

ANNUAL REPORT 2004/05



Innovation changes our view of the world

## Mission

“To become a relevant, prominent, credible, proactive and responsive advisory body to the Minister on national matters concerning innovation, science and technology, thereby contributing to the attainment of the national objectives of South Africa. NACI will give effect to its mission by utilising accountable scientific approaches and the best available resources.”

## About NACI

The National Advisory Council on Innovation (NACI) was established in 1997 following submission of the *White Paper on Science and Technology: Towards the 21st Century*.

NACI councillors were appointed in October 1998, with the first formal Council meeting taking place on 13 April 1999. The second NACI Council was appointed in April 2004.

With its motto, “Innovation for a better future”, NACI intends reinforcing the well-established relationship between innovation, economic growth and the quality of life of people.

Innovation for a better future

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# Abstracts of Annual Report – 2004/05

## Afrikaans

Die statutêre opdrag van die Nasionale Adviesraad op Innovasie (NACI) is om die Minister van Wetenskap en Tegnologie oor sake rakende wetenskap, tegnologie en innovasie te adviseer. Hierdie verslag dek NACI se program gedurende die sesde jaar sedert sy totstandkoming. Die Minister het vroeg in 2004 'n nuwe Raad van 22 lede vir die periode April 2004 - Maart 2007 aangestel. Die nuwe Raad het gedurende die verslagjaar deeglik besin oor sy mandaat, funksies, prioriteite en strukture en 'n hele aantal belangrike strategiese en operasionele besluite geneem. Die volgende verteenwoordig sommige van die opbrengste: Prioriteite is opnuut in lyn met dié van die Minister en regering gebring, terwyl nuwe prosedures vir ministeriële advies ontwerp is; die identifikasie van vyf strategiese fokuspunte (infrastruktuur, menslike en kenniskapitaal, mededingendheid, sosiale aspekte en NACI se posisie in die nasionale innovasiestelsel); die finalisering van drie adviesmemoranda; die lansering van drie nuwe studies en goedkeuring van 'n verdere vier om as basis vir adviesontwikkeling te dien. Teen die einde van die jaar het die Raad al sy strategiese doelwitte bereik of sal enkele maande later bereik.

## English

The National Advisory Council on Innovation (NACI) is mandated to advise the Minister of Science and Technology on matters pertaining to science, technology and innovation. This report covers activities during NACI's sixth year since its establishment. A new Council of 22 members was appointed by the Minister in early 2004 for the period April 2004 - March 2007. The new Council revisited its mandate, functions, priorities and structures in the course of the year and approved a number of important strategic and operational decisions. The following are some of the outcomes: the renewed alignment of priorities to those of the Minister and government, as well as a new procedure for advising the Minister; the identification of five strategic thrusts (infrastructure, human and knowledge capital, competitiveness, social aspects and NACI's position in the NSI); the finalisation of three advice memoranda; and the launching of three new studies and approval of a further four studies as bases for advice development. NACI ended the report year with all its strategic business objectives attained or to be attained early in the 2005 - 2006 financial year.

## IsiNdebele

UmKhandlu wesiTjhaba wezokuYeleliswa kwezokuSungula (i-NACI) iphiwe umsebenzi

wokulayeja uNgqongqotjhe wezeSayensi neTheknoloji ngezokusungulwa. Lombiko umumethe koke okwenziweko eminyakeni esithandathu selokhu i-NACI yahlonywa. UmKhandlu omutjha onamalunga ama- 22 ukhethwe nguNgqongqotjhe ekuthomeni kwaka- 2004, bona usebenze esikhathini esiphakathi kwaka-Apreli 2004 ukuya kuMatjhi 2007. Kilonyaka, lomKhandlu omutjha uye waqala kabutjha indaba yomsebenzi onikezwe wona, okuqakatheke khulu okufanele kutjhejwe kanye neenkhangano zokusebenza begodu wemukela iinqunto eziqakathekileko ngamahlalo wamaqhinga nawokusebenza. Lokhu okulandelako kube ngeminye yemiphumela yakhona: ukukhambelanisa izinto ezithathelwa phezulu mKhandlu kanye noNgqongqotjhe norhulumende kanye nendlela etja yokuyelelisa uNgqongqotjhe; ukutholwa kwehlelo lamaqhinga amahlano (imithangalasisekelo, umnotho obasebenzi kanye nelwazi, ukukghona ukuzijamela nawumanyaniswa nezinye iinhlango, amaphuzu wezokuhlalisana kanye namajamo we-NACI ku-NSI); ukuphethwa kwamamemorandamu amathathu wokuyelelisa; kanye nokuhlonywa kwamahlalo werhubhululo amathathu amatjha kanye nokwemukelwa kwamanye amarhubhululo amane azaba mleyo wokuyelelisa kanye nokuthuthukisa. I-NACI iphethe unyaka

okubikwa ngawo lo, ngawo woke amahlelo weminqopho yebhizinisi afezakalisiwe nanyana azakufezakaliswa ekuthomeni konyaka weemali ka- 2005 - 2006.

### **SePedi**

Ba Lekgotla la Bosetshaba la Keletšo ka ga Boithomelo le filwe maatla a go eletša Tona ya Saense le Theknolotši ka ditaba tseo di amanago le saense, theknolotši le boithomelo. Pego ye e akaretša mešongwana ya nakong ya mengwaga ye tshela ya NACI's ge e sa le e hlongwa. Lekgotla le lempsha la maloko a 22 le hlomilwe ke Tona mathomong a 2004 lebaka la go tloga Aporele 2004 go fihla go Matšhe 2007. Lekgotla le le mpsha le ile la lekola gape taelotšhomo ya lona, mešomo, dilo tše bohlokwa le dibopego tša yona mo ngwageng gomme la ba la dumelela dipheho tše bohlokwa tša maano le tshepedišo. Tše di latelago ke tše dingwe tša dipoelo: peyoleswa e mpsha ya maemo a dilo tše bohlokwa tša Tona le tša mmušo, gammogo le mokgwatshepetšo wo moswa wa go eletša Tona; go šupa maano a mahlano a maatla a tshepetšo (dilo tša motheo, tša batho le tsebo ka ga tšhelete, botswerere, dintlha tša leago le maemo a NACI ka go NSI); go phethagatša di memorantamo tše tharo tša keletšo; le go thakgola dinyakišišo tše tharo tše mpsha gape le go dumelela dinyakišišo gape tše nne bjalo

ka metheo ya tšwetšopele ya keletšo. NACI's e feleleditše ngwaga wa pego le maikemišetšo a maano a merero ya yona ao fihleletšwego goba tše di sa tlilego go fihlelelwa ngwageng wa ditšhelete wa 2005 - 2006.

### **SeSotho**

Khansela ya Setjhaba ya Boelets'i ka Ditshibollo (National Advisory Council on Innovation – NACI) e nehuwe matla a ho eletsa Letona la Saense le Thekenoloji malebana le merero e tobaneng le saense, thekenoloji le tshibollo. Tlaleho ena e kenyetsa mesebetsi nakong ya tshebetso ya selemo sa botshelela sa NACI ho tloha ha e thehwa. Khansela e ntjha ya ditho tse 22 e thontswe ke Letona maqalong a selemo sa 2004 bakeng sa nako ya Mmesa (Apreli) 2004 ho ya ho Tlhakubele (Matjhe) 2007. Khansela e ntjha e boitse ya hlahloba taelo, mesebetsi, ditho tse tlang pele le dihahelo nakong ya selemo mme ya amohela diqeto tse sehlotshwana tsa malebela le tshebetso. Tse latelang ke tse ding tsa dipheho: dintlha tsa bohlokwa tse pele tse ntjhafaditsweng ho tsamaelana le tse tsa Letona le mmuso, mmoho le mokgwa-tshebetso o motjha wa ho eletsa Letona; ho hlwaya dikatamelo tse hlano tsa malebela (diahelo tsa tshebetso, letsete la batho le tsebo, ho emelana le tlhodisano, dintlha tsa bodulo le boemo ba NACI's mabapi le NSI); phethelo

ya dimemorantamo tse tharo tsa boelets'i; le tlhomamiso ya diphuputso tse tharo tsa boithuto tse thehilweng ho ntshetsopele ya boelets'i. NACI e phethetse tlaleho ya selemo e fihleletse maikemisetso ohle a selemo sa ditjhelete sa 2005 - 2006.

### **SeSwati**

UMkhandlu waVelonkhe loweLuleka ngaloKusha (National Advisory Council on Innovation – NACI) unikwe ligunya lekweluleka Ndvunankhulu weTesayensi neteBucwephešhe macondzana netindzaba tetesayensi, bucwephešhe nalokusha. Lombiko ufaka ekhatsi tintfo letentiwe yi-NACI ngemnyaka wayo wesitfupha kusukela yasungulwa. UMkhandlu lomusha lonemalunga langu-22 wakhethwa nguNdvunankhulu ekucaleni kwemnyaka wa-2004 kutsi usebente kusukela nga-Apreli-2004 kuya kuMashi-2007. LoMkhandlu lomusha wabuyela emuva wabuketa kabusha ligunya, umsebenti, lokumele ukubeke embili kanye netimiso tawo emkhatsini wemnyaka waphindze futsi wavuma emasu netincumo tekusebenta. Loku lokulandzelako nguleminyeyemiphumela: kuvusetelwa kabusha kwetintfo letimele tibekwe embili tihambisane naletotaNdvunankhulu nahulumende, kanye nendlela lensha yekweluleka Ndvunankhulu; kutfo la emasu emikhakha lesihlanu (takhiwo,

bantfu, nelwati, kucudzelana, tinhlangotsi tetenhlalo kanye nesigaba se-NACI ku-NSI); kucedzelwa kwemamemoranda (imibiko) lamatsatfu ekweluleka; nekwetfulwa kwetifundvo letinsha letintsatfu kanye nekuvunywa kwaletinye tifundvo letine njengesisekelo sekutfutukisa kwelulekwa. I-NACI yavala umnyaka wekubika ngemigomo yayo onkhe emasu ekusebenta lezuziwe nune labekatawuzuzwa uma kusuka umnyaka wemali wa-2005 - 2006.

### **XiTsonga**

Huvo yo Tsundzuxa ya Rixaka ya Vutumbuluxi (NACI) yi na mpfumelelo wo tsundzuxa Holobye wa Sayense na Thekinoloji eka timhaka to yelana na sayense na thekinoloji na vutumbuluxi. Xiviko lexi xi angarhela migingiriko ya lembe ra vutsevu ra NACI hi mpfhuka yi tumbuluxiwa. Huvo yintshwa ya 22 wa swirho yi thoriwile hi Holobye eku sunguleni ka 2004 eka nkarhi wa Dzivamisoko 2004 ku fika Nyenyankulu 2007. Huvo yintshwa yi tlhele yi langutisisa mpfumelelo wa yona, mintirho, timhaka ta nkoka na swiyenge eku fambeni ka lembe no pasisa tindlela tingari tingani ta nkoka na swiboho swa matirhelo. Leyi landzelaka i mimbuyelo yin'wana: ku luhisa timhaka ta nkoka ku fambelana na Holobye na mfumo, xikan'we na endlelo tshwa ro tsundzuxa Holobye; ku tiva

ntlhanu wa maendlelo yo susumeta (muako, ntalo wa vanhu na vutivi, swa mphikizano, timhaka ta vaaki na xiyimo xa NACI eka NSI); ku simekiwa ka timemorandamu tinharhu to tsundzuxa; na ku simekiwa ka tidyondzo tinharhu tintshwa no pasisiwa ka tidyondzo ta mune to ya emahlweni tani hi masungulo yo tumbuluxa vutsundzuxi. NACI yi hete xiviko xa lembe hi ku fikelela swikongomelo hinkwaswo swa maendlelo ya mabindzu kumbe ku ta swi fikelela eku sunguleni ka lembe-ximali ra 2005 - 2006.

### **SeTswana**

Khansela ya Bosetšhaba ya Kgakololo malebana le Phetogo (NACI) e laletswe go gakolola Tona ya Saense le Thekenoloji ka ga merero ya saense, ya thekenoloji le ya phetogo. Pegelo e, e akaretsa ditiro ka motsi wa ngwaga wa borataro wa NACI fa e sale e tlhomilwe. Khansela e ntšhwa ya maloko a le 22 e ne ya tlhomiwa ke Tona kwa tshimologong ya 2004 malebana le paka ya Moranang 2004 go fitlha ka Mopitlwe 2007. Khansela e ntšhwa e ne ya leba sešwa taolelo ya yona, ditiro tsa yona, ditlhokwa tsa yona le ditheo tsa yona mo tsamaong ya ngwaga le go amogela ditshwetso di le mmalwa tse di botlhokwa tsa leano le tsa tiro. Tse di latelang ke ditlamorago: tolamisano e e ntšhwafaditsweng ya ditlhokwa go tsamaelana le tsa ga Tona le puso, go supiswa ga

dintlha di le tlhano tsa leano (mafaratlhatlha, tsa batho le tsa kitso, kgaisano, dintlha tsa loago le maemo a NACI mo NSI), konotelelo ya dimemorantamo di le tharo tsa kgakololo, le go tlhagisiwa ga dithuto tse dintšhwa di le tharo le kamogelo ya dithuto tse dingwe di le nne jaaka metheo ya tlhabololo ya kgakololo. NACI e khutlisitse ngwaga wa pegelo ka go fitlhelwa ga maitlhomotlho a yona a leano la tiro kgotsa go fitlhelwa kwa tshimologong ya ngwaga wa ditšhelete wa 2005-2006.

### **TsiVenda**

Khoro ya Lushaka ya Vhuelethshedzi nga ha Vhutumbuli yo newa maanda a u eletshedza Minisiša nga ha Saintsi na Thekhinołodzhi malugana na zwa saintsi, thekhinołodzhi na vhutumbuli. Uyu muvhigo u katela zwiwo zwe zwa bvelela nga n'waha wa vhurathi wa NACI u bva tshe ya simiwa. Minisiša o thola mirado ya 22 ya Khoro ntswa mathomoni a 2004 ine ya do thoma u shuma u bva nga Lambamai 2004 u swika nga Thafamuhwe 2007. Khoro yo sedzulusa maanda ayo, mishumo yayo, zwithu zwa ndeme na zwivhumbeo kana madzangano ayo kha n'waha wonoyo ya dovha hafhu ya tangedza tsho dza maitele dzi re na tshivhalo dzo lugelaho u shuma. Dzi nwe dza mvelelo ndi dzi tevhelaho: u vhekanya nga vhuswa zwithu zwa ndeme zwa Minisiša na zwa Muvhuso, khathihi na kuitele kuswa kwa

u eletschedza Minisita; u wana thuthuwedzo thanu dza maitele (zwa vhudavhidzani, zwa ndeme zwa vthathu na zwa ndivho, vhuuimiselili kha mitatano, zwitefwa zwa zwa matshilisano na vhuimo ha NACI kha NSI); u khunyeledzwa ha memorandamu dza ngeletshedzo, u lontsha kana u divhadza lwa tshiofisi thodisiso tharu ntswa na u tendela kana u tangedza dziwe thodisiso nna sa mitheo ya mvedziso ya ngeletshedzo. NACI yo pendela muvhigo wayo wa nwa nga ndivho dzothe dza bindu dzine dza tshimbilelana na maitele dzo swikelelwaho kana dzine dza do swikelelwa mathomoni a nwa wa masheleni wa 2005 - 2006.

