Case study report: Science and technology diplomacy and the 2012/2013 German –South African Year of Science

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EXECUTIVE SUMMARY

The high degree of interdependence among role players is one of the most important characteristics of the global arena in the twenty first century. The downside of the creation of an integrated and knowledge-driven global society is the increased global inequality, poverty and environmental degradation. Insufficient scientific and technological knowledge to address these challenges is one of the most pressing concerns for the developing countries and emerging market economies of the global South. To increase their technological capabilities without incurring the costs of technological innovation, these countries use science and technology diplomacy to create new and participate in existing global networks for scientific information exchange. The countries of the South do not perceive themselves to be 'borrowers' or 'adopters' of ready-made technology but as active participants in the acquisition, generation and management of technological expertise.

Developing countries and many emerging economies desperately need to level the global playing field by bridging the scientific and technological gap between them and developed countries. Different needs motivate a developed country, such as Germany to become involved in a bilateral diplomatic relationship with an emerging economy, such as South Africa. Germany aims to increase its access to South Africa's markets, thereby creating more opportunities for trade and economic growth. South Africa experiences developmental challenges and has since 1994 actively created diplomatic opportunities to ensure the successful transmission of technology to its people. South Africa's science and technology diplomacy takes place against the background of its national interest related to the transfer of technology to its people. South Africa recognised the necessity of diplomatic specialisation and therefore signed a bilateral science and technology agreement with Germany on 12 June 1996.

The broad aim of this case study is to demonstrate how the science and technology diplomacy between Germany, a highly developed country in the global North and South Africa, an emerging economy in the global South, can be instrumental in addressing the developmental challenges of the latter. More specifically, the purpose of this study is to

assess the significance of the scientific and technological diplomatic relationship between South Africa and Germany as manifested during the 2012/2013 German-South African Year of Science.

The main research question is whether the 2012/2013 German-South African Year of Science contributed to South Africa's ability to leverage scientific knowledge and technological skills from Germany. The first subsidiary question asks whether South Africa can use this Year of Science as a blueprint for similar partnerships with other countries. This leads to a second subsidiary question: What does the South African government need to do to establish a permanent, structural framework for the long-term inclusion of non-state role players in its science and technology diplomacy?

The study finds the Year of Science to be a highlight, a success and in many aspects a blueprint for future cooperation with other countries. This Year of Science demonstrates what a good and dedicated partnership could offer. It strengthened and supported the already existing relations with various non-governmental stakeholders. This Year of Science served as a diplomatic instrument for the inclusion of non-state role players for the promotion of science and technology agreements, the funding of scientific research and the exchange of scientific knowledge.

This case study report contributes to the field of science and technology diplomacy in general, but also provides valuable insight in the changes South Africa will have to make to its strategies and policies to benefit more to improve its science and technology diplomacy.

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ACRONYMS

AGNES	African-German Network of Excellence in Science
ASSAf	Academy of Science of South Africa
BMBF	Bundesministerium für Bildung und Forschung (German Federal Ministry of Education and Research)
BRICS	Brazil, Russia, India, China and South Africa
BNC	Binational Commission
COPS	Conference of Parties
CSIR	Council for Scientific and Industrial Research
CSTD	Commission on Science and Technology for Development
DAAD	German Academic Exchange Service
DACST	Department of Arts, Culture, Science and Technology
DDG	Deputy Director-General
DG	Director-General
DHET	Department of Higher Education and Training
DIRCO	Department of International Relations and Cooperation
DST	Department of Science and Technology
EU	European Union
GCIS	Government Communication and Information System
HRK	German Rectors' Conference
HESA	Higher Education South Africa
IB	International Bureau
JC	Joint Commission
TNC	Transnational Companies
NGO	Non-governmental Organisation
NMMU	Nelson Mandela Metropolitan University
NRDS	National Research and Development Strategy (2002)
NRF	National Research Foundation

R & D	Research and Development
SADC	Southern African Development Community
SAGCC	South African-German Chamber of Commerce and Industry
SARChI	South African Research Chairs Initiative
SASSCAL	Southern African Science Service Centre for Climate Change and Adaptive Land Management
SKA	Square Kilometre Array
UNDP	United Nations Development Programme
UNFCC	United Nations Framework Convention on Climate Change
WISA	Women in Science Awards
WTO	World Trade Organisation

INTRODUCTION

Global interconnectedness has increased the impetus for science and technology diplomacy as an innovative mode of diplomatic conduct that has since gained prominence on the diplomatic agenda. Developing countries and emerging economies in particular are compelled to prioritise science and technology diplomacy to advance their economies and societies through technological knowledge gained and generated. After 1994 South Africa needed to adapt to a rapidly changing global arena and pursued science and technology cooperation with countries such as Germany for economic development. The scientific and technological relations between Germany and South Africa were initiated as part of a broader South African strategy to achieve its scientific and technological needs.

The broad aim of this case study is to demonstrate how the science and technology diplomacy between two countries, Germany[1], a highly developed country in the global North and South Africa, an emerging economy[2] in the global South, can be instrumental in addressing the developmental challenges of the latter. More specifically, the purpose of this study is to assess the significance of the scientific and technological diplomatic relationship between South Africa and Germany as manifested during the 2012/2013 German-South African Year of Science.

The main research question is whether the Year of Science contributed to South Africa's ability to leverage scientific knowledge and technological skills from Germany. The first subsidiary question based on this: Can South Africa use this Year of Science as a blueprint for similar partnerships with other countries? This leads to a second subsidiary question which asks: What does the South African government need to do to

[1] Described by the Index Mundi 2014 as "the fifth largest economy in the world in PPP terms and Europe's largest - is a leading exporter of machinery, vehicles, chemicals, and household equipment and benefits from a highly skilled labor force".
[2] The global business advisor magazine refers to South Africa a an economic powerhouse on the African continent and a promising emerging market while Index Mundi 2014 describes South Africa as "a middle-income, emerging market with an abundant supply of natural resources; well-developed financial, legal, communications, energy, and transport sectors and a stock exchange that is the 16th largest in the world".

establish a permanent, structural framework for the long-term inclusion of non-state role players in its science and technology diplomacy?

SECTION 1: CASE STUDY DESCRIPTION

Bilateral relations between Germany and the new, democratic South Africa in the area of science and technology began in 1996 when the two countries signed a formal agreement. This agreement laid the foundation and provided the structure for cooperation in the niche field of science and technology. The two countries also continued their strategic partnership geared towards collaboration in the economic and political fields. The Ministers of Science and Technology of both countries agreed to host the German-South African Year of Science in 2012 and 2013[3], to celebrate their sixteen years of cooperation and to lay the foundation for many more years to come. For South Africa this German-South African Year of Science was of primary importance to serve a broader strategy aimed at ensuring short and medium term technology and knowledge transfer. The South African government also wanted to lay the foundation for long-term diplomatic cooperation by creating a network structure which can serve as a blueprint for the inclusion of other countries. It is crucial to provide more information on the background which led to the Year of Science.

SECTION 2: BACKGROUND AND CONTEXT

In broad terms, science can be described as a body of knowledge and as a way of acquiring knowledge and asks the questions why and how do things happen while technology is the practical application of scientific knowledge aimed at the solution of specific human problems (Diffen 2014:1; Archibugi and Lammarino 2002:99; QHR Technologies n.d). Globalisation is driven by a technological revolution and contributes to the creation of an integrated global society based on knowledge. Globalisation is described by Wiseman (2004:52) as “a form of accumulated social change that involves the deepening of political, economic, and cultural relations between peoples across

[3] From henceforth referred to as Year of Science

borders". However, the generation of knowledge in science and technology is still mainly concentrated in the developed countries and in those emerging economies that successfully managed to catch-up. Archibugi and Pietrobelli (2002:875) lament the insignificant contribution of developing countries to the generation of scientific knowledge, a fact that drives their efforts to acquire this knowledge from outside their countries.

The globalisation process drives societies to assimilate and transfer technology at a much higher speed and intensity than ever before. The consequence is that advanced countries manage to exploit their own technological capacity by participating in international trade but developing countries are often left with no choice but to depend on their cooperation with technologically advanced countries to ensure that they benefit from the generation and transfer of technological innovations. People in the South need to acquire science and technology to improve their basic living conditions and economic well-being. Titanji (2001:129) highlights Africa's scientific and technological developmental needs in particular areas, such as health care, ensuring long-term food security, improving communication networks and protecting the environment. He also identifies requirements to be met if Africa wants to escape economic marginalisation. He lists these requirements as the adoption of a scientific-technological culture, a coherent science-policy aimed at guiding scientific and technological development and a framework for cooperation (Titanji 2001:127-128).

