



Trajectories for NRF research support
May 2009

“It is no good to try to stop knowledge from going forward. Ignorance is never better than knowledge.”

Enrico Fermi Nobel laureate in Physics (1938)

The research funding climate in our country has changed dramatically. This communication sketches the new facts and realities that confront the NRF and the research community. Researchers are invited to study the interventions and revisions detailed. An onward engagement with the NRF management team is actively encouraged.



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1. NRF Vision 2015

During 2007, the NRF embarked on an extensive strategic planning process. This involved internal and external stakeholders including the research community, members of the NRF Board and officials from government departments, among others. More than one hundred contributions were received. Together these provided the foundations for our new vision and strategy.

a. Vision and values

A copy of the resulting strategic plan is available on the NRF website.¹ Our five new strategic goals are:

- A vibrant national science system,
- Leading edge research, technology and innovation platforms,
- World-class science bench marking and grant systems,
- A representative research and technical workforce in SA,
- An internationally competitive science, technology and innovation system.

NRF reporting is aligned with these strategic goals and with the mandatory balanced score card used by government. The NRF invites stakeholders to track its progress and performance over the time frame of the strategic plan (2008 - 2015).

2. The Reality of funding within the NRF

An understanding of the current financial position of the NRF is instructive in interpreting the way in which we are implementing our strategy.

a. Discretionary versus Contract Funding

It is important to understand that the NRF receives three distinct forms of income, reaching an unprecedented total in 2009 of R1.3 billion, a huge increase by comparison with 2007, but an increase that has not always benefited researchers with an independent agenda.

i) The NRF Discretionary budget. The NRF is informed about the size of the discretionary budget annually, in December of the preceding year, when it receives a notification of the medium term expenditure framework (MTEF). This is a three year rolling budget of about R340 million which is typically regarded as the base line for future funding. Increases may occur while decreases are extremely rare.

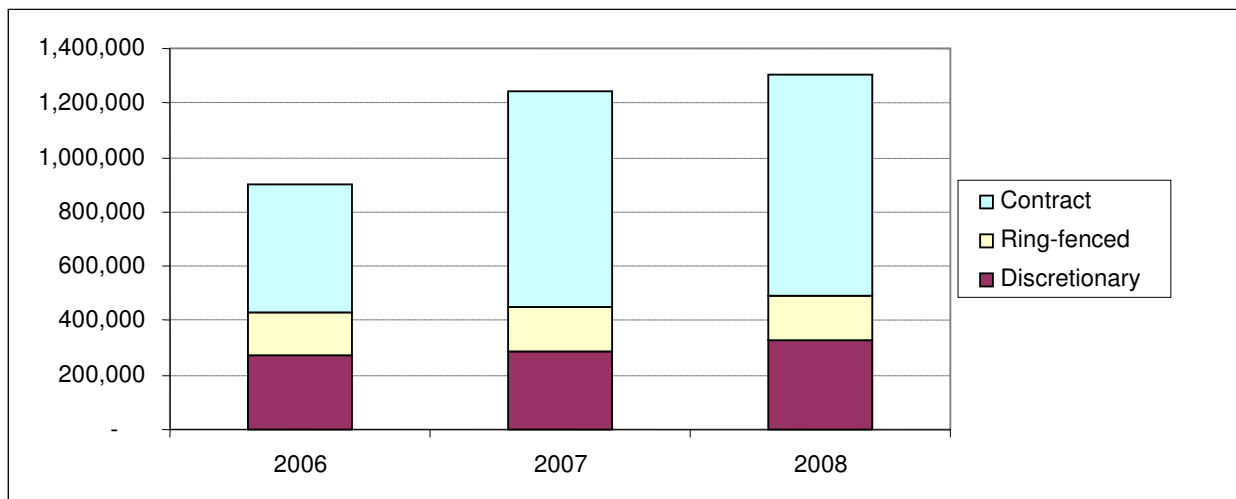
¹ http://www.nrf.ac.za/doc/nrf_vision_2015.pdf

ii) Ring-fenced grants. The MTEF letter also includes a number of entries that require spending that is not at the discretion of the NRF. These items are referred to as ring-fenced grants. Examples include some Centres of Excellence, selected programmes and equipment grants. Ring-fenced grants in 2009 total about R115 million.

iii) Contract funding. The third stream of income comes in the form of individual contracts. These contracts do not form part of the MTEF notification and arrive in a rather ad hoc manner throughout the year. Examples include the African Geographic Advantage Programme, the African Coelacanth Environment Programme and the South African National Antarctic Programme. The contracts arise mainly from the increased number of strategic interventions driven predominately by government. Their use is directed and strictly limited to the intentions of the strategy outlined in the contract. Contract funding in 2009 will total about R830 million.

