5. SA-EU INNOVATION COOPERATION

5.1. Existing EU States cooperation and partnerships with South Africa

Science and Technology Cooperation Agreement between EU and SA

The Trade, development and cooperation agreement (TDCA) constitutes the legal basis for the overall relations between South Africa and the EU. The TDCA covers political dialogue, the establishment of a free trade area over an asymmetrical twelve-year period, development co-operation, economic cooperation, and cooperation in a whole series of other areas. The agreement was signed in October 1999 and it entered into force in 2000. The Science and Technology Cooperation Agreement was concluded in 1996 and entered into force in November 1997.

In 2016, the EU and South Africa celebrate the 20th anniversary of the Science and Technology Cooperation Agreement, driving their bilateral R&I relations. This is the first agreement that the EU signed with SA since the advent of democracy in SA in 1994. SA-EU scientific collaboration is monitored and facilitated by the Joint Science and Technology Cooperation Committee, established under the Agreement. Science and Technology is embedded into the joint Action Plan implementing the EU-South Africa Strategic Partnership (see the agreement below).

http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=377

GENERAL DATA	
Official Title	Agreement on scientific and technological cooperation between the European Community and the Republic of South Africa
Type of Agreement	Bilateral
Place of Signature	Brussels
Date of Signature	05/12/1996
Date of Entry Into Force	11/11/1997
Duration	Definite
Objective of Agreement	To encourage and facilitate cooperation between the Community and South Africa in fields of common interest where they are supporting research and development including demonstration activities to advance science and/or technology.
Remarks	This Agreement, which was concluded before the Trade, Development and Cooperation Agreement (TDCA), constitutes a supplementary agreement to the latter. Science and technology are crucial for economic and social development and this agreement thus contributes to South Africa's development. Cooperation is taking place through various activities involving a number of actors, and includes: - reciprocal participation of research entities, i.e. research centres, companies, universities, for example (South African bodies are participating directly in the activities of the EC Framework Programme); - shared use of research facilities; - visits and exchanges of researchers, engineers and technicians; - exchange of information on practices, laws, etc.; - scientific networks and the training of researchers. The Joint Science and Technology Cooperation Committee is responsible for administering the Agreement. Its functions include, inter alia, making recommendations concerning cooperation activities, reviewing the effective functioning of the Agreement and providing an annual report on the state of progress and effectiveness of cooperation between the two parties. More specifically, a Joint Technology Management Plan (JTNP) is drawn up for each cooperation activity. This plan identifies the objectives of the research activities and the contributions of each party. It must also contain principles in respect of the ownership and use of information resulting from research activities. Funding is provided by each party according to availability of funds and each party's laws/plans. It is not necessary to transfer funds between parties, except in the case of participation in the programme relating to cooperation with third

	countries and international organisations. Thus, there is no common fund or fixed budget for cooperation and funding is granted according to project. Adequate protection of intellectual property is vital in this area. Each party is subject to the rights and obligations of the party responsible for the activity concerned and provisions relating to the utilisation and dissemination of results must be included in the JTNP. It is intended that the intellectual property rights of the results of activities undertaken under the Agreement should be shared equitably. The Agreement was initially planned to coincide with the duration of the Fourth Framework Programme, which ended in 1998. The Agreement was extended by mutual agreement between the parties and remains in force for the Fifth Programme.
OJ Number	L313
OJ Date	15/11/1997
OJ Page	26
Nature of Agreement	scientific and technological co-operation agreement
Depositary	Council of the European Union
Contracting Parties	European Community, South Africa
Official Languages	Danish, Dutch, English, Finnish, French, German, Greek, Italian, Portuguese, Spanish, Swedish
Subject Matters	ACP countries Research and Innovation
Clause(s)	Duration (Conditions) | Article 11 Agreement
Management	Joint Science and Technology Cooperation Committee

In 2012 South Africa's National Space Agency signed a Scientific Cooperation Agreement with the Joint Research Council. In 2015, the European Commission and the SA Department of Science and Technology signed an Implementing Arrangement to enable SA researchers supported by the SA National Research Foundation to undertake research visits to teams supported by the European Research Council. SA also signed an Association Agreement with EUREKA. A milestone in SA-EU R&I relations is their cooperation in Health research and innovation, showcased, among others, by the success stories of the European and Developing Countries Clinical Trials Partnership. The two partners have also developed notable cooperation in Earth Observations and Research Infrastructures; SA and the Commission, together with USA and China, co-chair the Group on Earth Observations. They also collaborate for the development of a Square Kilometre Array (SKA). The International Conference on Research Infrastructures took place between 3-5 October 2016 and was hosted by the Department of Science and Technology in collaboration with the European Commission. The EU and South Africa are currently exploring additional fields of R&I cooperation, including those of Marine research and Innovation, Bioeconomy and Renewable Energy. On 3 October 2016, the EC and DST concluded the signing of the Declaration of Intent on Marine research and innovation.

Finally, the EU and South Africa work together for the implementation of the EU-Africa R&I Partnership on Food and Nutrition Security and Sustainable Agriculture.

Legal entities from South Africa are eligible to receive funding through Horizon 2020 grants. SA-EU cooperation under H2020 covers several areas ranging from research infrastructures to health, food, transport, energy, etc. SA-EU relations in Science, Technology and Innovation are further promoted through the ESASTAP 2020 project, which aims to enrich bilateral policy dialogue and identify priority areas for mutually beneficial cooperation.

The EU and South Africa have also established a Strategic Partnership, and adopted an Action Plan for its implementation in May 2007. The Action Plan has two strands: enhanced political dialogue and cooperation on regional, African and world issues, and stronger cooperation in a number of economic, social and other areas.

5.1.1. Other EU - SA partnerships

Flagships of S&T Cooperation between South Africa and the EU are:

- The **European and Developing Countries Clinical Trials Partnerships** (EDCTP) was founded in 2003 to focus work of the European Commission and several EU Member States, in collaboration with African countries, into developing and testing of new medicines against HIV/AIDS, malaria and tuberculosis. The European Commission and South Africa have been very active in making EDCTP a success story. EDCTP currently supports 196 research projects; these include 57 clinical trials involving more than 100.000 patients. It has also helped train more than 300 African
- The **Group on Earth Observations (GEO)** is coordinating efforts to build a Global Earth Observation System of Systems, or GEOSS. GEOSS will provide decision-support tools to a wide variety of users. International collaboration is essential for exploiting the growing potential of Earth observations to support decision making. South Africa is co-chairing GEO and also co-chairs together with the USA and the EC a working group on GEO post-2015.
- **Square Kilometre Array (SKA)** is an iconic radio telescope array that will transform the way we see the universe, as well as being a driver of science, technology and innovation on an industrial scale. It is one of a few truly global facilities that will be built by a consortium of countries around the world. The EU and several Member States, in cooperation with South Africa, Australia and other non-European countries, have invested significant resources in the development of the Square Kilometre Array during the Sixth and Seventh Framework Programmes. South Africa will host the mid frequency part of the Array.

Agreements on Trade between South Africa and the EU:

South Africa's trade relations and development co-operation with the European Union are currently

governed by the Trade, Development and Co-operation Agreement (TDCA) . The Trade, Development and Co-operation Agreement has established a free trade area that covers 90% of bilateral trade between the EU and South Africa. The liberalisation schedules were completed by 2012.

In June 2016, South Africa signed EU - SADC EPA together with Botswana, Lesotho, Mozambique, Namibia, and Swaziland. Once ratified, the EPA will replace the TDCA. South Africa will benefit from new market access additional to the Trade, Development and Cooperation Agreement between the EU and South Africa, that currently governs the trade relations with the EU. The EPA includes a bilateral protocol between the EU and South Africa on the protection of geographical indications and on trade in wines and spirits. The EU will protect products such as Rooibos and wine names like Stellenbosch and Paarl. In return, South Africa will protect more than 250 EU names spread over the categories food, wines and spirits.

5.1.2. Bilateral agreements between EU States and South Africa

South Africa has a number of bilateral cooperation agreements with a number of EU countries. The table below shows a list of all the active bilateral agreements in place.

No	Country	Date	Comments (if any)
1	**Bulgaria**	Letter of Intent signed on 5 June 1995	
2	**Flanders**	General Agreement signed on 28 October 1996.	Cooperation on areas such as Biotechnology, Plant pathology, Environmental Research and Ecology, Statistical Modeling, Biochemistry, Agriculture and Food Production.
3	**France**	General Agreement signed on 4 November 1994. Agreement renewed on 28 February 2008.	Cooperation in areas such as engineering science and advancement of technologies; use of natural resources, Medical Research and Public health, social and Political sciences. SA-France-Senegal trilateral cooperation on laser technology from 2005.
4	**Germany**	S&T Agreement signed on 12 June 1996.	Cooperation on areas such as New Materials and Manufacturing, Renewable Energy, Environmental Issues, Integrated Community Development and Health Programmes, Biotechnology.

5	**Greece**	S&T Agreement signed on 31 October 2006.	
6	**Hungary**	S&T Agreement signed on 24 November 1997.	Cooperation on areas such as Materials Science, Manufacturing Technology, Biotechnology, Information Technology and Systems, Sustainable Management of Environmental Issues and of Natural Resources, Exploitation of Natural Resources and Minerals.
7	**Italy**	S&T Agreement signed on 16 Jan 1998.	Cooperation on areas such as Material, Physical, Medical and Social Sciences, Industrial Research and Technological innovations, Agricultural Science, Environmental Protection and Ecology.
8	**Netherlands**	General Agreement signed on 30 September 1996.	
9	**Poland**	Agreement signed on 25 November 1999.	Agreement renewed in November 2004.
10	**Portugal**	Agreement signed on December 2007.	
11	**Romania**	S&T Agreement signed on 15 September 2004.	DST and Romania to enter into a POC. Romania is of importance to SA in the fields of biotechnology, information technology, new materials, micro and nano technology and mathematics. POC being negotiated that will be signed during the last quarter of 2007.