To overcome their developmental challenges and their marginalised position, countries from the South are desperate for continuing technological innovation and change, often only possible through the adoption of technology, a process dependent on the transfer of technology[4] which still mainly manifests as a "North-South knowledge flow" (Archibugi and Pietrobelli 2003:875; Bell and Pavitt 1997:86). The developing countries of the global South need a diplomatic framework that will enhance their ability to network

[4] Technology transfer is defined by the UNFCCC (quoted in Taviv 2007) as *"a broad set of processes* covering the flows of know-how, experience and equipment for mitigating or adapting to climate change amongst **different stakeholders** such as governments, private sector entities, financial institutions, NGOs and research/ education institutions".

within and between countries to address global and national challenges as a collective. By being pro-active, governments can play a role to ensure that their populations are not marginalised and cut off from the opportunities and benefits of globalisation.

Countries focus on utilising science and technology diplomacy to further their common interests and obtain expertise. Science and technology diplomacy can improve a developing country's ability to create a sound scientific and technological base for development. It can also assist countries to advance a coherent, long-term science and technology policy framework designed to meet global and national challenges, such as economic competitiveness, the protection of the environment and the provision of health care. In its 2013 Human Development Report, the United Nations Development Programme (UNDP 2013:7-8) indicates that the developing countries of the South acknowledge the challenges of participating in global scientific and technological innovation in the twenty first century and that they use science and technology diplomacy as one of the strategies to contribute, shape and share knowledge.

Similarly, the United Nations Conference on Trade and Development (UNCTAD), a United Nations' agency actively involved in the study of the transfer of science and technology through diplomatic methods, states in its 2003 Report on Science and Technology Diplomacy that scientific knowledge is not only becoming increasingly specialised, but also that solving problems requires the ability to integrate knowledge embedded in different disciplines. The 2003 UNCTAD report also states that when states follow the path of diplomacy, they must realise that "…diplomacy now demands that government negotiators deal with both specialisation and integration" (UNCTAD 2003).

Many governments debate complex global issues in bilateral and multilateral forums, such as conference of parties (cops), where science and technology diplomacy features prominently as a diplomatic tool. Turekian and Neureiter (2012:3) Calestous (2013:2) Ahmed and Stein (2004:1) and Hormats (2012:1) have pointed out the importance of science and technology diplomacy and the role it plays in driving modern economies.

Investment in science requires long-term financial and human resources. Wealthy countries can afford this investment while developing countries tend to become recipients of the outcomes of research and innovation by developed countries. For a example, the World Trade Organisation is an international multilateral entity where governments negotiate issues of trade governed by among others the rules of equal treatment to all, promotion of fair competition and enhancement of trade globally. Developing countries are still grappling with technology and economic development. This sets these developing countries in a marginalised position in the global trade system. In addition the developing countries remain unable to enforce technology transfer from rich countries without contravening the rules of the World Trade Organisation (WTO). These limitations render science and technology diplomacy at both bilateral and multilateral levels important for developing countries.

South Africa embraces the belief that science and technology diplomacy is critical to the attainment of sustainable development and has since 1994 re-established its position globally in science and technology development. The South African science and technology diplomacy takes place in the broader context of globalisation and technological transfer from advanced industrialised countries to developing countries. The bilateral diplomatic relations between South Africa and Germany form the broad framework for technology transfer and capacity development, as advised by the Commission on Science and Technology for Development (CSTD) of the United Nations. The CSTD (2013:1) recommends that the science, technology and innovation policies be reviewed and applied consistently to enable growth and development in developing countries.

The quest for scientific and technological advancement forms the basis of South Africa's cooperation with countries such as Germany and is therefore regarded by South Africa as an important strategic partner in many respects. An analysis of the Year of Science will highlight the diplomatic significance of the scientific and technological relationship between the two countries and how this cooperation has benefited South Africa.

2.1 Literature overview

A review of the available literature focussed on the following three areas: the evolvement of diplomacy to include science and technology diplomacy as a niche area in the diplomatic arena, South Africa's scientific and technological needs and the bilateral relations between South Africa and Germany.

2.1.1 Science and technology diplomacy

Diplomacy owes its existence to the necessity to maintain working relations between geographical entities such as city states, kingdoms and empires. Tariqul Islam (2005:59) identifies the ancient Greek city states as the first architects of diplomatic relations and from there it developed to become what Tariqul Islam (2005:56) refers to as "one of the sets of instruments through which decisions are implemented, policy activated, and policy objectives are achieved" in the modern global arena. Irwin (1975: 81-96) focused his analysis on diplomacy in pre-colonial Africa and finds that, similar to Western societies, diplomatic activities occurred at a regular basis in pre-colonial Africa. For example, the Asante kings regulated their negotiations with widely accepted protocols and they formally ratified their treaties. Many African leaders also delivered general policy statements to large gatherings, thereby informing their own people of the negotiations and the end results thereof (Irwin 1975:91).

Berridge (2002:1), Hamilton and Langhorne (1995:1) and Du Plessis (2008: 89-90) describe diplomacy as a dialogue between states aimed at reaching a solution amicably without resorting to force. Their definition does not make provision for the involvement of non-state entities. Baylis and Smith (2001:318) and Wiseman (2010:24) characterise diplomacy as an exchange process involving various international role players who contribute towards addressing issues of commonality through peaceful means, such as negotiation. Satow (quoted in Berridge, Keens-Soper and Otte 2001:129) describes diplomacy as "the application of intelligence and tact to the conduct of official relations between governments and independent states". Nicolson (quoted in Berridge, Keens-

Soper and Otte 2001:157) and Tariqul Islam (2005:56) concur with Sharp (1999:40) on the importance of communication and negotiation between consenting parties to achieve a common understanding of each other with the aim of developing a structured framework for sustainable diplomatic relations. Holsti (1995:139) sees the purpose of diplomatic communication as "exchanging views, probing intentions, and attempting to convince other governments that certain actions… would be in their interest".

The modes of diplomacy include bilateral, multilateral and polylateral diplomacy. Berridge (2002:108) describes bilateral diplomacy as the creation of formal communication and cooperation between two countries. Successful bilateral diplomacy can pave the way for multilateral and polylateral diplomacy. Adegbite (2009:1) states that "bilateral negotiations should preempt multilateral structures and as such the concept of 'multi-bilateral' negotiations provide the best platform and foundation for lasting success". Multilateral diplomacy facilitates partnerships between multiple stakeholders working towards a common decision making process.

Wiseman (2010:24) acknowledges the concept of polylateral diplomacy as the nature of the relationships that are evolving in the international system to include non-state role players. Wiseman (2010:24) defines polylateral diplomacy as "the conduct of relations between official entities (such as state, several states acting together, or a state-based international organization) and at least one unofficial, non-state entity in which there is a reasonable expectation of systematic relationship, involving some form of reporting, communication, negotiation, and representation, but not involving mutual recognition as sovereign, equivalent entities". Hamilton and Langhorne (1995:183) agree that the modern state has undergone an expansion of functions which compelled role players, who are experts on issues other than diplomacy, to be included in the traditionally state-centric diplomatic arena. In the current global arena change is characterised by increased multilateral negotiations involving the application of innovative diplomatic methods and the inclusion of non-state role players on issues such as trade, economic and scientific cooperation (Barston 2013:5).

As alluded to in the discussion above, globalisation, driven by a technological revolution, brought about the incorporation of new global issues in diplomacy and also created new types of diplomacy. This era experienced a rapid growth and expansion of diplomacy in the international arena. Barston (2013:5) describes this process of changing the nature of diplomacy as an evolutionary trajectory which is subject to constant change.

This leads us to diplomatic specialisation in the form of the identification of niche areas. Niche diplomacy is defined by Evans (quoted in Henrikson 2007:67-71) as "a specialised area of diplomacy which enables a country to focus on achieving comparative advantage over other countries". In his definition of niche diplomacy Gareth Evans (2011) refers to "concentrating resources in specific areas best able to generate returns worth having, rather than trying to cover the field". Woods (2009:30) identifies requirements to be met by governments when choosing niche diplomacy, the first being that a specific area must be demarcated based on vested interest. The latter must be informed by the second requirement, which is that vested interest must be based on national interest and the third requirement is that there must be a likelihood of success. The fourth requirement is that policy priorities and strategies must be carefully selected. The last two requirements relate to government's careful selection of a particular mode of diplomacy (bilateral, multilateral or polylateral) and of partners on which to focus its diplomatic efforts (Wood 2009:30).

