



**Deepening Research Capacity and Collaboration across
Universities in SADC: a Southern African Universities
Regional
Research and Development Fund**

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Acronyms

ANDI	African Network for Drugs and Diagnostics Innovation
ASSAf	Academy of Science of South Africa
DALY	Disability Life Year
DRC	Democratic Republic of Congo
FTE	Full Time Equivalent (Researcher)
HEI	Higher Education Institution
ICT	Information and Communications Technology
IDRC	International Development Research Centre
IUCEA	Inter-University Council of East Africa
ODA	Overseas Development Agency
OECD	Organisation of Economic Cooperation and Development
R&D	Research and Development
RAE	Research Assessment Exercise
SADC	Southern African Development Community
SARUA	Southern African Regional Universities Association
S&T	Science and Technology
TDR	Special Programme for Research and Training in Tropical Diseases
WHO	World Health Organisation
UN	United Nations
UNECA	United Nations Economic Commission for Africa
USAID	United States Agency for International Development

I. Introduction

The literature abounds with references to the social and economic benefits of innovation (Guellec 2003, Guellec 2004, Cardoso 2009, Zagame 2010), and the associated activity of research and development (R&D) (Walwyn 2007, Baroush 2010). In particular, strong public sector R&D is considered essential to the capacity and capability of a country or region to innovate (Guellec 2003). Universities are the dominant contributors to public sector R&D, and their strength is critical to a vibrant and productive national system of innovation (European University Association 2010).

Unfortunately many of the universities in Southern Africa have been weakened by a combination of poor political management, insufficient public investment and the haemorrhaging of talent to the developed nations (European University Association 2010, Kotecha 2008). As a result, these institutions are well below their optimal performance levels in terms of both research output and human capital development. Despite the efforts of development agencies and continent wide initiatives pioneered by the African Union and others, universities in the region continue to struggle and lag behind similar institutions in Brazil, India and China, to name only a few countries. African science is dominated by three countries, namely Egypt, Nigeria and South Africa, with the three countries collectively accounting for over 80% of the total output of scientific papers (Adams et al 2010). Furthermore research collaboration, which is so essential to the productive research and human capital development, is restricted to three distinct clusters on the continent with relatively poor collaboration between the clusters (Adams et al 2010).

The Southern African Regional Universities Association (SARUA) proposes one possible solution to this problem, namely the establishment of a University Research and Development (R&D) fund to support collaborative projects in the region. In this document, the results of a background study to define the policy context, the objectives and the potential uptake of the proposed funding instrument are described.

2. Scope of the background study

This study has covered the following areas:

- the higher education policy environment within each of the participating countries including government objectives and priorities;
- the present higher education output from the region in terms of both publications and doctoral graduates (baseline data);
- the objectives, funding scales and lessons learnt from previous initiatives aimed at similar outputs (local and international);
- the feasibility of the proposed Fund, considering the present state of research and mentorship within the region, and with specific reference to:
 - the case for the establishment of a regional University Research and Development Fund;
 - the relevant stakeholders (performance institutions) and the potential roles in respect of establishing and managing such a fund;
 - specific considerations, in the view of the performance agencies, that should be taken into account in the establishment of a regional fund (as opposed to a national fund)
 - a list of potential focus areas (S&T domains) for the proposed fund based on

the regions priorities and the existing competence areas within the participating universities; and

- a detailed motivation (objectives, scope and implementation modality) for the Fund

3. Summary of the Policy Environment

3.1 R&D, Innovation and Development: an Academic Perspective

In 1987, many years before the major information technology advances of the late 20th century, Robert Solow received a Nobel Prize in economics for his work (Solow 1957) on the link between innovation and economic development. This work concluded that over 50% of the growth in United States output per hour during the first half of the twentieth century could be attributed to advancements in knowledge, particularly technological innovation¹ underpinned by R&D².

Although this relationship was accepted in developed countries, for much of the previous century the importance of a formal process for new knowledge generation to developing economies was questioned. It was argued that developing countries could ill afford the ‘critical mass’ investments in research infrastructure, and that the economic policies of such countries should focus on alternative sources of knowledge, such as technology transfer and adaptation (referred to as non-technological, incremental innovation).

More recently this perspective has shifted, with most academic literature now supporting the development of strong national systems of innovation, including robust R&D performance agencies, as essential to the implementation of domestic development agendas, and governments are urged to focus their efforts on how the two activities can be supported and fostered. In particular, it is emphasised that universities play a crucial role in all national systems of innovation, and particularly in the performance of basic and applied R&D, which collectively lay the foundations for a healthy innovation-based economy. As noted in the recently published White Paper on ‘Africa-Europe Higher Education Cooperation for Development: Meeting Regional and Global Challenges’ (European University Association 2010):

“Higher education is of critical importance to the long term development of knowledge societies ... Universities are vital for conducting research and researcher training, and therefore are important for knowledge generation and innovation to meet both local and global societal and economic needs. The development and modernisation of higher education is therefore a critical issue for governments and stakeholders around the world. Urgent action is needed to ensure that African countries have the necessary higher education capacity to respond to domestic and global challenges in the decades to come.”

Similarly this document notes that ‘research collaboration is clearly a priority of mutual interest for both Africa and Europe in terms of generating innovative capacity for social and economic development ... A stronger emphasis should be placed on developing research collaboration in its two-fold function, as a contribution to knowledge generation and exchange, and as a capacity building measure to support institutional development’ (European University Association 2010).

¹ Innovation is defined as the creation of economic value from knowledge.

² R&D is defined as the formal process leading to the generation of new knowledge.

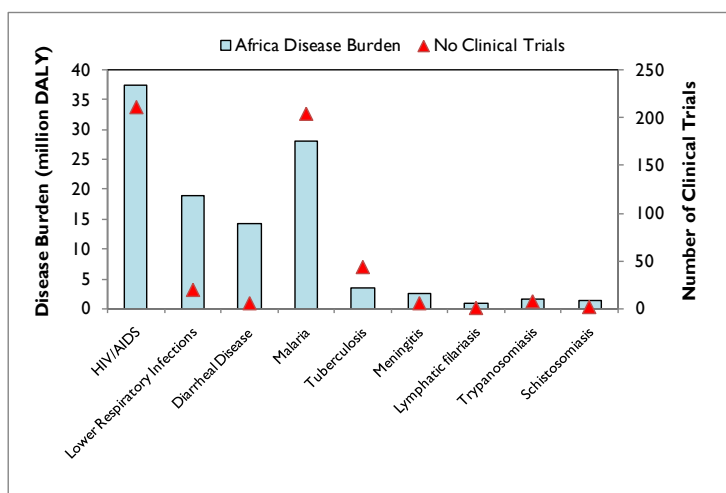
The same document also notes that ‘training talented young researchers is a major challenge for many African institutions and requires building capacity especially at doctoral level. This is crucial for the development of institutional and national research capacity ... Universities do not only need to produce PhDs for their own purposes, but for societies and economies that require research trained labour in a growing number of professional fields.’

The extent to which this new perspective on strengthening innovation systems and R&D institutions, as fundamental to development, has been incorporated into international and national policies is discussed in the subsequent sections.

3.2 International Donor Policies

Many international organisations, including the World Health Organisation, various agencies of the United Nations, and the Bill and Melinda Gates Foundation, recognise the importance of innovation, and building capacity for R&D, in dealing with the problems of developing countries. For instance, the Special Programme for Research and Training in Tropical Diseases (TDR) has recently launched the African Network for Drugs and Diagnostics Innovation (ANDI) in order to ‘promote and sustain African-led health product innovation and R&D to address African public health needs through efficient use of local knowledge, assembly of research networks, and building of capacity to support economic development’ (ANDI 2009). The network was established as a direct consequence of the Global Strategy and Plan of Action (GSPA), outlined at the 61st World Health Assembly which proposed the formation of R&D networks in disease endemic countries to ensure that existing capabilities are leveraged, identified gaps are more effectively filled and local priorities drive the R&D agenda.

Figure 1. African diseases attract little interest in global pharmaceuticals R&D



The area of health represents a particularly convincing argument for the strengthening of African research capacity in order to ensure that health problems which are endemic or peculiar to South Africa are adequately addressed. For instance, the ANDI publication (Nwaka 2010) shows that although the disease areas of HIV/AIDS, tuberculosis and malaria have attracted significant research funding, the diseases of schistosomiasis, trypanosomiasis, lower respiratory infections, diarrhoea and lymphatic filariasis remain substantially underfunded despite the large contribution of the latter to death and disease burden.

For instance, diarrheal disease accounts for 7.5% of the overall African disease burden, as measured by disability life years (DALYs), but accounts for only 0.4% of the clinical trials presently being undertaken on a global basis (see Figure 1). Applying a normalisation factor based on the number of clinical studies per disease burden, the level of funding on lower respiratory diseases and diarrhoea should be at least 5 to 10 times higher than the present level. The ANDI business plan (ANDI 2009) estimates that the health research funding gap in Africa is at least \$1 billion per annum and further specifies that the three main health R&D challenges in the continent are the ‘significant knowledge gap for diseases disproportionately affecting Africa, the low degree of collaboration among African researchers and insufficient investment and ownership of R&D in and for Africa’.

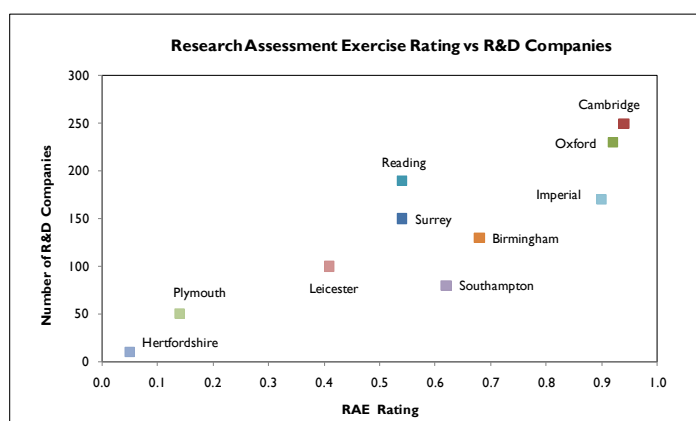
There is a striking similarity between many of the policy documents of these organisations as follows:

- the importance of innovation and its related activity of R&D to the economic development of all countries is acknowledged
- research collaboration (both North-South and South-South) is seen as an important means of building research capacity and generating relevant new knowledge
- the production of PhD level researchers is also considered as critical for building research capacity and developing of knowledge-based economies.