12	**Slovakia**	S&T Agreement signed on 15 May 2006.	
13	**Slovenia**	S&T Agreement signed on 29 June 2007	
14	**Spain**	S&T Agreement signed on 12 May 2003.	Cooperation on areas such as Human Resource Development, Advanced manufacturing, Innovation (projects and grants, mining and energy), Biotechnology, and ICT.
15	**Sweden**	S&T Agreement signed on 23 November 1999.	
16	**Switzerland**	Signing of S&T Agreement in November 2007.	Cooperation on areas such as life sciences micro technologies and nanotechnologies, material research, manufacturing and production technologies and basic sciences such as physics and chemistry.
17	**United Kingdom**	S&T Agreement signed on 27 February 1995	Cooperation in areas such as biomedicine, agriculture, biotechnology, environmental protection and the utilization of natural resources. Agreement on networking of scientists and the Letter of Intent on foot and mouth diseases and other animal diseases signed on 5 December 2002.
18	**Ukraine**	S&T Agreement signed on 28 November 1998.	

5.2. Mechanisms supporting SA-EU cooperation in innovation

FP7 and HORIZON 2020 Programmes

FP7

The Framework Programmes for Research and Technological Development, also called Framework Programmes or abbreviated FP1 through to FP7, are funding programmes created by the European Union (EU) in order to support and encourage research in the European Research Area (ERA). More than 100 countries from all over the world are involved in EU Research Programmes. These activities are within the "Cooperation" programme of FP7, which covers the international cooperation actions in 10 thematic areas and across themes. They are implemented in coordination with the "Cooperation", "People", "Ideas", "Nuclear Research and Training", Joint Research Centre" and "Capacities" programmes of FP7. The FP7 was EU's main funding instrument for research in Europe from 2007 to 2013. The programme had funding allocation of €50.5 billion for the core programme and an additional €2.7 billion for the Euratom component of the programme. The FP7 budget from the European Commission represented a 41% increase from FP6 at 2004 prices. The programme was designed to respond and address Europe's employment needs and competiveness.

International research and development is aimed at contributing to the production of global public goods and help to close the gap between different countries in the world. There is already a significant body of scientific knowledge in the world that is available as a resource for improving the lives of those who live in developing countries as well as those of European citizens.

HORIZON 2020

Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Running from 2014 to 2020 with an €80 billion budget, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe. Horizon 2020 provides major simplification through a single set of rules. It is intended to combine all research and innovation funding currently provided through the Framework Programmes for Research and Technical Development, the innovation related activities of the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT). The proposed support for research and innovation under Horizon 2020 will:

- Strengthen the EU's position in science with a dedicated budget of €24 598 million. This will provide a boost to top-level research in Europe, including an increase in funding of 77% for the very successful European Research Council (ERC).
- Strengthen industrial leadership in innovation €17 938 million1. This includes major investment in key technologies, greater access to capital and support for SMEs.

- Provide €31 748 million1 to help address major concerns shared by all Europeans such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population.
- Horizon 2020 will tackle societal challenges by helping to bridge the gap between research and the market by, for example, helping innovative enterprise to develop their technological breakthroughs into viable products with real commercial potential. This market-driven approach will include creating partnerships with the private sector and Member States to bring together the resources needed.

International cooperation will be an important cross-cutting priority of Horizon 2020. In addition to Horizon 2020 being fully open to international participation, targeted actions with key partner countries and regions will focus on the EU's strategic priorities. Through a new strategy, a strategic and coherent approach to international cooperation will be ensured across Horizon 2020. Horizon 2020 will be complemented by further measures to complete and further develop the European Research Area by 2014. These measures will aim at breaking down barriers to create a genuine single market for knowledge, research and innovation.

Other EU initiatives

- The **European Research Council** funds only one researcher who has a South African nationality. The researcher is hosted at the University in Bergen in Norway and works on ‚Tracing the evolution of symbolically mediated behaviours within variable environments in Europe and southern Africa'. There are some other ERC-funded projects that take place, at least in part, in South Africa. For example the SOLARIS project at the Nicolaus Copernicus Astronomical Center in Poland conducts measurements for detecting circumbinary planets around a sample of up to 350 eclipsing binary stars using eclipse timing and precision radial velocities. The measurements are done with four 0.5-meter robotic telescopes located in South Africa (Sutherland), Australia, and Chile. Another example is the HYRAX project at the CNRS, which seeks to develop rock hyrax middens as novel palaeo-environmental archives to investigate long-term climate change. These stratified accumulations of urine and faecal pellets contain reliable, high resolution records of long-term climate and vegetation change insouthern Africa spanning the last 50,000 years.
- After the European Research Council (ERC) launched its awareness raising campaign, „ERC goes Global", in Canada in February 2012, the ERC Secretary General Prof. Donald Dingwell continued his world tour with a visit to South Africa from 12 to 17 March 2012. It included meetings with key representatives and researchers from various universities and research institutions in Johannesburg, Pretoria, Durban and Cape Town.
- **Marie Curie fellowships**: between 2007 and 2012, 40 South Africans participated in Marie Curie Actions, mostly in the International Research Staff Exchange Staff Scheme (IRSES)
- **COST**: A reciprocal arrangement between the European Cooperation in Scientific and Technical Research (COST) Office and the Department of Science and Technology entered into force in 2009,

under which both sides provide funding for short-term scientific missions to be undertaken by SA and European researchers related to SA's participation in COST actions (scientific networks)93.

- **Innovation for Poverty Alleviation programme** (2009-2013) funded by the European Development Cooperation Instrument (DCI). The overall objective of the programme is to contribute to the South African Department of Science and Technology's policy and strategy of using science and technology for reducing poverty through job creation, SME development, economic growth and the improvement of the quality of life.
- **AERO-Africa** aims to support European and South African research cooperation in aeronautics and air transport. Learn More at: http://www.aeroafrica-eu.org/
- **PAEPARD**– The Platform for African European Partnership on Agricultural Research for Development. Learn More at: http://www.paepard.org
- **AERAP**– African European Radio Astronomy Platform. Learn More at: http://aerap.org/
- **African Union Research Grants**. Learn More at: http://hrst.au.int/en/rgp
- **ACP S&T Programme** – The ACP Science and Technology Programme facilitates the creation or strengthening of frameworks for regional and sub-regional co-operation and of inter-institutional co-operation in the African, Caribbean and Pacific region in the field of science and technology. Learn More at: http://www.acp-st.eu/
- **ST-Africa Initiative**. Learn More at: www.ist-africa.org
- **EUROAFRICA-P8**. Learn More at: http://euroafrica-ict.org

5.3. Participation of SA in FP4, FP5, FP6, FP7 and ACP projects

South Africa ranks number one among African countries in terms of participation in FP7. It ranks number five in terms of third country participation in FP7 directly following Russia, the USA, China, Brazil and India. South Africa has established itself as the EU's fifth most important collaborator in the European Commission's (EC's) seventh research Frame- work Programme (FP7). Under the previous FP4, FP5 and FP6 EC R&D programmes South Africa racked up nearly 250 participations and benefited from R150-million in EU investment in South African research. The benefits, however, are much more than just the money. The meaningful involvement in international R&D projects builds South Africa's own R&D capacity and capabilities. It also creates long-term strategic relationships, and complements and benefits bilateral R&D programmes as well. In addition, it enhances knowledge on different policy perspectives, and an in-depth understanding of administration and funding mechanisms.

The Chart below shows that South African participation has increased over the period and during different funding instruments with the highest participation achieved during the implementation of the EU research instrument (FP7).

93 https://eeas.europa.eu/sites/eeas/files/science_and_technology_fact_sheet_1.pdf

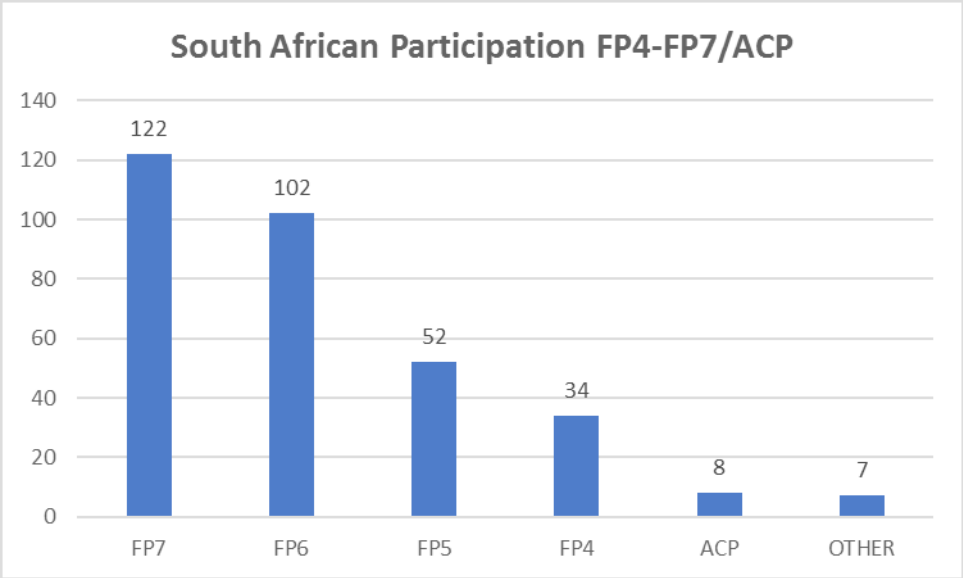


Figure 1- SA Participation FP4-FP7 & ACP

Moreover, evidence exists showing that South Africa has stronger research relationships with EU countries, UK and the Netherlands in particular with which other type of relations exist from the 1652. In addition, South Africa has strengthened its collaboration with other African countries as well as with the four BRICS countries through its participation in the FP7. Figure 2 shown below shows the collaboration partners in the FP7 as indicated in the Insights into South Africa's Participation in the 7th Framework Programme for Research and Technological Development of the European Commission released in 2015.