Science and technology diplomacy is a niche diplomacy which in particular demands the involvement of non-state experts in bilateral and multilateral negotiations on scientific matters. In this regard, traditional, bilateral relations become polylateral in nature when states establish diplomatic relations with non-sovereign entities, such as non-governmental organisations and transnational corporations, to pursue common objectives. Science and technology diplomacy is therefore defined, amongst others, by authors such as Yakushiji (2009:2), as a way "to advance scientific cooperation and also as a vehicle for foreign policy objectives of countries, to achieve scientific ends". Science has no boundaries and is characterised by non-governmental teams and

institutions working together to find solutions. Most authors in the field of diplomatic studies have realised the role of science and technology diplomacy as a niche area with benefits in the international arena. For example, Fedoroff (2009:9-11) describes science and technology diplomacy as the driver of social and human development. The world is dependent on knowledge generated by scientific research to provide global solutions to global problems. Science and technology diplomacy provides countries with the opportunity to remain in the cutting-edge of scientific development.

Similarly, Sunami, Hamachi and Kitaba (2013:2) state that "the primary purpose of science and technology diplomacy is to tap into the growing science base beyond a nation's borders including research facilities and human development". Johnson-Freese and Erickson (2005:1) and Hormats (2012:1) indicate that the knowledge-based economies of the twenty first century understand and acknowledge the necessity to promote knowledge sharing and learning by using science and technology diplomacy in both bilateral and multilateral settings. The participation of nations in knowledge sharing through forums or conferences on science matters provides valuable scientific know-how. Developed countries, such as Germany, Japan and the United States of America (USA) as well as regional organisations, such as the European Union (EU); and economic groupings, such as BRICS (Brazil, Russia, India, China and South Africa) actively promote cooperation and capacity building through the transfer of scientific knowledge and technology.

As an example of multilateral science and technology diplomacy, Johnson-Freese and Erickson (2005:12-22) refer to the EU-China space partnership where countries applied science and technology diplomacy to enhance their technological development and to establish their status as major competitors in this domain. China considers its science and technology diplomacy with the EU as even more important than its traditional economic diplomacy and argue that it is better to learn from others than to reinvent the wheel. The Chinese maintain that the USA must re-evaluate its bilateral scientific relationship with China because "the development of advanced technology with its corresponding (and overlapping) economic and military benefits have replaced the

dynamic political alignment, which was prevalent during the Cold War, as a major international system variable" (Johnson-Freese and Erickson 2005:14).

South Africa also realised in 1994 that it needed to specialise and concentrate its diplomatic resources and that policies and strategies must be guided by national interest and the likelihood of success. But what are South Africa's scientific and technological needs?

2.1.2 South Africa's scientific and technological needs

After 1994 South Africa faced unique challenges exacerbated by its isolated situation during apartheid and the need to improve its position in a rapidly changing global arena. In 1996 the South African Department of Arts, Culture, Science and Technology (DACST) acknowledged the importance of science and technology in its 1996 White Paper on Science and Technology as "… essential instruments not only for economic growth and competitiveness, but also for social development and poverty alleviation" (South Africa 1996:3). Coordination of the different stakeholders in science and research was promoted and encouraged enabling the country to respond to the global challenges at the same time addressing domestic objectives. The White Paper on Science and Technology was developed to address, among others, insufficient policy framework on science and technology, the performance of institutions involved in research, human resources and capacity building, development of science and technology infrastructure and how international cooperation could be pursued for the benefit of the country (South Africa 1996:1-80).

Subsequently the South African government developed the National Research and Development Strategy (NRDS) in 2002 to guide the Department of Science and Technology (DST) in advancing the country's science and technology objectives. The strategy outlines the status of the science and research areas in South Africa and focuses on science and technology development to meet human developmental challenges (South Africa 2002:52)

The NRDS addresses human development challenges in science and technology and identifies the following focus areas:

- “Astronomy – This is basically because of the country’s access to the Southern skies. These visible features contributed to South Africa jointly winning the Square Kilometre Array (SKA) project with Australia in 2012.

- Human palaeontology: This area is seen as important to South Africa since South Africa retains excellent sites in the Krugersdorp region.

- Biodiversity - the Cape Floral Kingdom is regarded as the smallest yet most diverse of the seven floral kingdoms in the world.

- Antarctic research – This is important as South Africa is the only African country with a presence in the Antarctic”.

On 28 June 2011 the Department of Science and Technology (DST) published a document entitled *Enhancing the National System of Innovation to support growth and development: A strategy to increase R&D investment in South Africa* in which it acknowledges that the South African economy lags behind its BRICS partners because it is “primarily driven by consumption expenditure, with inadequate expansion in the productive capacity of the economy” (South Africa 2011b:2). Even though technological innovation is of primary importance, the ability of South Africa to unlock its economic potential by creating “high level skilled human capital” lags behind both national targets and international criteria. The government’s adoption of a Ten-Year Innovation Plan in 2007 aimed at removing obstacles to research and development in South Africa, complements the National Research and Development Strategy (NRDS) of 2002 (South Africa 2011b:2-3).

The 2011 DST document highlights the critical link between investment in research and development, science and technology innovation and economic growth but it also acknowledges a very important principle: The document identifies a basic requirement for successful research and development innovation, as "A national consensus on the short and long-term needs of the country, and South Africa's intended role in the global environment must inform and strengthen policy to encourage innovation-driven economic growth" (South Africa 2011b:4).

The DST acknowledges that funding for technological innovation depends on the South African government, but also the public. Public investment will only increase if the following improves (South Africa 2011b:45-46):

- laboratories and scientific infrastructure, including scientific and technical services and programmes;

- The capacity of research universities and public research institutions and their collaboration with industry;

- The standards, quality and quantity of scientific outputs and the dissemination of ideas among researchers;

- The development of new industries.

The Human Development Index of the United Nations Development Programme (UNDP) is a tool to measure the level of human development reached by the countries of the world. In the 2013 edition of the Human Development Index listed South Africa among countries such as Mexico, Thailand and Turkey as becoming "the leading actors on the world stage". But in the category "Research and development, innovation and technology adoption" of this index South Africa is also ranked at 121 out of 186 countries (United Nations Development Programme 2013:23).

The long-term diplomatic relations with Germany are utilised to address South Africa's developmental challenge and the Year of Science was initiated and used as part of the broader South African strategy to further advance and achieve its scientific and technological needs.

2.1.3 South African – German relations

Germany, a country located in the heart of Europe, the largest economy in Europe and a member of the EU, is a leader in cutting-edge technology and a key research and development funder in Europe (Schiermeier 2013:1). The country's science and technology profile characterises its links to industry and presents opportunities for research collaboration in a wide range of research and development based and commercially proven technologies. Germany constitutes a strong national science and technology network, comprising higher education institutions, research associations and industry. These collaborative partnerships contribute to the successful science, research and innovation output of the German economy.

The German Federal Ministry of Education and Research/ Bundesministerium für Bildung und Forschung (BMBF) describes South Africa as Germany's "most important partner on the African continent, the strongest economic power in Africa and blessed with extensive raw materials" (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Final Publication 2013:5). However, the 2012/2013 German-South African Year of Science is not unique, but forms part of a number of similar events between Germany and Egypt (2007), Israel (2008), China (2009), Brazil (2010/11) and Russia (2011/12). Germany therefore hosts science years as a mechanism to share and strengthen scientific know-how with carefully selected partners.

South Africa and Germany share historical relations in the area of science and technology and Germany is the third most important international partner of South Africa's DST after USA and the UK (United Kingdom) (South Africa 2012a:1).

South Africa's foreign policy acknowledges the importance of science and technology as key elements for innovation and change (South Africa 2013a:14). The White Paper is a key driver in the development of South Africa's international cooperation in this area. It is against this background that South Africa is utilising its relations with countries such as Germany to advance its science and technology diplomacy. The science and technology cooperation between the two countries is part of a broader strategic partnership that rests on long-term economic and political relations.

The science and technology cooperation between Germany and South Africa is also motivated by similar national priorities as outlined in the Ten Year Innovation Plan (South Africa 2008:1-40) of the DST and the Germany High Tech Strategy 2020 (2010:1) of the BMBF. The science and technology relations with Germany have also contributed towards increased funding in the research partnerships between universities, science councils and the private sector. There are approximately 600 German TNCs involved in South Africa of which companies such as BMW, Mercedes, Siemens, Bosch, Daimler and Volkswagen (VW) stand out for their long-term transfer of German technical expertise to South Africa. Together the German TNCs in South Africa contribute to job opportunities for approximately 90 000 workers (German Missions in South Africa, Lesotho and Swaziland 2014:1). These companies established some of the most modern automotive production plants and laid the foundation for partnership in research and development with universities.