The figure below illustrates that the increase in NRF funding in recent years is almost entirely explained by the significant increase in government sponsored Contract funding over the last three years, with an average growth rate of 63% in nominal terms. During this same period the Ring-fenced funding has grown on average only by 6% (less than the inflation rate) and the Discretionary funding has grown on average at 11% (almost equal to inflation). The figure also indicates that the growth in Contract funding may have reached a plateau. New emergent initiatives could however change this pattern.

Relative growth rates of the three NRF funding streams



Thus, in essence, the business of the NRF has changed significantly over the last three to four years. Simply put, while funds have increased, the freedom to invest research monies at our discretion has been significantly curtailed. As a result, our operational planning has moved from independent investment to complementary investment of the discretionary funds to close emergent gaps in the national strategic funding landscape.

Despite growing demands on the salaries bottom line driven by the need to service growing numbers of contracts and through careful cost management, the deployment of

the Discretionary budget to grants remains high. The percentage devoted to grants was 74, 73 and 84% in 2006, 2007 and 2008, respectively. In addition, we are now employing full cost budgeting to new government contracts, something which did not happen historically. As a government agency the NRF may not accumulate funds for launching new initiatives. New initiatives are typically rolled out as funds are recovered from prior investments.

b. Small Cut in discretionary budget

It is worth noting that in early 2009, for the first time in the existence of the NRF our MTEF allocation for discretionary spending (first received on 18 December 2008) was cut by almost R5 million (on 15 January 2009). This amount is insignificant when viewed against the total budget of R1.3 billion, but the principle of an ever-increasing Discretionary budget has been compromised. In fact, in recent years the NRF has not experienced any real growth (excluding inflationary adjustments) in its Discretionary funding. The Chair of the NRF Board has held discussions with the Minister of Science and Technology on this matter and was informed that similar cuts had been applied across the board for numerous reasons, including the economic recession.

c. Current reality: Funding is limited

Despite the growth in the overall grant budget (Discretionary, Ring-fenced and Contract together), the fact is that this growth is largely confined to Contracts and that cross-funding is strictly forbidden. Thus there are very real limitations on available “free standing” funds for academic projects. Today, of every ten projects deemed fundable by peer evaluation only four are actually funded – a 40% average success rate for projects – and for every ten students that apply only three are funded – a 30% average success rate for students.

International benchmarking indicates that these success rates are still relatively high. However, the context is rather different in that in some other countries a principle investigator can apply to another funding agency if a grant application is not successful.

d. Inefficient use of limited funding

On average, the NRF’s beneficiaries only manage to spend three-quarters of grants awarded to them. A graphic representation of awarded amounts against time indicates a bell-shaped curve centred on June or July. Awards increase early in the year, when the peer review process is complete, and decrease rapidly towards the end of the year as grant-holder linked student bursaries and unspent grants are returned. The NRF together with the Higher Education sector needs to address these inefficiencies in future.

3. New Initiatives

The NRF has engaged in a number of new initiatives, with a number of purposes, to assist in addressing this complex situation while realising our strategic plan. Some have involved a re-allocation of existing funds, and others entail the development of new programmes. The NRF has not had to cut expenditure in any but the most minor respects. However we have sought to compensate free-standing researchers for the growth in restrictions imposed on them by the increase in contract and ring-fenced funding.

a. The South African PhD Project

This strategic project – less to do with financial systems than strategic goals - aims to increase substantially the diversity and number of highly skilled graduates. The target is a five-fold increase in the number of PhD graduates by 2024.

Other postgraduate degrees will not be downplayed in favour of the PhD. Instead the PhD will be used as a focal point for measuring our success across the entire pipeline of students.

The five-fold increase is ambitious. The NRF views this as a stretch target achievable by increasing the student throughput rates into Honours and PhD degrees. The table below compares actual throughput data from 2005 with three modeled scenarios. If the selected throughput rates are increased by 50% then the number of PhD graduates increases more than two-fold. If the throughput rates are magnified even further, say doubled and trebled, then the number of PhD graduates could increase four and nine times, respectively.

