

STRENGTHENING RESEARCH COLLABORATION BETWEEN SOUTH AFRICA AND THE UNITED KINGDOM

SUMMATIVE REPORT

ON THE JOINT WORKSHOP

CAPE TOWN, 10-11 FEBRUARY 2014

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Introduction

The Ministers of Science and Technology for the United Kingdom (UK) and South Africa (SA) have confirmed their commitment to a renewed and strengthened research collaboration between the two countries at the UK-SA Ministerial bilateral forum (2013) and during the follow up visit of the SA Minister of S&T to the UK in January 2014. Although specific areas of focus have been identified – namely space/astronomy, health research, biosciences and climate change – actual funding modalities have yet to be finalized and agreed upon. Towards this end, a workshop to explore possible ways to strengthen research collaboration between the UK and South Africa was held by the National Research Foundation (NRF), the Department of Science and Technology (DST), SA, the Royal Society (RS), the Department for Business Innovation and Skills (UK), and the UK Science and Innovation Network over two days (10-11 February 2014) in Cape Town.

Background and Context

Collaboration between the NRF and the RS of London dates back to 1996 with the Royal Society/NRF Joint Collaborative Programme¹, and the bilateral collaboration between the two countries has continued to grow stronger and expand (albeit at an uneven rate) to include other forms of support for the South African and British research communities.

The aim of the Royal Society/NRF Joint Collaborative Programme was to increase the number of South African researchers in science and technology from previously disadvantaged communities, to improve their access to UK research institutions, to establish centres of excellence at previously disadvantaged South African institutions and to encourage collaboration between these and their UK counterparts. This programme has been discontinued since the last call published in 2006.

More recently, the NRF and the United Kingdom (through the RS) have published a joint call for research proposals for Scientific Seminars². The aim of the Scientific Seminars is to fund the organisation of a series of small 3-day scientific meetings which bring together groups of early to mid-career scientists from SA and the UK. The purpose of the seminars is to facilitate scientific discussion, as well as to promote collaboration and knowledge transfer by encouraging interaction within the wider research community. The intention is to generate, through these seminars, an informed understanding of prospective collaborations to inform a potentially larger call between SA and the UK in the near future.

Understanding the potential for collaboration is of particular value in the context of a number of funding opportunities that have recently been announced by the UK, namely the Emerging Powers Research and Innovation Fund and the Newton Fund. The Newton Fund has committed £75 million per year for the next 5 years for international research collaboration. SA is one of the countries which have been identified for inclusion in this framework, and an amount of £4 million per year has been earmarked for SA-UK collaboration. Matched funding is expected from South Africa, but will be sought from multiple sources including the private sector. Funding within the framework will be available for three broad types of collaborations – capacity development, research and knowledge translation (application). An additional mechanism for facilitating collaboration is the UK Space Fund which is looking at the role that space can play in international development. The fund will invest £80 million over the next five years and cover three elements – space in environmental monitoring (earth observation satellites), the role of space in enabling broadband access, and capacity development in terms of education skills and training.

¹ Jointly funded by a British parliamentary grant, the Rhodes Trust, the NRF and participating universities

² Closing date was 18 February 2014.

Purpose of the Workshop

In the context of the Joint Seminars call, the NRF and the RS agreed to host a 2-day workshop prior to the deadline of the call with the aim to discuss possible ways to strengthen research collaborations between the UK and South Africa. In the context of the Newton and the Emerging Powers Funds, it was decided to expand the scope of the workshop to consider the broader collaborative environment between the two countries.

Ultimately, the objectives of the workshop were to:

- identify shared and specific areas of research interest that are relevant for potential future collaborations;
- identify the crucial elements needed for successful long-term collaborations;
- work towards reconciling the push to fund targeted research or agreed priority areas with the need to continue funding discovery research; and
- identify appropriate new and existing funding mechanisms that could be considered to support collaborations.

The workshop intentionally involved representatives from the science communities, government and funding bodies, to ensure that any current and future support platforms consider the demand side of research in both countries. Workshop discussions were facilitated with a focus on practical issues and identifying, amongst other things, the necessary elements that make collaborations work.

The sessions were structured in a logical order with initial discussions focusing on shared priorities and specific strengths (see Annexure I for the full workshop agenda). After the initial contextualization and introduction, the workshop comprised of three sessions. Session I focused on research topics for future collaborations, Session II with the lessons learned during previous and ongoing collaborations, while Session III explored support mechanisms for future collaboration, and the building blocks/principles that funding bodies (and scientists alike) need to take into consideration.

In order to facilitate deep engagement and discussion, two break-away sessions were held during the course of the workshop. Participants were pre-designated to a particular break-away group, and group facilitators were adequately briefed on the modalities of the sessions. Open and frank discussions were encouraged throughout the workshop.

This report emanating from the workshop will serve as input into the development of a proposal for establishing the strategic aims and direction of the SA-UK collaborative effort. An agreement will be drafted between the Ministries of the two countries and it is envisaged that the agreement will be signed shortly after the SA elections taking place in May 2014. In addition to this tangible output, it is expected that the workshop will contribute constructively to the shaping, evolution and growth of current funding schemes and provoke ideas/possibilities for more ambitious schemes in the future.

Proceedings of the Workshop

Day 1 focused on setting the scene for the deliberations (through a series of strategic presentations) and Session I which related to *Research topics for future collaborations: Shared priority areas and other fields*.

Dr Aldo Stroebel (Executive Director: International Relations and Cooperation, NRF) welcomed participants to the workshop by providing succinct contextual comments relating to the relevance and timely nature of the event. Specific reference was made to recent events which have led to a renewed focus and re-examination of how to strengthen the collaboration for joint benefit and optimal impact.

Dr Albert van Jaarsveld (Chief Executive Officer, NRF) formally opened the workshop and welcomed guests and participants. By highlighting some of the previous successes and challenges of the RS/NRF Joint Programme, Dr van

Jaarsveld set the scene for deliberations around the Joint Seminars and for thinking around an expanded collaborative venture between the two countries moving forward.

The British Consul General (Cape Town), *Mr Chris Trott* thanked the organisers of the workshop and drew attention to some of the exciting developments in the science and innovation arena involving SA and the UK. Citing science and innovation as the pillar of the relationship between the UK and SA, he reiterated the commitment from the ministers in September 2013 to redouble their efforts and renew the agreement between the two countries. He noted high profile collaborations already underway, for example the Bloodhound Supersonic Car attempt to break the world land speed record attempt in 2015/2016.