The polylateral diplomacy between the two countries was formalised through the signing of an agreement and has been maintained through structures such as the Joint Commission (JC) and the Binational Commission (BNC) to monitor progress. Management of the cooperation is reviewed on a regular basis to monitor progress and this is normally conducted at political level such as Heads of State, Foreign Minister or at Minister's level. The maturity of the relations accomplished a shared vision and acknowledged a layer of other partners building a foundation towards the extension to the multilateral and polylateral diplomatic settings.

The importance of science and technology cooperation for South Africa was stressed by former Science and Technology Minister, Derek Hanekom, when he stated that "The international nature of cooperation and innovation in science and technology is central to enhancing a country's competitiveness, its economic development, its human capital and its technology transfer," (Kahn 2013:1). The South African Minister of Science and Technology, Minister Naledi Pandor (2012:2) not only emphasised the importance of bilateral science and technology agreements for the benefit of societies, but also focused on how these agreements can be used as diplomatic tools to strengthen and advance cooperation to another level.

2.1.4 The significance of political engagements

Apart from the high level political interaction between Germany and South Africa, their long-term relations are anchored through the structure of the Binational Commission (BNC), a mechanism used by countries at political level to review relations during a bilateral cooperation (U.S. State Department 2014:1). The German-South African BNC is a strategic instrument used to review and advance cooperation between the two countries and meets every two years at an agreed alternative venue (South Africa 2012b:1). The German-South African BNC was inaugurated in 1996 during a state visit to Germany by the former and late President Mandela. The German-South African BNC comprises of working groups/joint committees in the areas of foreign and security policy, defence, economy, development cooperation, culture, labour and social affairs, environment and science and technology chaired by the Deputy Presidents and supported by the Foreign Affairs Ministries of both countries. Since the inauguration of the BNC, science and technology has been one of the highlights of the cooperation.

The DST and the BMBF cooperate through a unique diplomatic structure called the Joint Committee (JC) which meets annually and engage in policy dialogues, review the cooperation and provide progress reporting on the status of the cooperation to the BNC. The political principals at the 2012 German-South African BNC reported the satisfactory progress on the overall cooperation and highlighted the Year of Science as a

mechanism in strengthening the science and technology diplomatic relations between the two countries (South Africa 2012b:1). These consultation mechanisms of a Binational Commission and a Joint Committee represent the significance and diplomatic commitment by countries in an effort to jointly achieve results (Rana 2002:38). The section below outlines the details of the Year of Science.

SECTION 3: FACTUAL OVERVIEW OF THE CASE

The 2012/13 German-South African Year of Science was carried out under the auspice of the science and technology agreement signed between Germany and South Africa in 1996. A brief description of the case study is outlined below.

3.1 Description of the case

The mutual collaboration agreement in the fields of science and technology, which started in 1996, provided a framework for cooperation as part of a broader South African strategy to achieve its scientific and technological needs (South Africa 1996:1). The DST and the BMBF are the Ministries responsible to ensure implementation of the agreement and hold bilateral annual consultation meetings at officials' level to review progress and develop recommendations (BMBF 2014:2). In highlighting and honouring the significance of the cooperation between Germany and South Africa in the science and technology relations, former German Federal Minister of Education and Research, Ms Annette Schavan, and the South African Minister of Science and Technology, Ms Naledi Pandor, agreed on hosting the German-South African Year of Science in 2012 and 2013 respectively[5].

The aims of this event were to celebrate sixteen years of science and technology diplomatic relations between South Africa and Germany, to exchange ideas and seek ways to expand the bilateral cooperation taking into account the science and technology

[5] In February 2013 Johanna Wanka became the German Federal Minister of Education and Research and in October 2012 Derek Hanekom succeeded Naledi Pandor as the South African Minister of Science and Technology (South Africa. Department of Science and Technology 2014).

developmental challenges in the global arena (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Interim Report 2013:1-6). The event was also in response to South Africa viewing itself as a global player in science and technology and utilising knowledge generated through research partnerships with Germany for socio-economic development of South Africa.

The theme of the Year of Science was “Enhancing Science Partnerships for Innovation and Sustainable Development” (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Final Publication 2013:11). The event was a shared initiative celebrated both in Germany and South Africa with the opening event in Cape Town, South Africa in April 2012 and the closing in Berlin, Germany in April 2013. The seven research areas identified, were climate change, bio-economy, urbanisation, health innovation, astronomy, social sciences and humanities, and human capital development (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Final Publication 2013:12); Mail and Guardian (2012:1). These research areas are of global concern and in alignment with South Africa’s national priorities as outlined in the DST’s Ten Year Innovation Plan (South Africa 2008a:1-40) and those of the BMBF expressed in the German High Tech Strategy 2020 (2010:1).

The goals as identified by the German-South African Year of Science (2012:1) and the South African Department of Science and Technology (South Africa 2013b:1) are:

- “To emphasise the diversity and excellence of the German-South African initiatives and projects in the fields of research and technology, also for the purpose of promoting Germany and South Africa as centres of innovation vis-à-vis research-conscious companies in the two countries.

- To establish a new quality of bilateral cooperation, for example by setting up new partnerships between German and South African research institutions, universities,

colleges and companies, as well as intensified collaborative arrangements between ministries and intermediary and support organisations.

- To intensify the exchange of views, insights and information between young scientists in the two countries."

3.2 Planning and logistics management

As indicated above, the South African DST and the German BMBF carried the mandate of policy development for their respective countries and administer and manage public entities, such as research organisations under their Ministries in partnership with universities, non-state role players and the private sector in the implementation of this policy mandate. The two Ministries had to oversee the logistics of the event as it was within their portfolio.

Because the Year of Science was a shared initiative, coordinators for this event were officials from both the BMBF in Germany and from the DST in South Africa assisted by representatives from embassies of both countries. Based on the researcher's experience in hosting these types of events, such as the South Africa-Norway celebrations in 2007, the practise has been that working teams from both countries are established with clear decision making processes and dedicated responsibilities to coordinate these events. The teams are normally led by a Deputy-Director-General responsible for international relations who was at that time Dr Thomas Auf Der Heyde. The Deputy Director-General interacts and engages with teams through frequent meetings and provides regular feedback on progress to the respective political principals making communication a critical factor in the planning process. By the time the Year of Science took place the researcher had left the DST and did not play any role whatsoever.

Communication serves as an important variable in a diplomatic relationship and enables parties to develop a structured way of engagement. The German-South African Year of

Science required parties and partners to communicate regularly to adequately plan for the event. The use of technological tools as a means of communication, such as the exchange of information through emails and the conduct of meetings through video links, afforded officials despite their geographic location to update each other on the developments of the event. Jönsson and Hall (2003:206-207) mention how the contribution of technological advancement in the twenty first century as an efficient tool for communication has added to the ease and speed of information exchange in diplomatic relations.

The Year of Science had further attracted and involved the participation of many stakeholders compelling an effective and efficient coordination for its success. The annual performance plan (South Africa 2012a:7) states that the DST executive made a presentation to the Portfolio Committee Members in parliament among other things on progress of the Year of Science and concerns raised by the committee for not receiving invitations. The DST's executive apologised and confirmed that a service provider was appointed to facilitate and manage the logistics of the event including the issuance of invites and working closely with the departmental teams.

3.3 Participation and stakeholder involvement

Various stakeholders were involved in the event through hosting of workshops and seminars, ranging from public to private entities and NGOs, all working towards pursuing the science and technology agenda of both countries. The Year of Science also experienced a myriad of activities by "scientific and educational organisations, research institutions and companies participating with their own events under the auspices of the science and technology agreement signed between the two countries" (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Interim Report 2013:2). These events commenced concurrently in both countries after the opening of the launch by the two Ministers of Science and Technology in South Africa in April 2012 and ended at the closing in April 2013 in Germany. Most of these stakeholders willingly committed to utilise the Year of

Science as an opportunity to heighten their diplomatic relations with each other. Interactive consultations at research institutions and universities were held through workshops and seminars in alignment with the agreed research areas of the Year of Science. The DST, as part of celebrating the Year of Science, planned and organised the events in a way that it linked and incorporated some of its annual activities to bring awareness on the value of science and technology diplomacy between Germany and South Africa. An example of such an event was the Women in Science Awards (WISA) that the DST hosted in 2012 under the banner of the German-South African Year of Science (Mail and Guardian 2012:1).