### **IsiXhosa**

IBhunga leSizwe eliCebisa ngokwenza iiNguqulelo (NACI), lisekelwe ukucebisa uMphathiswa weNzululwazi neTeknoloji kwimiba yenzululwazi, yeteknoloji nokwenza iziqalo/iinguqulelo. Le ngxelo iqulathe imisebenzi yeNACI yonyaka wesithandathu okoko yasekwa. Eli Bhunga litsha elimalungu angama-22 lonyulwa ngumphathiswa ekuqaleni konyaka ka-2004 lisonyulelwa ukusebenza ukuqala kuka-Epreli wama- 2004 ukuya kuMatshi wama-2007 lokusebenza. IBhunga elitsha lithe laqwalasela ngokutsha umsebenzi walo, izinto ezibalulekileyo kunye nokwakhiwa ekuhambeni konyaka laza

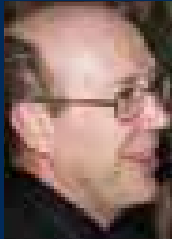
lathabatha izigqibo eziliqela ezibalulekileyo zendlela emakusetyenzwe ngazo. Ezi zezinye zeziphumo: ukulungelelaniswa kwezinto ezibalulekileyo ukuze zifane nezo zoMphathiswa norhulumente, inkqubo entsha yokucebisa uMphathiswa, ukuchongwa kwezinto ezingoondoqo (izakhiwo, abasebenzi kwanolwazi abanalo, ukhuphiswano, imiba yentlalo kwanendima yeNACI kwi-NSI); ukuqosheliswa kweememoranda zengcebiso ezintathu; ukusungulwa kwezifundo zophando ezintathu kwanokugunyaziswa kwezinye izifundo ezine eziya kunceda kuphuhliso lweengcebiso. I-NACI igqibe unyaka wengxelo izifezekisile iinjongo zayo, okanye ezinye ziya kufezekiswa ekuqaleni konyaka-mali ka-2005 - 2006.

### **IsiZulu**

Umkhandlu kaZwelonke ocebisa ngezinguquko ugunyazwe ukuba ucebise uNgqongqoshe weSayensi noBuchwepheshe ngezindaba eziphathelele nesayensi, ubuchwepheshe kanye nokuqanjwayo. Lo mbiko uqukethe imisebenzi ye-NACI onyakeni wesithupha yasungulwa. Umkhandlu omusha onamalungu angama-22 waqashwa nguNgqongqoshe ekuqaleni kuka-2004 ewuqashela isikhathi esisuka ku-Apreli- 2004 kuya ku-Mashi-2007. Lo mkhandlu omusha wabhekisisa igunya lawo, imisebenzi, okusemqoka kanye

nezimiso ozosebenzisana nazo ekuhambeni konyaka, wase uvumela izinqumo eziningi ezibalulekile ezibandakanya izinqumo zamacebo nokusebenzisa. Okulandelayo ngeminye yemiphumela: ukuvuselela ukuqondiswa kokusemqoka kufane nalokho kukaNgqongqoshe noHulumeni, indlela yenqubo entsha yokucebisa uNgqongqoshe, ukuqokwa kwamasu amahlanu okuhloma (ingqalazinda, okuqongelelwayo yabantu nolwazi, ukuncintiswa izimpawu zenhlalakahle kanye nesimo se-NACI kwi-NSI); ukuqedelwa kwezindabambiko zokucebisa ezintathu, kanye nokungeniswa kwezifundo ezintathu kanye nokugunyazwa kwezinye izifundo ezine njengesisekelo sokuthuthukiswa kokucebisa. I-NACI iqede unyaka wombiko ngazo zonke izinhlobo zebhinisi ezifeziwe noma noma izowafeza ekuqaleni konyaka wezimali ka-2005 - 2006.

## Message from the CEO



**Dr Rob Adam**  
Director-General:  
Department of Science  
and Technology

The report year 2004 - 2005 was an historic year for South Africa in general and the Science, Technology and Innovation (STI) system in particular. The fact that it marked the end of the first decade of our democracy was, of course, reason for celebration, but it also inspired the government to take serious stock of its first 10 years at the helm – its achievements and failures. A significant milestone for the STI system was the appointment, for the first time in our country's history, of a minister of science and technology, with a department exclusively dedicated to that portfolio.

### **New developments**

One of the most important national developments of the report year was undoubtedly the approval by cabinet of a new governance framework for the STI system. The new approach to the governance of the system will give the Minister of Science and Technology and the Department of Science and Technology (DST) an overseeing role over the entire spectrum of public STI initiatives

and programmes. This is expected to improve further coordination and monitoring of public investment in STI.

The new dispensation required a reorganisation of the DST. This would improve NACI's "informedness" about current developments in government through my office and the links between NACI and the Science and Technology Expert Services (SciTES) programme. The first consequence of the reorganisation is that most of the work originally done by the gender and disability unit of the Department was transferred to NACI's national advisory committee, SET4W, on 1 April 2005.

Last year also marked the successful completion of the second R&D survey and steps have been taken to have the data generated by the survey declared as national statistics. What is especially important about the survey and its data, is the fact that the entire programme is becoming a cornerstone of the government's commitment



to data-based monitoring of progress in STI policy and strategy implementation. In this regard, the indicators unit in NACI played an indispensable role, further validating the decision to transfer the unit from DST to NACI. I foresee that NACI will increasingly utilise this information source in developing ministerial advice.

### **Second NACI Council**

Within the above context the Second NACI Council took office on 1 April 2004. NACI had invited previous councillors to its first official meeting in order to capitalise on those councillors' reflections on their term of office. This exposure greatly assisted the new Council at a strategic planning meeting in August 2004 in taking stock of its position and to plan the way forward. I was impressed with the informed way the Council interrogated its mandate and mission, functions, priorities, *modus operandi*, own role expectations and expected outcomes and impact of its work. Although these analyses and planning took time

– and in effect defined the 2004 - 2005 report year as one of stock-taking and developing new operational perspectives – it was time well spent and will undoubtedly yield a rich return during the remainder of the Council's term of office. This expectation is further reinforced by the fact that the support service of NACI was strengthened, although it is still small in comparison to similar bodies elsewhere.

### **On the future**

I wish to conclude this message by suggesting a theme that NACI could consider in 2005 - 2006: demonstrating the potential and real beneficial impact of science on our country and its people. Government has in various ways committed itself to supporting STI and it should now be the task of the scientific community and those in the STI policy field to validate in a convincing way that public trust and optimism. As statutory advisory body, NACI is especially well positioned to give direction to studies and advice in this regard.

**“One of the most important national developments of this year's report was undoubtedly the approval by cabinet of a new governance framework for the STI system.”**

### **Word of appreciation**

It remains for me to thank all persons associated with NACI for their contributions in the course of 2004 - 2005.

A warm word of appreciation has to go to our Chair, Prof Calie Pistorius, who has approached his new – and additional, I should add – responsibility with contagious enthusiasm and dedication. His convincing insight into the complexities of innovation systems, and commitment to innovation in his approach to the nature and potential of an advisory body such as NACI, has been a beacon for the Council.

The Councillors – both first- and second-term members – have performed their duties in an exemplary way, notwithstanding the fact that they serve NACI in a part-time capacity.

They demonstrated a constructive openness to consider new perspectives on NACI's mandate and approach and made valuable contributions to the business at hand.

I also wish to record my appreciation to our service providers – both in the support and professional services – for the high-quality work they have rendered in all cases.

Finally, the staff of the Secretariat deserves a sincere “thank-you, all” for their loyalty to NACI, their unstinting commitment to quality across the broad spectrum of work they have to manage, and the professionalism with which they have supported the Council.

Dr Rob Adam  
23 September 2005

# Chairperson's Report

The term of office of the First National Advisory Council on Innovation came to an end at its last meeting in February 2004. The Second Council took office on 1 April 2004 and its first meeting was held in May 2004. A substantial portion the first year of the new term of office of the Second Council was used to consider all facets of NACI and its work against the background of its experience gained during 1999 - 2004 as well as practices of related councils elsewhere in the world.

This report offers a bird's-eye view of NACI's activities during the 2004 - 2005 year and covers new strategic and operational directions, our performance review, ministerial advice generated, progress on current initiatives, the work of the advisory committees (SET4W), communication as well as some future challenges.

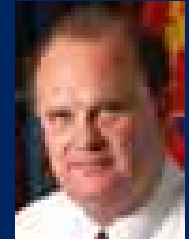
The prominence of science, technology and innovation as a contributor to the nation's prosperity, competitiveness and improving

quality of life of its citizens is generally heralded. As the importance of science, technology and innovation in this regard grows, so does the necessity for relevant policy advice. NACI was inaugurated in 1999 to fulfil the need that was foreseen even at that time in this regard. During the six years of NACI's existence much experience has been gained with regard to the structure and operation of a ministerial advisory body on science and technology. NACI must proactively contribute towards shaping the scientific and technological future by ensuring that it remains relevant and adds value to the policy debate by offering high-quality advice to the Minister.

## **New strategic and operational approach**

**Mandate** – In the course of operationalising its interpretation of its mission, approach and priorities the Council defined the following three basic dimensions that would guide its work during this term of office:

- Firstly, its work programme should be as closely aligned as possible to the needs of



**Prof Calie Pistorius**  
Vice-Chancellor and  
Principal:  
University of Pretoria

**The Council report rated its own performance in general to have been reasonably satisfactory in the strategic area, between satisfactory and good in the tactical area, while the performance in the results area was satisfactory.**

the Minister. This would require regular communication with the Minister and Deputy-Minister and flexibility to respond immediately to their requests.

- Secondly, NACI has to focus on its core mandate, namely to develop advice on the range of topics listed in Section 4 [4] (1) of its Act. Only business that directly supports this mandate should be maintained and non-core ones should be discarded.
- Finally, NACI has to shorten significantly the conversion rate and time between completion of studies and submission of advice.

NACI is mindful of the fact that the advice it offers the Minister in terms of the NACI Act can typically be initiated either by requests from the Minister or by issues relating to the National System of Innovation (NSI) that NACI itself deems important.

**Strategic thrusts** – The functional structure that the Council decided upon for the self-initiated advice, was that of five strategically

focussed sub-committees. This structure would ensure that the expertise of Councillors would be optimally utilised. The core function of sub-committees is to address critical issues within specific strategic domains and develop advice aimed at contributing towards a better functioning NSI. The strategic thrusts are:

- Infrastructure for innovation promotion;
- Human capital and the knowledge base for innovation;
- Science, Technology and Innovation (STI) for competitiveness, i.e. the dynamics of innovation and competitiveness in business undertakings;
- Social dimensions of innovation; and
- Position and role of NACI in the NSI to ensure that NACI delivers on its mission in the best possible way.

**Ministerial advice** – In the past, ministerial advice was channelled through the Department of Science and Technology which would normally add its perspectives on the advice to the report. This in effect meant the introduction

of an additional link in the advisory chain. A new procedure was approved by Council and accepted by the Minister whereby NACI would submit its advice directly to him and it would be his prerogative to request additional inputs from the Department.

**Expectation** – Feedback on the implementation of the above and subsidiary approaches during the latter part of the report year gives reason to believe that this strategic and operational approach will bear fruit in the new financial year.

### **Corporate Business Plan**

The year's business was guided by the *Corporate Business Plan 2004* (CBP 2004) that was originally approved by the First Council in February 2004. The Second Council provisionally ratified the business plan in May of that year and eventually amended the plan after the finalisation of the new strategic and operational programme. All the objectives of the amended CBP 2004 were attained by the

end of year or are about to be attained early in the new financial year. This process also meant that the budget had to be aligned with the amended CBP. The portion that was expected not to be committed in the course of the remainder of the year (including savings that accrued from unfilled posts) was moved to the Department for use in other programmes, since NACI's financial allocation is still part of the DST budget and expenditure is consequently accounted for in the departmental financial systems.

### **Performance review**

A new format for NACI's annual performance report was introduced in the course of the year. A Council report on its performance will be moderated by an external specialist before submission to the Minister in each of the first three years of its term of office. In the fourth year the review would consist of a comprehensive external review. The report year saw the first performance evaluation in terms of the new system.



**Three sets of ministerial advice were submitted to the Minister:**

- **mobility of research workers;**
- **potential impact of skills shortages in the construction industry; and**
- **utilisation of research findings.**

The Council report rated its own performance in general to have been reasonably satisfactory in the strategic area, between satisfactory and good in the tactical area, while the performance in the results area was satisfactory. On the basis of these evaluations Council reconfirmed that it should focus on national priorities that are high on the agendas of the Minister and government, apply a sound methodology in generating its advice, and ensure effectiveness and efficiency in its work. One of NACI's sub-committees is investigating various aspects of the effectiveness and efficiency of NACI, and will take into account the issues raised in the performance review.

The moderator – the CEO of a large foreign government R&D institution – commended the Council for the process of self-evaluation and accepted the overarching assessments. Apart from a number of detailed points made, the moderator urged NACI to ascertain the value placed on its advice and whether it led to change. In conclusion he recommended

that the measures/performance indicators be tightened up, the definition of deliverables be sharpened, and measures be taken to ensure timely delivery. We take the assessment and recommendations of the moderator very seriously and will implement them in the course of 2005/06.

**Ministerial advice**

Three sets of ministerial advice were submitted to the Minister via the Department of Science and Technology in the course of the report year. These advices dealt with the mobility of research workers, the potential impact of skills shortages in the construction industry, and the utilisation of research findings.

**South African Reference Group for Women in SET (SET4W)**

The South African Reference Group for Women in Science, Engineering and Technology (SET4W) is a permanent sub-committee of NACI, appointed by the Minister of Science and Technology. It has had

a productive year and continues to build a systematic body of evidence to inform policy-making in relation to gender as it pertains to the NSI. A comprehensive report, *Facing the facts: Women's participation in Science, Engineering and Technology*, was presented to the Minister of Science and Technology, who launched the summary report at an event attended by executive leaders from universities and Science Councils in November 2004. Negotiations started towards the end of the year to transfer three studies in 2005 from the Department to SET4W in the wake of the reorganisation of the Department and the closing down of the gender and disability unit. The management of these additional studies will undoubtedly place stress on the internal capacity of the Secretariat, but I am confident that it will succeed.

All the studies of SET4W are scheduled to be completed towards the end of 2005, following which the findings and advice will be submitted to the Minister.

### **Current initiatives**

The Council launched three projects after its meeting in November 2004:

- The state of ethics in the NSI;
- The NSI after a decade of democracy; and
- Appropriate human resources for a productive NSI.

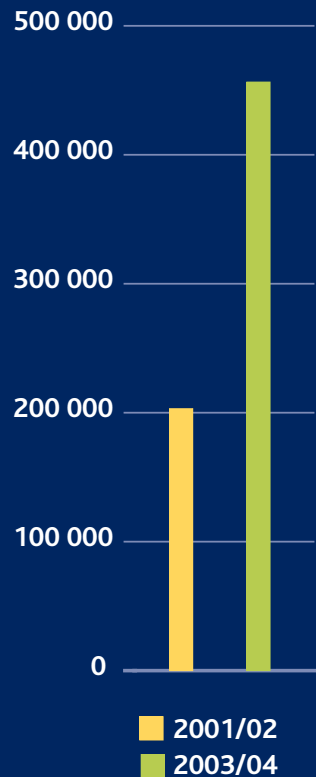
All three projects are expected to be completed in the next financial year and will form the bases for relevant advice to the Minister.