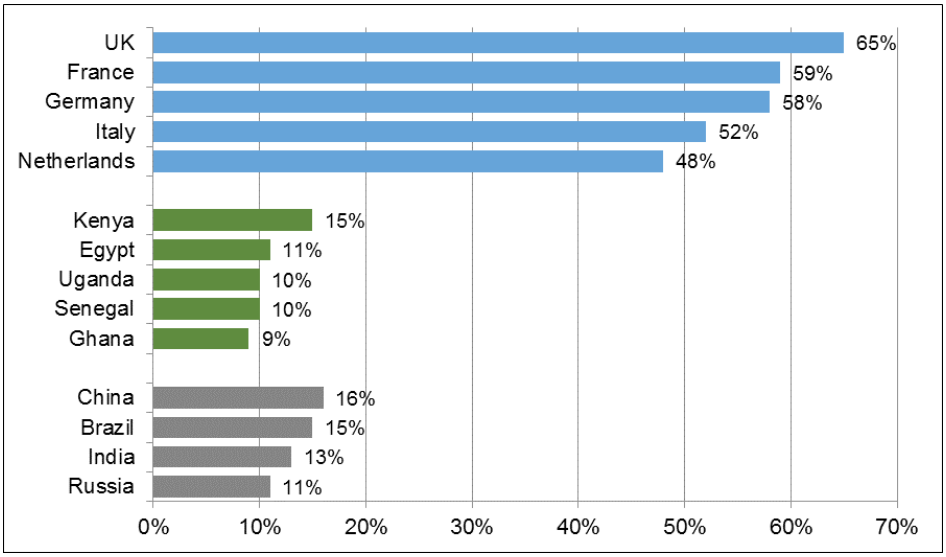
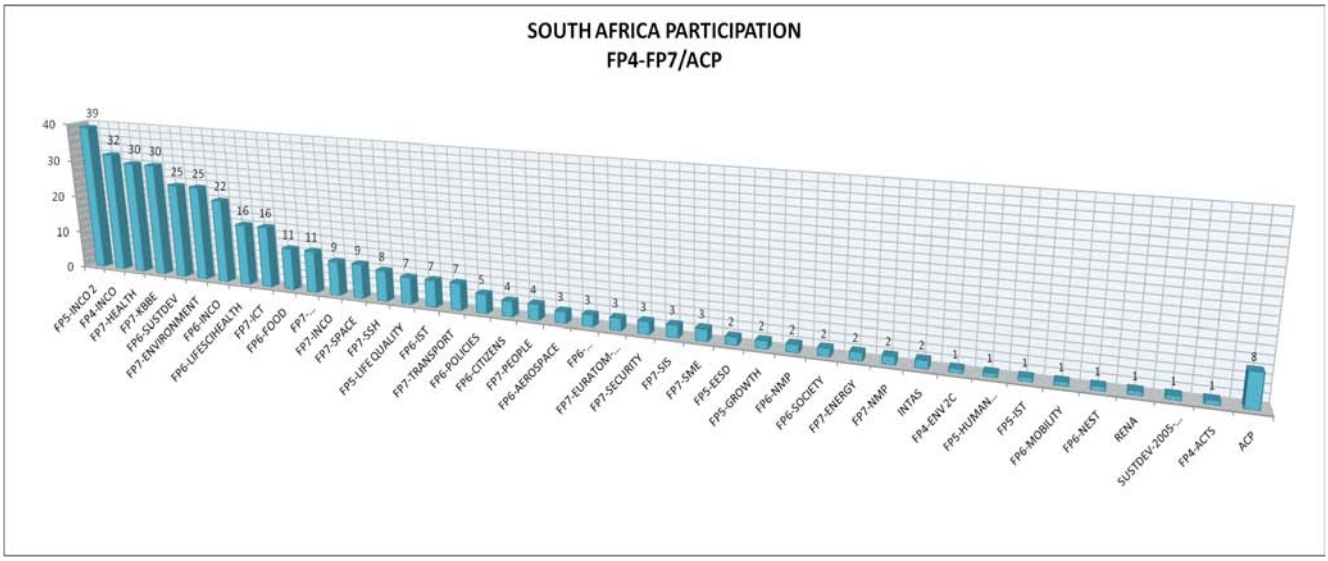


Figure 2 - Collaboration of EU countries (top 5), African countries (top 5) and four BRICS countries in South Africa's FP7 projects (N=122)

COORDINATOR COUNTRIES IN PROJECTS WITH SOUTH AFRICAN PARTNERS (FP4-FP7 / ACP)	
UNITED KINGDOM	85
NEDERLAND	43
DEUTSCHLAND	42
FRANCE	40
BELGIQUE-BELGIË	27
ITALIA	27
NORGE	12
DANMARK	11
ESPAÑA	11
SVERIGE	11
SOUTH AFRICA	13
ÉIRE/IRELAND	9
HELLAS	9
PORTUGAL	7
SCHWEIZ/SUISSE/SVIZZERA	6
MAGYARORSZAG	2
ÖSTERREICH	2
SUOMI/FINLAND	2
ARGENTINA	1
BULGARIA	1
CESKA REPUBLIKA	1
LUXEMBOURG (GRAND-DUCHÉ)	1
ROMANIA	1
SENEGAL	1

The Marie Curie actions category is by far the most successful priority area when looking at the number of successful applications. Last but not least, what can be easily seen is that SA partners have more participation in Health and Biotechnology calls (except INCO), areas which they have shown great expertise in the past. While projects under health do not have the highest success rate, they have shown to have the highest success rate for the amount of EC contribution received versus the amount requested.



PARTICIPATION OF SA PARTNERS IN SPECIFIC WORK PROGRAMMES AND CALLS	
FP5-INCO 2	39
FP4-INCO	32
FP7-HEALTH	30
FP7-KBBE	30
FP6-SUSTDEV	25
FP7-ENVIRONMENT	25
FP6-INCO	22
FP6-LIFESCIHEALTH	16
FP7-ICT	16
FP6-FOOD	11
FP7-INFRASTRUCTURES	11

FP7-INCO	9
FP7-SPACE	9
FP7-SSH	8
FP5-LIFE QUALITY	7
FP6-IST	7
FP7-TRANSPORT	7
FP6-POLICIES	5
FP6-CITIZENS	4
FP7-PEOPLE	4
FP6-AEROSPACE	3
FP6-INFRASTRUCTURES	3
FP7-EURATOM-FISSION	3
FP7-SECURITY	3
FP7-SIS	3
FP7-SME	3
FP5-EESD	2
FP5-GROWTH	2
FP6-NMP	2
FP6-SOCIETY	2
FP7-ENERGY	2
FP7-NMP	2
INTAS	2
FP4-ENV 2C	1
FP5-HUMAN POTENTIAL	1
FP5-IST	1

FP6-MOBILITY	1
FP6-NEST	1
RENA	1
SUSTDEV-2005-3.I.2.2	1
FP4-ACTS	1
ACP	8

South Africa's Participation in FP7

FP7 is one of the largest sources of funding for scientific research in the world with a budget > €50 billion between 2007-2013, and additional €2.7 billion for Euratom. This represented a 41% increase from FP6 at 2004 prices. FP7 was designed to support research activities of importance to EU and address employment needs and competitiveness issues.

Table : South Africa's FP7 applications per research priority area together with success rates (based on data up to 2012)

FP7 priority areas	Number of applicants	Success rate (applicants)	Requested EC contribution (€m)	Success rate (requested EC contribution)
Health	157	25.5%	49.71	25.1%
Environment (incl. climate change)	156	20.5%	29.51	14.1%
Marie Curie actions	150	40.0%	n/a	n/a
Food, agriculture & fisheries, and biotechnology	144	22.9%	24.38	17.7%
ICT	98	17.4%	19.53	8.4%
Socio-economic sciences and humanities	83	14.5%	16.06	11.6%

Table: South Africa's FP7 applications per organisation type together with success rates (based on data for 2012)

Organisation type	Number of applicants	Success rate (applicants)	Success rate (requested EC contribution)

Higher education sector	530	25.1%	19.3%
Research organisations	226	26.5%	17.6%
Private for profit (excl. education)	112	32.1%	21.0%
Other	66	25.8%	15.6%
Public body (excl. research and education)	61	41.0%	36.2%

From the above table, the data generated indicates that more than half of all applications for funding were received from higher institutions of learning. The science councils, which fall under research organisations, were the next biggest category, albeit contributing less than half of the applications from higher education. While the number of applicants from public institutions, other than research and education, is small, the success rates for this group of organisations are much higher than those of all the other categories. Specifically, 41% of all applicants in public institutions were successful, and the EC funding awarded to these successful applicants comprised 36% of the amount originally requested by all applicants from public institutions.

Although the public institutions had the highest success rate in relation to applications sent, higher education received by far the most funds for research. Higher education institutions, in 2012, accounted for €14.82 million, which represented over 50% of all funding that flowed into South African institutions. The category of research organisations accounted for 28%.

Breakdown of Projects by Programme

122 FP7 projects classified according to programme and sub-programme	**95 SP1 Co-operation projects – 22 in Environment & 19 in KBBE** **3 SP3 People projects** **21 SP4 Capacities projects** **3 SP5 Euratom projects**

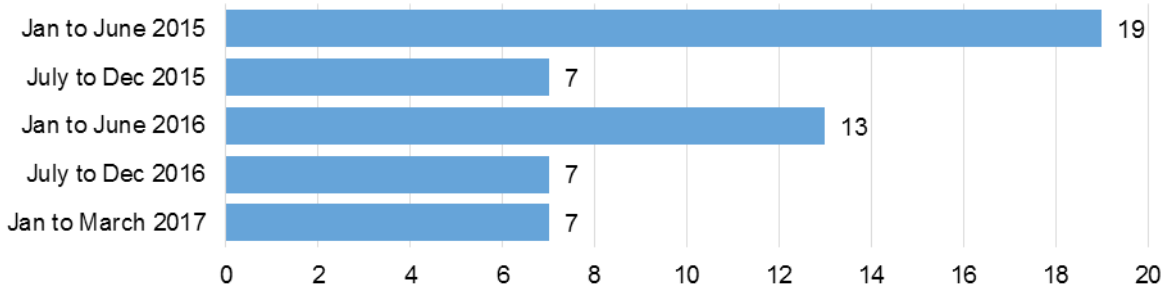
153 SA institutional participations	CSIR 30 DST 14 UCT 12 UKZN 10 SU 8

Data source: 1. Community Research and Development Information Service (CORDIS) database, 2. Focus group with DST officials, and 3. two web surveys (SA participants in FP7 projects and international coordinators of FP7 projects with SA participation)

SA Participants in Horizon 2020 Projects

Horizon 2020 (H2020) is the biggest EU research and innovation programme to date, with nearly €80 billion of funding available over seven years (2014 to 2020). To date, about 20.3 billion Euros have been invested in H2020 (based on data in the EU Open Data Portal). Of these, 0.3% (66.6 million Euros) have been allocated to projects by non-EU countries automatically eligible for funding, and 0.1% (17 million Euros) to South Africa.