3.3.1 Public sector stakeholders

Public sector stakeholders who participated in the Year of Science came from research organisations and universities. Due to many events that took place in both countries the author will focus only on those stakeholders that carried out key decisions that resulted from the Year of Science and are subsequently discussed below.

3.3.1.1 The role of South Africa's DST and Germany's BMBF

Other than the coordination of the event by the two Ministries, the DST and the BMBF actively participated in the following:

(i) A planning workshop.

As part of the build-up towards the Year of Science events, the BMBF in collaboration with the German Academic Exchange Service (DAAD), the DST and the German Embassy in South Africa, facilitated a planning workshop at the Council for Scientific and Industrial Research (CSIR) with South African public sector partners, such as the NRF, Universities of Cape Town, Stellenbosch, NMMU, Tshwane University of Technology and Durban University of Technology who have cooperation agreements and have successfully implemented research projects with Germany. The purpose of the research seminar was to share each other's' science and technology landscapes

and to find ways of enhancing cooperation opportunities for South African researchers in Germany. According to Sibisi and Pillay (2012:1) the information seminar aimed at establishing the needs from the various South African researchers who have existing bilateral cooperation with Germany and to strengthen, expanded and established new relations in the context of the Year of Science celebrations.

(ii) Event coordination.

The DST and the BMBF also ensured that coordination of the entire event, including the facilitation of logistics of Ministerial visits, the discussions on policy dialogues between political principals during the opening and the closing of the event in South Africa and in Germany took place.

The involvement and contribution of the NRF, SAGCC and NGOs to the Year of Science manifested in different activities.

3.3.1.2 The National Research Foundation (NRF)

South Africa's NRF is an agency involved with implementing policies of government Departments such as the DST and the Department of Higher Education and Training (DHET) through cooperation with South African universities and research organisations. The objectives of the NRF is "to promote and support research through funding, human resource development and the provision of the necessary research facilities in order to facilitate the creation of knowledge, innovation and development in all fields of science and technology, including indigenous knowledge, thereby contributing to the improvement of the quality of life of all South Africans" (National Research Foundation 2012:1). The DST is committed to strengthening its science and technology diplomatic relations through signing of science and technology agreements, establishment of joint funding initiatives with countries aimed at knowledge generation and building of capacity in the area of science and technology. The NRF is the branch of the DST which conducts the implementation of these initiatives. Among key programmes managed by the NRF, is that of the South African Research Chairs Initiative (SARChI). The initiative

is designed to contribute, improve and expand the scientific research base of South Africa through universities in support of the implementation of national research and development policies (National Research Foundation 2012:1).

South Africa and Germany agreed on joint funding of research projects and as part of celebrating the Year of Science, a special call for research proposals themed “Ideas Competition” was launched in 2012. The NRF in South Africa and the International Bureau (IB) a section responsible for the management of “call for proposals” for the BMBF in Germany, were responsible for coordinating the research proposals (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development, Interim Report 2013:18).

3.3.2 The involvement of the SAGCC in the Year of Science

One of the goals of the Year of Science was the involvement of the private sector in research and development. The private sector consists of various TNCs under the South African-German Chamber of Commerce and Industry (SAGCC), such as BASF Holding South Africa (Pty) Ltd, Siemens Ltd and VW Southern Africa (Pty) Ltd. Many of these companies are actively involved in the funding of research and development in South Africa and participated in the Year of Science under the SAGCC, thereby supporting and advancing the science and technology development of both countries. In its 2013 Annual Report the SAGCC acknowledged the importance of science in solving global challenges. The German private sector has also contributed significantly towards increased funding for research in South Africa and actively participated in the German-South African Year of Science event. The SAGCC’s role in facilitating opportunities and providing business linkages in both countries should not be underestimated since German TNCs are key role players in the transfer of technology to South Africa (SAGCC 2014:1). One of the highlights of the Year of Science was the focus on encouraging innovation in young minds whereby the SAGCC partnered with the DST/NRF Centre of Excellence in Strong Materials located at the Wits University in a schools’ competition. Various Grade 10 pupils from different schools participated in

developing a novel idea in materials science. The competition was won by learners from the Randpark High School in Johannesburg and they received the first Year of Science award based on their demonstration of the utilisation of strong materials for future space exploration (Business Day 2013:2). Furthermore, Professor Malegapuru Makgoba, vice-chancellor and principal of the University of Kwazulu Natal, was also awarded by the SAGCC member companies for his contribution towards ground-breaking work in the area of immunology (Business Day 2013:2). The awardees were also given the opportunity to attend the closing event of the Year of Science in Berlin, Germany in 2013.

Similarly, a conference entitled “Technological Innovations for a Low Carbon Society”, under the leadership of (South African) Professor Roseanne Diab and (German) Professor Sigmar Wittig, was funded by the South African and German Academies of Science and attended by leading German solar power experts. This event created opportunities to address one of Africa’s most pressing problems of climate change, (as stated in the German-South African Cooperation on Science, Technology and Innovation for Sustainable Development. Final Publication 2013:28-30) “Africa is the continent with the lowest emissions of pollutants, yet climate change threatens to hit it the hardest “. The African continent is not immune to climate change and that it is the most vulnerable and affected due to its lack of adaptive capacity and growing dependence on resources, cooperation with leading countries such as Germany becomes crucial in order to source the necessary know-how and financial resources.

3.3.3 The contribution of NGO’s to the Year of Science

The participation of non-governmental organisations (NGO’s) in an era where international relations are no longer controlled by the state alone have emerged to be key in influencing and driving areas such as science and technology developmental matters. Various South African and German research and educational institutions and NGOs were actively involved and contributed funds to various scientific endeavours in the Year of Science. On the South African side the list includes the NRF, Academy of

Science of South Africa, the African Institute of South Africa, the Council for Scientific and Industrial Research (CSIR), the Human Sciences Research Council (HSRC), the South African National Biodiversity Institute and the South African National Space Agency. On the German side, the German Research Foundation focuses on universities, but is mainly responsible for funding German research projects. The Volkswagen Foundation is Germany's largest private funder of science development. The Alfred Wegener Institute for Polar and Marine Research, the German Academic Exchange Service, the German Academy of Sciences Leopoldina and the Goethe Institute also hosted various seminars with their South African counterparts during the Year of Science (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Final Publication 2013: 68-70).

Of particular importance for the Year of Science was the Alexander von Humboldt Foundation. This Foundation provides fellowships and awards to foreign scientists and scholars and also gives them the opportunity to visit Germany. "Researchers from Germany have the opportunity to apply for fellowships to carry out research projects abroad as guests of one of more than 26,000 Humboldt Foundation alumni worldwide" (Alexander von Humboldt Foundation 2013:1). During the Year of Science members of the Foundation attended a conference with the alumni of DAAD and the two Ministers from both countries. The Foundation, supported by the BMBF, launched the 'Neville Alexander Memorial initiative', named after a former Humboldt scholar and a friend of former President Nelson Mandela's (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Final Publication 2013:45-46). The report further states that the memorial focused on institutional partnerships and linkages for promoting the African-German Network of Excellence in Science (AGNES), award for supporting AGNES, and a research award in memory of Neville Alexander. In support of capacity in research, during this conference three (3) African researchers namely Professor Samuel G.K. Adiku – Ghana, Professor Hamadi I. Boga – Kenya and Dr Heather G. Marco – South Africa received awards in the research area of their expertise.

Only when the public is aware of the need for funding of science and technology related research, will they be willing to fund projects, conferences and related activities. The communication of diplomatic activities of this nature to the public involves a focus on the external and internal diplomatic environments and the use of the printed and electronic media.

3.4 Public diplomacy in the Year of Science

The key message of the Year of Science was to raise awareness and attract audiences from both countries on the significance of this cooperation. Public diplomacy is described by Potter (quoted in Jönsson and Hall 2003:204) as "an effort by governments to convince and create awareness to other governments about their policies and ideologies" Public diplomacy is an instrument of soft power used to influence the government and citizens of another country to achieve its policy objectives without using force (Nye 2008: 94-109) A country such as Germany uses smart power in conjunction with public diplomacy to convey and achieve policy objectives with its partners. Public diplomacy played a crucial role during the Year of Science and took the form of statements by and interviews with high level politicians, and joint communication with various officials of the two Ministries, researchers and citizens. The aim was to raise awareness of the scientific and technological matters.

3.4.1 Internal communication

Bilateral diplomacy has experienced the need and importance of communication and negotiation in advancing objectives between parties. Communication and negotiation between consenting parties are also key to achieve a common understanding of each other in dialogues with the aim of developing a structured framework for sustainable diplomatic relations (Tariqul Islam 2005:56; Sharp 1999:40). The communication processes for and in the planning of the Year of Science compelled parties to have regular consultations through policy dialogues, meetings and exchanges at different

political levels providing enhanced benefits and achievement of the objectives agreed upon.