Ms Maddalaine Ansell (Head of International, Knowledge and Innovation Unit UK Department for Business, Innovation and Skill – BIZ) reiterated the objectives of the workshop (see earlier discussion) and noted some key thoughts to inform discussions. She highlighted the role of innovation, education and research in the growth and prosperity strategy of the UK and the multiple benefits of collaboration – including addressing the world’s “big challenges” and the cost- and risk-sharing gains. She indicated that SA offers a unique opportunity for the UK to further engage other sub-Saharan African (SSA) nations, and the shared research interests of the two countries provides a platform from which to move forward.

As an important backdrop to discussions and to situate the workshop deliberations within the South African legal context, *Dr Kerry Faul* (Head at the South African National Intellectual Property Management Office – NIPMO) presented intellectual property implications related to publicly funded research (see Presentation for full details and discussion related to challenges later in this report).

In his presentation, *Dr Gansen Pillay* (Deputy Chief Executive Officer, NRF) highlighted areas of research strength in South Africa and outlined the main features of the South African research and innovation system. He emphasized South Africa’s need to collaborate research for capacity building, address the lack in supervisory capacity and bolster research output and productivity. South Africa offers a unique “living laboratory” for international researchers to conduct their research in collaboration with local researchers, has a number of geographical advantages, extensive biodiversity, and a number of national facilities which provide platforms for world class research. In this context, the country wishes to position itself as a science, technology and innovation destination of choice and a catalyst for high impact collaborative research.

Dr Sophie Laurie (Head of International, Research Councils UK (RCUK))³ spoke on behalf of the UK research councils working with SA. The international knowledge production arena is changing drastically and rapidly, and as new emerging role players (e.g. China) continue to gain rapid ground, traditional role players (e.g. the US and the UK) will need to work harder and smarter to maintain their competitive advantage. As the international research environment continues to shift, the UK must position its research base and strategic collaborations for the future. Dr Laurie shared the research priorities of the various councils, and their strategic contributions to the identified grand challenges. The overlap between the priorities of SA and the UK are clear, and thus numerous possibilities for collaboration exist.

One of the objectives of the workshop was to reflect on how best to reconcile the push to fund agreed priority areas with the need to continue discovery research⁴, and in this context *Prof John Pickett* (speaking on behalf of the Royal Society) engaged with participants about the complexities and challenges around funding discovery research. The undisputable value of discovery research is its potential pathway to new (and unpredictable) knowledge, which can shape the future in unexpected and dramatic ways. The risk involved in concentrating too much on targeted/engaged research⁵ and defined priority areas is that the opportunity for major scientific break-through in

³ RCUK was represented by 5 of the 7 discipline-oriented research councils at the workshop.

⁴ Also referred to as Blue Skies Research or curiosity-driven research.

⁵ Also referred to as applied research

the future may be compromised. Compulsory conventional metrics – commonplace in most research funding instruments (e.g. impact statements) – may inhibit the pursuit of pure discovery. Striving to balance donor, government and researcher interests in order to optimize the potential contributions of discovery research in the long-term must be sought. If the goal is too close it may limit what we can learn.

After introductory remarks by *Dr Andrew Kaniki* (Executive Director: Knowledge Fields Development, NRF) the break-out groups for Session I engaged on various topics centered on the following themes:

- What are the areas of collaboration that SA and UK researchers want to pursue?
- What works in terms of collaboration and what needs to be in place for this to work?
- What experiences have researchers have had in collaborating?

Each of the groups was assigned a particular focus, as is reflected below:

- Group 1: Research strengths and potential contribution of South Africa to collaborations
- Group 2: Research strengths and potential contribution of the UK to collaborations
- Group 3: The importance of support for new science and discovery research

The themes, inputs and recommendations emerging from Session I are discussed in an integrated manner below.

Research Strengths and Potential Contributions of SA and the UK

The UK has research strengths and top quality researchers in almost all domains of research, whilst SA has a number of niche areas in which it excels. In addition to this, South Africa is faced with a number of particularly pressing challenges including the need to dramatically increase PhD productivity and significantly bolster supervisory capacity whilst transforming the profile of the scientific workforce. Based on this, UK-SA collaborations could thus be viewed in two broad categories, namely a strength-to-strength approach or a strength-to-need approach.

The two sections below summarise the strengths and contributions of the UK and SA as highlighted by participants during the workshop.

SA Strengths and Potential Contributions

FUNDING AGENCY INFRASTRUCTURE: The NRF is the strongest funding council in sub-Saharan Africa (SSA), with many of the equivalent bodies/units in other SSA countries lacking in requisite capacity. The UK does not have strong funding relationships with similar organisations in other countries, and collaboration with the NRF offers both infrastructure benefits and access to potential new partners in the region. Although frequent mention of SA being a “gateway” to the rest of SSA was made during the workshop, there is recognition that this notion should be carefully considered and sensitively managed to avoid SA being seen as the “big brother” of the continent. Despite this cautionary note, there is substantial opportunity for multilateral cooperation between SA, the UK and other African countries utilising the SA-UK collaborative relationship as a platform from which to mobilise.

Through its partnership with the NRF (and SA), the UK stands to re-establish itself as a credible research partner in Africa.

GEOGRAPHICAL, ENVIRONMENTAL AND SOCIETAL UNIQUENESS: As noted earlier, SA excels in a variety of areas – both environmental and societal – as a unique “living laboratory”. The biodiversity, climatic conditions and potential for understanding social justice and reconciliation stand out as areas of particular interest and opportunity.

UK Strengths and Potential Contributions

FACILITIES: Facilities are one of the key strengths the UK brings to the collaborative endeavour. These include large scale facilities and large infrastructure projects which enable an integrated approach to problem solving. More specifically, the UK has a strong and proven track record of developing facilities, creating strong communities around them and effectively managing these for enhanced collaboration.

WAYS OF WORKING: UK scientists and academics are accustomed to collaborating and networking in their research endeavours, a culture which is not yet deeply entrenched in SA academia. Through continued collaborative efforts SA academics can enhance and improve their collaborative research capacities.

ENGAGEMENT AND COMMUNICATION: UK scientists and research councils have worked intentionally on improving the engagement of scientists with the public, the media and policy makers. There have been significant strides in this regard which the broader SA scientific community can glean from.