3.3 National and Regional Policies

Most developing and developed countries, probably without exception, emphasise the importance of supporting a vibrant higher education sector in order to achieve the three objectives of human capacity development, R&D, and technology transfer in support of unmet social needs. In developed countries, this objective is embedded in much of the economic development and innovation policy documents. For instance, the United Kingdom’s Science and Innovation Investment Framework (2004 - 2014), noted that the importance of the country’s science base to its innovation capacity, and committed the government to an average annual growth rate in science funding (and particularly basic science research in universities) of 5.8% in real terms (HM Treasury 2004).

Figure 2. Strong research universities stimulate growth of regional clusters



Several subsequent publications have highlighted the economic returns from this investment; for instance the Sainsbury Review of the United Kingdom’s Science and Technology Policies notes that the formation of high-technology clusters around the

country's world-class research universities, and the resultant stimulation of regional economies (Sainsbury 2007; see Figure 2). The same report maintains that universities 'promote innovation and entrepreneurship, not only by spinning out companies, but also by creating an appropriate microenvironment to attract innovation-based companies and foreign R&D facilities'.

Among developing countries, China is a good example of a country which followed (and continues to follow) an R&D intensive approach to development (Walwyn 2010). This policy approach is now urged on all developing countries; for instance in a recent Organisation of Economic Cooperation and Development (OECD) publication (Kraemer-Mbula 2010), it is argued that 'while it is recognised that innovation is more than R&D, R&D matters and must be supported'. As for developed countries, the role of universities in national systems of innovation is recognised with both regional and national policy documents calling for a strengthening of these institutions. For instance, in its 2nd Decade of Education Plan of Action, the African Union calls for revitalisation of higher education in Africa through various initiatives including better cooperation and exchange between African institutions. The latter has stimulated a growing interest in strengthening intra-African higher education cooperation, as reflected by the agenda of several higher education organisations such as the Association of African Universities, the Inter-University Council of East Africa (IUCEA) and the Southern African Regional University Association (SARUA).

While acknowledging the distinction between R&D and science and technology (S&T), a similar perspective on not only the importance of R&D, but also the way in which new knowledge is now generated, can be obtained from a recent comparison between the S&T policy of the United States and the BRIC countries (Brazil, Russia, India and China) (National Research Council 2010). This report notes the following:

"The global science, technology, and innovation (ST&I) environments are largely open, with easy and inexpensive access to information for a greatly expanding number of countries and people who will participate in advanced S&T creation, innovation, and commercialization. The "control and isolation" of information strategy of the 1950s that restricted access to information that was deemed critical to national security and economic competitiveness has broken down in several important areas.The explosion of access to the Internet and the increase in the conduct of scientific and engineering research outside the United States have increased access to information for people and countries alike. When coupled with the increasing pressure to lead the introduction of innovative products into the global marketplace, this increased access to information has flipped the paradigm from "control and isolation" of information for innovation control to "engagement and partnerships" between innovators for innovation creation."

In other words, national S&T policy and the closely related R&D policy both reflect the importance firstly of R&D, and secondly to the centrality of collaboration/partnerships to the creation of new knowledge. The extent of existing R&D linkages in Africa, and how this situation can be improved, are discussed in more detail later.

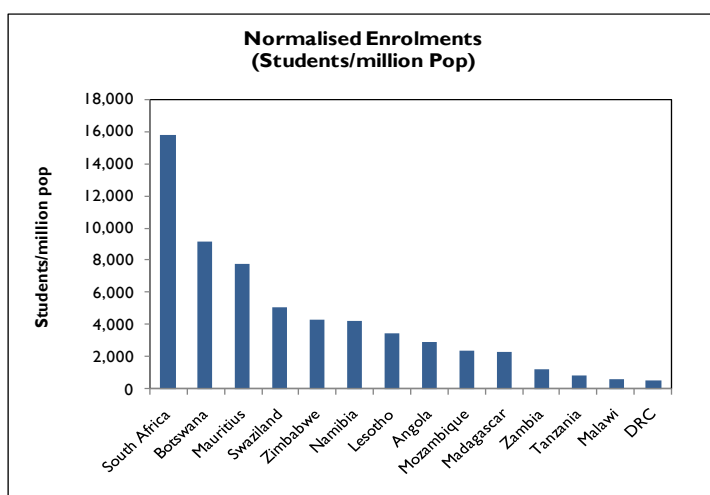
4. Imperatives for Change in SADC Universities

Despite the unambiguous and now uncontested policy objectives, the translation of these objectives into improved environments for both research and teaching within southern African institutions continues to lag. Many of the latter institutions complain of lack of governmental and institutional policy, limited financial support and poor research infrastructure as the main obstacles to the improvement of the outputs within the

universities (Kotecha 2008). Some of the broader issues requiring fundamental re-alignment are as follows:

- higher public spending in R&D; as noted by Mouton (2008) the ratio of Gross Expenditure on Research and Development (GERD) to Gross Domestic Product (GDP) in all SADC countries with the exception of Mozambique and South Africa falls below 0.5% (a target of 1% for developing countries is considered a minimum with much of this spending coming from public funds)
- higher student enrolments as a percentage of the total population; increased levels of education, especially at the tertiary level, are essential in the transition from commodity to knowledge based economies (see Figure 3)
- significantly expanded levels of funding for doctoral studies with a particular focus on shifting the balance of students towards full-time study (ASSAf 2010).

Figure 3. SADC enrolments are highly skewed



Many specific recommendations have been made about how to improve the capacity and productivity of African universities. For instance the European University Association White Paper calls for a number of urgent actions including the following:

- higher levels of international exchange and cooperation
- more innovative partnerships models as a means to strengthen both North-South and South-South collaboration
- more funding for intra-Africa exchange and research collaboration such as the proposed Mwalimu Nyerere programme (it is considered that low activity in intra-African mobility is not due to a lack of interest but rather a lack of funding opportunities)
- enhanced understanding and exchange in the area of graduate and specifically doctoral education
- increased support for the internationalisation of universities and the promotion of the integration of internationalisation and development cooperation strategies (European University Association 2010).

5. Baseline Data; Present University Outputs

5.1 Methodological Issues with Output Measurement

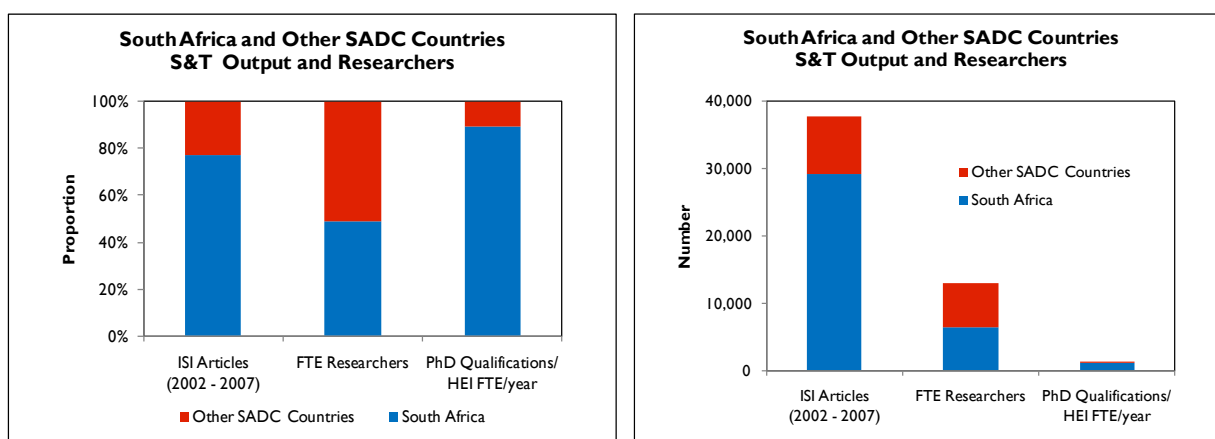
The measurement of institutional performance in the higher education sector has been a highly contested area for many years. Present methodologies follow similar approaches, with parameters such as numbers of peer-reviewed publications, impact scores, h factors (for individual academics), number of graduations at doctoral level, and contract research income being common to many evaluation frameworks. These parameters are not without controversy, with many academics arguing that they lack rigour, the favour quantity over quality, and fail to account for the contribution of many researchers, especially in the humanities and social sciences.

In this report, the standard parameters of peer-reviewed publications and numbers of doctoral-level qualifications are used, notwithstanding the problems with the indicators. It is noted that there are several initiatives to revise the evaluation frameworks, including a high-level project within the European Union known as U-Multirank (European Commission 2010). The collection of additional data, as recommended by such initiatives, is beyond the scope of this study.

5.2 Baseline Data: Publications

Much of the data in this section, and in Section 5.3 has been extracted from the previous SARUA reports (Mouton 2008 and Butcher 2008). These reports provide a thorough overview of the research and post-graduate outputs of the universities within the SADC countries. A striking feature of all the data is the dominance of South Africa within the various categories, including scientific publications, PhDs, student enrolments, and number of public universities, whether this is measured on an absolute or a normalised basis (see Figure 4)³.