According to CORDIS (the Community Research and Development Information Service), a total of 53 project have involved South Africa as participant under H2020. These 53 H2020 projects involving South African participation originated at different times between January 2015 and March 2017 (figure below). The larger number (19) started in the six month period between January and June 2015. In 2016, 20 new projects were signed.



South African H2020 projects, by starting period

The majority of projects remain concentrated in the RIA (45%) and CSA (40%) categories (findings in the figure below).

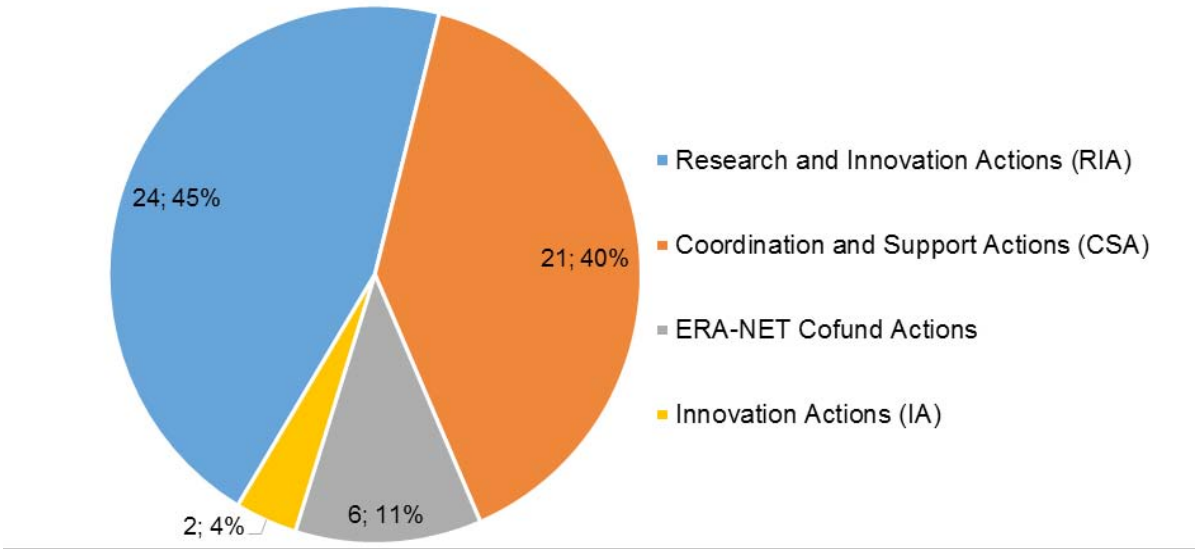


Figure: South African H2020 projects, by type of action

Only two of the 53 projects are coordinated by South African organisations – respectively the Department of Science and Technology (in the case of a Coordination and Support Action) and Cyanolakes (Pty) Ltd. (in the case of an Innovation Action). The remaining 51 projects are coordinated by organisations spread across 16 European countries. Organisations in Germany coordinate 11 of the projects, followed by organisations in the Netherlands (7 projects) and France and the UK (5 projects each).

A total of 688 ('unique') organisations are participating in South Africa's H2020 projects, of which 31 are South African-based and 657 located in other countries. The 31 South African organisations are listed in the table below, together with their sector classification (according to the H2020 classification of activity type) and the total amount of EC funding received.

The CSIR appears at the top of the list of South African organisations in terms of the number of H2020 project participations (11 in total). The CSIR's combined share of funding, taking into account all 11 projects, amount to just more than one thousand Euros. Next is the DST (10 projects), followed by the University of Cape Town (6 projects). In terms of funding, the NRF received the largest EC allocation for its participation in seven projects (about 2.8 thousand Euros), followed by Task Foundation NPC (about 1.9 thousand Euros for one project) and Stellenbosch University (about 1.6 thousand Euros for 6 projects). Of the nine private for-profit entities (businesses, firms and consultancies) none received more than one thousand Euros, except for Kelvion Thermal Solutions (1.1 thousand Euros).

Organisation	Sector	Number of projects	Total EC funding
Council for Scientific and Industrial Research (CSIR)	REC	11	€ 1 019 984

Department of Science and Technology (DST)	PUB	10	€ 1 334 354
University of Cape Town (UCT)	HES	8	€ 1 254 250
National Research Foundation (NRF)	PUB	7	€ 2 822 330
Stellenbosch University (SU)	HES	6	€ 1 641 778
University of the Witwatersrand (WITS)	HES	5	€ 637 803
MINTEK	REC	3	€ 488 970
Water Research Commission (WRC)	PUB	3	€ 341 297
National Health Laboratory Services (NHLS)	HES	2	€ 40 750
Agricultural Research Council (ARC)	REC	2	€ 181 795
University of the Western Cape (UWC)	HES	2	€ 1 039 562
Academy of Science of South Africa (ASSAf)	PUB	1	€ 50 000
Notus Fan Engineering	PRC	1	€ 270 675
Optima Agrik Pty Ltd	PRC	1	€ 112 604
DMT-KAI Batla Pty Ltd	PRC	1	€ 32 600
Virtual Consulting Engineers (VCE)	PRC	1	€ 235 463
Kelvion Thermal Solutions (Pty) Ltd	PRC	1	€ 1 148 500
Cyanolakes (Pty) Ltd	PRC	1	€ 145 783
Advance Call Pty Ltd	PRC	1	€ 229 528
ICLEI – Local Governments for Sustainability - Africa	OTH	1	€ 117 926
Law Trusted Third Part Services Pty Ltd	PRC	1	€ 54 906
Task Foundation NPC	OTH	1	€ 1 873 804
Technology Innovation Agency (TIA)	OTH	1	€ 56 250

Pikitup Johannesburg (Pty) Ltd	PRC	1	€ 62 500
KwaZulu Natal Research Institute for TB-HIV (K-RITH) NPC	OTH	1	€ 167 227
Tshwane University of Technology (TUT)	HES	1	€ 185 625
The South African San Institute Trust	OTH	1	€ 179 226
University of KwaZulu-Natal (UKZN)	HES	1	€ 150 000
Nelson Mandela Metropolitan University (NMMU)	HES	1	€ 301 413
University of Limpopo (UL)	HES	1	€ 788 125
E-waste Association of South Africa	OTH	1	€ 27 500

Note: HES = Higher or secondary education establishments; PRC = Private for-profit entities; PUB = Public bodies; REC = Research organisations; OTH = other

As far as the international organisations participating in South African H2020 projects are concerned, 77% (505) of these 657 organisations are based in EU member states (Figure below). A further 9% (58) of organisations are located elsewhere in Africa, and 2% (14) in the developing region of Latin America and the Caribbean.

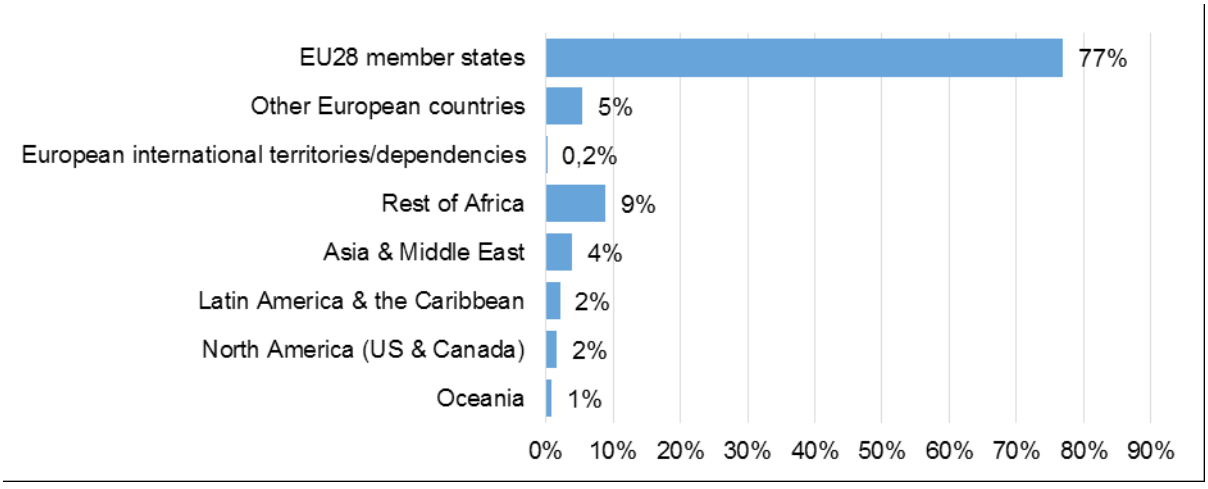


Figure: South African H2020 projects, by region of internationally participating organisations

The figure above presents a network map of South Africa's linkages with countries that participate in its H2020 projects. The network takes into account the co-occurrences of country names across the different projects, showing how the countries are interlinked through their project participation. In the resultant

mapping, South Africa is positioned as being in relatively close proximity to countries such as the UK, Germany (de), France (fr), Austria (at), Belgium (be) Portugal (pt), and Italy (it). On the right is a cluster of African countries. South Africa links to this cluster mainly via three African partners – Ghana (gh), Cape Verde (cv) and Kenya (ke). Two European countries – Finland (fi) and Ireland (ie) – are also positioned as having relatively close linkages with this African cluster.

