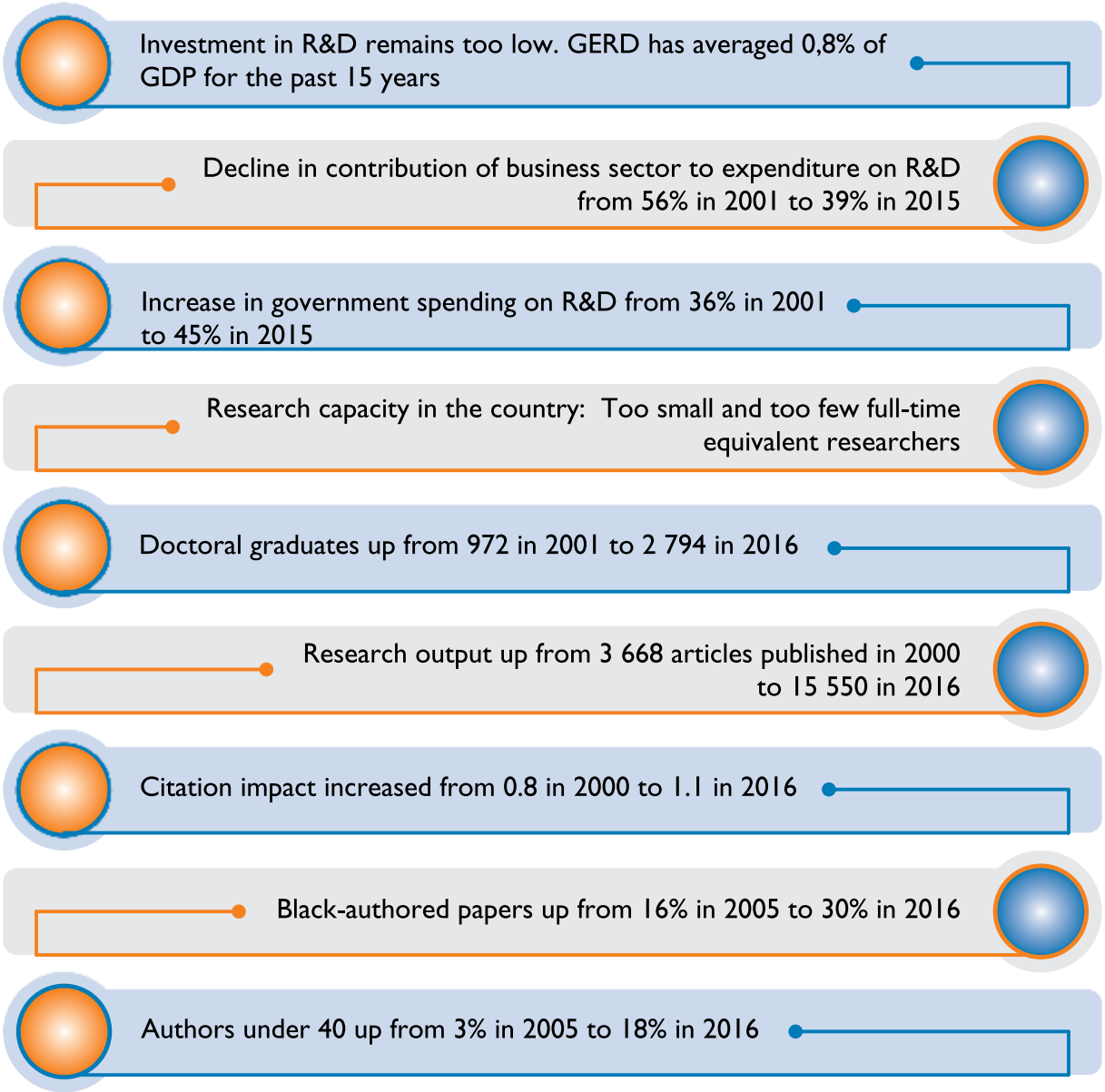
The Department is associated with excellence and high levels of performance, attaining over 80% of its predetermined objectives and spending 99% of its budget in the past four years. In November 2020, the Auditor-General of South Africa gave the Department yet another award for a clean audit finding for the 2019/20 financial year, and an award for the best performing Accounting Officer. While the DSI does not have provincial and local government, and relies on staff at national level to identify and build the relations necessary to integrate STI into provincial and local government agendas, this poses a risk to the execution of the Department's mandate, as does the high vacancy rate of 23,08%, with 22,40% at Senior Management Service level.

(a) Reviews of the existing STI policy mix

The adoption of the new White Paper was part of the continued evolution of STI policy, and was informed by ministerial reviews of the STI landscape in 2010 and 2012, and a 2017 National Advisory Council on Innovation (NACI) review of the 1996 White Paper. The reviews assessed performance against the vision, high-level goals and various specific initiatives set out at the time, such as policy formulation and resource allocation; regulatory policy; financing at performance level; human resource development and capacity building; and science and technology infrastructure. The reviews found that much improvement had been made, but that more needed to be done in some areas.

In 2016, the National Research Foundation commissioned the Centre for Research, on Evaluation, Science and Technology (CREST) to undertake a comprehensive assessment of the state of the South African research enterprise. The insights of the CREST study, published in 2019, are summarised below.

Figure 1: Summary of CREST study findings on the state of the South African research enterprise



The review of the 1996 White Paper and 2019 CREST publication both indicate that the national system of innovation is yet to realise its full potential. The NSI needs to be better coordinated to respond to national imperatives and increase its contribution to socio-economic transformation.

The Department is currently developing an implementation plan for the 2019 White Paper on STI, the decadal plan for STI. This is informed by various reviews, including the 2020 NACI reviews on the 2002 National Research and Development Strategy, the Ten-Year Innovation Plan (2008-2018) and the Higher Education, Science, Technology and Innovation Institutional Landscape Review, which analyses the strengths and weaknesses of the NSI and the efficacy of the existing policy mix. The decadal plan is also informed by the South Africa Foresight Exercise for Science, Technology and Innovation 2030, which identified nine STI domains for particular focus, namely, (i) the circular economy, (ii) education for the future, (iii) sustainable energy, (iv) the future of society, (v) health innovation, (vi) high-tech industrialisation, (vii) ICTs and smart systems (viii) nutrition security, and (ix) water security.

The new era of STI policy is targeted at increasing the responsiveness of the NSI and its contribution to socio-economic imperatives and national priorities. It places greater emphasis on technology and innovation deployment and the use of innovation in support of a capable state and service delivery improvement.

(b) The NSI and DSI response to the COVID-19 pandemic

On 7 April 2020, Intel announced that it was pledging an additional $50 million globally for a technology initiative in response to the pandemic. The initiative is accelerating access to technology at the point of patient care, speeding up scientific research and ensuring access to online learning for students. The continued reality in managing the pandemic and the post COVID-19 recovery show that accelerating access to digital infrastructure is not only helping to combat the pandemic, but also enabling new technology and scientific discovery to prepare South Africa for future crises, and supporting the rebuilding of the South African economy in the short and long-term.

Intel South Africa Corporation, in collaboration with Dell Technologies, intends to support the upgrade of the CSIR's Centre for High Performance Computing (CHPC) to the value of more than R10 million, to establish a dedicated COVID-19 response platform. The platform will enable the government and scientists to speed up research considerably, as well as tracking outbreaks, using advanced analytics to facilitate lockdown levels, reducing time to treatment and the isolation of people that have come into contact with infected individuals, and ultimately getting the outbreak under control more quickly. This platform will also be able to support other African countries, specifically those that do not have the scientific and health care facilities or the finances and technical skills to respond in such a way. The selection of the CHPC was motivated by South Africa's response when the pandemic hit the country, when the CHPC's OpenStack Cloud initiative provided computational and data support to the national Department of Health for its dashboards, including much-needed data analysis for decision-making processes. For example, it provided detailed information through geospatial mapping to enable an understanding of students' locations, network coverage and relevant resources in the country, so that online learning preparedness could be assessed.

The Department's budget allocation for 2020/21 has been revised downwards from R8 797 393 to R7 362 088. An amount of R324 175 million was redirected to COVID-19-related responses. The pandemic has been an opportune time for the South African science system to demonstrate its relevance and support of national priorities and South Africa's socio-economic imperatives. Entities such as the CSIR and the Human Sciences Research Council (HSRC), as well as other platforms and programmes established or supported by the Department, have responded to the situation in a variety of ways, including the development of continuous positive airway pressure solutions under the guidance of the National Ventilator Project, the deployment of DSI-funded infrastructure to expand testing facilities, and the manufacturing of molecular biology enzymes, reagents and testing kits. The South African Radio Astronomy Observatory (SARAO) provided systems engineering and project management support for the design and manufacture of ventilators.

In managing the budget cuts, the Department attempted to absorb them internally as far as possible, in areas least likely to affect delivery on its mandate. The budget cuts have impacted the Department's plans in the following broad areas:

- Infrastructure (the Square Kilometre Array, the National Integrated Cyberinfrastructure System and the South African Research Infrastructure Roadmap).
- Human capital development programmes that support established researchers (the South African Research Chairs Initiative, the centres of excellence and research grants).
- Human capital in designated areas of advanced manufacturing, aerospace, chemicals, mining, ICTs and the Industry Innovation Programme, including the Sector Innovation Fund and the green economy.
- Scaling back and/ or delaying a number of long-term R&D initiatives.
- Science awareness initiatives.
- The generation of knowledge and innovation products.

The following interventions across the NSI are part of the employment stimulus:

- Health promotion agents (1 000 beneficiaries) to be implemented by the HSRC.
- Enviro Champs (300 beneficiaries) to be implemented by the Duzi Umngeni Conservation Trust.
- Water Graduate Employment Programme (400 beneficiaries) to be implemented by the Water Research Commission (WRC).
- Experiential learning programme (189 beneficiaries) to be implemented by the CSIR in partnership with the Southern African Society for Cooperative Education (SASCE).
- The Department introduced a new output performance indicator, "number of Presidential Youth Employment Initiative (PYEI) beneficiaries" with a target of 1,700 beneficiaries, and secured ringfenced funding of R44 999 000 from the employment stimulus fund. This was supplemented by savings to facilitate effective implementation of the programme and to exceed the target of 1,700.

(c) International cooperation

The Department has achieved significant success in the development of STI partnerships with a pan-African focus, including many bilateral STI cooperation initiatives co-funded with African partner governments. At a multilateral level, the five-year Science Granting Councils Initiative, led in South Africa by the National Research Foundation (NRF), strengthened the capacities of science granting councils in sub-Saharan Africa to support research and evidence-based policies that will contribute to economic and social development. A three-year pilot of the African Open Science Platform was completed in 2019. Engagements undertaken at multilateral level, in both the African Union and the Southern African Development Community (SADC), proved to be especially successful, for example, the creation of a post dedicated to the role of STI in advancing regional integration by the SADC Secretariat on its personnel establishment (for which the Department provided seed funding over many years). The Department also continued to actively champion a focus on STI in various bi-regional AU partnership initiatives, mostly related to China, the European Union and Japan.

The Department enjoys respect among its peers in the science diplomacy arena, with South Africa known for producing world-class research outputs (with quality in many disciplines above the world average, participation in large/global research institutions and projects like CERN (the European Organisation for Nuclear Research), the European Synchrotron Radiation Facility, the Square Kilometre Array, the Southern African Large Telescope, the Group on Earth Observations and the International Centre for Genetic Engineering and Biotechnology, and as a facilitator of the STI agenda across Africa.

As part of its expanded mandate, the DSI has been appointed to champion several strategic initiatives on behalf of government, such as the South African Affiliate of the World Economic Forum's Centre for the Fourth Industrial Revolution, which is focused on understanding and dealing with technology governance challenges that prevent innovation and the effective deployment of technologies.

5. THE 2019-2024 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 second of which is the 2019-2024 Medium Term Strategic Framework (MTSF). The 2019-2024 MTSF is premised on three pillars with seven associated apex priorities. Over the medium-term period, the DSI will contribute to and report on the following apex priorities:

Figure 2: Summary of pillars and priorities

Table 1: 2019-2024 MTSF commitments led by the DSI

National Development Plan	MTSF priorities	Outcome	Intervention	Action/commitment
Chapter 3: Economy and employment	**Apex Priority 2:** Economic transformation and job creation	Improve competitiveness through ICT	Increase investment in gross expenditure on research and development (GERD)	Provide leadership and an enabling environment to e increase investment in GERD by a range of investors to 1,1% of gross domestic product by 2024
			Strengthen the national system of innovation	35 000 research articles published by NRF-funded researchers and cited in the Web of Science Citation Database by 31 March 2024
Chapter 9: Improving education, training and innovation	**Apex Priority 3:** Education, skills and health	Expand access to post-school education and training opportunities	Increased number of black lecturers supported through the New Generation of Academics Programme (nGAP)	12 200 PhD students awarded bursaries as reflected in the reports from the NRF and other relevant entities by 31 March 2024
		Improved quality of post-school education and training provisioning	Implement the nGAP	24 400 pipeline postgraduate students awarded bursaries through NRF and DSI-managed programmes as reflected in the NRF and DSI project reports by 31 March 2024
			Proportion of university lecturers who hold doctoral degrees	3 000 of emerging researcher grants to improve percentage of PhD-qualified staff (gender, race, disability and age) by 31 March 2024
		A responsive post-school education and training system	Conduct intellectual property awareness sessions (IP Wise) at technical and vocational education and training (TVET) colleges	20 intellectual property awareness sessions at TVET colleges by 31 March 2024
			Users from the education and research sector supported through the South African National Research Network (SANReN)	1,3 million users (from the university and post-school sectors, national research facilities, science councils, and all public research-performing institutions) supported by SANReN by 31 March 2024

6. OVERVIEW OF 2019/20 BUDGET AND MTEF ESTIMATES AND EXPENDITURE TRENDS

R'000	Audited outcome			Adjusted appropriation	MTEF estimates		
Programme	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**
Administration	357 904	379 522	352 076	304 107	328 196	332 550	333 293
Technology Innovation	1 120 554	1 148 962	1 236 673	1 378 321	1 780 222	1 783 283	1 793 320
International Cooperation and Resources	136 679	145 172	136 027	116 802	146 625	149 090	149 466
Research Development and Support	4 296 468	4 520 446	4 578 431	3 745 248	4 949 244	5 093 259	5 192 081
Socio-economic Innovation Partnerships	1 617 000	1 755 218	1 778 196	1 733 809	1 729 028	1 769 794	1 776 421
Total	**7 528 605**	**7 949 320**	**8 081 403**	**7 278 287**	**8 933 315**	**9 127 976**	**9 244 581**
Compensation of employees	345 135	358 819	336 658	361 993	358 003	358 364	358 376
Goods and services	207 056	243 223	222 049	144 981	208 465	213 906	214 717
Transfers and subsidies	6 955 110	7 336 872	7 514 812	6 767 909	8 363 994	8 552 691	8 668 340
Payments for capital assets	21 085	10 263	7 775	3 404	2 853	3 015	3 148
Payments for financial assets	219	143	109	-	-	-	-
Total	**7 528 605**	**7 949 320**	**8 081 403**	**7 278 287**	**8 933 315**	**9 127 976**	**9 244 581**

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

Table 30.2 Vote expenditure trends by Programme and economic classification

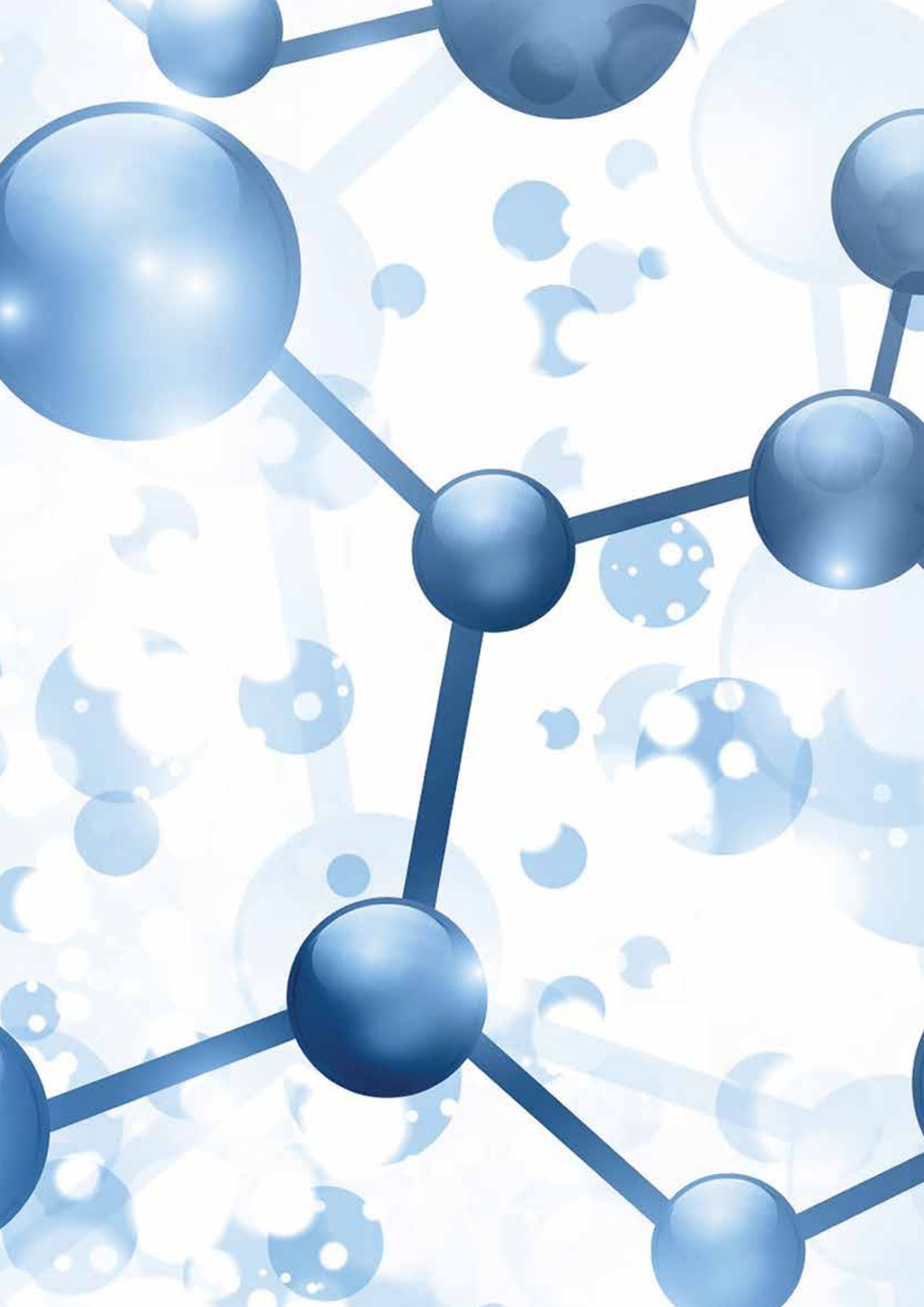
Programmes

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

Programme	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Revised estimate	Outcome/annual budget average (%)	Outcome/adjusted appropriation average (%)
R million	**2017/18**			**2018/19**			**2019/20**			**2020/21**			**2017/18-2020/21**	
Programme 1	422,8	415,0	357,9	438,9	404,2	379,5	424,0	391,3	352,1	360,3	304,1	304,1	84.7%	92.0%
Programme 2	1,073,6	1,075,1	1,120,6	1,131,7	1,136,7	1,149,0	1,224,3	1,224,3	1,236,7	1,504,5	1,378,3	1,378,3	99.0%	101.5%
Programme 3	128,7	132,4	136,7	136,4	148,9	145,2	149,0	149,0	136,0	156,4	116,8	116,8	93.7%	97.7%
Programme 4	4,348,8	4,350,1	4,296,5	4,360,3	4,538,1	4,520,4	4,572,9	4,572,9	4,578,4	4,882,5	3,745,2	3,745,2	94.4%	99.6%
Programme 5	1,622,3	1,623,6	1,617,0	1,778,3	1,785,6	1,755,2	1,824,4	1,834,7	1,778,2	1,893,7	1,733,8	1,733,8	96.7%	98.7%
Total	**7,596,3**	**7,596,3**	**7,528,6**	**7,845,6**	**8,013,5**	**7,949,3**	**8,194,6**	**8,172,3**	**8,081,4**	**8,797,4**	**7,278,3**	**7,278,3**	**95.1%**	**99.3%**
Change to 2019 Budget estimate														

Programme	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Revised estimate	Outcome/annual budget average (%)	Outcome/adjusted appropriation average (%)
Economic classification														
Current payments	**613,8**	**608,8**	**552,2**	**656,5**	**655,8**	**602,0**	**678,9**	**645,7**	**558,7**	**632,5**	**506,9**	**506,9**	**86.0%**	**91.8%**
Compensation of employees	336,9	348,2	345,1	382,7	382,7	358,8	410,3	389,1	336,7	421,9	361,9	361,9	90.4%	94.6%
Goods and services	277,0	260,6	207,1	273,8	273,1	243,2	268,6	256,6	222,1	210,5	144,9	144,9	79.4%	87.4%
of which:														
Advertising	20,3	9,0	9,3	10,4	11,6	25,0	11,3	11,2	14,1	13,2	13,4	13,4	110.1%	134.9%
Consultants: Business and advisory services	20,6	19,1	6,4	21,5	27,4	16,4	21,4	21,4	12,4	21,9	13,6	13,6	57.0%	59.8%
Agency and support/ outsourced services	16,7	16,7	7,3	17,6	11,9	12,0	16,1	16,1	9,1	16,1	11,9	11,9	60.7%	71.3%
Travel and subsistence	70,9	73,3	67,2	81,5	82,2	65,9	62,8	59,4	61,9	61,2	19,2	19,2	77.5%	91.6%
Venues and facilities	32,9	33,3	22,1	25,5	24,4	26,6	13,1	16,5	17,5	16,2	10,6	10,6	87.5%	90.6%
Interest and rent on land	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transfers and subsidies	**6,961,1**	**6,965,1**	**6,955,1**	**7,175,2**	**7,343,7**	**7,336,9**	**7,513,0**	**7,523,9**	**7,514,8**	**8,162,2**	**6,767,9**	**6,767,9**	**95.9%**	**99.9%**
Departmental agencies and accounts	5,204,3	5,204,3	4,807,3	5,312,3	5,496,5	5,044,7	5,595,0	5,605,3	5,165,3	6,179,9	5,131,8	5,131,8	90.0%	93.7%

Programme	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Revised estimate	Outcome/annual budget average (%)	Outcome/adjusted appropriation average (%)
Higher education institutions, foreign governments and international organisations	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Public corporations and private enterprises	1,420,1	1,447,1	1,683,5	1,519,9	1,504,8	1,809,3	1,541,9	1,541,9	1,811,7	1,593,2	1,256,6	1,256,6	109.3%	115.1%
Non-profit institutions	336,1	313,1	462,5	342,8	341,6	481,4	376,1	376,1	533,6	388,9	379,4	379,4	128.6%	131.7%
Households	0,6	0,6	1,8	-	0,9	1,5	-	0,5	4,2	-	-	-	979.7%	382.5%
Payments for capital assets	**21,4**	**22,5**	**21,1**	**13,9**	**13,9**	**10,2**	**2,8**	**2,8**	**7,8**	**2,8**	**3,4**	**3,4**	**104.0%**	**99.9%**
Machinery and equipment	21,4	22,5	21,1	13,9	13,9	10,2	2,8	2,8	7,8	2,8	3,4	3,4	104.0%	99.9%
Payments for financial assets	**-**	**-**	**0,2**	**-**	**-**	**0,1**	**-**	**-**	**0,1**	**-**	**-**	**-**	**0%**	**0%**
Total	**7,596,3**	**7,596,3**	**7,528,6**	**7,845,6**	**8,013,5**	**7,949,3**	**8,194,6**	**8,172,3**	**8,081,4**	**8,797,4**	**7,278,3**	**7,278,3**	**95.1%**	**99.3%**



MEASURING PERFORMANCE

PART C

INSTITUTIONAL PROGRAMME PERFORMANCE INFORMATION

Internally, the Department is organised into five budget programmes to deliver on its mandate and contribute to the 2019-2024 MTSF Apex Priorities, as well as the recently launched South African Economic Reconstruction and Recovery Plan, through six institutional outcomes with the associated 22 outcome indicators as indicated below. The budget programmes are as follows:

- **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 DSI 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).

Over the next medium term, the DSI will continue to fund, support and facilitate an STI-enabling ecosystem and set out performance indicators and medium-term targets in support of the six institutional outcomes and 22 outcome indicators.

Outcome 1: A transformed, inclusive, responsive and coherent NSI

In support of Outcome 1, the Department has identified and adopted the following four outcome indicators to measure over the Strategic Plan period:

1.1 Number of formalised partnerships between different categories of actor in the NSI that advance decadal plan priorities.

1.2 Number of missions introduced and adopted by Cabinet over the next five years that crowd in resources and capabilities across the NSI.

1.3 Percentage increase in investment support by government that advances GERD towards 1,1% of GDP.

1.4 Number of signed strategies that give effect to the agreed dimensions of transformation to be effected in the NSI.

Through these outcomes, the Department will strive to improve the alignment of the NSI's contribution to the NDP. This will be directed primarily through the decadal plan, though which the 2019 White Paper on STI will be implemented. The decadal plan will define critical STI interventions and missions/priorities for the country between 2020 and 2030, taking into account the recommendations of various reviews, and will guide the establishment of new NSI institutions, make proposals for the geospatial location and distribution of the new institutions, and propose new institutional forms to expedite the implementation of missions and critical research areas such as astronomy.

If the NSI is to grow its contribution to addressing national priorities, it is necessary to focus on the following:

- Enabling the modernisation of sectors of the economy such as manufacturing, agriculture and mining to ensure that these sectors are competitive and can contribute to higher GDP growth.
- Exploiting new industries based on new sources of growth, e.g. the Fourth Industrial Revolution and the circular economy.
- Increasing the NSI contribution to exports by putting in place measures to accelerate the conversion of research ideas and knowledge into products and services.
- Supporting grassroots innovators.
- Accelerating inclusivity and supporting new entrants into the economy, by supporting SMMEs and co-operatives via targeted research, development and innovation (RDI) instruments.
- Use technological advancement to contribute to an STI-enabled capable state for improved service delivery and decision making.

The 2019 White Paper on Science, Technology and Innovation proposes that a "whole-of-society" approach be the cornerstone of the NSI's contribution to national priorities. The NSI is made up of actors from government, the private sector, higher education institutions (HEIs), research organisations and civil society. Traditionally, partnerships between NSI players have been between HEIs or research councils and government or the private sector.

Over the Strategic Plan term, more effort will be directed towards the formalisation of partnerships aligned to the mission approach of the decadal plan, with a particular emphasis on non-traditional NSI players such as NGOs and civil society youth organisations.

In increasing the number of formalised partnerships between different categories of NSI actors, interdepartmental teams have been established to propose areas of synergy and the efficient use of budgets towards the goals of the NDP, such as increased PhD production, increased knowledge and innovation outputs, and increased PhD qualifications specifically among staff across both the higher education and the science council and research facilities system. Bearing in mind that some subsets of the system are already operating optimally (80% of all PhDs and knowledge outputs are produced by five universities), the parts of the system that are not operating optimally, or that are under-represented and underserved, should receive particular attention. Historically disadvantaged institutions and individuals will receive targeted development support and funding to ensure that they contribute as much as possible to the research and knowledge enterprise.

On the international front, the DSI's intention is to ensure a far greater focus on innovation partnerships involving South Africa, moving away from relatively small-scale, collaborative academic projects towards market-oriented research projects. There is a prominent role for STI in the achievement of the SDGs, and the DSI will continue using the SDGs to guide its multilateral policy framework for international engagement and cooperation with a view to facilitating a range of partnerships. These will be with development cooperation agencies, philanthropic organisations and multilateral bodies that make resources available to assist efforts to put STI at the service of South African society, or to leverage South African STI expertise to contribute to global development and advance South Africa's foreign policy. Foreign policy includes the country's international trade and investment agenda, especially the involvement of SMMEs in international cooperation activities and public-private partnerships.

The DSI will continue with its active leadership role in implementing the AU's Science, Technology and Innovation Strategy for Africa (STISA-2024), maximising benefits for the NSI and improving coordination so that strategic synergies can be exploited, especially in African STI partnerships, such as between the SADC and the AU. The Department will pursue initiatives supporting the AU's Agenda 2063 and the SADC's Regional Indicative Strategic Development Plan. Bilateral cooperation through plans of action agreed to with other African partners will be prioritised.

Outcome 2: Human capabilities and skills for the economy and for development

In support of Outcome 2, the Department has identified the following five outcome indicators to measure over the strategic plan period:

2.1 Number of DSI-funded PhDs graduating annually as a contribution to the NDP target of 100 PhDs per million population by 2030.

2.2 Artisans and technicians absorbed into the economy in sectors where the DSI has active programmes.

2.3 Percentage increase of women and black researchers in the South African research workforce.

2.4 Percentage increase of PhD-qualified teaching and research staff.

2.5 Improved knowledge of science among citizens.

The 2019 White Paper on Science, Technology and Innovation identifies the lack of transformation in the NSI as a challenge that needs to be addressed urgently. The DSI will continue to expand the transformation agenda in all its strategic STI focus areas over the medium term. Transformation is to be considered in six dimensions: (i) demographic transformation; (ii) transdisciplinary transformation; (iii) institutional transformation; (iv) transformation through the translation of science and innovation into societal benefit and fundamental economic transformation; (v) transformation through citizen science (public engagement); and (vi) digital transformation of the national system of innovation.

