

# 1. Innovation & Technology

(Chapter provided by the Department of Science & Technology)  
PROTECTING INTELLECTUAL PROPERTY FROM PUBLICLY-FINANCED RESEARCH



## MANAGEMENT OFFICE (NIPMO)

NIPMO was established in terms of the Intellectual Property Rights from Publicly Financed Research and Development Act (IPR Act; No. 51 of 2008). The scope of this piece of legislation is to ensure that intellectual property (IP) emanating from publicly financed research and development is identified, protected, utilised and commercialised for the benefit of the people of the Republic, whether it be for socio- economic and/or other impacts.

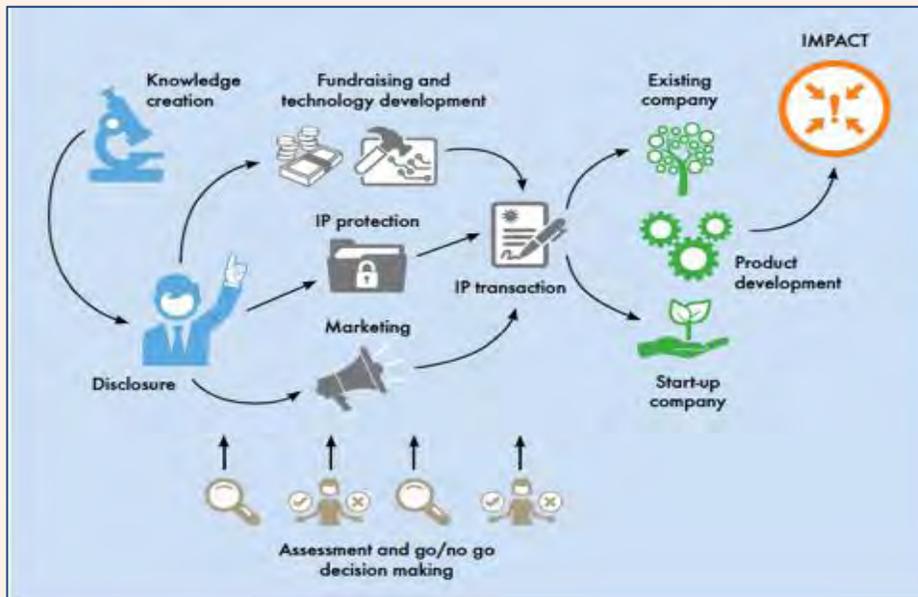
**Figure 1. The pathway for the transfer of technology (embodying intellectual property) from a research institution to an existing company or a start-up to create impact - including jobs, improvement in the quality of life of individuals and contribution towards GDP**

Source: The DST

Progress in ensuring that new technologies developed by our higher education institutions and science councils can be tracked through various key indicators including:

- (a) The number of new disclosures (new IP creations such as an invention) made by researchers to their office of technology transfer at an institution has increased from 2008 to 2014 (**Figure 2**).
- (b) The number of patent applications filed by institutions. (**Figure 3**) - where the number of new patent applications filed increased more rapidly than the increase in research expenditure over the period 2008 to 2014;
- (c) The number of licensing agreements concluded granting an existing company or a start-up company rights to use the IP (**Figure 4**); where the number quadrupled over the period of 20018 to 2014. Furthermore, 45 start-up companies were formed over the period to commercialise an institution’s technology, 73% of which were based on publicly-funded IP. From 2010 to 2014 the total number of FTEs employed in start-up companies originating from higher education institutions grew by 29%, from 238 to 308.

## AND DEVELOPMENT THROUGH THE NATIONAL INTELLECTUAL PROPERTY



(d) Revenue collected by an institution for the use of its IP was, on average, R32.9 million per year (Figure 5). Of significance is that more than 88% of this revenue accrued consistently each year to the same four institutions that have well-established TTFs. Most IP transactions yielded less than R100,000 per year.