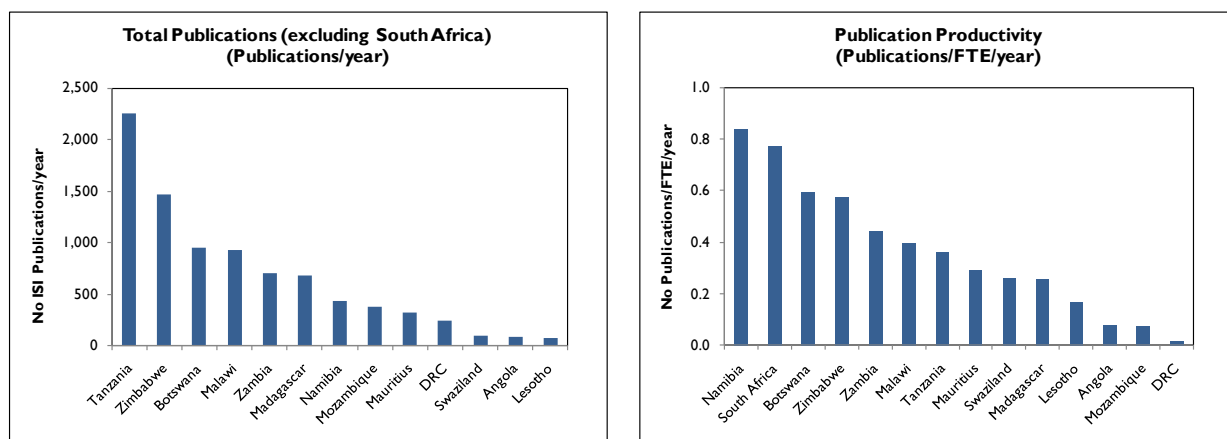
Figure 4. South Africa produces more than 80% of SADC R&D output



A second feature is the generally low research output, which is clearly a major challenge for all SADC countries and requires active intervention for the situation to be improved (see Figure 5; the average research output for developed countries is between 1.2 to 1.5 publications/FTE/year).

³ Normalisation is computed using both per capita or gross domestic product (GDP).

Figure 5. Publication rates are low for most SADC countries

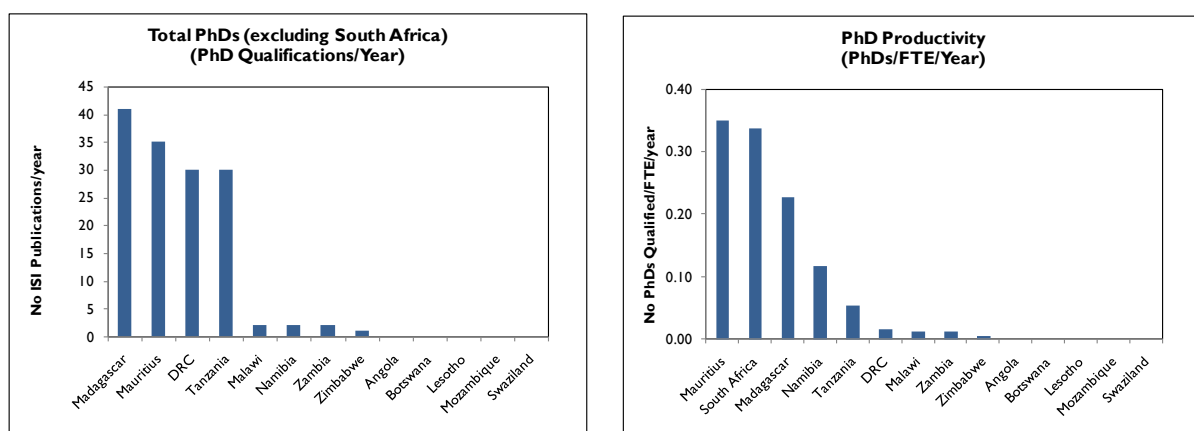


5.3 Baseline Data: Doctoral Qualifications

The production of doctoral graduates is an essential component of the national system of innovation of modern industrialized societies. Such graduates have acquired the necessary knowledge and skills that underpin the modern knowledge economy and are able to produce new knowledge. As a result, the Department of Science and Technology and National Research Foundation in South Africa have developed programmes to accelerate the production of PhDs in the system.

Similar trends as for publications are observed for doctoral (PhD) qualifications (see Figure 6). Although South Africa accounts for 89% of PhDs in the region, two recent reports by the Council on Higher Education (Centre for Research on Science and Technology 2009) and the Academy of Science of South Africa (ASSAf 2010) both note that the “production of doctorates in South Africa is and has remained stable for several years. It is equally clear that working only within existing systems, and taking into account available capacity, there is simply no way that a rapid growth in high-level qualifications at the level of the doctorate will materialise in the foreseeable future.”

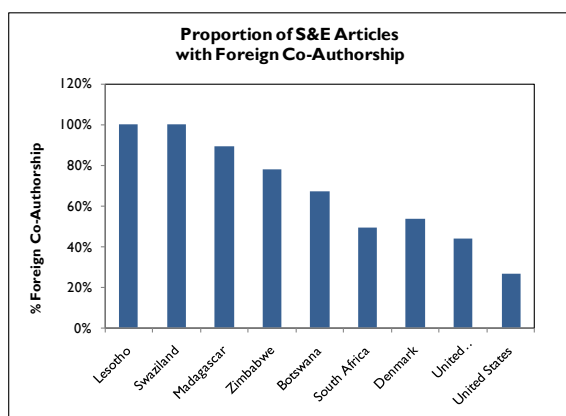
Figure 6. SADC countries have very low graduation rates per FTE



5.4 Baseline Data; Clusters of Collaboration

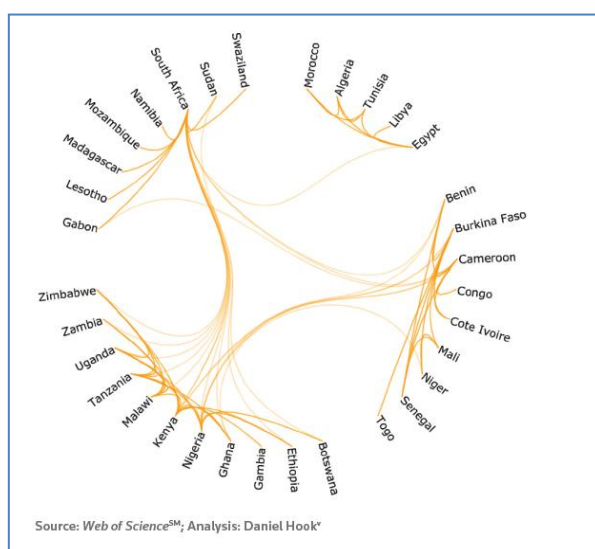
Collaboration and partnerships in the production of new knowledge, and especially for universities, is widely acknowledged as being not only important, but in many respects essential. Although there is evidence of extensive North-South collaborations (for instance science and engineering articles from several SADC countries have >90% foreign co-authorship⁴; see Figure 7), the same cannot be said of South-South partnerships.

Figure 7. Foreign co-authorship in science and engineering articles



There is some collaboration within Africa, but this tends to be organised within four very distinctive and separate clusters, namely the northern Arabic countries, the former French colonies, former British colonies excluding South Africa and her neighbours, and the remainder (see Figure 8). This image has been extracted from the Thomson Reuters report on science in Africa (Adams 2010), and illustrates the limited inter-cluster partnerships especially between the northern Arabic countries and the former French colonies.

Figure 8. Collaboration clusters in Africa

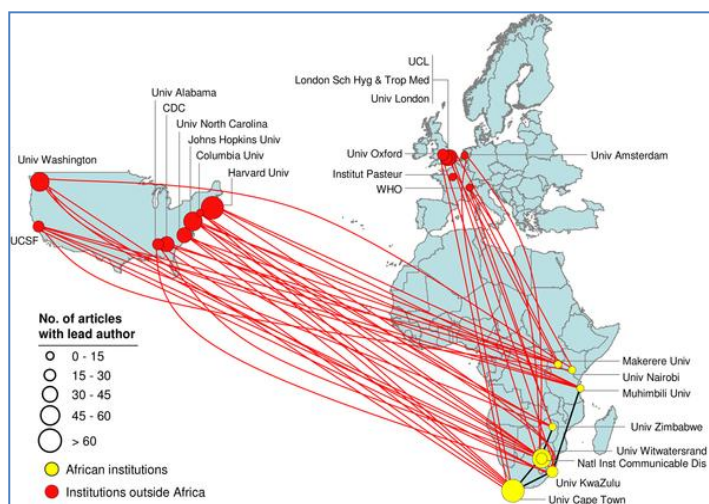


Similarly, an image from the ANDI business plan (Nwaka 2010) shows that the HIV/AIDS

⁴ Data on co-authorship has been obtained from the World Bank Knowledge for Development web site (World Bank 2009).

R&D networks are dominated by North-South partnerships, with very few South-South co-authorships on research publications, as noted by leading author status on the publication (see Figure 9).

Figure 9. HIV/AIDS R&D networks between Africa and countries elsewhere



In summary, there is an urgent need within the SADC region for an instrument which can address the following three weaknesses of the HEI sector:

- funding for R&D and hence output of peer-reviewed literature
- support for PhD studies, including adequate facilities, experienced/competent supervision and post-graduate students
- a greater degree of South-South/intra-regional R&D collaboration.

These weaknesses have already been identified by other organisations (for instance, see ANDI 2009 and Nwaka 2010). The experiences of these organisations, and organisations which have funded North-South partnerships in the SADC region, are described in the forthcoming section.

6. Experiences of R&D Funding Initiatives

R&D is supported by a number of funding actors including the following (South Africa 2008):

- government: funds are made available through institutional research allocations/call for research proposals, or *via* donor funds reserved for specific interventions. In most developing countries the majority of these funds are provided by developed countries through various support instruments. Where developing countries allocate R&D funds these are primarily granted for research projects within that specific country. South Africa provides several funding instruments which fund mainly basic and early stage applied research.
- private sector: this sector generally supports commercial R&D, with a focus on near-commercial opportunities or addressing of company-specific challenges. This funding is not necessarily aligned to national R&D priorities and the benefits may be limited to the company

- donor organisations: philanthropic organisations, such as foundations and trusts, are also major contributors to R&D, especially in respect of capacity development initiatives or studies impacting quality of life.