Projects - List of 53 H2020 projects with South African participations

ID	Acronym	Project title	Start date	End date	Action type	Total cost	EC maximum contribution
207609	4D hybrid	Novel ALL-IN-ONE machines, robots and systems for affordable, worldwide and lifetime Distributed 3D hybrid manufacturing and repair operations	2017/01/01	2019/12/31	Research and Innovation Actions (RIA)	€ 9 429 875	€ 4 990 000
206758	AENEAS	Advanced European Network of E-infrastructuresfor Astronomy with the SKA	2017/01/01	2019/12/31	Research and Innovation Actions (RIA)	€ 2 999 995	€ 2 999 995
193369	AEROGUST	Aeroelastic Gust Modelling	2015/05/01	2018/04/30	Research and Innovation Actions (RIA)	€ 4 289 986	€ 4 237 652
199887	AfriAlliance	Africa-EU Innovation Alliance for Water and Climate	2016/03/01	2021/02/28	Coordination and Support Actions (CSA)	€ 3 238 735	€ 3 238 735
207216	anTBiotic	AnTBiotic – progressing TB drug candidates to clinical proof of concept	2017/01/01	2021/12/31	Research and Innovation Actions (RIA)	€ 5 819 416	€ 5 819 416
193188	AtlantOS	Optimizing and Enhancing the Integrated Atlantic Ocean Observing System	2015/04/01	2019/06/30	Research and Innovation Actions (RIA)	€ 20 652 921	€ 20 652 921
197193	B3Africa	Bridging Biobanking and Biomedical Research across Europe and Africa	2015/07/01	2018/06/30	Coordination and Support Actions (CSA)	€ 2 035 250	€ 2 001 250
193917	BioMOre	New Mining Concept for Extracting Metals from Deep Ore Deposits using Biotechnology	2015/02/01	2018/01/31	Research and Innovation Actions (RIA)	€ 8 564 962	€ 8 564 962
203256	caLIBRAte	Performance testing, calibration and implementation of a next generation system-of-systems Risk Governance Framework for nanomaterials	2016/05/01	2019/10/31	Research and Innovation Actions (RIA)	€ 9 828 106	€ 7 999 688

ID	Acronym	Project title	Start date	End date	Action type	Total cost	EC maximum contribution
206263	COP21 RIPPLES	COP21: Results and Implications for Pathways and Policies for Low Emissions European Societies	2016/12/01	2019/11/30	Research and Innovation Actions (RIA)	€ 2 986 924	€ 2 986 924
206333	CyanoLakes	The Cyanobacteria Blooms Public Information Service	2016/11/01	2019/10/31	Innovation Actions (IA)	€ 1 631 346	€ 1 040 484
196809	ECOPOTENTIAL	ECOPOTENTIAL: Improving future ecosystem benefits through earth observations	2015/06/01	2019/05/31	Research and Innovation Actions (RIA)	€ 15 993 931	€ 14 874 340
206407	ERA-MIN 2	Implement a European-wide coordination of research and innovation programs on raw materials to strengthen the industry competitiveness and the shift to a circular economy	2016/12/01	2021/11/30	ERA-NET Cofund Actions	€ 16 058 787	€ 4 999 890
204153	ESASTAP 2020	Strengthening Technology, Research and Innovation Cooperation between Europe and South Africa 2020	2016/02/01	2019/01/31	Coordination and Support Actions (CSA)	€ 999 954	€ 999 953
193589	EUSPACE-AWE	EU SPACE AWARENESS	2015/03/01	2018/02/28	Coordination and Support Actions (CSA)	€ 1 999 965	€ 1 999 965
198648	EVAg	European Virus Archive goes global	2015/04/01	2019/03/31	Research and Innovation Actions (RIA)	€ 12 168 055	€ 10 792 868
193845	EWIT	EWIT: Developing an e-waste implementation toolkit to support the recycling and the secondary raw material recovery strategies in metropolitan areas in Africa	2015/02/01	2017/01/31	Coordination and Support Actions (CSA)	€ 1 641 750	€ 1 641 750
200554	FERTINNOWA	Transfer of INNOvative techniques for sustainable WAter use in FERtigated crops	2016/01/01	2018/12/31	Coordination and Support Actions (CSA)	€ 2 999 273	€ 2 999 273
202698	FutureTrust	Future Trust Services for Trustworthy Global Transactions	2016/06/01	2019/05/31	Innovation Actions (IA)	€ 7 474 031	€ 6 338 949

ID	Acronym	Project title	Start date	End date	Action type	Total cost	EC maximum contribution
200092	GLOBUS	Reconsidering European Contributions to Global Justice	2016/06/01	2020/05/31	Research and Innovation Actions (RIA)	€ 2 498 996	€ 2 498 996
193867	green.eu	European Global Transition Network on Eco-Innovation, Green Economy and Sustainable Development	2015/02/01	2019/01/31	Coordination and Support Actions (CSA)	€ 2 994 179	€ 2 994 179
196818	GREEN-WIN	Green growth and win-win strategies for sustainable climate action	2015/09/01	2018/08/31	Research and Innovation Actions (RIA)	€ 3 925 013	€ 3 624 763
200866	ICRI 2016	International Conference on Research Infrastructures (ICRI 2016)	2015/10/01	2016/12/31	Coordination and Support Actions (CSA)	€ 623 203	€ 300 000
199409	IN-SKA	Square Kilometre Array: Infrastructure Detailed Design for SKA Phase 1	2016/01/01	2017/08/31	Research and Innovation Actions (RIA)	€ 4 955 475	€ 4 955 475
199895	INTMET	Integrated innovative metallurgical system to benefit efficiently polymetallic, complex and low grade ores and concentrates	2016/02/01	2019/01/31	Research and Innovation Actions (RIA)	€ 7 838 726	€ 7 834 976
193886	INTRAW	International cooperation on Raw materials	2015/02/01	2018/01/31	Coordination and Support Actions (CSA)	€ 2 111 375	€ 2 104 801
205999	IST-Africa 2016-2018	IST-Africa (2016 - 2018)	2016/10/01	2018/12/31	Coordination and Support Actions (CSA)	€ 800 000	€ 800 000
207184	JUMPING JIVE	Joining up Users for Maximising the Profile, the Innovation and the Necessary Globalisation of JIVE	2016/12/01	2021/01/31	Coordination and Support Actions (CSA)	€ 3 312 309	€ 2 983 683
208059	leap-agri	A long term EU-Africa research and innovation partnership on food and nutrition security and sustainable agriculture	2016/12/01	2021/11/30	ERA-NET Cofund Actions	€ 33 049 448	€ 10 906 318
196897	MAGIC	Middleware for collaborative Applications and Global vIrtual Communities	2015/05/01	2017/04/30	Coordination and Support Actions (CSA)	€ 1 821 873	€ 1 355 972

ID	Acronym	Project title	Start date	End date	Action type	Total cost	EC maximum contribution
206029	MarTERA	Maritime and Marine Technologies for a New ERA	2016/12/01	2021/11/30	ERA-NET Cofund Actions	€ 31 118 822	€ 10 269 211
200084	M-ERA.NET 2	ERA-NET for materials research and innovation	2016/03/01	2021/02/28	ERA-NET Cofund Actions	€ 49 687 954	€ 12 750 000
199851	mHealth4Afrika	Community-based ICT for Maternal Healthcare in Africa	2015/11/01	2018/10/31	Research and Innovation Actions (RIA)	€ 1 999 995	€ 1 999 995
200380	MinWaterCSP	MinWaterCSP - Minimized water consumption in CSP plants	2016/01/01	2018/12/31	Research and Innovation Actions (RIA)	€ 5 861 372	€ 5 861 372
193282	nEUROSTRESSPEP	Novel biocontrol agents for insect pests from neuroendocrinology	2015/06/01	2019/05/31	Research and Innovation Actions (RIA)	€ 6 995 054	€ 6 995 053
197443	NUCLEUS	NUCLEUS - New Understanding of Communication, Learning and Engagement in Universities and Scientific Institutions	2015/09/01	2019/08/31	Coordination and Support Actions (CSA)	€ 3 993 633	€ 3 993 633
194806	PROIntensAfrica	Towards a long-term Africa-EU partnership to raise sustainable food and nutrition security in Africa	2015/04/01	2017/03/31	Coordination and Support Actions (CSA)	€ 1 777 874	€ 1 047 005
207426	RadioNet	Advanced Radio Astronomy in Europe	2017/01/01	2020/12/31	Research and Innovation Actions (RIA)	€ 10 513 023	€ 10 000 000
194395	RINEA	Research and Innovation Support for Europe and Africa	2015/03/01	2018/02/28	Coordination and Support Actions (CSA)	€ 1 927 363	€ 1 927 363
207625	RINGO	Readiness of ICOS for Necessities of integrated Global Observations	2017/01/01	2020/12/31	Coordination and Support Actions (CSA)	€ 4 719 680	€ 4 719 680
203389	SafeWaterAfrica	Self-Sustaining Cleaning Technology for Safe Water Supply and Management in Rural African Areas	2016/06/01	2019/11/30	Research and Innovation Actions (RIA)	€ 2 989 998	€ 2 989 998
194952	Sci-GaIA	Energising Scientific Endeavour through Science Gateways and e-Infrastructures in Africa	2015/05/01	2017/04/30	Coordination and Support Actions (CSA)	€ 1 339 125	€ 1 339 125