TECHNOLOGY TRANSFER AND KNOWLEDGE APPLICATION: The UK has demonstrated more success than SA in translational research and product development. SA researchers and funders – in conjunction with UK researchers – can enhance their skills in creating an environment that accelerates product development through strong industry-academia collaborations.

Themes and Areas for Collaborative Research

Identifying and refining themes for collaboration has the benefit of bringing some level of focus and direction to collaborations, however, there should be scope for other areas of research collaboration in addition to these.

Although themes and broad funding areas have already been identified for funding, researchers and science councils in both contexts should have the opportunity to provide inputs on the refinement, understanding and interpretation of the themes. A mixture of top-down and bottom-up approaches are needed, and this workshop is an example of such an effort.

The process of finalising and refining themes should identify the “big questions” in both contexts and funding should be focussed to some extent towards answering these questions. Importantly, it should be noted that identifying the “big questions” does not imply a preference for applied research over discovery driven research.

Both breadth and depth are necessary when a research agenda is determined. There should be sufficient breadth to accommodate a wide range of collaborations, with a focus on depth (scaled investments) in a smaller number of areas/projects. The four themes that have been identified are sufficiently (and intentionally) broad, and can be interpreted broadly. They also resonate strongly with the grand challenges in both SA and the UK (with the exclusion of astronomy).

In addition to (and in confirmation of) the themes already identified a wide variety of themes for potential collaboration were mentioned by the workshop participants, some of which inevitably reflect personal research interests. Despite this, some commonalities and overlaps in themes and areas for research were identified; these are grouped broadly and noted below.

ASTRONOMY/SPACE SCIENCE: This is one of the themes already identified for collaboration between SA and the UK, and was also frequently mentioned by the scientists from both countries⁶. SA has many projects in astronomy (specifically the SKA), and wants to build on its competitive strengths in this area. This particular area represents an opportunity for a strength-to-strength collaboration.

⁶ There was some debate around whether this research theme should be astronomy and space or only astronomy. Some clarification in this regard is needed.

ENVIRONMENTAL RESEARCH: The UK has broad, integrated approaches to environmental research and natural resources valuation which could be applied to the SA context. In particular, the energy, water, food nexus is not well understood from a pure sciences or social sciences perspective and represents a potentially strong area for collaboration. Climate related matters (including climate change⁷, climate modelling and modelling projections for agricultural development) were also noted by the participants as areas for collaboration. The UK has specialised labs and equipment for studying and modelling climate related matters, and the SA climate offers a new context/environment for conducting research. Energy storage and renewable energy (which could be studied in SA given favourable climatic conditions) was also noted.

SOCIAL SCIENCES/HUMANITIES/DEVELOPMENT: The UK has a strong portfolio of internationally recognized development research, and SA has been noted as a “living laboratory” for social studies – particularly in the context of justice, inequality and reconciliation. The “digital humanities” was noted as an area which SA is interested in investing in. The UK is currently doing work in this broad field, particularly related to digital transformation (the Digging into Data project). Potential for research around big data in the social sciences and social media are also areas for potential collaboration.

BIG DATA: The NRF currently supports the South African National Research Network (SANREN) and is broadly interested in the issue of big data. Once the SKA is fully functional and online there will be massive amounts of data that need to be stored, managed and analysed. The NRF is interested in partnering in this area. Related to this is the potential for collaborating on HPC computing. The UK also expressed broad interest and potential for contribution in this regard.

OTHER: A wide variety of other potential areas for collaboration were listed including human health and infectious diseases (e.g. TB)⁸, animal health and husbandry⁹, oceanography¹⁰, mineralogy and mineral extraction (great potential for new discovery and new research in the SA context), biotechnology, catalysis (a particular strength for SA with strong potential to enrich the research agenda in the field internationally), paleosciences, sustainable economic growth and sustainable urbanisation (of particular relevance to SA).

The list above is non-exhaustive and may not represent the most impactful areas for research collaboration and investment. It was suggested that funders should consider mapping the SA-UK collaborations that already exist with the aim to identify strengths and gaps. Consideration should also be given in such an exercise to key areas of interest and strength for both parties where no current collaborations exist, with the aim to facilitate potential matching.

Funding Blue Sky Research

Consideration around funding collaborative discovery research was one of the key outcomes for the workshop.

As history has clearly demonstrated, discovery research has the potential to be a game changer by yielding outputs that impact society in dramatic ways, but the trajectories and long-term impacts of this research are unforeseen and often unknowable at the outset of the research project. The yet to be answered question is how to create an optimally enabling funding environment for curiosity driven work. Shifts at policy level and in funding approaches are needed to address this challenge. The acknowledgement of the value of discovery research should be emphasized at science policy level as a means to ensure continued investment of public funds in this type of research. On the other hand, funders should seek effective ways to fund “great ideas” without imposing compulsory “metrics” in proposals.

Discovery research can play an important role in establishing and sustaining collaborative research partnerships, and in principle, funders should allocate (and make known up-front) a proportion of funds for discovery driven research (dependent on resources and context). At the same time, it is becoming increasingly clear that strict definitions of

⁷ Climate change is one of the themes already identified for the collaboration.

⁸ Also identified as one of the themes for collaboration.

⁹ Related to the broad theme of biosciences.

discovery driven vs. applied research are at times not helpful and lines are often blurred; if pre-determined themes are kept sufficiently broad and open for interpretation the apparent tension in funding this type of research can be overcome to some extent.

An important element in harnessing the potential impact of discovery research is innovation and integrity in the application and selection process (see also the later discussion on creating enabling environments). Funders should seek to utilise the review process in a manner which does not exclude new thinking, whilst ensuring that the best scientists are selected to conduct this type of research.

Establishing, nurturing & sustaining long-term collaborations

Day 2 focussed on Sessions II and III, namely *Benefits of UK - South Africa research collaborations: Past experience and Recommendations for future UK - South Africa collaborations and mechanisms to realise them.*

Successful collaborations have a multiplicity of benefits and have the potential to serve as a catalyst for synergistic impact that extends beyond the individual potential of the partners working alone. The case study presented as the introduction to Session II serves as an exemplar of how collaborations can lead to ground breaking research, high-level capacity development, expanded infrastructure development (particularly in the case of SA), the emergence of new intellectual centers, expanded partnerships with industry and policy influence. The case study is also an example of how collaboration can outlive the initial funding period and continue to collaborate successfully.