In 2020/21, the Department approved a new postgraduate funding policy that provides for full-cost support for certain groups of students, namely, the financially disadvantaged, students with disabilities, and exceptional academic achievers. The implementation of the policy will commence in 2021/22, with the consequence that comparably fewer postgraduate students will receive funding, but more will receive comprehensive funding. The Department will also finalise a tracer study on PhDs who graduated between 2001 and 2017/18. The South African Women in Science Awards, the South African Research Chairs Initiative, the centres of excellence, research grants, internships and special programmes such as Thuthuka have contributed to improving female representation, which has increased to 46% of the scientific workforce and, going beyond demographics, has seen a new type of knowledge generated. Going forward, while maintaining gains achieved on gender transformation, more effort is required to promote participation of black researchers towards achieving a more inclusive NSI.

The science engagement campaign, guided by the Science Engagement Strategy, advances the intentions of the White Paper on STI to build a science-aware and science-literate society.

At transdisciplinary transformation level, the Department has mainstreamed the themes in research grants covering all knowledge fields using four unique instruments, namely the Indigenous Knowledge Systems (IKS) Biennial Interface Conference, which brings research grant holders, knowledge holders and students together under specific themes; the annual Indigenous Knowledge Systems Conference and Expo, which showcases innovation across the fields of IKS; the Global Change Biennial Conference, which brings together researchers in Earth Systems Science, cutting across multiple disciplines; and the South African Research Infrastructure Roadmap, a strategic instrument that earmarks multidisciplinary and transdisciplinary access to research infrastructure. Marine and polar science, and the palaeosciences, are research areas that use research instruments that promote transdisciplinary transformation, including the Habitable Planet programme under the Applied Centre for Climate and Earth Systems Science (ACCESS), which introduces black students to the concept of Earth systems science.

Formal collaboration between the DSI and the Department of Basic Education dates back to 2004 and continues to encourage learners to participate in science, technology, engineering, mathematics and innovation (STEMI) subjects. The DSI has signed direct collaboration agreements with seven provincial departments of education, which has led to selected schools in these provinces participating in initiatives that contribute to the building of a STEMI human capital pipeline. In 2021/22, attention will be given to the remaining two provinces, while learners' STEMI activities will be expanded in the provinces already collaborating with the DSI.

The DSI, with its entities, will continue supporting high-level human capital development (HCD) for the NSI through bursary support for postgraduate training in science, engineering and technology (SET). This is also intended to transform the NSI's human resource base through postgraduate studies, particularly at PhD level, in terms of gender and race. Postgraduate funding in engineering will be a specific focus, in line with the recommendations of the Academy of Science of South Africa's 2019 Status of Postgraduate Research Training in Engineering in South Africa report.

This DSI-commissioned study recommends the production of more master's and doctoral degrees in engineering in line with the innovation and economic development priorities of the country, as identified in different sector master plans and the decadal plan for STI currently under development. Liaison between various DSI and Department of Higher Education and Training (DHET) budget programmes will contribute to the development of other upstream skills required for the country's economic sectors.

The DSI and its entities, particularly the National Research Foundation, have enjoyed strong collaboration with the DHET in research development and support. The DSI, NRF and DHET will continue supporting the collaborations fostered with industry through the Ikusasa Student Financial Aid Programme to extend the initiative to postgraduate support. Between 2017/18 and 2019/20, the DHET provided R621 million in funding to the NRF for awarding postgraduate bursaries.

To address the high unemployment rate, especially among the youth, the Department, through the NRF, has been implementing the DSI-NRF Internship Programme. The Statistics SA Quarterly Labour Force Survey for the second quarter of 2020 has estimated youth (ages 15 to 34 years) unemployment to be at 44,7%. This is exacerbated by lack of workplace skills and formal work experience among graduates. The Internship Programme places unemployed SET and human and social sciences graduates at various research performing and research policy institutions throughout the country, allowing them to gain work experience under the supervision of mentors who are experts in their fields. In 2019/20, 1 091 interns were hosted by over 100 institutions.

The emerging researcher segment of the HCD pipeline continues to receive less funding than other parts of the pipeline, such as the next generation of researchers and established researchers' segments. Financial resources need to be reprioritised in this area, as recommended in the CREST Study on Building a Cadre of Emerging Scholars for Higher Education in South Africa, to help increase the percentage of senior lecturers and lecturers who are PhD-qualified and publishing.

On the international front, the DSI will continue pursuing international HCD opportunities for South Africans, including access to global research infrastructure, specifically initiatives targeted at historically disadvantaged institutions and individuals as part of the DSI transformation framework.

In 2020/21, key science engagement stakeholders such as HEIs, science councils, government departments and relevant non-governmental organisations were consulted on the set of impact indicators on which to base a survey to measure South Africans' relationships with science. The survey sample framework and technical report format has been approved by Exco. The focus in 2021/22 will be on developing data collection instruments, taking the DSI closer to the first survey, planned for 2023/24, dedicated to assessing the progress being made towards a society that is science-aware and scientifically literate as envisaged in the White Paper on STI. In sustaining the science awareness and engagement campaign to achieve this,

key initiatives such as the annual National Science Week, science centres-based activities and school-level science engagement, which were placed on hold in response to the COVID-19 pandemic, will resume in 2021/22, using a hybrid approach comprising virtual and physical participation by the target publics. The Cofimvaba Science Centre in the Eastern Cape will be launched to mark the piloting of an intergovernmental model for developing and managing science centres, which will be instrumental in informing a future policy approach to the development and support framework in South Africa.

The Department will also support the development of critical high-end skills in selected technology areas such as the bioeconomy, space science and technology, energy, intellectual property management, nanotechnology, robotics, photonics and areas of technology convergence that are important in building a knowledge society. This will be done in the form of specialised training interventions, and graduate and postgraduate student support in these areas. Support will also be directed towards the development of technical and artisan skills that will contribute to the deployment of newly developed innovations.

Outcome 3: Increased knowledge generation and innovation outputs

In support of Outcome 3, the Department has identified the following three outcome indicators to measure over the strategic plan period:

3.1 Increase South Africa's share (percentage) of global publication outputs.

3.2 Percentage increase in prototypes, technology demonstrators and pilot plants that advance industrialisation.

3.3 Percentage increase in patent applications and design applications filed from publicly financed R&D.

South Africa's research productivity compares favourably with countries such as Mexico, Chile, Greece, Malaysia, Turkey and Poland when it comes to world share and world rank. South Africa's research outputs trebled between 1996 and 2014, and its world share of publications doubled from 0,4% to 0,88%. This contribution is higher than the ratio of the country's population size relative to the global population. The target over the strategic plan term is to improve research productivity to 1% of global output.

South African universities account for 80% of research outputs, with science councils, national facilities and other public research institutions making up the rest. Measured against comparator countries, South African universities have lower ratios of PhD-qualified staff and the recently completed CREST Study on Building a Cadre of Emerging Scholars for Higher Education in South Africa shows that even PhD-qualified staff do not publish as a norm. Research productivity will be increased by fast-tracking interventions aimed at PhD qualification attainment in the first place, and capacity-building interventions aimed at inculcating a research publication scholarship among the PhD-qualified staff. Underperforming research institutions such as historically disadvantaged institutions (HDIs) and universities of technology are to be targeted with customised programmes in line with their missions. This will include ring-fenced budget support for HCD and infrastructure grants.

The DSI will focus on investments that are geared towards supporting the translation of publicly financed intellectual property (IP) into social and economic value, using NIPMO's database of disclosures of publicly financed IP as a basis for tracking the utilisation of IP via the conclusion of commercial agreements and the introduction of products and services to the public.

The DSI, with DHET, under the HDI Development Grant, will develop targeted programmes aimed at ensuring that a critical mass of publishing academics is established at HDIs, and at increasing research outputs per capita. DHET, through its Research Outputs Policy, rewards research outputs produced by researchers in public higher education institutions, while science councils, as public research institutions, do not benefit from the subsidy programme. An interdepartmental task team has been established to look at a subsidy programme for researchers in the science councils and other recognised research institutions, and the inclusion of a subsidy for innovation and other creative outputs. The task team will consider the expansion of the Research Output Submission System to include research outputs produced outside the university system. This is in line with the development of regulations that enable the Department to declare research institutions that are eligible for NRF funding.

The research chairs established through the South African Research Chairs Programme and the centre of excellence have been instrumental in increasing the country's research outputs. During the MTEF the focus will be on ensuring alignment between the research outputs produced and the national priorities, to ensure that research conducted directly responds to the country's developmental needs. Therefore, this requires a joint research agenda setting to improve utility of research outputs produced, including the involvement of relevant government departments to promote a transparent and seamless value chain from the formulation of research questions to the translation of research outputs into policies and innovations. Some progress has been made through the establishment of communities of practice, but more effort is required to maintain and expand this progress. Collaboration among researchers is key in achieving this. The promotion of multidisciplinary, transdisciplinary and intra-disciplinary research through local and international partnerships becomes even more critical.

Over the strategic plan term, the Department will measure and track the number of outputs commercialised as a result of support provided in designated areas, e.g. licences; assignments; options of varying natures (such as directed research and joint ventures); start-ups, spinouts and new companies created; and distribution, manufacturing and sales agreements for products, processes and services. The commercialisation of products, processes and services may involve other departments, entities and market players, and therefore may fall outside the Department's control.

The Department provides funding support in the form of research infrastructure grants to researchers and institutions across the innovation value chain. The grants include support for innovation infrastructure in the form of pilot plants, incubators, technology demonstrators and specialised facilities. The implementation of the South African Research Infrastructure Roadmap (SARIR) will continue over the MTSF period, with all 13 research infrastructures approved in the first edition of the roadmap being established or rolled out.

The implementation of the following projects of the National Integrated Cyberinfrastructure System (NICIS) will continue: (i) the National e-Science Postgraduate Teaching and Training Platform, which offers a multi-institutional, multidisciplinary structured e-science master's degree (postgraduate teaching and training programme), which is to be expanded in terms of the disciplines covered and institutions being added; (ii) increasing the number of awards offered through the National e-Research Support Programme; (iii) additional regional Tier 2 data nodes being established; and (iv) the National Big Data Strategy for Research, Development and Innovation being implemented.

An NDP target, under the theme "expanding access to communication technology", is 100% broadband penetration by 2020. The DSI is contributing to this target through the roll-out of the South African National Research Network (SANReN) project. It is estimated that SANReN's projected total available broadband capacity by the 2024/25 financial year will be 7 100 Gbps, which will be achieved through the addition of several new network links and sites, the upgrading of existing links and transmission equipment, and the activation of additional international West Africa Cable System (WACS) capacity. This translates into giving more than a million users access to broadband connectivity.

The Multiwavelength Astronomy Strategy seeks to position South African as a vibrant hub for astronomy facilities and sciences – harnessing South Africa's geographical advantage of clear, dark skies and radio silence in the Northern Cape. For South Africa to become one of the leading nations in the discipline of astronomy, it has to develop world-class infrastructure and the requisite skills, allowing for notable scientific discoveries – this is already being made possible by the completed MeerKAT telescope. The focus in the 2020-2025 period is on enhancing the scientific capabilities of the MeerKAT through the installation of S-band and L-band receivers, and expanding the MeerKAT by an additional 20 dishes. The DSI will also be working closely with the South African Radio Astronomy Observatory (SARAO) and the Northern Cape government to ensure socio-economic benefits to the surrounding communities and to enhance public awareness of the project and the opportunities it presents.

The SKA Organisation is progressing well with preparations for SKA Phase 1, and South Africa continues to play an active role in the project. It was one of seven countries (with Australia, China, Italy, the Netherlands, Portugal and the United Kingdom) to sign a treaty establishing the SKA Observatory on 12 March 2019. Other countries are expected to join later as the project progresses. South Africa is also working on getting the SKA Observatory treaty ratified by Parliament. The SKA Observatory is an intergovernmental organisation tasked with the construction and operations of the SKA radio telescope. The quality of astronomy infrastructure will allow world-class research.

The implementation of the Protection, Promotion, Development and Management of Indigenous Knowledge Act, 2019, will lead to the development of new policy initiatives. Regulations will have to be facilitated to enable the DSI to lead the implementation of the Act. A special services delivery unit (SSDU) will be established to serve as the authority regulating the IKS sector. The registration of indigenous knowledge through the National Recordal System will run on the SSDU platform. The setting up of institutional units for the recognition of prior learning in IKS disciplines will be a novel contribution by the DSI to developing human capabilities in ways currently outside the mainstream.

In the coming medium-term period, the Department aims to create capability for knowledge brokerage. The Earth Systems Science Research Programme, introduced under the Global Change Research Plan, has been a driver of several programmes under the NRF, the South African National Biodiversity Institute, the CSIR and the Agricultural Research Council. The intention is for the knowledge generated through these programmes to be entered into databases for analytics so that the outputs of knowledge products and services can be deployed in science services to solve problems arising from the climate change crisis, environmental degradation, desertification, loss of biodiversity, etc.

The establishment of an IK-based Bioinnovation Institute will be essential for interfacing and mainstreaming the wealth timeless African wisdoms for applied integral research, inclusive innovation, local technology transfer, holistic enterprise development and conscious commercialisation.

The institute will be a precursor for the establishment of world-class natural products industries on the African continent.

Outcome 4: Knowledge utilisation for economic development –

(a) revitalising existing traditional industries and
(b) stimulating R&D-led industrial development

In support of Outcome 4, which involves (a) revitalising existing (traditional) industries and (b) stimulating R&D-led industrial development, the Department has identified the following four outcome indicators to measure progress over the strategic plan period:

4.1 Rand value of RDI investment attracted to support RDI needs identified through the sector master plan process.

4.2 Number of SMMEs/co-operatives whose performance has improved or who have secured new opportunities through support provided by the DSI and its entities.

4.3 Percentage increase in the commercialisation of granted intellectual property rights from publicly funded research and development (R&D).

4.4 Number of new R&D-led industrial development opportunities initiated by the DSI.

The Department is participating in the development of a number of sectoral master plans that will be implemented over the strategic planning period, including agriculture, the oceans economy, energy, mining and health. In partnership with other national, provincial and local government departments, the DSI will implement common flagship programmes in support of priority sectors as reflected in the national reimagined/revitalised industrial strategy.

Energy security remains a serious challenge for South Africa, with rolling blackouts caused by a lack of generating capacity at the country's utility, leading to constrained economic growth, and crippling not only SMMEs but also production in the industrial sector. Progress in the electrification of rural households is hindered by difficult terrain which impedes the deployment of bulk infrastructure, while the growth of informal households in urban areas continues to be exacerbated by the steady influx of residents from rural areas of the country, leading to a decline in the percentage of households electrified in the economic hubs of Gauteng and the Western Cape. Partnering with the Department of Mineral Resources and Energy, the DSI will continue deploying fuel cells at government buildings and critical infrastructure such as airports, as well as rural formal and urban informal settlements, to assess whether alternative technologies such as fuel cells can reduce the impact of rolling blackouts on service delivery, as well as speed up the rate of electrification. Using industrial ports as the nerve centres for scaling up the use of clean hydrogen is a critical step in the process of building a hydrogen economy in South Africa.

The recently released Integrated Resource Plan gives a clear indication that, while solar and wind technologies have an important role in the country's electricity mix, a just transition requires STI to speed up the penetration of abatement technologies to minimise greenhouse gas and pollutant emissions from existing and future fossil-based power-generation installations. A carbon capture and use flagship programme will therefore be introduced through a public-private partnership to find solutions that will protect the sustainable development of the country while revitalising existing sectors of the economy.

The role of energy storage in both the mobility and utility sector has been emphasised by the Green Transport Strategy recently released by the Department of Transport, as well as the announcement of Eskom on the roll-out of utility scale batteries in support of the country's power system. Building on the successful launch of the pilot plant for the manufacturing of lithium-ion battery precursor materials, the Energy Storage Research, Development and Innovation Programme is putting in place strategic international partnerships (with Argonne National Laboratory) to speed up the commercialisation of technologies in the portfolio while strengthening relationships with local private-sector partners. The focus will be on producing precursor materials based on manganese in the early part of the value chain, and using South Africa's abundant mineral resources of fluorspar as a source of electrolytes for lithium-ion batteries.

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 innovation, to support the demonstration and piloting of new technologies and upscale these where and when appropriate, and to ensure that suitable IP protection and support mechanisms are in place.

The indigenous knowledge-based bioinnovation sector will focus on interfacing and mainstreaming, through organised institutionalisation, the creation of high-end products (traditional medicines, cosmeceuticals and nutraceuticals, including herbal beverages), enterprise development (SMME support) and the commercialisation of natural products.

The IK-Based Bioinnovation Institute framework is being finalised. The aim is to ensure the alignment of various players in the innovation system in order to create a seamless process from concept generation and applied research, to product development and commercialisation.

Priority will be given to the development of COVID-19 solutions in terms of antiviral therapies, immune modulators, nutraceuticals and health supplements. This will be done under guidelines produced by the World Health Organization's African Regional Expert Committee on Traditional Medicine for COVID-19, which is chaired by a South African. The committee has endorsed a protocol for phase III clinical trials of herbal medicine for COVID-19.

Building on the partnership with WHO, the development of a proprietary African medicines policy, and establishment of the African medicines clinical trials working group and registration committees have also become areas of focus for South Africa. There is collaboration with the South African Health Products Regulatory Authority (SAHPRA). This initiative facilitates the advanced development of IK-based products and the upscaling of SMMEs, and the manufacturing and commercialisation of natural products in a properly regulated environment. Both the Technology Innovation Agency (TIA) and the Industrial Development Corporation have created a value-chain that will close existing commercialisation chasms and promote the flow of knowledge, research, innovation and commercialisation.

The DSI leads the RDI aspect of the national master plan programme on medicinal cannabis and hemp. The focus is on developing medicines, nutraceuticals and cosmeceuticals from cannabis. This work is being done together with other government departments in collaboration with civil society, academia and business, and is grounded on the principles of socio-economic transformation, especially the inclusion of for women and youth.

The National Intellectual Property Management Office (NIPMO), which is the implementing office for the Intellectual Property Rights from Publicly Financed Research and Development Act (IPR Act), stimulates greater economic and social returns (from IP generated through R&D activities conducted using public funds), through a number of interventions, including financial support for the offices of technology transfer (OTTs) at various research institutions, and the Intellectual Property Fund. By the end of 2018/19, NIPMO had provided financial support in excess of R176 million for, among other things, the creation of 132 posts for highly skilled individuals through the OTT Support Fund. Furthermore, financial support for the statutory protection and maintenance of IP rights has exceeded R160 million since the inception of the IP Fund. Both areas will continue receiving support in the 2021/22 financial year. These interventions are all aimed at equipping institutions to increase knowledge utilisation to advance economic and social development, through the recognition and protection of IP.

The Department will continue to scale-up its network of technology stations/platforms in order to provide cross-cutting/cross-sector technological support for SMMEs, potential entrepreneurs and co-operatives. Access to technological support is essential in new product/process development (or improvement) and in developing prototypes and concept demonstrators.

The Department will also continue managing a portfolio of projects with the potential of creating new industries or rejuvenating existing industries. The current projects in this portfolio are the Aeroswift additive manufacturing machine, the mining extraction RDI programme, the bioeconomy, hydrogen fuel cells, and the fourth phase of the Fluorochemicals Expansion Initiative.

Outcome 5: Knowledge utilisation for inclusive development

In support of Outcome 5, the Department has identified the following outcome indicators to measure over the strategic plan period:

5.1 Grassroots innovations whose commercialisation has been facilitated by the support/access of the multi-tiered support package provided by the DSI.

5.2 Publicly financed IP made available in support of grassroots innovators.

In focusing on these two outcomes, the DSI will be advancing its commitment to an inclusive and responsive NSI, characterised by equitable access to the knowledge infrastructure. These outcomes premised on inclusion are key for reimagining the NSI as inclusive with a broader concept of innovation in line with the national development profile and social dynamics. In using the multi-tiered package to support the commercialisation of grassroots innovations, the key aspects will include technology development; compliance with industry standards (where applicable); and protection of IP and mentorship. These aspects are key in enabling the participation of grassroots innovators, who are often marginalised in technology-based economic development opportunities. As part of enhancing the use of IP generated from publicly funded research, the DSI will facilitate access to this IP, working with relevant partners. There will be a more deliberate focus on IP related to solutions that enable and improve access to basic services; strengthen the capacity of the state in service delivery; and promote the inclusion of women, young people, and people living with disabilities.

In pursuing the two outcomes, the DSI will focus on strengthening partnerships with relevant government departments and research institutions, organisations responsible for compliance and setting standards, higher education and post-school institutions, the private sector and non-profit organisations. These partners are all key in providing a systemic and approach comprehensive support to grassroots innovation, ensuring that its potential role in economic development is realised and enhanced. The focus on facilitating the commercialisation of grassroots innovation and its access to publicly available

IP will be pursued in line with the commitment for the deployment of locally developed technology solutions. The instruments used will include technology demonstrations, agroprocessing facilities, and support for entrepreneurs.

While focused on technology development and commercialisation, the aim of knowledge for inclusive development is innovation deployment, i.e. ensuring that creative ideas find expression in the market. The following are some ways of promoting inclusive development:

- Encouraging science-based risk-taking to enable innovations to be tested for market readiness and transforming the use or application of conventional products or services.
- Full value chain assessment and development (e.g. in the creation of technology platforms and preclinical capabilities).
- Coordinating stakeholders and role players to maximise transmission to market opportunity (e.g. using stakeholder committees to steer programmes).
- Co-funding to ensure that the limited resources of the DSI are extended (e.g. through partnerships with other government departments or the private sector).
- Adopting an NSI approach, which recognises that skills, resources and opportunities are highly dynamic, and that networking and facilitating partnerships beyond public support is essential.

Outcome 6: Innovation in support of a capable and developmental state

In support of Outcome 6, the Department has identified the following four outcome indicators to measure over the strategic plan period:

6.1 Increase in the number of use cases of decision-support systems.

6.2 Number of demonstrators that have successfully introduced a new way of delivering a service.

6.3 Number of district/metropolitan municipalities supported with technology-based applications as part of the District Development Model for Service Delivery Improvement.

6.4 Evidence of informed integration of innovation in service delivery.

The DSI is a national department that does not have a provincial or local footprint, which can be a challenge in implementing national STI interventions. However, through the Regional Innovation Support Programme, the DSI is contributing to the development of innovation ecosystems and a capable and developmental state. A concerted effort is being made to increase the spatial footprint of innovation support so that innovation can enable localised socio-economic development. Provincial growth and development and local economic development strategies will be studied to enable the Department to better align its innovation-support interventions with the District Development Model.

Since service delivery is implemented at local government level, this is where technology deployment in support of a capable state is needed. It is necessary to pilot technologies that facilitate service delivery to ensure appropriate technology deployment – for waste management, water and wastewater management, housing, sanitation and energy provision, among others. In order to address South Africa's climate and SDG obligations, technologies for the circular economy must be included to enable the transition to a low-carbon economy.

To build a coherent system to address both SDGs and climate change effects, a digital economy is required. The DSI will contribute to this through focused programmes that enable innovation and build capacity in the post-school system in ICT domains such as data science, artificial intelligence, the Internet of Things and cybersecurity. Capacity to use 5G and other wireless technologies optimally must also be developed, enabling the state and citizens to take advantage of digital economy opportunities.

PROGRAMME 1: Administration

Purpose

To provide strategic policy and planning alignment, ensure effective governance, risk management, and monitoring and evaluation (M&E) within DSI and among entities, and provide strategic science communication and branding of the activities of the DSI, its entities and the national system of innovation (NSI).

Chief directorates

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

The Ministry and the Office of the Director-General

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

mechanisms for handling Parliamentary questions and replies, Cabinet matters, correspondence, submissions and memoranda. It also coordinates activities within the Department to assist in steering the NSI towards the development of a knowledge-intensive economy with higher productivity levels.

Enterprise Risk Management

Provides and drives an enabling environment in support of the identification, management and oversight of risks across strategic, tactical and operational levels in the Department. This role includes ensuring that countering fraud and/or corruption is made an integral part of strategy, operations and administration within the Department.

Policy, Planning, Governance, Monitoring and Evaluation

Supports the DSI leadership in steering the NSI by facilitating the coordination of selected cross-cutting issues in the Department, strategic and operational planning, monitoring and evaluation for the Department and its public entities, and governance of the public entities, in order to assist the Department and its entities to contribute to the realisation of departmental and national priorities.

Internal Audit

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

Human Resources Management

Ensures that the Department is able to (a) provide a professional service through accurate, consistent and best employment practices in all its activities; (b) attract, retain and motivate employees who share the organisational vision; (c) champion organisational transition, with a view to ensuring that change is embraced; (d) set performance standards and manage performance against them; (e) promote an environment that supports the personal and career development of all employees so that they can reach their full potential and contribute better to the achievement of the Department's strategic objectives; (f) instil a culture of service excellence; and (g) provide an environment that promotes health, wellness and safety, and embraces the value of diversity.

Finance

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

Information Systems and Knowledge Management

Is responsible for the delivery of services that support the Department's strategic plan and individual units' objectives through the effective use of information technology, the institutionalisation of knowledge management, and the preservation of the Department's institutional memory. Its purpose is to align the Information Systems and Knowledge Management Strategy with the business strategy to ensure that the Department achieves optimum use of its resources. In addition, the chief directorate is tasked with the responsibility of providing cutting-edge technologies that will optimise the use of information in a reliable and secure manner. This includes the implementation of effective and efficient business systems that meet users' needs, the provision of reliable IT infrastructure, and creating capacity for proper information management and business intelligence.

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 DSI, entity and NSI stakeholders. It seeks to provide the public with timely, accurate and clear information that is widely accessible to all South Africans about government policies, programmes, plans, services and initiatives in a non-partisan way, thus making it accountable to the public it serves. 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. Through the branding of the Department and its entities, it will demonstrate how the Department is "Making sure it's possible", and how, through the DSI's various initiatives, STI can transform and empower society. It promotes dialogue between citizens and government, including on policy, and establishes partnerships with a range of stakeholders, including the private sector, higher and post-school education institutions, and research institutions.

Legal Services

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

Table 2: Outcomes, outputs, performance indicators and targets for 2021/22

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Innovation in support of a capable and developmental state	DSI public entities' APPs and shareholder compact	DSI public entities' annual performance plans and CSIR shareholder compact approved by the Minister	DST public entities' 2018/19 strategic and annual performance plans and CSIR shareholder compacts signed by the Minister and chairpersons of the boards by 31 March 2018	DST public entities' 2019/20 annual performance plans and annual reports approved by the Minister by 31 March 2019	DST public entities' 2019/20 annual performance plans and annual reports approved by the Minister by 31 March 2020	DSI public entities' 2021/22 annual performance plans (NRF, HSRC, TIA, SANSA, NACI, SACNASP and ASSAf) and CSIR shareholder compact signed by the Minister and chairpersons of the boards by 31 March 2021	DSI public entities' 2022/23 annual performance plans (NRF, HSRC, TIA, SANSA, NACI and ASSAf) and CSIR shareholder compact approved by the Minister by 31 March 2022	DSI public entities' 2023/24 Annual Performance Plans (NRF, HSRC, TIA, SANSA, NACI and ASSAf) and CSIR shareholder compact by the approved Minister by 31 March 2023	DSI public entities' 2024/25 Annual Performance Plans (NRF, HSRC, TIA, SANSA, NACI and ASSAf) and CSIR shareholder compact approved by the Minister by 31 March 2024
	Decadal plan for the national system of innovation	Approved decadal plan to implement the 2019 White Paper on Science Technology and Innovation	-	-	-	Finalisation of the decadal plan and approval by Cabinet by 31 March 2021	Finalisation of the decadal plan and approval by Cabinet by 30 June 2021	Implementation of the decadal plan priorities by 31 March 2023	Implementation of the decadal plan priorities by 31 March 2024
	Reduce vacancy rate	Percentage of approved funded positions filled annually	-	-	-	75% of all approved funded positions filled by 31 March 2021	85% of all approved funded positions filled by 31 March 2022	90% of all approved funded positions filled by 31 March 2023	94% of all approved funded positions filled by 31 March 2024
	Good financial governance	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General by 30 September 2020	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General by 30 September 2021	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General by 30 September 2022	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General by 30 September 2023

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
A transformed, inclusive, responsive and coherent NSI	Media and marketing initiatives to profile the DSI and its entities	Number of media platforms used to promote the DSI and its entities	-	-	-	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities by 31 March 2021	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities by 31 March 2022	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities by 31 March 2023	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities by 31 March 2024
		Number of branding initiatives developed and implemented	-	-	-	Two national thematic campaign reports on the branding roll-out initiatives by 31 March 2021	Two national thematic campaign reports on the branding roll-out initiatives by 31 March 2022	Two national thematic campaign reports on the branding roll-out initiatives by 31 March 2023	Two national thematic campaign reports on the branding roll-out initiatives by 31 March 2024

Table 3: Indicators, annual and quarterly targets for the 2021/22 financial year

No.	Output performance indicator[3]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1.	DSI public entities' annual performance plans and CSIR shareholder compact approved by the Minister and signed by the chairpersons of the boards	DSI public entities' 2022/23 annual performance plans (NRF, HSRC, TIA, SANSA, NACI and ASSAf) and CSIR shareholder compact approved by the Minister and signed chairpersons of the boards by 31 March 2022 *(Non-cumulative target)*	No target	No target	First draft APPs and shareholder compacts for DSI public entities submitted to NT and the DPME by 30 October 2021 for concurrence	Second and final draft APPs and shareholder compacts for DSI public entities approved by the Minister and signed by the chairperson of the boards by February 2022
2.	Approved decadal plan to implement the 2019 White Paper on Science Technology and Innovation	Finalisation of the decadal plan and approval by Cabinet by 30 June 2021 *(Non-cumulative target)*	Cabinet approval of the decadal plan	Consultation with NSI stakeholders	Alignment of strategic plans and APPs of the DSI and its entities and the CSIR shareholder compact to the decadal plan priorities	Alignment of SP and APPs of the DSI and its entities and the CSIR shareholder compact to the decadal plan priorities
3.	Percentage of approved funded positions filled annually	85% of all approved funded positions filled by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	85% of all approved funded positions filled by 31 March 2022
4.	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General by 30 September 2021 *(Non-cumulative target)*	No target	Unqualified audit opinion with no financial matters in the audit report from the Auditor-General	No target	No target

[3] The technical indicator description for each output performance indicator detailing source data, method of calculation, means of verification, etc., is set out in Part *D*.