### **Communication**

NACI was again active in furthering its functional networks in a balanced way as part of accessing new sources of information and expertise, testing existing information, and disseminating its own information, methodology and perspectives. This took place through personal meetings, delegations, participation in conferences – nationally and internationally. Overviews of these activities can be found elsewhere in the report. A service provider was commissioned in March 2005 to redesign the NACI innovation portal and



## Government expenditure on R&D (Rm)



Source: DST 2003 & 2005.  
*National survey of research and experimental development – 2003/04*  
(2001/02) fiscal year: High-level key results. Pretoria: DST

the new portal should be in operation by the middle of 2005.

### Future challenges

It is inevitable that the process of looking back upon a past year's intentions, activities and results should also stimulate thinking about the future. This report is not different. Against the background of our work in 2004 - 2005 the following challenges emerge for NACI in the 2005 - 2006 year.

- Firstly, at strategic and operational level, we should take very seriously the challenges the moderator of the performance report has posed, namely to ensure that our advice is respected, valued and differentiated from other quarters in the NSI.
- Secondly, at the process level, NACI will have to ensure that the work that was initiated in the report year be successfully completed.

It is imperative that NACI lives up to its commitment of efficiency in generating evidence-based advice, that it further proves itself as relevant and able to have an impact on the NSI. We have revamped our modes of operation and strengthened the executive component and the results should follow.

- Finally, at the content level, we have to ensure that we keep focussed on the issues that lie at the centre of attention and that we provide the Minister with advice that can make a difference. High on the agenda should be advice on strategies concerning the provision of human resources, bridging the innovation chasm and further substantiating to government and the general public what we know but cannot necessarily convince others about, namely the impact that science does make on the challenges facing our country.



## Appreciation

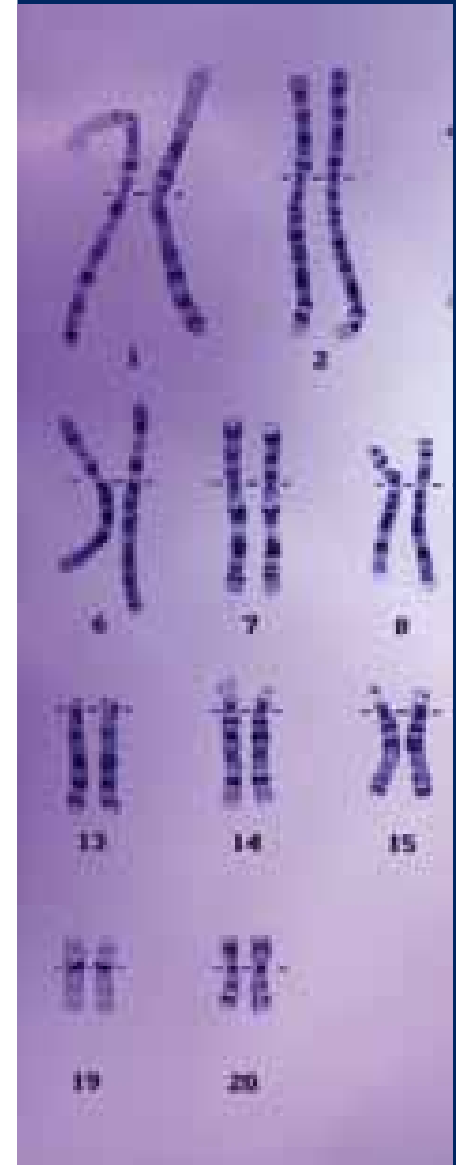
My sincere appreciation goes to all who have contributed to the year covered by this report. I wish to thank Minister Mosibudi Mangena for the informed interest in the role that the NACI should play as well as the constructive discussions regarding the ministerial advice that NACI has offered. On behalf of the National Advisory Council on Innovation I trust that this annual report will serve as substantiation of the trust the Minister of Science and Technology has put in us and at the same time strengthen his expectations of the advisory service he can expect of us in future.

I would also like to thank Deputy-Minister Derek Hanekom for his interest and discussions regarding NACI and its work. A special word of thanks goes to Dr Rob Adam, the CEO of NACI and also the Director General of Science

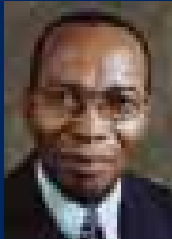
and Technology. Dr Bok Marais and all the members of the Secretariat of NACI have done a tremendous job, and they deserve our gratitude and appreciation.

The members of the Second Council approached the challenge of radically reconsidering its mission, strategy and operations with openness and commitment resulting in a fresh approach that should result in appropriate and timeous advice. I thank them all for this.

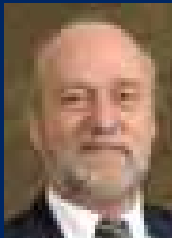
Prof Calie Pistorius  
Chairperson  
22 September 2005



## Excerpt of Addresses by Ministers



**The Hon Minister  
Mosibudi Mangena**  
Minister of Science and  
Technology



**The Hon  
Deputy-Minister  
Derek Hanekom**  
Deputy-Minister of  
Science and Technology

### **The Honourable Minister Mosibudi Mangena**

In an address to the Council on 10 February 2005 Minister Mangena emphasised the following points:

- There is an urgent need to meet the demand for appropriately trained human resources.
- The private sector should be consulted in all processes concerning investment in Science, Technology and Innovation (STI).
- More public-private partnerships in all the processes in STI need to be established.
- The fact that a number of key experts are being drawn into the government sector made it necessary to soften the boundaries between government service and higher education institutions to ensure that such expertise would still be available to universities.
- Higher education and S&T should collaborate more to promote sufficient awareness of where the STI system was heading.

- If Science, Engineering and Technology Institutions (SETIs) are to play an increasingly important role in the economy of South Africa, all relevant stakeholders must be brought together to plan and agree on the way forward.

### **The Honourable Deputy-Minister Derek Hanekom**

In his budget vote speech in June 2004 Deputy-Minister Hanekom said, among other things: "It is clear from international experience that our economy will not achieve the growth targets we have set ourselves unless there is meaningful investment in science and technology. However, even the best technology in the world is of little value unless it is made available to the people and enterprises that are producing the goods and services that we consume."

# NACI Council

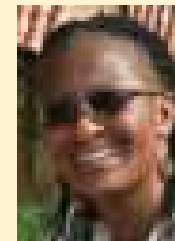
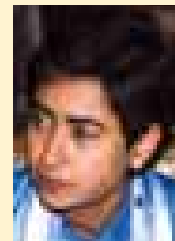
The Second NACI Council was appointed on 1 April 2004 and formally took office on 27 May 2004 at the 18<sup>th</sup> Council Meeting.

The new NACI Council is composed as follows:

	Gender		Race		Sector			
	Men	Women	Black	White	Science Councils	Business	Gov	HE
Number of Councillors	16	6	13	9	3	10	4	5

The NACI Council is shown overleaf. Below are the Councillors who could not be present for the group photograph:

*From left* – Dr Khotso Mokhele, Dr Nhlanhla Msomi, Mr Thero Setiloane, Dr Mala Singh, Dr Nthoana Tau-Mzamane.





Photographed at the first meeting of the new Second Council, were:

*Back from left* – Mr Fairoz Jaffer, Prof Tshilidzi Marwala, Dr John Stewart, Mr Geoff Rothschild, Mr Alan Hirsch, Prof Jennifer Thomson, Dr Steve Lennon, Dr Johannes Potgieter, Dr Francis Petersen, Mr John Marriott;

*Seated* – Prof Cheryl de la Rey, Dr Nombasa Tsengwa, Dr Ntuthuko Bhengu, Ms Luci Abrahams, Prof Calie Pistorius, Dr Sibusiso Sibisi, Dr Rob Adam.

### **Chairperson**

**Prof Calie Pistorius**

Vice-Chancellor and Principal:  
University of Pretoria

### **CEO**

**Dr Rob Adam**

Director-General: Department  
of Science and Technology

### **Executive Committee**

**Ms Luci Abrahams**

Director: LINK Centre,  
University of the Witwatersrand

**Dr Johannes Potgieter**

Chief Director: Innovation and  
Technology, Department of  
Trade and Industry

**Dr Nombasa Tsengwa**

General Manager: Safety,  
Health & Environment, Kumba  
Resources

### **Councillors**

**Dr Ntuthuko Bhengu**

Executive Director: Africa  
Biopharma Investments

**Prof Cheryl de la Rey**

Deputy Vice-Chancellor:  
University of Cape Town

**Mr Alan Hirsch**

Chief Director: The Presidency

**Mr Fairoz Jaffer**

Chief Executive Officer:  
Abnoba Information Dynamics

**Dr Steve Lennon**

Managing Director: Resources  
& Strategy Division, Eskom

**Mr John Marriott**

Advisor: Sasol Synfuels  
International

**Prof Tshilidzi Marwala**

School of Electrical &  
Information Engineering,  
University of the Witwatersrand

**Dr Khotso Mokhele**

President and CEO: National  
Research Foundation

**Dr Nhlanhla Msomi**

Chief Executive Officer:  
ECOBIO, Lifelab East Coast  
Biotechnology Regional Centre

**Dr Francis Petersen**

Head: Strategy & Planning,  
Anglo American Platinum  
Corporation Ltd

**Mr Geoff Rothschild**

Director: Marketing, JSE  
Limited

**Mr Thero Setiloane**

General Manager: Marketing  
Department, AngloGold

**Dr Sibusiso Sibisi**

President and CEO: CSIR

**Dr Mala Singh**

Executive Director: Higher  
Education Quality Committee,  
Council for Higher Education

**Dr John Stewart**

Consultant: Mining Industry  
and Technology Management

**Dr Nthoana Tau-Mzamane**

President and CEO:  
Agricultural Research Council

**Prof Jennifer Thomson**

Department of Molecular &  
Cell Biology, University of  
Cape Town

## NACI Advisory Committee: South African Reference Group for Women in SET (SET4W)

The South African Reference Group for Women in Science, Engineering and Technology (SET) – referred to as SET4W – has a three-year term of office (April 2003 – December 2005). The group is composed as follows:

	Gender		Race		Sector				Inter-national
	Men	Women	Black	White	Science Councils	Business	Gov	HE	
Number of Members	3	18	14	7	1	7	2	7	4

The South African NSI is weakened due to the poor participation of women in the Natural Sciences, Engineering and even in the Social Sciences and Humanities. These are precisely those areas where the country most needs to increase its competitiveness and its capacity to address poverty.

### SET4W Members

#### Chairperson

**Ms Luci Abrahams**  
Director: LINK Centre,  
University of the  
Witwatersrand

#### Members

**Prof Cheryl de la Rey**  
Deputy Vice-Chancellor:  
University of Cape Town

#### Prof John Duncan

Dean of Research: Rhodes  
University

#### Ms Tina Eboka

Director: Group Corporate  
Affairs,  
Standard Bank

#### Prof Sharon Fonn

Head of the School of Public  
Health, University of the  
Witwatersrand

#### Ms Erika Johnson

General Manager:  
Systems Operations, Eskom

**Dr Bongani Khumalo**

Chairperson: Grey Global  
South Africa

**Ms Allyson Lawless**

Director: Allyson Lawless and  
Associates

**Dr Steve Lennon**

Managing Director:  
Resources & Strategy Division,  
Eskom

**Prof Valerie Mizrahi**

Director: Molecular  
Mycobacteriology Research  
Unit, University of the  
Witwatersrand and National  
Health Laboratory Service

**Ms Zuki Munyai**

Chief Executive Officer:  
Muvhango Technologies

**Ms Bongiwe Njobe**

Director: Corporate Affairs,  
South African Breweries

**Ms Khungeka Njobe**

Director: Environmentek,  
CSIR

**Ms Susan Nkomo**

Chief Executive Officer:  
Office of the Status of  
Women, President's Office

**Prof Tebello Nyokong**

Department of Chemistry,  
Rhodes University

**Prof Helen Rees**

Director: Reproductive Health  
and HIV Research Unit, Chris  
Hani Baragwanath Hospital

**Prof Jennifer Thomson**

Department of Molecular &  
Cell Biology, University of  
Cape Town

**International members**

**Mrs Catherine Didion**

Executive Director:  
International Network for  
Women Engineers and  
Scientists

**Prof Lydia Makhubu**

President and Vice-Chancellor:  
Third World Organisation  
of Women in Science and  
University of Swaziland

**Dr Shirley Malcom**

Director: Education and  
Human Resources, American  
Association for Advancement  
of Science

**Dr Elizabeth Rasekoala**

Director: African Caribbean  
Network of Science and  
Technology

## Sub-committees and Strategic Thrusts

At a strategic planning meeting in August 2004 the Council approved a set of strategic thrusts as well as a new functional structure. These thrusts were subsequently fine-tuned, discussed with the Minister and now represent the framework within which the Council's evidence-based advice would be developed.

The functional structure comprises five strategically focussed sub-committees. This structure would ensure that the expertise of Councillors would be optimally utilised, beyond the previous format of only attending and participating in plenary meetings.

The core function of sub-committees is to

address critical issues within their domains and develop advice aimed at contributing towards a better functioning NSI. More specifically, they are responsible for:

- Advising Council on important strategic issues on which advice should be generated;
- Approving the scope and evidence-gathering under their designated strategic theme;
- Guiding the drafting of any Ministerial Advice on the particular strategic theme; and
- Serving as interface between NACI and prominent stakeholders and role players in their particular strategic area.

The five strategic thrusts and their priorities are listed on the following pages.



## **Infrastructure for innovation promotion**

### **Focus**

Productive STI systems in developed economies are characterised by configurations of policies conducive to innovation across sectors, access to optimal physical infrastructure and high, if not growing, levels of expenditure on STI. The key cause for concern for the sustainability of minimum levels of STI in developing economies has been identified as largely the opposite: acceptable policies, but inadequate and ageing physical infrastructure as well as low expenditure. Against this background, an important strategic focus of NACI is to offer advice on the dimensions and conditions that define an environment in which innovation would thrive.

### **Priorities**

1. Document NSI achievements in the first decade of democracy. (This will be presented in book form, with accompanying ministerial

advice, to the 24<sup>th</sup> Council Meeting in November 2005).

2. Develop a profile of best practices for the country with regard to the major aspects of the NSI.
3. Determine all aspects of the required physical infrastructure to attain the country's common vision of its NSI generated in Point 2 above.
4. Develop a profile of provincial innovation systems. (A study had already been approved, but suspended pending finalisation of the present prioritisation.)

## **Human capital and the knowledge base**

### **Focus**

Two of the key elements of any innovation system are human resources and knowledge. Neither can be strategically changed over the short term, but both are very sensitive to the dynamics and consequences of globalisation, as evidenced in a net outflow of scientists or

## **Infrastructure for innovation promotion sub-committee**

Dr S Lennon (convenor)  
Dr R Adam  
Dr N Bhengu  
Mr A Hirsch  
Dr F Petersen  
Dr S Sibisi  
Dr N Tau-Mzamane

## **Human capital and the knowledge base sub-committee**

Dr K Mokhele (convenor)  
Prof C de la Rey  
Prof T Marwala  
Dr N Msomi  
Prof J Thomson

**Science, Technology  
& Innovation for  
competitiveness  
sub-committee**

Dr J Stewart (convenor)

Mr J Marriott

Dr F Petersen

Dr J Potgieter

Mr T Setiloane

Dr N Tsengwa

discriminating aspects of intellectual property rights. The dual nature of its economy makes South Africa especially vulnerable with regard to the provision and spread of its human capital and the challenges posed to its knowledge base. It follows that NACI should focus on determining the parameters of an ideal human capital and knowledge base and that this focus should include the optimal use of both.