The Session Chairs Profs. Richard Catlow (FRS, University College London) and Phuti Ngoepe (University of Limpopo) – both former RS-NRF Joint Collaborative Programme grant holders – shared the details, history and growth of the collaboration, their successes and the crucial factors that enabled success. Of particular interest in this case study is the longevity of the collaboration, the ground-breaking science that was enabled for SA and UK scientists, as well as the impact of the collaboration in the lives of individuals, institutions (e.g. through the establishment of the Centre of High Performance Computing in Cape Town) and in the broader scientific community.

After their contribution, the task of the break out groups for Session II was to focus on identifying the necessary building blocks that make successful collaborations work, and facilitators were all former grant holders of the RS-NRF Joint Collaborative Programme.

Feedback from the break-away group discussions and the open forum discussions were categorized as follows: what are the essential ingredients of successful collaborations, what should funders do to create enabling environments for effective collaboration, what activities should funders be funding and what challenges need be overcome in order for collaborations to flourish.

What are the ingredients of successful long-term collaborations?

SHARED VISION AND COMMON GOALS: A shared vision – as reflected in genuine, mutual shared scientific interest and research direction – is one of the most fundamental components of establishing and sustaining long-term collaborations. Funding for collaboration ideally should serve as an enabler for an idea or vision which existed before the opportunity for funding existed. In addition to the existence of a shared vision, common goals need to be mutually negotiated and agreed upon at the outset of a collaboration and consistently be revisited at agreed upon intervals as the collaboration moves forward.

GENUINE COLLABORATION FOR MUTUAL BENEFIT: Successful partnerships reflect genuine collaboration towards the mutual benefit of all partners as co-operatively agreed upon. Although individual partners may derive highly diverse benefits from a collaborative activity, the principle of mutual gain in line with agreed upon objectives and activities should not be negotiable. Collaboration for mutual benefit can be facilitated by upfront negotiations, clearly articulated expectations and an intentional effort to ensure complementarity between the varied skills and needs of the partners.

Although partners inevitably bring varied skills, competencies and resources to research collaboration, ideally each should derive benefit from the partnership in both the immediate and over longer term. Collaborations that are built on the development imperatives of both contexts are more likely to contribute to mutual benefit over the longer term, especially in the case of engaged (or impact driven) research projects. In particular, within the South African context, one of the driving imperatives is the need for capacity development and the transformation of the science workforce.

INTENTIONALITY REGARDING LONGEVITY: Collaborations which “stand the test of time” have increased potential to result in impact (within the research/academic environment and beyond). Partners seeking successful collaborations should therefore be intentional about planning for longevity from the outset of the collaborative effort, avoiding the short-sighted notion that any one form or source of funding will be sufficient to sustain the research/initiative/project indefinitely.

Planning for and enabling longevity is partly dependent on the structure of funding mechanisms (see discussions in the following section), and partly dependent on the partners’ initiative around seeking multiple sources of funding and using initial seed-funding to leverage access to a broader resource network. Evidence in practice has demonstrated that successfully accessing one source of funding (particularly from a reputable funder) can in fact provide leverage to other sources of funding. Newly established collaborations should be encouraged to think and plan in towards this end.

LEADERSHIP AND RELATIONSHIPS: Resources and resolve cannot be separated from each other. Strong, committed, expert leaders are fundamental building blocks upon which innovative research, capacity strengthening and long-term collaborations can be established and nurtured. Leaders who choose to work collaboratively should seek out partners with whom they can establish strong interpersonal working relationships as a platform to carry the collaboration forward.

Furthermore, responsible leaders plan for longevity and success through a continued focus on maintaining and growing interpersonal relationships between researchers from both countries working together in the collaborative effort, as well as by ensuring the continuation of expertise through capacity development and succession planning.

Strong interpersonal relationships within collaborative efforts also enhance the establishment of international research networks for young and emerging academics and lay the foundation for new and emerging collaborations in the future.

MONITORING AND EVALUATION: Sustainable and successful collaborations harness the value of regular feedback and monitoring in order to inform progress and growth. This can include regular, structured internal monitoring, regular business and sciences meetings between partners, dialogue with stakeholders and researchers within the network, as well as formal evaluation processes. Lessons learnt from these multiple feedback mechanisms should be used in an ongoing manner to effectively and efficiently strengthen and shape activities.

How do funders create enabling environments for success?

FACILITATE OPPORTUNITIES FOR RESEARCHERS TO NETWORK: Mobility grant initiatives such as the Joint Seminar Series and other investments in networking opportunities provide a platform for researchers to meet and explore common interests for research. Through creating opportunities of this nature, funders create the space for researchers to identify and develop the shared vision and strong interpersonal relationships that can ultimately contribute to greater success and sustainability in collaborative efforts over the longer term.

EFFICIENT AND EFFECTIVE APPLICATION AND SELECTION PROCESSES: An innovative and reliable application process should enable funders to identify projects with a high likelihood of success – both in terms of establishing the collaboration and the ultimate value/impact of the research. At the very least, application proposals should be able

to identify complementarity of skills, genuine shared vision, the opportunity for mutual benefit and a demonstration of how the collaboration will contribute to capacity development.

In addition, evidence of prior collaboration activities or outputs (e.g. publications, site visits or other joint projects) are a potential proxy indication of genuine collaborations with high potential. Furthermore, sustainability and planning for longevity could serve as proxies for indicating commitment beyond the initial funding period.

However, whilst there is a valid case to be made for providing funding to researchers who have evidence of existing collaborations/shared interest it is also essential to allow scope for funding new collaborations which do not yet exist, but which have high potential for success. Furthermore, it is also clear that a level of innovative thinking is needed around the application process for curiosity research projects so as to ensure that great ideas get funded without losing the integrity of the process.

Review panels will continue to play an important role in the proposal approval process. A continued focus on monitoring the integrity of these processes is needed to ensure that this essential quality assurance process serves its true purpose of selecting for excellence in science and does not stifle or inhibit the entrance of new ideas and thinking with high potential.

FLEXIBLE, ADAPTIVE FUNDING MECHANISMS: Through the provision of financial inputs, funders serve as an enabler for collaboration between researchers. However, the nature, amount and timing of funding are critical success factors in the establishment and sustainability of successful research collaborations.