No.	Output performance indicator[3]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
5.	Number of media platforms used to promote the DSI and its entities	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities by 31 March 2022 *(Non-cumulative target)*	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities	Six platforms (print, broadcast, online, media liaison, stakeholder engagement and social media) to profile the DSI and its entities
6.	Number of branding initiatives developed and implemented.	Two national thematic campaign reports on the branding roll-out initiatives by 31 March 2022 *(Cumulative target)*	No target	One roll-out branding initiatives (thematic billboards and social media) across provinces and metropolitan municipalities	No target	Two roll-out branding initiatives (thematic billboards and social media) across provinces and metropolitan municipalities

[3] The technical indicator description for each output performance indicator detailing source data, method of calculation, means of verification, etc., is set out in Part *D*.

Explanation of planned performance over the medium term

Over the medium-term, the budget programme aims to provide centralised strategic administrative support; strategic policy and planning alignment; effective corporate governance, risk management and monitoring and evaluation; strategic science communication with stakeholders on the activities of the DSI and the NSI; and effective human resource management within the Department, including staffing, human resource development, performance management, labour relations and human resource administrative systems.

Effective financial management practices, including management accounting, financial accounting and supply chain management and asset management, will be implemented, in line with the requirements of the Public Finance Management Act (PFMA).

Particular attention will be given to effective cash flow management within the organisation to ensure that the Department remains within its budgetary allocations, taking cognisance of the current economic environment and fiscal constraints. The monitoring and evaluation of the financial management of public entities reporting to the Department will be strengthened. The budget programme supports two of the six departmental outcomes that have been adopted, namely, a transformed, inclusive, responsive and coherent NSI; and innovation in support of a capable and developmental state.

The table below sets out how the medium-term budget allocation (2021/22 – R328 196; 2022/23 – R322 550; and 2023/24 – R333 293) will be used to realise the budget programme outputs identified in both the 2021/22 Annual Performance Plan and the 2021/22 Annual Operational Plan.

Reconciling performance targets with the budget and MTEF

Table 4: Administration expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation	Medium-term expenditure estimates		
	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Ministry	8 250	8 949	2 896	5 886	5 515	5 559	5 559
Institutional planning and support	196 466	201 424	170 099	141 180	169 004	171 181	171 504
Corporate services	145 640	166 993	144 235	151 434	148 119	150 107	150 506
Office accommodation	7 548	2 156	34 846	5 607	5 558	5 703	5 724
TOTAL	**357 904**	**379 522**	**352 076**	**304 107**	**328 196**	**332 550**	**333 293**
Compensation of employees	167 507	179 734	161 369	171 901	170 010	170 184	170 183
Goods and services	151 683	174 834	160 103	113 208	140 069	143 686	144 236
Transfers and subsidies	17 526	14 595	22 723	15 594	15 264	15 665	15 726
Payments for capital assets	21 085	10 241	7 774	3 404	2 853	3 015	3 148
Payments for financial assets	103	118	107	-	-	-	-
TOTAL	**357 904**	**379 522**	**352 076**	**304 107**	**328 196**	**332 550**	**333 293**

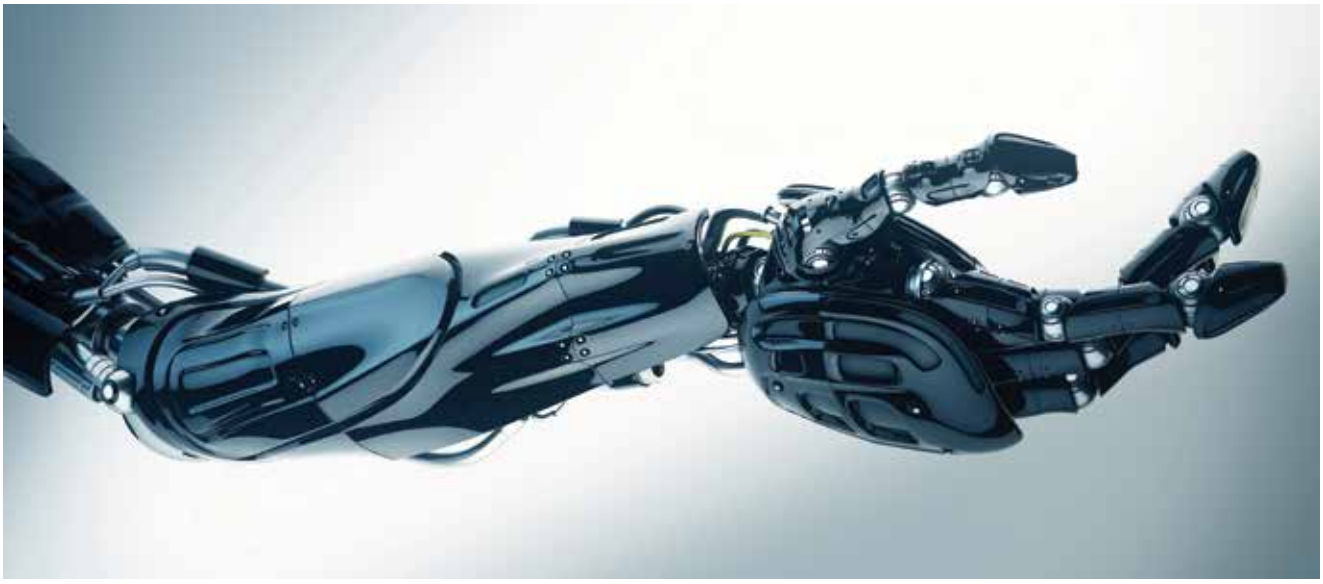
Table 5: Updated key risks and mitigation – Administration

Outcome	Key risks	Mitigation action
Outcome 1: A transformed, inclusive, responsive and coherent NSI	Sub-optimal implementation of the 2019 White Paper.	Establishment of Ministers' Science, Technology and innovation structure (Ministerial level committee for science technology and innovation) Establishment of the Presidency-level STI Plenary. Presentation of the finalised Decal Plan to Clusters and incorporate input received.
	Insufficient demonstration of socio-economic impact of STI.	M&E development of socio-economic and environmental outcome and impact indicators. Virtual Brown bag sessions with DSI to raise awareness on planning and M&E linkages (to internalise the White Paper). (Due to lockdown measures imposed)
	Misalignment of Entity objectives with DSI's objectives.	No action plans required as all controls are effective and the residual risk exposure is equal to required residual risk exposure. This a low risk, management will continue to monitor any changes
	Stakeholders (public) uninformed and/or unaware of the work/offerings of the DSI/ NSI.	Implementation and roll-out of the Communication campaigns aimed at external audiences, and reports will be generated at end of each campaign (bi-annual). Hosting virtual events (the challenge remains the poor internal and external Broadband coverage). Engagements with communities through the use of community radios to reach the rural, marginalized or grassroot communities. Branding initiatives developed and implemented.
Outcome 6: Innovation in support of a capable and developmental state	Inaccurate, unreliable and incomplete reporting of actual achievements against predetermined objectives as indicated in the APP (Qualified Audit Opinion on non-financial performance).	Implementation and monitoring of the Department of Science and Innovation Performance Information Reporting Guidelines. (The purpose of this document is to clarify the roles of Programme Management, Monitoring and Evaluation (M&E) and Internal Audit Activity (IAA) in ensuring that Performance Information (PI) reported is accurate, complete, reliable and valid).
	Delay in the filling of prioritised posts.	Facilitate the annual review and approval of all Job Descriptions Facilitate dedicated recruitment processes for scarce skills Streamline processes and align the department`s recruitment plan with the DPSA advertisement schedule Benchmark Job Descriptions with similar positions in other departments
	Over and material under spending of the DSI budget.	Implementation of the budget restructuring process Enhance the quality of the budget bids by starting the process earlier.
	Ineffective Procurement system	Engage with HR to conduct skills audit for SCM. Evaluate the possibility to acquire a procurement system to pay.

PROGRAMME 2:
Technology Innovation

Purpose

To promote technology development and the protection and utilisation of publicly funded intellectual property for innovation with socio-economic impact.



Chief directorates

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

Bioinnovation

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

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

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

Hydrogen and Energy

The chief directorate supports the reduction in greenhouse gas emissions and air pollution, contributing to a more diverse and sustainable energy mix by enabling the widespread commercialisation of battery, fuel cell, renewable and low-carbon technologies based on publicly funded intellectual property rights. It supports the competitiveness and penetration of clean and alternative energy technologies through research, development and validation efforts with current technologies in terms of cost and performance while fostering strategic partnerships with the public and private sectors to reduce the institutional and market barriers to their commercialisation.

The chief directorate has three directorates managing thematic priorities aligned to its focus areas, namely, Hydrogen and Energy, Transport Fuels and Renewable Energy, and Power.

Space Science and Technology

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

The chief directorate supports the creation of an environment conducive to the implementation of the National Space Strategy and the South African Earth Observation Strategy, 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 also plays a critical oversight function over the South African National Space Agency (SANSA).

The chief directorate has two directorates managing thematic priorities aligned to its focus areas, namely, Earth Observation and Space Science.

Innovation Priorities and Instruments

The chief directorate supports and strengthens the innovation policy package (and related interventions) with the aim of creating and sustaining an enabling environment for innovation, technology development, and the utilisation, including commercialisation, of publicly funded R&D initiatives. It does this by identifying, developing, creating and supporting policy and institutional structures that facilitate technology development and its progression into national and international markets.

The chief directorate also supports the development and implementation of emerging technologies, in areas such as synthetic biology, structural biology, systems biology and functional genomics (collectively comprising the South African BioDesign Initiative), nanotechnology, photonics and robotics, and converging technologies that have the potential to influence and affect social and economic development positively. These emerging technologies are being brought together under the Converging Technologies Platform, which seeks to emphasise their role in providing solutions to complex social and economic challenges in their integrated form.

The chief directorate supports the building of innovation and entrepreneurship culture through industry internships in partnership with the Technology Top 100 companies. It has oversight of the Technology Innovation Agency (TIA) and also augments seed, technology development and commercialisation funding. The chief directorate implements the Innovation Fund, which seeks to promote the commercialisation of publicly funded R&D.

The chief directorate has two directorates managing thematic priorities aligned to its focus areas, namely, Emerging Research Areas and Innovation Instruments.

National Intellectual Property Management Office

NIPMO, established as the implementing agency for the IPR Act, is currently located in the Department as a specialised service delivery unit. NIPMO's mandate is to ensure that intellectual property from publicly financed research and development is identified, protected, utilised and commercialised for the benefit (social, economic, military or any other) of the people of South Africa.

NIPMO ensures this mandate through numerous enabling mechanisms and the enforcement of compliance provisions, as set out in the IPR Act. NIPMO supports offices of technology transfer (OTTs) at institutions (27 higher education institutions and 11 institutions listed in Schedule 1 of the IPR Act, which are mostly science councils) by providing funding assistance for the salaries of technology transfer professions in the OTT, associated capacity development, operational costs as well as technology transfer-related costs for business case development, intellectual property audits, and techno-economic feasibility analyses, among other things. Funding support is also provided as a rebate through the Intellectual Property Fund for intellectual property prosecution and maintenance costs in line with the NIPMO guideline. In order to drive the use of research for socio-economic impact, NIPMO provides incentives to IP creators to encourage them to disclose, protect and utilise their creations. NIPMO also oversees the Innovation Bridge Portal and the commercialisation project management system as an effective means to strategically fund technology development and provide a platform for technologies to find partners and reach the market. Lastly, NIPMO develops guidelines, practice notes and interpretation notes, including on approvals and mandatory reporting requirements, which provide clarity on how to interpret and apply the IPR Act.

By providing this mix of enabling and compliance services, NIPMO contributes towards increasing the rate of knowledge utilisation from publicly funded R&D, thereby contributing to economic development in South Africa.

Planned policy initiatives over the medium term

Planned policy initiatives	Key actions
Innovation Fund (previously called the Sovereign Innovation Fund) to support the commercialisation of locally developed IP	• Present progress to ESIEID Cluster • Ultimately present implementation update to Cabinet
The amendment of the IPR Act	• Review, adapt (where appropriate) and implement recommendations of the Ministerial Review Panel
Institutional review of TIA and SANSA	• Review, adapt (where appropriate) and implement the recommendations of the Ministerial Review Panel • Appointed SANSA Review Panel
Business case for commercial space launch capability in South Africa	• Cabinet
Hydrogen Society Roadmap	• Present to Economic Sectors, Investment, Employment and Infrastructure Development Cluster • Ultimately present to Cabinet

Table 7: Outcomes, outputs, performance indicators and targets for 2021/22

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Innovation in support of a capable and developmental state	Decision-support tools	Number of decision-support tools utilised in all spheres of government	3 decision-support interventions maintained by 31 March 2018	2 decision-support interventions maintained by 31 March 2019	3 decision-support interventions maintained by 31 March 2020	3 decision-support tools developed and/ or maintained by 31 March 2021	2 decision-support tools developed and/ or maintained by 31 March 2022	2 decision-support tools developed and/ or maintained by 31 March 2023	2 decision-support tools developed and/ or maintained by 31 March 2024
	SANSA and TIA oversight to ensure alignment with government priorities	Number of strategic and technical engagements with SANSA and TIA to ensure alignment with national priorities	-	-	-	8 strategic and technical engagements with SANSA and TIA to ensure alignment with national priorities by 31 March 2021	8 strategic and technical engagements with SANSA and TIA to ensure alignment with national priorities by 31 March 2022	8 strategic and technical engagements with SANSA and TIA to ensure alignment with national priorities by 31 March 2023	8 strategic and technical engagements with SANSA and TIA to ensure alignment with national priorities by 31 March 2024
	SANSA Regional Space Weather Centre development and upgrades completed	Provision of space weather information for the aviation industry in South Africa and the African continent	-	-	-	SANSA Regional Space Weather Centre upgrades initiated by 31 March 2021	3 new Products and / or Services developed (linked to High Frequency Propagation and / or Global Navigation Satellite System applications) by 31 March 2022	New SANSA Regional Space Weather Centre upgrades commissioned by 31 March 2023	Fully operational space weather centre issuing bulletins and warnings to at least two sectors in South Africa and Africa by 31 Mar 2024
	CubeSat launched	Number of maritime domain awareness (MDA) missions completed in support of the Oceans Economy Phakisa	-	-	-	Flight model delivered and ready for launching by 31 December 2020	Launch of 3 CubeSats for MDASat constellation	Manufacturing of 3 more CubeSats for MDASat constellation initiated by 31 March 2023	Manufacturing of 3 more CubeSats for MDASat constellation initiated by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Human capabilities and skills for the economy and for development	Support provided to master's and doctoral students[4]	Number of postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments and bioeconomy areas	266 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2018	354 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2019	297 postgraduate students (master's and doctoral) funded in designated areas by 31 March 2020	200 postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments and bioeconomy areas by 31 March 2021	190 postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments, and bioeconomy areas by 31 March 2022	180 postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments, and bioeconomy areas by 31 March 2023	180 postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments, and bioeconomy areas by 31 March 2024
	Artisans and/ or technicians trained for the energy, space and bio-economy	Number of artisans and/ or technicians trained in space, energy and bio-economy	-	-	-	20 artisans and/ or technicians trained in the energy and agriculture sectors of the economy by 31 March 2021	20 artisans and/ or technicians trained in space, energy and bio-economy by 31 March 2022	20 artisans and/ or technicians trained in space, energy and bio-economy by 31 March 2023	20 artisans and/ or technicians trained in space, energy and bio-economy by 31 March 2024
	People trained in intellectual property management and technology transfer	Number of trainees upskilled in intellectual property management and technology transfer	256 trainees attending training initiatives in designated areas by 31 March 2018	336 trainees attending training initiatives in designated areas by 31 March 2019	242 trainees attending training initiatives in designated areas by 31 March 2020	225 trainees upskilled in intellectual property management and technology transfer skills by 31 March 2021	250 trainees upskilled in intellectual property management and technology transfer skills by 31 March 2022	250 trainees upskilled in intellectual property management and technology transfer skills by 31 March 2023	250 trainees upskilled in intellectual property management and technology transfer skills by 31 March 2024

[4] Several chief directorates contribute towards the support for master's and doctoral students. Contributions may come from major projects such as the Strategic Health Innovation Partnerships (SHIP), Hydrogen South Africa (HySA) and the Agricultural Bioeconomy Innovation Partnership Programme (ABIPP).

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Increased knowledge generation and innovation outputs	Disclosures received from publicly financed research and development institutions	Number of disclosures received from publicly financed research and development institutions by NIPMO	239 new disclosures reported by publicly funded institutions by 31 March 2018	311 new disclosures reported by publicly funded institutions by 31 March 2019	258 new disclosures reported by publicly funded institutions by 31 March 2020	225 disclosures received from publicly financed research and development institutions by NIPMO by 31 March 2021	235 disclosures received from publicly financed research and development institutions by NIPMO by 31 March 2022	250 disclosures received from publicly financed research and development institutions by NIPMO by 31 March 2023	250 disclosures received from publicly financed research and development institutions by NIPMO by 31 March 2024
	Disclosures licensed annually	Number of disclosures licensed for the first time received from publicly financed research and development institutions and recipients as reported by NIPMO	New	New	New	New	15 disclosures licensed for the first time received from publicly financed research and development institutions and recipients as reported by NIPMO by 31 March 2022	18 disclosures licensed for the first time received from publicly financed research and development institutions and recipients as reported by NIPMO by 31 March 2023	20 disclosures licensed for the first time received from publicly financed research and development institutions and recipients as reported by NIPMO by 31 March 2024
	Improve the filing of publicly funded intellectual property rights[5]	Number of intellectual property rights filed based on RDI conducted in designated areas	-	-	-	4 intellectual property rights filed based on RDI conducted in designated areas by 31 March 2021	4 intellectual property rights filed based on RDI conducted in designated areas by 31 March 2022	4 intellectual property rights filed based on RDI conducted in designated areas by 31 March 2023	4 intellectual property rights filed based on RDI conducted in designated areas by 31 March 2024

[5] Several chief directorates contribute towards the support for master's and doctoral students. Contributions may come from major projects such SHIP, HySA and ABIPP.

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
	Technology demonstrations, prototypes, products and services developed[6]	Number of technology demonstrations, prototypes, products and services developed	-	-	-	10 technology demonstrations, prototypes, products and services developed in designated energy, space, Innovation Priorities and Instruments, and bioeconomy areas by 31 March 2021	10 technology demonstrations, prototypes, products and services developed in designated energy, space, Innovation Priorities and Instruments, and bioeconomy areas by 31 March 2022	7 technology demonstration, prototypes, products and services developed in designated energy, space, Innovation Priorities and Instruments, and bioeconomy areas by 31 March 2023	5 technology demonstration, prototypes, products and services developed in designated energy, space, Innovation Priorities and Instruments, and bioeconomy areas by 31 March 2024
Knowledge utilisation for economic development – *(a) revitalising existing (traditional) industries and (b) stimulating R&D-led development*	Deployed stationary fuel cells and/ or other clean energy technologies.	Number of stationary fuel cell systems/ clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements	-	-	-	2 stationary fuel cell systems/ clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements by 31 March 2021	2 stationary fuel cell systems/ clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements by 31 March 2022	2 stationary fuel cell systems/ clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements by 31 March 2023	2 stationary fuel cell systems/ clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements by 31 March 2024
	SMMEs assisted/ supported with business development and commercialisation	Number of SMMEs contracted and/or assisted for business development and commercialisation	-	-	-	10 SMMEs assisted with business development and commercialisation by 31 March 2021	9 SMMEs assisted with business development and commercialisation by 31 March 2022	25 SMMEs assisted with business development and commercialisation by 31 March 2023	35 SMMEs assisted with business development and commercialisation by 31 March 2024

[56] Several chief directorates contribute towards the support for master's and doctoral students. Contributions may come from major projects such SHIP, HySA and ABIPP.

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
	Commercial outputs in designated areas[7]	Number of commercial outputs in designated areas	5 commercial outputs in designated areas by 31 March 2018	7 commercial outputs in designated areas by 31 March 2019	11 commercial outputs in designated areas by 31 March 2020	4 commercial outputs in designated areas by 31 March 2021	4 commercial outputs in designated areas by 31 March 2022	5 commercial outputs in designated areas by 31 March 2023	5 commercial outputs in designated areas by 31 March 2024
	Black emerging farmers benefiting from technology/ innovation support programmes	Number of black emerging farmers (subsistence, small-scale, and potential commercial farmers) benefiting from technology/ innovation support programmes	-	-	-	200 black emerging farmers (subsistence, small-scale, and potential commercial farmers) benefiting from technology/ innovation support programmes by 31 March 2021	200 black emerging farmers (subsistence, small-scale, and potential commercial farmers) benefiting from technology/ innovation support programmes by 31 March 2022	300 black emerging farmers (subsistence, small-scale, and potential commercial farmers) benefiting from technology/ innovation support programmes by 31 March 2023	300 black emerging farmers (subsistence, small-scale, and potential commercial farmers) benefiting from technology/ innovation support programmes by 31 March 2024

[7] Several chief directorates contribute towards the support for master's and doctoral students. Contributions may come from major projects such SHIP, HySA and ABIPP.

Table 8: Indicators, annual and quarterly targets for the 2021/22 financial year

No.	Output performance indicator[8]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1.	Number of decision-support tools utilised in all spheres of government	2 decision-support tools developed and/or maintained by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	2 decision-support tools developed and/or maintained by 31 March 2022
2.	Number of strategic and technical engagements with SANSA and TIA to ensure alignment with national priorities	8 strategic and technical engagements with SANSA and TIA to alignment with national priorities by 31 March 2022 *(Non-cumulative target)*	2 strategic and technical engagements with SANSA and TIA to alignment with national priorities by 30 June 2021	2 strategic and technical engagements with SANSA and TIA to alignment with national priorities by 30 September 2021	2 strategic and technical engagements with SANSA and TIA to alignment with national priorities by 31 December 2021	2 strategic and technical engagements with SANSA and TIA to alignment with national priorities by 31 March 2022
3.	Provision of space weather information for the aviation industry in South Africa and the African continent	3 new Products and / or Services developed (linked to High Frequency Propagation and / or Global Navigation Satellite System applications) by 31 March 2022 *(Cumulative target)*	No target	1 Product and/ or Services developed	No target	3 new Products and/ or services developed by 31 March 2022
4.	Number of maritime domain awareness (MDA) missions completed in support of the Oceans Economy Phakisa	Launch of 3 CubeSats for MDASat constellation by 30 December 2021 *(Non-cumulative target)*	Flight Acceptance Review completed	No target	Launch of 3 CubeSats for MDASat constellation	Commissioning and operation of the 3 satellites
5.	Number of postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments and bioeconomy areas	190 postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments and bioeconomy sectors by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	190 postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments and bioeconomy sectors by 31 March 2022

[8] The technical indicator description for each output performance indicator detailing source data, method of calculation, means of verification, etc., is set out in Part D.

No.	Output performance indicator[8]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
6.	Number of artisans and/or technicians trained in space, energy and bio-economy	20 artisans and/or technicians trained in space, energy and bio-economy by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	20 artisans and/or technicians trained in space, energy and bio-economy by 31 March 2022
7.	Number of trainees upskilled in intellectual property management and technology transfer	250 trainees upskilled in intellectual property management and technology transfer skills by 31 March 2022 *(Non-cumulative target)*	150 trainees upskilled	No target	100 trainees upskilled	No target
8.	Number of disclosures, received from publicly financed research and development institutions by NIPMO	235 disclosures received from publicly financed research and development institutions by NIPMO by 31 March 2022 *(Non-cumulative target)*	130 disclosures received from publicly financed research and development institutions by NIPMO	No target	105 disclosures received from publicly financed research and development institutions by NIPMO	No target
9.	Number of disclosures licensed for the first time received from publicly financed research and development institutions and recipients as reported to NIPMO	15 disclosures licensed for the first time received from publicly financed research and development institutions and recipients as reported to NIPMO by 31 March 2022 *(Non-cumulative target)*	8 disclosures licensed for the first time received from publicly financed research and development institutions and recipients as reported by NIPMO	No target	7 disclosures licensed for the first time received from publicly financed research and development institutions and recipients as reported by NIPMO	No target
10.	Number of intellectual property rights filed based on RDI conducted in designated areas	4 intellectual property rights filed based on RDI conducted in designated areas by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	4 intellectual property rights filed based on RDI conducted in designated areas
11.	Number of technology demonstrations, prototypes, products and services developed.	10 technology demonstrations, prototypes, products and services developed in designated energy, space, and bioeconomy areas by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	10 technology demonstrations, prototypes, products and services developed in designated energy, space, and bioeconomy areas

No.	Output performance indicator[8]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
12.	Number of stationary fuel cell systems/clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements	2 stationary fuel cell systems/ clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	2 stationary fuel cell systems/ clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements
13.	Number of SMMEs contracted and/or assisted with business development and commercialisation	9 SMMEs assisted with business development and commercialisation by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	9 SMMEs contracted and/or assisted with business development and commercialisation
14.	Number of commercial outputs in designated areas	4 commercial outputs in designated areas by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	4 commercial outputs in designated areas
15.	Number of black emerging farmers (subsistence, small-scale and potential commercial farmers) benefiting from technology/ innovation support programmes	200 black emerging farmers benefiting from technology/ innovation support programmes by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	200 black emerging farmers benefiting from technology/ innovation support programmes

Explanation of planned performance over the medium term

Over the medium-term, the budget programme will support five of the outcomes identified in the Department's 2020-2025 Strategic Plan, namely, (i) A transformed, inclusive, responsive and coherent NSI; (ii) Human capabilities and skills for the economy and for development; (iii) Increased knowledge generation and innovation output; (iv) Knowledge utilisation for economic development in (a) revitalising existing industries and (b) stimulating R&D-led industrial development; and (v) Knowledge utilisation for inclusive development.

In 2021/22, the budget programme will do the following to ensure that 15 outputs are realised:

- Ensure that flagships that profile South Africa's NSI capabilities will include non-traditional NSI participants and extend to areas that have been previously marginalised.
- Support the development of critical high-end skills in the bioeconomy, space science and technology, energy, intellectual property, nanotechnology, robotics, photonics and areas of technology convergence that are important in building a knowledge society. This will be done in the form of specialised training interventions (formal or informal), and graduate and postgraduate student support.
- Support the development of technical and artisan skills to support the deployment of newly developed innovations, as well as technology dissemination.
- Make investments geared towards supporting the translation of publicly financed IP into social and economic value. Through NIPMO, a database of disclosures of publicly financed IP will be used as a basis for tracking the utilisation of IP through the conclusion of commercial agreements and the introduction of products and services to the public.
- Participate in the development of a number of sector master plans (Oceans Economy, Renewable Energy, Health and Agriculture) that will be implemented over the strategic planning period, in partnership with other government departments, at national, provincial and local level.
- Implement common flagships in support of priority sectors. In implementing the Innovation Fund, support new and improved innovations aimed at providing societal and economic solutions.
- Support the deployment of IP from publicly financed research and development in ways that will benefit the marginalised. The emphasis will be on enhancing service delivery improvements and the economic upliftment of rural communities, the urban poor, women, young people and people with disabilities. These instruments used will include technology demonstrations, agroprocessing facilities, and support for entrepreneurs.

The table below sets out how the medium-term budget allocation (2021/22 – R1 780 222; 2022/23 – R1 783 283; and 2023/24 – R1 793 320) will be used to realise the budget programme outputs identified over the medium-term.