**Priorities**

1. Modelling of the demand and supply of human resources and developing a strategy for optimising the supply of the medium-term demands. (The first draft report was completed in February 2005 and the final report and ministerial advice will be completed in the latter half of 2005.)
2. Establishing requisite dimensions of the national knowledge base to ensure international competitiveness on the one hand and development of the second economy on the other.

**Science, Technology &  
Innovation for competitiveness**

**Focus**

Greater innovation (and technology transfer) and competitiveness are key to improved growth in South African industry. There is a perception that much of the innovation flows from imported technology, and that a large portion of the growth experienced does not create the desired number of new jobs. Economic growth and greater levels of employment are national imperatives, and it is thus important that NACI develops a deep understanding of the dynamics of innovation and competitiveness that are at play in both large and small industrial undertakings in South Africa, with a view to identifying how these might be enhanced for national benefit.

**Priorities**

1. Interpret the dynamics of innovation (including technology transfer) and competitiveness in South African large,

medium and small business.

2. Use indicators more extensively in monitoring innovation and competitiveness.
3. Review and promote the role of Intellectual Property Rights (IPR) in innovation and competitiveness.

### **Social dimensions of innovation**

#### **Focus**

The social processes underlying innovation and competitiveness in a dual-economy country such as South Africa, and the social consequences of innovation and competitiveness, are not well understood and perhaps not sufficiently accounted for. The social factors (individual, communal, national) inhibiting the adoption of innovation in the second economy on the one hand need to be interwoven with those that facilitate innovation generation in the first economy on the other.

#### **Priorities**

A workshop of experts is scheduled to take place in 2005 to assist in demarcating the field and sharpening the focus and priorities.

#### **Position and role of NACI in the NSI**

#### **Focus**

The intent is to ensure that NACI delivers on its mission in the best possible way, namely to advise the Minister of Science and Technology on issues relating to the NSI.

#### **Priorities**

1. Establish international “best practice” with regard to STI advice.
2. Analyse current practice in South Africa with regard to STI advice and compare strengths and weaknesses of NACI in this regard.
3. Implement organisational STI advisory structures and amendments to NACI.

### **Social dimensions of innovation sub-committee**

Dr M Singh (convenor)  
Ms L Abrahams  
Prof C de la Rey  
Mr F Jaffer

### **Position and role of NACI in the NSI sub-committee**

Prof C Pistorius (convenor)  
Dr K Mokhele  
Dr J Potgieter  
Mr G Rothschild  
Dr M Singh  
Dr J Stewart

**In 2003/04 about 30 000 researchers, of whom 38% were women, were involved in R&D. To grow GERD to 1% by 2008, would require marked increases in our S&T human resource capacity. Investment in increasing the number of women scientists and researchers in productive S&T output is part of the solution and one being addressed by SET4W.**

## SET4W

The South African Reference Group for Women in Science, Engineering and Technology (branded SET4W) was appointed by the Minister of Science and Technology and approved by Cabinet as a permanent sub-committee of NACI. Following its inaugural meeting in March 2003, SET4W has been active in building a systematic body of evidence to inform policy-making in relation to gender as a factor in the NSI.

Promoting gender mainstreaming in all spheres of SET involves an understanding and recognition of the valuable contributions made by women and men in society, particularly in the highly competitive environment of global R&D and innovation.

The objectives of SET4W are to:

- Advise the Minister on measures to establish engendered research agendas that improve the quality of life for women;
- Promote innovation that will allow women to make a greater contribution to wealth

generation in South Africa;

- Advise on developing mechanisms that will increase the participation and contribution of women in Science and Technology;
- Encourage the SET sector to develop engendered human resource development plans; and
- Monitor and evaluate the progress of all R&D institutions in achieving the above objectives, by determining gender-specific key performance indicators.

The Board of SET4W met four times during the report year. The Chairperson briefs the NACI Executive Committee and Council meetings on the programme, progress and other developments.

SET4W will, in the coming years, continue to explore new contours of gender in the South African NSI to advise NACI and the Minister in this regard.

# Performance Review

In the past the Council annually considered a performance report that summarised all the activities of the previous year. In 2004, however, it was decided to put the review on a systematic footing: for each of the first three years of a Council's term of office the Chair and CEO would submit a report to Council. An external specialist would subsequently be invited to moderate the report before submission to the Minister. In the fourth year of office, the review would consist of a comprehensive external review.

The review of NACI's performance for the 2004 - 2005 year is the first one undertaken in terms of the new system. The report addresses the following performance areas:

- Strategic policy and prioritisation;
- Tactical implementation;
- Results assessments; and
- Change and repositioning of NACI.

The CEO of a large overseas government R&D institution served as external moderator.

On the basis of substantive information on activities and outputs, the following assessment and conclusions for each of the performance areas were approved by Council:

## **Strategic policy and prioritisation**

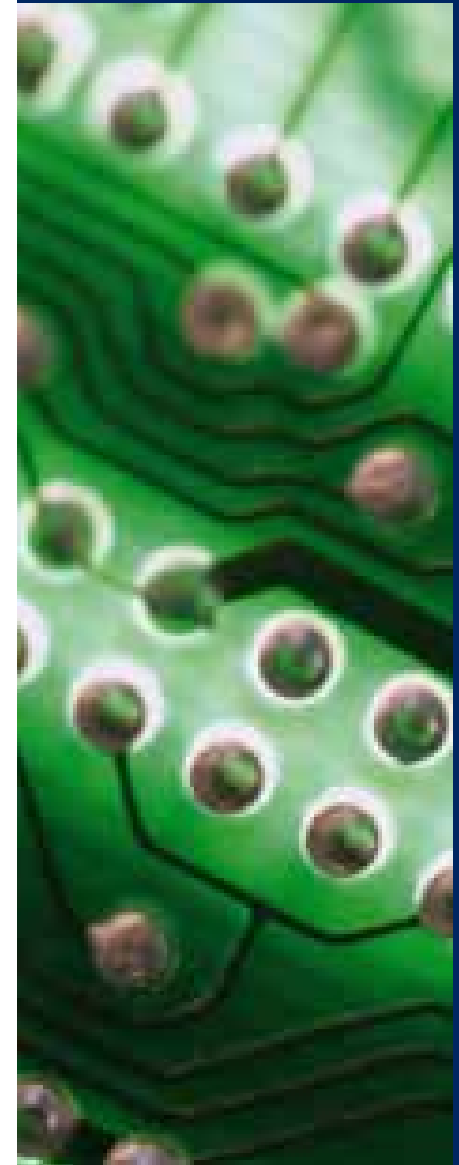
**Determinant:** Had NACI done the right and/or appropriate things in the course of the year?

**Outcome:** The report concluded that NACI had attended to a number of issues that were on the national agenda and which fall within its mandate. However, some initiatives had to be postponed or suspended to allow the new Council to consider its programme. Despite this, NACI has succeeded through its programme (strategic themes and studies) in addressing most of the strategic goals set by the First NACI Council in February 2004. In conclusion, NACI's performance in the strategic area was described as successful, for the most part.

## **Tactical implementation**

**Determinant:** Had NACI been effective?

**Outcome:** Council concurred with the



**The NACI self-assessment process, incorporating a thorough re-evaluation of its priorities and a well-defined assessment framework, is to be applauded.**

conclusion that its performance had been satisfactory to good. It concluded that there was a need to consider its mission and structure from a more strategic perspective, and also to advise the Minister on the best ways in which it should serve him with advice. This may require some organisational restructuring of NACI itself.

#### **Results assessment**

**Determinant:** Were the results and outcomes of the year's work functional?

**Outcome:** It was concluded that NACI could not attend to all the functions allowed by its Act – primarily because of the limited resources at its disposal. However, those that had been attended to, were successfully performed and Council was increasingly recognised as a significant player by other role players in the NSI. The overall rating was at least satisfactory.

#### **Change and repositioning**

**Determinant:** Are changes in priorities and direction required for the new financial year?

**Outcome:** It was concluded that NACI

should ensure that all its components focus on key issues, have sufficient evidence, and are operating at a suitable level. The overarching recommendation for further development was to maintain a relationship with the Minister that would be based on providing high-quality advice when it was needed.

#### **Response by the moderator**

The moderator's report covered three areas:

- Specific aspects of the performance review;
- Broader issues that NACI should consider; and
- General evaluation of the performance review.

#### **Specific aspects**

The moderator's report referred to and commented on a number of aspects. The following list is indicative of nuances in the response:

- The amount of time spent by Councillors on NACI business was commended.
- The challenge of operationalising impact (outputs/outcomes as opposed to activities/inputs) of policy advice was highlighted.
- The question was raised whether a (shorter

term) task force structure would not be better than a (longer term) committee structure.

- The need to improve the conversion rate from generating evidence to advice was stressed.

### **Broader issues to be addressed by NACI**

The moderator raised three mission- and strategy-related issues that NACI should consider in assessing its performance in future:

- Does the Minister value the advice provided?
- Does the advice produced lead to policy changes? In other words, NACI should concentrate on those policy issues that could have major impact.
- NACI should endeavour to differentiate itself from other policy sectors, such as health and education, if it were to be the credible source of advice on STI.

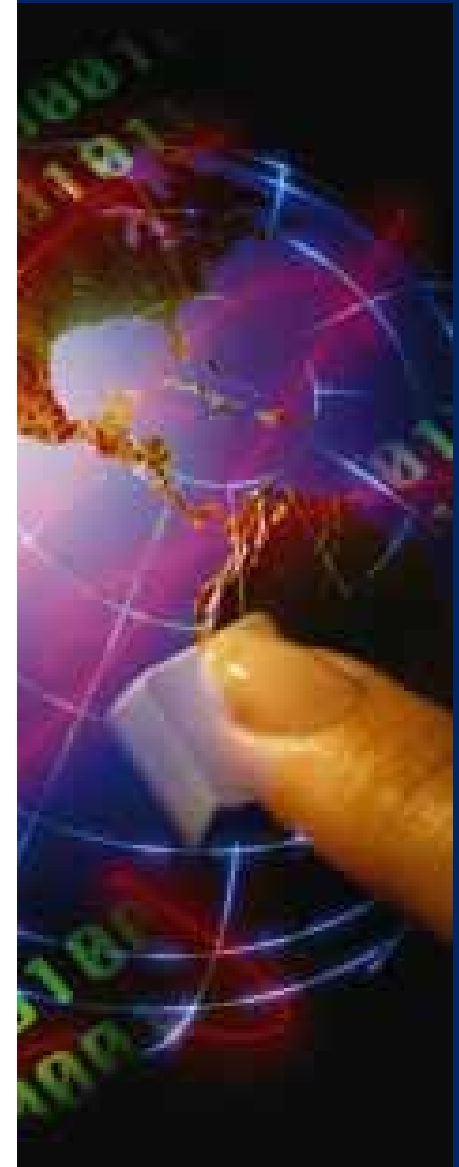
### **Conclusions**

The following statements serve as overarching conclusions of the moderator's report:

- "The NACI self-assessment process, incorporating a thorough re-evaluation of its priorities

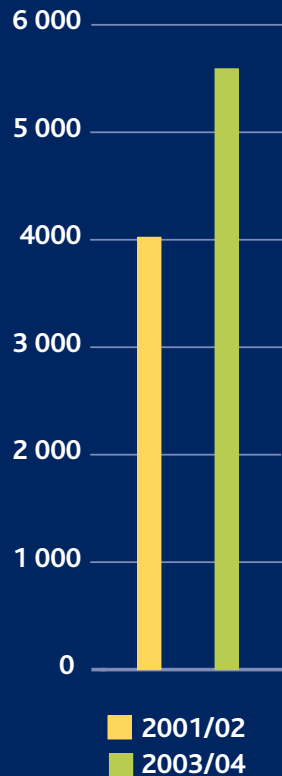
and a well-defined assessment framework, is to be applauded (...) The Corporate Business Plan, and progress against the targets/performance metrics defined therein, is core. The Council itself is best positioned to adjudicate on progress here, and their judgement as reflected in the report must be taken at face value, and duly supported. Moving into the future, it might be reasonable to ask, for example, whether the measures/performance indicators can be tightened up, deliverables more clearly defined, resources refocussed to better ensure timely delivery, and potential overlap between sub-committees eliminated."

- "I would strongly endorse the comments of the necessity for some serious reflection around the whole system and process of scientific advice for policy re-evaluation and development, as indeed is happening quite widely around the world. However, continuous improvement (evolution) seems the order of the day, rather than any more drastic revolutionary changes."



# Financial Report

Business enterprise (Rm)



Source: DST 2003 & 2005.  
National survey of research and experimental development – 2003/04  
(2001/02) fiscal year: High-level key results. Pretoria: DST

The National Advisory Council on Innovation was allocated R6,5 million for the 2004/05 financial year to perform its functions. As in the previous financial year the allocation is still integrated with the DST and all expenditure is still accounted for in the various financial systems of the Department. During the financial year NACI's allocation was adjusted to R6,1 million with total expenditure of

R6,1 million. The adjustment in NACI could be accommodated within the allocation, due to funds saved under "Goods and services" that resulted from delayed tenders contracted but not completed during the 2004/05 financial year. R397 000 was shifted to other sub-programmes of Programme 1, within the Department.



## Budget versus Expenditure

### for the year ended 31 March 2005

	2004/05							2003/04	
	Adjusted Appropriation R'000	Shifting of Funds R'000	Virement R'000	Final Appropriation R'000	Actual Payment R'000	Variance R'000	Payment as % of final appropriation	Final Appropriation R'000	Actual Payment R'000
Current payment	6 493	(485)	–	6 008	6 005	3	99,95	5 472	5 458
Transfers and subsidies	7	12	–	19	19	–	100,00		
Expenditure for capital assets	–	76	–	76	76	–	100,00		
<b>Total</b>	<b>6 500</b>	<b>(397)</b>	<b>–</b>	<b>6 103</b>	<b>6 100</b>	<b>3</b>	<b>99,95</b>	<b>5 472</b>	<b>5 458</b>

Economic Classification									
Current payments									
Compensation to employees	1 977	–	–	1 977	1 977	–	100,00	908	896
Goods and services	4 516	(488)	–	4 028	4 025	3	99,93	4 561	4 559
Financial transactions in assets and liabilities	–	3	–	3	3	–	100,00	–	–
Transfers & subsidies									
Provinces & municipalities	7		–	7	7	–	100,00	3	3
Gifts and donations	–	12	–	12	12	–	100,00	–	–
Payments for capital assets	–	–	–	–					
Machinery & equipment	–	76	–	76	76	–	100,00	–	–
<b>Total</b>	<b>6 500</b>	<b>(397)</b>	<b>–</b>	<b>6 103</b>	<b>6 100</b>	<b>3</b>	<b>99,95</b>	<b>5 472</b>	<b>5 458</b>

## International Relations

NACI's mandate is to provide accurate and reliable advice to the Minister of Science and Technology. Hence, it is vital that the tools used to derive this advice – as well as the advice itself – should be tested by benchmarking and comparing them with relevant counterparts elsewhere in the world.