A few principles appear to stand out. First, longer-term funding is important in the incubator phase for projects to develop and grow, but long-term visions can also be nurtured with short-term grants (for example the RS Networking Grants). Ideally, funding cycles should be at least 5 years (a realistic time to allow for a PhD cohort to graduate), but should not be shorter than 3 years. Whilst there appears to be general consensus on these ideas in principle, practicalities (e.g. political realities) restrict funder flexibility in this regard to some extent. Furthermore, smaller amounts of funding can be of tremendous value in establishing relationships and setting the stage for future collaborations.

Second, a balance between structure and flexibility in fund spending should be sought, allowing researchers to use their discretion within an appropriately monitored environment. Lack of funding flexibility can lead to premature termination of collaborations.

Finally, towards the end of the initial incubation phase, once collaborations are solidified, small additional investments (from the current or additional funder) can make a big difference to the sustainability of the research collaboration.

COMMITMENT TO LOCAL CONTEXT: Funder engagement with stakeholders (for example through award holder meetings) in order to understand the local needs of the science community in both countries can play an important role in the meeting the needs (scientific and developmental) of all partners.

What challenges and risks need be considered or overcome?

A number of challenges and risks – varying in scale and complexity – need to be considered in order for the SA-UK funding collaboration to be optimised.

At the macro-level, the contextual realities (political and social) of both partners must be taken into consideration when planning and implementing collaborative funding efforts. In the SA context a number of systemic obstacles in the educational environment limit the extent to which efforts to increase capacity at the highest level can address.

In addition to the contextual realities, a number of challenges/risks within the control of the funding councils/researchers were identified and are summarised below.

AVOIDING BRAIN DRAIN, ENCOURAGING BRAIN CIRCULATION: A number of factors contribute to the potential risk of brain drain, including the lack of concrete, enticing opportunities for graduates and early career researchers who have spent time studying abroad.

The structure of study abroad opportunities can also contribute to the prevention of brain drain, through split site arrangements which allow (and even require) students to maintain strong links with their home institutions. International guidelines on minimising brain drain should be consulted and considered in the establishment of collaborative agreements as a preventative measure.

SCALING UP IMPACT TO THE INSTITUTIONAL LEVEL: Whilst there are examples of positive impact at the individual and centre/departmental level emanating from collaborations, instances of institutional level change and capacity development are less frequent. SA universities continue to differ vastly in terms of their capacity to effectively conduct research and train researchers. Institutional capacity development is thus an important element of transformation in the South African context and therefore inclusivity and diversity should rank alongside excellence in science in selection and approval criteria – without necessitating a compromise in scientific excellence. Institutional triads and hub-spoke partnership models can underpin effective efforts towards an inclusive developmental approach (see discussion on recommendations for funding in the following section).

INTELLECTUAL PROPERTY MANAGEMENT: IP management is an important facet of the modern day research environment, and universities (and researchers) need to be strategic about how they invest their time and financial resources.

When conducting international collaborative research and public funding from both countries is invested, IP implications and legal modalities in both contexts should be carefully considered. Upfront negotiation on IP management, responsibility and benefit should be strongly encouraged (whilst joint ownership is discouraged from a legal perspective).

A number of standard guidelines for IP agreements between engagement partners exist (in Europe). These should be interrogated for contextual relevance and tailored for application in the SA-UK collaborative partnership.

NEW GENERATIONAL SCIENCE – BILATERAL VS. MULTILATERAL AGREEMENTS

As the nature of research and the ways of doing research continue to evolve, the pre-eminence of bilateral agreements may decline and give way to increased attention given to multilateral cooperation. Early signs of this are already on the horizon, with some funders requiring multilateral cooperation (specifically with an African partner) as a prerequisite to funding.

Regardless of this shift, a multitude of factors (including government pressures and requirements) currently discourage and stunt the rapid emergence of multilateral funding agreements, and existing multilaterals do not always function optimally. Although their relevance is increasingly recognised, these arrangements are further complicated by the expectation of matched funding and the reality of genuine resource constraints in some developing contexts.

Funders will need to keep a proverbial “finger on the pulse” in order to plan their response to this evolution appropriately and efficiently. Embedding multilateral arrangements into the current bilateral agreement between the UK and SA is one possible alternative to consider. For example hub-and-spoke models which have shown relative success in some contexts (e.g. Ghana and Tanzania) could be considered, but institutional capacity development to support this arrangement may be needed.

Recommendations for future UK-SA collaborations

Session III focussed on *Recommendations for future UK-SA collaborations and mechanisms to realise them* (chaired by Prof. Dianne Edwards FRS, Cardiff University). The session included short presentations on the RS-NRF Joint

Collaborative Programme (Ms Prudence Makhura, Director: Overseas Cooperation, International Relations and Cooperation, NRF) and the UK/South Africa Network Grants (Dr Hans Hagen, Senior Manager: Grants, Royal Society). A facilitated group discussion was utilised to draw additional inputs from the workshop participants to serve as stakeholder inputs on determining the way forward.

Ms Makhura shared succinctly with the participants a short history of the collaborative efforts between SA and the UK to date, highlighting the disciplines and activities which have benefitted from the initial Joint Collaborative Programme. The NRF is considering supporting the SA-UK collaborative effort through a number of mechanisms, including a Joint Research Programme (offering longer term funding – e.g. 5 years – to research projects), joint SA-UK Bilateral Research Chairs, flagship projects emerging from the workshop and the Joint Seminars, as well as the continuation of the current networking and mobility funding.

Dr Hagen noted the RS funding schemes relevant to the workshop discussions, namely the **Newton International Fellowships** for or early career researchers¹⁰, **International Exchanges** for established researchers at any career stage¹¹, the **Royal Society - DFID Africa Capacity Building Initiative**¹² to strengthen collaborations within sub-Saharan Africa, and the **South Africa - UK Scientific Seminars**¹³ to facilitate collaborations between South Africa and the UK. He elaborated on the history of the Network Grant Scheme– which is now in the process of being revived (in a new format) as the SA-UK Scientific Seminar Scheme.