In considering the funding landscape for the proposed Regional R&D Fund, an overview of initiatives supporting African R&D was undertaken. The main source reference for this work was the International Development Research Centre's (IDRC) recently issued Compendium of Funding Opportunities for Research, Education, and Development Projects in Africa (The WorldFish Centre 2009). In each case information was obtained on the funding source, key objectives of the fund/funder, the fund's/funder's priorities and funding instruments employed. The tabulated outputs of this exercise are provided in the Appendix (attached as a separate document).

This overview is not fully comprehensive, but indicative of the diversity of funds and funders operational in Africa, the priorities receiving R&D funding, and the instruments utilised in addressing such priorities. Where possible, reviews of the respective funding programmes were studied, although limited information appears to exist in this regard. While monitoring and evaluation may be conducted at project-level, these studies and the evaluations of the full programmes are not generally publicly available, with the exception of the Overseas Development Aid (ODA) country studies which provide macro-level information relative to the country-specific ODA agenda.

Sections 6.1 and 6.2 below highlight examples of funds/funded initiatives that offer insights into the creation and institutionalisation of a regional HEI R&D fund. A summary of appropriate priorities and funding modalities is provided, as well as any available reviews, lessons learnt and the associated recommendations of each specific fund.

6.1 North-South Funds

The majority of funds supporting higher education and R&D initiatives operate on the basis of North-South cooperation, irrespective of the source of funding (both foreign governments, as well as many philanthropic organisations adopt this *modus operandi*). The examples given below provide a snapshot of the different modalities adopted by various funders.

6.1.1 The Higher Education Partnerships in Africa Programme

The Higher Education Partnerships in Africa Programme, which is jointly financed by the United States Agency for International Development (USAID) and the United States Department of State, focuses on the development of institutional partnerships between USA colleges and universities with institutions of higher learning in developing countries. The goal of these higher education partnerships has been to promote economic development and poverty reduction in cooperating countries, while serving students, faculty, and citizens in the United States.

In the period 1998 to 2007, 109 USA to Africa higher education partnerships were formed as part of this programme, comprising about 33% of all partnerships with developing countries over the same period. The partnerships were primarily focused in the areas of education, agriculture, economic development and health. The majority of partnerships were funded by small, two-year "seed grants" of about \$100,000, although substantial

additional contributions were made in-kind and through cost-sharing.

Ninety three of these projects involved partners in sub-Saharan Africa. The focus of the partnerships was on capacity building through faculty upgrading, institutional strengthening, with programme areas selected often paralleling the USA government's strategic objectives for economic development and poverty reduction, such as agriculture and environment, education, communication technology, health, workforce development, democracy building, and economic growth. Evaluation studies showed that the partnerships:

- met their objectives using appropriate theories of programmatic change and strategies
- effected change in the host-country institutions
- initiated changes that lasted long after the official contracts ended
- attracted a large and diverse group of U.S. higher education partners
- improved teacher/classroom preparation and training
- provided evidence of how faculty assisted in policy advising to non-government organizations and government ministries
- improved academic programs and curricula
- demonstrated how the higher education institutions were working in the communities (outside the universities) such as supporting skilled workforce training
- positively influenced national policy and the achievement of national development goals in host countries.

A study reviewing the decade of funded partnerships concluded that “strengthening tertiary education in Africa has only begun. There is a growing recognition that increased foreign assistance is desperately needed to expand and extend the benefits higher education offers. African higher education requires continuing institutional and faculty strengthening, quality monitoring and accreditation standards, an increased focus on extension and public service, and viable plans to fund institutional change and growth. These requirements must be addressed within a context that includes a rapidly growing private university segment” (Morfit 2009, Hartle 2008).

6.1.2 Global Change System for Analysis, Research and Training (START)

START is a network of research centres and collaborating scientists in Africa, East Asia, South Asia, Southeast Asia and Oceania working on global environmental change issues. START was formed in 1992 under the aegis of the International Council for Science (ICSU) and its four international global change science programmes. START's main objectives are to promote research-driven scientific capacity in Africa and Asia that builds human resources and institutional strengths, and fosters an exchange of knowledge/information at the science-policy interface.

START has three key mechanisms that it utilises to achieve its goals of capacity building, stimulation of regional research and development of a vulnerability/adaptation programme. START provides fellowships, training and research grants, and fosters collaboration and sharing amongst scientists, as well as policymakers and governments. START's work in nurturing and strengthening regional research structures has resulted in substantial growth in the number of scientists and institutions from developing countries involved in global environmental change research, and has enhanced the output and quality of peer-review

publications. START recently convened a forum on the role of African universities in supporting and informing societal efforts to adapt to climate change. A key outcome of the forum was the creation of the African Climate Research and Education (ACRE) network. Other examples of START initiatives include the African Climate Change Fellowship Programme (ACCFP) and Advancing Capacity to Support Climate Change Adaptation Programme (ACCCA). START receives funding for its operations from a myriad of funders, viz. the Department for International Development (DFID – UK), the European Commission, the International Development Research Centre (IDRC), the Swedish International Development Cooperation Agency (SIDA) and the World Bank to name a few.

6.1.3 The South Africa Netherlands Research Programme on Alternatives in Development (SANPAD)

SANPAD brings together academics from South Africa and the Netherlands for research in the field of the social and economic sciences. The Programme was established in 1997 with the goals of promoting co-operation between Dutch and South African researchers and institutions, developing research capacity and a research culture in historically disadvantaged communities, stimulating and promoting quality research, and producing research outputs intended and useful for development purposes. SANPAD receives its funding from the Netherlands Ministry of Foreign Affairs. In its external evaluation of Phase I, the following conclusions were presented:

- implementation of research findings by policy-makers and other users needed to be carefully monitored
- the number of aims and themes of the Programme had been too ambitious and needed culling
- the ‘match making’ function between SA and NL researchers required special attention
- programme governance was to be simplified in Phase 2 by concentrating governance and administration in South Africa, albeit with Dutch membership of the respective organs.

In response, Phase 2 of SANPAD refined its general objectives and reaffirmed its focus on the financing of multi-disciplinary research projects with social development and policy related content across thematic areas, with a special emphasis on poverty reduction. The development of research capacity was also a key SANPAD initiative. Outputs for the period under review (1999 – 2004) were prolific, with 589 academic outputs averaging 6.8 units per project and 394 scientific outputs, averaging 4.5 units per project. Recommendations from the internal review to improve the efficacy of the SANPAD programme include:

- improvement of the monitoring and analysis
- regular updating and more accurate data capturing of SANPAD data
- the promotion of enduring and sustainable networks
- the capacity development of policy makers
- special post project completion funding with an eye to publication
- inclusion of policy makers and civil servants in policy relevant research
- attention to the strategies that will be employed in dissemination and their impact on policy
- training of supervisors to enhance the quality of supervision available to graduate

students

- attention by SANPAD to the decision making processes around funding
- consideration of funding projects that integrate graduate programmes with research outputs to enhance both accredited and graduate outputs
- sensitivity by SANPAD to undue pressure on researchers emanating from excessive requests for similar information.
- projects that integrate graduate studies and research projects of some scope lead to increased outputs –both accredited and graduate (Baijnath, 2006).

SANPAD is currently in Phase 3 of its operation, with poverty reduction continuing as key focus area and the key objectives being to promote the internationalisation of higher education and to encourage sustainability of the SANPAD programme through facilitating new partnerships with the Southern African Development Communities (SADC) and other internationally relevant partners. SANPAD's activities for Phase 3 include:

- financing approximately 76 research projects, 40 pre-proposal and 40 reformulation workshops
- facilitating and financing approximately 15% of total research budget on development research in the areas of science, technology and innovation
- facilitating an annual Pre-doctoral Research Capacity Initiative and Advanced Research Capacity Initiative programme for registered PhD candidates
- undertaking ~25 relevant research support activities to promote equity and excellence in research and research capacity building in advancing the development of a knowledge society in South Africa and the selected SADC states
- promoting regional cooperation in research and knowledge development within selected SADC states (approximately 10 projects) through a multilateral (NL, SA and SADC) mutually beneficial research partnership and capacity building programme.

6.1.4 The European Union's 7th Framework Programme for Research and Technological Development (FP7) Africa Call

The EU-Africa Strategic Partnership paved the way for the FP7 Africa call, presenting an opportunity for strengthening Africa's base in research areas, addressing the complex issues of global water and food security and the health of populations in developing countries. The call, implemented jointly by the FP7 'Health', 'Food, Agriculture and Fisheries, and Biotechnology' and 'Environment (including climate change)' Themes, funds projects aimed at enhancing African socio-economic development and capacity building.

The aim of the call is to address some of the S&T objectives of the "Africa - EU Strategic Partnership" putting emphasis on 'Water and Food Security' and 'Better Health for Africa.' It has a holistic approach involving various scientific and technological research fields, such as food, agriculture, health, land and water resources, including their interaction with climate change and integrating broader socio-economic factors such as migration and resettlement, urbanisation, health care systems and programme interventions. A multi-disciplinary and integrated approach, taking into consideration broader socio-economic factors, and the participation of appropriate stakeholders and local and/or regional actors is considered essential to achieving the expected impacts. A balanced level of participation for African countries in collaboration with their European partners is desired, with due consideration required of the various geographical, sectoral and cultural differences that exist within Africa.

Instruments utilised for the call comprise:

- Collaborative Projects, large scale integrating projects and small or medium scale focused research projects, for specific cooperation actions (SICA). The participation criteria required at least 4 independent legal entities, of which, 2 to be established in different member state or associate countries and the other 2 must be established in different international cooperation partner countries (ICPC) from African ACP members and / or Algeria, Egypt, Libya, Morocco, and Tunisia.
- Coordination and Support Action (coordinating action): at least 6 independent legal entities, of which, 3 must be established different member state or associate countries, 2 of which are not established in the same member state or associate countries, and the other 3 must be established in different ICPC from African ACP members and / or Algeria, Egypt, Libya, Morocco, and Tunisia.