Reconciling performance targets with the budget and MTEF

Table 9: Technology Innovation expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation	Medium-term expenditure estimates		
	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Office of the Deputy Director-General	4 374	5 247	6 392	3 979	4 706	4 757	4 767
Space Science	191 823	170 132	225 244	225 934	249 162	210 359	211 124
Hydrogen and Energy	147 467	164 828	176 850	183 350	188 159	193 595	197 487
Bioeconomy	161 933	215 302	194 877	204 663	203 875	209 117	209 871
Innovation Priorities and Instruments	526 793	531 360	578 064	706 159	1 079 649	1 109 635	1 113 874
NIPMO	88 164	62 093	55 246	54 236	54 671	55 820	55 997
TOTAL	**1 120 554**	**1 148 962**	**1 236 673**	**1 378 321**	**1 780 222**	**1 783 283**	**1 793 320**
Compensation of employees	44 980	45 440	43 824	52 212	51 623	51 685	51 691
Goods and services	13 815	20 133	23 609	12 359	23 152	23 763	23 848
Transfers and subsidies	1 061 702	1 083 375	1 169 239	1 313 750	1 705 447	1 707 835	1 717 781
Payments for capital assets	-	-	-	-	-	-	-
Payments for financial assets	57	14	1	-	-	-	-
TOTAL	**1 120 554**	**1 148 962**	**1 236 673**	**1 378 321**	**1 780 222**	**1 783 283**	**1 793 320**

Table 10: Updated key risks and mitigation – Technology Innovation

Outcome	Key risks	Mitigation action
Outcome 2: Human capabilities and skills for the economy and for development	Decline in public and privately funded research, development and innovation activities	Increase the number of partnerships with the private sector, NGOs, philanthropic foundations and non-profit organisations and governments (local and international).
		Solicit strategic infrastructure proposals and submit them to Programme 4 to evaluate and fund successful proposals.
Outcome 3: Increase knowledge generation and innovation outputs	Reduction in the work output for the sub –programmes, Innovation Priorities and Instruments, Space Science and NIPMO.	Ensure the Programmes participation in the IT enterprise architecture process.
		Request and agree on a 12 month maintenance agreement with the current service provider for the NIPMO Knowledge Information Management System.
Outcome 4: Knowledge utilisation for economic development in *(a) revitalising existing industries and (b) stimulating R&D-led industrial development*	Decline in public and privately funded research, development and innovation activities	Increase the number of partnerships with the private sector, NGOs, philanthropic foundations and non-profit organisations and governments (local and international).
		Solicit strategic infrastructure proposals and submit them to Programme 4 to evaluate and fund successful proposals.
	Reduction in the work output for the subprogrammes, Innovation Priorities and Instruments, Space Science and NIPMO.	Participate in Human Resource processes to carry out the filling of vacant posts which have been prioritised.
		Ensure the Programmes participation in the IT enterprise architecture process.
		Request and agree on a 12 month maintenance agreement with the current service provider for the NIPMO Knowledge Information Management System.
Outcome 6: Innovation in support of a capable and developmental state.	Misalignment in planning instruments and activities between the DSI and its entities.	Implement the recommendations set out the in the independent review of the Entities
		Participate in Human Resource processes to carry out the filling of vacant posts which have been prioritised.

PROGRAMME 3:
International Cooperation and Resources

Purpose

To develop, promote and manage international partnerships that strengthen the national system of innovation (NSI) and enable the exchange of knowledge, capacity, innovation and resources between South Africa and its international partners, particularly in Africa, in support of South African foreign policy through science, knowledge and innovation diplomacy.

Chief directorates

International Resources

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

Multilateral Cooperation and Africa

Advances and facilitates South Africa's participation in bilateral STI cooperation initiatives with other African partners, in African multilateral programmes, especially SADC and AU programmes, and in broader multilateral STI partnerships, with a strategic focus on South-South cooperation and the Sustainable Development Goals.

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.

Planned policy initiatives over the medium term

Planned policy initiatives	Key actions
African Strategy	• Consult with NSI role players • Implement plans of action with bilateral partners • Support SADC Regional Indicative Strategic Development Plan initiatives • Support AU Agenda 2063 initiatives
EU engagements	• The future of the European South African Science and Technology Advancement Programme • Framework Programme participation • Sector Budget Support funding • European and Developing Countries Clinical Trials Partnership participation • Africa-EU Policy Dialogue • SA-EU Strategic Partnerships Dialogue Facility

Table 11: Outcomes, outputs, performance indicators and targets for 2021/22

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
A transformed, inclusive, responsive and coherent NSI	International resource-leveraging engagements undertaken by the Department	Number of international resource-leveraging engagements undertaken by the Department	-	-	-	43 dedicated international resource-leveraging engagements undertaken 31 March 2021	43 dedicated international resource-leveraging engagements undertaken 31 March 2022	43 dedicated international resource-leveraging engagements undertaken by 31 March 2023	43 dedicated international resource-leveraging engagements undertaken by 31 March 2024
Human capabilities and skills for the economy and for development	South African students participating in international training programmes as part of cooperation initiatives facilitated by DSI	Number of South African students participating in international training programmes	241 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DST	1 470 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated	642 South African students participating in international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated	326 new South African students participating in international training programmes as part of cooperation initiatives facilitated by DSI by 31 March 2021	326 new South African students participating in international training programmes as part of cooperation initiatives facilitated by DSI by 31 March 2022	326 new South African students participating in international training programmes as part of cooperation initiatives facilitated by DSI by 31 March 2023	326 new South African students participating in international training programmes as part of cooperation initiatives facilitated by DSI by 31 March 2024
	Capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals	Number of capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals	-	-	-	32 capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals by 31 March 2021	32 capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals by 31 March 2022	32 capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals by 31 March 2023	32 capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
	International policy dialogues and technical exchanges to support the policy intents of the White Paper on STI	Number of international policy dialogues and technical exchanges to support the policy intents of the White Paper on STI	-	-	-	34 international policy dialogues and technical exchanges to support the policy intents of the White Paper on STI by 31 March 2021	34 international policy dialogues and technical exchanges to support the 2020 decadal plan priorities by 31 March 2022	34 international policy dialogues and technical exchanges to support the 2020 decadal plan priorities by 31 March 2023	34 international policy dialogues and technical exchanges to support the 2020 decadal plan priorities by 31 March 2024
Knowledge utilisation for economic development – *(a) revitalising existing (traditional) industries and (b) stimulating R&D-led industrial development*	STI initiatives targeting objectives of the Agenda 2063 supported	Number of STI initiatives targeting the objectives of Agenda 2063 supported	-	-	-	15 new STI initiatives targeting objectives of Agenda 2063 supported by 31 March 2021	15 new STI initiatives targeting the objectives of Agenda 2063 supported by 31 March 2022	15 new STI initiatives targeting the objectives of Agenda 2063 supported by 31 March 2023	15 new STI initiatives targeting the objectives of Agenda 2063 supported by 31 March 2024
	STI initiatives targeting the objectives of the SADC Regional Indicative Strategic Development Plan (RISDP) supported	Number of STI initiatives targeting the objectives of the SADC RISDP supported	-	-	-	17 new STI initiatives targeting the objectives of the SADC RISDP supported by 31 March 2021	17 new STI initiatives targeting the objectives of the SADC RISDP supported by 31 March 2022	17 new STI initiatives targeting the objectives of the SADC RISDP supported by 31 March 2023	17 new STI initiatives targeting the objectives of the SADC RISDP supported by 31 March 2024
	Number of STI plans of action implemented with bilateral African partners	Number of bilateral STI plans of action implemented with African partners	-	-	-	6 new bilateral STI plans of action implemented with African partners by 31 March 2021	6 new bilateral STI plans of action implemented with African partners by 31 March 2022	6 new bilateral STI plans of action implemented with African partners by 31 March 2023	6 new bilateral STI plans of action implemented with African partners by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Innovation in support of a capable and developmental state	Engagements with global science leaders to advance national priorities in multilateral forums	Number of engagements with global science leaders to advance national priorities in multilateral forums	-	-	-	12 engagements with global science leaders to advance national priorities in multilateral forums by 31 March 2021	12 engagements with global science leaders to advance national priorities in multilateral forums by 31 March 2022	12 engagements with global science leaders to advance national priorities in multilateral forums by 31 March 2023	12 engagements with global science leaders to advance national priorities in multilateral forums by 31 March 2024
	International STI initiatives focused on SDGs supported by South Africa	Number of international STI initiatives focused on SDGs supported by South Africa	-	-	-	8 new international STI initiatives focused on SDGs supported by South Africa by 31 March 2021	8 new international STI initiatives focused on SDGs supported by South Africa by 31 March 2022	8 new international STI initiatives focused on SDGs supported by South Africa by 31 March 2023	8 new international STI initiatives focused on SDGs supported by South Africa by 31 March 2024

Table 12: Indicators, annual and quarterly targets for the 2021/22 financial year

No.	Output performance indicator[9]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1.	Number of international resource-leveraging engagements undertaken by the Department	43 dedicated international resource-leveraging engagements undertaken 31 March 2022 *(Non-cumulative target)*	5 international resource-leveraging engagements	6 international resource-leveraging engagements	21 international resource-leveraging engagements	11 international resource-leveraging engagements
2.	Number of South African students participating in international training programmes	326 new South African students participating in international training programmes as part of cooperation initiatives facilitated by DSI by 31 March 2022 *(Non-cumulative target)*	10 South African students participating in international training programmes	50 South African students participating in international training programmes	82 South African students participating in international training programmes	184 South African students participating in international training programmes
3.	Number of capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals	32 capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals by 31 March 2022 *(Non-cumulative target)*	2 capacity-building initiatives for international cooperation	6 capacity-building initiatives for international cooperation	8 capacity-building initiatives for international cooperation	16 capacity-building initiatives for international cooperation
4.	Number of international policy dialogues and technical exchanges to support the policy intents of the White Paper on STI	34 international policy dialogues and technical exchanges the policy intents of the White Paper on STI by 31 March 2022 *(Non-cumulative target)*	8 international policy dialogues and technical exchanges to support the policy intents of the White Paper on STI	4 international policy dialogues and technical exchanges to support the policy intents of the White Paper on STI	11 international policy dialogues and technical exchanges to support the policy intents of the White Paper on STI	11 international policy dialogues and technical exchanges to support the policy intents of the White Paper on STI
5.	Number of STI initiatives targeting objectives of Agenda 2063 supported	15 new STI initiatives targeting objectives of Agenda 2063 supported by 31 March 2022 *(Non-cumulative target)*	No target	1 STI initiatives supporting Agenda 2063	2 STI initiatives supporting Agenda 2063	12 STI initiatives supporting Agenda 2063

[9] The technical indicator description for each output performance indicator detailing source data, method of calculation, means of verification, etc., is set out in Part D.

No.	Output performance indicator[9]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
6.	Number of STI initiatives targeting the objectives of the SADC RISDP supported	17 new STI initiatives targeting the objectives of the SADC RISDP supported by 31 March 2022 *(Non-cumulative target)*	2 STI initiatives supporting the SADC RISDP	4 STI initiatives supporting the SADC RISDP	6 STI initiatives supporting the SADC RISDP	5 STI initiatives supporting the SADC RISDP
7.	Number of STI plans of action implemented with bilateral African partners	6 STI plans of action implemented with bilateral African partners by 31 March 2022 *(Non-cumulative target)*	No target	1 STI plan of action implemented with bilateral African partners	2 STI plan of action implemented with	3 STI plan of action implemented with bilateral African partners
8.	Number of engagements with global science leaders to advance national priorities in multilateral forums	12 engagements with global science leaders to advance national priorities in multilateral forums by 31 March 2022 *(Non-cumulative target)*	1 engagement with a global science leader	3 engagements with a global science leader	3 engagement with a global science leader	5 engagement with a global science leader
9.	Number of international STI initiatives focused on SDGs supported by South Africa	8 new international STI initiatives focused on SDGs supported by South Africa by 31 March 2022 *(Non-cumulative target)*	1 international STI initiatives focused on SDGs supported by South Africa	No target	1 international STI initiatives focused on SDGs supported by South Africa	6 international STI initiatives focused on SDGs supported by South Africa

Explanation of planned performance over the medium term

Over the medium-term the budget programme will directly and/or indirectly support all nine of the Department's outcomes identified in the 2020-2025 Strategic Plan.

In 2021/22, the budget programme will do the following to ensure that nine outputs are realised:

- Use international cooperation opportunities to advance the transformation of the NSI.
- Coordinate appropriate formal partnerships with preferred international partners through joint planning with other DSI Programmes, with a specific focus on the implementation of the decadal plan for the NSI.
- Implement joint programmes for the coordination of skills with the Department of Higher Education and Training and the National Research Foundation as implementation partner to increase the number of South Africans graduating and receiving qualifications through international training and exchange programmes.
- Promote international partnerships to increase knowledge production and knowledge utilisation, especially in the context of the focus on STI in the Sustainable Development Goals.
- Support efforts to revitalise existing industries and securing international funding or partnerships, while supporting R&D-led industrial development and partnerships for R&D-related activities. In the upcoming year the focus will be on aligning international industrial R&D partnerships in which South Africa is participating to support the South African industry master plans.
- Actively advance inclusive development themes in international partnerships, with a specific focus on South African grassroots innovators, and advancing African regional cooperation and integration, and South-South cooperation.
- Use technical exchanges with international partners to access relevant scientific evidence for translation into advice to inform the integration of innovation into service delivery, support decision support systems. The Budget programme will pursue and share its learning to initiatives supporting Agenda 2063 and the SADC Regional Indicative Strategic Development Plan (RISDP).

The table below sets out how the medium-term budget allocation (2021/22 – R148 112; 2022/23 – R147 931; and 2023/24 – R146 804) will be used to realise the budget programme outputs identified over the medium-term.

Reconciling performance targets with the budget and MTEF

Table 13: International Cooperation and Resources expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation	Medium-term expenditure estimates		
	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Office of the Deputy Director-General	6 081	5 300	6 665	4 276	4 969	5 009	5 023
Multilateral Cooperation and Africa	31 353	36 123	30 500	27 551	32 057	32 517	32 581
International Resources	61 481	61 851	61 488	56 601	66 843	68 184	68 385
Overseas Bilateral Cooperation	37 764	41 898	37 374	28 374	42 756	43 380	43 477
TOTAL	**136 679**	**145 172**	**136 027**	**116 802**	**146 625**	**149 090**	**149 466**
Compensation of employees	51 026	51 796	48 357	53 805	53 217	53 261	53 267
Goods and services	21 426	25 201	19 791	3 296	18 904	19 402	19 478
Transfers and subsidies	64 224	68 165	67 879	59 701	74 504	76 427	76 721
Payments for capital assets	-	10	-	-	-	-	-
Payments for financial assets	3	-	-	-	-	-	-
TOTAL	**136 679**	**145 172**	**136 027**	**116 802**	**146 625**	**149 090**	**149 466**

Table 14: Updated key risks and mitigation – International Cooperation and Resources

Outcome	Key risks	Mitigation action
Outcome 1: A transformed, inclusive, responsive and coherent NSI	Negative perception by foreign partners of SA as a viable destination for STI investments.	• Open and regular dialogue to determine which of the risk factors is challenging/threatening the partnerships (Continuous dialogue and reviews with international partners)
	Lack of interest and/or unwillingness by international partners to share STI expertise and resources with South Africa.	• Targeted formation of mutually beneficial strategic partnerships with partners of priority interest to South Africa.
	Accessing of inappropriate and irrelevant international experience and expertise is not aligned with South African needs.	• Involvement of South African technical expertise in all phases of planning and execution of international capacity-building initiatives designed to support South African priorities.
	Development of a Sub-optimal Continental System of Innovation in partnership with South Africa.)	• Jointly beneficial cooperation programmes negotiated providing for investment according to capacities and aligned with joint strategic objectives.
	Old (longstanding) development paradigms skewing African objectives as set out in e.g. Agenda 2063 and therefore also influencing partnerships with South Africa.	• Cautious consultation with international partners and beneficiaries in Africa, highlighting value addition of South African contribution.
	Multilateral institutional challenges resulting in delays at continental or regional level impacting progress of AU or SADC initiatives.	• Implementation of initiatives to advance continental and regional agenda not constrained by institutional frameworks.
	External geopolitical factors negatively impacting South African influence of international STI decision-making.	• Close and strategic cooperation with DIRCO and other relevant departments in multilateral engagements including to exploit support from regional and other strategic alliances towards STI priorities.
Outcome 2: Human capabilities and skills for the economy and for development	Reluctance by SA students to study (in other African countries).	• Improve national coordination of investment role players in students studying abroad to ensure the effective leveraging of international partnerships.
	Development of a Sub-optimal Continental System of Innovation in partnership with South Africa.	• Jointly beneficial cooperation programmes negotiated providing for investment according to capacities and aligned with joint strategic objectives.
Outcome 3: Increase knowledge generation and innovation output.	Constraint ability to leverage resources to invest in international partnerships.	• Proactive engagement to sensitize international partners of the return on investment in cooperating with South Africa, as well as improved internal SANSI coordination in international investment
	Development of a Sub-optimal Continental System of Innovation in partnership with South Africa.	• Jointly beneficial cooperation programmes negotiated providing for investment according to capacities and aligned with joint strategic objectives.

Outcome	Key risks	Mitigation action
	Old (longstanding) development paradigms skewing African objectives as set out in e.g. Agenda 2063 and therefore also influencing partnerships with South Africa.	• Cautious consultation with international partners and beneficiaries in Africa, highlighting value addition of South African contribution.
	Multilateral institutional challenges resulting in delays at continental or regional level impacting progress of AU or SADC initiatives.	• Implementation of initiatives to advance continental and regional agenda not constrained by institutional frameworks.
Outcome 4: Knowledge utilisation for economic development – *(a) revitalising existing industries and (b) stimulating R&D-led industrial development*	Development of a Sub-optimal Continental System of Innovation in partnership with South Africa.	• Jointly beneficial cooperation programmes negotiated providing for investment according to capacities and aligned with joint strategic objectives.
	Old (longstanding) development paradigms skewing African objectives as set out in e.g. Agenda 2063 and therefore also influencing partnerships with South Africa.	• Cautious consultation with international partners and beneficiaries in Africa, highlighting value addition of South African contribution.
	External geopolitical factors negatively impacting South African influence of international STI decision-making.	• Close and strategic cooperation with DIRCO and other relevant departments in multilateral engagements including to exploit support from regional and other strategic alliances towards STI priorities.
Outcome 5: Knowledge utilisation for inclusive development	Development of a Sub-optimal Continental System of Innovation in partnership with South Africa.	• Jointly beneficial cooperation programmes negotiated providing for investment according to capacities and aligned with joint strategic objectives.
	Multilateral institutional challenges resulting in delays at continental or regional level impacting progress of AU or SADC initiatives.	• Implementation of initiatives to advance continental and regional agenda not constrained by institutional frameworks.
	External geopolitical factors negatively impacting South African influence of international STI decision-making.	• Close and strategic cooperation with DIRCO and other relevant departments in multilateral engagements including to exploit support from regional and other strategic alliances towards STI priorities.
Outcome 6: Innovation in support of a capable and developmental state	Multilateral institutional challenges resulting in delays at continental or regional level impacting progress of AU or SADC initiatives.	• Implementation of initiatives to advance continental and regional agenda not constrained by institutional frameworks.
	External geopolitical factors negatively impacting South African influence of international STI decision-making.	• Close and strategic cooperation with DIRCO and other relevant departments in multilateral engagements including to exploit support from regional and other strategic alliances towards STI priorities.

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, human capital development, and the provision of research infrastructure and relevant research support, in pursuit of South Africa's transition to a knowledge economy.

Chief directorates

Human Capital and Science Promotion

This chief directorate formulates and implements policies and strategies that address the availability of human capital for STI, and that provide fundamental support for research activities. The chief directorate provides strategic direction and support to institutions mandated to develop human capital and increase knowledge production, as well as interfacing with relevant stakeholders in this regard. In addition, the chief directorate is responsible for the development of a society that is scientifically literate and critically engaged with science through public engagement in STI and enhancing youth access to STI.

The chief directorate has three directorates managing thematic priorities aligned to its focus areas, namely, Research Development, Science Promotion, and Research Support.

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, statistics, computer science, biological and life sciences, geographic and geological sciences), theoretical and computational sciences, data sciences, and the human and social sciences, including digital humanities.

The chief directorate has two directorates managing thematic priorities aligned to its focus areas, namely, Cyberinfrastructure and Basic Sciences.

Science Missions

Promotes the development of research and the production of scientific knowledge and human capital in science areas

in which South Africa enjoys a geographic advantage. These areas include the dynamics of climate change and its impact on Earth systems, Antarctic and marine research, the palaeosciences, and indigenous knowledge systems (IKS). The chief directorate has four directorates managing thematic priorities aligned to its focus areas, namely, Marine, Polar Research and Palaeosciences; Knowledge Management; Indigenous Knowledge Policy and Advocacy and Earth Systems Sciences.

Astronomy

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

The chief directorate has two directorates managing thematic priorities aligned to its focus areas, namely, Multiwavelength Astronomy, and the Astronomy Management Authority.

Planned policy initiatives over the medium term

Planned policy initiatives	Key actions
National open science policy	• Policy framework for establishment of a SA research cloud
Transformation policy	• Increase participation of women and black researchers, and those based historically disadvantaged universities • Increase production of research outputs that have higher potential of utility through alignment of DSI initiative and involvement of relevant stakeholders in the formulation of research agenda
Recognition of research outputs produced by research institutions (excluding universities)	• Expansion of the Research Output Submission System to include other role players within the NSI
DSI/NRF Postgraduate Funding Policy	• Implementation and monitoring of the Postgraduate Funding Policy
Reporting on postgraduate support across all DSI Programmes	• Implementation of the Framework on Corporate Reporting throughout the DSI
PhD tracer study	• Completion and presentation to the Minister of the PhD tracer study
Astro-tourism strategy	• Undertaking a consultative process for the development of an astro-tourism strategy
Astronomy institute	• Review of the astronomy institutional landscape

Table 15: Outcomes, outputs, performance indicators and targets for 2021/22

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Human capabilities and skills for the economy and for development	PhD students awarded bursaries annually	Number of PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities	No fewer than 3 621 PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2018	No fewer than 3 380 PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2019	2 991 PhD students awarded bursaries annually as reflected in the reports from the NRF and relevant entities	No fewer than 2 400 PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2021	2 000 PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2022	2 300 PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2023	2 400 PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2024
	Pipeline postgraduate students awarded bursaries annually	Number of pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities	10 601 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2018	9 774 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2019	8 632 pipeline postgraduate students awarded bursaries annually as reflected in the NRF and relevant entities.	No fewer than 8 000 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2021	6 200 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2022	5 100 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2023	4 400 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2024
	Graduates and students placed in DSI-funded work preparation programmes	Number of graduates and students placed in DSI-funded work preparation programmes in SETI institutions	823 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2018	802 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2019	1 091 graduates and students placed in DSI-funded work preparation programmes in SETI institutions	No fewer than 750 graduates and students placed in DSI-funded work preparation programmes in SETI institutions by 31 March 2021	750 graduates and students placed in DSI-funded work preparation programmes in SETI institutions by 31 March 2022	750 graduates and students placed in DSI-funded work preparation programmes in SETI institutions by 31 March 2023	750 graduates and students placed in DSI-funded work preparation programmes in SETI institutions by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
A transformed, inclusive, responsive and coherent NSI	Research infrastructure grants	Number of research infrastructure grants awarded	28 research infrastructure grants awarded as per award letters by 31 March 2018	35 research infrastructure grants awarded as per award letters by 31 March 2019	33 research infrastructure grants awarded as per award letters annually	20 research infrastructure grants awarded by 31 March 2021	25 research infrastructure grants awarded by 31 March 2022	30 research infrastructure grants awarded by 31 March 2023	30 research infrastructure grants awarded by 31 March 2024
	Broadband capacity	Total available broadband capacity provided by SANReN per annum	3 292 Gbps total available broadband capacity provided by SANReN by 31 March 2018	3 557 Gbps total available broadband capacity provided by SANReN by 31 March 2019	4 522 Gbps available broadband capacity provided by SANReN per annum.	5 000 Gbps total available broadband capacity provided by SANReN by 31 March 2021	5 800 Gbps total available broadband capacity provided by SANReN by 31 March 2022	6 200 Gbps total available broadband capacity provided by SANReN by 31 March 2023	6 500 Gbps total available broadband capacity provided by SANReN by 31 March 2024
Increased knowledge generation and innovation output	Researchers awarded research grants	Number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	4 707 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2018	4 633 researchers awarded research grants annually through NRF-managed programmes as reflected by the NRF project reports by 31 March 2019	3 205 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	No fewer than 3 000 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2021	3 000 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2022	3 300 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2023	3 500 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2024
	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 Web of Science Citation Database as reflected in the NRF project reports	8 384 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	9 159 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	7 255 research articles published by NRF-funded researchers and cited in the Thomson Reuters Web of Science Citation Database as reflected in the NRF project report	6 000 Internationally accredited research articles from researchers awarded research grants by 31 March 2021	7 000 Internationally accredited research articles from researchers awarded research grants by 31 March 2022	7 200 Internationally accredited research articles from researchers awarded research grants by 31 March 2023	7 500 Internationally accredited research articles from researchers awarded research grants by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
	L-Band science mode receivers installed	Number of additional receivers installed on the MeerKAT telescope to enhance the performance of the MeerKAT telescope	64-antennas commissioned for a single polarisation array 31 March 2018	64 ultra-high frequency science mode receivers installed on the MeerKAT by 31 March 2019	8 large survey project science modes installed on MeerKAT correlator by 31 March 2020	64 S-Band science mode receivers installed on MeerKAT by 31 March 2021	Production plan approved for the L-band receivers for the additional 20 MeerKAT antennas approved by 31 March 2022	Production of the L-band receivers for the additional 20 MeerKAT antennas completed by 31 March 2023	Installation of the L-band receivers on the additional 20 MeerKAT antennas completed by 31 March 2024
	Regulations approved by Minister under the Protection, Promotion and Protection, Promotion, Development and Management of Indigenous Knowledge Act (IK Act)	Number of components of the IK legal architecture implemented	-	-	-	Regulations for the IK Act approval by the Minister by 31 March 2021	Launch of the National Recordal System for registration and access to indigenous knowledge by 31 March 2022	Intellectual property instruments launched by 31 March 2023	A fully functional SSDU in operation by 31 March 2024
	Public awareness of and engagement initiatives	Number of initiatives conducted to promote public awareness of and engagement with science throughout the country as reflected in the reports of the NRF and other implementing and collaborative partners	-	-	-	-	9 initiatives promoting public awareness of and engagement with science conducted, as reflected in the reports of the NRF and other implementing and collaborative partners by 31 March 2022	12 initiatives promoting public awareness of and engagement with science conducted, as reflected in the reports of the NRF and other implementing and collaborative partners by 31 March 2023	15 initiatives promoting public awareness of and engagement with science conducted, as reflected in the reports of the NRF and other implementing and collaborative partners by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
	South African science survey report	First South African public relationship with science survey report published	-	-	-	Sample and technical report frameworks for the first South African public relationship with science survey approved by 31 March 2021	Data collection instruments for the first South African public relationship with science survey produced by 31 March 2022	First South African public relationship with science survey conducted by 31 March 2023	South African public relationship with science survey conducted by 31 March 2024
Innovation in support of a capable and developmental state	Oversight over NRF, SACNASP and ASSAf to ensure that they respond to government priorities	Number of strategic and technical engagements with the NRF, SACNASP and ASSAf to ensure alignment with national priorities	-	-	-	12 strategic and technical engagements with NRF, SACNASP and ASSAf to alignment with national priorities by 31 March 2021	12 strategic and technical engagements between NRF, SACNASP and ASSAf to alignment with national priorities by 31 March 2022	12 strategic and technical engagements between NRF, SACNASP and ASSAf to alignment with national priorities by 31 March 2023	12 strategic and technical engagements between NRF, SACNASP and ASSAf to alignment with national priorities by 31 March 2024

Table 16: Indicators, annual and quarterly targets for the 2021/22 financial year

No.	Output performance indicator[11]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1.	Total number of PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities	2 000 PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2022 *(Cumulative target)*	1 000 PhD students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities by 30 June 2021	1 500 PhD students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities by 30 September 2021	1 800 PhD students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities by 31 December 2021	2 000 PhD students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities by 31 March 2022
2.	Total number of pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities	6 200 pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities by 31 March 2022 *(Cumulative target)*	3 200 pipeline postgraduate students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities by 30 June 2021	4 700 pipeline postgraduate students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities by 30 September 2021	5 600 pipeline postgraduate students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities by 31 December 2021	6 200 pipeline postgraduate students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities by 31 March 2022
3.	Total number of graduates and students placed in DSI-funded work preparation programmes in SETI institutions	750 graduates and students placed in DSI-funded work preparation programmes in SETI institutions by 31 March 2022 *(Cumulative target)*	450 graduates and students placed in DSI-funded work preparation programmes in SETI institutions	550 graduates and students placed in DSI-funded work preparation programmes in SETI institutions	650 graduates and students placed in DSI-funded work preparation programmes in SETI institutions	750 graduates and students placed in DSI-funded work preparation programmes in SETI institutions by 31 March 2022
4.	Number of research infrastructure grants awarded	25 research infrastructure grants awarded by 31 March 2022 *(Non-cumulative target)*	No target	Call for proposals on awarding of research infrastructure grants issued	No target	25 annual research infrastructure grants awarded by 31 March 2022
5.	Total available broadband capacity provided by SANReN per annum	5 800 Gbps total available broadband capacity provided by SANReN by 31 March 2022 *(Non-cumulative target)*	No target	New links and upgrade plan finalised by 30 September 2021	No target	5 800 Gbps total available broadband capacity provided by SANReN by 31 March 2022

[11] The technical indicator description for each output performance indicator detailing source data, method of calculation, means of verification, etc., is set out in Part D.

