NATIONAL RESEARCH FOUNDATION MANAGEMENT RESPONSE TO THE RECOMMENDATIONS OF THE 2013 REVIEW OF THE CENTRE OF EXCELLENCE PROGRAMME

INTRODUCTION

The Centres of Excellence (CoEs) Programme was launched in 2004, by the Department of Science and Technology (DST) and the National Research Foundation (NRF), with the establishment of the following six CoEs:

1. DST-NRF CoE for **Biomedical TB Research** to research new tools for the diagnosis, treatment and prevention of tuberculosis (established in June 2004);
2. DST-NRF CoE in **Birds as Keys to Biodiversity Conservation** to focus on understanding and maintaining biodiversity using birds as indicators (reconstituted in September 2004);
3. DST-NRF CoE for **Invasion Biology** to address the biodiversity consequences of biological invasions (established in June 2004);
4. DST-NRF CoE in **Tree Health Biotechnology** to concentrate on understanding and combating diseases affecting South Africa's indigenous trees (reconstituted in June 2004);
5. DST-NRF CoE in **Catalysis** to drive innovation in catalysis, a key process in the chemical and manufacturing sector (established in June 2004); and
6. DST-NRF CoE in **Strong Materials** to seek to understand and improve the properties of advanced strong materials to increase their efficiency and reduce their cost (established in June 2004**)**.

In May 2006 an additional DST-NRF CoE was established in **Epidemiological Modelling and Analysis** to use mathematics to understand, predict and ultimately combat diseases.

The NRF was appointed by the DST, through a contractual agreement, to perform the operational management of the CoE Programme while the DST provided strategic leadership. Under this agreement, the cohort of seven CoEs were to be funded for a period of ten years with a mid-term review to assess the performance of the programme and a further review to be undertaken either in the penultimate year of funding or, on completion of the funding cycle in order to determine the exit strategy.

The first retrospective review was undertaken in 2009 covering the period from inception in 2004/05 to June 2008. The 2009 review took the form reviews of individual CoEs followed by a Synthesis Report compiled by Dr. Susan Cozzens (Associate Dean for Research, Ivan Allen College of Humanities and Social Sciences, Georgia Institute of Technology, Atlanta Georgia, USA) and Professor David R. Woods (retired Vice Chancellor and Principal, Rhodes University, South Africa). Based on the favourable review recommendations, funding for all seven CoEs was continued for the full ten year period.

In 2013 a second retrospective review was undertaken to assess the performance of the programme as a whole, with a bird's eye view of individual CoEs, for the period July 2008 to December 2012 inclusive. The review was undertaken by an international panel of five members including Professors Woods and Cozzens. The full panel comprised of the following members:

- Professor Howard Alper, University of Ottawa and Government of Canada's Science, Technology and Innovation Council, Canada;
- Professor Ahmed Bawa (Convenor), Vice-Chancellor and Principal, Durban University of Technology, South Africa;
- Professor Susan Cozzens, Vice Provost (Graduate Education), Georgia Institute of Technology, USA;
- Professor Venni Krishna, Professor in Science Policy and Chairperson, Centre for Studies in Science Policy, Jawharlal Nehru University, India; and
- Professor Dave R Woods, Chair (SANTRUST), Cape Town.

The NRF is deeply appreciative of the enormity of the task undertaken by the 2013 CoE International Review Panel and of the observations and recommendations made by the panel. Having reflected on the review report in its entirety, the NRF management response and comments are indicated

NRF RESPONSE AND COMMENTS

4.1. Funding Extensions

The Review Panel recommends that

a. *New Centres receive funding for a maximum period of 2 terms of five years each*
b. *Existing Centres:*
    - *Funding should be terminated at the end of the 15-year period.*
    - *Immediate steps should be taken to develop transition plans.*
    - *International best practice of trajectories adopted by Centres of Excellence that have come to the end of their funding should be systematically studied.*

The NRF acknowledges the recommendations and concurs with the view that the CoEs must map transition plans for sustainability in line with international best practices. At the time of conceptualisation of the CoEs as a strategic funding instrument, a funding period of five to seven years, in line with international norms, was considered before deciding to fund the initial cohort of CoEs for two terms of five years, with a mid-term review. In June 2012, Minister Pandor, the then Minister of Science and Technology, made the decision to continue funding of the initial cohort of seven CoEs for a third five-year term, subject to sustainability plans that reduce DST-NRF contribution towards academic salary costs and operational costs and, increases spend on postgraduate and postdoctoral training. This decision was motivated by the following:

· The fact that the CoEs had, severally and collectively, met and exceeded all performance milestones in the first-five term;

- The view that, given the development context in South Africa, a funding period of 10 years for the CoEs was not long enough;
- The need to match the CoE funding period to that of the South African Research Chairs Initiative (SARChI) to create long term certainty and stability in these two funding instruments; and
- The need to contain the potential loss of critical expertise within the CoEs.
- *The Review panel did not provide explicit reasons for the proposed 10 year funding horizon for CoE's. The NRF is supportive of a longer horizon (15 years) provided the 5 year reviews hurdles are achieved. In addition, the NRF is not supportive of a funding cliff but of adopting a phasing out approach after the funding horizon.*

4.2. Identity of Centres of Excellence and the Programme

The Review Panel recommends that

a. *The NRF should define the key characteristics of these Centres and especially how they differ from numerous university established centres. What is it that makes them national Centres of Excellence?*

b. *This is related to their*
   - *Purpose*
   - *Place in the NSI*
   - *Orientation with respect to the NDP and national grand challenges*

The NRF acknowledges the recommendations and concurs that the key distinguishing features of the DST-NRF CoEs, although detailed in the CoE Framework document, is not widely understood within the South African Research community. The DST-NRF CoE funding instrument is a key driver for strengthening knowledge generation, innovation and human capital development in alignment with national priorities [Refer to the National Development Plan (NDP), the DST Ten – year Innovation Plan (TYIP) and the National Research and Development Strategy NRDS)]. As such the DST-NRF CoEs are established in order to:

- Exploit the competitive advantage vested in outstanding researchers in South Africa;
- Reward, retain, sustain and improve scientific excellence;
- Ensure the integration of several smaller and related research initiatives into large science programmes;
- Achieve economies of scale through the optimisation of resources and effort through sharing personnel, equipment, data, ideas etc.;
- Promote collaborative, multidisciplinary and interdisciplinary research;
- Promote better diffusion and exploitation of the knowledge produced by tertiary institutions to where it is needed;
- Ensure secure and stable funding for research and dissemination;
- Allow for planned, strategic, long-term research; and
- Reduce micro-management of resources by the funding agency;

- Strategically exploit areas of geographical research advantage in a more optimal fashion; and
- Strengthen areas or research where a critical mass of research activity is considered to be aligned with National priorities.

The DST-NRF CoE funding instrument is distinguished from other research funding instruments in that, in addition to knowledge generation, research and training, all DST-NRF CoEs are required to undertake information brokerage, networking and service rendering activities and are required to reach beyond the borders of individual institutions and grow national networks of expertise.

The DST-NRF CoE is rendered a national centre by the requirement for at least two institutions to partner for the establishment of a CoE and, the requirement to network and incorporate several smaller and related research initiatives into a multi-institutional and multidisciplinary research programme once established.

4.3. The Orientation of the Centres of Excellence

The Review Team recommends that

a. *Centres of Excellence be strongly aligned with the NDP and national grand challenges. For example, consideration should be given to the establishment of a Centre of Excellence in Mining, in Food Security, and so on.*
b. *There be detailed discussions between the NRF/DST and the National Development Commission, the other science councils, policymakers and other government departments about the themes of any new centres that may come into being.*
c. *The Centres should be strongly interdisciplinary with social sciences woven in.*
d. *Serious consideration should be given to the establishment of a number of social science Centres of Excellence to address the enormity of the social issues faced by South Africa.*
e. *The Centres must remain strongly inter-institutional, and they must build networks that are sustainable. Longstanding and strong networks should be a lasting legacy of their existence. Appropriate research schemes and institutional arrangements should be created to sustain research and excellence capacities already developed in Centres of Excellence.*
f. *The Centres must deliberately build networks with historically disadvantaged institutions to the building of capacity and inclusivity in South Africa's research base.*

And the Centres must move towards an impacts paradigm rather than an outputs approach.

The NRF acknowledges and concurs with these recommendations. Some of these recommendations have already been taken into consideration in the April 2013 call for the establishment of five new CoEs. In particular, the recommendation relating to

Food Security and the Social Sciences and the Humanities has been incorporated into this call inviting applications in three pre-determined themes namely (i) Food Security; (ii) Science, Technology and Innovation Policy and Measurement; and (iii) Mathematical and Statistical Sciences and an open category CoE that must be in the Social Sciences or Humanities. The remaining CoE to be established may be in any discipline that is in alignment with national priorities.