The SA-UK Scientific Seminar Scheme is aimed at mid-career scientists wishing to organise a scientific seminar (not exceeding three days) between scientists from SA and the UK. The grant provides support for costs of meeting of up to 20 attendees from different institutions (5 from the visiting country and up to 15 from the host country) and meetings can take place either in the UK or SA. The intention behind the scheme is to promote collaboration and knowledge transfer by allowing researchers to engage intensively around areas of commonality. Although it is not expected that all seminars will lead to collaborations, the intention is that potential collaborative efforts are articulated at the end of each seminar. Applicants will be screened for complementarity and future prospects for research will serve as criteria for selection. Grants of up to £12,000 in total, jointly covered by both partners will be made. A dual selection procedure will be made through the RS's e-GAP2 portal, after which the Society sends PDF versions of applications to the NRF. Both organisations will use their established review systems, and independently shortlist applications deemed fundable, and applications shortlisted by both organisations can be considered for the final joint shortlist. The cost sharing arrangement agreed upon is that the sending side covers the travel cost for up to five participants and the receiving side covers the costs for accommodation and venue.

In addition to this, following extensive discussions with the MRC and the NRF, the RS has proposed a new scheme to offer additional support for early to mid-career researchers in order to attract the best post-doctoral talent to research institutions in South Africa, ensure the career progression and retention of successful candidates and strengthen the research collaborations between the UK and South Africa. Only researchers who have already successfully secured a post-doctoral fellowship from the MRC or NRF (such as the Research Career Advancement Fellowship) will be eligible to apply. The funding instrument will have three consecutive annual rounds of applications, offering 6 awards each year (18 in total) – with the possibility of being scalable. The aim is to create a cohort of talented and well-funded post-doctoral researchers plus a sizeable group of PhD students. Fundraising efforts are still needed, and the details of the modalities need to be clarified.

¹⁰ <http://royalsociety.org/grants/schemes/newton-international/>

¹¹ <http://royalsociety.org/grants/schemes/international-exchanges/>

¹² <http://royalsociety.org/grants/schemes/africa-capacity-building/>

¹³ <http://royalsociety.org/grants/schemes/south-africa-seminars/>

What activities should collaborations be funding?

During the workshop discussions a number of activities and approaches to funding were noted. The broad categories/activities for funding identified were: capacity development and graduate student training, supervisory support and developing supervisory capacity, career development opportunities for early career researchers, alternative capacity development programmes and initiatives, facilities (and access to facilities), and mobility and networking platforms.

CAPACITY DEVELOPMENT AND GRADUATE STUDENT TRAINING: Capacity development and training for the next-generation of researchers is a mutual goal for both the SA and UK, although it is of critical developmental concern for South Africa. Funding for capacity development and graduate student training should be allocated both to student exchanges (short-term visits of 1-3 months) and to student bursaries (e.g. for the full duration of a PhD degree).

Short-term stays abroad for graduate student are viewed positively by both scientists and funders, and have multiple potential benefits. Students establish international research networks which they can continue to access in their future careers. SA researchers in particular note the change in attitude and work ethic once students return (even from short-term visits) and visits for Master's students can set the stage for international PhD studies.

Full-time bursaries offer opportunities for South African students to be trained in high-tech labs and for UK students to be exposed to the unique "living laboratory" and biodiversity in SA. Furthermore, full-time international PhDs allow for accelerated PhD production (from the SA perspective).

In addition, alternative models of PhD provision, including sandwich degrees and split-site registration/joint degrees could also be considered for funding. Whilst these models are not without their own unique set of challenges, they present one way in which to lessen the impact of the supervisory capacity gap in South Africa and can contribute positively to brain retention (see earlier discussions). Joint supervision arrangements can also be funded or facilitated outside of formal joint degree arrangements.

Negotiations with higher education institutions are needed to establish (where possible) agreements/MoUs with regards to bench fees/overhead costs, cost sharing (in terms of travel, subsistence etc.) and assessments arrangements in the case of both full-time bursaries and short-term visits.

It is important to maintain a longer term view with regards to capacity development, and the ultimate goal of moving towards strong, resilient African universities which become the institution of choice for registration should be considered in funding efforts aimed at graduate student training.

SUPERVISORY SUPPORT AND DEVELOPING SUPERVISORY CAPACITY: Engaging retired academics as mentors and supervisors through funding opportunities, as well as investigating innovative mechanisms for co-supervision between SA and the UK can serve to help address the supervisor capacity conundrum in SA and potentially contribute to the development of UK researchers.

There was some discussion around the possibility of drawing in young recent graduates from the UK who are not yet working in research positions as supervisors in SA. There was not consensus on the benefit of this to the young academic or the benefit to the students who would be supervised by inexperienced researchers. Additional consideration of how to optimally draw this cohort in to offer supervisory support is needed. Some innovative models may already be in existence and could be applied to the SA-UK collaboration (see later discussion on research in triplets model).

NURTURING EARLY CAREER RESEARCHERS FOR ESTABLISHMENT: Once qualified, retaining PhD graduates within university environments is an important link in the chain of ensuring a sustainable, strong, motivated core of next-generation researchers. Funding to create enticing post-doctoral opportunities for early researcher career development can contribute to the retention of the best and the brightest in the academic environment.

Limited resources inhibit the ability of post-docs to establish research careers. Supplemental funding to post-docs plays a major role in providing these young researchers with the capacity to purchase equipment, employ research assistants and fund mobility to establish strong networks.¹⁴ This type of supplemental funding could facilitate SA researchers to work in the UK or vice versa. When providing this type of funding, measures to buffer post-docs and recently completed post-docs from unreasonable administrative and teaching loads should be sought, for example by obtaining commitment from host institutions to reasonable expectations during the grant allocation process. Funding for replacement teaching (as a short-term solution) can provide immediate solutions to institutions and allow post-docs to set up research groups and labs. Replacement funds or protected posts should not however result in a complete disengagement from teaching.

One of other the challenges faced by recent doctoral graduates (in particular when returning from studies abroad) is the limited positions available within universities. Phased post-doctoral funding between partners (funder and university) over an agreed upon number of years to enable post-docs to publish and create a position at the South African institution enable opportunities for graduates at SA institutions without placing unrealistic demands on universities. Junior Chair positions (modelled on the SA SARChI programme) can also serve as a catalyst for bringing young African academics back to Africa after the completion of their studies abroad.

