The National Research Foundation of South Africa
- Fostering Science and Research Collaboration in Africa -

Preamble

Excellence in research and capacity development is a key imperative in achieving the aspiration to establish South Africa as a preferred destination for science and technology investment in and for the continent, and to establish a globally competitive science system. In line with the National Research Foundation's (NRF) core mandate, the goals of contributing 1% of global R&D output annually and substantially increasing doctoral production have been articulated as high level targets. Through a multiplicity of mechanisms, internationalisation - in particular Africa-based collaboration - underpins and supports the accomplishment of these goals. The International Relations and Cooperation (IRC) Directorate, on behalf of the NRF, acts as the custodian and facilitating entity of a broad-based, dedicated approach to global engagement, and particularly with Africa. The cross-cutting drive towards an international focus necessitates the contributions of all Directorates, particularly within the ambit of the Research and Innovation Support and Advancement (RISA) Business Unit to the endeavour, and especially a consolidated position statement and strategy by the NRF.

The NRF's robust and internationally recognised funding systems position it as a leading funding agency in Africa, using this strategic advantage to accelerate engagements between countries on the African continent in collaboration with international partners. In partnership with a growing number of African countries, the NRF promotes and supports research through funding and human capital development to promote the global knowledge economy in contributing to socio-economic and sustainable growth on the African continent. The Science, Technology and Innovation Strategy for Africa (STISA) creates the framework for South Africa to play a key facilitating role to support Sub-Saharan Africa[1].

The purpose of this document is to provide a summary of selected NRF strategic collaborative initiatives within Africa, as well as to propose a framework for discussion on how the NRF, in line with its core mandate and its focus on Africa, can obtain and provide leverage through improved synergies between role players – both in terms of supporting research and innovation, as well as developing the requisite human capacity on the continent. *This approach is aligned with the evolving Africa Strategy that International Cooperation and Resources (ICR) at the DST is developing.*

The initiatives, instruments and engagements are clustered into i) **bilateral instruments**; ii) **areas of strategic investments**; iii) **enabling partnerships**; and iv) **leveraging new business**.

A dedicated focus on new approaches to funding mechanisms to provide innovative, contemporary and targeted support mechanisms to enable strategic collaborative engagements, informs the inclusive focus of the NRF, as guided by the DST. New investment horizons, active partners and cross-cutting initiatives have been launched as part of the further development and strengthening of internationalisation at the NRF.

[1] https://www.ist-africa.org/home/default.asp?page=news-doc-by-id&docid=8793

Bilateral Instruments

Africa Cooperation

In line with the NRF's mission to prioritise Africa, the Africa Cooperation unit within the International Relations and Cooperation's (IRC) Directorate of the NRF leads the promotion and support of continental and regional scientific collaboration. Active joint calls with nine (9) African countries have resulted in more than 190 joint projects valued at approximately R44m, as summarised in Table 1. A committed focus on inclusivity of geographical spread of participating South African institutions, diversity and equity in both the researchers and participating students, and a drive to research excellence through joint panels, are areas of strategic output for South Africa.

Table 1: Direct investment in bilateral projects (2009 – 2014)

Country	Number of Joint Projects	SA Investment	Partner Investment (JC amounts)
Algeria	22	R 2,320,499	R 2,400,000
Angola	13	R 7,843,525	R 10,000,000
Egypt	14	R 3,923,835	R 4,500,000
Kenya	24	R 3,906,463	R 5,200,000
Mozambique	20	R 4,720,546	R 4,800,000
Namibia	66	R 11,725,107	R 14,000,000
Tanzania	15	R 2,982,410	R 3,000,000
Tunisia	10	R5, 000, 000	R 5,000, 000
Zambia	8	R 1,513,240	R 800,000
Total	**192**	**R 43,935,625**	**R 49,700,000**

African Stakeholder Research Management Workshop

In further advancing and supporting the bilateral instrument mechanism, the NRF initiated and hosted during 2014 the first African Stakeholder Research Management Workshop. The event brought together research funding managers and administrators, grant coordinators, directors of research-oriented committees and associations, and representatives from Ministries of Science and Technology or equivalent from 10 African nations including Angola, Botswana, Egypt, Kenya, Mozambique, Namibia, South Africa, Tanzania, Tunisia and Zambia. The intent of this new annual event is to foster closer collaboration and advance quality joint research, also strengthening all participant organisations' ability to support high-level science.