This programme includes four modalities:

1. NACI has all its important documents peer-evaluated at the highest level. This often includes an international expert.
2. NACI welcomes overseas fact-finding missions with which it can exchange information. In the year under review it received three such official delegations and four individual overseas visitors.
3. The Council encourages its members to participate in international conferences and official meetings (such as the OECD). In the course of the year five such visits took place, often as part of an official government delegation.
4. The Council decided in November 2004 – under clearly defined conditions which included relevance, priority and cost-effectiveness – to send small Council delegations overseas on fact-finding missions. At the end of March 2004 the first delegation attended a forum on the internationalisation of Research and Development (R&D) and an OECD meeting on Science and Technology Policy.

## New Projects

Eight studies were undertaken in the course of the report year. They were all project managed by the Secretariat (including the SET4W staff) and members of the Secretariat were extensively involved in their execution. Their design was guided by the relevant NACI sub-committees or SET4W and the final reports will be converted into ministerial information and/or advice memoranda, after they have been peer-evaluated.

### **Facing the facts: Women's participation in Science, Engineering and Technology**

The study was completed in early 2004. A comprehensive report was presented to the Minister of Science and Technology, who launched the summary report on 8 November 2004 at an event attended by a number of Deputy Vice-Chancellors of Research from universities and executive leaders of Science Councils.

The study consisted of secondary analyses of available databases and was conducted

by the Centre for Research on Science and Technology (CREST), based at the University of Stellenbosch.

The study found, among other things, that, while there had been a significant increase in the participation of women in the public science system – higher education institutions and Science Councils – between 1992 and 2001, there are areas of concern. While 53% of all higher education enrolments and 58% of all graduates were women (higher than their proportion in the population), in 2001, only 43% of Master's and doctoral graduates were women. While there was a concomitant increase in the number of African, Coloured and Asian female enrolments and graduations, White women still constituted the majority. African males were a greater percentage of graduates than African females at the doctoral level of study.

The report identified various areas of weakness regarding women's participation in the

### **Research-for-policy**

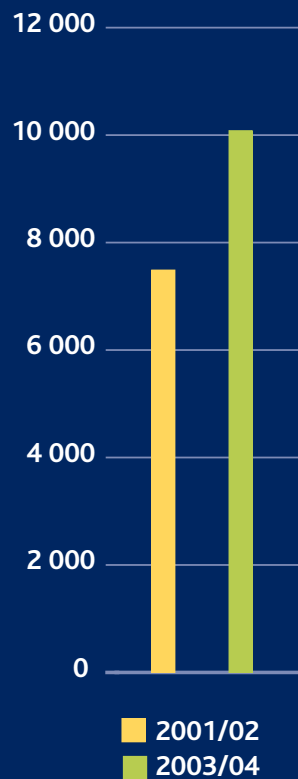
**Evidence-based policy research underpins NACI's policy advice.**

**Research is, therefore, not an end in itself.**

**Accordingly, policy advice is much more than a summary of research findings and/or a synthesis of policy recommendations generated through empirical research.**

*Extract from NACI  
Corporate Business Plan – 2004*

## Gross domestic expenditure on R&D-GERD (Rm)



Source: DST 2003 & 2005.  
*National survey of research and experimental development – 2003/04 (2001/02) fiscal year: High-level key results.* Pretoria: DST

following key areas:

- Enrolments and graduations in the natural sciences and engineering at all levels of higher education;
- Enrolments and graduations at Master's and doctoral levels across the social sciences and humanities, medical sciences and natural sciences and engineering; and
- Senior lecturer and professorial levels of permanent senior instructional and research staff at universities (including universities of technology).

These statistics reveal that the South African national system of innovation is weakened due to the poor participation of women in the Natural Sciences, Engineering and even in the Social Sciences and Humanities. These are precisely those areas of human resource development where the country most needs to increase its competitiveness and its capacity to address poverty. The statistics for doctoral graduations in the social sciences and humanities – 39% in 2001 – are startling

because it is often assumed that women are more active in this scientific field.

The statistics point to a need to take necessary and urgent measures to increase the limited stock of women human resources for SET in order to achieve the objectives of science and technology policies and strategies such as the Advanced Manufacturing Technology Strategy, the National Research and Development Strategy, the National Biotechnology strategy and to increase women's participation in science mega-projects such as the Square Kilometre Array radio-telescope.

Furthermore, they point to the need to take necessary and urgent measures to increase the limited stock of women human resources who can promote the utilisation of SET for poverty reduction and social development in the agricultural sciences, in the health and medical sciences and in the social sciences.

The summary report of the study has been

widely disseminated in booklet form. It is also available on the websites of the DST and of SET4W ([www.sarg.org.za](http://www.sarg.org.za)).

### **The NSI after a decade of democracy**

The innovation policy and system developed since 1994 represent a radical change from the pre-1994 policy, especially in terms of national importance attached to science and technology, the steering role of the STI system by government, and the missions and objectives of the components of the system.

NACI initiated this project to take stock of the current state of the NSI and to assess its performance after the first decade of democracy by publishing a book titled, *South Africa's system of innovation: A decade plus 1*. The study aims to produce an assessment of the overall performance of the NSI, map the institutional and policy changes and landscape, and identify future challenges over the medium to long term.

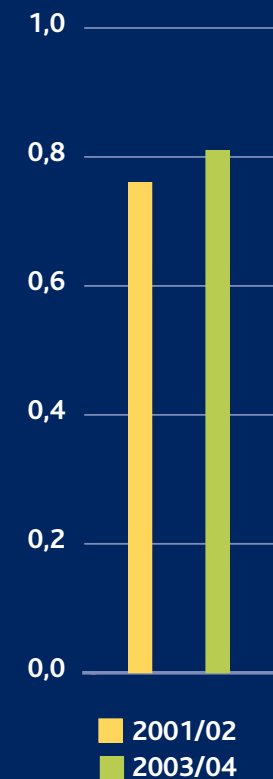
The book is designed to cover, among others, the following aspects: the origins of the NSI; the model, structure and components of the NSI; the dynamics, policies and strategies; business, governance; quantitative and qualitative performance; challenges, and future developments. Given the spread and specific content topics and expertise, a matrix approach was adopted to generate the contents. Ten contributors addressed specific issues.

The study was initiated in December 2004. By the end of March 2005 most of the input papers had been submitted, with additional data gathering by NACI staff in progress. The publication of the book was originally planned to coincide with the May Council meeting of NACI. However, due to a need to increase the original page count by about 50%, arising from the evaluation of the papers submitted, this date had to be revisited.

### **The state of ethics in the NSI**

The purpose of this project is to obtain an

### **Gross Expenditure on Research and Development (GERD) as a percentage of Gross Domestic Product (GDP)**



Source: DST 2003 & 2005.  
*National survey of research and experimental development – 2003/04 (2001/02) fiscal year: High-level key results.* Pretoria: DST

## Total R&D personnel (FTE)



Source: DST 2003 & 2005.  
*National survey of research and experimental development – 2003/04 (2001/02) fiscal year: High-level key results.* Pretoria: DST

overview of the extent to which codes of ethics guide actions at institutional, individual and project level in the fields of science, technology and innovation within the NSI. The subject is salient in light of recent developments in science and technology, such as cloning, and in view of some of the evidence submitted to the Truth and Reconciliation Commission.

The project is a joint venture between NACI and the NSTF. Launched in January 2005, the project is expected to be completed by November 2005. It consists of three components: a literature study of contemporary ethical challenges to STI systems; an analysis of statutory and related arrangements in this area; and a survey among primary interest groups, including R&D institutions in the private and public sectors. By the end of the report year, the literature study had been completed, while the analysis of the statutory arrangements, the design of the questionnaire and the design of the sample frame had commenced.

## Appropriate human resources for a productive NSI

In November 2004 Council identified inputs to the drafting of a human resources strategy as a key priority and approved that a study, *Appropriate human resources for a productive NSI*, be undertaken. It commissioned a two-part study to:

1. Provide a concise overview of data sources, identifying emerging issues and gaps in the data; and
2. Develop and validate a robust dynamic model, identifying, among other things, the interaction between demand and supply as well as the main factors that influence the relationship.

The design of the study included a workshop of experts on 10 November 2004 to discuss the terms of reference for this study, which subsequently was approved by the NACI Council the following day. The data overview study was commissioned to the HSRC and the report submitted in January 2005. The

dynamic modelling component of the study was commissioned to Dynamic Strategies. The first draft report was presented to the Council meeting in February 2005 and the final report is expected to be completed in July 2005. This will be followed by another expert workshop to test and, where necessary, to refine the model before an advice will be prepared. The study was steered by the NACI sub-committee: Human capital and knowledge base.

The study is expected to produce a valid planning instrument that would assist policy-makers to assess the implications and impact of alternative policy options under different scenarios.

### Women in industrial SET

The purpose of this SET4W study is to determine the factors contributing to or inhibiting women’s participation in the industrial SET sector of South Africa. The study complements the “Facing the Facts” study (see above) and will assist in building a

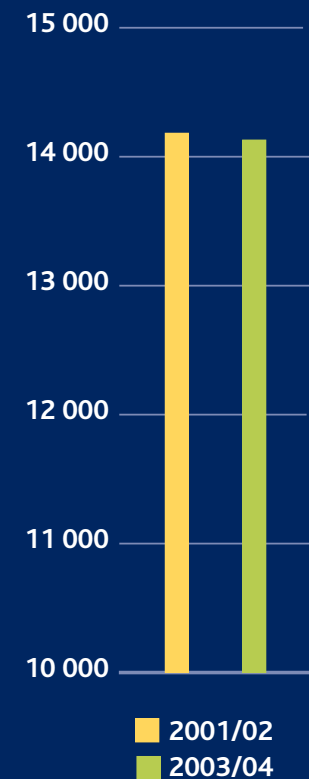
comprehensive picture of women’s participation across the public and private sector SET landscapes. The study aims to determine the experiences and needs of women within the SET background and working in industry. A survey study will quantify the gender representation, while further qualitative and quantitative methods will determine inhibitors of women’s advancement in the SET sector. Samples consist of 27 companies, comprising six State-owned Enterprises (SOEs), nine private companies, six JSE-listed companies and six SMMEs. The findings from this research will be compared with those of others to guide the design of a gender and human capital in SET strategy 2014.

Conducted by the Human Science Research Council (HSRC), the study is planned for completion by November 2005.

### Looking at SET through women’s eyes

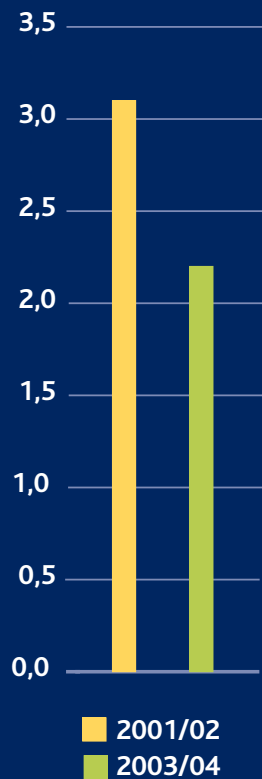
The study aims to build an in-depth picture of women’s participation in SET beyond the

Total researchers (FTE)



Source: DST 2003 & 2005. National survey of research and experimental development – 2003/04 (2001/02) fiscal year: High-level key results. Pretoria: DST

**Total researchers  
per 1 000 total employed  
(FTE)**



Source: DST 2003 & 2005.  
National survey of research and  
experimental development – 2003/04  
(2001/02) fiscal year: High-level key  
results. Pretoria: DST

statistics. It will collect qualitative data on issues affecting the recruitment, advancement and retention of women in the SET sector and the ongoing challenge of public research funding issues that require a stronger gender focus.

The study was initiated by DST and transferred to NACI/SET4W following restructuring of the Department. The reports will be completed in the 2005 - 2006 financial year.

The study comprises four complementary sub-projects:

- **One-on-one interviews:** qualitative research conducted to gather the views of 136 women and men and solicit their understanding of the institutional context and the challenges experienced by women in making a career in SET.
- **Moderated email discussions:** to gather views about Human Capital Development and Research Agendas in order to promote women's involvement, advancement and retention in the SET sector through on-line

discussion.

- **Consultative Conferences:** inviting women to participate in facilitated sessions to obtain an in-depth understanding of the issues affecting recruitment, advancement and retention of women within the SET sector.
- **Focus group discussions:** conducted with senior leadership in publicly funded institutions, aimed at mainstreaming gender perspectives in research and human capital development.

The study is project managed by the Human Sciences Research Council. The one-on-one interviews are conducted by Tara Research and Feedback Performance Monitoring. The consultative conferences are conducted by Da Vinci Institute of Technology Management.

**Longitudinal study on women in SET**

This is a five-year study of undergraduate, junior postgraduate (Honours) and senior postgraduate (Master's and doctoral) students that aims to:



- Explore and determine the factors affecting women's interest in, their recruitment to, and career advancement within the SET sector; and
- Determine how the senior doctoral candidates account for their success in the sector.

The study will track the careers of selected women and determine the variables which help or hinder achievement of career/professional goals. It will explore and document how they cope in order to achieve academic and career success and it will document and investigate how they account for the choices they make at particular points in their lifetime. The research findings will be disseminated to relevant stakeholders in the SET and higher education policy environments.

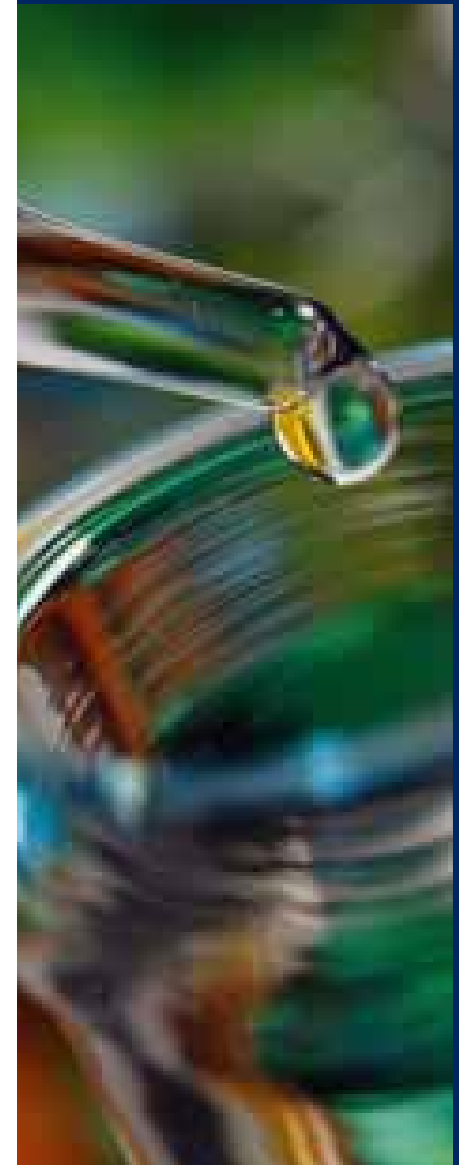
This is a long-term study with particular milestones at which reports and recommendations will be made to the Minister of Science and Technology. The phases of the report are due as follows:

1<sup>st</sup> phase: March 2006  
 2<sup>nd</sup> phase: March 2007  
 3<sup>rd</sup> phase: March 2008  
 4<sup>th</sup> phase: March 2009  
 Final report: March 2010.

The study is being conducted by the HSRC.

**Design of a monitoring and evaluation framework to benchmark the performance of women in the NSI**

There is limited regular collection of data on the performance of women in the NSI and it is thus difficult to assess whether South African institutions are making progress in relation to stated policy objectives. The National R&D Strategy (2002) argues that in order to overcome the "frozen demographics" with respect to race and gender in the SET workforce, due attention should be paid to building a new generation of scientists with women being a significant proportion of that workforce and making a major contribution to research and innovation. Currently, limited data



are collected to test whether this objective is being met.