3.4.1.1 Logo development

In a quest to brand the Year of Science, the DST and the BMBF developed a joint logo termed “two nations one corporate logo” (German-South African Year of Science Logo 2012:2). This logo was used in all the print, electronic publications and promotional material such as banners, folders and pens distributed to the participants throughout the event. A joint CD manual with all the necessary details of the logo was developed. The joint logo for the Year of Science symbolised “…. elements from both nations in its colours and shapes, stands for a spirit of optimism, the discovery of new things, the possible change of perspective that is necessary for many innovations, and the beauty and culture of both countries which ought to be preserved and protected to serve as a symbol of good cooperation between Germany and South Africa” (German-South African Year of Science Logo 2012:2).

3.4.2 External communication

Due to the extent of participation in the different sectors, the event received positive coverage in electronic and print media reaching out to the audiences and showcasing the achievements and significance of the bilateral relationship between the two countries. As part of the working team DST and BMBF officials from their respective communication departments jointly worked together and ensured that all the communication requirements such as logo development, media coverage and the management of press releases and joint statements by political principals both in Germany and South Africa were translated in English and German languages to enable the audiences that did not have access to the internet to receive regular updates. The details of officials responsible for communication matters in both countries were provided in the Year of Science’s website to the public for any communication/media related enquiries of the event.

3.4.2.1 Media coverage

Boosted by the good diplomatic relations between South Africa and Germany, the Year of Science received extensive media coverage. In South Africa, articles on print media about the Year of Science were featured in the Mail and Guardian, Business Day and Wallstreet Online whilst interviews with political leaders, such as the Ministers of Science and Technology and the German Ambassador in South Africa were aired on the local radio stations such as SA FM and Talk Radio 702. An example of the latter is the publication in the Business Day of former Minister of Science and Technology Derek Hanekom's, announcement of the benefits resulting from the involvement of German companies in South Africa when he indicated that "R4 million will be dedicated to the *Inkaba yeAfrika*[6] collaboration between South Africa and Germany, which includes projects on climate change and fuel cells" (Kahn 2013). The German Ambassador to South Africa, Dr Horst Freitag, also used the Business Day and Engineering News (2012) to emphasize the positive contribution of the Year of Science to the creation of new learning opportunities for South African Masters and Doctoral students. He announced that German higher institutions offered their major subjects in English and that there was great potential for German involvement in vocational training in South Africa (Kahn 2013).

In Germany articles appeared in Financial Times Deutschland, Der Tagesspiegel, Frankfurter Allgemeine Zeitung and Spiegel Online (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Interim Report 2012:30). A film for the Year of Science was developed covering the entire event in South Africa and Germany and was shown at the closing of the German-South African Year of Science event in Germany in 2013.

[6] Inkaba ye Africa comprises 12 projects devoted to three main research themes entitled the Heart of Africa, Margins of Africa, and Living Africa (GFZ German Research Centre for Geosciences 2014)

3.4.2.2 German – South African Year of Science Website

The internet was extensively used to publicise the event enabling users to express their views about the event. The two Ministries jointly provided all the necessary information of the event which was in both German and English languages. The purpose of the website was to provide interactive communication and the provision of the latest events to South African and German audiences. The website consisted of all the activities including interviews by key political principals and research communities from both countries who contributed towards the success of the science and technology cooperation between South Africa and Germany and was also used to profile the event in passing valuable legacy of knowledge, experience and contacts.

According to the German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Interim Report 2013:1) the website gained popularity and recorded a visitation of almost forty one thousand (41 000). Viewers from both countries expressed interest by visiting the website which afforded them updated news and a schedule of events. Through a media library in the German-South African Year of Science website viewers were provided with all the media statements including photo, video and audio galleries of the event.

3.5 The Year of Science and Southern African countries

During the launch of the Year of Science the two countries issued a joint declaration on a climate change project called the SASSCAL. SASSCAL is a project between Germany and South Africa involving Angola, Botswana, Namibia and Zambia as partners and Germany being the biggest funder. At the signing of the joint declaration, officials from these partner countries were invited and made speeches on behalf of their respective countries acknowledging to being part of SASSCAL (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Interim Report 2013:24). The SASSCAL project will contribute to the climate change research and the South African Minister of Science and Technology, Ms Naledi Pandor,

thanked former German Minister of the Federal Ministry of Education and Research, Ms Annette Schavan for extending the partnership with neighbouring countries in Africa towards building scientific capacity towards the mitigation of climate change effects (McGregor 2012:1).

The incorporation of some of the SADC countries into the bilateral cooperation between Germany and South Africa symbolises the development and expansion of a science and technology diplomacy that is solid and moving beyond to include more partners in addressing common challenges that transcend borders. “A good bilateral relationship acts as a building block for mutually beneficial regional activities” (Rana 2000:40).

SECTION 4: AN EVALUATION OF THE YEAR OF SCIENCE

Cooperation between the two countries during this Year of Science demonstrated their commitment to strengthen their bilateral relationship in the field of science and technology. The cooperation was motivated by the similar national priorities of South Africa, outlined in the Ten Year Innovation Plan of the DST and the Germany High Tech Strategy 2020 of the BMBF. The Year of Science was initiated to strengthen their relations following a signed science and technology agreement with the aim of addressing the broader South African strategy in advancing its scientific and technological needs. An important motivation for Germany to focus its science and technology cooperation with South Africa in the form of a Year of Science was, according to Johanna Wanka, the German Education and Research Minister, “to do research in South Africa because it was a "natural laboratory" for the earth sciences, astronomy and the palaeoscience” (Kahn 2013). The Minister also indicated that future cooperation will include bio-economics, health economics, climate change and urbanization.

4.1 Expectations of key stakeholders

Various stakeholders participated in the Year of Science ranging from political principals representing government, universities and research organisations representing the public sector and the SAGCC, representing the private sector. Their involvement facilitated the creation of opportunities and business linkages for both countries. Since the signing of the science and technology agreement, cooperation between Germany and South Africa has proven its value expanding and granting four hundred research and development projects in an amount of R80 million with universities, research organisations and private sector partners (South Africa 2013b:1).

This funding benefited universities such as the Nelson Mandela Metropolitan University (NMMU) in the funding of the research chair in the area of automotive by VW and DAAD, research organisations such as the CSIR on IT research with the Fraunhofer Heinrich Hertz Institute (German Embassy Pretoria 2011:1). Rana (2002:42) emphasises the importance of institutional partnerships forged in a bilateral cooperation to have lasting effects independent of individuals. This was evident during the Year of Science with the number of engagements that took place at various institutions. The success of the cooperation was further expressed by positive feedbacks received through interviews by representatives from various institutions both in Germany and South Africa. Many interviewees comprising of political principals from the DST and the BMBF, researchers from universities such as the University of North West with its partner in Germany the Leibniz Institute for Astrophysics Potsdam cited their opinions on science and technology matters, approval of the Year of Science and how it offered opportunities for expanded networks on research and development presenting possibilities for new research frontiers.

Diplomacy has over time evolved compelling experts in areas such as science and technology to engage and shape the debates in partnership with various stakeholders towards reaching solutions. Rana (2002:45) mentions that the acknowledgement of

think tanks, academia, the science and technology community, the social and volunteer organisations and the NGO's must be appreciated as they play a role in conveying relevant messages to the public and they also form part of the new public outreach. These stakeholders assist governments in raising awareness on matters such as those in science and technology that are seldom debated and communicated to the public. The Year of Science illustrated this concept where non-state actors such as the Alexander Humboldt Foundation, the Goethe Institute and the South African Academy of Science were instrumental in raising awareness and pursuing the science and technology agenda in partnership with the two governments.

The different levels of organisation, not only between governments and non-state role players but also between various entities demonstrated an integrated approach towards achieving a common goal. The partnerships of mutual interest, coordination and implementation rendered the hosting of the Year of Science a success and are reflected as follows.

4.1.1 Political and public interactions

The German-South African Binational Commission (BNC), the South African DST and the German BMBF played pivotal roles in the Year of Science.

4.1.1.1 The function of the German-South African Binational Commission (BNC)

In reviewing the bilateral diplomatic cooperation, Rana (2002:37-48) refers to consultation mechanism varying from BNC's to annual consultations as instruments used in the cooperation to review and advance relations. At a political level acknowledgement was made by the political principals at the joint communication of the German-South African BNC held in May 2012 in Berlin Germany, chaired by the Foreign Minister of the Federal Republic of Germany, Dr Guido Westerwelle and former Deputy President of South Africa Mr Kgalema Motlanthe. The two political principals

embraced the good diplomatic relations between the two countries and acknowledged the launch of the Year of Science as a highlight of the science and technology cooperation between Germany and South Africa (South Africa 2012b:1).