No.	Output performance indicator[11]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
6.	Total number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports	3 000 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2022 *(Cumulative target)*	1 200 researchers awarded research grants through NRF-managed programmes	1 700 researchers awarded research grants through NRF-managed programmes	2 000 researchers awarded research grants through NRF-managed programmes	3 000 researchers awarded research grants through NRF-managed programmes as reflected by the NRF project reports by 31 March 2022
7.	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	7 000 internationally accredited research articles from researchers awarded research grants by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	7 000 internationally accredited research articles from researchers awarded research grants by 31 March 2022
8.	Number of additional receivers installed on the MeerKAT telescope to enhance the performance of the MeerKAT telescope	Production plan for the L-band receivers for the additional 20 MeerKAT antennas approved by SKA SA Project Director 31 March 2022 *(Non-cumulative target)*	SKA SA Project Director approved production plan by 30 June 2021	SKA SA Project approved progress report with reference to production plan provided by 30 September 2021	SKA SA Project approved progress report with reference to production plan provided by 31 December 2021	Production plan approved for the L-band receivers for the additional 20 MeerKAT antennas by 31 March 2022
9.	Number of components of the IK legal architecture implemented	Launch of the National Recordal System for registration and access to indigenous knowledge by 31 March 2022 *(Non-cumulative target)*	IK data quality checked and synchronised from IKS Documentation Centres to the NRS central server by 30 June 2021	An IK Registration Requirements Specification developed by 30 September 2021	Testing the registration and access applications in a controlled environment by 30 December 2021	Launch of the National Recordal System for registration and access to IK by 31 March 2022

No.	Output performance indicator[11]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
10.	Number of initiatives conducted to promote public awareness of and engagement with science throughout the country, as reflected in the reports of the NRF and other implementing and collaborative partners.	9 initiatives promoting public awareness of and engagement with science conducted, as reflected in the reports of the NRF and other implementing and collaborative partners by 31 March 2022 *(Cumulative target)*	(1) Cofimvaba Science Centre launched by 30 June 2021	(2) National Science Week conducted by 30 September 2021 (3) STEMI Olympiads and Competitions Community of Practice Conference conducted by 30 September 2021	(4) Three main STEMI Olympiads and competitions conducted targeting learners in all nine provinces by 31 December 2021 (5) South African Association of Science and Technology Centres conference held by December 2021 (6) Three Talent Development camps conducted for selected learners in all nine provinces by 31 December 2021	(7) At least 20 science centres supported by the DSI conducted science engagement activities throughout the year (8) Intellectual property management training conducted for educators in provinces that have signed collaboration agreements with the DSI by 31 March 2022 (9) Two mainstream media-based (radio and television) science communication activities conducted by 31 March 2022
11.	First South African public relationship with science survey report published	Data collection instruments for the First South African public relationship with science survey produced by 31 March 2022 *(Non-cumulative target)*	No target	No target	No target	Data collection instruments for the first South African public relationship with science survey produced by 31 March 2022
12.	Number of strategic and technical engagements with NRF, SACNASP and ASSAf to ensure alignment with national priorities	12 strategic and technical engagements between NRF, SACNASP and ASSAf to alignment with national priorities by 31 March 2022 *(Non-cumulative target)*	3 bilateral engagement report	3 bilateral engagement reports	3 bilateral engagement reports	3 bilateral engagement report

Explanation of planned performance over the medium term

Over the medium-term the budget programme will support the 2019 White Paper aimed at establishing a greater role for STI in the achievement of the National Development Plan's core objectives and the United Nation's Sustainable Development Goals (SDGs), while responding to the risks and opportunities of the fourth industrial revolution.

Programme 4's contribution to the implementation of the new White Paper will focus on the following:

- The development of a more science-aware citizenry.
- Upgrading and expanding research infrastructure, including cyberinfrastructure (through, for example, the establishment of a national research infrastructure fund at National Treasury with long-term planning horizons).
- Accelerating knowledge development through increased support for research, particularly in the fundamental disciplines in both the natural sciences and the humanities and social sciences, and the endorsement of open data and open science.
- Expanding the STI institutional landscape with a focus on human capabilities, skills and knowledge (through publications) required by the economy and being supportive of inter and transdisciplinary approaches to knowledge development.
- Expanding the inclusivity and transformation of the national science system by ensuring significant growth in the participation of black people and women in the research and development workforce, as well as in doctoral graduation rates.
- Enhancing South Africa's geographic advantage by continuing to support scientific progress in fields such as astronomy, palaeosciences, marine sciences, earth systems sciences and indigenous knowledge systems. and
- Harnessing the potential of big data to realise economic, social, scientific and industrial benefits for South Africa.

In 2021/22, the budget programme will do the following to ensure that 13 outputs are realised:

- The 2019 White Paper on Science, Technology and Innovation has identified a lack of transformation in the NSI as a challenge that needs to be addressed urgently. The budget programme is therefore implementing the Ministerial Guidelines on Achieving Equity in the Distribution of Bursaries, Scholarships and Fellowships to accelerate racial and gender transformation of the student body. Over 85% of bursary and internship beneficiaries are from previously marginalised groups, namely, black people and women.
- Continue support for human capital development and research capacity – PhDs and pipeline (honours, BTech, master's) postgraduate students awarded bursaries, researchers receive research grants through programmes managed by the NRF and other relevant entities, and research infrastructure grants are awarded to researchers and institutions across the entire innovation value chain with direct funding from the Programme.
- Implement the DSI/NRF Postgraduate Funding Policy approved by the Minister, which is aligned to the National Student Financial Aid Scheme to cater for financially deprived students, offering full-cost-of-study support for three groups of students, namely, the financially needy, postgraduate students with a disability, and exceptional academic achievers.
- Through bilateral engagements, the DSI and the DHET will continue efforts towards better alignment between the DHET's Staffing South Africa Universities Framework (SSAUF) and the DSI/NRF HCD initiatives including bursaries for pipeline (undergraduate to postgraduate) students.
- Through the South African National Research Network (SANReN) the DSI will continue to provide broadband connectivity to all the main campuses of all HEIs, science councils, national facilities and other public research performing institutions.

- The DSI will also be working closely with the South African Radio Astronomy Observatory (SARAO) and the Northern Cape government to ensure socio-economic benefits for communities near astronomy infrastructure, and to enhance public awareness of the project and the opportunities it presents.
- Registration of indigenous knowledge through the National Recordal System will run on the Special Services Delivery Unit platform for the Recognition of Prior Learning in Indigenous Knowledge Systems. This will allow the DSI contribute to non-mainstream ways of developing human capabilities, among other things.

The table below sets out how the medium-term budget allocation (2021/22 – R4 949 244; 2022/23 – R5 093 259; and 2023/24 – R5 192 081) will be used to realise the budget programme outputs identified over the medium-term.

Reconciling performance targets with the budget and MTEF

Table 17: Research Development and Support expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation	Medium-term expenditure estimates		
	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Office of the Deputy-Director General	4 543	3 820	2 319	4 133	3 951	3 973	3 974
Human Capital and Science Promotion	2 379 550	2 447 150	2 629 802	2 282 971	2 693 344	2 758 935	2 769 491
Science Missions	201 731	223 348	239 201	202 771	249 773	256 036	256 975
Basic Science and Infrastructure	977 488	1 095 294	978 717	757 026	1 147 623	1 190 711	1 241 259
Astronomy	733 156	750 834	728 392	498 347	854 553	883 604	920 382
TOTAL	**4 296 468**	**4 520 446**	**4 578 431**	**3 745 248**	**4 949 244**	**5 093 259**	**5 192 081**
Compensation of employees	38 764	37 853	39 915	39 270	38 853	38 876	38 878
Goods and services	13 279	15 313	12 781	8 840	16 392	16 834	16 897
Transfers and subsidies	4 244 374	4 467 265	4 525 734	3 697 138	4 893 999	5 037 549	5 136 306
Payments for capital assets	-	12	-	-	-	-	-
Payments for financial assets	51	3	1	-	-	-	-
TOTAL	**4 296 468**	**4 520 446**	**4 578 431**	**3 745 248**	**4 949 244**	**5 093 259**	**5 192 081**

Table 18: Key risks – Research Development and Support

Outcome	Key risks	Mitigation action
Outcome 1: A transformed, inclusive, responsive and coherent NSI	High attrition rate of postgraduate students	• A joint DHET/DSI report to the Minister on an efficient holistic financial aid ecosystem for both undergraduate and postgraduate students support. (the joint report will create synergies between DSI and DHET bursary support and will make recommendations to leverage third party support such as industry and international partners). • Implementation of the Historically Disadvantaged institutions (HDI) / - Development Programme (DP)/ Framework, also called Prof Sibusiso Bhengu Development ProgrammeReview and Reporting on the Extension Support for Masters and PhD students
	Use of public funds to support postgraduate students in areas that do not contribute to South Africa's socioeconomic development and growth needs (priority areas).	• Review and update the list of priority areas informed by the White Paper and the Decadal Plan. (research prioritization document).
Outcome 2: Human capabilities and skills for the economy and for development	High attrition rate of postgraduate students	• A joint DHET/DSI report to the Minister on an efficient holistic financial aid ecosystem for both undergraduate and postgraduate students support. (the joint report will create synergies between DSI and DHET bursary support and will make recommendations to leverage third party support such as industry and international partners). • Implementation of the Historically Disadvantaged institutions (HDI) / - Development Programme (DP)/ Framework, also called Prof Sibusiso Bhengu Development Programme. • Updates and Reporting on the Extension Support for Masters and PhD students.
	Use of public funds to support postgraduate students in areas that do not contribute to South Africa's socioeconomic development and growth needs (priority areas).	• Review and update the list of priority areas informed by the White Paper and the Decadal Plan. (Research prioritization document).
Outcome 3: Increased knowledge generation and innovation output	Failure to provide quality (acquisition of new, replacement and/or upgrade of existing infrastructure) and competitive world-class research infrastructure (both physical infrastructure and non-physical cyberinfrastructure) to ensure a sustainable enabling environment for research and innovation.	• Review Implementation and impact evaluation of the National Equipment Programme (NEP). • Develop Evaluation Framework for 5 year review of the SARIR projects.
	Decline or stagnation of the research and innovation outputs.	• Implementation of the policy recommendations emanating from the findings of the Silent Majority study. (Implementation of the Policy Recommendations which will leverage resources from the DHET, USAf and ASSAf).

Outcome	Key risks	Mitigation action
	Decline or stagnation of the research and innovation outputs.	• Implementation of the policy recommendations emanating from the findings of the Five-Year Review of the South African Research Chairs Initiative (SARChI)
	Stagnant scientific output from geographic advantage knowledge areas.	• Finalise the development of and approval of the Regulations for the Indigenous Knowledge Act. • Establishment of Special Services Delivery Unit (SSDU) as IKS Authority Regulating the sector.
	Failure to build a capable South African agency for Science and Technology Advancement (SAASTA) that diligently, effectively and efficiently coordinates science engagement programme.	• Finalise and jointly adopt SAASTA Business Plan by DSI and NRF (Business Plan articulating the operating model and resource requirements).
	Unattractive science engagement campaign/programme to the intended beneficiaries (loss of interest by citizens due to the inability relating to and engage with the science messages being communicated).	• Develop and adopt a plan to train facilitators of various study modules of the science communication postgraduate diploma at the University of Limpopo.
	Ineffective protection of Astronomy Advantage Areas (AAA).	• Finalise the signing and Implementation of the MoAs at different levels - in ensuring co-existence of radio Astronomy and other Government activities within the declared KCAAA without causing harmful interference to each other. • Finalise signing and Implementation MOA with SAPS. • Extension of compliance date by 12 months to enable AMA/DSI to conduct awareness session / workshop within KCAAA. • Finalise development of the AMA website.
	Reduced National Treasury allocations to AVN and SKA project.	• Submitting the funding proposal to the African Renaissance Fund (ARF).

PROGRAMME 5:
Socio-economic Innovation Partnership

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 and the provision of statistics and analysis for purposes of system-level monitoring and evaluation.




Chief directorates

Technology Localisation, Beneficiation and Advanced Manufacturing

Provides policy, strategy and direction-setting support for the R&D-led growth of strategic sectors of the economy and 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 SMMEs and manufacturing firms in the supply chains of large-scale public procurement programmes.

The chief directorate has four directorates managing thematic priorities aligned to its focus areas, namely, Technology Localisation; Mining and Minerals Beneficiation; Chemicals and Related Industries; and Advanced Manufacturing Technologies (which is not staffed).

Sector Innovation and Green Economy

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

- Facilitating the implementation of high-impact S&T interventions.

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

The chief directorate has three directorates managing thematic priorities aligned to its focus areas, namely, Environmental Services and Technologies; Sector and Local Innovation; and Information Communication and Technology.

Innovation for Inclusive Development

Provides leadership and guidance for harnessing science, technology and innovation (STI) for the delivery of basic services, local economic development and inculcating a culture of innovation across government through the following interventions:

- Leading the development, demonstration, transfer and diffusion of innovative solutions towards supporting evidence-based service delivery policy making and practice.
- Strengthening STI capacity, maturity and collaboration with local government and sector departments towards a capable and innovative state.
- Supporting the development and strengthening of local systems of innovation and production to promote innovation-driven local economic development (LED), while transforming LED policy and practice
- Coordinating and inculcating STI initiatives in support of the District Development Model.

The chief directorate has two directorates managing thematic priorities aligned to its focus areas, namely, Technology for Sustainable Livelihoods, and Science and Technology for Sustainable Human Settlements.

Science and Technology Investment

Leads and supports the development of indicators and instruments for measuring and monitoring investments in S&T and the performance of the NSI, and ways of strengthening the NSI and innovation policy. This includes an annual R&D survey, innovation measurement, the development of S&T indicators, and the national S&T expenditure tables, and the implementation of section 11D of the Income Tax Act, 1962, to promote private-sector R&D investment.

The chief directorate has three directorates managing thematic priorities aligned to its focus areas, namely, Research and Development Tax Incentive, Research and Development Planning, and Science and Technology Indicators.

Planned policy initiatives over the medium term

Planned policy initiatives	Key actions
Improve inclusion and build more linkages across the NSI (White Paper Policy Intent 3.2)	• Strengthen innovation partnerships with civil society organisations • Contribute to sector R&D plans • Sector Innovation Funds • Industry Innovation Partnerships
Enhance policy coherence and programme coordination in the NSI (White Paper Policy Intent 3.3)	Strengthen policy and programme alignment with higher education
Expand the NSI – Expansion of the scientific knowledge base of the NSI (White Paper Policy Intent 3.5)	• Knowledge fields associated with new sources of growth (circular economy and 4IR base knowledge areas) • Knowledge fields associated with industrial development priorities (advanced metals, advanced manufacturing; mining and increased local production)
Upgrade M&E and policy capacity (White Paper Policy Intent 3.6)	• Maintain key annual statistical series (the national survey on research and experimental development, the Survey of Government Funding for Scientific and Technological Activities, and the R&D statistical report) • Produce additional statistics (innovation survey, technology transfer survey) • Procure demand-driven policy briefs • Strengthen transformation innovation policy capacity
Adopt a broader conceptualisation of innovation beyond R&D (White Paper Policy Intent 4.3)	Mobilisation of the NSI to support the District Development Model
Use public procurement as a vehicle to further innovation (White Paper Policy Intent 4.5)	• Technology Acquisition and Deployment Fund • Technology Localisation Programme

Planned policy initiatives	Key actions
Increase support for and collaboration with the business sector (White Paper Policy Intent 4.6)	• Technology Stations Programme • Industry development centres • Industry Innovation Partnerships including Sector Innovation Funds • Understanding the nature, character and impact of innovation in state-owned enterprises • R&D tax incentive programme • Joint government-industry RDI programme, e.g. in mining
Increase the spatial footprint of innovation (White Paper Policy Intent 4.9)	Regional Innovation Support Programme
Support for social and grassroots innovation (White Paper Policy Intent 4.10)	Grassroots Innovation Programme
Exploit new sources of growth (White Paper Policy Intent 4.11)	• Circular economy roadmap • Support National Collaborative Research Programmes as part of a Converging Technologies Platform
Innovation to revitalise existing sectors (White Paper Policy Intent 4.12)	• Mandela Mining Precinct • Fluorochemicals Expansion Initiative • Collaborative Programme in Additive Manufacturing
Strengthen government's role as an enabler for innovation (White Paper Policy Intent 4.13)	• District Development Model • Strengthen decision-support systems • Strengthen evidence-based decision making
Strengthen skills in the Economy (White Paper Policy Intent 5.5)	• Presidential Youth Employment Initiative • Living Labs/mLabs • Technology Stations Programme • Experiential training programme

Table 19: Outcomes, outputs, performance indicators and targets for 2021/22

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Innovation in support of a capable and developmental state	Knowledge products	Number of knowledge products on innovation for inclusive development published	6 knowledge products on innovation for inclusive development published by 31 March 2018	8 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	At least 4 knowledge products on innovation for inclusive development published by between 1 April 2020 and 31 March 2021	4 knowledge products on innovation for inclusive development published by between 1 April 2020 and 31 March 2022	4 knowledge products on innovation for inclusive development published by between 1 April 2020 and 31 March 2023	4 knowledge products on innovation for inclusive development published by between 1 April 2020 and 31 March 2024
Knowledge utilisation for inclusive development	Decision-support system	Number of decision-support system introduced, maintained and improved	10 decision-support systems maintained and improved by 31 March 2018	10 decision-support systems maintained and improved by 31 March 2019	At least 10 decision-support systems maintained and improved by 31 March 2020	At least 10 decision-support systems maintained and improved by 31 March 2021	6 decision-support systems introduced, maintained and improved by 31 March 2022	6 decision-support systems introduced, maintained and improved by 31 March 2023	6 decision-support systems introduced, maintained and improved by 31 March 2024
	Learning interventions (seminars, policy round tables)	Number of learning interventions (seminars/policy round tables discussions) hosted	13 learning interventions (seminars) generated by 31 March 2018	10 learning interventions (seminars) generated by 31 March 2019	9 learning interventions (seminars) generated by 31 March 2020	At least 4 learning (seminars/policy round tables) hosted by 31 March 2021	3 learning interventions (seminars/policy round tables) hosted by 31 March 2022	3 learning interventions (seminars/policy round tables) hosted by 31 March 2023	3 learning interventions (seminars/policy round tables) hosted by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Human capabilities and skills for the economy and for development	High-level HCD built for competitiveness and new industry development	Number of high-level research students (honours, master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs the Industry Innovation Programme – incl. SIF and the green economy)	At least 291 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and SIFs) by 31 March 2018	At least 242 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs and the Industry Innovation Programme – incl. SIF) by 31 March 2019	231 master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme and the Sector Innovation Fund) by 31 March 2010	At least 392 honours, master's and doctoral students fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF, and green economy) by 31 March 2021	392 high-level research students (of which 57 at PhD level) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF, and green economy) by 31 March 2022	392 high-level research students (of which 57 at PhD level) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF, and green economy) by 31 March 2023	392 high-level research students (of which 57 at PhD level) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF, and green economy) by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Increased knowledge generation and innovation output	Knowledge and innovation products added to the industrial development and green economy IP portfolios	Number of knowledge and innovation products added to the industrial development and green economy IP portfolios through fully funded or co-funded research initiatives	38 knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development IP portfolio by 31 March 2018	42 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development IP portfolio by 31 March 2019	At least 57 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development IP portfolio by 31 March 2020	At least 70 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development and green economy IP portfolio by 31 March 2021	60 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development and green economy IP portfolio by 31 March 2022	60 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development and green economy IP portfolio by 31 March 2023	60 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development and green economy IP portfolio by 31 March 2024

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
	Funding instruments to increase localisation, competitiveness and R&D-led industry development	Number of instruments funded in support of increased localisation, competitive ness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, and ICTs, Industry Innovation Programme and the sector innovation fund.	6 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2018	9 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2019	9 instruments funded in support of increased localization, competitiveness and R&D-led industry development by 31 March 2020	At least 5 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2021	5 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, and ICTs, Industry Innovation Programme and the sector innovation fund. by 31 March 2022	5 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, and ICTs, Industry Innovation Programme and the sector innovation fund. by 31 March 2023	5 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, and ICTs, Industry Innovation Programme and the sector innovation fund. by 31 March 2024
Knowledge utilisation for inclusive development	Innovation-support interventions funded or co-funded that strengthen with provincial or rural innovation systems	Number of innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems	8 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2016 and 31 March 2018	11 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2016 and 31 March 2019	16 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems by 31 March 2020	At least 14 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2020 and 31 March 2021	14 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2020 and 31 March 2022	15 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2020 and 31 March 2023	15 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 1 April 2020 and 31 March 2024

[12] The technical indicator description for each output performance indicator detailing source data, method of calculation, means of verification, etc., is set out in Part D

Outcome	Output	Output performance indicator	Annual Targets						
			Audited performance			Estimated performance	Medium Term Expenditure Framework period		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Innovation in support of a capable and developmental state	Statistical reports and policy briefs approved by Exco for publication and/ or submitted to Cabinet and/or disseminated to policy audience	Number of statistical reports and policy briefs approved by Exco for publication and/ or submitted to Cabinet and/or disseminated to policy audience	3 statistical reports or policy briefs submitted to Cabinet by 31 March 2018	5 statistical reports or policy briefs approved by Exco for publication and/ or submitted to Cabinet by 31 March 2019	6 statistical reports and policy briefs approved by Exco for publication and/ or submitted to Cabinet between 1 April 2019 and March 2020	6 statistical reports or policy briefs approved by Exco for publication and/ or submitted to Cabinet and/or disseminated to policy audience by 31 March 2021	6 statistical reports or policy briefs approved by Exco for publication and/ or submitted to Cabinet and/or disseminated to policy audience by 31 March 2022	6 statistical reports or policy briefs approved by Exco for publication and/ or submitted to Cabinet and/or disseminated to policy audience by 31 March 2023	6 statistical reports or policy briefs approved by Exco for publication and/ or submitted to Cabinet and/or disseminated to policy audience by 31 March 2024
Knowledge utilisation for economic development – *(a) revitalising existing (traditional) industries and (b) stimulating R&D-led industrial development*	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 101 days (on average)	Preapproval decision provided within 90 days on 39% (or 51) of the 131 applications received from 01 January 2018 to 31 December 2018. Overall, of all the 131 applications received over the same period, 95 (or 73%) have been provided with decision	Preapproval decisions provided within 90 days from date of receipt on 11% (or 12) of the 106 applications received for the R&D tax incentive received between 01 January 2019 and 31 December 2019	Preapproval decisions provided within 90 days from date of receipt for 80% of applications for the R&D tax incentive received between 01 January 2020 and 31 December 2020	Preapproval decisions provided within 90 days from date of receipt for 80% of applications for the R&D tax incentive received between 01 January 2021 and 31 December 2021	Preapproval decisions provided within 90 days from date of receipt for 80% of applications for the R&D tax incentive received between 01 January 2022 and 31 December 2022	Preapproval decisions provided within 90 days from date of receipt for 80% of applications for the R&D tax incentive received between 01 January 2023 and 31 December 2023
Innovation in support of a capable and developmental state	Oversight over the CSIR and HSRC to ensure they respond to government priorities	Number of strategic and technical engagements with CSIR and HSRC to ensure alignment with national priorities	-	-	-	8 strategic and technical engagements with CSIR and HSRC to ensure alignment with national priorities by 31 March 2021	8 strategic and technical engagements with CSIR and HSRC to ensure alignment with national priorities by 31 March 2022	8 strategic and technical engagements with CSIR and HSRC to ensure alignment with national priorities by 31 March 2023	8 strategic and technical engagements with CSIR and HSRC to ensure alignment with national priorities by 31 March 2024

Table 20: Indicators, annual and quarterly targets for the 2021/22 financial year

No.	Output performance indicator[12]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1.	Number of knowledge products on innovation for inclusive development published	4 knowledge products on innovation for inclusive development published by 31 March 2022 *(Cumulative target)*	1 knowledge product on innovation for inclusive development published	2 knowledge products on innovation for inclusive development published	3 knowledge products on innovation for inclusive development improved	4 knowledge products on innovation for inclusive development published on Department's website by 31 March 2022
2.	Number of decision-support systems introduced, maintained and improved.	6 decision-support systems introduced, maintained and improved by 31 March 2022 *(Cumulative target)*	Annual work plan approved for 2 decision-support systems	Annual work plan approved for 4 decision-support systems	Annual work plan approved for 5 decision-support systems	6 decision-support systems introduced, maintained and improved between 01 April 2021 and 31 March 2022
3.	Number of learning interventions (seminars/ policy round tables discussions) hosted.	3 learning interventions (seminars/policy round tables) hosted by 31 March 2022 *(Cumulative target)*	1 learning intervention hosted	2 learning interventions hosted	3 learning interventions hosted between 01 April 2021 and 31 December 2022	No target
4.	Number of high-level research students (honours, master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF and the green economy)	392 high-level research students (of which 57 at PhD level) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF, and green economy) by 31 March 2022 *(Non-cumulative target)*	86 high-level research students (of which 12 at PhD level) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF, and green economy)	No target	No target	Additional 306 high-level research students (of which 45 at PhD level) funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF, and green economy) by 31 March 2022 taking the total for the year to 392
5.	Number of knowledge and innovation products added to the industrial development and green economy IP portfolios through fully funded or co-funded research initiatives	60 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development and green economy IP portfolio by 31 March 2022 *(Cumulative target)*	3 industrially relevant knowledge or innovation products added to the industrial development IP portfolio	11 industrially relevant knowledge or innovation product added to the industrial development IP portfolio	At 30 industrially relevant knowledge or innovation product added to the industrial development IP portfolio	An annual total of 60 industrially relevant knowledge or innovation products added to the industrial development IP portfolio between 01 April 2021 and 31 March 2022

No.	Output performance indicator[12]	Annual target	Quarter 1	Quarter 2	Quarter 3	Quarter 4
6.	Number of instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, and ICTs, Industry Innovation Programme and the sector innovation fund	5 instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, and ICTs, Industry Innovation Programme and the sector innovation fund by 31 March 2022 *(Cumulative target)*	Annual workplans or contract approved for 3 support instruments of increased localisation, competitiveness and R&D-led industry development	No target	No target	Annual workplans or contract approved for 5 support instruments of increased localisation, competitiveness and R&D-led industry development between 01 April 2021 and 31 March 2022
7.	Number of innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems	14 innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems between 01 April 2020 and 31 March 2022 *(Cumulative target)*	No target	Annual workplans for 10 innovation support interventions that strengthen provincial or rural innovation systems.	No target	Annual workplans for 14 innovation support interventions that strengthen provincial or rural innovation systems between 01 April 2021 and 31 March 2022
8.	Number of statistical reports and policy briefs approved by Exco for publication and/or submitted to Cabinet and/or disseminated to policy audience	6 statistical reports or policy briefs approved by Exco for publication and/or submitted to Cabinet and/or disseminated to policy audience by 31 March 2022 *(Cumulative target)*	No target	No target	3 statistical reports approved by Exco for publication and/or submitted to Cabinet and/or disseminated to policy audience	6 statistical reports approved by Exco for publication and/or submitted to Cabinet and/or disseminated to policy audience between 01 April 2021 and 31 March 2022
9.	Turnaround time for providing preapproval decisions on applications for the R&D tax incentive	Preapproval decisions provided within 90 days from date of receipt for 80% of applications for the R&D tax incentive received between 01 January 2021 and 31 December 2021 *(Non-cumulative target)*	Preapproval decisions provided within 90 days on 80% of applications received between 01 January 2021 and 31 March 2021	Preapproval decisions provided within 90 days on 80% of applications received between 01 April 2021 and 30 June 2021	Preapproval decisions provided within 90 days on 80% of applications received between 01 July 2021 and 30 September 2021	Preapproval decisions provided within 90 days on 80% of applications received between 01 October 2021 and 31 December 2021
10.	Number of strategic and technical engagements with CSIR and HRSC to ensure alignment with national priorities	8 strategic and technical engagements with CSIR and HSRC to ensure alignment with national priorities by 31 March 2022 *(Cumulative target)*	Two strategic and technical engagements	Four strategic and technical engagements	Six strategic and technical engagements	Eight strategic and technical engagements between 01 April 2021 to 31 March 2022

Explanation of planned performance over the medium term

The budget programme is support the Department's outcomes that have been identified for the 2020-2025 Strategic Plan, namely, (i) A transformed, inclusive, responsive and coherent NSI; (ii) Human capabilities and skills for the economy and for development; (iii) Increased knowledge generation and innovation output; (iv) Knowledge utilisation for economic development in (a) revitalising existing industries and (b) stimulating R&D-led industrial development; and (v) Knowledge utilisation for inclusive development.

In 2021/22, the budget programme will do the following to ensure that 10 outputs are realised:

- Enable the modernisation of sectors of the economy such as manufacturing, agriculture and mining to ensure that these sectors are competitive and can contribute to higher GDP growth and participating in the aerospace, mining, and automotive sector master plans.
- Develop new industries based on new sources of growth e.g. the Fourth Industrial Revolution and the circular economy.
- Increase the NSI contribution to exports, by putting in place measures to accelerate the conversion of ideas and knowledge to products and services.
- Support grassroots innovators.
- Supports the RDI projects that contribute towards industrialisation, transitioning towards a circular economy and the development of high-end skills required for a digital economy.
- Promote private sector R&D investment in all sectors of the economy through implementation of the R&D Tax Incentive.
- Support knowledge utilisation for economic development through Sector Innovation Funds and industry development centres at the CSIR through the Industry Innovation Partnership programme. These two initiatives are intended to incentivise the private sector to increase investments in research, development and innovation, as well as using the publicly funded capabilities and capacity of institutions at the CSIR, to assist industry to become more competitive.
- The DSI through the Regional Innovation Support and Innovation for Local Economic Development (ILED) programmes is supporting interventions to enable innovation ecosystem development in support of a capable and developmental state. Concerted efforts are being made to increase the spatial footprint of innovation support and enable localised socio-economic development.

The table below sets out how the medium-term budget allocation (2021/22 – R1 729 028; 2022/23 – R1 769 794; and 2023/24 – R1 776 421) will be used to realise the budget programme outputs identified.