ID	Acronym	Project title	Start date	End date	Action type	Total cost	EC maximum contribution
208314	SEACRIFOG	Supporting EU-African Cooperation on Research Infrastructures for Food Security and Greenhouse Gas Observations	2017/03/01	2020/02/29	Coordination and Support Actions (CSA)	€ 1 999 890	€ 1 999 890
194868	SEREN 3	Security Research NCP Network 3	2015/05/01	2018/04/30	Coordination and Support Actions (CSA)	€ 1 995 451	€ 1 995 451
194091	SMART2D	A people-centred approach through Self-Management and Reciprocal learning for the prevention and management of Type-2-Diabetes	2015/01/01	2019/03/31	Research and Innovation Actions (RIA)	€ 3 344 981	€ 3 344 979
207230	SPICES	Scaling-up Packages of Interventions for Cardiovascular disease prevention in selected sites in Europe and Sub-Saharan Africa: An implementation research (SPICES Project)	2017/01/01	2021/12/31	Research and Innovation Actions (RIA)	€ 5 902 039	€ 5 902 039
199892	STRADE	Strategic Dialogue on Sustainable Raw Materials for Europe	2015/12/01	2018/11/30	Coordination and Support Actions (CSA)	€ 1 977 509	€ 1 977 509
194057	TBVAC2020	TBVAC2020; Advancing novel and promising TB vaccine candidates from discovery to preclinical and early clinical development	2015/01/01	2018/12/31	Research and Innovation Actions (RIA)	€ 25 056 507	€ 18 200 000
197442	TRUST	Creating and enhancing TRUSTworthy, responsible and equitable partnerships in international research	2015/10/01	2018/09/30	Coordination and Support Actions (CSA)	€ 2 651 259	€ 2 141 173
193301	VIROGENESIS	Virus discovery and epidemic tracing from high throughput metagenomic sequencing	2015/06/01	2018/05/31	Research and Innovation Actions (RIA)	€ 2 995 970	€ 2 995 969
202632	WATERSPOUTT	Water - Sustainable Point-Of-Use Treatment Technologies	2016/06/01	2020/05/31	Research and Innovation Actions (RIA)	€ 3 571 946	€ 3 084 351
193847	WaterWorks2014	Water Works 2014-2019 in Support of the Water JPI	2015/02/01	2020/01/31	ERA-NET Cofund Actions	€ 18 667 631	€ 6 160 307

ID	Acronym	Project title	Start date	End date	Action type	Total cost	EC maximum contribution
200087	WaterWorks2015	Water Works 2016-2020 in Support of the Water JPI (WaterWorks2015) - Sustainable water use in agriculture, to increase water use efficiency and reduce soil and water pollution	2016/01/01	2020/12/31	ERA-NET Cofund Actions	€ 30 398 222	€ 9 494 832

SA Participants in Horizon 2020 Projects

Table: Horizon2020 projects involving South African participation, by EC classification of projects

EC project classification		Number of SA projects	Number of SA participants
EC hierarchy	EC topic		
Climate action and resource efficiency – Eco-innovation	Global waste dimension (WASTE-4b-2014)	1	4
	Stepping up EU research and innovation cooperation in the water area (WATER-3-2014)	1	1
Climate action and resource efficiency – Strategy	Consolidating global knowledge on the green economy in support of sustainable development objectives in Europe and internationally (SC5-14-2014)	1	1
Excellent science department – Marie Sklodowska-Curie COFUND, Researchers' Night and Individual Fellowships Global	Marie Skłodowska-Curie Individual Fellowships (IF-GF) (MSCA-IF-2014-GF)	1	1
Excellent science department – Marie Sklodowska-Curie Research and Innovation Staff Exchanges	Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE) (MSCA-RISE-2014)	8	12

H2020 environment & resources	Developing in-situ Atlantic Ocean Observations for a better management and sustainable exploitation of the maritime resources (BG-08-2014)	1	1
	Mining of small and complex deposits and alternative mining (SC5-11a-2014)	1	2
	Strategic international dialogues and cooperation on raw materials with technologically advanced countries (SC5-13b-2014)	1	2
Health – fighting infectious diseases and global epidemics	Vaccine development for poverty-related and neglected infectious diseases: tuberculosis (PHC-08-2014)	1	3
Health – medical research and the challenge of ageing	Global Alliance for Chronic Diseases: prevention and treatment of type 2 diabetes (HCO-05-2014)	1	1
Industrial leadership and societal challenges department – Space research	Outreach through education (COMPET-10-2014)	1	1
Industrial leadership and societal challenges department – Sustainable resources for food security and growth	Native and alien pests in agriculture and forestry (SFS-03a-2014)	1	1

International Cooperation – European neighbourhood, Africa and the Gulf	Encouraging the research and innovation cooperation between the Union and selected regional partners – proposals targeting Black Sea, Middle East, Africa (INT-02-2014)	1	1
Total		20	31

Note: Contracts signed between November 2014 and March 2015

SA-EU Innovation Cooperation

The Strengthening of Technology, Research and Innovation between Europe and South Africa (ESASTAP) Project and its predecessors have been instrumental in enhancing the success of the SA-EU science, technology and innovation cooperation. Better coordination of various research and innovation initiatives could result in more optimal investment of resources through funding partners, as well as provide key resources and new tools of cooperation for South Africa. More specifically, in the thematic areas, a cooperative approach will serve to better address and coordinate funding activities. However, the challenge is to be more effective in addressing basic needs for sustainable development and to do so in a better informed and coordinated manner.

Lessons from the ESASTAP Plus report indicate that coordination of various research and innovation initiatives works best when the principle of ownership in partners is entrenched. It is thus important that the joint programmes to be embarked upon should be identified and supported by the partners themselves.

In 2016 marked the 20th year celebration of a successful cooperation in Science, Technology and Innovation (STI) between South Africa and the European Union (EU). STI policy dialogue is sustained through the meetings of the EU-SA Joint Science and Technology Cooperation Committee (JSTCC). Recently, discussions on new areas of cooperation have been framed through the Roadmap for the Cooperation between South Africa and the European Union, with a renewed focus on themes of common interest such as marine research, energy, as well as minerals and mining research.

The ESASTAP 2020 Project and its predecessors have been instrumental in enhancing the success of the SA-EU science, technology and innovation cooperation through strategic activities, the result of concerted efforts undertaken by the successive Framework Programme (FP) 6 as well as FP7 INCO projects SAccess, ESASTAP, ESASTAP-2 and ESASTAP Plus.

The continuation of the ESASTAP Plus consortium in the new ESASTAP 2020 ensures smooth transition,

transfer of knowledge and successful implementation of the actions proposed in the new ESASTAP project. New European and South African partners have joined the consortium and these augurs well for the successful implementation of the ESASTAP2020 objectives going forward. All partners bring to the consortium unique and complimentary knowledge and expertise and will assist ESASTAP 2020 by providing access to research and innovation opportunities for research communities. The current ESASTAP2020 consortium consist of the following ten partners from seven countries:

Country	Institution	Status
South Africa	Department of Science and Technology (DST)	Old partner (WP1 Leader)
National Research Foundation (NRF)		New partner (WP2 Leader)
Technology Innovation Agency (TIA)		New partner
Academy of Science of South Africa (ASSAf)		Old partner
Italy	Agenzia per la Promozione della Ricerca Europea (APRE)	Old partner (WP3 Leader)
Greece	Foundation for Research and Technology Hellas (FORTH)	Old partner (WP4 and 5 Leader)
France	The French Institute for Research and Development (IRD)	Old partner
Norway	Research Council Norway	New partner
Germany	Deutsches Zentrum Fuer Luft – und Raumfahrt EV (DLR)	Old partner
Austria	Centre for Social Innovation (ZSI)	New partner

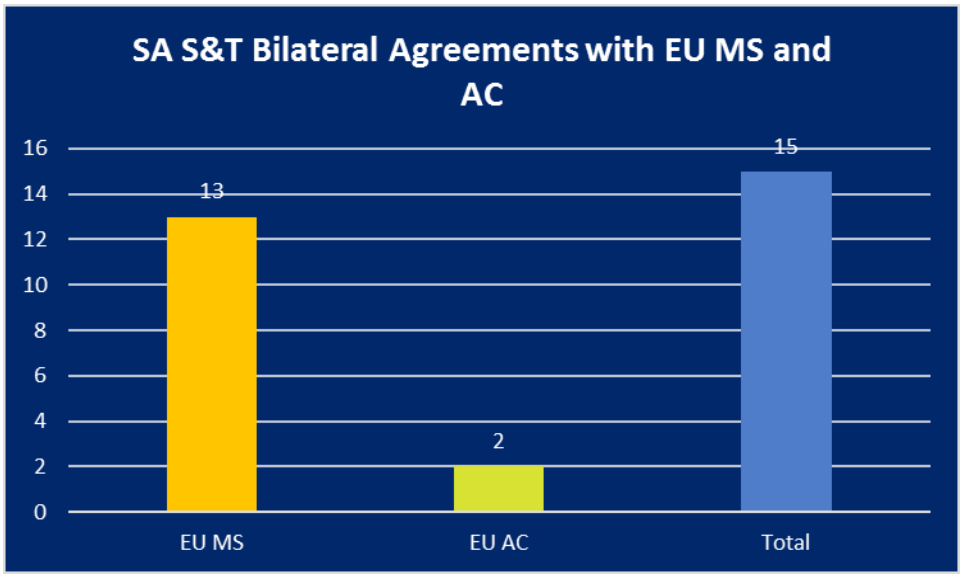
Current Bilateral Research and Innovation Programmes

This section provides an analytical summary of the information that was collected throughout this research. The section will focus on three main issues, i.e. (1) formally signed bilateral S&T agreements between South Africa and EU MS (Member States)and ACs (Associated Countries), (2) S&T thematic areas of focus between South Africa and EU MS and ACs, (3) commonly used instruments/mechanisms for implementing

S&T bilateral agreements. The analysis of these three topics will also be done by looking at the bilateral programmes that South Africa has with countries in other regions (i.e. Africa, Asia and Americas) and also in line with the EU R&D programmes that South African researchers apply to.