4.1.1.2 The contribution of South Africa's DST and Germany's BMBF

The Year of Science was structured through various events such as workshops, symposia coordinated by science and technology Ministries of both countries. In addition, the outcome of the special call placed during the Year of Science by the NRF and the IB resulted in an award of forty one projects (41) funded by the DST and the BMBF. "The initiatives that were funded as part of the Year of Science succeeded in establishing and strengthening interaction between research communities in both countries drawing extensively on existing pools of expertise and creating valuable learning opportunities for students." (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Final Publication 2013:67).

The visits by the two Ministers at the opening and the closing of the events in South Africa and Germany resulted in a commitment made towards moving the cooperation to another level. In a speech by the former Minister of Science and Technology Mr Derek Hanekom (2013:3) at the closing event he acknowledged the success of the Year of Science and thanked Germany for offering a research chair to South Africa in an area to be discussed and finalised between the two countries as part of capacity enhancement for the country.

4.1.1.3 Benefits for the academic fraternity

The Year of Science provided new opportunities for cooperation and learning taking into cognisance the global challenges that countries are faced with. Research organisations, such as the CSIR with its counterpart Fraunhofer Institute, and universities such as the University of Pretoria, the University of Stellenbosch and the University of North West enhanced collaboration with their counterparts universities in Germany such as the

University of Applied Sciences Kiel, the University of Münster and the House of Astronomy, Heidelberg, under the auspice of the bilateral cooperation between the two countries strengthened their partnerships in the research areas identified during the Year of Science. (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Final Publication 2013:2-65)

The German Federal Ministry of Education and Research (2013:2) cited an estimation of a hundred collaborative projects between Germany and South Africa in institutions of higher learning. According to the Ministry the following were the highlights of the Year of Science in the academic environment.

- Signing of the declaration of intent to cooperate in August 2013 the German National Academy of Sciences, the Leopoldina, and its South African counterpart, the Academy of Science of South Africa (ASSAF);

- Germany's Federal Ministry of Education and Research (BMBF) and South Africa's Department of Science and Technology (DST), agreed to set up a German-South African research chair in a research area that will be of benefit to South Africa;

- The German Rectors' Conference (HRK) and its South African equivalent, Higher Education South Africa (HESA) issued a joint declaration of intent expressing the intention to collaborate.

The various institutional engagements displayed the important contribution that the academic sector makes in the promotion of scientific and research development agenda between South Africa and Germany.

4.1.2 Private sector contributions

Prior to the Year of Science, South Africa's science and technology relations with Germany led to increased funding in the research partnerships involving universities, research organisations and the private sector. The commitment of the private-public partnership by the German companies has yielded benefits for South Africa. One such example of the private sector involvement is that of transnational corporations such as BMW and Volkswagen setting up automotive production plants in South Africa, thereby creating employment and opportunities for training and research, thereby laying the foundation for public-private partnerships in research and development with universities. Former German Minister of Education and Research, Ms Annette Schavan (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Final Publication 2013:2) reported that South Africa in the period 2003 until 2012 benefited in an estimated direct investment flow of R33.7 billion in the automotive, chemical, mechanical and engineering sectors.

In addition as part of building capacity in South Africa, the German-South African private-public sector partnership resulted in the Volkswagen Group South Africa jointly with DAAD and the NMMU funding a seven million rand (R7 million) Research Chair in the Automotive Engineering at the NMMU in 2006. The purpose was to develop capacity in the automotive industry for South Africa through bursaries and exchange programmes for local students and the facilitation of knowledge transfer in multi-disciplinary research (Volkswagen South Africa 2014:1). Also this gave VW the opportunity to source local talent as a way of job creation in South Africa. The current research chair Professor Theo Van Niekerk (2014:1) acknowledges the importance of the research chair in building capacity and engineering support in the automotive industry for South Africa.

The culmination of these developments led to the private sector companies under SAGCC participating in the Year of Science as part of their commitment towards the

enhancement of skills and capacity in the science and technology research and development of South Africa. The awards made by these companies under the SAGCC, such as Volkswagen SA, and SAP (a German company based in South Africa responsible for ICT development) to students and researchers were to stimulate and enhance the science and technology skills in South Africa, another feature of the Year of Science.

4.2 Lessons learnt from the Year of Science

The successful bilateral cooperation between Germany and South Africa provides the best evidence that science and technology diplomacy can serve as an efficient tool for countries to advance their science and technology objectives. The promotion of these objectives in a bilateral cooperation provides a positive impact affording parties mutual benefits Rana (2002:37-48). This was endorsed by the successful hosting of sixteen years of cooperation through the Year of Science. The event was coordinated with success and was strengthened by regular political engagements between the two countries. This cooperation also provided a better understanding of the science systems of both countries.

The study reveals how developed countries, such as Germany, can use science and technology diplomacy to achieve its goals of advancing its national interest in the development of and access to markets, seeking research opportunities and making the country one of the leaders in cutting-edge technological innovations and a key research and development funder. Germany allows public-private and non-state sector participation in research and development promoting and encouraging the polylateral diplomacy, a model that drives the German economy. Since South African science and technology diplomacy is in the broader context of technology transfer for its economic development, cooperation with Germany has proven to be of value in the pursuance of capacity building and leveraging of technologies in the scientific development agenda of the country. Both countries benefit, as emphasised by Dr Horst Freitag, when he declared that German TNCs in South Africa not only create thousands of jobs for South

Africans, but that they also provide practical training because they need trained workers in their companies (Kahn 2013).

As indicated earlier, the science and technology relations between South Africa and Germany have proven how a partnership with focus and commitment can yield positive results. The study further shows how the two countries have used their science and technology bilateral diplomacy to build a foundation for multilateral diplomatic relations in a specific strategic research area with other countries. An example cited is the SASSCAL initiative which is a climate change project that was negotiated between Germany and South Africa extending partnership with countries such as Angola, Botswana, Namibia, and Zambia. These interactive collaborations have seen South Africa being regarded as one of the technologically advanced countries on the African continent. Furthermore South Africa actively participates in multilateral forums and this has offered the country the opportunity to be supported by its bilateral partners, such as Germany backing South Africa in the implementation of the EU Africa Strategy.

According to Wiseman (2010:38) the acknowledgement of non-state actor diplomacy in contributing towards a common goal is key. Germany's view towards science and technology diplomacy is holistic and includes various players in driving the economy through science. This was proven by the German government apart from the private sector involvement, non-state role players such as the Leibniz Association and the Alexander von Humbolt Foundation were recognised as partners and participated in the Year of Science. It is as a result of the meaningful contribution made by these foundations and associations that their impact towards science and technology development is recognised and appreciated. The modes of bilateral, multilateral and polylateral diplomacy are equally important in the twenty first century and should be complementary and assessed based on situations as they arise.

The positive results that flowed from the Year of Science proved the effectiveness of both the internal and external communication between parties. The manner in which the two communication units of both Ministries handled and managed communication

matters in their respective countries through the various forms of media was a demonstration of good planning. The various forms of media and the press during the Year of Science were appropriate channels used to reach out to the audiences. The first half of the Year of Science recorded four hundred (400) articles published on the success of the initiative appearing on the different media and press of both countries whilst the website received regular visitation of approximately forty one thousand (41 000) viewers (German-South African Cooperation on Science, Technology and Innovation for Sustainable Development Interim Report 2013:3-4). A film for the event was also developed highlighting the successes of the event and was featured at the closing event that left a positive legacy of the Year of Science. The partnership approach towards managing communication proved to be useful and as Rana (2002:44) states “the creation of positive publicity is the more effective route for image building….”

Much as it was a DST bilateral event, the challenge of communication experienced was that the information about the Year of Science within some government departments was limited. This issue was also cited at the DST’s presentation of the annual performance plan (South Africa 2012a:7) by the portfolio committee chairperson in parliament on the lack of appropriate communication stating that the portfolio members had not received formal invites and had learnt about the event through the media. This could be one of the lessons to be drawn from this experience that a better internal communication approach within government departments is necessary.

Germany accumulated a wealth of experience in hosting science years with various partner countries and as a result benefiting more compared to South Africa having hosted such an event for the first time with no experience. Another issue of concern was the timing of the Year of Science that stretched for the whole year without a dedicated South African team focussing on the event placing a strain on the human resources of the DST. Officials had to structure their daily activities to factor in the schedule of the Year of Science to ensure its efficient running resulting in some activities of other bilateral relations neglected.