Reconciling performance targets with the budget and MTEF

Table 21: Socio-economic Innovation Partnerships expenditure estimates

R'000 Programme	Expenditure outcome			Adjusted appropriation	Medium-term expenditure estimates		
	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Office of the Deputy Director-General	4 355	3 998	4 856	3 529	3 347	3 389	3 391
Sector Innovation and Green Economy	985 314	1 102 855	1 049 495	987 259	1 065 992	1 091 908	1 096 068
Innovation for Inclusive Development	356 729	339 953	373 080	369 703	374 883	382 888	384 314
Science and Technology Investment	22 198	29 935	33 983	32 019	35 626	36 300	36 410
Technology Localisation and Advanced Manufacturing	248 404	278 477	316 782	341 299	249 180	255 309	256 238
TOTAL	**1 617 000**	**1 755 218**	**1 778 196**	**1 733 809**	**1 729 028**	**1 769 794**	**1 776 421**
Compensation of employees	42 858	43 996	43 193	44 805	44 300	44 358	44 357
Goods and services	6 853	7 742	5 766	7 278	9 948	10 221	10 258
Transfers and subsidies	1 567 284	1 703 472	1 729 237	1 681 726	1 674 780	1 715 215	1 721 806
Payments for capital assets	-	-	-	-	-	-	-
Payments for financial assets	5	8	-	-	-	-	-
TOTAL	**1 617 000**	**1 755 218**	**1 778 196**	**1 733 809**	**1 729 028**	**1 769 794**	**1 776 421**

Table 22: Updated key risks and mitigations – Socio-economic Innovation Partnerships

Outcome	Key risks	Mitigation action
Outcome 1: A transformed, inclusive, responsive and coherent national system of innovation	The DSI may miss the opportunity to participate in government strategy and policy formulation relating to science, technology and innovation for the circular economy.	Submit a request for a contract position to fill the post of DD: Green Economy
	The Programme may be unable to fully implement the Water and Waste RDI Initiatives.	• Realign transfer dates in line with the proposed uniform funding cycle to spend the funds within the financial year. • Conduct the mid-term review of both roadmaps to determine the effectiveness of the implementation of the roadmaps.
Outcome 2: Human capabilities and skills for the economy and for development.	The Programme may be unable to fully implement the Water and Waste RDI Initiatives.	• Realign transfer dates in line with the proposed uniform funding cycle to spend the funds within the financial year. • Conduct the mid-term review of both roadmaps to determine the effectiveness of the implementation of the roadmaps.
	Having a portfolio of projects that does not have the potential to impact on industrial development	• Ensure progress reviews are communicated to key stakeholders e.g. Industry partners/ Minister for key flagship projects based on contract value/ economic impact
	Projects not delivered as planned by implementation entities	Improve the quality of the reports from the implementing agencies.
Outcome 3: Increased knowledge generation and innovation output	Projects not delivered as planned by implementation entities	Improve the quality of the reports from the implementing agencies.
Outcome 4: Knowledge utilisation for economic development – *(a) revitalising existing industries and (b) stimulating R&D-led industrial development*	Administrative and adjudication errors in processing R&D tax incentive applications.	• Conduct research to understand the R&D activities in the FinTech industry and versus the current provisions • Conduct meetings with industry/consultants to engage on the tax incentive programme (Private Sector)
	Not achieving the targeted turnaround time in providing a decision to applicant companies	• Extend the functionality of the Online Application system to cover the entire value chain up to approval/non- approval stage. • Participate in HR processes with respect to the filling of vacancies within the directorate.
Outcome 5: Knowledge utilisation for inclusive development	Mismatched and inefficient joint initiatives for Innovation in sector departments	Ensure that there are bi-lateral meetings and project steering committee meetings at an operational level between the DSI line departments and stakeholders.
	Inadequate uptake and scale-up of solutions by line departments	• Pilot and scale up of technology demonstrators and locally developed technologies. • Provide alternatives to existing models used by line departments.
	Provincial and local government may not provide funding or take ownership of catalytic interventions	Continue the Regional Innovation Support Programme to support interventions that enable innovation in a particular location.

Outcome	Key risks	Mitigation action
	Lack of inclusivity of catalytic interventions	Continue the Regional Innovation Support Programme to support interventions that enable innovation in a particular location.
Outcome 6: Innovation in support of a capable and developmental state.	Mismatched and inefficient joint initiatives for Innovation in sector departments	Ensure that there are bi-lateral meetings and project steering committee meetings at an operational level between the DSI line departments and stakeholders.
	Inadequate uptake and scale-up of solutions by line departments	• Pilot and scale up of technology demonstrators and locally developed technologies. • Provide alternatives to existing models used by line departments.
	The DSI may miss the opportunity to participate in government strategy and policy formulation relating to Science, Technology and Innovation for the circular economy.	Submit a request for a contract position to fill the post of DD: Green Economy
	Statistics and indicators commissioned by the Sub programme may not adequately meet policy requirements.	• EXCO approval of all major changes to existing measurement relating to : • Frascati Manual and Oslo Manual, policy requirements, policy dialogue with user community and R&D and Innovation survey review workshops). • Engage with Stats SA and HSRC regarding access to the data for the STI surveys. • Conduct bi-annual engagements with internal and external stakeholders for awareness and inputs into the survey instrumentsAssess new needs based on the Decadal Plan (including Foresight results and White Paper).
	Production of poor quality (e.g. coverage, accuracy) statistics	• Maintenance of the established benchmarks/standards for assessing the quality of each statistical report. • Regular consultations/workshops with Stats SA and OECD.

The DSI public entities

The Public Finance Management Act (PFMA), 1999 (Act No. 1 of 1999), requires the oversight of public entities reporting to the executive authority. 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 DSI provides support and advice to the Minister on matters regarding the public entities. The DSI, in consultation with its public entities, developed the Governance Framework for the Entities Reporting to the Minister of Science and Technology. The framework guides the relationship between the DSI and its entities, and outlines the governance structures, systems and processes put in place to advance matters of national interest.

Table 23: Public entities reporting to the DSI

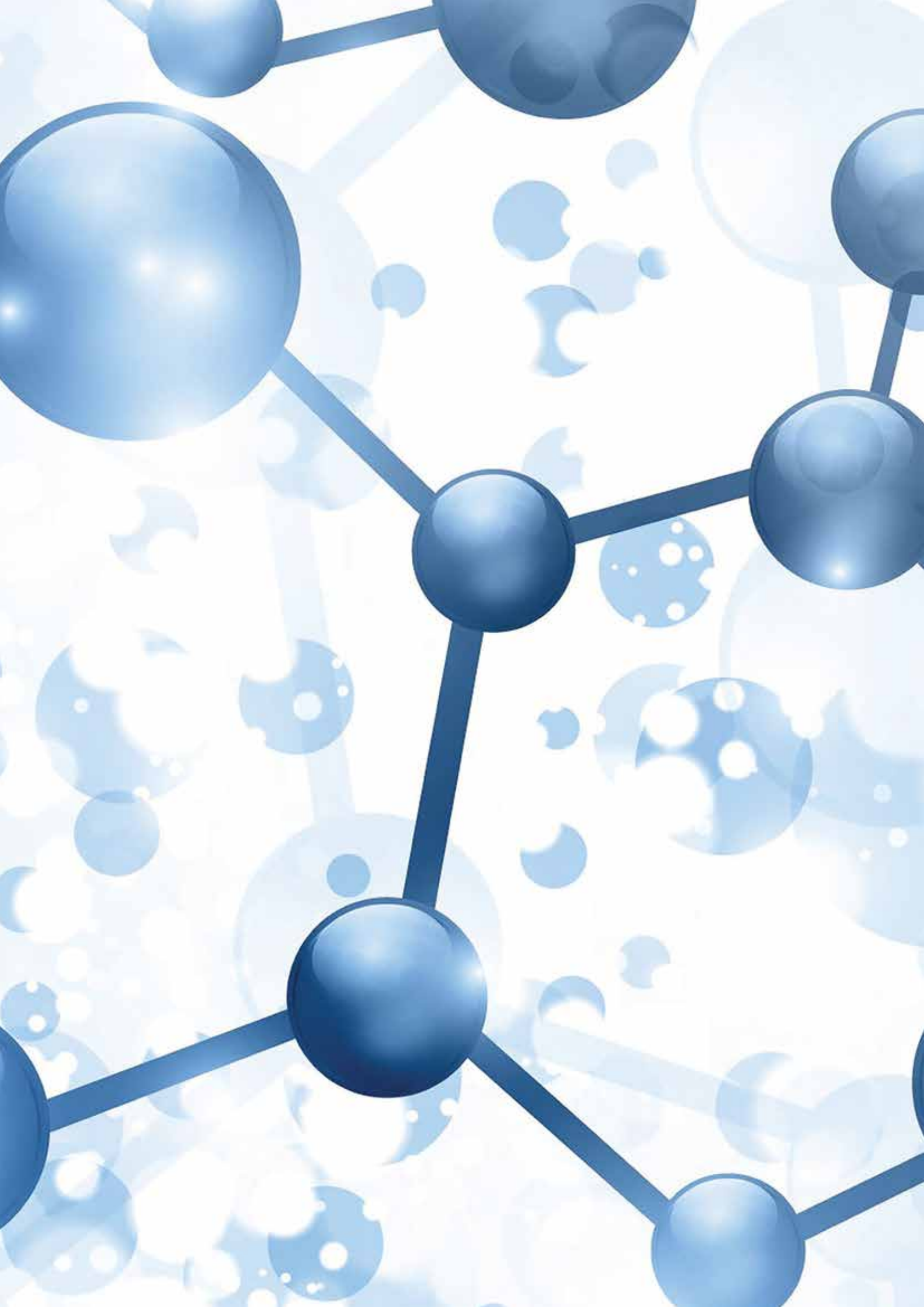
Name of public entity	Mandate	Outcomes	Current annual budget (R'million)
Academy of Science of South Africa (ASSAf)	• To promote common ground in scientific thinking across all disciplines, including the physical, mathematical and life sciences, as well as the human, social and economic sciences. • To 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.	• Increased knowledge generation and innovation output • Innovation in support of a capable and developmental state	R24 840 000
Council for Scientific and Industrial Research (CSIR)	• 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.	• Knowledge utilisation for economic development (a) in revitalising existing (traditional) industries and (b) in stimulating R&D-led industrial development • Increased knowledge generation and innovation output • Innovation in support of a capable and developmental state	R893 581 000

Name of public entity	Mandate	Outcomes	Current annual budget (R'million)
Human Sciences Research Council (HSRC)	• 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.	• Innovation in support of a capable and developmental state • Increased knowledge generation and innovation output • Knowledge utilisation for inclusive development	R289 325 000
National Advisory Council on Innovation (NACI)	• To advise the minister responsible for science and technology and, through the minister, the Cabinet, on the role and contribution of science, mathematics, innovation and technology, including indigenous technologies, in promoting and achieving national objectives, namely, to improve and sustain the quality of life of all South Africans, develop human resources for science and technology, build the economy, and strengthen the country's competitiveness in the international arena.	• A transformed, inclusive, responsive and coherent NSI • Innovation in support of a capable and developmental state	R 5 300 000
National Research Foundation (NRF)	• To contribute to national development by– • supporting, promoting and advancing research and human capacity development, through funding and the provision of the necessary research infrastructure, in order to facilitate the creation of knowledge, innovation and development in all fields of science and technology, including humanities, social sciences and indigenous knowledge; • developing, supporting and maintaining national research facilities; • supporting and promoting public awareness of, and engagement with science; and • promoting the development and maintenance of the national science system and support of government priorities.	• A transformed, inclusive, responsive and coherent NSI • Increased knowledge generation and innovation output • Human capabilities and skills for the economy and for development	R859 469 000

Name of public entity	Mandate	Outcomes	Current annual budget (R'million)
South African Council for Natural and Scientific Professions (SACNASP)	• To administer the registration of professional, candidate and certificated natural scientists, and related matters.	• A transformed, inclusive, responsive and coherent NSI • Human capabilities and skills for the economy and for development	R 5 000 000.
South African National Space Agency (SANSA)	• 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 human capital development outreach programmes and infrastructure development. • To foster international cooperation in space-related activities.	• Increased knowledge generation and innovation output • Innovation in support of a capable and developmental state • Knowledge utilisation for economic development (a) in revitalising existing (traditional) industries and (b) in stimulating R&D-led industrial development	R161 196 000
Technology Innovation Agency (TIA)	• 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.	• Knowledge utilisation for economic development (a) in revitalising existing (traditional) industries and (b) in stimulating R&D-led industrial development • Increased knowledge generation and innovation output • Innovation in support of a capable and developmental state	R408 825 000

Table 24: Infrastructure projects

Project name	Programme	Project description	Outputs	Project start date	Project completion date	Current allocation (R million)
Square Kilometre Array (SKA)	4	Phase 1 of the SKA will include the installation of 2 of 3 science modes (UHF, LSP and S-Band) by 31 March 2020	Installation of 2 (UHF and LSP) of the 3 science modes	2018/19	2021/22	R 802 407 000
South African Research Infrastructure Roadmap (SARIR)	4	Initiation of the establishment of 4 large research infrastructure (RI) projects over the 2020/21 to 2022/23 MTEF period as part of the implementation of SARIR	The 4 RIs to be initiated: 1. South African Marine and Antarctic Research Facility 2. Nano Manufacturing facility 3. Solar Research Facility 4. Materials Characterisation Facility	2016/17	2023/24	R 346 666 000
National Integrated Cyberinfrastructure System (NICIS)	4	NICIS is the national or Tier 1 platform to provide e-infrastructure, tools and services to enable sustainable e-research, human capital and research capacity and skills development; and effective delivery of e-learning.	1. Increase the total available broadband capacity provided by SANReN annually 2. Increase the data storage capability through DIRISA projects 3. Conduct a feasibility study to increase the compute capability to 10 PFlops 4. Graduate master's students in e-science through the National e-Science Postgraduate Teaching and Training Platform	2017/18	On-going project	R 272 121 000



TECHNICAL INDICATOR DESCRIPTIONS

PART D

Programme 1: Administration

Indicator title 1	DSI public entities' annual performance plans and CSIR Shareholder Compact approved by the Minister
Definition	The DSI entities' (HSRC, NRF, SANSA, ASSAf, TIA and NACI) Strategic Plans (SP) and the Annual Performance Plans (APP) and the CSIR's shareholder compact approved by the Minister and signed by the DSI entities' board chairpersons.
Source of data	The DSI entities SPs and APPs signed by the Minister • Proof of submission to National Treasury and the Department of Planning, Monitoring and Evaluation. • Minister submission accompanied by signed letter to the Chairperson of the board approving the final APP and SP.
Method of calculation/ assessment	The indicator is a quantitative indicator and requires no calculation rather the assessment of the source data provided.
Means of verification	DSI entities' strategic plans, annual performance plans and signed shareholder compacts.
Assumption	Engagements and assessment of draft plan as stated on the Exco approved planning cycle.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Biannually: Q3 and Q4).
Desired performance	High performance – DSI public entities' 2022/23 Annual Performance Plans (NRF; HSRC; TIA; SANSA; NACI; ASSAf) and CSIR shareholder compact signed by the Minister and Chairperson of the board.
Indicator responsibility	Director: Governance Chief Director: Policy, Planning, Governance, Monitoring and Evaluation

Indicator title 2	**Approved Decadal Plan to implement the 2019 White Paper on Science Technology and Innovation.**
Definition	Sets out plan for implementing the White Paper on STI and indicators for the system to measure contribution and efficiency.
Source of data	• The approved Decadal Plan on STI signed by the Minister. • Approved Cabinet memorandum.
Method of calculation/ assessment	The indicator is a qualitative indicator and requires no calculation. The source data provided must be assessed.
Means of verification	• Signed DG and Minister submission. • Stakeholder engagement on the Decadal Plan. • Presentation to Portfolio Committee. • Exco submission approval. • Minister submission approval.
Assumption	Engagement with the broader NSI
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	High performance
Indicator responsibility	Deputy Director-General: Institutional Planning and Support Chief Director: Policy, Planning, Governance, Monitoring and Evaluation

Indicator title 3	Percentage of approved funded positions filled annually.
Definition	The indicator intends to determine the percentage of funded positions filled annually.
Source of data	PERSAL system.
Method of calculation/ assessment	Total number of filled positions on PERSAL / total number of funded positions on PERSAL x 100.
Means of verification	PERSAL reports.
Assumption	The Department will maintain a 10% vacancy rate as the DPSA standard.
Disaggregation of beneficiaries (where applicable)	Target for women: Consideration to DSI employment equity plan when a post is filled.
	Target for youth: n/a
	Target for people with disabilities: Consideration to DSI employment equity plan when a post is filled.
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Annually in Q4).
Desired performance	High performance – 85% of all approved funded positions filled.
Indicator responsibility	Chief Director: Human Resources Management Deputy Director-General: Corporate Services

Indicator title 4	**Unqualified audit opinion with no financial matters in the audit report from the Auditor-General**
Definition	It measures efficiency and compliance with regulatory frameworks
Source of data	• BAS and Logis, and populated Treasury templates for financial statements • Audit report from Auditor-General of South Africa
Method of calculation/ assessment	The Auditors opinion is the only way it could be measured for example qualified opinion means that management did not comply with prescripts therefore did not meet the minimum expected standards of financial performance. Unqualified means that the Department performed and an acceptable level. Clean audit meaning the department exceeded the expected standard and the policies are effective.
Means of verification	Trial balance, detailed reports and commitment reports from Logis and financial statements.
Assumption	Compliance with regulatory frameworks, policies and National Treasurer Instruction notes.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Annually in Q2.)
Desired performance	High performance – Unqualified audit opinion (A qualified opinion means that management did not comply with prescripts and therefore did not meet the minimum expected standards of financial performance. An unqualified audit opinion means that the Department performed at an acceptable level of financial performance was achieved. Clean audit means that the Department exceeded the expected standard and the policies are effective).
Indicator responsibility	Chief Financial Officer Deputy Director-General: Corporate Services

Indicator title 5	Number of media platforms used to promote the DSI and its entities.
Definition	To raise the profile of the Department through the publication of articles, conducting broadcasts, media liaison activities, online, internal and external stakeholder engagement, social media initiatives that is based on thematic content.
Source of data	Media coverage in community and mainstream publications, live broadcasts and pre-recorded content on television and radio, online media articles and videos, media statements and media briefings, and social media activities.
Method of calculation/ assessment	Numeric count of media platforms.
Means of verification	• Media monitoring reports. • Published articles. • Broadcasted content. • Tweets, infographics and social media videos. • Media statements.
Assumption	Media plans approved
Disaggregation of beneficiaries (where applicable)	Target for women: Yes, through community base media and stakeholder engagement.
	Target for youth: Yes, through community base media and digital platforms.
	Target for people with disabilities: Yes only in Q4.
Spatial transformation (where applicable)	Targeting historically disadvantaged, rural and urban communities.
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	High performance – Six media platforms to profile the DSI and its entities.
Indicator responsibility	Director: Media Chief Director: Communication

Indicator title 6	Number of branding initiatives developed and implemented
Definition	Roll-out of approved branding initiatives on a project-to-project basis.
Source of data	Reports on Branding initiatives rolled-out.
Method of calculation/ assessment	All approved projects developed and implemented in identified provinces.
Means of verification	• Approved project specifications prepared / advertised e.g. corporate video with new brand messaging, billboard advertising etc. • List of campaigns developed / implemented / installed.
Assumption	Available (billboard) advertising space, new marketing platforms available.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: Yes, n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Cumulative
Reporting cycle	2021/22 (Biannually: Q2 and Q4).
Desired performance	High performance – Two National thematic campaign reports on the roll-out of branding initiatives.
Indicator responsibility	Chief Director: Communication Deputy Director-General: Institutional Planning and Support

Programme 2: Technology Innovation

Indicator title 1	Number of decision-support tools utilised in all spheres of government
Definition	Decision-support tools help people think about choices they face; they describe where and why choice exists; they provide information about options, including, where reasonable, the option of taking no action. These interventions aim to help people to deliberate, independently or in collaboration with others, about options by considering relevant attributes to help them forecast how they might feel about short, intermediate and long-term outcomes which have relevant consequences. They support the process of constructing preferences and eventual decision making, appropriate to their individual situation. A decision-support tool will be considered "developed" once it has been approved by one or more designated members of the DSI Exco. A decision-support tool will be considered maintained once funding has been transferred to a relevant institution/department, the tool has been transferred to a relevant institution/department, or support has been provided through promotional activities, e.g. workshops that would be used as a marketing and adoption tool.
Source of data	**Hydrogen and Energy; Bioinnovation; Innovation Priorities and Instruments; and NIPMO** • Signed contract • Signed annual report/draft annual report/signed summary reports from implementing agency indicating number and an appendix with the name of decision-support intervention supported or maintained OR • Website which shows the developed and/or maintained interventions • Approved submission and payment stub **Space Science and Technology** Website link to an interactive portal OR • Workshop report or report of stakeholder engagements approved by a designated member of Exco. • Proof of transfer to relevant department or institutions
Method of calculation/ assessment	A = B + C Where A = total number of decision-support tools developed and/or maintained B = decision-support interventions developed and/or maintained C = decision-support interventions developed and/or maintained.
Means of verification	The relevant Programme officials will check the input received against the source data and check whether the target can be claimed. Hard or soft copy data will be used and the evidence will be saved on Alfresco.
Assumption	In some cases, there may be a delay in obtaining the relevant data given dependence on other internal or external stakeholders. This will also affect the quality of the data obtained. "Approved" will include "noted" as there will be circumstances in which approval is not required. Given the needs/requirements of government, a number of interventions other than those specified may fall within the definition of decision-support interventions and may be included in totals for the financial year. It should be noted that the baseline will fluctuate from year to year because of the uncertainty associated with the requirements of government and the DSI's ability to respond.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities:
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative: The sum of all decision-support tools utilised in all spheres of government
Reporting cycle	2021/22 (Annually:Q4)
Desired performance	Higher performance desired – 2 decision support tools developed and/or maintained.
Indicator responsibility	Deputy Director-General: Technology Innovation

Indicator title 2	**Number of strategic and technical engagements with SANSA and TIA to ensure alignment to national priorities.**
Definition	This is an oversight function of the DSI (DDG: TI and Chief Director: Space S&T) to ensure that SANSA and TIA adhere to the government framework in their APPs and SPs, and to ensure that the APPs and SPs are aligned to the DSI's APP and SP. The SANSA and TIA APPs and SPs should respond to the DSI (Decadal Plan, White Paper) and broader government priorities (NDP, MTSF).
Source of data	• The TIA and SANSA APPs and SPs have transformation, poverty alleviation and inequality targets in support of the Department's outcomes. OR • Reports that resulted from strategic engagements. OR • Minutes of meetings.
Method of calculation/ assessment	Number of meetings convened per year, number of SMMEs supported, BBBEE, women and youth benefiting.
Means of verification	Annual/quarterly reports
Assumption	That these engagements with the entities take place as planned, and the inputs are taken into consideration when the draft APP and SP are completed. That SANSA and TIA APPs and SP are approved by the Minister.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where application)	Focus on rural areas, townships and informal settlements
Calculation type	Non-cumulative: Total number of meetings convened between the DSI and SANSA, and between the DSI and TIA.
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4)
Desired performance	Higher performance desirable – 8 strategic and technical engagements with SANSA and TIA to align to national priorities.
Indicator responsibility	Deputy Director-General: Technology Innovation

Indicator title 3	Provision of space weather information for the aviation industry in South Africa and the African continent
Definition	SANSA has been appointed as the regional space weather centre for the African region by the International Civil Aviation Organization. The centre will be upgraded to ensure that it provides 24/7 space weather services for South Africa and the African continent.
Source of data	Quarterly and annual reports of the upgraded infrastructure and facility; and derived and usage of products and services by the aviation sector.
Method of calculation/ assessment	Number of quarterly reports with clear milestones and deliverables as per the contract
Means of verification	Applicable contract/agreement, approved submissions,
Assumption	That the SANSA Regional Space Weather Centre is upgraded, fully operational, and capable of providing 24/7 space weather information for the aviation sector in the country and continent by 31 March 2024.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Cumulative
Reporting cycle	2021/22 (Biannually: Q2 and Q4)
Desired performance	High performance – SANSA Regional Space Weather Centre upgrades initiated including products and services developed.
Indicator responsibility	Chief Director: Space Science and Technology Deputy Director-General: Technology Innovation

Indicator title 4	**Number of maritime domain awareness (MDA) missions completed in support of the Oceans Economy Phakisa**
Definition	As part of the National Space Programme satellite build programme, the DSI has committed to contribute to the Oceans Economy Phakisa through the development of 9 satellite missions for maritime domain awareness. The satellites will provide information for decision support, ocean governance and marine protection, and marine spatial planning.
Source of data	• Number of quarterly reports with milestones and deliverables: • Flight Acceptance Review completed • Launch of 3 Cubesats for MDASat constellation • Commissioning and operation of the 3 satellites
Method of calculation/ assessment	Applicable contract, agreement, approved submissions, quarterly reports
Means of verification	The DSI will verify the deliverable and milestones through site visits to the lab to view the progress in the manufacturing of various components and subsystems.
Assumption	That the satellites are successfully developed and operational as per the technical specifications
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative: Total number of quarterly reports with clear deliverables and milestones as per the contract
Reporting cycle	2021/22 (Quarterly: Q1, Q3, and Q4)
Desired performance	High performance – Number of satellites launched into the outer space in the correct orbit and operational providing quality maritime domain awareness data and information for decision support and marine spatial planning
Indicator responsibility	Chief Director Space Science and Technology Deputy Director-General: Technology Innovation

Indicator title 5	**Number of postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments and bioeconomy areas**
Definition	This indicator refers to master's and doctorates supported as a result of the Department funding initiatives in the designated areas. Designated areas include space science, energy, bio-innovation, emerging research areas, IP management, and technology transfer and technology commercialisation
Source of data	Only master's and doctoral students supported within the 2020 calendar year will be used for the final calculation. **Bio-Innovation; Hydrogen and Energy; Innovation Priorities and Instruments; Innovation Priorities and Instruments; Space Science and Technology** • Signed contracts • Approved submission and proof of payment • Signed reports which indicates total number of postgraduate (master's and doctoral) students supported OR • Proof of enrolment (proof of registration on an official letterhead, stamped and signed) for postgraduate students from institutions.
Method of calculation/ assessment	If 100 postgraduate students are supported during the year, then the total supported at the end of Quarter 4 is 100.
Means of verification	The relevant Programme officials will check the input received against the source data and check that the target can be claimed. Hard or soft copy data will be used and the evidence will be saved on Alfresco.
Assumption	Postgraduate students are produced by the universities. The Programme provides funding support, infrastructure and resource support through universities, science councils and its agencies, as appropriate. Given this scenario and the resulting dependence on other internal or external stakeholders, there may be delays in obtaining the relevant data. This will also affect the quality of data obtained. There may also be variances from the planned target as students may complete their research over a shorter or longer period.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	N/A
Calculation type	Non-cumulative: Sum of all master's and PhD students supported during 2021
Reporting cycle	2021/22 (Annually: in Q4)
Desired performance	Higher performance desired – 190 of postgraduate students (master's and doctoral) supported in designated energy, space, Innovation Priorities and Instruments and bioeconomy areas.
Indicator responsibility	Deputy Director-General: Technology Innovation

Indicator title 6	Number of artisans and / or technicians trained in space, energy and bio-economy
Definition	This indicator seeks to measure and track the number of artisans/technicians trained in space, energy and bio-economy. A key aspect is that training is not limited to research but that technology services in the sector are supported.
Source of data	• Approved submission where appropriate • Funding agreement/contracts where appropriate • Training supported where appropriate – linked to projects • Signed reports/signed summary reports from implementing agency, and letter from the employing institutions confirming absorption
Method of calculation/ assessment	Total number receiving employment contracts by the end of the financial year.
Means of verification	The relevant Programme officials will check the input received against the source data and check whether the target can be claimed. Hard or soft copy data will be used and the evidence will be saved on Alfresco.
Assumption	In some cases, there may be a delay in obtaining the relevant data given dependencies on other internal or external stakeholders. This also affects the quality of data obtained. Caveat: Depending on the timing of training period for absorption into the space, energy and bio-economy. Absorbed means employed (temporary or permanent) at a lab/company/ university/etc. may differ.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: Yes
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative: Sum of all of the technicians/artisans absorbed during all quarters of the financial year.
Reporting cycle	2021/22 (Annually in Quarter 4)
Desired performance	Higher performance is desirable – 20 artisans and/or technicians trained in space, energy and bio-economy
Indicator responsibility	Deputy Director-General: Technology Innovation

Indicator title 7	Number of trainees upskilled in intellectual property management and technology transfer
Definition	This indicator refers to the number of individuals trained in the area of intellectual property management and technology transfer through workshops and World Intellectual Property Organization (WIPO) distance learning courses and the Nanotechnology Summer School.
Source of data	• Attendance registers (applicable only for workshops) OR • Attendance certificates OR • Letter of registrants to WIPO (applies only to distance learning courses)
Method of calculation/ assessment	• Total number of registrants at the end of the financial year (applies only to the WIPO distance learning courses) • Total number of participants at the end of the financial year (applies only to workshops/summer school)
Means of verification	The relevant officials will check the input received and verify that the target can be claimed.
Assumption	The individuals who have registered the WIPO distance learning courses will complete the course (Nanotechnology Summer School held once every 2 years). All participants will attend throughout the workshop.
Disaggregation of beneficiaries (where applicable)	Target for women: Yes
	Target for youth: Yes
	Target for people with disabilities: Yes
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Biannually: Q1 and Q3)
Desired performance	Higher performance desired – 250 trainees upskilled in intellectual property management and technology transfer skills
Indicator responsibility	Deputy Director-General: Technology Innovation