Formal Bilateral Agreements between South Africa and EU MS and AC

The 1996 formal S&T agreement between South Africa and the EU led to the establishment of bilateral S&T agreement between South Africa and several EU MS and AC. As illustrated on the graph below, there are currently fifteen activate bilateral research and innovation cooperation agreements between South Africa and EU MS and ACs.

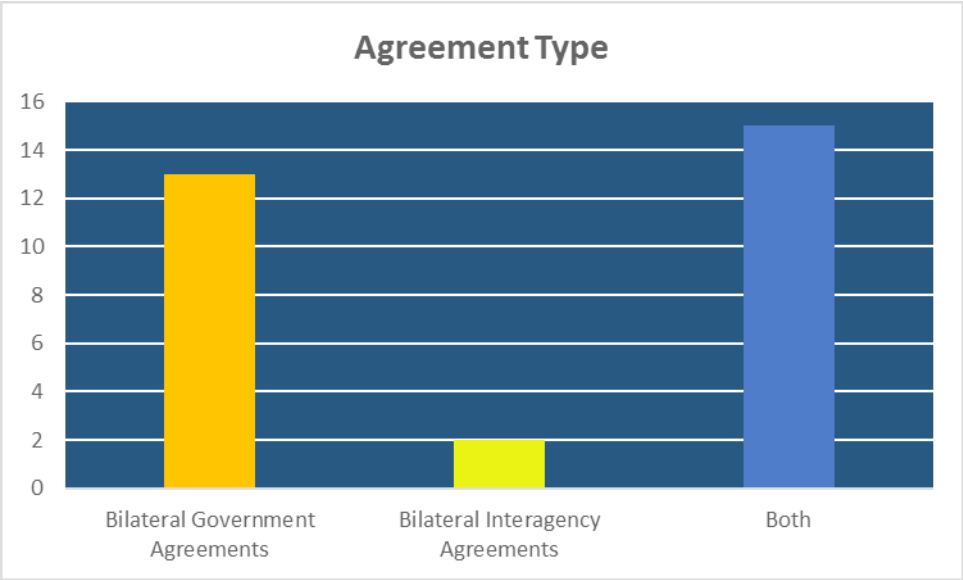


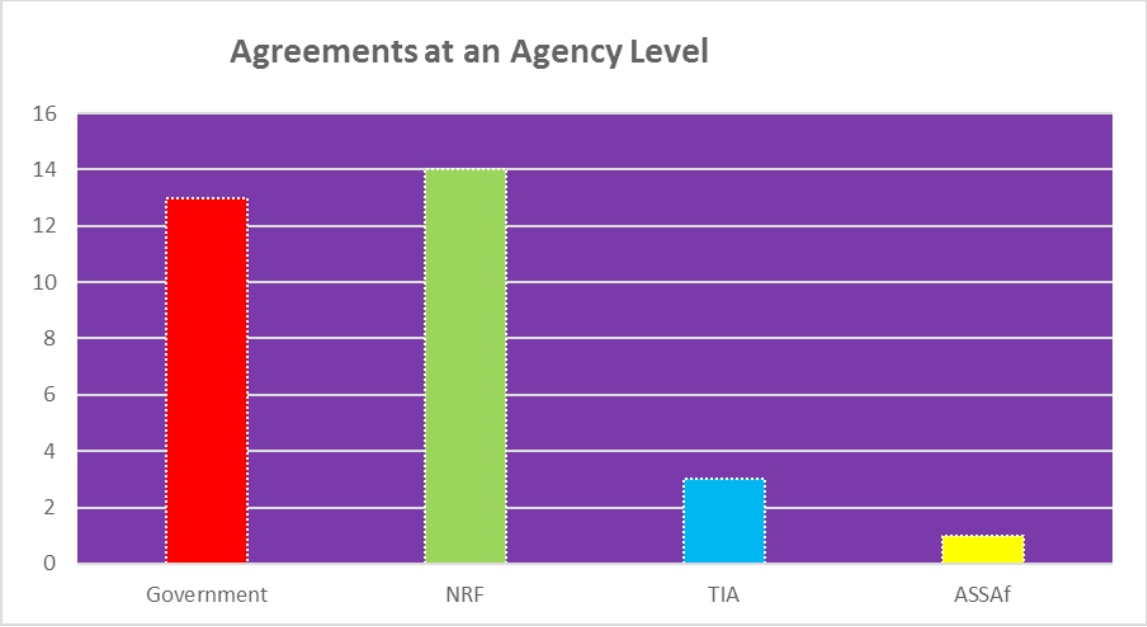
SA S&T Bilateral Agreements with EU MS and AC

These bilateral agreements are concluded either at a governmental or interagency level to create a robust national system of innovation and enable its transition to a knowledge economy. The agreements provide that any EU MS or AC can enter into an S&T agreement and nominate a research or innovation funding agency to implement the agreement on its behalf. In this instance, in most of the cases, the funding agency would also enter into a funding agreement that specifies (1) the type of instrument to be utilised in implementing the governmental agreement, (2) the funding modalities, (3) the activities to be supported, (4) the national and call specific eligibility criteria, and (5) criteria for evaluating proposals. It is only on rare occasions that an agency will enter into an interagency agreement without the umbrella government-to-government agreement.

In most cases, a country would have two or more S&T agreements – one at a governmental level and the rest at agency level – depending on the stipulated clauses in the overall government agreement. As illustrated below, of the current fifteen active S&T bilateral agreements, only two are at an agency level (with the

South African NRF) – without the broader government agreement. In South African CSIR and HSRC were not included in the study as they are not necessarily funding agencies but rather R&D performers.





The above mentioned fifteen bilateral agreements are currently at different stages of implementation. For example, the bilateral agreement with Portugal has recently been signed and has not yet been implemented. The NRF is currently in discussions with the Portuguese Funding Agency to identify mechanisms of implementing this agreement. There are also discussions at different levels to establish bilateral agreements where there's currently none. One of the examples is the ongoing discussions between the NRF and Nuffic Neso of Netherlands to establish a bilateral Human Capital Development (HCD) programme. The DST is also currently negotiating a bilateral programme, at a governmental level,

with Finland Ministry of Employment and the Economy.

The table below highlight the status of each of the bilateral agreement between SA-EU Ms:

Country	Level	Status
Austria	Governmental and Interagency	Active
Belgium	Governmental and Interagency	Active
Czech Republic	Interagency	Recently lapsed, currently negotiating renewal
Finland	Interagency	Active, currently negotiating governmental
France	Governmental and Interagency	Active
Germany	Governmental and Interagency	Active
Italy	Governmental	Active, currently working on options for renewal
Netherlands	Governmental	Active
Norway	Governmental and Interagency	Active, currently working on options for renewal
Poland	Governmental and Interagency	Active
Portugal	Governmental	Recently signed, currently
Romania	Governmental	Active
Sweden	Governmental and Interagency	Active
Switzerland	Governmental and Interagency	Active
United Kingdom	Governmental and Interagency	Active

S&T Thematic Areas of Focus between South Africa and EU MS and AC

All the active bilateral programmes that currently exists between South Africa and EU MS and ACs are designed on the basis of agreed upon thematic areas of focus deemed important by the partners. Some thematic areas can be identified as key priority fields where potential for better coordination and synergies can hold. During this study it became clear that there were three broad categories that appeared with almost all the bilateral programmes (i.e. Health, Blue Economy and Oceans, and Water and Food Security). These thematic areas were, however, captured/explained differently by different partners. Taking the "health" theme as an example, some partners emphasised the issue of "communicable and non-communicable diseases", some focused on "pharmaceuticals", while others focused on "medicinal biotechnology". The table below indicates the countries that are currently focusing and/or would like to establish programmes on these three broad themes in their bilateral programmes with South Africa. The same themes are also key priority areas of focus between South Africa and Kenya, Japan and the United States.

Countries	Thematic Areas						Total programmes	
	Health		**Blue Economy and Oceans**		**Water and Food Security**			
	health, infectious diseases, communicable and non-communicable diseases, medicine, biotechnology, pharmaceuticals		marine sciences, maritime resources, climate change, environment, blue economy, oceans, aquaculture		Agriculture, food and nutrition security, agro-food, water research, agri-biotechnology		Active	Future
Austria	x	x	-	x	x	-	2	2
Belgium	x	x	x	x	x	x	3	3
Denmark	-	-	-	x	-	x	0	2
Finland	-	x	-	-	-	x	0	2
Flanders	x	-	x	x	-	-	2	1
France	x	x	x	x	x	x	3	3
Germany	x	x	-	x	x	x	2	3
Ireland	x	x	x	x	x	x	3	3
Italy	x	x	-	x	-	x	1	3
Japan	x	x	x	x	x	x	3	3
Kenya	x	x	x	x	x	x	3	3
Lithuania	-	x	-	x	-	x	0	3
Netherlands	-	x	-	x	x	x	1	3
Norway	-	-	x	x	-	-	1	1
Poland	x	-	x	-	x	-	3	0
Portugal	x	x	x	x	-	x	2	0
Sweden	x	x	x	x	x	x	3	3
Switzerland	x		-		-			1
United Kingdom	x	x	x	x	x	x	3	3
United States	x	x	x	x	x	x	3	3
Total	16	15	12	17	12	15		

Table 3: Currently active and future bilateral thematic areas of focus

This table also clearly illustrates the challenge that South Africa faces with managing numerous bilateral programmes all of which striving to achieve more or less the same thing. There are at least 10 programmes in each category with different EU countries. Also, this picture may change at any given time – taking into consideration the fact that there are currently negotiations taking place on developing new programmes

with some of these countries.

It is important to note that in most of these bilateral programmes, interdisciplinary and/or multi-disciplinarily in thematic areas was encouraged and tend to be favoured. In today's knowledge landscape there are powerful drivers for multidisciplinary research. The argument put forward is that through simple collaboration researchers from different disciplines can accomplish more by teaming up. Interdisciplinary research moves beyond simple collaboration and teaming to integrate data, methodologies, perspectives, and concepts from multiple disciplines in order to advance fundamental understanding or to solve real world problems. Nature and society are complex, and human beings' innate curiosity to understand the elements and forces within them requires examination from the perspective of multiple disciplines. For example, interrogating climate change, requires a consideration of, among other things, how oceans and rivers are influenced by land use and the products of industrialisation, atmospheric constituents and solar radiation. These subsystems are linked in time and space and have embedded in them multiple feedback mechanisms.