The National R&D Survey conducted by the HSRC collected some data on women and gender, while the Key Performance Indicator reports submitted to the DST provide additional data.

The “benchmarking gender” research project will therefore review the existing indicators, mechanisms and approaches which organisations use to monitor gender-disaggregated contributions to the NSI and use this as the basis to design a comprehensive monitoring and evaluation framework that can be used to measure progress over time. The framework should enable government and institutions to determine the following:

- Strengths and weaknesses in the performance of women and in the contribution of the respective genders to the NSI;
- Institutional strengths and weaknesses in harnessing gender as a means to strengthening

- research and innovation across the NSI; and
- The ongoing gaps in highlighting gender-specific dimensions in research projects, including research in Natural Sciences, Engineering and Social Science.

Application of the framework and publication of reports on an annual or bi-annual basis will enable institutions to take their own corrective actions and will enable NACI and SET4W to prepare informed advice to the Minister of Science and Technology on system-wide interventions to achieve the intended policy outcomes. These outcomes are to strengthen the contribution of women in building and sustaining the interface between SET policy on the one hand, and economic and social development policy on the other hand.

The study is conducted by the Centre for Research in Science and Technology, CREST.

# Diary

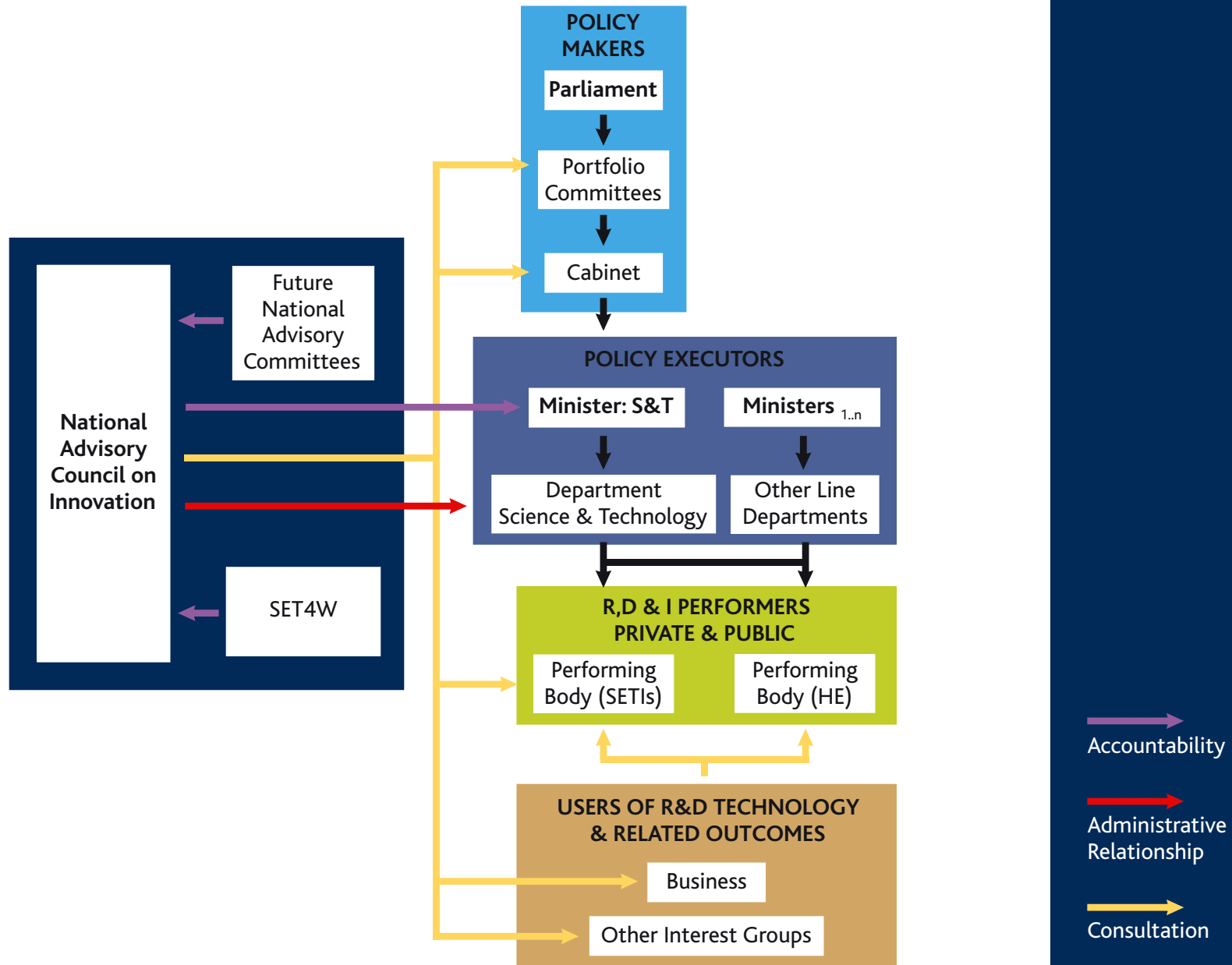
The following are selected entries from the NACI/SET4W diary for 2004 - 2005:

<b>22 April 2004</b>	Paper, SARIMA workshop: "Innovation and technology transfer: The special case of rural areas" – Dr Bok Marais
<b>09 May 2004</b>	NACI Sunday seminar: "Intellectual property rights and innovation" – Prof Prabuddha Ganguli, patent attorney and consultant, Mumbai, India
<b>14 May 2004</b>	Consultative meeting: Evaluation of a development project – Councillors and external specialists
<b>19 May 2004</b>	NACI lunch seminar: "Dynamics of innovation" – Prof Edward Lumsdaine, New Mexico State University
<b>27 May 2004</b>	18 <sup>th</sup> Council meeting (First meeting of 2 <sup>nd</sup> Council)
<b>08 June 2004</b>	SET4W 6 <sup>th</sup> Board meeting
<b>24 June 2004</b>	38 <sup>th</sup> NACI Exco meeting
<b>06 July 2004</b>	NACI lunch seminar: "ICT: its role in development" – Prof Wesley Shrum, Louisiana State University
<b>03 August 2004</b>	Meeting with a delegation of the US National Academies of Science
<b>05-07 August 2004</b>	SET4W 7 <sup>th</sup> Board meeting
<b>19 August 2004</b>	19 <sup>th</sup> Council meeting
<b>26 August 2004</b>	Briefing of official Chinese delegation
<b>02 September 2004</b>	NACI Secretariat operational planning meeting
<b>15 September 2004</b>	NACI lunch seminar: "NSI concept to think and frame African Development" – Prof Mammo Muchie (Middlesex University Business School and the University of Aalborg, Denmark)
<b>16 September 2004</b>	Think Tools training workshop
<b>19 September 2004</b>	39 <sup>th</sup> NACI Exco meeting



<b>11-12 October 2004</b>	Participation in OECD workshop in Geneva on the use of patent indicators and statistics – Mr Charles Mokonoto
<b>16-22 October 2004</b>	Paper, Globelics Conference, Beijing, China: “Developing a framework to map the innovation chasm of a developing country” – Mr Simon Mpele
<b>20 October 2004</b>	40 <sup>th</sup> NACI Exco meeting
<b>28-29 October 2004</b>	Paper, Amsterdam: “Innovation policy scenarios: A NACI perspective” – Dr Bok Marais
<b>02 November 2004</b>	Briefing of official Swedish delegation
<b>08 November 2004</b>	SET4W: Launch of report, “Facing the facts”
<b>10 November 2004</b>	Operationalisation workshop: “Appropriate human resources for a productive NSI” – Councillors and external specialists
<b>11 November 2004</b>	20 <sup>th</sup> Council Meeting, preceded by sub-committee meetings
<b>23 November 2004</b>	SET4W 8 <sup>th</sup> Board meeting
<b>13 December 2004</b>	Operationalisation workshop: “NSI after the first decade of democracy” – Secretariat and external specialists
<b>28 January 2005</b>	41 <sup>st</sup> NACI Exco meeting
<b>10 February 2005</b>	21 <sup>st</sup> Council meeting, preceded by sub-committee meetings
<b>18-20 February 2005</b>	Papers, International conference on technology, knowledge and society, Berkeley USA: “Changing the facts: Gender & Talent in the Performance of the South African NSI” – Ms Luci Abrahams, and “Social challenges in technology transfer” – Dr Bok Marais
<b>18 March 2005</b>	SET4W 9 <sup>th</sup> Board meeting
<b>23 March 2005</b>	Operationalisation workshop: “Design of the innovation survey” – NACI, DST and external specialists
<b>29-30 March 2005</b>	Participation in CSTP workshops in Brussels: “Internationalisation of R&D” – Dr Francis Petersen, Dr Nombasa Tsengwa, Mr Fairouz Jaffer, Ms Khungeka Njobe, Mr Charles Mokonoto

# NACI's Position in the NSI



## Restructuring of STI Governance

In October 2004 the Cabinet approved a new governance system for the STI system, which was scheduled to come into effect on 1 April 2005. In this new dispensation a distinction is made between three classes or types of S&T institutional missions.

**Type I capacity:** those institutions and programmes with cross-cutting S&T functions such as large scale, or broad scope new S&T platforms and challenges (e.g. space science, biotechnology, climate-change, nanotechnology, the hydrogen economy).

**Type II capacity:** sector-specific S&T functions in relatively mature research domains, such as mining, veterinary science, water, and so forth.

**Type III capacity:** routine technology-intensive services (marine resource estimation, standards writing, geological surveying, forensics, and so forth).

In terms of this new dispensation the Minister of Science and Technology and DST provide a core service to the government by leading

portfolios of Type I activities whether in government laboratories or universities. They also ensure that a common governance framework, performance and budgetary monitoring system exist and are maintained.

Specific line ministers and departments assume primary responsibility over Type II in partnership with the Minister of S&T and DST, while sector-specific ministers and departments also have full responsibility over Type III activities.

NACI is well positioned to support the Minister with advice within this changing context. The functions ascribed to NACI by its Act cover a wide spectrum: these range from advice on human resources to the funding of S&T, and from advice on promotion of cooperation in the NSI to strategies for the promotion of technological innovation. Advice rendered in the past and current studies are well aligned with the philosophy underpinning the new governance system.

## Indicators Programme

The indicators programme is a large, technically specialised and prominent research programme, embedded in extensive South African and international networks. It consists of three components:

1. The National R&D survey;
2. The National Innovation Survey; and
3. Representation on, and participation in, international indicator bodies, such as the OECD's National Experts on S&T Indicators (NESTI).

The major objectives of the indicators programme are to:

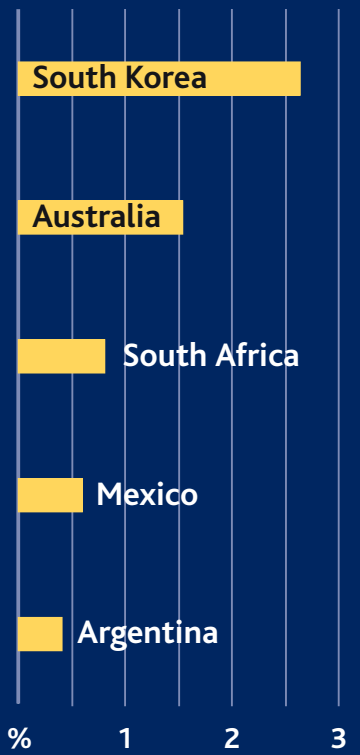
- Enable DST to assess the development of the South African National System of Innovation (NSI) over time; and
- Support NACI in developing evidence-based policy advice on the basis of secondary analyses of the data.

This programme (including staff and projects) was transferred from the DST to NACI in May 2004 and has since been coordinated by NACI. Negotiations with StatsSA were launched to get the R&D survey data declared official statistics and a decision is expected early in the new financial year.

In view of the national and complex nature of the programme, the Council approved that a national Reference Group: Indicators be established in 2005 to ensure the necessary supervision of the individual initiatives undertaken in that programme and to advise NACI in that regard. The group will be composed of two NACI Councillors, one senior official from DST and one from StatsSA.



## Gross Expenditure on Research and Development (GERD) as a percentage of Gross Domestic Product (GDP)



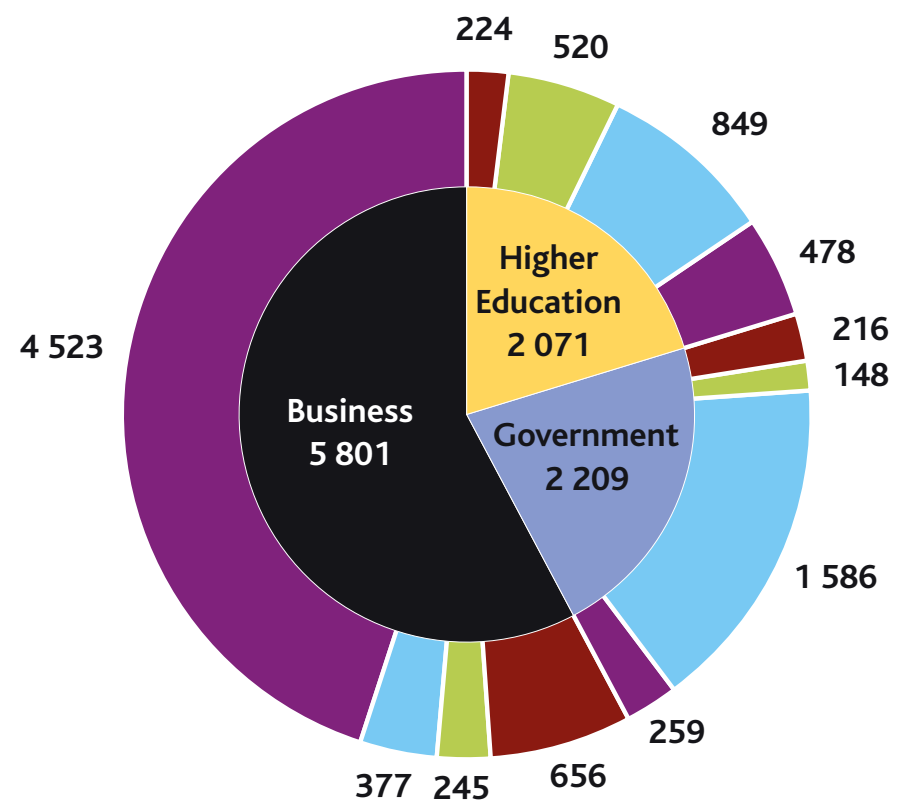
Source: DST 2003 & 2005. National survey of research and experimental development – 2003/04 (2001/02) fiscal year: High-level key results. Pretoria: DST

## Innovation Indicators

Innovation indicators are useful markers of the strength of the NSI in which all role players function. Indicators – even a comprehensive set – do not, however, represent the full picture, since they vary in reliability and validity, interact with each other and can not capture qualitative processes, such as political climate. Nevertheless, they assist a body such as NACI in prioritisation, monitoring of development and related policy advice functions. The following are examples of the latest indicator information.