UK Newton Fund

During 2013, the UK Chancellor's Autumn Statement announced the creation of an Emerging Powers Research Fund to develop scientific capacity in partner nations for their long-term sustainable economic growth. Up to £4 million will be spent on engagements with South Africa, with contributions from both DST and the NRF to match this. The NRF facilitates 80% of South Africa's total engagement with the Newton Fund. South Africa will be the first country to engage in trilateral arrangements under the Newton Fund, and has initiated discussions with Egypt, soliciting support from DST. Strategically, one of the first mega-projects supported and driven by the NRF has been

approved in Astronomy, supporting an innovative training programme with a number of African countries related to the African Very Long Interferometry Baseline Network (AVN).

Africa Mobility Grants

The Knowledge, Interchange and Collaboration (KIC) funding instrument is South Africa's largest mobility programme, supporting South Africa-based researchers to increase and expand their international networks. Specific engagements with Africa have been supported since 2013, with a concomitant increase in quality applications under the Africa bilateral framework as a consequence. Annually, more than 400 applications are supported, of which approximately 40% are focussed on Africa.

Areas of Strategic Investment

The African Very Long Interferometry Baseline Network (AVN)

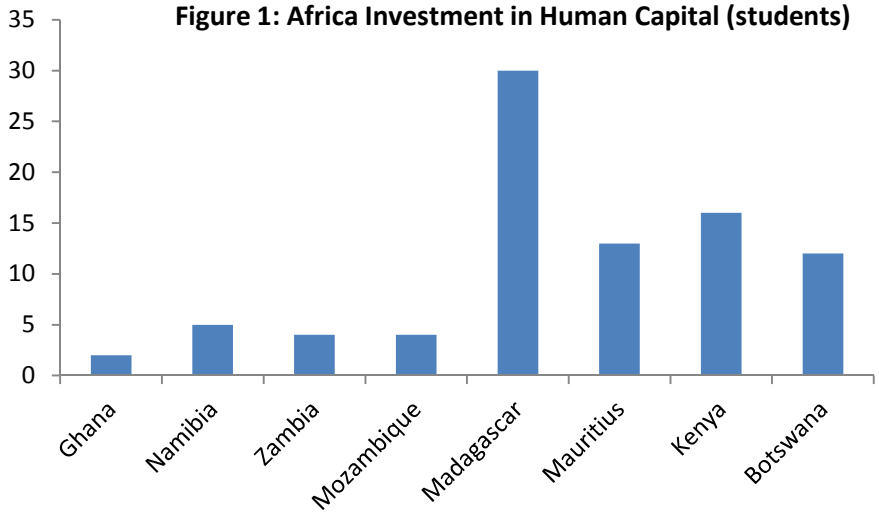
South Africa has a distinct competitive advantage in the field of Astronomy, and is not only a continental leader, but also an international contributor to the field. The NRF plays a pivotal role in coordinating and driving astronomy activities in South Africa. The varied astronomy initiatives of the national research facilities, viz. the Square Kilometre Array (SKA), the SA Astronomical Observatory (SAAO) and the Hartebeesthoek Radio Astronomy Observatory (HartRAO), are platforms from which the NRF can and should seek to increase collaboration and identify ways to continue to increase engagement with African partners. The SKA project is set to grow significantly and will involve eight African partners over the next 10 years through the African Very Large Baseline Network (AVN) Array which will see the refurbishment of disused radio telecommunications dishes (in Ghana and Kenya), as well as new dishes being built in Namibia, Botswana, Mauritius, Zambia, Kenya and Mozambique. The Very Large Baseline Interferometry (VLBI) technique will enable these radio dishes to work in unison, effectively as a single large telescope spread over a very large area that increases the sensitivity and the resolution of the telescope. The SAAO which operates the Southern African Large Telescope (SALT) is involved in building optical telescopes in Kenya and Ethiopia with potential for replication in other African countries. New collaborative opportunities – such as the potential next generation Cherenkov Telescope Array (CTA) telescope in Namibia – are on the horizon. A strong capacity building component has been incorporated into the suite of astronomy projects, including a large number of bursaries and scholarships across the pipeline to students from South Africa and other African countries. The total AVN investment in Africa has been R 140m, with support of R 120m from the Department of International Relations and Cooperation, and R 20m from DST.

The SKA South Africa project team continues to develop young scientist in Africa and have trained 18 interns to date – from Zambia, Ghana, Kenya and Botswana. A number of young scientists and engineers who have been trained by the AVN team have secured bursaries for PhD, MSc or MEng degree studies.