Indicator title 8	**Number of disclosures, received from publicly financed research and development institutions as reported to NIPMO.**
Definition	This indicator refers to the number of disclosures (or IP7 forms) received by NIPMO from publicly financed research and development institutions.
Source of data	Disclosures submitted to NIPMO on the knowledge and information management (KIM) system
Method of calculation/ assessment	• Acknowledgement letters confirming the number of disclosures received • Signed summary report of licenced IP reported
Means of verification	The disclosures will be reported in the first and third quarter, NIPMO will review the submitted disclosures and a summary of Database of IP7 forms received will be approved by the Head: NIPMO.
Assumption	There is an assumption that publicly financed research and development institutions will enter into licence agreements (which may be dependant of various factors)
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative: Total number of disclosures from publicly financed research and development institutions
Reporting cycle	2021/21 (Biannually: Q1 and Q3)
Desired performance	Higher performance is desirable – 235 disclosures received from publicly financed research and development institutions as reported to NIPMO
Indicator responsibility	Head of NIPMO Deputy Director-General: Technology Innovation

Indicator Title 9	**Number of disclosures licensed for the first time, received from publicly financed research and development institutions and recipients as reported to NIPMO**
Definition	This indicator refers to number disclosures (IP7 Forms), received bi-annually from publicly financed research and development institutions as reported to NIPMO, which are licensed for the first time
Source of Data	• Acknowledgement letters to institutions • Summary report of IP licensed for the first time signed by Head: NIPMO
Method of Calculation / Assessment	Signed summary report of licensed IP reported
Means of verification	The relevant official/s will review the NIPMO KIM system to verify licensing status of IP reported to NIPMO and draft summary report of IP which was licensed for the first time.
Assumption	There is an assumption that publicly financed research and development institutions will enter into licence agreements (which may be dependent of various factors)
	There is an assumption that NIPMO KIM database would be operational during the submission and retrieval of information
Disaggregation of beneficiaries (where applicable)	Target for Women: N/A
	Target for Youth: N/A
	Target for people with Disabilities: N/A
Spatial Transformation (where application)	OTTs are located across the country in all 9 provinces.
Calculation Type	Non-cumulative: Sum of all the IP disclosures which indicated that it had be licensed for the first time.
Reporting Cycle	2021/22 (Biannualy:Q1 and Q3)
Desired performance	Higher performance required
Indicator Responsibility	Deputy Director General: Technology Innovation

Indicator title 10	**Number of intellectual property rights filed based on RDI conducted in designated areas.**
Definition	Filings/applications of IPRs**** in energy, emerging research areas, and the bioeconomy. ****IPRs are inclusive of the following categories of IPRs: patents and trademarks, copyright, designs, plant breeders' rights and geographical indications.
Source of data	Only IPR applications/filings during the period 1 April 2020 to 31 March 2021 either in South Africa or in other countries will be counted. • Signed project funding agreements, memoranda of agreement, or contracts • Signed annual reports/draft annual reports/signed summary reports from implementing agency with number and list of IPRs applications/filings; • Proof of application/filing of IPRs • Approved submission and payment stub where applicable
Method of calculation/ assessment	Total number of IPRs filed at the end of the financial year = the sum of the IPRs applications/filings produced during each quarter of the financial year
Means of verification	The relevant Programme officials will check the input received against the source data and check whether the target can be claimed. Hard or soft copy data will be used and the evidence will be saved on Alfresco.
Assumption	In most cases there are delays in obtaining the final data given dependencies on other internal or external stakeholders. This also affects the quality of data obtained/reported. Moreover, given that the results of research and development are difficult to predict, variations from the planned outputs can be expected.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where application)	n/a
Calculation type	Non-cumulative: Sum of all IPRs filed during 2020
Reporting cycle	2021/22 (Annually in Q4)
Desired performance	Higher performance is desirable – 4 intellectual property rights filed based on RDI conducted in designated areas
Indicator responsibility	Deputy Director-General: Technology Innovation

Indicator title 11	Number of technology demonstrations, prototypes, products and services developed.
Definition	This indicator refers to prototypes, pilots, demonstrators, technology transfer packages, software, and pre-commercial products, processes or services developed in the following designated areas: space science, energy, bio-innovation, emerging research areas, IP management, technology transfer and technology commercialisation.
Source of data	• Signed contracts • Signed reports or signed summary report from implementing agency as appropriate with number and names of knowledge application products funded during the period • Approved submission and payment stub
Method of calculation/ assessment	Total number of technology demonstrations, prototypes, products and services developed at the end of the financial year = the sum of the technology demonstrations, prototypes, products and services developed during each quarter of the financial year
Means of verification	The relevant Programme officials will check the input received against the source data and check whether the target can be claimed. Hard or soft copy data will be used and the evidence will be saved on Alfresco.
Assumption	In some cases, there may be a delay in obtaining the relevant data given dependencies on other internal or external stakeholders. This also affects the quality of data obtained. Caveat: Depending on the design and implementation of initiatives, consultation with stakeholders, resource limitations/reprioritisation and other factors affecting this performance the development of technology demonstrations, prototypes, products and services may be postponed or terminated or replaced or merged with another relevant technology demonstrations, prototypes, products and services developed other than those specified may be included in the totals for the financial year.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Cumulative: Sum of all of the knowledge application products developed during all quarters of the financial year.
Reporting cycle	2021/22 (Annually in Q4)
Desired performance	Higher performance is desirable – 10 technology demonstrations, prototypes, products and services developed in designated energy, space, and bioeconomy areas
Indicator responsibility	Deputy Director-General: Technology Innovation

Indicator title 12	Number of stationary fuel cell systems/clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements
Definition	This indicator refers to prototypes, pilots, demonstrators, technology transfer packages, software, and pre-commercial products, processes or services deployed in rural and informal settlements in South African in partnership with local/district municipalities.
Source of data	• Signed reports or signed summary report from implementing agency as appropriate with number and names of knowledge application products funded during the period;
Method of calculation/ assessment	Total number of technology demonstrations, prototypes, products and services developed at the end of the financial year = the sum of the technology demonstrations, prototypes, products and services developed during each financial year
Means of verification	The relevant Programme officials will check the input received against the source data and check whether the target can be claimed. Hard or soft copy data will be used and the evidence will be saved on Alfresco.
Assumption	In some cases, there may be a delay in obtaining the relevant data given dependencies on other internal or external stakeholders. This also affects the quality of data obtained. Caveat: Depending on the design and implementation of initiatives, consultation with stakeholders, resources limitations/reprioritisation and other factors impacting on this performance indicator, the development of technology demonstrations, prototypes, products and services may be postponed or terminated or replaced or merged with another relevant technology demonstrations, prototypes, products and services developed other than those specified may be included in the totals for the financial year.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where application)	The focus will be on dealing with energy access challenges in rural communities as well as informal settlements in urban and peri-urban areas.
Calculation type	Non-cumulative: Sum of the stationary fuel cell systems/clean energy technologies deployed during all quarters of the financial year.
Reporting cycle	2021/22 (Annually in Q4)
Desired performance	Higher performance is desirable – 2 stationary fuel cell systems/clean energy technologies deployed in partnership with local and district municipalities in rural and informal settlements
Indicator responsibility	Chief Director: Hydrogen and Energy Deputy Director-General: Technology Innovation

Indicator title 13	Number of small, medium and micro-enterprises (SMMEs) contracted and/or assisted for business development and commercialisation
Definition	The indicator refers to research, development and innovation projects that supports and assist SMMEs with value-addition, product development, technology transfer, incubation, branding and marketing. This includes preclinical and clinical studies, business development initiatives, brand development, exhibitions/expositions and commercialisation events. Included will be actual sales of products and commercial licences and agreements signed and manufacturing contracts offered to SMMEs
Source of data	• Signed reports and signed contracts on Alfresco. • Reports may include signed preliminary documents, drafts quarterly and annual reports. • Websites which show the information related to the interventions. • Approved submissions and payment stubs.
Method of calculation/ assessment	Total number of organisations supported financially, for product development (innovations), technology transfer, business development and commercialisation
Means of verification	Programme managers will monitor inputs against the source of data and check whether the target can be claimed. Hard or soft copies of reports and related evidence will be saved on Alfresco
Assumption	Delay may be experienced from entities depending on their internal approval processes for reports to be sent to the DSI. This work involves multiple stakeholders and value-chain processes where one organisation may be delayed by another. Innovation and business development in IKS involves the community, and the time this takes is often unpredictable. As a result, there may be variations in planned outputs.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	This work involves rural development where pre-processing facilities and plant propagation for agri-businesses are supported. Land is often acquired from royal authorities and local municipalities.
Calculation type	Non-cumulative: Sum total of SMMEs supported through Earth observation and IK-Based Technology Innovation initiatives during the 2020 financial year
Reporting cycle	2021/22 (Annual in Q4)
Desired performance	Higher performance is expected – 9 SMMEs contracted and/or assisted with business development and commercialisation
Indicator responsibility	Director: IK-Based Technology Innovation; Director: Earth Observations Deputy Director-General: Technology Innovation

Indicator title 14	Number of commercial outputs in designated areas.
Definition	This indicator seeks to measure and track the number of outputs commercialised as a result of support provided in designated areas, e.g. licences, assignments, options of various natures (e.g. directed research and joint ventures); start-ups, spin outs, new companies, etc. created; distribution, manufacturing, sales agreements and the like for products, processes and services. The commercialisation of products, processes and services may involve other departments, entities and market players and therefore may fall outside the Department's control.
Source of data	• Approved submission where appropriate • Funding agreement/contracts where appropriate • Signed reports/signed summary reports from implementing agency, or letters indicating number and names of commercial outputs that arose as a result of support, or other evidence, such as an invoice or licence agreement or royalty payment to show that the product is available on the market • Photographs of the relevant outputs where appropriate
Method of calculation/ assessment	Total number of commercial outputs at the end of the financial year = the sum of all the commercialised outputs during each quarter of the financial year
Means of verification	The relevant Programme officials will check the input received against the source data and check whether the target can be claimed. Hard or soft copy data will be used and the evidence will be saved on Alfresco.
Assumption	In some cases, there may be a delay in obtaining the relevant data given dependencies on other internal or external stakeholders. This also affects the quality of data obtained. **Caveat:** Depending on the design and implementation of initiatives, consultation with stakeholders, resources limitations/reprioritisation and other factors impacting on this performance indicator the development of technology demonstrations, prototypes, products and services may be postponed or terminated or replaced or merged with another relevant technology demonstrations, prototypes, products and services developed other than those specified may be included in the totals for the financial year.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative: Sum of all commercial outputs funded during all quarters of the financial year
Reporting cycle	2021/22 (Annually in Q4)
Desired performance	Higher performance is desirable – 4 commercial outputs in designated areas
Indicator responsibility	Deputy Director-General: Technology Innovation

Indicator title 15	**Number of black emerging farmers (subsistence, small-scale and potential commercial farmers) benefiting from technology/innovation support programmes.**
Definition	This indicator seeks to measure emerging farmers (subsistence, small-scale and potential commercial) benefiting from technology/innovation support programmes. The benefits will include one or more of the following: Assistance with production inputs; Gaining knowledge and obtaining results through demonstration trials; Receiving training; Participation in targeted awareness sessions; Mentoring and technical support; and Innovation support
Source of data	• Approved submission where appropriate • Funding agreement/contracts where appropriate • Signed reports/signed summary reports from implementing agency confirming type of technology/innovation support and beneficiaries
Method of calculation/ assessment	Total number of farmers (subsistence, small-scale emerging and potential commercial) at the end of the financial year. Types of benefit include farmer development support programmes, access to technology/innovation or training or participation in technology/innovation demonstration linked to projects supported.
Means of verification	The relevant Programme officials will check the input received against the source data and check whether the target can be claimed. Hard or soft copy data will be used and the evidence will be saved on Alfresco.
Assumption	In some cases, there may be a delay in obtaining the relevant data given dependencies on other internal or external stakeholders. This also affects the quality of data obtained.
Disaggregation of beneficiaries (where applicable)	Target for women: n/.a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial Transformation (where application)	Emerging black farmers
Calculation type	Non-cumulative: Sum of all of emerging farmers benefiting from technology/innovation support programmes during all quarters of the financial year.
Reporting cycle	2021/22 (Annually in Q4)
Desired performance	Higher performance is desirable – 200 of black emerging farmers benefiting from technology/innovation support programmes
Indicator responsibility	Chief Director: Bio Innovation Deputy Director-General: Technology Innovation

Programme 3: International Cooperation and Resources

Indicator title 1	Number of international resource-leveraging engagements undertaken by the Department.
Definition	This indicator refers to the number engagements held with international partners to leverage resources for the benefit of NSI.
Source of data	• An official written communication (email/letter) from the international partner or investor. • Confirming the resource leveraging letter. OR • Agreements/contracts. OR • Memo by CD: International Resources supported by Overseas Bilateral Cooperation and Multilateral Cooperation and Africa.
Method of calculation/ assessment	Number of engagements with foreign partners to leverage resources.
Means of verification	• Email from international partner. OR • Contract. OR • Memo by CD.
Assumption	The target will be achieved regardless of specifically planned annual STI initiatives correctly.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance desirable – 43 dedicated international resource-leveraging engagements undertaken.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Indicator title 2	Number of South African students participating in international training programmes.
Definition	This indicator refers to the amount of South African students accepted into international training programmes offering a postgraduate qualification as part of cooperation initiatives facilitated by the DSI.
Source of data	• Official documentation from the implementing organisation of the international training programme indicating the formal acceptance of the South African student into the programme (Name, Gender, ID of student or student number where possible), document with a list of international training programmes and the number of SA students participated in such programmes. OR • Memo by the CDs: International Resources, Multilateral Cooperation and Africa, and Overseas Bilateral Cooperation.
Method of calculation/ assessment	The sum of all South African students accepted into international programmes, as part of cooperation initiatives facilitated by the DSI.
Means of verification	• Official letter from the implementing organisation. OR • International partner email from the implementing organisation of the international training programme indicating the formal acceptance of the South African student into the programme. OR • Memo by the CD.
Assumption	The target will be achieved using the planned annual STI initiatives appropriately. However, privacy policy of international partners paying for these students limits the type of personal information received.
Disaggregation of beneficiaries (where applicable)	Target for women: 55%
	Target for youth: 60%
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance desired – 326 new South African students participating in international training programmes as part of cooperation initiatives facilitated by DSI.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Indicator title 3	**Number of capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals.**
Definition	This indicator refers to capacity-building initiatives aimed at increasing opportunities for historically disadvantaged institutions and individuals.
Source of data	• Official communication from the National Research Foundation on calls published where HDIs participated. • Official communication from DSI targeting historically disadvantaged institutions on theme specific engagements, e.g. workshop minutes. OR • Memo by CD: International Resources, CD: Multilateral Cooperation and Africa and CD: Overseas Bilateral Cooperation.
Method of calculation/ assessment **Means of verification**	• Number of capacity-building initiatives for HDIs. • Calls/theme-specific workshops/ Official communication from DSI targeting historically disadvantaged institutions on theme-specific engagements, e.g. workshop minutes. OR • Memo by CD.
Assumption	The target will be achieved using the planned annual STI initiatives correctly.
Disaggregation of beneficiaries (where applicable)	Target for women: Yes, but numbers cannot be confirmed nor verified.
	Target for youth: Yes, through BRICS Young Scientist Forum Initiatives and other capacity-building initiatives.
	Target for people with disabilities: Yes, but numbers cannot not be confirm nor verified.
Spatial transformation (where applicable)	Focus will be meanly on historically disadvantaged institutions (HDIs) and previously disadvantaged individuals (PDIs).
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance desired – 32 capacity-building initiatives for international cooperation specifically targeting historically disadvantaged institutions and individuals.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Indicator title 4	**Number of international policy dialogues and technical exchanges to support the policy intents of the White Paper on STI.**
Definition	Dedicated international technical exchanges such as workshops, seminars or training programmes, undertaken to build or reinforce South Africa's capabilities in key STI domains specifically referenced in the DSI Strategic Plan, with the support of international partners facilitated by the DSI.
Source of data	• The official recording per officially signed documentation (reports on or minutes of workshops/seminars. OR • Memo by the CD: International Resources; CD: Multilateral Cooperation and Africa and CD: Overseas Bilateral Cooperation with the relevant information attached confirming the relevance of the data.
Method of calculation/ assessment	The sum of the individual technical exchanges, e.g. the organisation of a technical workshop facilitated by the DSI during the financial year.
Means of verification	• Confirmation of the successful organisation of the technical exchange with the international partner. OR • Memo by CD.
Assumption	The target will be achieved using the planned annual STI initiatives appropriately.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance desired – 34 international policy dialogues and technical exchanges the policy intents of the White Paper on STI.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Indicator title 5	**Number of STI initiatives targeting the objectives of the Agenda 2063 supported.**
Definition	This indicator refers to the amount of STI initiatives targeting objectives of Agenda 2063.
Source of data	• An official written communication from partners with the confirmation of initiatives. OR • Agreements/contracts. OR • Memo by Chief Director: Multilateral Cooperation and Africa supported by International Resources and Overseas Bilateral Cooperation.
Method of calculation/ assessment	Confirmation of successful initiatives/ activities with the international partner.
Means of verification	• Agreements/contract/minutes of meetings/ official written communication from partners with the confirmation of initiatives. OR • Memo by CD.
Assumption	The target will be achieved by using the planned annual STI initiatives appropriately.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where application)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q2, Q3 and Q4).
Desired performance	Higher performance desired – 15 new STI initiatives supporting Agenda 2063.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Indicator title 6	Number of STI initiatives targeting the objectives of the SADC RISDP supported.
Definition	This indicator refers to the number of initiatives supported by DSI targeting objectives of the Southern African Development Community (SADC) Regional Indicative Strategic Development Plan (RISDP) by 31 March 2022.
Source of data	• An official written communication (email/letter) from the international partner confirming DSI's participation. OR • Agreements/contracts. OR • Memo by CD: International Resources, CD: Multilateral Cooperation and Africa and CD: Overseas Bilateral Cooperation.
Method of calculation/ assessment	Sum of activities committed by DSI in support of initiatives supporting the SADC RISDP.
Means of verification	• Minutes of meetings/ technical exchanges or workshops/ official written communication (email/letter) from the international partner confirming DSI's participation. OR • Contracts. OR • Memo by CD.
Assumption	The target will be achieved using the planned annual STI initiatives appropriately.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance is desirable – 17 new STI initiatives supported targeting the objectives of the SADC RISDP.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Indicator title 7	Number of STI Plans of action implemented with bilateral African partners.
Definition	This indicator refers to the plans of action implemented with African partners.
Source of data	• An official written communication between DSI and African partners on the implementation of agreements/ contracts. OR • Memo by CD: Multilateral Cooperation and Africa.
Method of calculation/ assessment	Confirmation of the successful implementation plans undertaken by South Africa and African partners led by DSI.
Means of verification	• Minutes of workshops, seminars and technical exchanges. OR • Memo by Chief Director: Multilateral Cooperation and Africa.
Assumption	The target will be achieved using the planned annual STI initiatives appropriately.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q2, Q3 and Q4).
Desired performance	Higher performance desirable – 6 STI plans of action implemented with bilateral African partners.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Indicator title 8	**Number of engagements with global science leaders to advance national priorities in multilateral forums.**
Definition	Interactions with individuals in global science leadership positions to leverage their influence to benefit the NSI.
Source of data	• Official correspondence indicating interaction with global science leaders to benefit the NSI. OR • Memo by CD: International Resources, CD: Multilateral Cooperation and Africa and CD: Overseas Bilateral Cooperation.
Method of calculation/ assessment	The total number of topic specific interactions with global science leaders to benefit the NSI.
Means of verification	• Responses received from global science leaders. OR • Memo by CD.
Assumption	The global leaders will act on the interactions to benefit the NSI.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Actual performance is high – 12 engagements with global science leaders to advance national priorities in multilateral forums.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Indicator title 9	**Number of international STI initiatives focused on SDGs supported by South Africa.**
Definition	All international STI initiatives addressing SDGs in which South Africa actively participate.
Source of data	• Official correspondence (Minutes of meetings, e-mails from international partners, agreements, funding and in-kind support) that confirm South Africa's STI participation in international SDG initiatives. OR • Memo by CD: International Resources, CD: Multilateral Cooperation and Africa and CD: Overseas Bilateral Cooperation.
Method of calculation/ assessment	The number of STI initiatives addressing SDGs in which South Africa participates.
Means of verification	• Memo by CD with Official correspondence that confirm South Africa's STI participation in international SDG initiatives. OR • Approved Minister Submission. OR • Approved DG Submission. OR • Approved DDG submission.
Assumption	The official decisions will translate in the active involvement of South African scientists and innovators.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q3 and Q4)
Desired performance	Actual performance is high – 8 New international STI initiatives focused on SDGs supported by South Africa.
Indicator responsibility	Deputy Director-General: International Cooperation and Resources.

Programme 4: Research Development and Support

Indicator title 1	**Number of PhD students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities.**
Definition	Total number of PhD bursaries awarded annually as reflected in the reports from NRF and other relevant entities.
Source data	• Contracts entered into with the NRF and other relevant entities (CSIR, SANSA and ARC) in Q3. • Proof of registration (with letterhead, stamped and signature by the Registrar) from the institution or entity in Q4. • Database of PhD students with ID numbers, student numbers, and course details disaggregation of beneficiaries – disabilities, gender, and race. • Payment stubs on funds transferred relating to the bursaries in Q3. • Progress reports on individual programmes or letter confirming the reported quarterly outputs.
Method of calculation/ assessment	Total number of PhD bursaries awarded annually through NRF, CSIR, SANSA and ARC-funded programmes.
Means of verification	Contracts, performance reports or information letter.
Assumption	• The NRF quarterly reports that do not contain the final quarterly data on students due to the late finalisation and auditing of data from their side, thus resulting in the DSI first reporting on preliminary data contained in an email from the NRF. The preliminary data is then updated when the agency sends a formal performance information letter to the DSI. • These are bursaries awarded from Programme 4 funds through the NRF and other relevant entities, including the CSIR, SANSA and the ARC.
Disaggregation of beneficiaries (where applicable)	Target for black people: 80%
	Target for women: 55%
	Target for youth: The nature of the KPI is such that some of the students will fall into youth category.
	Target for people with disabilities: 2% (relevant data to be provided with the annual report data).
Spatial transformation (where applicable)	PhD students in all public universities.
Calculation type	Cumulative: Numerical
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3, Q4).
Desired performance	Higher performance desirable – No fewer than 2 000 PhD students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities.
Indicator responsibility	Director: Research Development Deputy Director-General: Research Development and Support

Indicator title 2	**Number of pipeline postgraduate students awarded bursaries annually as reflected in the reports from the NRF and other relevant entities.**
Definition	Total number of bursaries awarded to pipeline postgraduate students (BTech/honours and master's) annually as reflected in the reports from the NRF and other relevant entities.
Source data	• Contracts entered into with the NRF and other relevant entities including (CSIR, SANSA, and ARC) in Q3. • Payment stubs on funds transferred relating to the bursaries in Q3. • Progress reports on individual programmes or letter confirming the reported quarterly outputs. • Proof of registration (with letterhead, stamped and signature by the Registrar) from the institution or entity in Q4. • Database of postgraduate students with ID numbers, student numbers, course details, disaggregation of beneficiaries – disabilities, gender, and race.
Method of calculation/ assessment	Number of bursaries awarded through NRF and other relevant entities' – funded programmes (BTech/honours and master's degrees).
Means of verification	Contracts, performance reports or performance information letter.
Assumption	• The NRF quarterly reports that do not contain final quarterly data on students due to the late finalisation and auditing of data at the NRF, thus resulting in the DSI first reporting on preliminary data contained in an email from the NRF. The preliminary data is then updated when the agency sends a formal performance information letter to the Department. • The bursaries are awarded from Programme 4 funds through the NRF and other relevant entities, including the CSIR, SANSA and the Agricultural Research Council
Disaggregation of beneficiaries (where applicable)	Target for black people: 80%
	Target for women: 55%
	Target for youth: The nature of the KPI is such that most of the students will fall into youth category
	Target for people with disabilities: 2% (relevant data to be provided with the annual report data)
Spatial transformation (where applicable)	Pipeline students in all public universities
Calculation type	Cumulative: Numerical
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4)
Desired performance	Higher performance desirable – No fewer than 6 200 pipeline students awarded an annual bursary as reflected in the reports from the NRF and other relevant entities
Indicator responsibility	Director: Research Development Deputy Director-General: Research Development and Support

Indicator title 3	**Number of graduates and students placed in DSI-funded work preparation programmes in SETI institutions.**
Definition	Total number of graduates and students placed in DSI-funded work preparation programmes (through internship programme and the National Youth Service) in science, engineering, technology and innovation (SETI) institutions.
Source data	• Consolidated contract entered into with the entity on the funding of interns in Q3. • Payment stubs on funds transferred relating to the workplace preparation programmes in Q3. • Progress reports on workplace preparation programmes or letter confirming the reported quarterly outputs. • Internship database (NRF interns register in all quarters). • National Youth Service database of students in all quarters.
Method of calculation/ assessment	Total number of graduates and students placed through the Internship Programme and National Youth Service.
Means of verification	Verification relevant for that quarter to be provided. Contracts, reports, or performance information letter.
Assumption	Data focuses on students and graduates that have been placed in the programme in a given year. The success rate of employment can be determined after the internship year. The database for the total number of graduates and interns to be available at the end of the financial year.
Disaggregation of beneficiaries (where applicable)	Target for black people: 80%
	Target for women: 55%
	Target for youth: The nature of the KPI is such that most of the students will fall into youth category.
	Target for people with disabilities: 2% (relevant data to be provided with the annual report data).
Spatial transformation (where applicable)	Unemployed graduates across nine provinces (including rural communities and townships).
Calculation type	Cumulative: Numerical
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance desirable – No fewer than 750 graduates and students placed in DSI funded work preparation.
Indicator responsibility	Director: Research Support Deputy Director-General: Research Development and Support

Indicator title 4	Number of research infrastructure grants awarded.
Definition	The provision of research infrastructure across the entire innovation value chain.
Source data	• Call for proposals on awarding of research infrastructure grants in Q2. • Annual report from implementing agency (NRF)
Method of calculation/ assessment	Adding the total number of grants funded annually through internal DSI and external NRF processes. These research infrastructure grants will include single and multiple-year funding.
Means of verification	Reports, contracts.
Assumption	Research infrastructure is an enabler for research, education, innovation and training.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	Countrywide (The NSI, government departments, academia).
Calculation type	Non-Cumulative: Numerical
Reporting cycle	2021/22 (Biannually: Q2 and Q4).
Desired performance	High performance is desired – 25 research infrastructure grants awarded.
Indicator responsibility	Chief Director: Basic Sciences and Infrastructure Deputy Director-General: Research Development and Support

Indicator title 5	Total available broadband capacity provided by SANReN per annum.
Definition	Total available broadband capacity provided by SANReN per annum through upgrades, new sites added to the network.
Source data	• New Links and upgrade plan in Q2; • Signed letter indicating the TABC calculation for the financial year; • A spreadsheet capturing the details of the calculation; and • Internal audited annual report from the CSIR (NICIS annual report).
Method of calculation/ assessment	Adding the total bandwidth available through all links constituting the network.
Means of verification	Annual report, contracts.
Assumption	The SANReN bandwidth is crucial for transmission of research data, facilitating research collaboration and enabling online teaching and providing access to online teaching and training material.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	Countrywide: (The NSI, government departments, all public research-performing institutions, Skills development in academic institutions).
Calculation type	Non-Cumulative: Available broadband capacity.
Reporting cycle	2021/22 (Biannually: Q2 and Q4)
Desired performance	Higher performance desirable – 5 800 total available bandwidth capacity provided by SANReN.
Indicator responsibility	Chief Director: Basic Sciences and Infrastructure Deputy Director-General: Research Development and Support

Indicator title 6	**Number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports.**
Definition	Total number of researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports. Researchers awarded research grants to conduct research and supervise postgraduate students (e.g. including research chairs, rated researchers, centre of excellence).
Source data	• Contracts entered into with the NRF in respect of programmes aimed at the funding of researchers in Q3. • Payment Stub on funds transferred relating to funding of researchers in Q3. • NRF progress report on researchers awarded research grant or letter confirming the reported quarterly outputs. • Database of researchers (with names, ID, institution) in all quarters.
Method of calculation/ assessment	Sum of researchers that are awarded research grants.
Means of verification	Contract; Quarterly Reports; or Performance information letter.
Assumption	The NRF quarterly reports that do not contain final quarterly data on researchers due to late finalisation and auditing of data at the NRF, thus resulting in the Department first reporting on preliminary data contained in an email from the NRF. The preliminary data is then updated when the agency sends a formal performance information letter to the DSI.
Disaggregation of beneficiaries (where applicable)	Target for black people: 42%
	Target for women: 41%
	Target for people with disabilities: 2% (relevant data to be provided with the annual report data).
Spatial transformation (where applicable)	Researchers in all public universities, and declared research institutions.
Calculation type	Cumulative: Numerical
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance desirable – No fewer than 3 000 researchers awarded research grants through NRF-managed programmes as reflected in the NRF project reports.
Indicator responsibility	Director: Research Support Deputy Director-General: Research Development and Support