Source: DST 2005. National survey of research and experimental development – 2003/04 fiscal year: High-level key results. Pretoria: DST

## Where does funding for R&D come from? 2003/04 (Rm)

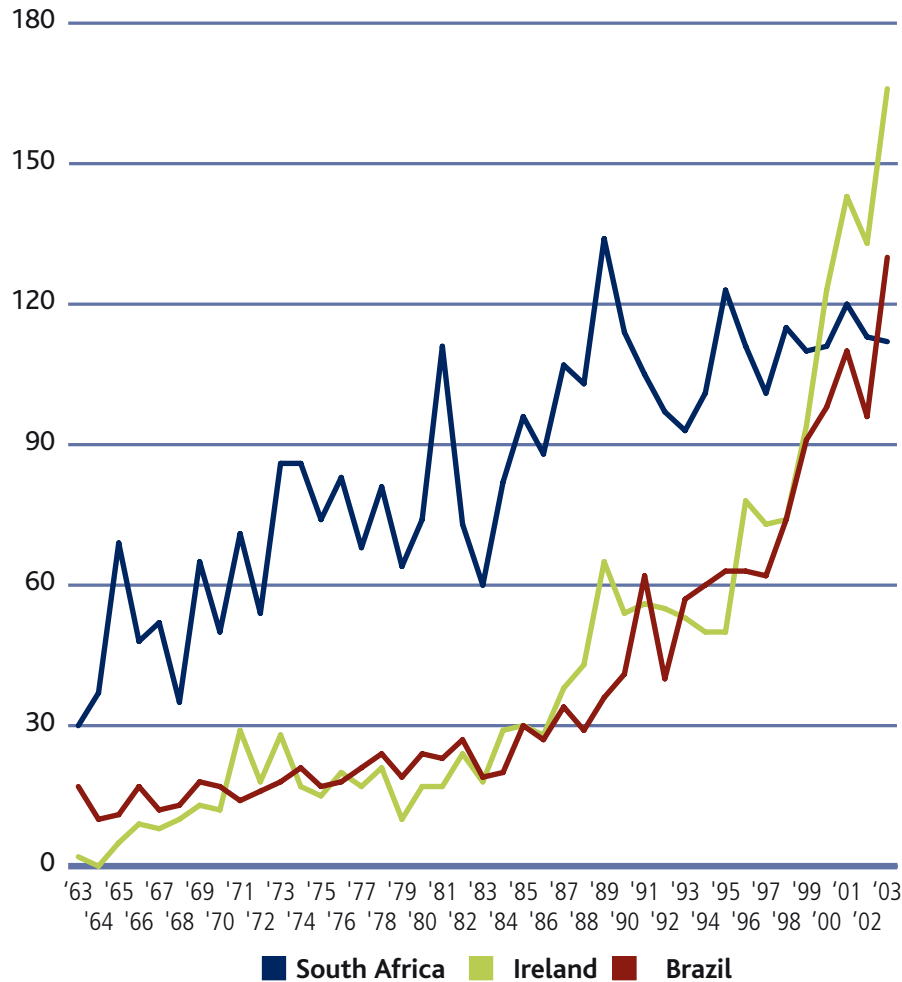


The three national performers for R&D are Business, Government and Higher Education (see inner circle). Each receives funding (see outer circle) from the following sources:

- Foreign
- Government
- Other
- Business

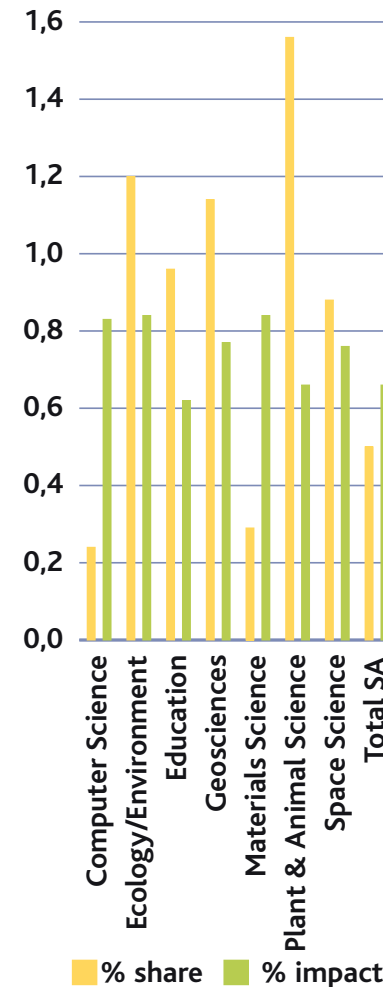


Patents granted to SA, Brazil and Ireland at US Patent and Trademarks Office (USPTO) 1963 – 2003



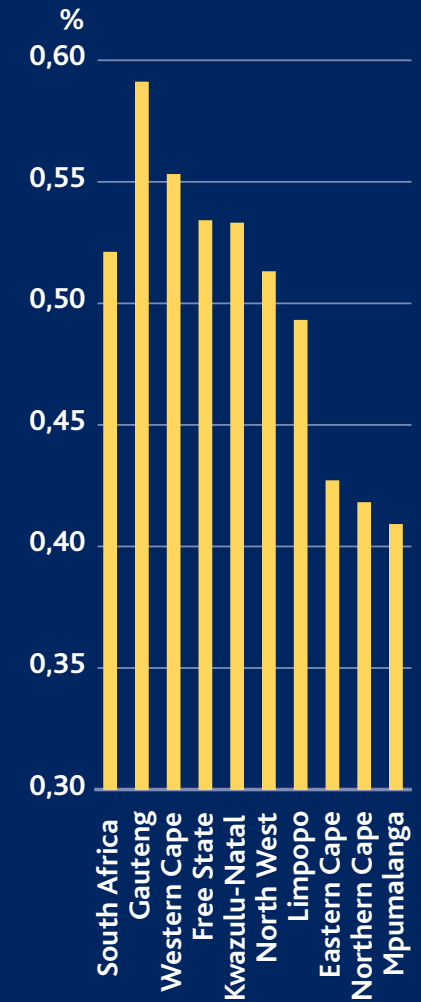
Source: NACI 2005. Analyses based on USPTO databases

SA publication outputs in world context: 1999 – 2003



Source: NACI 2005. Analyses based on National Science Indicators, ISI

Provincial contributions to the SA Technology Achievement Index (TAI)



Source: DST 2004. Regional contributions to the South African Technology Achievement Index. Pretoria: DST

**Thematic areas  
of FP7:  
life sciences,  
information sciences,  
nanosciences,  
aeronautics,  
food quality,  
energy,  
space science,  
security.**

## State of the NSI (2004 – 2005)

As a key player in the STI environment, NACI both influences and is influenced by trends in the NSI and STI internationally. Since NACI is one of the foremost STI institutions in South Africa, and is strategically positioned within the NSI, it is crucial that NACI:

- Critically engage with new policies, empirical data, methods, concepts and theories which explain the role of STI in the economies of the world; and
- Play a proactive role in understanding, shaping and responding to the STI challenges of the present and the future.

Monitoring and assessing the state of the NSI and the international STI terrain is critically important to NACI's remit of contributing to the development and delivery of a coherent and effective national strategy for STI, and of providing advice to the Minister of Science and Technology. This section attempts to provide a brief overview of national and international developments in the STI landscape in 2004.

### **International Science & Technology overview**

#### **Policies and programmes**

In 2004, governments internationally continued to recognise innovation as a major source of economic growth and well-being and aimed to shield public R&D investments from spending cutbacks. A number of countries have established explicit targets for boosting R&D expenditures by both the public and private sectors. Countries such as Denmark, Germany, the Netherlands and Norway have created special funds to finance research in priority fields such as ICT, biotechnology and nanotechnology.

Furthermore, officials in Brussels have drawn up plans for the EU's Seventh Framework Programme of Research (FP7). The current plans do not contain any major revisions to the existing FP6, but FP7 will be twice as big (US\$40 billion) and include a more extensive basic research component. It would appear as

if the “instruments” of the programme, such as the transnational Integrated Projects and Networks of Excellence, will remain the same. Similarly, the thematic areas are likely to remain constant: life sciences, information sciences, nanosciences, aeronautics, food quality, energy and governance. Two new thematic areas join the list: space science and security. Moreover, a separate budget for the European Research Council is expected to be included in the proposal to the European Parliament.

A number of governments abroad have introduced reforms to strengthen research. For example, Denmark, Japan and the Slovak Republic have increased the autonomy of universities or transformed them into private or quasi-private institutions. Funding structures have been changed to make universities and government laboratories less dependent on institutional (i.e. block grant) funding. Also, many countries have stepped up efforts to evaluate public research organisations, with a view to improving the quality of teaching and research.

Several countries are also taking steps to improve technology transfer. For example, new legislation in Denmark and Norway makes technology transfer to industry an explicit mission of universities. Moreover, rules governing the ownership of intellectual property (IP) generated by public research institutions are being transformed, with a move to granting ownership of IP to the institution in order to facilitate its commercialisation. Norway and Switzerland introduced such changes in recent years, and Iceland and Finland are preparing legislation on the subject. In addition, a number of countries that have not changed legislation (Australia and Ireland) have developed new guidelines to encourage commercialisation of research and provide consistency in IP management.

Support for business R&D is a central feature of innovation policies internationally. While direct government support to business R&D is declining, greater emphasis is being placed on indirect measures, such as tax incentives



**New legislation in Denmark and Norway makes technology transfer to industry an explicit mission of universities.**

for R&D. Between 2002 and 2004, Belgium, Ireland, and Norway established new tax incentive schemes, bringing to 18 the number of OECD countries employing tax incentives for R&D. The UK also widened its tax incentive scheme to include large firms.

### **Scientific breakthroughs**

The well-known journal *Science* announced the following breakthroughs in 2004, which are arranged in order of perceived importance:

- **Water:** NASA's robotic explorers, *Spirit* and *Opportunity*, found strong evidence of water on Mars.
- **The littlest humans:** The discovery of a species of small human-like creatures in a cave on the Indonesian island of Flores suggests that modern humans and the small "hominids" shared the Earth just 18 000 years ago.
- **Human cloning:** South Korean researchers announced that they had cloned a human embryo, proving that the technique could work with human cells.
- **Banner year for condensates:** An understanding of how to chill the two basic types of atoms into a single quantum state or "condensate" allowed researchers to probe these forms of matter.
- **Hidden genome treasures:** Stretches of "junk DNA" in the human genome were found to be more important than previously thought, appearing essential for helping genes turn on at the right time and in the right place.
- **Pulsar pair:** Astrophysicists discovered the first known pair of pulsars, of which further study could provide stringent examination of Einstein's general theory of relativity.
- **Plant and animal diversity declines:** Surveys of amphibians, butterflies, plants and birds this year provided evidence of the decline of species diversity.
- **More water discoveries:** Advances in the understanding of water's structure and chemical behaviour could alter fields from chemistry to atmospheric sciences.
- **Medicines for the world's poor:** This year saw a strong emergence of public-private

partnerships improving the way medicines are developed and delivered to developing countries, including a malaria vaccine trial and efforts to provide anti-HIV drugs.

- **Genes in a drop of water:** Collecting water from environments such as the Sargasso Sea and the depths of an abandoned mine, researchers found a way to identify life forms too small and remote to see with the naked eye, by sequencing the genes floating in the water, which has turned up new genes and genomes.

### Prizewinners

In the sciences, the 2004 Nobel Prizewinners were:

- **Physics:** David J Gross, H David Politzer, and Frank Wilczek (all US) for the discovery of “asymptotic freedom” in the “theory of the strong interaction”, i.e. Quantum ChromoDynamics (QCD).
- **Chemistry:** Aaron Ciechanover (Israel), Avram Hershko (Israel), and Irwin Rose (US) for the discovery of ubiquitin-mediated

protein degradation.

- **Physiology or Medicine:** Richard Axel and Linda Buck (both US) for their discoveries of odorant receptors and the organisation of the olfactory system.

George FR Ellis, a leading South African theoretical cosmologist renowned for his contributions to the dialogue between science and religion, won the prestigious 2004 Templeton Prize. The 2004 Turing Award went to Internet pioneers Vinton Cerf and Robert Kahn for their contribution on TCP (Transmission Control Protocol) in 1974.

### Women in STI

#### Government initiatives

During the period under review, there have been a number of key government initiatives in the field of women in STI. In September 2004, the Minister of Education commissioned a review of progress in implementing the recommendations of the 1997 Gender Equity

**The DST will follow a two-pronged approach to gender mainstreaming:**

- **act upon the challenges that women face in entering and pursuing SET-related careers:**
- **ensure that R&D programmes benefit both men and women equally.**

**Despite significant achievements, women make up only 41% of total academic staff at HEIs in South Africa, and women NRF-rated researchers account for only 20% of the total NRF-rated researchers.**

Task Team's (GETT) Report on the State of Gender Equity in the Education System. The review aimed at identifying gaps in policy and legislation as well as the barriers to the successful implementation of gender equity goals in the education system.

In November 2004, the DST launched a report on the *Status of Women in Science, Engineering and Technology*. It was announced that the DST will follow a two-pronged approach to achieve gender mainstreaming in SET. First, there is a need to act upon the challenges that women face in entering and pursuing SET-related careers. Second, there is a need to ensure that R&D programmes benefit both men and women equally.

### **Awards**

Women's achievements in science and technology have been recognised through a number of prestigious awards, for example:

- Professor Jennifer Thomson (professor in Molecular and Cell Biology, UCT; also a NACI

Councillor) received the international L'Oréal UNESCO Women in Science for Africa award.

- Wits reproductive health Professor Helen Rees won an award for improving the quality of life of South African women at the second annual DST Women in Science awards. Professor Patricia Berjak, of the University of KwaZulu-Natal, received the equally prestigious Distinguished Woman Scientist award in recognition of consistent contributions to science over an entire career.
- Prof Tebello Nyokong (SET4W member) of Rhodes University won the Science and Technology Category of the Women of the Year by Shoprite Checkers.
- Prof Valerie Mizrahi (SET4W member) was a first runner-up of the Distinguished Women Scientist award category.
- Fellowships for young women scientists were presented to four women scientists on the brink of finishing their degrees.
- The NRF honoured Dr Hanlie Moolman-Smook of Stellenbosch University with the NRF President's Award.

- In May 2004 the NSTF made a number of awards to the following women for outstanding contributions in SET:
  - Professor Priscilla Reddy: the study of behaviour and health promotion;
  - Dr Olive Shisana: the evidence base for decision-making on social aspects of HIV/AIDS and health in SA; and
  - Dr Debra Meyer: research in the chemistry of HIV/AIDS.

The NRF has recently awarded A-ratings to two women:

1. Chemical engineer Professor Diane Hildebrandt at Wits University, who takes a creative re-look at the fundamentals of chemical engineering; and
2. Speech and language pathologist Professor Claire Penn for her innovative and ground-breaking research on linguistics, sign language, child language, aphasia and head injury.

Notwithstanding the above achievements women are still under-represented in the NSI:

1. They make up only 41% of total academic staff at HEIs in South Africa;
2. They account for only 20% of the total NRF-rated researchers; and
3. They account for only 23% of total authorships of peer-reviewed articles.

### **Government departments**

#### **Department of Science & Technology (DST)**

Understanding the role that a developmental state can play in fostering growth, enabling redistribution and defining sectoral strategies was a major feature of government for the period under review. The economic and investment cluster of cabinet, within which the DST is now located, also maintained this policy stance by suggesting that infrastructure investment lays the foundation for economic growth and employment creation. The role allocated to DST by the Medium-Term Expenditure Framework (MTEF) was one of stewardship, coordination and leadership of South Africa's National System of



**Government has maintained real spending on HE, but has steadily decreased the proportion of costs covered by subsidy (from around 66% to around 50%).**

Innovation. The MTEF specifically recognised that productivity enhancement is a critical determinant of economic growth. Based on international best practice and an assessment of the state of the NSI contained in the cabinet-approved National R&D Strategy (NRDS), government accepted that an empirical basis exists for the recognition that technological advances derived from R&D had helped improve productivity growth in numerous economic sectors, most notably in manufacturing, energy and agriculture. It was within this context that government approved a DST strategy aimed at improving its overseeing of national Science Councils, strengthening the governance frameworks and improving the country's research capabilities.