The issue of interdisciplinary research relates to one of the issues that came out strongly in this study, that is, the relationship between research and innovation. Majority of the bilateral programmes analysed tend to put emphasis on the need to ensure that all the research programmes supported have and/or leads to some form of innovation for economic development. This could only be possible through support of interdisciplinary research. This is because interdisciplinary research requires either that individual researchers gain depth of understanding in two or more disciplines and be conversant with the languages and methodologies of these disciplines, or more frequently that multidisciplinary teams assemble and create a common language and framework for discovery and innovation. The emphasis in most of the bilateral programmes is that entrepreneurial skills are key to any country's development into a knowledge economy. Therefore, partnerships for capacity building in innovation tend to be favoured. Examples here are the bilateral innovation programmes between South Africa and Switzerland, France and the United Kingdom (led by TIA from the South African side).

Furthermore, these bilateral cooperation programmes with South Africa tend to have a greater regional dimension. There is emphasis on the need to link bilateral activities more explicitly with regional and multilateral initiatives to build on leverage effects and synergies more effectively to avoid duplication. It also appears that bilateral programmes tend to be a first gateway for stakeholders to bigger regional initiatives. This trend is also supported, to a large extend, by the importance and participation rate of South African researchers and innovators in the European Programme. Programmes such as the Erasmus Mundus, Nyerere Programme, H2020 ERA-NET Co-fund Programmes (e.g. ERAfrica and LEAP AGRI) Enterprise Europe Network (EEN) Programme, and CAAST-Net Plus, an ongoing FP7 CSA project, further promote a move for partnership beyond bilateral programmes.

Commonly Utilised Instruments for Implementing the Bilateral Programmes

The implementation of activities for almost all the bilateral programmes is the responsibility of the research and innovation national funding agencies. In South Africa, the NRF and TIA are the main funders and

implementers of the S&T bilateral agreements on behalf of the Department of Science and Technology. The NRF has agency partners with most of the European countries. In some instances, the NRF would enter into partnership with more than one agency in one European country to implement programmes with different focus. A case in point is the bilateral partnership with the United Kingdom under the Newton Fund Programme whereby the NRF has partnered with eight different UK partners.

Table four below indicates the NRF partners within the currently active bilateral programmes.

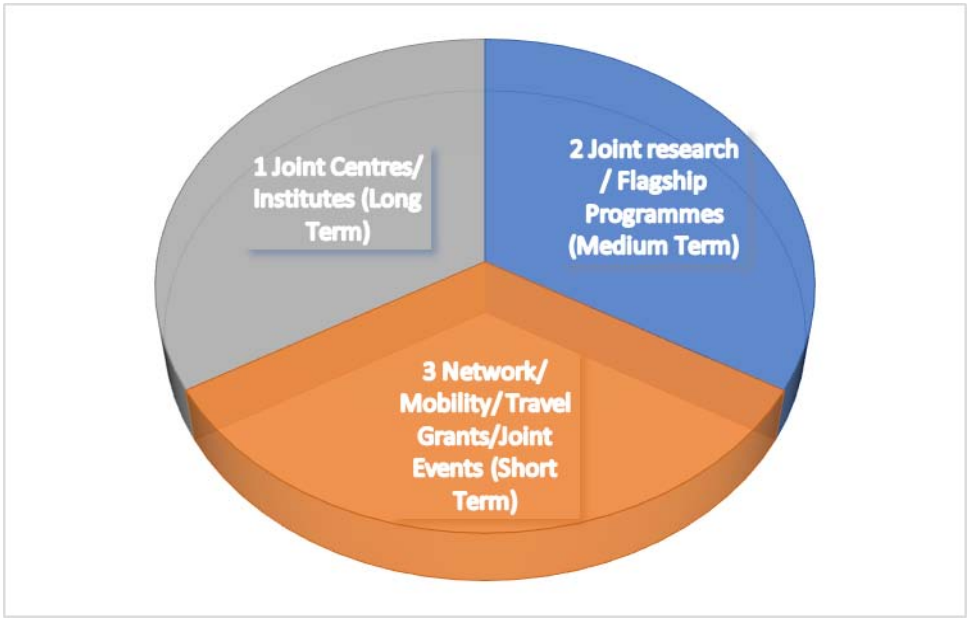
Country	**Funding Agency**
Austria	- Austrian Agency for International Cooperation in Education and Research (OeAD-GmbH)
Belgium	- Fund for Scientific Research - FNRS (F.R.S.-FNRS)
Finland	- Academy of Finland (AF) - Finnish Funding Agency for Technology and Innovation (TEKES)
Flanders	- Fonds Wetenschappellijk Onderzoek (FWO)
France	- L'institut de Recherché Pour le Development (IRD) - Le Centre National de la Recherché Scientifique (CNRS) - Le Centre de Cooperation Internationale en Recherché Agronomique Pour le Development (CIRAD)
Germany	- The Deutsche Forschungsgemeinschaft (DFG) - Deutscher Akademischer Austauschdienst – German Academic Exchange Service (DAAD) - German Aerospace Centre - Project Management Agency (DLR-PT)
Japan	- Japanese Society for the Promotion of Science (JSPS) - Japan Science and Technology Agency (JST)

Netherlands	- Netherlands Organization for Scientific Research (NWO) - Organisation for Internationalisation in Education (EP-Nuffic)
Norway	- Research Council Norway (RCN)
Poland	- National Centre for Research and Development (NCBR)
Portugal	- Foundation for Science and Technology (FCT)
Sweden	- Foundation for International Cooperation in Research and Higher Education (STINT) - Swedish Research Council
Switzerland	- Swiss National Science Foundation (NSF)
United Kingdom	- Academy of Medical Sciences - British Academy - British Council - Economic and Social Research Council (ESRC) - Research Council UK (RCUK) - Royal Academy - Royal Society - Science and Technology Facilities Council (STFC)
United States	- National Science Foundation (NSF)

Agency partnership with the NRF

All these bilateral programmes provide a framework in which science and technology cooperation is

promoted. In all these frameworks partners make use of similar instruments/mechanisms to implement activities and/or enhance research and innovation HCD (Human Capital Development) in their countries. The different instruments can be used simultaneously in one programme or a bilateral programme can be designed around a single instrument. The instruments used to implement bilateral programmes can be grouped into three categories depending on the level of funding provided and the longevity of the programme, as follows:



Category 1 – Long term Funding Mechanisms

Instruments in this category are used for bilateral programmes that are at a much higher strategic level – involving huge financial support and are more institutional in nature. This would involve the establishments of Joint Centres or Institutes for capacity development focusing on particular disciplines. France, as an example, has partnered with South Africa to establish a Joint Institute in Agricultural Sciences (F'SAGRI) based at three South African rural universities. Other examples of institutional programmes at a higher level include the establishment of Joint Bilateral Research Chairs. Case in point is the recently launched bilateral Joint Chairs between South Africa and Germany, Switzerland and the United Kingdom. A Joint Bilateral Research Chair can be supported for a period of – to 15 years. These are viewed as long term investments.

Category 2 - Medium term Funding Mechanisms

There are, however, other instruments that are used to facilitate a set of HCD activities for medium to long term. These instruments include the funding of bilateral joint research and innovation programmes (or what is known as flagship programmes) for a minimum of 3 to a maximum of 5 year periods. This instrument also involves significant financial investment as one joint programme and/or flagship programme would involve supporting a team of researchers and their doctoral and post-doctoral students. Examples in this case include programmes such as: SANCOOP (South Africa / Norway Research Cooperation Programme), SSAJRP and SSABDP (South Africa / Switzerland Joint Research Programme and the Business Development Programme), IRTGs (South Africa / Germany International Research Training Groups), etc.

Category 3 – Short term Funding Mechanisms

This category is more to facilitate the mobility of researchers to assist them to meet and interact with their counterparts. This is more of a short term and enabling instrument, the aim of which is to provide seed funding. It involves the support for exchange of scientists, mobility /travel grants, and joint workshops, conference or seminars. This mobility support is encouraged and viewed as critical in bilateral programmes. Researchers make use of this mobility grant for different reasons such as to exchange knowledge, work on joint publications, access infrastructures that are not readily available in one's country, provide research training and prepare joint proposals for application to bigger programmes.

It is important to note that these instruments are sometimes used interchangeably and are interlinked. One instrument has a direct impact on the other. Also, depending on the maturity of the bilateral partnership, partners may decide to start implementing programmes using Category 3 instruments until such time they understand each other's systems better and their researchers have established stronger links with potential for long-term partnership. Therefore, Category 3 instruments are mostly used as a stepping stone to Category 2 and eventually Category 1.

Recommended Thematic Areas of Focus for Joint Activities

Given the detailed account of the existing bilateral programmes, instruments and preferred thematic areas of focus between partners, this study draw conclusions and make suggestions/recommendations on activities that could be leveraged for better coordination and strengthening of European research and innovation cooperation programmes with South Africa in order to avoid duplications and extra administrative burdens. The suggested thematic areas for joint activities, indicated below, are viewed as feasible because of the support shown by countries through all the existing bilateral programmes.

- Health
- Blue Economy and Oceans
- Water and Food Security

In addition, opportunities for enhancing coordination between EU MS and ACs and South Africa in the field of Marine sciences and water have been discussed on several occasions in previous years under ESASTAP Plus. Few workshops and twinning events in Marine sciences and water were organised under ESASTAP Plus and would therefore be enhanced going forward.

It is further suggested that all the identified joint activities to be supported within the above-recommended thematic areas should take into consideration the cross-cutting factors such as inter and/or multi-disciplinarily in the research to be conducted; research projects must plan for or have an innovation angle; and capacity development of young and emerging researchers.