Numbers of people passing through the higher education pipeline

	Senior Certificate	Undergrad	Honours	Masters	PhD
Actual throughput in 2005	26,000	16,000	3,200	3,000	560
Increased throughput by 50%	26,000	16,000	4,800	4,500	1,260
Doubled throughput	26,000	16,000	6,400	6,000	2,240
Trebled throughput	26,000	16,000	9,600	9,000	5,040

It is clear that, within the existing budget, the NRF will not be able to fund all these PhD students. In 2008 the NRF supported more than 7 800 postgraduate students, some 44% of the total number of students needed to fill the pipeline targeted for 2024. Besides lobbying for increased budget to support more students, the SA PhD Project also encourages potential PhD students to take up scholarships offered at universities across the world, rather than providing direct support. A healthy mix between growing the number of students trained locally and encouraging studies abroad will allow us to achieve these targets sooner.

Other initiatives by the NRF to move the system towards the envisaged five-fold increase include the suggested 4 by 4 graduate experience. Within the academic regulations (NQF), the NRF encourages universities to avoid the use of the current three exclusion gates (post-undergraduate, post-honours and post-masters) in favour of one gate after the first four years (post-undergraduate and honours) of study. The NRF also encourages, through changes in its funding programmes, a swing away from grant-holder linked bursaries – where professors are required to find students – to increasing numbers of free-standing scholarships – where students are empowered to find supervisors.

The capacity of Higher Education institutions to absorb these anticipated student numbers is of great concern. The Research Chairs and Centres of Excellence programmes are helping to alleviate this capacity problem but we aim to use all avenues, including international partnerships to deliver on this objective.

b. Phasing out of the Focus Areas Programme (FAP)

The Focus Areas Programme (FAP) predates the inception of the NRF in 1999². It consisted of up to nine focus areas that were used to more closely align research to societal needs and national imperatives. The strategic context was the Reconstruction and Development Programme (RDP). Although the focus areas subsequently underwent refinement³ during their life span, to maintain their relevance, their core purpose never changed - namely to provide strategic direction for research in the new South Africa.

However, over the intervening years the RDP programme was overtaken by a number of other government sponsored strategies. This started with the 1994 Foresight exercise and was followed by the White paper on Science and Technology in 1996. The National R&D Strategy in 2002 was followed by the Biotechnology Strategy, the Advanced Manufacturing Strategy and others and, more recently, the DST 10 Year Innovation Plan.

Two consequences arose from these new strategies. First, the government increased its spending on R&D but placed its spending outside the discretionary budget of the NRF. This increased spending was closely aligned with the unfolding strategies. Secondly, this new layer of sharply focused spending over and above the NRF focus areas meant that nowhere was there room for fundamental curiosity driven research. Researchers were confronted by layers upon layers of directed research funding calls, with little room for pursuing their disciplines in ways of their own choosing. There were calls from the academic community for the NRF to fund basic research on a discipline-specific basis to counter-balance the growing strategic investment in the science landscape.

² <http://www.nrf.ac.za/publications/news@nrf/oct2000/grants2001.stm>

³ <http://www.nrf.ac.za/news/focusareadebate.stm>

In the light of this, following a recommendation from the 2005 NRF Institutional Review⁴ an independent review of the FAP⁵ was commissioned, with the possible softening of the extreme “directedness” of research funding calls in mind. A decision was subsequently taken to phase out the FAP. Of course this had to be done in a responsible manner, avoiding the premature termination of existing commitments to researchers (grant-holders) and their students.

In 2007, some 944 researchers were supported through an investment of R162 million (new grants and carry forward provision) in the FAP. Projections showed (see table below) that if no new FAP grants were made available, through a process of natural attrition, about R40 million per annum could be released for investment into other funding programmes over a period of four years to bring the FAP investment to a close in 2011. In 2009 some 768 researchers still hold active FAP grants.