Table 1 maps the existing CoEs and identified themes for the new CoEs to be established against the five Grand Challenges, the priority areas of the National Development Plan and the National R&D Strategy. It must be borne in mind that the DST-NRF CoEs are established to exploit the competitive advantage vested in existing research programmes and outstanding researchers active in South Africa. The CoEs are complemented by the SARChI funding instrument that affords the opportunity to establish new research programmes and to strengthen research across all disciplines by attracting to South Africa outstanding researchers from across the globe. The SARChI investment also aims to strengthen the research cohort in the country, beyond what is affordable using existing Higher Education Institutional budgets. The SARChI Chairs therefore is a strategic instrument for developing research excellence in priority research areas and it is envisaged that one or more SARChI Chair programmes could progress to become CoEs.

Table 1. Mapping of Centres of Excellence with the National Research and Development Strategy, Areas of Geographical Advantage, the five Grand Challenges and the National Development Plan

	Existing Centres of Excellence	Call for new Centres of Excellence
Alignment with the National Research and Development Strategy		
Science and Technology for poverty Reduction	· All Centres of Excellence	· Humanities and/or Social Sciences · Food Security
New Technology Platforms	· CoE Applied Centre for Climate and Earth Systems · CoE for Epidemiological Modelling and Analysis	· Humanities and/or Social Sciences
Technology for advanced manufacturing	· CoE in Strong Materials · CoE in Catalysis	· Food Security
Technology and knowledge for and from resourced based industries	· CoE in Strong Materials · CoE in Catalysis · CoE in Tree Health Biotechnology	
Alignment with identified areas of geographical advantage		
Astronomy		Mathematical and Statistical Sciences
Human palaeontology	· CoE in Palaeosciences	
Biodiversity	· CoE Applied Centre for Climate and Earth Systems · CoE in Tree Health Biotechnology · CoE in Invasion Biology · CoE in Birds as key to Biodiversity Conservation	
Antartic research	· CoE Applied Centre for Climate and Earth Systems	
Alignment with Grand challenges		
From Farmer to Pharma – (Biotechnology)	· CoE in Biomedical Tuberculosis Research · CoE in Tree Health Biotechnology	
Space Science & Technology	· CoE in Strong Materials	· Mathematical and Statistical Sciences
Energy Security	· CoE in Catalysis	
Global Change	· CoE in Applied Centre for Climate and Earth Systems Science · CoE in Invasion Biology · CoE in Birds as key to Biodiversity Conservation · CoE in Tree Health Biotechnology	
Human & Social Dynamics	· CoE in Applied Centre for Climate and Earth Systems	· Humanities and/or Social Sciences

	Science	· Food Security
Alignment with the National Development Plan		
Economy and Employment	· All Centres of Excellence	
Economic infrastructure	· CoE in Strong Materials · CoE in Catalysis	
Transitioning to a low carbon economy	· CoE Applied Centre for Climate and Earth Systems · CoE in Tree Health Biotechnology · CoE in Invasion Biology	
Inclusive rural economy		· Food Security
Education & Training Innovation	· All CoEs · CoE in Catalysis · CoE in Epidemiology Modelling and Analysis	· Science, Technology and Innovation Policy and Measurement · Mathematical and Statistical Sciences
Health	· CoE in Biomedical Tuberculosis Research · CoE in Epidemiology Modelling and Analysis	
Building a capable state		
Accountability and fighting corruption		
Transforming society and uniting the country		

The NRF supports the recommendation for CoEs to deliberately build networks with historically disadvantaged institutions to facilitate the building of research capacity and inclusivity in South Africa's research base. The newly established Institutional Engagement and Partnership Development (IEPD) Directorate at the NRF will be interfacing with the universities and CoEs to identify institutional priorities for research development and to provide the necessary support to institutions.

The NRF is in full agreement on the need for the CoEs to move towards an impacts paradigm and the NRF has commissioned a study on the development of impact measures for research and development activities across a range of funding instruments.

4.4. Student Experience

Taking into account our engagement with the students the Review Panel recommends the actions be taken to:

a. *Increase support for doctoral students from three to four years as a standard.*

b. *Build career advice and preparation into the programmes, including both academic and non-academic career pathways.*

The NRF recognises the need for support for doctoral students beyond the third year of study and the DST-NRF have implemented a funding category that specifically calls for applications for completion of masters and doctoral studies. By linking the funding for the final year of studies to firm deliverables, throughput of doctoral graduates is facilitated and limited financial resources are utilized optimally.

The NRF is in agreement with the need for career advice for postgraduate students and preparation for career paths, at large. This will become all the more important as the system ramps up the graduation rate of doctoral candidates to achieve the target of 5 000 doctoral graduates per million population by the year 2030. The objective is to incorporate the career advice and training into postgraduate training programmes at the institutional level.