The total call budget is €63,000,000, of which €39,000,000 is allocated from Theme 1 – Health, €6,500,000 from Theme 2 - Food, Agriculture and fisheries, and Biotechnology and €17,500,000 from Theme 6 - Environment (including climate change).

Other examples of relevant North-South collaborative funds include:

- *The Africa Capacity Building Foundation (ACBF)*: ACBF supports projects and programmes strengthening the public sector. ACBF has supported a total of 246 programs and projects in some 44 Sub-Saharan African countries and committed more than \$400 million to capacity building.
- *The African Caribbean and Pacific (ACP) Science and Technology Programme* focuses on building and enhancing strong scientific and technological capacity to support research, development and innovation in the ACP region in the areas of health, the environment, energy, transport, agriculture and sustainable trade. In the Programme's 1st call 36 projects were funded supporting co-ordination and networking in applied research, collaborative research and the management of research activities and reinforcement of research quality as key schemes.
- *The Alliance for a Green Revolution in Africa (AGRA)* seeks to improving agricultural productivity and small holder farmer well-being throughout sub-Saharan Africa
- *The Global Research Network* has as one of its core objectives fostering global policy debates in developing and transition countries, and through its African Economic Research Consortium (AERC) is strengthening local capacity for economic policy research in the Sub-Saharan Africa region
- *Netherlands-African Partnership for Capacity Development and Clinical Interventions Against Poverty-Related Diseases (NACCAP)* endeavours to strengthen African R&D capacity in the field of poverty-related diseases through investment in joint research activities and clinical testing in Africa at locally owned R&D centres.

North-South collaboration is currently the most prevalent means of realising research capacity and networking initiatives on the African continent. Recent initiatives, however, are increasingly focused on contributing to and enhancing South-South collaboration. The Japan International Cooperation Agency (JICA), for example, regards South-South Cooperation as contributing to North-South Cooperation, stating:

“A country in the South sometimes has a better chance to find solutions to its development challenges in the experiences of other Southern countries with similar economic, social and cultural

conditions ... South-South Cooperation is also seen as a means for a Southern country to enhance its capacity, transforming itself into a donor of assistance”.

6.2 South-South Funds

South-South Cooperation is defined by the United Nations Development Programme (UNDP) as “a means of promoting effective development by learning and sharing best practices and technology among developing countries”. This has been interpreted within the context of funding of R&D and education initiatives, as the provision of funds (irrespective of the source of funding) to support South-South collaborative programmes, strengthening research capacity and networks, particularly in HEIs (but not limited to these institutions).

Key initiatives illustrating such South-South collaborations are highlighted below. It should be noted, however, that with few exceptions, such programmes are wholly financially supported by funders from the North.

6.2.1 The Mwalimu Julius Nyerere Programme

The overall objective of this initiative is to promote sustainable development and poverty alleviation by increasing the availability of trained and qualified high-level professional manpower in the African countries. The Nyerere Programme will fund:

- exchanges of students between participating African universities on approved post-graduate courses (lasting maximum two years)
- links between two or more African universities, to further the process of capacity building. Links will include exchanges of university faculty members for approved teaching programmes, research and staff development, planned and prepared jointly.
- limited sponsorship for undergraduate degrees for applicants from countries in situations of conflict or post-conflict
- twinning partnerships bringing together, inter alia, European and African universities.

It is anticipated that the Mwalimu Julius Nyerere Programme will support ~250 student-years of mobility/exchanges annually, producing the following results:

- African postgraduates completing Masters and PhDs outside of their home countries
- African Academic staff exposed and contributing to the higher education inter-institutional exchanges
- enhanced international cooperation capacity of higher education institutions in the African countries through cooperation within the region
- sharing in experiences and best practices of participating universities
- increasing both visibility for the participating institutions and ability to host and manage flow of foreign students
- improving cultural understanding and respect for diversity
- in the longer term, improved political, cultural, educational and economical links between the countries in the African region with a better understanding of mutual values.

This €30 million, five-year programme is part of the EU-African Union (AU) joint strategy for Africa.

6.2.2 African Network for Drugs and Diagnostics Innovation (ANDI)

Building research capability and leadership in developing countries is increasingly seen as essential to tackling major health issues. The WHO /TDR, in conjunction with several African institutions and the African Diaspora, proposed the creation of ANDI, whose main objective is to promote and support health product R&D led by African institutions for diseases of high prevalence in the Continent. ANDI is expected to contribute to the discovery, development and delivery of affordable new health tools, including those based on traditional medicine, as well as the development of capacity and establishment of centres of research excellence.

Following a series of consultations and workshops, a comprehensive business has been developed from ANDI, outlining its proposed mission and business model, operating model and implementation plan and financials. In terms of this plan ANDI is set to “foster *African leadership* by local researchers, support *African research priorities*, focus on *sustainability* of health product development and form an *African interface* for partners operating in Africa. Furthermore, ANDI will create an independent and sustainable financial model to which everyone, and especially all people of African descent, can contribute.”

6.2.3 Partnership for Higher Education in Africa (PHEA)

PHEA was a ten-year funder collaborative that sought to strengthen higher education in Africa. The funder partnership comprised the Carnegie Corporation of New York and the Rockefeller, Ford, John D. and Catherine T. MacArthur, William and Flora Hewlett, Andrew W. Mellon, and Kresge Foundations. The collaborative “saw an opportunity to make a difference by encouraging systemic and sustainable change to higher education institutions in countries where they were already actively working”. A collective investment of nearly half a billion dollars aimed at strengthening higher education was made by PHEA over a ten-year period to universities in Egypt, Ghana, Madagascar, Mozambique, Kenya, Nigeria, South Africa, Tanzania, and Uganda. Successes recorded by PHEA include:

- increased spotlight on the importance of higher education in Africa
- increased investment in African higher education by participant foundations
- strengthened universities through core institutional development and other capacity-building activities in areas such as financial management, administrative systems, and development
- increased focus by Partnership members on larger initiatives than would have been possible individually by foundations
- creation of a community of practice within the foundations to share ideas and information with one another and improve their individual grantmaking
- generation of more data and information about universities and other higher education institutions in Africa than available previously.

A number of challenges were encountered in working in such a partnership. The experiences of the Foundation staff in working in such a large and complex collaborative provide valued insights in instances where programme funds are being solicited from organisations with different cultures, leadership styles and missions. These insights are reflected elsewhere in this document.

6.2.4 The Southern African Development Community (SADC) HIV/Aids Special Fund

This fund is financed through contributions from Member States and other regional and non-regional sources, including the private sector, civil society, non-governmental organisations, workers and employer's organisations, as well as private philanthropic organisations. It supports measures in the fight against HIV/AIDS in the SADC Member States through operationalisation of the Maseru Declaration on HIV/AIDS, and provides assistance to research or intervention projects, as well as small projects and activities intended to enhance the capacity, output, or impact of existing HIV and AIDS programmes. Projects are required to be multiple-country joint interventions and multisectoral in nature, with a minimum of three collaborating countries participating in an initiative. SADC will contribute a maximum project budget of \$500,000. Projects must be sustainable and ensure ownership and commitment by beneficiary SADC Member States. Projects activities and outputs must also integrate into regular activities of existing national/regional programmes.

6.2.5 The University Science, Humanities and Engineering Partnerships in Africa (USHEPiA)

USHEPiA developed as a result of a particular historical context in Africa in the 1990s and the encouragement of key donor agencies who were exploring the potential of "South-South" partnerships. The creation of USHEPiA is characterised by broad consultation across the continent. This consultation is recognised as contributing to the success of the Programme. The programme was supported by the Rockefeller Foundation, the Carnegie Corporation, the Coca Cola Foundation, the Ridgefield Foundation and the Andrew W. Mellon Foundation.

Since its inception USHEPiA has offered 64 full degree Fellowships to members of staff of the USHEPiA partner universities; 35 in three Science and Engineering Cohorts; 26 in four Humanities Cohorts, and 3 in a Food Security Cohort. The initiative has resulted in the award of thirty-eight degrees. USHEPiA also initiated and participated in a number of other capacity development projects. These included a Small Grants scheme offering awards to graduated Fellows on their return to their home universities, a series of consultative workshops in Health Equity and Food Security, the development of a USHEPiA Intellectual Property Office, a Research Publication Network, a workshop for the USHEPiA Contacts in each partner university, workshops in Benchmarking Best Practice, the Research Degree and the Role of the Supervisor, and training for Emerging Researchers. Internal and external evaluations of USHEPiA acknowledge the programme as a successful model for capacity development in African higher education, noting that "its success is attributed to intensive Programme management, ongoing wide consultation, flexibility in the USHEPiA version of split-site degrees, and the development of a multi-level network among vice chancellors, supervisors, Fellows, and administrative staff".

Other examples of relevant South-South collaborative funds include:

- *Regional Initiative in Science and Education (RISE)*: The RISE initiative is constituted of research and training networks comprising universities in at least three different countries in sub-Saharan Africa. These networks, funded by the Carnegie Corporation of New York, focus on materials science, mathematics, chemistry (including natural products and biochemistry), information and communication

technology, instrumentation, software engineering, renewable energy and water resources as priority areas. RISE networks provide graduate training programs and enable researchers from multiple universities to use specialized scientific instrumentation that may be available at only one of the sites, or to pool resources to obtain new equipment. Each of the 5 RISE networks is expected to grant a minimum of 15 PhD and Masters degrees over 4-6 years. The networks are also expected to develop a strategy for retaining at universities in the region faculty members who have received their training through RISE.