Planned phase out of the FAP

Year	Actual investment / R'000 000	Decline in investment / R'000 000
2007	162	
2008	122	40
2009	82	40
2010	42	40
2011	2	40

Simultaneously, the NRF considered what new funding programmes should be developed to gradually take up this investment and to complement the strategic investments being made by government. Crucially these new programmes should not add further strategic focus but should rather support disciplinary research endeavours.

c. Six new funding programmes (2008)

Before 2008, the Focus Areas Programme (FAP) used 57% of the discretionary budget of the NRF. The remainder is taken up by the Thuthuka and Research Niche Areas funds. With the phasing out of the FAP in 2008-11, six new programmes have been developed and they will be implemented gradually as funds are released from the FAP. They share some attributes: they do not require a match with any strategic focus and wherever possible they encourage a fundamental disciplinary approach. The new programmes are briefly described below.

i) Incentives for rated researchers⁶: This programme was created in response to the independent review of the Evaluation and Rating system co-convened by the NRF and HESA⁷. One of the major recommendations of this review was to re-link the granting of ratings to the granting of funding, as was the case in the old FRD. So we intend, over the next few years, to release sufficient funding from the FAP to provide

⁴ <http://www.nrf.ac.za/news/review05.stm>

⁵ http://evaluation.nrf.ac.za/Content/Documents/PrgDocs_new.htm#

⁶ http://www.nrf.ac.za/doc/ifrr_manual_2009.pdf

⁷ <http://www.hesa.org.za/hesa/>

funding to all rated researchers and to encourage them to maintain or improve their ratings. The rationale for this is that rated researchers are typically the most productive of all researchers, while their work has a very high impact. Current data indicates that rated researchers produce some 76% of all the research outputs produced with the support of the NRF and that they supervise 75% of the students supported by the NRF in programmes open to their participation.

There are now more than 1 800 rated researchers - double the number of researchers supported by the FAP in 2007. The NRF discretionary grant budget, which is less than R300 million, will never, on its own, be able to support the full research programmes of all the rated researchers; especially for expensive research that involves high cost consumables or instrumentation - leaving many rated researchers entirely unfunded, an untenable situation. The new Incentive Funding system is designed to address this problem, by providing relatively modest supplementary funding across all disciplines.

ii) Blue Skies Research Grants⁸: This programme arose in direct response to the fact that Government grants to the NRF were becoming increasingly directed towards specific ends. As pointed out already, since 2000 most new investments by government have been strictly ring-fenced for specific strategic areas. An unintended consequence of this has been a dearth of funding available for doing truly novel and potentially paradigm-shifting research.

The Blue Skies programme is intended to rectify this. The intention of this initiative is to support very novel research ideas that could shift disciplinary paradigms and which do not have any obvious or intended impacts on society. The research to be supported through this programme has to be cutting edge, speculative and exciting and will probably involve a high risk investment by the funding agency. The intention is to offer a radical counter balance to the increasing amounts of directed and strategic research funding available to the research community.

The implementation of this programme was preceded by a lengthy consultation phase where the NRF held workshops with members of the broader research community to formulate this “blue sky” research initiative.

iii) Collaborative Research at National Facilities: The NRF is the custodian of seven national research facilities. These facilities include large pieces of equipment such as optical telescopes, radio telescopes, magnetic field sensors and accelerator based equipment as well as collections of aquatic species, terrestrial species and environmental observation stations and data. Part of the NRF custodianship role is to actively encourage the use of these facilities by researchers. The NRF strategic review revealed that these platforms were under-utilised by the research community and that their use needed to be stimulated. Applications by the research community to do research that uses these facilities are invited on a disciplinary basis.

⁸ http://www.nrf.ac.za/doc/bsrp_sep2008.pdf

iv) Community Engagement: One of the major pillars of the NRF is the South African Agency for Science and Technology Advancement (SAASTA). We consider community engagement to be an important component of academic activity, in addition to learning, teaching and research. The advancement of science in society is therefore clearly a priority for the NRF. In this context, previous attempts by the NRF to encourage all their grant-holders to share their work with relevant communities were launched. In reality though, there has been little research supported by the NRF to better understand this process of transferring knowledge and innovations to communities, and indeed, the generation of new knowledge through interaction and working together with communities. Consequently, this programme was established to improve our understanding, through research, of how best to engage with communities to convey the wonders, outcomes and benefits of research to society.

v) Competitive Support for Unrated Researchers⁹: Previously in the NRF, the loss of a rating meant that one was excluded from the opportunity to apply for support from, for example, the FAP. In addition, some researchers chose not to participate in the NRF rating system. This scheme therefore, provides a focused opportunity for unrated researchers to apply for grants on a disciplinary basis. As this scheme is rolled out, the intention is that these researchers may compete for three years of research support to assist them to regain their rating or to become rated. This programme is not meant to provide ongoing support for unrated researchers and will remain highly competitive.

vi) Competitive Support for Rated Researchers: This programme, which will be launched later in 2009, will offer rated researchers support in any discipline. It will offer an additional alternative to the many focused strategic programmes available to the research community and is more likely to be used by those who cannot find a niche for their research in the dominant strategic directions offered by government sponsored programmes. This programme will always remain competitive with a limited budget but will offer a disciplinary based alternative.