Due to this interest and the progress already made by the project team, significant leveraging of funds has been achieved with the UK contributing R7m to the project for human capital development and outreach programmes. The SKA bursary programme supports a number of foreign African nationals within the quota guidelines set by the Minister of Science and Technology. The

total costs of these bursaries and grants are R29m with the number of awards totalling 86. Figure 1 below provides details by country.

Figure 1: Africa Investment in Human Capital (students)



To increase capacity for delivery on the continent, additional funding from DST, the African Union (AU) and the European Union (EU) will support African students in a pre-doctoral programme for Astrophysics and Space Science. These funds have been secured through the National Astrophysics and Space Science Programme (NASSP).

Southern African Young Scientists' Summer Programme (SA-YSSP)

The SA-YSSP is an innovative initiative that contributes to the establishment, growth and enhancement of high level strategic research networks internationally, whilst at the same time developing capacity in systems analysis at the PhD, postdoctoral and supervisory levels through research conducted in the areas of the DST's grand challenges. SA-YSSP targets advanced doctoral candidates from South Africa, Southern Africa and IIASA member nations to ensure a rich international mix of participants and to encourage exchanges and collaboration on projects that address complex global challenges. Since inception, the programme has supported students from Sub-Saharan Africa who make up approximately 20% of the participants. An agreement with the International Institute for Applied Systems Analysis (IIASA) based in Laxenburg, Austria will be concluded with the NRF to further develop and strengthen the approach to systems analysis, particularly in SADC. Foresight capacity in Southern Africa will be a particular focus.

Global Research Council (GRC)

The NRF and the Namibian Council on Research, Science and Technology (NCRST) co-hosted the Africa Regional Consultation of the Global Research Council (GRC), bringing together representatives of 17 science granting councils in Africa and other stakeholders. This sets the scene for an expanded engagement with a large number of science granting councils on the continent, which will be confirmed during the annual global meeting of the GRC, which the NRF will co-host with its Japanese counterpart in May 2015 in Tokyo.

TWAS/NRF agreement for Mobility of Students from Africa

The NRF and the World Academy of Sciences (TWAS) is concluding a five-year agreement on human capital development, supported by the DST. TWAS and the NRF share common interests in developing a cadre of the next generation of researchers in Africa. Through TWAS, the main focus will be on fostering collaboration between developing countries. For the NRF, the partnership is sought in order to strengthen supervisory capacity for postgraduate students in South Africa. When aligned and combined, these two goals address a national objective of South Africa to build human capacity that supports the positioning of the country for global competitiveness and emergence as an economic power. Up to 240 bursaries for postgraduate students will be provided to study and conduct research in South Africa.

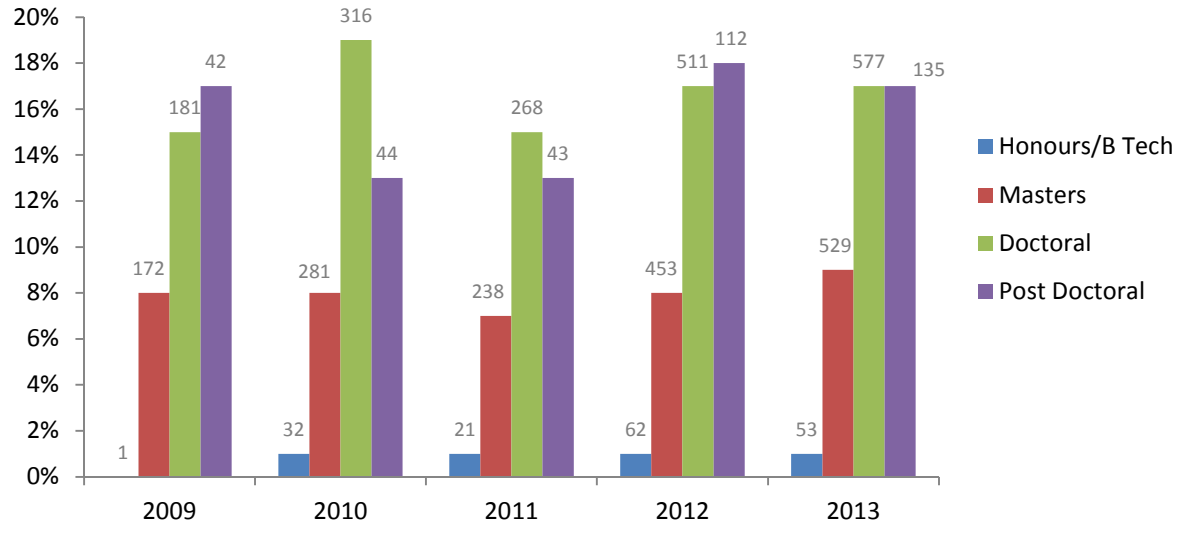
SADC Engineering Needs and Numbers Study