- *The Southern Africa Biosciences Network (SANBio):* SANBio is one of 4 regional biosciences networks established on the continent. A network comprises a hub and nodes spread throughout the region. A Hub is an institution that is involved in cutting edge research and has critical mass of expertise that is actively involved in research and development while Nodes are institutions that are also actively involved in research and have expertise that provide unique skills and research facilities to complement the capacity of the Hub. The South African Council for Scientific and Industrial Research (CSIR) hosts the Hub for SANBio. SANBio is currently implementing eight R&D projects in SADC involving the CSIR-Hub and six country Nodes which have been established in different countries in the region. SANBio contributes to capacity development of African scientists in applied and basic sciences through short- and long-term training. Within SANBio, NEPAD is establishing a bioinformatics core facility at the University of Mauritius and an Indigenous Knowledge Systems (IKS) Centre of Excellence at the University of North West in South Africa. A mushroom germplasm bank will be established in Swaziland. These centres will enhance capacity building in these domains in Southern Africa. SANBio has also engaged in various networking and gender mainstreaming activities. Support for the network has been received from Canadian International Development Agency (CIDA), the Government of South Africa through the Department of Science and Technology, the Government of Finland and the European Union. Direct financial support for the network has also been received from South Africa, Malawi, Namibia and Zambia.
- *India-Brazil-South Africa (IBSA) Fund:* The Fund was created in 2004 within the IBSA Dialogue Forum. The Fund, as an example of cooperation among three developing countries, constitutes a pioneer and unique initiative to enhance South-South cooperation for the benefit of the most needed nations. The Fund supports viable and replicable projects that, based on the capabilities available in the IBSA countries and in their internal best practices, contribute to the national priorities of other developing countries. Projects are also intended to serve as examples of best practices for the fulfilment of the Millennium Development Goals. Projects under the IBSA Trust Fund are carried out in collaboration and consultation with partner countries, through South-South Cooperation mechanisms. IBSA projects are executed through partnerships with local governments, UNDP or national institutions. Each IBSA country contributes with \$1 million per year to the Fund. The IBSA Fund received the UN South-South Partnership Award in 2006.

The examples provided of South-South collaboration demonstrate both the willingness and the capability of Southern African organisations and stakeholders to engage with funders in providing support for local capacity development and research partnerships that contribute to addressing challenges and needs faced in the region.

“There is growing recognition of the strategically important role higher education plays in the development of African nations - from support of basic education through teacher training, to skills development for professionals in key social and economic sectors. Strengthening tertiary education in Africa has only begun. There is a growing recognition that increased foreign assistance is desperately needed to expand and extend the benefits higher education offers. African higher education requires continuing institutional and faculty strengthening, quality monitoring and accreditation standards, an increased focus on extension and public service, and viable plans to fund institutional change and growth.”

Whilst South-South collaborations may in some instances still be embryonic in execution, the enthusiasm and willingness to meet challenges provides impetus for motivating the formation of a Regional R&D Fund to Build Research Capacity within HEIs.

6.3 Areas Identified as Priorities for Funding

An overview of the priority areas of the various identified funded initiatives/funding organisations is tabulated below.

Table 1. Overview of funded priority areas

Priority Area	
Agriculture and Food Security	Health
access to finance for smallholder farmers, agro-dealers and agricultural businesses	diagnostics
adding value to agro products	discovery and development of new drugs
Africa’s staple food crops	enteric and diarrheal diseases
agribusiness	family planning
agricultural and rural development	health product R&D
agricultural development	health services and systems
agricultural development policy	healthcare
agricultural systems management	HIV/AIDS
agriculture and environment	knowledge, health and social development
agriculture and water management	malaria
animal health	maternal, neonatal and child health
aquaculture	medical devices,
crop improvement	microbicides
crop management	natural products
crop productivity	neglected and other infectious diseases
cropping systems crop economics	pneumonia
enhancing soil health	quality health care
fish biodiversity	traditional and biodiversity dependent community medicines
fisheries	traditional medicines and natural products
food and water insecurity	tuberculosis
food productivity	tuberculosis
food security	vaccine-preventable diseases
forestry and agroforestry	vaccines
horticulture	
improve smallholders’ market access	Climate and Environment
increasing food security	climate change adaptation strategies
insecticides	climate change and the environment
land & water resources	climate change capacity building
livestock	climate change policies and planning

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Priority Area	
livestock production systems	climate risk for agriculture and water resources
nutrition	climatic variability
plant genetic resources	environmental / natural resources management
post-harvest management;	environmental bioremediation
promote policies that provide comprehensive support to farmers	environmental challenges to growth
soil management & crop nutrition	global environmental change / climate change
sustainable agriculture	global environmental vulnerability
	impact of and adaptation to global environmental change
Energy	increasing environmental sustainability
energy poverty	institutional determinants of ecosystem change
energy related global and local environmental impacts	linkages between poverty and access to and dependence on natural resources
energy security	management of fresh water resources
renewable energy and technologies	natural environmental conservation
	natural resources and energy
Infrastructure	natural resources and their governance
infrastructure and roads	sustainable development
infrastructure development, rural development and building skilled workforces	sustainable environment
secure food, water, housing and infrastructure	sustainable growth and resilience to climate change
solutions for fast-growing cities	water resources
transport and transportation	water resources and disaster management
urban and regional development	water, sanitation & hygiene
urbanization	
Democracy, Policy and Governance	Humanities
conflict prevention and peace	basic survival safeguards
democracy, equality and human rights	gender
fostering functioning and effective states	gender and development
global governance	gender and migration
global relationships	gender and security
global security and cooperation	gender equality
<u>governance</u>	growth (including education and infrastructure)
governance in challenging environments	growth and livelihoods
human rights	identities, cultures and societies
human security	improved measures and analyses of sustainability and well-being
humanitarian and emergency assistance	media and information services
improving the policy environment for growth	migration
leadership and governance	poverty and environmental health
national ownership and leadership	poverty and hunger
national parliaments and parliamentary institutions	poverty reduction
peace building and conflict prevention	promoting equality between women and men
policy and advocacy	social and human development
politics, governance, state and society	social security
professionalization of the voices of the private	social transformation and social cohesion

Priority Area	
sector and civil society	
promoting regional stability and cooperation	stronger safety nets, reinvigorated citizenship, re-imagined policy frameworks
public administration and management	
strengthening governance institutions and practices	
S&T, Capacity Development and Education	Economic Development, Business and Trade
enhance the capacities of educators, researchers and academic leaders	economic development
higher education research and analysis	economic growth
identifiable impact	economic management
information and communication technologies in / for teaching, learning, research and management	economic policy
innovation, policy and science	financial management and accountability
internal and external audit and monitoring and evaluation systems	financial services
knowledge institutions	financial services for the poor
libraries and information	globalisation, trade and the environment
PhD and MSc programmes	international trade and investments;
public and university libraries	macroeconomics and public administration
regional integration	private sector development
regional networks for research and post-graduate training	promoting trade
securing the future of children and youth	social and economic policy
south-south cooperation	stimulating sustainable economic growth
strengthening local capacity	sustainable trade
teacher training	trade
university leaders' forum	trade and development
university-industry linkages	
Cross-Cutting	
biochemistry	genome sciences
bioinformatics	indigenous knowledge systems
biotechnology	information and communication technology
chemistry	materials science
computer science	mathematics
Engineering	national statistics and statistical systems

Whilst any funding proposal will require positioning with respect to that fund's priorities, it is critical that the needs and priorities of the respective SADC Member states and the region are duly recognised in identifying the areas for research collaboration and capacity development of a Regional R&D Fund.

6.4 Funding Instruments

A funded initiative may employ any of several instruments to implement its activities in realisation of its objectives. An overview of the various mechanisms used by funders to achieve their objectives is given in Table 2.

Table 2. Overview of mechanisms used by funders

Mechanism	
academic liaison with industry	mentorship programmes / traineeship programmes / training of staff members
academic research infrastructure programme / infrastructure upgrading	monitoring and evaluation
access to data, research, and communication technology skills / regional data and information platforms	mutual research
research projects / applied research projects	network creation and dissemination / networking and communication activities
bursaries for attendance of workshops, conferences	networks of excellence
case study partnerships	open calls
centres of excellence	pilot and demonstration projects
co-funding	planning visits
collaborative research programmes / integrated projects / collaborative regional research	postgraduate training / courses / research programs
commissioned projects	preparation of learning materials
expert advice	projects and programmes grants
external examining	publications
feasibility studies	research collaborations / research and education partnerships / partnership programmes
fellowship programmes / fellowships and research grants to early- and mid-career scientists / postdoctoral fellowships / senior fellowships	research and training networks / research coordination networks
full and targeted intervention country programmes	research experiences for students
funds awarded to graduates returning to home universities / home countries	research grants for doctoral candidates / young scientists / research grants to research units
information dissemination	research support activities
intervention projects	scholarships – PhD, MSc / in-country / in-region scholarships
joint calls	securing of additional resources
Journals	staff exchanges / student exchanges
medals and awards	training and assistance with data management, financial management, administration, quality
meetings, courses, seminars, conferences, roundtable discussions	twinning partnerships
member states initiated projects	

The selection and design of appropriate instruments, and the effective communication of the operation of such instruments, are fundamental to the successful implementation of a fund. Various modalities exist; consideration is required in respect of the priorities of the programme, the intended recipients/participants, the monitoring and evaluation requirements, the funder/donor requirements, stakeholder expectations, regional imperatives etc. It is noted that consultation is crucial in such processes.

7. Objectives for the Proposed University R&D Fund

In the previous sections, the critical issues facing SADC universities, and particular the R&D capacity and productivity of these institutions, have been described. As a partial but influential solution to these problems, it is proposed that a new University R&D fund should be established. The objectives of the fund will be to:

- strengthen the research capacity of universities within the Southern African region
- strengthen the networks between researchers from the HEIs within this region (notably South-South partnerships), particularly between countries which have historically not collaborated despite many good reasons for doing so
- increase the research output of these universities in areas of direct and specific relevance to the region including health, infrastructure, social sciences, mining, financial services and manufacturing
- increase the output of post graduates from the region's universities who are well equipped to undertake the development of innovative products and services to meet the needs of the region.

These objectives are now explained in more detail.