Figure 2. The number of disclosures<sup>1</sup>

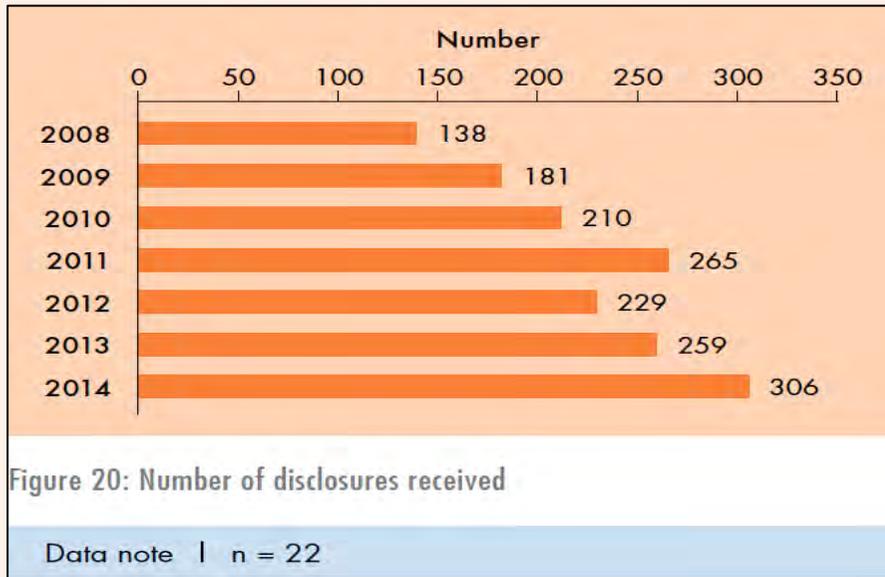


Figure 3. The number of new patent applications

<sup>1</sup> PLEASE NOTE: The data in charts 2-5 is the most recent to hand. A further major update review is to be carried out in 2018, for release in early 2019.

Figure 4. Licence agreements concluded

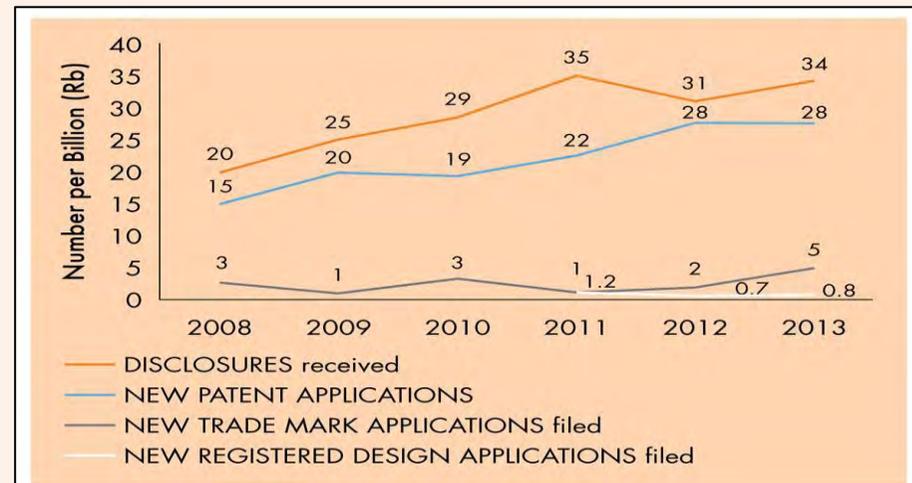


Figure 32: IP related activities per Billion Rand of institutional research expenditure in constant 2010 prices

Data note | n = 21  
\*Plant Breeders' Rights data was not included due to insufficient data.

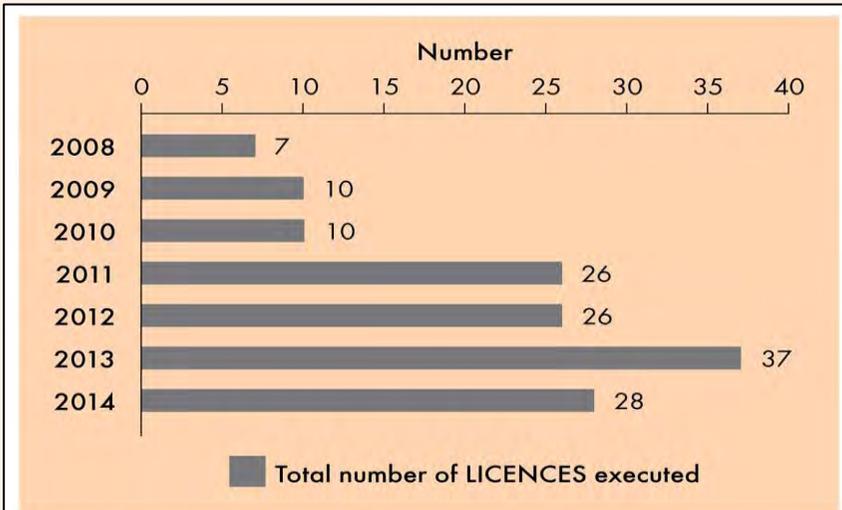


Figure 34: Number of licences executed in a particular year

Data note | n = 22  
 Data was unavailable from one major contributor, which means that this series is under-estimated.