In 2009 South Africa proposed the establishment of an Engineering Programme to the 182nd session of the UNESCO Executive Board. The goals for this initiative include addressing the chronic shortage of engineers in the developing world, and particularly in the SADC region. The programme will further promote engineering education, capacity building and the application of technology solutions to eradicate poverty and address sustainable development. The NRF is implementing this programme on behalf of the DST with a total budget of R 3m.

Student Scholarships

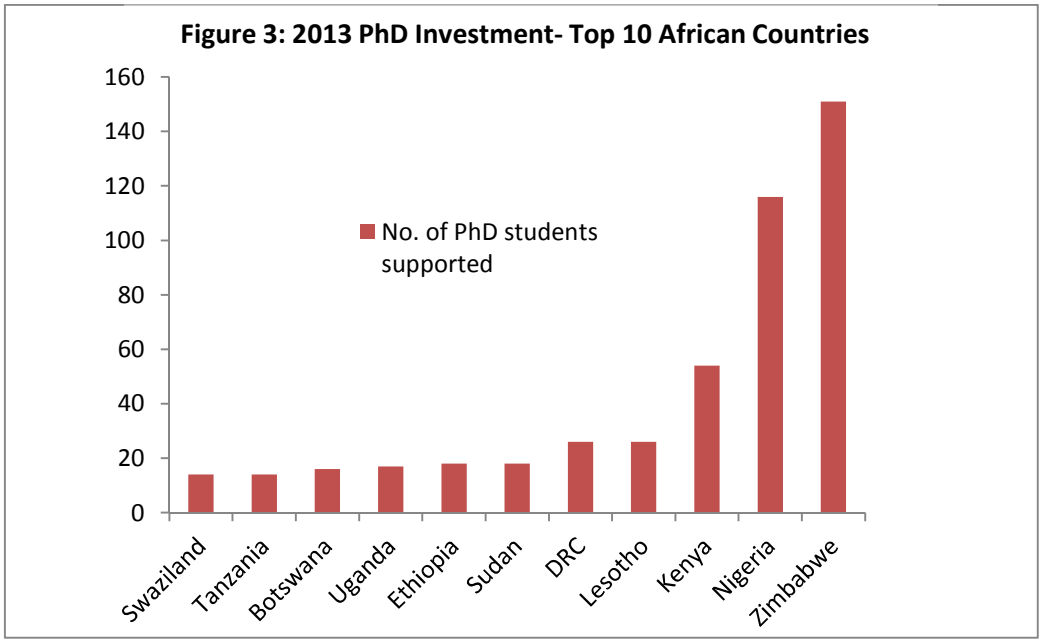
The NRF has significantly invested in a number of African students enrolled at higher education institutions in South Africa. African students supported by the NRF for the period 2009 to 2013, are indicated in Figure 2:

Figure 2: Investment in students from African countries
(Figures above the bar indicates actual student numbers)



As per illustration, during 2013 the NRF supported 135 and 577 postdoctoral fellows and PhD students respectively from 28 African countries, representing 18% of all postdoctoral and PhD students funded by the NRF. A significant portion of support is allocated at the PhD and postdoctoral

levels aligned to the human capital development strategy. As indicated in Figure 3, the majority of the investment during 2013 supported students from Zimbabwe and Nigeria.



SADC STI Policy Training

In 2008 the SADC Science and Technology Ministers endorsed the Science Policy Training for SADC Senior Officials programme and mandated South Africa to lead the process towards the initiation of the training. To ensure a balanced and highly regarded input on the different approaches to science, technology and innovation (STI) policy internationally, a UN organisation was recommended to develop the proposed training content, with the specific requirement of allowing varied national and international partner participation.

The NRF facilitated training for 11 SADC countries (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe) over a period of 18 months. The total contract fund for the SADC Policy Training project was R2.6m.

Enabling Partnerships

Strengthening and Funding STI for Africa

As side-events to the seminal US-Africa Leaders Summit in Washington DC during August 2014, the leadership of the US National Academies, the NRF and the Carnegie Corporation of New York co-hosted leaders from the African science academies, national science granting councils, and their partners. More than 20 leaders from the science academies of Cameroon, Ethiopia, Ghana, Kenya, Nigeria, Senegal, South Africa, Tanzania, and Uganda highlighted their role in advancing a range of scientific, technology, and innovation issues in Africa and planned together for future innovative endeavours to bring about transformative change in Africa.