7.1 Strengthening Research Capacity

Research capacity, as characterised by facilities to undertake R&D, university-based funding to support R&D projects, experienced staff to supervise R&D projects, and doctoral/post-doctoral students who are interested and able to undertake the R&D, are all limiting factors in the research output of SADC universities (Kotecha 2008). One of the objectives of the fund will be to indirectly strengthen research capacity through the provision of financing for research projects.

It is emphasised that the sustainability of R&D in the region will never be achieved through a fund of the size proposed in this report. It is important that the national governments follow through on their commitments to build and maintain strong public universities by re-investing in these institutions and in particular providing adequate levels of funding for basic research.

7.2 Improved Cooperation on Regional Development Priorities

The benefits of inter-institutional collaboration on research projects have already been outlined (see Sections 3.2 and 3.3). Although a widely-shared policy objective, the reality is that such partnerships are difficult to establish and maintain. Some of the important principles which need to be in place to ensure successful collaboration are:

- a clearly identified purpose in the collaboration
- a carrier of mutual interest
- the incorporation of 'messengers' in the project programme (mainly people exchange)
- sufficient resources (mainly financial support)
- measurable deliverables and outputs.

Researchers from SADC-based universities have raised a number of concerns about collaborative research programmes, mostly in North-South partnerships as follows:

- academics from developed countries often take the lead in research, while African colleagues are relegated to minor roles
- visiting academics adopt a top-down approach in securing resources, rather than working with department-level staff
- African universities, students, and faculty members often cannot afford significant project costs associated with collaborative research programmes
- top-quality universities do not want to collaborate with lowly-ranked universities
- although North-South partnerships are common, South-South collaboration is weak and requires further focus and development.

Many of these concerns must be addressed in the proposed university Fund if the latter is to succeed. In particular it will need to ensure that:

- each project includes a number of universities from different countries (South-South partnerships are prioritised)
- the principal investigators over the whole portfolio are from a range of countries
- sufficient resources are allocated to the projects so that the projects are not overly restricted by budgets (adequate but not excessive funding).

7.3 Increasing Research Output

In whichever way research output is measured, it remains low for most of the public universities within the SADC countries (see Sections 5.2 and 5.3). Perhaps of greatest concern is the low productivity in terms of both PhD qualifications and publications. Malawi, Tanzania, Mauritius, Swaziland, Madagascar, Lesotho, Angola, Mozambique and the DRC all have publication rates of less than 0.4 publications per FTE per year (vs. the benchmark of between 1 to 1.5 publication/FTE/year). Similarly only South Africa and Mauritius have a PhD qualification rate of above 0.3 PhDs/FTE/year; all the other countries have rates lower than 0.1 PhDs/FTE/year).

One of the three principle objectives of the fund is to improve the research productivity of universities in the region, as measured by the two parameters of PhD productivity and publication rate. In this regard, the fund will encourage collaboration between high performing and lower performing institutions, so that 'best-in-class' communities of practice can be shared within the projects and assist in upgrading the outputs of the participating universities.

Previous experience with instruments similar to that outlined in this document is that competitive funds are highly effective in introducing changes such as those listed in this section. Although a relatively small number of projects are funded, the systems responds at an overall level to the new challenges and the necessary behavioural change is achieved.

8. Scope and Operation of the Proposed R&D Fund

The scope and operation of the fund will be as follows:

- it will support basic and applied research⁵ within public universities in the SADC region
- it will be directed, competitive, thematic funding; in other words it will fund specific projects within certain S&T domains only based on a competitive proposal-driven process
- it will initially consist of a portfolio of about fifteen projects; each project will be funded over a 3 to 5 year period at a maximum value of \$250,000 per year (equivalent to about R5.25 million per project at the present exchange rate of R7/\$)
- the process for the allocation of the funding will be driven by an expression of interest, followed by submission of detailed proposals; the latter will be assessed in a peer reviewed, *ex ante* evaluation process
- each proposal will require the participation of at least three universities, preferably from separate countries and including at least one institution with presently a poor research output, as measured using the criteria outlined in Section 5
- each institution may act as the principal coordinator in only two proposals; it may participate in other proposals, but may only submit a maximum of five proposals as the principal investigator
- the total value of the fund is estimated at \$100 million over the first five years of the initiative; this money will be sourced from interested donors and participating countries
- preference will be given to projects which have high strategic alignment with the present R&D and S&T policies within the respective countries
- each project will be funded initially for a one year period, during which time it will be expected that a proof of principle will be well established; the projects will be then eligible for funding over a further three year period, after which time clear deliverables and outputs will be required including most of the following:
 - peer reviewed publications
 - provisional patents (where applicable)
 - PhD graduates
 - joint authorships on publications
 - success in raising additional funds for collaborative research projects
 - leading author status on the project's publications by at least one of the participating institutions.

The initial proposed focus areas (S&T domains) for the fund are:

- Information and Communications Technology (ICT); research projects submitted within this theme must be directed at the development of new knowledge, products or services through the application of ICT. Areas of particular importance include the improvement of bandwidth connectivity, the facilitation of on-line collaboration and e-learning, and improved network/communication systems
- Climate change; changes to the global climate, as a result of human activity, are being felt across a wide range of ecosystems and environments. Projects within this theme must seek to understand and address climate change in one of these dimensions, and thereby make suggestions for mitigation and/or avoidance of such impacts. Areas of

⁵ The terms of basic and applied research are used in a very specific sense, as defined by the Frascati manual for the measurement of R&D. It is proposed that the fund does not support experimental development or technology transfer, but is restricted to the more conventional roles of the R&D value chain.

particular importance include predictive modelling of climate within the region, affect of climate change on food security, ecosystems services and biodiversity.

- Health; research into both diagnostics and treatment for neglected diseases remains one of the most urgent priorities for the region, including the diseases of HIV/AIDS, malaria, tuberculosis, schistosomiasis and diarrhoea. Projects within this theme must address one of these priorities and/or aspects of health systems research. It is noted that clinical trials will not be supported.
- Human and social dynamics; this theme is constructed with a relatively broad focus, covering the need to 'to better understand the dynamics of human and social behaviour at all levels and to increase our ability to anticipate the complex consequences of change'. Particular emphasis will be given to the development of new approaches within public administration and governance to deal with the present social dynamics including poverty and corruption
- Energy security; energy security remains an area of considerable weakness within many SADC countries, given their dependence on crude oil and the almost total absence of significant crude oil deposits within the region (with the obvious exception of Angola). Research into sustainable alternative energy supply and distribution systems, which can improve energy efficiency and security, will be the focus of this theme.
- Food security; despite many years of research into food supply and security, the region remains vulnerable to fluctuations in food production and prices. The theme will focus on the development of new knowledge, products and services which will have significant impact on improved food security. Preference will be given to the application of modern biotechnology to improving levels of food production, and to approaches which will lead to more widespread and efficient use of local ecosystem services in the food value chain.

9. Feasibility of the Proposed R&D Fund

9.1 Important Considerations for Stakeholders

Following 10 years of investment in African universities, the foundations that contributed to the PHEA programme “.....encourage others to join the ongoing effortsto support the strengthening of African higher education systems, particularly through direct assistance to African universities identifying and designing solutions to their own challenges and opportunities.”

These foundations also note that “there is growing recognition of the strategically important role higher education plays in the development of African nations—from support of basic education through teacher training, to skills development for professionals in key social and economic sectors ... Africa's efforts to achieve reasonably stable levels of growth and development, reduce poverty, improve the quality of governance, tackle the HIV/AIDS pandemic, and participate effectively in the rapid pace of globalization will be futile without a strong and sustained programme for capacity building ... Top among these challenges is the recruitment, development, and retention of the Next Generation of African Academics”.

Solving the “Next Gen” problem requires highly trained academics working within functional universities and collaboration through networks and other kinds of academic communities. Efforts are needed to strengthen and expand postgraduate capacity, including research productivity, to create institutional policies and practices that nurture junior

academics and to adopt national policy and regulatory environments that help build sustainable institutions that serve national development needs.

The Commission for Africa has, as part of its report *Still our Common Interest* called on the donor community to increase funding to Africa's higher education system, saying there has been no improvement in resources channelled towards the sector in the past five years - "*Investment in higher education has not improved - contributing to a continued shortage of trained teachers, doctors and other key professionals*"

Despite considerable growth in universities in Africa, institutions still face considerable challenges⁶:

- enrolments that are increasing faster than capacity to accommodate growth
- education quality that has declined as a result of poor working conditions, salaries, and brain drain
- lack of relevance to national development needs, and links to the labour market
- gender, ethnic, and class discrimination among students, faculty, and staff
- low levels of research production and connection to global knowledge systems - both human and institutional
- weak governance and management procedures
- lack of faculty depth in the science, technology, engineering, and mathematics (STEM) disciplines; this problem is compounded by the poor STEM skills students possess when entering tertiary institutions
- siphoning of academic talent into more lucrative and prestigious positions in government, the private sector, and internationally
- lack of funding.

Funding organisations can be faced with several challenges when engaging with African universities. Lessons learnt from previous initiatives include:

- involve host country partner institutions in the critical process of determining performance objectives for the partnership activities and outcomes; such interactions are vital to the development of trust relationships and to contributing to effective partnerships.
- involve the host country partners actively in the selection of the donor partner institution. In many instances in North-South collaborations, partner organisations from donor countries are pre-selected based on criteria of the donor country. Host country organisations should nevertheless be offered the opportunity to select the partner organisation.
- in collaboration with host organisations, it is important that means of repatriating / attracting host country academics studying abroad for advanced degrees back to their institutions form part of the institutional strengthening goal of the partnership. Improving the work environment sometimes helps to reverse the "brain drain," which often is affected by lack of "something" to return to, i.e., improved curricula, research opportunities, laboratory equipment, and continuing collegial support.