4.5. The Knowledge Project

The Review Panel recommends that:

a. *The knowledge project of the Centres of Excellence must encompass the full spectrum of research and innovation (together with teaching and training). These are not separable entities in the context of a national system of innovation. By innovation we refer to industrial, institutional, organisational and social innovation. This should become a focus of attention as the Centres mature in their research function.*

b. *Consideration should be given to the creation of intermediary functions/institutions at Centres to facilitate this at the institutional locus of the Centres. An example of this is the Strategic Health Innovation Partnership (SHIP)—an intermediary established by the MRC.*

The NRF supports the recommendation that the CoEs should encompass the full spectrum of research and innovation and progress to focus to some degree on downstream activities along the innovation value chain as they reach a stage of maturity. This is in alignment with the notion that CoEs ought to move towards an impacts paradigm.

It is also important to recall that focused down-stream entities have been created by the DST, the Centres of Competence, which explicitly aim to bring products to market and are primarily supported through the Technology Innovation Agency. These respective roles of the CoE' and Centres of Competence should not be conflated.

4.6. Governmental Synergy

The Review Panel is deeply concerned by what appears to be the balkanization of government's interactions with the Centres of Excellence, as with the science system generally. This has important consequences for the way in which the Centres of Excellence are perceived by policymakers and perhaps more importantly, for the long-term sustainability of the Centres.

The Review Panel therefore recommends

a. *The NRF should play a key role in developing regular formal discussions concerning planning and implementation of new programmes, as well as monitoring existing programmes between itself, DST, DHET and other government departments that intersect with the Centres such as the Department of Health, DTI, DWA, DEA, etc. Balkanization must be prevented.*

b. *This engagement should also focus in on the ways in which government departments pay for services that they receive from the Centres.*

The NRF recognises its catalytic role in averting the balkanization of research and development initiatives across the system. In this regard much progress has been made through the DST-DHET bilateral engagements in which the NRF participates as a key partner. Engagements with other government departments are also occurring to varying degrees.

4.7. Internationalising South African Research

Notwithstanding evidence of extensive international collaborations and linkages that some of the Centres have provided, in the opinion of the Review Panel the scope and extent of this internationalisation has by no means reached desirable levels. Centres of Excellence in other international contexts have established strategic research programmes with centres in other countries.

The Review Panel therefore recommends that

a. *The Centres must enter and initiate research programmes that are international in scope to enhance South African science, broaden the funding base, increase the mobility of researchers and so on.*

b. *The Centres consider using bi-national and multinational agreements as a platform for these.*

c. *The Centres deliberately adopt strategies that will extend its international activities beyond collaboration between individuals and to focus their attention on building strategic programmes of research with international partners.*

The NRF acknowledges these findings and is supportive of this strategy. While it is an expectation of the CoEs to foster national and international collaborations and, to leverage additional financial resources, CoEs were not necessarily required to foster strategic research partnerships with other centres internationally.

4.8. Networks for Building Capacity

One of the defining characteristics of the 1995 science and technology policy development process was the driving impetus to correct the race and gender imbalances of the science system. This is one of the core mandates of the NRF as well. While progress has been made in addressing these issues, much has still to be done.

The Centres of Excellence are all located within academic institutions and there was a strong view within the Review Panel that these institutions must draw on the Centres to build research capacity, research management, and so on.

The Review Panel recommends that

a. *The Centres must proactively build relationships and connections with HDIs so as broaden the research and innovation base of South Africa.*

b. *Academic institutions must work proactively to change the research culture using the Centres as models. This includes the management of research at those institutions.*

The NRF agrees with these recommendations. As indicated under 4.3., the IEPD Directorate at the NRF will be interfacing with the universities and CoEs to identify institutional priorities for research development, to broaden the research and innovation base, and to provide the necessary support to institutions and CoE's to maximize impact in this area.

4.9. Management Information

The Review Panel makes the following recommendations:

a. *The NRF must establish a management information system that gathers comparative data and allows it to provide strategic programmatic leadership and management. This should involve all of the NRF's funding programmes as well as national baselines.*

b. *The NRF should develop an online system for centres to use to enter information so that it can be easily aggregated at program level.*

c. *The NRF should require the centres to enter data for the students they support into the NRF tracking system.*

d. *The NRF should develop a system to track student career outcomes after graduation.*

The NRF fully agrees with the urgency to implement effective data capturing and management systems. An online submission module for student nominations and annual reporting has been developed and will be implemented in January 2014. In the medium-term, a comprehensive Business Intelligence System is under

development at the NRF. The NRF also concurs with the recommendation to track the career progression of NRF supported postgraduates. The intention is to achieve this through the *South African PhD Project* web portal and to utilise social networking media such as LinkedIn.