Summary of new programmes and their impact on the total budget

The early allocations to these six new funding programmes are summarised in the table below. It is important to note that the funding available for these programmes will increase over the period 2009 to 2012 as the FAP is phased out and budget is released for re-allocation.

⁹ <http://www.nrf.ac.za/HICD/docs/csurframework.pdf>

The six new funding programmes within the discretionary budget as a whole

Name	Purpose	2009 budget R' 000 000	% of total discretionary grant budget in 2009 *
Incentive funding for rated researchers	Incentive	37	13
Blue Skies	Novel	7	2.5
Collaborative research at NFs	Facility	5	1.8
Research into community engagement	Outreach	1	0.36
Competitive support for unrated	Safety-net	5	1.8
Competitive support for rated	Alternative	0 **	0
Sub-total		55	20
Old Focus Area Programme grants	Focused research	115	41
Thuthuka	Development	28	10
Research Niche Areas	Development	32	11
Free Standing Scholarships & fellowships	Development	34	12
Sub-total		209	75
International liaison	Collaboration	6	2.2
Travel and events support	Collaboration	6	2.2
Other		3	1.1
Sub-total		15	5.4
Total Discretionary Budget		279	100

*R279 million

** Yet to be launched

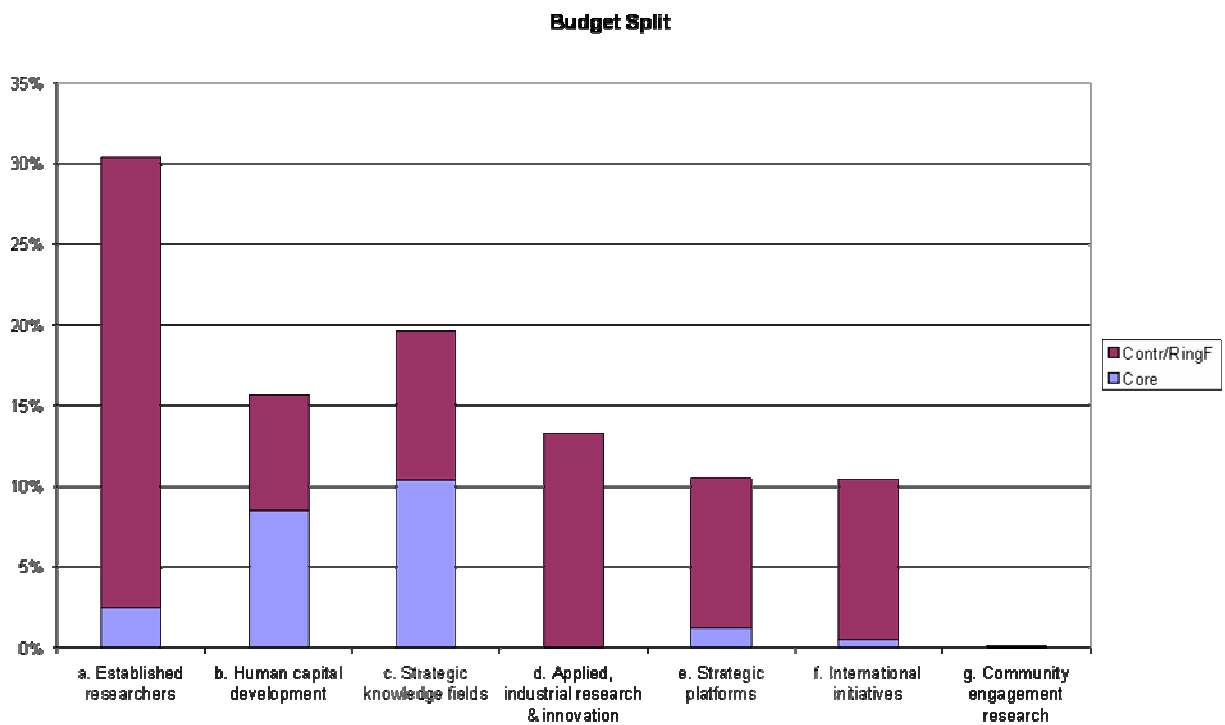
By the end of 2008 some R115 million was still invested in the old FAP. This amounts to 41% of the NRF discretionary budget but will slowly be absorbed into the above programmes over the next four years.