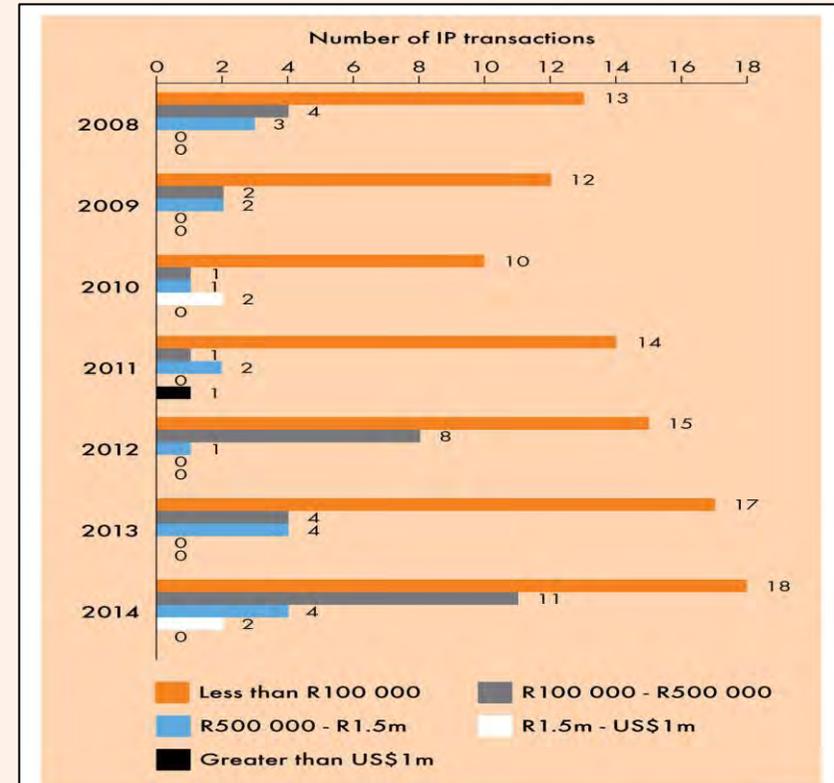


Figure 37: Number of IP transactions yielding revenue in five revenue brackets

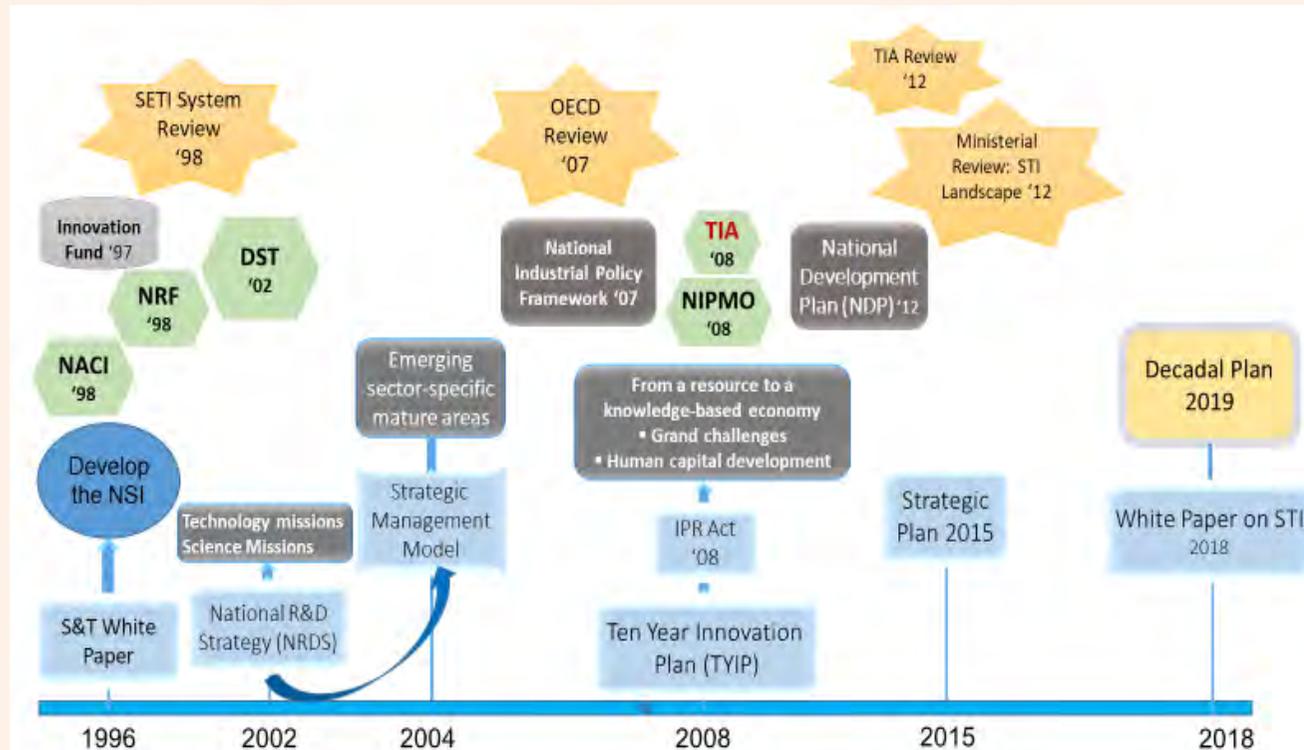
Data note | n = 20  
 The Rand equivalent of US\$1m was obtained from purchasing power parity (PPP) estimates for South Africa from the Organisation for Economic Cooperation and Development (OECD) website (<http://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>, accessed 2015/02/19). See Table 3.  
 Data was not available from at least one major contributor, which means that this series is an under-estimate.