SECTION 5: POLICY CONCLUSIONS AND RECOMMENDATIONS

5.1 Policy conclusions

Drawing from the Year of Science case study it is clear that the cooperation between Germany and South Africa remains active, effective and valuable for South Africa and should be maintained and nurtured. South Africa has proven its ability to advance and achieve in the science and technology front in the absence of a framework on science and technology diplomacy. The successful coordination of the Year of Science driven from political level showcased the commitment by both parties in taking this cooperation to another level endorsing science and technology diplomacy as key in driving and shaping modern economies. South Africa's transition to a knowledge economy requires modern technologies in areas of strategic importance for economic development and partnership with Germany has been critical in ensuring that South Africa's national interest is promoted.

The event advocated a level of commitment of interconnectedness by multiple partners from different sectors all working as a collective and appreciating the benefits flowing from this cooperation. The impact of the Year of Science resulted in various commitments made such as signing of agreements by partners in various public institutions and Germany affording South Africa a research chair making this cooperation to progress to another level. This is in addition to a research chair funded by Volkswagen South Africa, DAAD and NMMU in developing capacity in the automotive industry for South Africa. It is evident that official reports and documents show how the bilateral cooperation between the two countries have increased over time providing an enabling environment for strengthened diplomatic relations on science and technology activities.

In addition, the event revealed the ability of various institutional linkages and their innovative ways in ensuring achievements such as the award of joint research initiatives from the joint research call that was posted by the NRF and the IB. "Agreements that

cover new areas of cooperation are both the end product of expanding relationships and provides a platform for stronger subsequent actions" (Rana 2002:38).

5.2 Recommendations

Science and technology has developed to become a niche for South Africa and the following could be pursued:

- The hosting of science years with bilateral partners demonstrates the ability of soft power to improve scientific partnerships and develop an approach that has worked for Germany and South Africa. South Africa must carefully select the partnerships that will benefit the country the most, based on its national interest and its particular drive for science and technological innovation. South Africa developed a 2030 vision to develop the country into an economically viable state through the National Development Plan (South Africa 2011:70). Science and technology is recognised to be one of the key drivers in modern economic, health, education and infrastructure. It is crucial for the country to review existing science and technology agreements based on their strategic relevance and importance. South Africa should also focus on improving its science and technology cooperation with the emerging economies of Africa, Asia, Latin America and its BRICS partners.

- The expansion of diplomacy has seen growth in most areas requiring the traditional diplomat to be skilled in areas such as economic and science and technology diplomacy. DIRCO currently provides formal training to diplomats in economic diplomacy. It is a basic requirement that South African diplomats should also be formally trained in the area of science and technology diplomacy.

- The DST has shown commitment to the advancement of the South African science agenda by establishing an international relations branch and by placing South African science and technology representatives in Brussels, Japan,

Geneva and Botswana. With the emergence of economic groupings such as BRICS, more could be done by placing science and technology representatives in BRICS member countries. It will be to South Africa's benefit if it advances its own science and technology diplomatic base that will in turn benefit the continent.

- Germany invests extensively in its science base and has a large number of research and development communities. South Africa is still grappling with its human capital development challenges and ranks very low at number one hundred and eighteen in the United Nations Human Development Index (UNDP 2013:23). South Africa should continue to strengthen its relationship with Germany to build innovation capacity in the area of research and development.

- South Africa developed a 2030 vision in its National Development Plan (South Africa 2011a:70). Even though this vision recognises science and technology to be a key driver of its economic, health, education and infrastructural development, it is not practically envisioned nor clearly articulated in a science and technology diplomatic structure. The development of a medium to long-term structural framework for science and technology diplomacy is crucial and will assist South Africa to achieve more on science and technology related matters.

- Since activities related to science and technology cut across various Ministries, such as the Departments of Environmental Affairs, Water and Sanitation, Energy and Minerals, these departments are forced to manage their own international affairs. Coordination between departments needs to be strengthened and enhanced to avoid duplication of responsibilities and resources with international partners.

- In political consultations, such as the BNC and the JC, it is recommended that the private sector companies involved in the promotion and funding of research

and development activities, be recognised as partners and treated as such by government during scientific and research deliberations.

- Communication of science matters to the citizens is crucial for the development of a country. An enhanced and structured public diplomacy strategy on science and technology diplomacy is crucial both locally and internationally. Institutions, such as DIRCO, Brand SA and DST should, in partnership with the Government Communication and Information System (GCIS) be optimally used as vehicles to communicate news and events within and outside the government.

SECTION 6: CONCLUSION

Diplomacy, a centuries old peaceful and reciprocal instrument of foreign policy, rests on the pillars of negotiation and communication and is regulated with legal norms and procedures. Diplomacy evolved to include new modes aimed at including new types of role players to solve issues exacerbated by the global technological revolution which forces governments to specialize to address science and technological gaps in their own societies. In this regard, different modes or layers of diplomacy can be distinguished, ranging from bilateral to multilateral and polylateral diplomacy. Bilateral diplomatic relations often form the pillar for polylateral diplomacy as governments carefully choose an applicable diplomatic mode, niche area of specialisation, policies and strategies to succeed in their science and technology diplomatic endeavours.

This study focuses on a specialized, niche area of science and technology diplomacy between Germany and South Africa. Their close cooperation led to a dedicated year of Science in 2012/2013 which has facilitated polylateral diplomacy because it involved the formal participation of non-state role players, such as NGOs, civil society groups and TNCs. Cooperation with Germany as one of the leading industrialised European countries and the biggest investor in science, technology and innovation, has offered many benefits to South Africa. The diplomatic engagements during this Year of Science included policy dialogues, visits by political principals and the exchange of researchers

in the field of science and technology between the two countries. The relations added significance and appropriateness to bilateral cooperation in the current global arena characterised by multilateralism.

Similarly, the relations have proven South Africa's soft power ability as a way to benefit and advance its scientific interests with international partners such as Germany. It is crucial to acknowledge the role of polypolar diplomacy as a particular instrument of soft power, employed to "liberate the scientific and technological knowledge from its rigid national and institutional enclosures, to unleash its progressive potential through collaboration and sharing with interested partners' world-wide" (Copeland 2010:1).

Against the background of the long-term cooperation between Germany and South Africa, this study aimed to demonstrate how the science and technology diplomacy during the Year of Science contributed to South Africa's ability to increase its research and development capacity aimed at addressing its developmental challenges. Did it improve South Africa's ability to leverage scientific knowledge and technological skills from Germany? The answer lies in the requirements set out in South African documents such as the 1996 White Paper on Science and Technology and the National Research and Development Strategy of 2002, but also in the 2011 DST document, *Enhancing the National System of Innovation to support growth and development: A strategy to increase R&D investment in South Africa* (South Africa 2011b). This document refers to requirements, such as the improvement in the research and development capacity of universities and public research institutions, the increase in research standards and in the quality and quantity of scientific outputs and the increase in the dissemination of ideas among researchers.

The Year of Science improved South Africa's ability to advance the quantity and quality of its science and technology research in the area of human development ranging from the funding of public sector institutions and of research projects, the private sector funding of research and development initiatives and the involvement of NGO's in research. Furthermore, this partnership has created an opportunity for South Africa to

leverage technologies in areas particularly related to climate change and sustainable development. Forty one projects were funded by the DST and the BMBF during this Year of Science. A project of particular importance to South Africa and its Southern African neighbours is the SASSCAL project on global climate change.

In addition, this Year of Science became a blueprint for similar partnerships with other countries. It not only gave South Africa more opportunities to enhance its innovation profile, but also taught the South African government and all its partners in this polylateral endeavour lessons on how to organise such a year of science, who to involve and how to communicate the events to the public. It also informed the various government departments that they should coordinate their activities to reap maximum benefits while also preventing unnecessary duplication. The South African government need to carefully choose its partners to ensure success and must also establish a permanent, diplomatic framework for the long-term inclusion of non-state role players in its science and technology diplomacy. Formal training of its diplomats in the fields of science and technology should be a first point of departure. The long-term involvement of non-state role players in formal bilateral and multilateral diplomatic relations is a crucial requirement. This dedicated partnership took the form of a Year of Science between Germany and South Africa in 2012/2013. The benefits reaped during and after this Year of Science proof that the countries of the global South are not ‘borrowers’ or ‘adopters’ of ready-made technology but rather active participants in the acquisition, generation and management of the technological expertise they need.

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