If we look at the **total** NRF budget (including discretionary, contract and ring fenced funding), we can see that the NRF supports a broad range of research. The range spans all disciplines – natural science and engineering to social science, humanities and law. For example, the NRF supports innovative research, fundamental disciplinary-based research as well as strategic research – research that is aimed at addressing a specific need or solving a specific problem. As we have seen above, strategic research is more frequently funded by Contract funding whereas novel and disciplinary research is typically funded through the NRF discretionary budget. Finally, the NRF also funds applied and broad innovation research, especially non-technological innovations. This includes social, political and environmental innovations that lead to significant public benefits. This research is usually funded through agreements and in collaboration with specific government departments or sectors. The NRF will also work closely with the newly created Technology Innovation Agency (TIA) to ensure that emergent technological innovations are transferred to that environment for commercialisation.

The art of research management, especially from a funder's point of view, is to support an appropriate balance of each of these types of research. To assist the NRF to achieve an appropriate balance of investments, investments are monitored across seven broad investment areas. These are:

- Established researchers (rated researchers)
- Human capital development and unrated researchers
- Strategic knowledge fields
- Strategic Platforms (Including research at the National Facilities)
- International initiatives
- Applied research and innovation
- Community engagement research

The distribution of the **total** 2009 budget into these respective investment areas is shown in the figure below. (This figure excludes those funds still locked up in the FAP.) The Contract and Ring-fenced funding is not deployed at the discretion of the NRF and our objective is to use the available discretionary funding to complement the suit of strategic investments in the best possible manner.



Comparison of investment of Discretionary and Contract/Ring-fenced funds into the seven broad investment areas

d) Shift from grant-holder linked bursaries to free-standing scholarships

In 2008 the NRF supported 7 849 postgraduate students representing some 44% of those needed to fill the targeted 2024 PhD pipeline. To grow this pipeline the NRF hopes to encourage universities to increase their throughput rate by a third through the use of a 4 by 4 postgraduate experience, by encouraging more students to complete PhDs through the South African PhD Project and empowering students to find the most suitable supervisors for them by offering more free-standing scholarships.

Although grant-holder linked bursaries are a fairly efficient way of supporting students the process has major drawbacks, namely:

- Money set aside for bursaries is often returned to the NRF late in the year making it difficult to reassign,
- The achievement of demographic targets for awardees is slow and cumbersome.

Of the students currently supported by the NRF some 75% have grant-holder linked bursaries. Over the next four years the pendulum will slowly swing towards free-standing scholarships until the ratio of free-standing to grantholder bursaries approaches 1:1. It is important to note that student support is provided by the full suite of R1.3 billion invested by the NRF and not just the FAP. Any small reductions in numbers of students supported in one programme will not significantly affect the number of students supported across the funding system. Attempts to raise student bursary values would have far more significant consequences on numbers of students supported. However, the NRF remains committed to increasing bursary values whenever possible.

e) Review of Peer-review processes

NRF Vision 2015¹⁰ has a number of clearly articulated grant awarding principles. Those relevant to this Section are paraphrased as:

- Award grants on a competitive basis,
- Award grants based on merit as assessed by rigorous peer review, and
- The entire process of decision making should be fair, transparent and accountable.

The NRF, like other similar organisations, uses peer review to assess the quality of research proposals and their alignment with various selection criteria. This process is used to filter out applications that are not worthy of funding and to prioritise those that are worthy of funding. The NRF uses two types of peer review:

- i) **Postal (email) peer review** for the assessment of the quality of the proposed research. This involves sending a copy of the proposal and assessment criteria to the peer with a request that a review report is returned by a certain date.
- ii) **Panel meetings** (also called “peer review by committee”) that consists of committees of research peers convened at a central place (often but not exclusively at the NRF). The peers are normally experienced in the task and are often generalists by nature. They may not be experts in the fields of research of all the proposals, but are able to comment in general, based on their knowledge of the overall field of research.