The sessions included a joint symposium with the US National Academy of Sciences with leading African and American scientists and policymakers in the field of science and technology, as well as heads of African Science Academies. A prominent event, attracting more than 150 participants, was a Partners Forum initiated by the NRF on innovative global funding initiatives for STI in Africa. Dr Cora Marrett, Deputy-Director of the NSF, Dr Bernie Fanaroff, the SA SKA Project Director, and Minister Naledi Pandor of the Department of Science and Technology, were among the keynote speakers. Other stakeholders included private and public funders of research in the USA, the Forum for Agricultural Research in Africa (FARA), the World Bank and the US Agency for International Development (USAID).

Additional strategic discussions to forge stronger partnerships within the agricultural sector were also concluded. Recently during the Regional Universities for Forum for Capacity Building in Agriculture (RUFORUM) Biennial discussions, IRC on behalf of NRF, with the World Bank and the US Association of Public and Land-grant Universities (APLU), has been elected to host the interim secretariat of the Global Partnership on Agricultural Education and Training, aligned with the African Union's Year of Agriculture and Food Security (2014).

International Council for Science (ICSU)

By hosting the ICSU South Africa (ICSU-SA) secretariat and working closely with the ICSU Regional Office for Africa (ICSU-ROA), the NRF has greatly enhanced access to and facilitation of networking activities of researchers on the African continent, with members of the African Diaspora, and of the global ICSU community. Through ICSU-SA, grants are awarded for South African researchers to visit African countries as well as to invite African researchers to South Africa. ICSU- SA also supports other strategic bodies such as the International Astronomical Union (IAU) which is the largest body of professional astronomers in the world. The IAU has set up the Office of Astronomy for Development (OAD) in partnership with the NRF. The OAD has a global remit, and has been especially active in Africa, developing nodes in Zambia, Ethiopia and Nigeria. Recently, the OAD has been South Africa's first successful consortium partner under the H2020 programme of the EU.

The emergence of the Future Earth[2] initiative is a clear example of how international research groups are recognizing the need to harness their energies and function more synergistically. This global platform brings together the efforts of existing global environmental change programmes [Diversitas (merging into Future Earth), IGBP, IHDP, WCRP and ESSP][3], to help develop a stronger and broader community. The Future Earth initiative illustrates the emergence of multi-level collaboration models which promote interdisciplinarity in science, multiple funders in alliance, and the involvement of broad stakeholders (including policy makers, funders, academics, business and industry, and other sectors of civil society) to co-design and co-produce research agendas and knowledge in order to ensure increased capacity development. The NRF will support and initially coordinate the Africa node, pending additional discussions on hosting arrangements with ICSU.

[2] Future Earth will be a global platform to deliver solution-orientated research for sustainability, linking environmental change and development challenges to satisfy human needs for food, water, energy and health.

[3] IGBP: International Geosphere-Biosphere Programme; IHDP: International Human Dimensions Programme; WCRP: World Climate Research Programme; ESSP: Earth System Science Partnership

Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL)

Hosted and supported by the NRF, the SASSCAL intervention has grown out of previous science initiatives in Southern Africa and is actively supported by a broad range of stakeholders, aiming to establish the consortium as the regional driver for innovation and knowledge exchange to enhance adaptive land use, learning and sustainable economic development in Southern Africa under global change conditions. The main objectives of SASSCAL are to establish a network of science service centres in the Southern African region, thereby strengthening the regional scientific capacity and existing initiatives; support adaptation by the participating countries to cope with climate change and land use change and the resulting impact on ecosystem functions and services; and to generate and provide scientifically sound, relevant and timely information for policy and development planning processes that will promote the improved livelihoods of the broader society. Participating countries in the network include Angola, Botswana, South Africa, Zambia and Germany.

NRF-Carnegie Corporation of New York

IRC on behalf of the NRF has forged a strategic partnership with the Carnegie Corporation of New York through a joint initiative to determine how to increase the quantity and quality of PhD production on the African continent. Three high-level seminars with eminent scholars from the continent developed a range of policy briefs as one of the main inputs to the Continental Higher Education Summit in Senegal scheduled for March 2015. The approach has been lauded by the Chairperson of the African Union Commission, who participated in two of the events. At the Summit, the NRF will be facilitating the session on "*The role of research and postgraduate studies in African Higher Education"*.