The DST has adopted a mission statement which clarifies its mandate. Accordingly, it sees its function as including development, coordination and management of the NSI. The DST seeks to maximise human capital formation, promote sustainable economic

growth and contribute to improvements in quality of life. This links with its vision to create a prosperous society that derives enduring and equitable benefits from science and technology. Baseline adjustments to the DST budget were achieved for the purposes of implementing the NRDS, establishing the National Energy Research Institute, funding to the various line-department-based Science Councils and re-categorising the Agricultural Processing Programme which was previously funded out of a poverty relief allocation.

The New Strategic Management Model, which was approved by cabinet, systematises and classifies the publicly-funded research and development activities and various technology-related services. Cabinet also approved:

- The transfer of the CSIR from the Department of Trade and Industry (**the dti**) to the DST;
- An institutional mechanism for the creation of a human capital strategy which bridges the higher education sector with the DST;



- The appointment of DST representatives to all Science Councils;
- The redefinition of the science vote into a national science and technology expenditure plan and associated processes;
- The drafting of policies in the domain of intellectual property rights and governance standards for science and technology institutions.

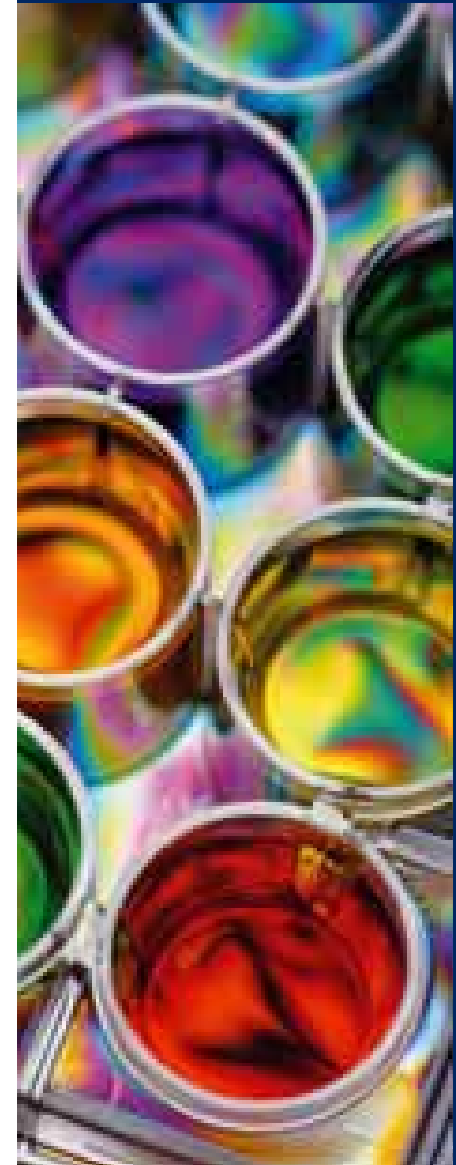
Other important initiatives included:

- An indigenous knowledge strategy;
  - The establishment of a higher education centres of excellence programme;
  - A programme to promote nanotechnology;
  - The launch of the SA Environmental Observation Network;
  - The adaptation of the UNDP's Technology Achievement Index for application at provincial level;
  - The identification of the Hydrogen Economy as a frontier S&T domain;
  - Approval by the EU of a dedicated platform to promote SA-EU S&T cooperation; and
- Full membership of the International Centre for Genetic Engineering and Biotechnology.

### Department of Trade & Industry (**the dti**)

In order to enhance industrial development and competitiveness through technology support measures to industry, **the dti** contributed to the NSI in the following ways:

- A study, *Global Technology Development Trends*, was undertaken to identify possible opportunities and threats to local industry. The study covered 10 industrial sectors. At present the research findings are being rolled out to industry with a view to formulating technology strategies.
- The Venture Capital Fund is a joint initiative between **the dti** and the CSIR. It aims to provide early-stage capital and, to a lesser extent, expansion capital for technology-based SMMEs and management support to investee companies.
- The Technology Transfer Centre (TTC) was established at the CSIR to provide the following services to South African industries:



**Both firms and government need to invest in infrastructure and human resources to exploit research, innovate and access the international science system if SA is to remain globally competitive.**

- Negotiating and drafting assistance agreements related to technology transfer;
  - Technology transfer training;
  - Technology evaluation, assessment and selection services related to technology transfer;
  - Technology advisory services;
  - Match-making between technology sellers and buyers, and appropriate financial institutions; and
  - Direct and/or indirect financial assistance for technology transfer activities, if required.
- Technology Business Incubators. Recently established incubators include:
    - Acorn Incubator at the University of Cape Town, specialising in medical-device technologies;
    - EgoliBio in Modderfontein, Gauteng, focusing on biotechnologies;
    - Timbali Incubator in Nelspruit, Mpumalanga, focusing on floriculture technologies;
    - Chemin Incubator at the Nelson Mandela Metropolitan University in Port Elizabeth,

focusing on fine chemicals technologies; and

- Bodibeng Incubator in Sunninghill, Johannesburg, focusing on information, communications and electronic technologies.

Approval has been given for two incubators in Polokwane and Etekwini to support emerging contractors in the construction industry, and a further incubator in Polokwane to support the manufacturing of bio-diesel.

## **Higher education (HE)**

The major policy development in HE is the result of Minister Asmal's decision to restructure the apartheid-shaped institutional landscape. This was achieved through a series of mergers, reducing the existing 36 universities and technikons to 22 institutions: 11 universities, six comprehensives and five technikons (since renamed Universities of Technology). A key challenge for these new institutions is to craft new strategic and academic identities and roles, and to develop their capacities to fulfil these in

an increasingly competitive national and cross-border environment.

Government has maintained real spending on HE (in relation to inflation), but has steadily decreased the proportion of costs covered by subsidy (from around 66% to around 50%). Government has understandably been reluctant to fund ongoing inefficiencies in the form of astronomical dropout and low throughput rates, and what it perceives to be unplanned growth in fields not aligned with national priorities.

A number of parallel policy initiatives have arisen. These include: the CHE's proposals around a new qualifications framework; the National Qualifications Framework (NQF) review; the emerging new interface with the further education band, including the new Further Education and Training Certificate (FETC) framework and the issue of school-leaving qualifications and entrance requirements; the Higher Education Quality Committee's (HEQC) review of programmes,

including the review of MBAs; proposals for a centralised Admissions Information Service; and the imminent integration of the existing binary stakeholder bodies (CTP and SAUVCA) into the new Higher Education South Africa (HESA) association.

Other ongoing developments and debates relate to the central challenges facing HE. These are:

- Effectiveness in supporting national development goals, and the NSI. This implies achieving the required quality, relevance and extent of graduate and research outputs in relation to HRD and labour market needs and expectations. It also implies clarity on curriculum issues and the ongoing debates around new modes of knowledge production and dissemination and, in particular, the appropriate balance between traditional disciplinarity and credit transfer and modularised interdisciplinarity.
- Efficiency in the utilisation of existing resources. This implies greater throughput, fewer dropouts and higher graduation rates,



as well as increased staff productivity; and

- Equity of access and success as well as greater representivity and diversity of staff, students and outputs in the system. Change has been slow among academics and executive management, and at the higher qualifications levels, scarce skills domain and the transformation of institutional cultures to accommodate diversity. At the institutional level, previous redress issues have largely been accommodated in the new funding framework, which allows for subsidies for institutional factors. At the individual level, increased government funding for the National Student Financial Aid Scheme is helping to increase access, but remains inadequate as institutions are forced to increase fees in the light of reduced government subsidies.

Underlying all this is the central challenge of achieving an appropriate form of steerage which balances accountability, autonomy, market opportunities, policy-driven regulation and self-regulation.

## Conclusions

To conclude, the objectives of this section of the annual report were to:

- Provide an introductory overview of important international developments, scientific breakthroughs, exceptional awards and prizes;
- Scan awards and initiatives as they pertain to SA women's participation in STI; and
- Summarise the policies, programmes, and strategies of pivotal government departments (i.e. the DST and **the dti**) and the higher education sector *vis-à-vis* the NSI.

The selective thumbnail sketch of the state of the NSI provided above clearly demonstrates the complex and highly dynamic nature of the terrain that NACI operates in, and that both firms and government need to invest in infrastructure and human resources to exploit research, innovate and access the international science system if SA is to remain globally competitive.

## Secretariat

Until the beginning of 2004, NACI was supported by a fully contracted staff complement. Two important developments, which took place in the report year, should enhance the role of the Secretariat:

- The Indicators unit, consisting of three permanent posts, was transferred to NACI. This improved the stability of the Secretariat considerably.
- Two specialist posts in the policy development field were approved, the posts were advertised in the media and interviews are scheduled to take place in the new financial year. It is expected that this development will significantly improve the capacity to generate policy advice.

During the course of the report year the staff complement of the Secretariat was as follows:

- Four permanent employees (one resignation);
- Five medium-term contracted employees (one resignation);

- One short-term contracted employee; and
- Two permanent posts to be filled in 2005 - 2006.

NACI places a high premium on the professionalism of its staff and therefore encourages capacity development and high-level participation at professional conferences. To this end, four scholarly papers were read at national and international conferences, and five short courses were attended by four staff members.

The Secretariat also:

- Administered 16 formal NACI meetings for which more than 150 documents were produced;
- Participated in at least 20 external meetings (five abroad); and
- Managed eight contracts (advertising, selecting, drafting and implementing the contracts).

### **The Secretariat is composed of:**

Dr B Marais

Ms L Lebeso

Mr C Mokonoto

Mr S Mpele

Ms C Mzolo

Mr D Naidoo (resigned)

Mr K Phate (resigned)

Mr E Rakate

Mr I Sentile

Mrs R Vogel

## List of Acronyms

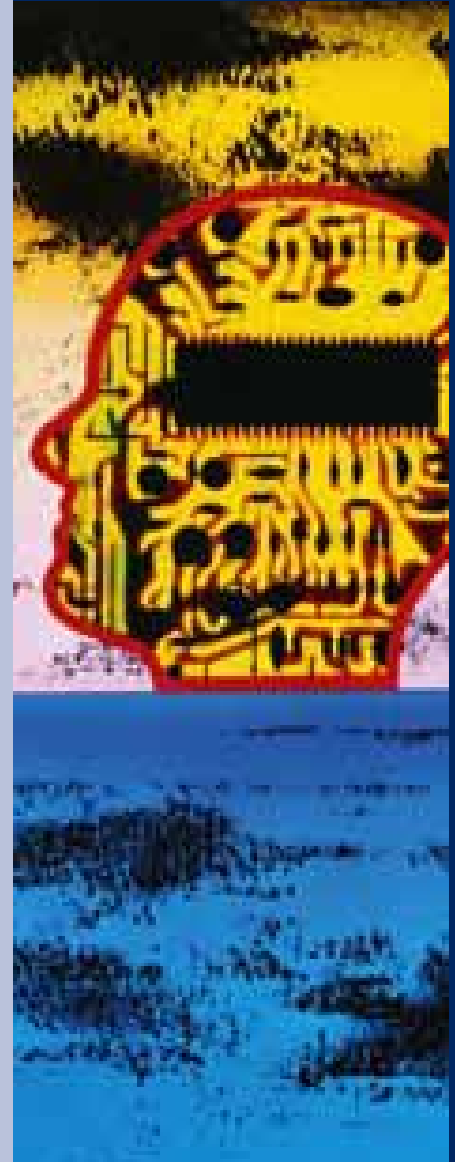
AMTS	Advanced Manufacturing Technology Strategy	GETT	Gender Equity Task Team	OECD	Organisation for Economic Cooperation and Development
BEE	Black Economic Empowerment	HE	Higher education	QCD	Quantum Chromo Dynamics
BERD	Business Expenditure of Research and Development	HEIs	Higher education institutions	R&D	Research and development
CBP	Corporate Business Plan	HEQC	Higher Education Quality Committee	StatsSA	Statistics South Africa
CEO	Chief Executive Officer	HR	Human resource	S&T	Science and technology
CREST	Centre for Research on Science and Technology	HSRC	Human Sciences Research Council	STI	Science, Technology and Innovation
CSIR	Council for Scientific and Industrial Research	ICF	Intellectual Capital Forum	SciTes	Science and Technology Expert Services
CSIRO	Commonwealth Scientific and Industrial Research Organisation	ICT	Information and communication technology	SET4W	Science, Engineering and Technology for Women
CSTP	Committee for Scientific and Technological Policy	IDC	Industrial Development Corporation	SET	Science, engineering and technology
DST	Department of Science and Technology	IP	Intellectual property	SETI	Science, engineering and technology institution
dti	Department of Trade and Industry	IPR	Intellectual property rights	SMME's	Small Medium and Micro Enterprises
EU	European Union	JSE	Johannesburg Stock Exchange	SOE	State-owned Enterprise
FETC	Further Education and Training Certificate	MEC	Member of the Executive Committee	SPII	Support Programme for Industrial Innovation
FTE	Full Time Equivalent	MRC	Medical Research Council	TCP	Transmission Control Protocol
FP7	Seventh Framework Programme of research	Mintek	Council for Mineral Technology	TTC	Technology Transfer Centre
Furntech	Furniture Technology Centre	NACI	National Advisory Council on Innovation	THRIP	Technology and Human Resources for Industry Programme
GDP	Gross domestic product	NESTI	National Experts of Science and Technology Indicators	UK	United Kingdom
GERD	Gross expenditure on research and development	NQF	National Qualifications Framework	UNESCO	United Nations Education, Scientific and Cultural Organisation
		NRDS	National Research and Development Strategy	USA	United States of America
		NSI	National System of Innovation		
		NSTF	National Science and Technology Forum		

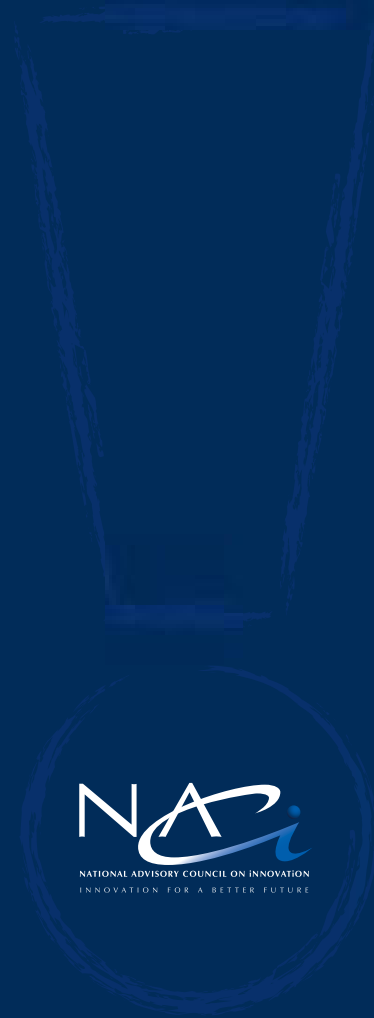
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