4.10. Governance Issues

The Centres of Excellence are important science institutions in the national system and it is important to ensure that their governance systems are properly constituted and effective. Three points need to be kept in mind. These are publicly funded research centres and so their Boards must bear their fiduciary responsibility including long-term plans for their research agendas. The Boards must also act as a resource to connect the Centres with relevant social, economic and industrial stakeholders.

The Review Panel recommends strongly that the boards (and the NRF) establish a number of assessment facilities to quality assure the Centres is performing excellent research, providing high quality education for students, producing knowledge that is relevant to appropriate stakeholder groups, and communicating that knowledge both to users and the broader public. Because the Board has this stewardship function, it needs to be appropriately constituted.

They should be constituted in such a way that this role can be played.

a. *Transition and accountability plans should be developed as a matter of good governance and good practice.*

b. *The DST should designate the NRF as its representative on the CoE Programme.*
c. *The NRF representative on the Board should hold observer status.*

d. *The Boards should be chaired by an independent external expert and NOT the relevant Research DVC.*

The Advisory Boards for the CoEs have played an important steering and oversight role in ensuring the successes of the CoEs to date. The NRF agrees with the recommendation that the Board must be appropriately constituted with the relevant expertise and, that the Boards should be provided with quality assessment criteria for assessing annual performance of the CoEs. While the NRF is not opposed to having an independent external expert as Chair of the Advisory Board, it favours having the relevant DVC as a pivotal role player. The NRF would therefore suggest that the DVC Research act as Board Vice-Chair as this ensures institutional accountability for the CoE and ensures that Board meetings take place twice a year as required. The NRF is also not opposed to the NRF and DST representatives having an observer status on the board but remains of the view that both NRF and DST attendance at the Board meetings greatly assists with the management and governance of the CoEs and, in keeping them informed about the scientific programme. It should be noted that the outputs of the CoEs as a strategic instrument have a direct bearing on

the Shareholder Compact between the NRF Board and the Minister of Science and Technology and on the performance contract of the Minister of Science and Technology with the President of the country.

4.11. Leadership of Centres of Excellence

The leadership of a Centre is critically important to its success. The Centres are complex research and innovation bodies that play a variety of roles including their effective participation in the social and/or economic sector(s) in which they exist.

The Review Panel therefore recommends that in making the appointment of director, care be taken to ensure that in addition to being an outstanding researcher/scientist, the Director has the knowledge, experience and passion to:

a. *Undertake the setting of the research and innovation agenda of the Centre.*

b. *Play the role of networker.*

c. *Be people sensitive.*

d. *Engage the NSI in terms of the place of the Centre in it.*

e. *Lead Industrial/user engagement to ensure that there are channels of connection between the Centres and their 'markets'. This includes engagement with the NDP and other national grand challenge projects.*

f. *Lead the Centres engagement with industry/government/other users about the knowledge translation project—to act positively to address the innovation chasm project.*

g. *Be efficient and effective as an administrator.*

The NRF concurs with the view that, in addition to being a leading scholar and researcher, the Centre Director should have management expertise and the desirable leadership qualities. It should be noted though, that the CoEs make provision for the appointment of an administrator and centre manager to bring these capabilities to the team. Furthermore, it is expected that, through the performance management processes and personal development plans for the director and other centre staff, management and leadership capabilities will be further enhanced.

4.12. Awareness of Centres of Excellence

The Review Panel recommends that the NRF and the Centres of Excellence work together to develop a strategy to address an awareness deficit and to consider this on four levels:

a. *Public awareness of the Centres and the science that they do.*
b. *Integration of the Centres into NSI so that they are seen by the science councils, universities, government laboratories and others as important elements of a national system.*
c. *The development of an ongoing and vibrant/exciting communication strategy with the public, within the scientific community and internationally.*
d. *The development of a regular engagement with parliamentarians, public policymakers and cabinet.*

The NRF agrees with the recommendation to increase the visibility and awareness of the CoEs and to facilitate engagement with the scientific community, policy makers and with the public. Plans are in place for public engagement through the NRF Science for Society lecture series and for a series of policy briefs for policymakers. The NRF Business Unit for Science Engagement and Corporate Relations will provide leadership and expertise in these initiatives.

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