University Engagements

Efforts by a number of individual higher education institutions in South Africa signals commitment to establish continental and international research networks of excellence. Examples include the Australia Africa Universities Network (AAUN) (Co-chaired by Prof Cheryl de la Rey) which brings together eight African universities (two from South Africa) and eleven Australian universities, connecting researchers and academics through institutional partnerships in order to address challenges facing both continents. The AAUN aims to sustain research and education collaboration and leadership across priority areas, as well as to marshal Australian and African expertise to address challenges across continents.

Similarly, highly strategic initiatives on the continent driven by the African Doctoral Academy (ADA) at Stellenbosch University, and the Education for Sustainable Development in Africa (ESDA) initiative by the University of Tokyo, University of Cape Town and five (5) African Universities, are indicative of a growing research focused framework that the NRF supports.

Leveraging New Business

Strengthening the Capacities of Science Granting Councils in Sub-Saharan Africa

A 5-year, $15 million investment for institutional strengthening and quality improvement of granting and research support, will be launched by the NRF, the Canadian International Development Research Centre (IDRC) and the UK's Department of International Development (DFID) in April 2015.

The innovative programme aims to strengthen the ability of African science granting councils to manage research, design and monitor research programmes based on the use of robust STI indicators, support the transfer of knowledge to the private sector, and establish partnerships with other science system actors.

The four main objectives of the programme are to strengthen the ability of participating science granting councils to: (i) Manage research; (ii) Design and monitor research programmes based on the use of robust Science, Technology and Innovation (STI) indicators; (iii) Support the transfer of knowledge to the private sector; and (iv) Establish partnerships with other science system actors.

The Belmont Forum

The Belmont Forum is a clear example of an alliance/collaborative approach to addressing complex global environmental change problems and pooling both financial and in-kind resources that are available to public funding agencies for increased impact. The platform strengthens engagement between the research funding agencies, research communities and increasingly the public, allowing for improved co-design, co-alignment, and co-funding of major research projects and programmes. The NRF was a founding member and served as the Co-Chair and co-secretariat of the Forum during 2012 to 2014. South African researchers, in collaboration with a number of African partners, have been awarded highly competitive grants as principal investigators and or collaborators in the areas of coastal vulnerability, fresh water security, food security, and biodiversity.

Conclusion

The acknowledgement that the answers to Africa's "hard major challenges" require collective, multidisciplinary intelligence and shared resources is adding impetus to the increasing scope and number of collaborative efforts in the realm of research and capacity development on the African continent. Despite the increased efforts towards collaboration, the overall approach remains fragmented and lacking in coordination and synergy. There are multiple benefits to be gained from improved and larger scale collaboration and coordination across sectors and disciplines – including resource sharing, optimal use of multiple opportunities and synergistic impact which can only be achieved by the sum of each role player's individual efforts.

It is thus the responsibility of the NRF to engage with appropriate role players to identify how the organisation can add value, coordinate activities and synergistically align with initiatives in order to achieve its core mandate, but especially to add value to the engagements on the continent.

Government departments and higher education institutions in South Africa are actively working towards increasing collaboration between relevant role players on the continent and overseas to stimulate research and innovation, as well as to promote high-level capacity development.

In the higher education sector, this commitment was confirmed at the Higher Education South Africa (HESA) Research and Innovation Conferences - held during 2010, 2012 and 2014 which identified the need to strengthen internationalisation efforts and partnerships through a series of targeted initiatives, including the development of a *South African Higher Education Internationalisation Framework* for the sector (this initiative is currently being considered by DHET, with the NRF a leading participant in the working group).

As a collective approach to innovative and strategic interventions, the NRF is further strengthening its suite of engagements to be responsive, proactive and contemporary in its approach to internationalisation, focusing on Africa. The following summarises current considerations:

- **Co-investment with funding partners** (international and African) over a range of countries through clustering of institutions/research institutes/networks etc., when goals, mission and objectives are well-aligned;
- **Investment in South African universities** to link with a potential suite of 16 selected universities on the continent;
- Investigating ways in which **discipline-based transcontinental initiatives** can be linked more effectively and funded collaboratively following the example of the Future Earth initiative and the Belmont Forum approach;
- Continue to focus on developing and strengthening the NRF's **relationship with strategic funding partners**, for example the IDRC, the Carnegie Corporation and the Bill and Melinda Gates Foundation.

The NRF will continue to work closely with the DST and other role players to further advance research collaboration and scientific cooperation on the African continent.