⁶ These challenges are outlined by World Bank education specialists: Peter Materu, Re-Visioning Africa's Tertiary Education in the Transition to a Knowledge Economy, Talking Notes for a Panel Discussion on the Role of Tertiary Education in the Knowledge Economy, Johannesburg, South Africa, May 8–10, 2006

- ensure that the partnership objectives clearly focus on providing results that build human and institutional capacity. Sometimes the capacity building goals are overshadowed by an emphasis on external technical assistance rather than the development of technical expertise within the host country institution. For example, the assistance sometimes includes high levels of technical assistance that cannot be sustained in a region that lacks dependable electricity supplies to support IT and web access; requires mechanical skills for keeping equipment operating; and promotes an attitude that some outsider will continue to solve all the technical issues.
- determine if donor and host country partners have genuine collegial support from a legitimate academic unit(s) involving more than one motivated principal investigator. These cross-cultural partnerships are successful when more than one academic from each of the participating institutions is involved and willing to support team-centred research and teaching activities. Successful partnerships require the expertise and experience of more than one professional and often involvement from more than one academic unit.
- facilitate and encourage social and cultural sensitivity on the part of the participating partners. Consideration needs to be paid to religious differences, social awareness, and true cultural understandings related to attitudes toward time, face-saving techniques, caste influences, racial overtones, attitudes to modern e-communication means for example. Partners are not required to condone social practices, but must be sensitive to the influence they may have upon academic changes.
- review the progress reporting format and refine questions to capture more precise quantitative and specific qualitative information related to progress toward partnership objectives. In addition, a system should be put in place that encourages donor staff to schedule portfolio reviews regularly and consistently as a way to track potential problematic issues and confer with partners periodically during the life of the partnership. Such mechanisms should also make provision for dealing with non-delivery on the part of a partner.

Consideration should be paid to the administrative burden and to the required resources to execute administrative and reporting requirements. Whilst good governance and accountability are vital to successful grant management, requirements that place additional burden on researchers who are responsible for excessive teaching loads, in addition to any research responsibilities that they may wish to engage with, need to be carefully considered. Excessive reporting demands may act as a deterrent to engagement. Reporting requirements should be carefully designed in line with an envisaged monitoring and evaluation programme and project participants should where possible be consulted in the design.

Typically, most funders provide for a small percentage towards overhead costs. Increasingly, however, the burden and intricacies of project administration is being evolved from the funder to the researcher. Consideration should therefore be given to an equitable and reasonable contribution to overheads. Project specific administrative costs should, for example, constitute a project direct cost. Many institutions top-slice funds received; this action for the most part does not comply with funder requirements, and in addition, yields a smaller working budget for the research project. In design of the programme and development of its budget, it is essential that partner institutions be consulted and an understanding developed and agreed upon in respect of the institutional overheads modalities.

The means of distribution of funds and the capabilities of the respective country institutions in dealing with such funds (financial / banking, revenue / customs and taxes and university institutions) must be catered for in design of the programme.

It is important that in evaluating the success of the initiative, focus goes beyond the measurement of direct outputs and that the longer term impact of the fund is assessed. In this regard, it is essential that a comprehensive monitoring and evaluation scheme is developed to track and assess the impact of all the funded initiatives and their respective “outputs.” Issues such as human capacity development, retention, exchanges and internships, collaborative research, joint publications, new academic programs, curricula changes, improved instruction/new teaching methods, south-south and north-south linkages beyond those of project initiatives, public outreach, technology transfer, commercialisation, contributions to policy dialogue/development, contributions to regional and national S&T and development goals etc. are considered. In addition, consideration should be given to the impact of the collaborative research at regional, national and institutional level. Funding for this evaluation is required beyond the scope of the funding for R&D projects; indeed each R&D project should contain a funded M&E aspect. Funding should also be provided for interviewing of the collaborative project’s principal investigators and to visit project research sites some time after the project closure/after the term of the fund. Studies have shown that such impact investigations provide valuable lessons, best practices and success stories essential for improving and continuing similar programmes (Gore 2009).

A thoughtfully and consultatively designed and successfully implemented initiative will contribute positively to the successful implementation of a funded programme.

“Donor coordination is an increasingly important part of the international development effort, and is crucial to aid effectiveness and to sustainable development.” When different donors collaborate in funding initiatives, implementing agencies often are required to deal with the different ideologies of the donor organisations. Advice from the PHEA initiative to organisations considering such collaborative funding includes:

- collaborate on issues and ideas of a scale that one organization could not do alone
- secure senior leadership support and engage them throughout
- set clear goals and expectations to keep members focused on what success looks like
- establish a clear structure and rules of participation including how to make decisions
- for large initiatives, create a secretariat or coordinating body and give it decision-making power
- be clear about the time commitment
- take time for participants to get to know one another and build trust
- consider pooled funding to work on joint activities.
- set up a system to gather data and evaluate the outcomes of large grants
- establish single-reporting templates and contact person or organization for joint grantees where possible
- establish an exit plan.

“We hope others will join in supporting an Africa-led transformation of higher education systems so that universities might play their vital role in advancing the continent’s civil society, economic development, and capacity to address local challenges and opportunities.”

9.2 Specific Considerations for Universities

Universities engaging in joint undertakings need to consider the collaborative efforts of such projects and the requirements/impacts such partnerships may have on the organisation. These include considerations such as:

- how to guarantee a combined focus on sustainable capacity development and scientific quality
- how to deal with the dilemma of funding already existing partnerships versus new initiatives. Funders require tangible deliverables - existing partnerships as a starting point are more likely to achieve something within the short timeframes of early funding cycles, whereas starting from scratch takes much longer because trust must grow. How does an organisation ensure that sufficient links being made with new initiatives?
- how is synergy created between an implementing agency's focus on national and regional imperatives and the funder's priorities and objectives?
- how does an organisation optimally align and combine the funder's / implementing agency's strategy and objectives with the university's own agenda?
- the ability of university structures to assist researchers with administrative requirements of such projects

Leveraging of realistic institutional overheads for projects – top-slicing of funds received constitutes a sub-optimal practice. Provision should be made for adequate training and support of researchers in research project budgeting. University administration should be tasked to develop an understood and defensible overhead model that is sufficiently flexible to allow for different funder's financial rules on eligible / ineligible costs. Note that South African universities are required by legislation to develop such overhead costing models.

For the optimal embedding within the national structures, senior African participants involved in the programmes must be experienced, have a high position and a good network. This means that in general they are involved in much national and international collaboration and have a busy agenda.

The younger African participants (e.g. PhD's and Masters) often have to conduct the research next to their teaching requirements. In addition, attractive offers from private and public sector organisations often lure academics into leaving from HEIs. It is therefore a challenge to retain these young professionals for research.

Other considerations include:

- the tension between longer-term institutional capacity development and shorter-term personal development; the need to improve communication at all levels, empowerment of host organisation supervisors; and a perceived lack of support from some host universities.
- the role of host universities in sustainability of funded initiatives and “fit” with a university's broader research strategies.

Successful networking is required simultaneously at three levels: (a) at the university senior management level, (b) at the departmental level, and (c) at the level of individual Fellows.

“At this stage of Africa's development, support by African governments and their development partners will need to go far beyond simply creating "enclaves" of capacity building interventions, to commitments that will make a visible, meaningful, structural and lasting difference.” Universities should similarly engage in contributing to such efforts!

10. Proposed Implementation and Monitoring Strategy

10.1 Management of the R+D Fund

It is recommended that SARUA does not manage the fund directly, but that this management function is outsourced to a suitable agency. The main reasons for this recommendation are as follows:

- the objectives and core competencies of a funding agency are very different to the present SARUA mandate; undertaking the management/operational tasks associated with the fund will require a significant change to the SARUA mandate
- none of the required infrastructure exists at SARUA and will have to be established from scratch, including the ICT systems for proposal submission and evaluation, financial administration
- SARUA will be required to recruit new staff to administer the fund; based on the experience of similar funds, it is estimated that the overall administrative costs will be between 4% to 8% of the overall fund disbursements per year. In the example of a \$100 million fund (disbursed over a five year period), these costs will be about R6 to R10 million per year (which gives an idea of the number of people and the scale of the operation).
- a well-structured service level agreement may be more efficient than the development of in-house capacity. Existing organisations have experience of undertaking this task on behalf of third parties (for example in South Africa the National Research Foundation manages the Technology for Human Resources in Industry Programme on behalf of the Department of Trade and Industry and the Industrial Development Corporation manages the Support Programme for Industrial Innovation, also on behalf of the Department of Trade and Industry).

10.2 Monitoring & Evaluation Framework (Outcomes and Impact)

The objectives for the fund have been detailed earlier in this paper. Based on these objectives, its monitoring and evaluation parameters are given in Table 3. In all cases, it is suggested that these parameters should be evaluated only after the first round of projects have been completed. An interim evaluation, based on a smaller subset of parameters could be undertaken should this be required by the donors to the programme. Details of these interim evaluations have not been provided in this report.

Table 3. Monitoring and evaluation framework for the R+D Fund

Objective	Performance Measure	Target (over 5 year period)
Strengthening of research capacity	Research leadership	Leading author status on at least one major publication arising from the project
	Investment in scientific infrastructure (for HEI)	Increase of 1% in ratio of capital equipment purchase: annual turnover

	Registration of new PhD students	Increase of 50% within participating institutions
	HEI staff with PhDs	At least 50% of staff with PhD
Improved South-South partnerships and collaboration	Joint co-authorship of peer-reviewed publications between South-South HEIs	At least one publication per \$125,000 of project funds
	Leveraging of funding	Leveraging of project to obtain further funding
Increased research productivity	Publication rate of participating researchers	1.0 publication/FTE/year
	PhD rate	0.3 PhD qualifications/ FTE/year
	Patent rate (where relevant; does not apply to social sciences)	1.0 patent per R5 million funding

II. Recommendations for a Way Forward

In this report, the rationale, objectives and modalities for a new initiative to support research in the higher education sector within SADC countries have been described. In summary, the need for the Fund is highly evident and although there are similar initiatives within Africa, none of these initiatives are specifically targeted at the public universities.

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