ALTERNATIVE CAPACITY DEVELOPMENT PROGRAMMES AND INITIATIVES: Optimal solutions would enable the production of PhDs, the development of supervisory capacity and the opportunity for SA and UK researchers to make progress on an identified research agenda. Possible models, for example the current NRF engagement with the International Institute for Applied Systems Analysis (IIASA) could be considered to achieve this. The model sets up a research triplet – with one supervisor from each country and a group of PhD students who work together on an identified theme over a three-month intensive programme. The output expected from each triplet is a publishable article in a peer reviewed journal. Some partnership models are also functioning in the UK that involves institutional triads. Funding these types of activities and programmes has potential for high impact across multiple areas.

Centres for doctoral training (such as the African Doctoral Academy at Stellenbosch University) could also be considered for funding. Their continued contribution to capacity development and training over extended periods of time can serve to strengthen the African institutions, as well as provide platforms for engagement and research with UK partners.

FUNDING FACILITIES AND ACCESS: Funding the establishment of facilities or maintenance of current facilities can be costly, but the investment can have a potentially high rate of return. In the initial stages of collaboration, facilities funding may be necessary. As collaborations grow and gain momentum other partners (e.g. industry and the private sector) should be sought as contributing funders in this regard.

MOBILITY AND NETWORKING PLATFORMS: The value of funding for mobility to establish networks, continue collaborations and access facilities cannot be overstated. As indicated in the discussions above, this is one of the key ways in which funders can help to contribute to enabling successful collaborations.

INSTITUTIONAL CAPACITY DEVELOPMENT: As noted earlier, institutional capacity development is needed in the long term. Funding institutional triads, possibly through hub-and-spoke models could be considered towards this end. Current NRF high-end funding instruments, such as SARChI and the CoE's could serve as potential platforms for engaging international partners in institutional capacity development programmes.

¹⁴ Example of this is the Future Research Leaders funded by the ESRC.

Conclusion

Final inputs and thoughts were shared by the participants, concluding with final comments from Ms Makhura and Ms Ansell. A summary of the way forward – including additional details about the Newton and Space Fund were shared. Participants were reminded of the closing date for applications for the Joint Seminar Series.

The section below summaries the key lessons drawn from the workshop.

Workshop Summary

At the highest level, SA and the UK are actively working towards strengthening and revitalising the collaborative research efforts in a targeted and strategic manner. A number of recently announced UK funding opportunities open up the possibility of substantial increases in these collaborative efforts and provide the impetus for the revitalisation.

The two-day workshop signalled the first step in the process of setting the path for this renewed effort. This workshop report serves as one of the inputs to a proposal for establishing the strategic aims and directions of the SA-UK collaborative effort, ultimately leading to a signed agreement between the ministries of the two countries in May 2014.

Strengths and potential contributions of SA and the UK

The workshop identified a number of strengths and potential contributions of both the UK and SA. Whilst the UK has research strengths and top quality researchers in almost all domains of research, SA has a number of niche areas in which it excels. In addition, SA is faced with a number of particularly pressing challenges including the need to dramatically increase PhD productivity and significantly bolster supervisory capacity whilst transforming the profile of the scientific workforce. Based on this, UK-SA collaborations could thus be viewed in two broad categories, namely a strength-to-strength approach or a strength-to-need approach.

Partnership with the NRF as the leading science granting council in SSA (with adequate capacity for facilitating collaborative research) opens up substantial opportunity for multilateral cooperation between SA, the UK and other African countries utilising the SA-UK collaborative relationship as a platform from which to mobilise. SA is a unique living laboratory with extensive biodiversity, unique climatic conditions and a social history which has the potential for research into understanding social justice and reconciliation.

On the other hand, the UK has large scale facilities and large infrastructure projects which enable an integrated approach to problem solving. More specifically, the UK has a strong and proven track record of developing facilities, creating strong communities around them and effectively managing these for enhanced collaboration. The UK has also made significant strides in engaging and communication with the public, the media and policy makers, and have demonstrated greater success in technology transfer and knowledge application – SA researchers stand to learn much from their UK counterparts in these respects.

The workshop discussions highlighted a number of themes and potential areas for collaborative research. The process of finalising and refining themes should identify the “big questions” in both contexts and funding should be focussed to some extent towards answering these questions. Importantly, it should be noted that this does not imply a preference for applied research over discovery driven research. Both breadth and depth are necessary when a research agenda is determined, and allowance should be made for both applied and discovery driven research. The four themes that have been identified are sufficiently (and intentionally) broad, and can be interpreted broadly. They also resonate strongly with the grand challenges in both SA and the UK

(with the exclusion of astronomy). In addition to the themes already identified a number of other themes were noted during the workshop, including (but not limited to): environmental research (including climate matters, energy and natural resources); social sciences, humanities and development (including the digital humanities) and big data (including the SKA data).

Establishing, nurturing and sustaining long-term collaborations

Successful collaborations have a multiplicity of benefits and have the potential to serve as a catalyst for synergistic impact that extends beyond the individual potential of the partners working alone.

A number of factors that contribute to successful long-term collaborations, including: a shared vision and common goals, genuine collaboration for mutual benefit, intentionally planning for longevity, strong leadership and healthy interpersonal team relationships, and focus from the outset on monitoring and evaluation.

Funders have an important role to play in creating enabling environments for success. They can contribute significantly by facilitating opportunities for researchers to network, employing innovative reliable and efficient application and selection processes, designing flexible and adaptive funding mechanisms and engaging with stakeholders in both contexts regarding their scientific and developmental needs.

Various challenges and risks need to be overcome in order for collaborative efforts to be optimally successful. Funders should be aware of the risk of brain drain and seek ways of encouraging brain circulation, they should work with researchers and institutions to find ways to scale up impact to the institutional level, and intellectual property management should be attended to from the start.

As the nature of research and the ways of doing research continue to evolve, the pre-eminence of bilateral agreements may decline and give way to increased attention given to multilateral cooperation. Early signs of this are already on the horizon. Funders will need to keep a proverbial “finger on the pulse” in order to plan their response to this evolution appropriately and efficiently.

Recommendations for future UK-SA Collaborations

The workshop discussions brought to light a number of key activities and funding approaches that should be considered in the collaboration. These suggestions can be broadly classified under: capacity development and graduate student training, supervisory support and developing supervisory capacity, career development opportunities for early career researchers, alternative capacity development programmes and initiatives, facilities (and access to facilities), and mobility and networking platforms.