¹⁰ http://www.nrf.ac.za/doc/nrf_vision_2015.pdf

Peer review is a ubiquitous assessment process used throughout academia. Its success depends on independent judgments expressed by peers unencumbered by conflict of interest. The reality though is that it can easily degenerate into pettiness and can entrench biases. These behaviours may be intentional or unintentional. Both are equally harmful, the latter is usually more difficult to detect and prevent.

We intend to open our peer review processes to public and stakeholder scrutiny. Since peer review and transparent and accountable decision-making are key principles of the NRF it is important to ensure that our peer review processes are benchmarked against the best international practices.

It is intended to divide the investigation into four parts:

1. An initial one day conference, to be held in Pretoria, to set the scene and to obtain critical inputs from the community,
2. An in depth investigation of the processes used by the NRF to manage peer review by a team of independent analysts, and
3. A series of five regionally organised workshops, again open to all, to discuss the findings and recommendations of the analysis.
4. The team of independent analysts to make recommendations to the NRF about how it can improve its peer review processes.

It is intended that this process will be completed by the end of 2009.

f) Reinforcing the Evaluation and Rating system

The evaluation and rating of individual researchers' profiles in the international research community has been a practice of the NRF since 1984¹¹. As the system uses peer review to determine an individual's standing it often throws up controversial results. Therefore the system is regularly subjected to independent review¹².

i) HESA review

The latest such review was co-convened by HESA and the NRF. The steering committee included eight independent people (see page 1 of report¹³ for their names). They decided to base the review on evidence provided by five studies. (The names of the studies and the respective service providers are given on page 2 of the report¹⁴.)

¹¹ <http://evaluation.nrf.ac.za/Content/Evaluation/history.htm>

¹² <http://www.nrf.ac.za/news/review05.stm>

¹³ http://evaluation.nrf.ac.za/Content/Documents/rsc_findings_recom.pdf

The findings of the review¹⁴ essentially include the following:

- The rating system should be retained and its focus on research excellence sharpened,
- The NRF should take full responsibility for disseminating accurate information about how the NRF rating system works,
- Funding should be directly linked to rating,
- The NRF, in consultation with its stakeholders, should address the criticisms regarding various aspects of the rating system, e.g., rating categories, simplification of processes, transparency, feedback etc.,
- The NRF and HESA should lobby for sufficient levels of funding to sustain the rating system, and
- The DST, DoE, HESA, NRF, etc., should interact to align the recognition and reward of research outputs.

ii) Implementation of findings

In line with the above recommendations, the NRF has retained and sought to strengthen the rating system. The system is well-used by the academic community, and the number of rated researchers continues to grow, by some 14% per annum up to 2008. Social scientists and humanities researchers are also taking to the system - they grew from 21% to 31% of the total number of rated researchers over the last five years.

The NRF's senior executive recently undertook a road-show on this matter to 43 institutions. During these meetings the outcomes of the review of the rating system and an overview of new programmes and grants were discussed in detail with over 1 400 people.

As pointed out above, the linking of funding with the evaluation and rating system was initiated in 2008 through the Incentive Funding programme in accordance with the HESA recommendations. We were happy to do this, since the rating system is peer review based. In fact it is a more onerous and substantial peer review process than presently used for any project evaluation process. The process assesses the publication track record of a researcher, judges the quality and impact of the work completed over the last eight years and reflects on a research plan for the subsequent five years.

The NRF believes that the Incentive Funding is a sound investment. It will eventually support about 2 000 highly productive researchers across all disciplinary fields. This we believe to be a very high impact investment in researchers with a track record of using their available research resources wisely. Although this will eventually amount to a substantial investment of almost R 90 million per annum, this is only 7% of the total available NRF funding of R 1.3 billion.

¹⁴ http://evaluation.nrf.ac.za/Content/Documents/rsc_findings_recom.pdf

4. Conclusion

This shift in the funding framework that emerged from NRF Vision 2015 is the most fundamental re-alignment of the national funding regime in 15 years. Re-aligning complex operations such as the NRF will take some time and we do not foresee it being a painless exercise. In the process, the NRF anticipates that there will be plenty of advice from all quarters, some of it which we will be able to take on board. However, we are confident that the NRF and national funding system will emerge from this exercise both well-aligned with the national strategic priorities of the day, yet adequately counter-balanced by appropriate investments in fundamental disciplinary research.