Indicator title 7	**Number of research articles published by NRF-funded researchers and cited in the Web of Science Citation Database as reflected in the NRF project reports.**
Definition	Number of accredited research articles published by NRF-funded researchers and cited in the Web of Science Citation Database as reflected in the NRF project reports. The articles reported on are those published within the Academic/Calendar-year (01 January 2020 to 31 December 2020) and reported on the government financial year-end 31 March 2021.
Source data	Consolidated HCD contracts entered into with the NRF on funding of researchers in Q4. Payment stub on funds transferred relating to the funds in the consolidated contract in Q4. Database or list of peer-reviewed accredited research papers published in Q4.
Method of calculation/ assessment	Approximately 1,6 research output units per NRF funded researcher
Means of verification	Database, contract
Assumption	The collection of data is done by the implementing agency and the comprehensive information is only available after the close of the financial year (4th quarter). The articles reported on are those published within the calendar year and each article reported on is distinct.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Reporting cycle	2021/22 (Annually in Q4)
Desired performance	Higher performance desirable – No fewer than 7 000 research articles published by NRF-funded researchers and cited in the Web of Science Citation Database as reflected in the NRF project reports
Indicator responsibility	Director: Research Support Deputy Director-General: Research Development and Support

Indicator title 8	Number of additional receivers installed on the MeerKAT telescope to enhance the performance of the MeerKAT telescope
Definition	Production plan for the L-Band receivers finalised.
Source data	Quarterly and annual reports from SARAO.
Means of verification	Reports signed by SARAO.
Method of calculation/ assessment	Approved production plan towards installation of receivers.
Assumption	Production plan finalised and approved.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative: Numerical
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3, and Q4).
Desired performance	Higher performance desirable – Production plan approved for the L-band receivers for the additional 20 MeerKAT antennas.
Indicator responsibility	Director: Multiwavelength Astronomy Deputy Director-General: Research Development and Support

Indicator title 9	Number of components of the IK legal architecture implemented.
Definition	The data quality assurance and data synch to the NRS central server will guide the launch of the National Recordal System
Source data	Quarterly reports on the milestones. • **Q1:** An IK Data Synchronisation Report of 7 IKS Documentation Centres IK data quality and successfully synched to the NRS central server • **Q2:** CD approved IK Registration Specification Document • **Q3:** A CD approved report indicating the online accessibility of the NRS to access IK, based on ease of online registration and log-on process, application and granting of IK use • **Q4:** A report on the National Recordal System launch. The National Recordal System is live and available for access online.
Method of calculation/ assessment	Approval of the reports at various levels of delegated authority.
Means of verification	Approved reports by delegated authority
Assumption	Without the assurance of the data quality of the IK data collected through the IKS Documentation Centres, the NRS cannot be launched.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	Countrywide
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3, Q4)
Desired performance	Higher performance desirable – Approved data quality, data synching and online accessibility.
Indicator responsibility	Chief Director: Science Missions Deputy Director-General: Research Development and Support

Indicator title 10	**Number of initiatives conducted to promote public awareness of and engagement with science throughout the country, as reflected in the reports of the NRF and other implementing and collaborative partners.**
Definition	Initiatives or projects encompassing a host of science awareness and engagement activities.
Source data	Quarterly Synoptic Reports.
Method of calculation/ assessment	Counting the number of initiatives conducted.
Means of verification	Quarterly reports.
Assumption	Planned number of initiatives comprising multiple activities will be conducted throughout the country.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	Geographic coverage
Calculation type	Cumulative: E-numeration – counting of initiatives one by one.
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3, Q4).
Desired performance	High Performance – 9 initiatives promoting public awareness of and engagement with science conducted by 31 March 2021, as reflected in the reports of the NRF and other implementing and collaborative partners.
Indicator responsibility	Director: Science Promotion Deputy Director-General: Research Development and Support

Indicator title 11	First South African public relationship with science survey report published
Definition	Science engagement programme impact study to determine the difference the programme is making towards its ultimate strategic intention.
Source data	Exemplar data collection instrument for the First South African public relationship with science survey produced.
Method of calculation/ assessment	Representative sample.
Means of verification	A print out of the data collection instrument.
Assumption	A scientific research methodology to be followed as a primary data source and existing project records to serve as secondary data source.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	Demographics and/or living standards measures may be used, depending on impact measure category.
Calculation type	Non-cumulative: Representative sample.
Reporting cycle	2021/22 (Annually in Q4).
Desired performance	Higher performance desirable – Data collection instrument or questions to be used in the survey published.
Indicator responsibility	Director: Science Promotion Deputy Director-General: Research Development and Support

Indicator title 12	**Number of strategic and technical engagements with NRF, SACNASP and ASSAf to ensure alignment with national priorities.**
Definition	Budget Programme oversees functions of NRF, SACNASP and ASSAf.
Source of data	• Entity technical reports OR • Bilateral engagement minutes
Method of calculation/ assessment	Total of number of quarterly engagement reports.
Means of verification	Minutes of meetings.
Assumption	Tactical and strategic engagements with entities are conducted.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3, Q4).
Desired performance	Higher performance desirable – 12 strategic and technical engagements with NRF, SACNASP and ASSAf to ensure alignment to national priorities.
Indicator responsibility	Director: Research Development Deputy Director-General: Research Development and Support

Programme 5: Socio-economic Innovation and Partnerships

Indicator title 1	Number of knowledge products on innovation for inclusive development published.
Definition	Count the number of knowledge products, including, but not limited to, briefing notes, policy briefs, case studies, technical briefs, research reports, evaluation reports, books (or part/s thereof) and single project or initiative. Various 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 to people involved in implementation. A **technical brief** refers to a range of knowledge products providing project performance data that deals with specifications or which deals with a specific technical challenge that can impact on the adoption of a particular technology. A **research report** refers to a document that presents research undertaken to address a particular issue of concern. It includes evaluation studies (can be an evaluation report) that contain a rigorous analysis of completed or ongoing activities that determine or support management accountability, effectiveness and efficiency. An **evaluation report** is the key product of the evaluation process. Its purpose is to provide a transparent basis for accountability for results, decision-making on policies and programmes, for learning, for drawing lessons and for improvement. A **research paper** refers to a substantial piece of academic writing in which the author does independent research into a topic and writes a description of the findings of that research, which may or may not be presented at a conference or published in a journal. A **book** is a printed or digital publication based on in-depth research in a particular subject matter or knowledge area. Provision is made for other knowledge products not yet defined should a need for a new form of knowledge product emerge that cannot be classified under a current category. A **single project** or initiative can support the production of several of the knowledge products described above. Knowledge products can also be complemented by a decision-support intervention. A knowledge product has to meet the needs of a particular user-community and therefore decision-support interventions provide significant interaction to determine what would be of value and how such value can be realised.

Source of data	Register 1: IID knowledge products The following documentation is required for a valid registration of a knowledge product • Copy of the knowledge product to be published • Submission to Chief Director: Innovation for Inclusive Development requesting formal approval for publication and distribution In case of a knowledge product from an implementing agency, optional additional documentation will include a letter from the implementation agency to the DSI confirming that the knowledge product was a result of funding support from the DSI.
Method of calculation/ assessment	A = the total number of knowledge products registered B = briefing notes C = policy briefs D = case studies E = technical briefs F = research reports G = evaluation reports H = research paper I = Book J = Other
Means of verification	Information gathered and generated quarterly on knowledge products to be registered
Assumption	The sum of knowledge products has been registered
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Cumulative
Reporting cycle	2021/22 (Quarterly:Q1, Q2, Q3, Q4)
Desired performance	Higher performance desirable – 4 knowledge products on innovation for inclusive development published
Indicator responsibility	Chief Director: Innovation for Inclusive Development Deputy Director-General: Socio-economic Innovation Partnerships

Indicator title 2	Number of decision-support systems introduced, maintained and improved.
Definition	Decision-support interventions help people think about choices they face; they describe where and why choice exists; they provide information about options, including, where reasonable, the option of taking no action. These interventions aim to help people to deliberate, independently or in collaboration with others, about options by considering relevant attributes to help them forecast how they might feel about short, intermediate and long-term outcomes, which have relevant consequences. They support the process of constructing preferences and eventual evidence-informed decision making, appropriate to their individual situation.
Source of data	Register 2: IID Decision-Support Systems Registration or re-registration will happen annually. The following documentation is required for a valid registration: • Annual workplan • Internal DSI submission providing formal approval for the workplan
Method of calculation/ assessment	A = B + C + D A = total number of decision-support interventions registered B = decision-support interventions introduced C = decision-support interventions maintained D = decision-support intervention improved
Means of verification	• Total number of decision support systems as per action category, that is, either introduced, maintained, or improved. • Pre-defined Excel Spreadsheet pivot-table
Assumption	Information gathered and generated quarterly on decision support systems are re-registered.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	In districts and metros where DSI has an STI footprint
Calculation type	Cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4)
Desired performance	Higher performance desirable – 6 decision-support systems introduced, maintained and improved.
Indicator responsibility	Chief Director: Innovation for Inclusive Development Deputy Director-General: Socio-economic Innovation Partnerships

Indicator title 3	Number of learning interventions (seminars/policy round table discussions) hosted.
Definition	In this context a learning intervention refers to an event conceptualised and/or resourced by the Department. The learning intervention can be organised and run by an implementing agency contracted by the DSI or by the DSI itself. The Department can also partner with other organisations in organising the event or in presenting evidence-based position at an event. The event is structured in terms of a number of formats (e.g. seminars, lectures, learning interventions, workshops or policy dialogues). Notwithstanding the specific format used, the intention is to bring together a select group of knowledgeable researchers, policy analysts, experts and/or practitioners to advance collective understanding of a specific theme aligned to the strategic objective. Each learning intervention is unique with respect to the format used and the group of participants.
Source of data	Register 3: Innovation for inclusive development learning interventions The following documentation will be required for a valid registration: • Signed learning intervention report for each learning intervention compiled by the organiser (implementing agency or DSI) • Internal departmental approval of the learning intervention report
Method of calculation/ assessment	A = B + C + D + E + F + G A = total number of learning interventions registered B = seminars C = lectures D = learning forums E = Policy dialogues F = Workshops G = Other
Means of verification	Learning interventions registered during the applicable reporting period.
Assumption	Total number of learning interventions by type, that is, workshop, seminar policy round table discussion, etc.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	In districts and metros where DSI has an STI footprint
Calculation type	Cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance desirable – 4 learning (seminars/policy round tables) hosted.
Indicator responsibility	Chief Director: Innovation for Inclusive Development Deputy Director-General: Socio-economic Innovation Partnerships

Indicator title 4	**Number of high-level research students (honours, master's and doctoral students) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF and the green economy).**
Definition	High-level human capital refers to students who are enrolled at universities or universities of technology for an honours, master's or doctoral qualification. Co-funded is where the Department pays only a portion of the student's fees. The niche areas identified to support industrial development include the advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, selected Sector Innovation Funds, the green economy, and selected CSIR Industry Development Centres.
Source of data	Register 6: Industrial development student beneficiaries and Register 4: Green economy student beneficiaries Registration of student beneficiaries will take place in quarter 1 and quarter 4. For a valid registration, the following documentation will be used: • Annual registration letter from the university where the student is registered • A letter from the implementation agent confirming the students that are being funded through a sign contract with the DSI. The letter will include a schedule providing additional core profile information of the students (name, ID number, race, gender) The register will include additional profile information that is required for management and analytical purposes. The proof of registration should contain the letterhead and stamp of the tertiary education institution. The proof of registration will be accepted as valid for a specific calendar year, which implies that it covers two DSI financial years. As an example, DSI can count the student as being funded in Q4, and also in Q1 to Q3 (of the next financial year) with the same proof or evidence.
Method of calculation/ assessment	The sum of students on the beneficiary register disaggregated by individual contract For Register 4, students are calculated as follows: A = B + C + D A = the total number of students funded or co-funded B = honours, master's and doctoral students (funded water initiatives) C = honours, master's and doctoral students (funded waste initiatives) D = honours, master's and doctoral students (Paper Manufacturers Association of South Africa (PAMSA) and Sugar Milling Research Institute (SMRI) sector innovation funds (SIFs)
Means of verification	Schedule from implementing agent
Assumption	The contract between the DSI and the implementing agency will include the sum of students on the disaggregated beneficiary register on individual contract.
Disaggregation of beneficiaries (where applicable)	Target for women: Yes
	Target for youth: The nature of the KPI is such that most of the students will fall into youth category
	Target for people with disabilities: Yes
Spatial transformation (where applicable)	All nine provinces are targeted.

Calculation type	Non-cumulative A = B + C + D + E + F + G Where A = The total number of students funded or co-funded B = honours, master's and doctoral students (funded water initiatives) C = honours, master's and doctoral students (funded waste initiatives) D = honours, master's and doctoral students (funded Ecological Infrastructure initiatives) E = honours, master's and doctoral students (PAMSA and SMRI SIFs) F = honours, master's and doctoral students (Biorefinery Industry Development Centre) G = honours, master's and doctoral students (other)
Reporting cycle	2021/22 (Biannually: Q1 and Q4).
Desired performance	Higher performance desirable – 392 high-level research students (of which 57 at PhD level) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals, ICTs, the Industry Innovation Programme – incl. SIF, and green economy).
Indicator responsibility	Chief Director: Technology Localisation, Beneficiation and Advanced Manufacturing Chief Director: Sector Innovation and Green Economy Deputy Director-General: Socio-economic Innovation Partnership

Indicator title 5	**Number of knowledge and innovation products added to the industrial development and green economy IP portfolios through fully funded or co-funded research initiatives.**
Definition	Number: the number of knowledge or innovation products. Knowledge or innovation product: the output (discrete intermediate steps or final) of knowledge or innovation (process, market, product or improved service delivery) that is quantifiable (e.g. invention disclosure, patent, prototype, technology (transfer) package, technology demonstrator, etc.). It should be noted that different technologies/processes have slightly different phases or designated conventions/names. Intellectual property (IP) portfolio: The collection of IP products funded/co-funded by the Department. The IP products may be related or unrelated to the progress of maturing one specific technology. Funded: Reflects where DSI is funding or co-funding a specific research/technology initiative. An initiative does not need to be 100% DSI-funded to be eligible to be counted.
Source of data	Register 8: Register of industrial development knowledge and innovation products Register 5: Register of green economy knowledge and innovation products The following documentation will be required for a valid registration • A signed declaration from an implementation agency of a potential qualifying knowledge or innovation product. The declaration will provide essential information, including type of product, registration number (if applicable) and appropriate supporting information • A signed confirmation by a registrar (currently Chief Director: Technology Localisation, Beneficiation and Advanced Manufacturing for Register 8 and D: Environmental Services and Technologies for Register 5) that the knowledge or innovation product met the required qualifying criteria and can be registered
Method of calculation/ assessment	Total number of registrations during the applicable reporting period disaggregated by funded initiative For Register 5: A = B + C + D + E A = total number of registrations of knowledge and innovation products B = Registrations (funded water initiatives) C = Registrations (funded waste initiatives) D = Registrations (SMRI and PAMSA SIFs) E = Registrations (Biorefinery Industry Development Facility) For Register 8: The Industry Innovation Partnership (IIP) fund formally includes the Sector Innovation Fund (SIF) and other funds, and instruments funded under the IIP can be counted. The SIF also includes funding via the various areas of the Industry Innovation Programme (IIP) and they can therefore also be counted. Number: refers to the number of instruments (e.g. programmes) and not the individual beneficiaries.

Method of calculation/ assessment	The following instruments currently qualify to be counted: 1. Technology Stations Programme, incorporating the Institutes of Advanced Tooling, consisting of 18 entities, but counts as one funding instrument 2. Centres of competence (titanium and any other) count as one 3. Incubators (there is one for ICT) 4. Technology Development Grant scheme 5. Sector-wide technology assistance packages 6. Firm-level technology assistance packages 7. Science, Engineering and Technology Industry Internship Programme 8. Collaborative R&D networks (e.g. the Collaborative Carbon Fibre RDI Programme) where the R&D agenda is almost exclusively defined by industry. This also includes the Sector Innovation Funds, where the R&D agenda is defined by the respective industry association/body, representing the R&D needs of the respective sector. 9. R&D networks led by science councils and/or universities, where the R&D agenda is determined primarily from the R&D stakeholders. This includes R&D programmes aimed at unlocking new opportunities based on local knowledge and/or IP. Instrument: a defined support mechanism, as described above. The indicator (funding instrument) will be formally referred to in a contract and be described by supporting, internal DSI document defining the objective, procedures, scope and evaluation parameters.
Means of verification	Excel spreadsheet.
Assumption	The IP declaration from implementation agency meet the criteria of the TIDs
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Cumulative
Reporting cycle	2021/22 (Quarterly:Q1, Q2, Q3, Q4)
Desired performance	Higher performance desirable – 60 industrially relevant knowledge and innovation products (patents, prototypes, technology demonstrators or technology transfer packages) added to the industrial development and green economy IP portfolio.
Indicator responsibility	Chief Director: Technology Localisation, Beneficiation and Advanced Manufacturing Chief Director: Sector Innovation and Green Economy Deputy Director-General: Socio-economic Innovation Partnership

Indicator title 6	**Number of instruments funded in support of increased localisation, competitiveness and R&D-led industry development in aerospace, advanced manufacturing, chemicals, mining, advanced metals, and ICTs, Industry Innovation Programme and the sector innovation fund.**
Definition	Number: The number of instruments (e.g. programmes) and not the individual beneficiaries. Instrument: A formally established (by contract) entity (also virtual) that is used in support of R&D-led industry development. R&D-led industry development: This includes R&D performed in the defined areas of aerospace; advanced manufacturing; mining; minerals beneficiation; chemical related industries, ICTs and sector innovation funds. Funded: Reflects where DSI is funding, or co-funding a specific instrument. An instrument does not need to be 100% funded to be legible to be considered as an instrument funded by DSI.
Source of data	Register 9: Innovation support instruments Registration or re-registration will happen annually. The following documentation is required for a valid registration • Annual workplan • Internal DSI submission or signed contract.
Method of calculation/ assessment	The sum of support instruments registered or re-registered
Means of verification	Summary information captured and archived on PIMS
Assumption	The information provided on the contracts or workplan meet the TID requirements
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Cumulative
Reporting cycle	2021/22 (Biannually: Q1 and Q4)
Desired performance	Higher performance desirable – 5 instruments funded in support of increased localisation, competitive- ness and R&D-led industry development.
Indicator responsibility	Chief Director: Technology Localisation, Beneficiation and Advanced Manufacturing. Deputy Director-General: Socio-economic Innovation Partnership.

Indicator title 7	Number of innovation-support interventions funded or co-funded that strengthen provincial or rural innovation systems.
Definition	An intervention includes analytical, planning and coordination support as well as catalytic activities that enhance provincial or local innovation. Provincial and rural and production system = the system of innovation at provincial, regional, local levels, including those linked to rural and the informal economic activities. Analytical, planning and coordination support – means any form of study or strategy development that can assist provincial and local governments with their planning, decision making and implementation of innovation programmes. Also includes funding for innovations forums and capacity building. Catalytic interventions are DSI supported initiatives or projects that help stimulate the growth of existing innovation initiatives, or enable the development of innovation enabling ecosystems.
Source of data	Register 14: Provincial and rural innovation interventions The following documentation is required for a valid registration or re-registration of a provincial or rural innovation-support intervention funded by the DSI: • Annual workplan (a workplan can make provision for more than one innovation-support intervention) • Submission requesting formal approval of the workplan and registration of qualifying interventions An optional document for a registration is a signed contract with an implementation agent. A single contract may enable more than one registration. Registrations will be re-validated after the end of the performance year to remove interventions which may not have been implemented. Revalidation will be based on an annual progress report.
Method of calculation/ assessment	A = B + C A = total number of innovation-support interventions funded or co-funded B = interventions supported under the Directorate: Sector and Local Innovation C = interventions under the Directorate: Sustainable Livelihoods
Means of verification	Pre-defined Excel spreadsheet pivot-table
Assumption	The information gathered and generated quarterly on innovation-support interventions is registered
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	The DSI has spatial footprint in most 44 Districts and 8 Metropolitan Municipalities and intend to expand in line with the District Development Model and 2020/21 Presidential nodes.
Calculation type	Cumulative
Reporting cycle	2021/22 (Biannually: Q2 and Q4).
Desired performance	Higher performance desirable – 14 innovation-support interventions funded or cofounded that strengthen provincial or rural innovation systems.
Indicator responsibility	Chief Director: Innovation for Inclusive Development Chief Director: Sector Innovation and Green Economy Deputy Director-General: Socio-economic Innovation Partnerships

Indicator title 8	**Number of statistical reports and policy briefs approved by Exco for publication and /or submitted to Cabinet and/or disseminated to policy audience.**
Definition	Count the number of statistical reports and policy briefs produced. A policy briefing refers to a communication tool produced by policy analysts, in the form of either a Cabinet memorandum or evidence-based report or strategy which serves as an impetus for action for the policy audience such as Cabinet, Parliament and Portfolio Committee, the Minister of Science and Technology, provincial government, or another Minister of government department. The briefing or report may also be used to support broader advocacy initiatives targeting a wide but knowledgeable audience, e.g. the Economic Sectors, Investment, Employment and Infrastructure Development Cluster, decision-makers, researchers, and administrators.
Source of data	• Copy of the statistical report or policy brief that is approved by Exco for publishing and/ or submission to Cabinet and or relevant decision-making authority.
Method of calculation/ assessment	Total number of reports and policy briefs during the reporting period by the end of a financial year or reporting period.
Means of verification	The following documentation will enable a valid registration: • Register 11: Register on statistical reports and policy briefs • Extract of the minutes from the Exco meeting approving publication and/ or submission to Cabinet or relevant decision-making authority.
Assumption	Statistical reports or policy briefs are registered during the applicable reporting period.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	None
Calculation type	Cumulative - Numeric count
Reporting cycle	2021/22 (Biannually: Q3 and Q4).
Desired performance	Higher performance desirable – 6 statistical reports and policy briefs approved by Exco for publication and/or submitted to Cabinet and/or disseminated to policy audience.
Indicator responsibility	Chief Director: Science and Technology Investments Deputy Director-General: Socio-economic Innovation Partnership

Indicator title 9	**Turnaround time in providing preapproval decisions on applications for the R&D tax incentive.**
Definition	Turnaround time refers to the number of days from date of receipt of application to the date of providing preapproval decisions on applications for the R&D tax incentive. An efficiency objective, measured at aggregated (total applications for period x) level, is to reduce the average number of days of turnaround compared to previous periods.
Source of data	Register 12: R&D applications management database Important note – section 11D (17) provides for the confidentiality of applicants. Access to the R&D applications management database will need to be limited and guided by a signed oath of secrecy
Method of calculation/ assessment	% of applications that receive a decision within 90 days (in the reporting period). Number of days exclude weekends, holidays and the days when DSI awaits additional information from applying companies.
Means of verification	R&D tax incentives applications management
Assumption	The accurate information will be gathered and generated when applications are received and/or finalised.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Non-cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4)
Desired performance	Higher performance desirable – Preapproval decisions provided within 90 days from date of receipt on 80% of applications for the R&D tax incentive received between 01 January 2021 and 31 December 2021
Indicator responsibility	Chief Director: Science and Technology Investment Deputy Director-General: Socio-economic Innovation Partnerships

Indicator title 10	**Number of Strategic and Technical engagements with CSIR and HSRC to ensure alignment with national priorities.**
Definition	Strategic oversight of CSIR and HSRC.
Source of data	Register of bilateral executive meetings (Strategic and Technical).
Method of calculation/ assessment	• Number of Strategic Executive Bilateral (HSRC). • Number of Technical Bilateral (HSRC). • Number of Strategic Executive Bilateral (CSIR). • Number of Technical Bilateral (CSIR).
Means of verification	Technical Bilaterals – Signed minutes of meetings. Strategic Executive Bilaterals – Signed minutes from the Secretariat
Assumption	Executive bilaterals at executive and technical levels is the foundation through which information is shared, critical requirements identified by the Minister, the Portfolio Committee and government more broadly are processed and where alignment of the work of the CSIR and HSRC to national priorities is achieved. Executive bilaterals are complemented by formal communication, reviews and feedback of plans and quarterly reports.
Disaggregation of beneficiaries (where applicable)	Target for women: n/a
	Target for youth: n/a
	Target for people with disabilities: n/a
Spatial transformation (where applicable)	n/a
Calculation type	Cumulative
Reporting cycle	2021/22 (Quarterly: Q1, Q2, Q3 and Q4).
Desired performance	Higher performance desirable – Planned bilateral executive meetings with each entity (HSRC and CSIR) happened at least four times annually, to ensure division between strategic and technical executive bilaterals as well as planned cycle meetings are aligned to planning and budgeting cycles.
Indicator responsibility	Deputy Director-General: Socio-economic Innovation Partnerships

LIST OF ABBREVIATIONS

APP	Annual Performance Plan
AU	African Union
BBBEE	broad-based black economic empowerment
CSIR	Council for Scientific and Industrial Research
CHPC	Centre for High Performance Computing
CREST	Centre for Research, on Evaluation, Science and Technology
DAFF	Department of Agriculture, Forestry and Fisheries
DHET	Department of Higher Education and Training
DSI	Department of Science and Innovation
Exco	Executive Committee of the DSI
Gbps	gigabits per second
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
OTT	office of technology transfer
PYEI	Presidential Youth Employment Initiative
R&D	research and development
RDI	research, development and innovation
RISDP	Regional Indicative Strategic Development Plan
S&T	science and technology
SADC	Southern African Development Community
SANReN	South African National Research Network
SANSA	South African National Space Agency
SARIR	South African Research Infrastructure Roadmap
SETI	science, engineering, technology and innovation
SIF	Sector Innovation Fund
SKA	Square Kilometre Array
SMME	small, medium or micro-enterprise
STEMI	science, technology, engineering, mathematics and innovation

STI	science, technology and innovation
TIA	Technology Innovation Agency
TVET	technical and vocational education and training
TYIP	Ten-Year Innovation Plan
WACS	West African Cable System
WIPO	World Intellectual Property Organization

Notes

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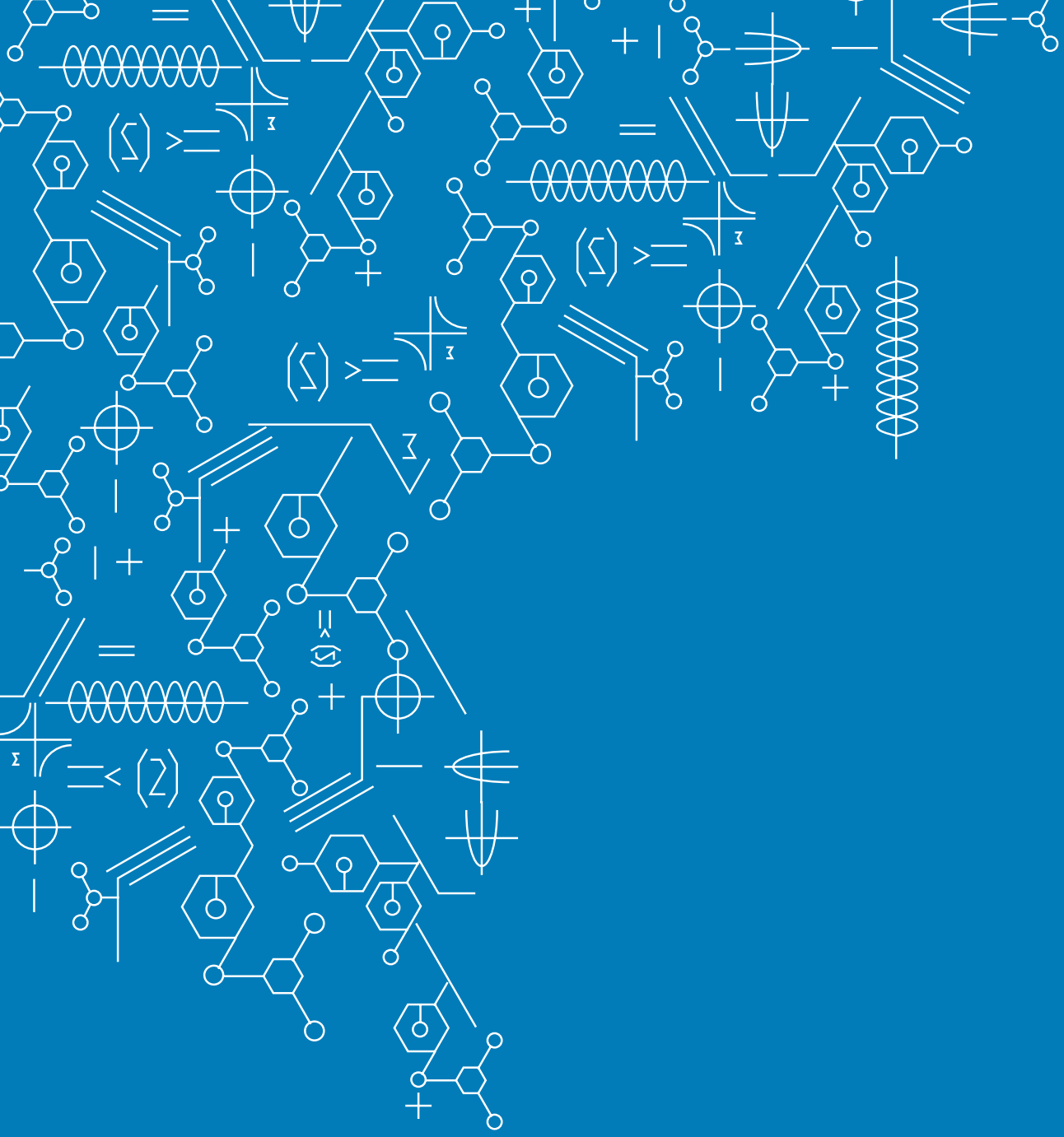

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