Capacity development and graduate student training covers a vast number of activities, ranging from short-term stays to full-time bursaries. Alternative models of PhD provision, such as sandwich degrees, were also noted as opportunities. Inseparable from student capacity development is finding solutions to the SA supervisor capacity challenge; it is clear that innovative models for bolstering supervisory capacity are needed.

A strong emphasis was placed on facilitating opportunities for early career researchers to establish themselves as researchers (without being overburdened by teaching and/or administrative responsibilities). Funding models must make resources available to these early career scientists in order to enable them to establish research groups and set up successful labs.

Optimal funding solutions would enable the production of PhDs, the development of supervisory capacity and the opportunity for SA and UK researchers to make progress on an identified research agenda. In this regard,

innovative models, such as research triplets and institutional triads, as well as centres for doctoral training could be considered for funding.

In addition to the above funding for facilities (and access to facilities), mobility and networking platforms and institutional capacity development is also needed.

Annexure I: Workshop Agenda

9 February

18:00 - 19:30 *Welcome reception at venue*

10 February

08:30 - 09:30 *Registration*

Opening session - Chaired by Dr Aldo Stroebel, Executive Director: International Relations and Cooperation, National Research Foundation

09:30 - 09:45 *Welcome and Opening Remarks - Dr Albert van Jaarsveld, Chief Executive Officer, National Research Foundation*

09:45 - 10:00 *Welcome by the British Consul General, Cape Town, Mr. Chris Trott*

10:00 - 10:15 *Objectives of the workshop - Maddalaine Ansell, Head of International, Knowledge and Innovation Unit UK Department for Business, Innovation and Skill*

10:15 - 10:45 *Presentation on Intellectual property - Dr Kerry Faul, Head of the National Intellectual Property Management Office - NIPMO*

10:45 - 11:00 *Open discussion on Intellectual Property*

11:00 - 11:30 *Areas of research strength in South Africa - Dr Gansen Pillay, Deputy Chief Executive Officer, National Research Foundation*

11:30 - 12:00 *South Africa as a priority for the UK - Dr Sophie Laurie, Head of International, Research Councils UK*

12:00 - 12:30 *The importance of supporting "discovery research" - Prof John Pickett FRS, Rothamsted Research*

12:30 - 13:00 *Discussions*

13:00 - 14:00 *Lunch break*

Session I: Research topics for future collaborations: Shared priority areas and other fields - Chaired by Dr Andrew Kaniki, Executive Director: Knowledge Fields Development, National Research Foundation

14:00 - 14:15 *Introductory remarks - Dr Andrew Kaniki, Executive Director: Knowledge Fields Development, National Research Foundation*

14:15 - 15:30 *Break-out group discussions*

Group 1: Research strengths and potential contribution of South Africa to collaborations - Facilitated by Dr Aldo Stroebel, Executive Director: International Relations and Cooperation, National Research Foundation

Group 2: Research strengths and potential contribution of the UK to collaborations - Facilitated by Dr Peter Fletcher, Head of International Relations, Science & Technology Facilities Council

Group 3: The importance of support for new science and discovery research - Facilitated by Prof Sir Brian Greenwood FRS, London School of Hygiene & Tropical Medicine

15:30 - 16:00	Coffee/tea break
16:00 - 16:30	<i>Summaries</i> of each group discussions (rapporteurs)
16:30 - 17:30	<i>Floor discussions</i> - Chaired by Dr Andrew Kaniki, Executive Director: Knowledge Fields Development, National Research Foundation
18:00	Departure for reception
18:30 - 20:00	<i>Reception</i> at the Cape Town residence, hosted by Mr. Chris Trott, the British Consul General, Cape Town

11 February

Session II: Benefits of UK - South Africa research collaborations: past experience - Chaired by Prof Richard Catlow FRS, University College London, and Prof Phuti Ngoepe, University of Limpopo

09:00 - 09:30	<i>Introductory remarks</i> by former RS - NRF Joint Programme Grant Holders - Prof Richard Catlow FRS, University College London, and Prof Phuti Ngoepe, University of Limpopo
09:30 - 10:30	<i>Break-out group discussions</i> on the necessary building blocks that make successful collaborations work - Facilitators are former Award Holders of the RS - NRF Joint Collaborative Programme <i>Group 1</i> - Facilitated by Prof Paul O'Brien FRS, University of Manchester, and Prof Neerish Revaprasadu, University of Zululand <i>Group 2</i> - Facilitated by Prof Richard Catlow FRS, UCL, and Prof Phuti Ngoepe, University of Limpopo <i>Group 3</i> - Facilitated by Prof Vincent Savolainen, Imperial College and Kew Royal Botanic Gardens) and Prof Michelle van der Bank, University of Johannesburg
10:30 - 11:00	Coffee/tea break
11:00 - 11:45	<i>Summaries</i> of each group discussions (rapporteurs)
11:45 - 12:30	<i>Floor discussions</i> - Chaired by Prof Richard Catlow FRS, UCL, and Prof Phuti Ngoepe, University of Limpopo
12:30 - 13:30	Lunch break

Session III: Recommendations for future UK - South Africa collaborations and mechanisms to realise them - Chaired by Prof Dianne Edwards FRS, Cardiff University

13:30 - 13:45	<i>Introductory remarks</i> - Prof Dianne Edwards FRS, Cardiff University
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13:45 - 14:00	<i>Short presentation:</i> The RS - NRF Joint Collaborative Programme - Ms. Prudence Makhura, Director: Overseas Cooperation, International Relation and Cooperation, National Research Foundation
14:00 - 14:15	<i>Short presentation:</i> The UK/South Africa Network Grants - Dr Hans Hagen, Senior Manager: Grants, Royal Society
14:15 - 15:00	<i>Floor discussions</i> - Chaired by Prof Dianne Edwards FRS, Cardiff University
15:00 - 15:30	Coffee/tea break
15:30 - 16:00	<i>Summary of session</i> - Chaired by Prof Dianne Edwards FRS, Cardiff University
16:00 - 16:15	<i>Closing remarks</i> by Dr Aldo Stroebel, Executive Director: International Relations and Cooperation, National Research Foundation and Maddalaine Ansell, Head of International, Knowledge and Innovation Unit UK, Department for Business Innovation and Skill
16:15	Workshop closes
17:00	<i>Small reception</i> and opportunity for further discussions at venue for participants