Figure 5. Revenue received by institutions from their licensed IP

## SCIENCE AND TECHNOLOGY

The landscape of the South African National System of Innovation (NSI) has also developed over the last ten years, with the milestones indicated in the schematic below. The green hexagons indicate new institutions which were established over this period.

**Figure 6. South African SET policy and institutional trajectory**



**Source:** The DST

The next major milestones in the NSI is the update of the White Paper on Science and Technology, followed by the development of the Decadal Plan which will replace/update the Ten-Year Innovation Plan (2008 – 2018).

## 1. DEVELOPMENT OF THE WHITE PAPER ON SCIENCE & TECHNOLOGY

Since the adoption of the 1996 White Paper on Science and Technology 20 years ago, the STI environment has seen significant shifts that require an updated policy response from South Africa. The White Paper on Science, Technology and Innovation, currently under development, and scheduled for completion during the 2018/19 financial year, seeks to achieve the following:

- Based on an evaluation of progress across the NSI over the past 20 years, retain and intensify policy approaches that are delivering good results, and where necessary, adopt new approaches.
- Address the risks and position South Africa to benefit from the opportunities presented by megatrends such as urbanisation, environmental degradation, increasing role for digital technologies and ICTs, as well as the Digital Industrial Revolution.
- Put strategies in place to ensure that the NSI becomes more inclusive.

In recognition of the fact that improved innovation performance is dependent on partnerships, the White Paper is aimed at fostering innovation ecosystems at all levels in the NSI. This will be done through inter alia, the purposeful inclusion of both business and civil society in the identification of STI priorities, the implementation of programmes locally and an intensified focus on linking with African (and other international) STI programmes and entrepreneurs.

To improve the functioning of the NSI and the full realisation of the benefits of STI, the White Paper also proposes mechanisms to improve the coordination and governance of STI programmes across government and the NSI. For instance, the White Paper proposes a “whole-of-government” approach to innovation policy (e.g. harmonising policies that impact on innovation and aligning incentives across government).

Fundamental to improving the functioning of the NSI is the need to build on progress in knowledge generation and to increase the rapid diffusion of knowledge, as well as to significantly expand the human capital base of the economy (in both technical and academic disciplines) and to support would-be technology-based entrepreneurs.

In addition to measures to address these needs, the White Paper places further emphasis on transformation of the economy through the utilisation of publicly funded Intellectual Property to develop new black-owned technology-based firms. For innovation and entrepreneurship to become pervasive throughout South African society, the White Paper focuses on expanding the Public Engagement with Science programme, amongst others.

The NSI is underfunded and both business confidence and the fiscal situation have not been conducive to increased investment in STI over the recent past. Therefore, the White Paper prioritises mechanisms to attract greater STI investment. Examples are an evidence-based STI investment framework supported by the National Treasury and the rest of government, and new approaches to the selection of technology focus areas that would improve the productivity of public STI investment and attract private sector investment across the NSI.

## 2. SCIENCE AND TECHNOLOGY INNOVATION (STI) AND ECONOMIC GROWTH: SA POLICY CONTEXT AND COORDINATION

### 2.1 Investment in knowledge generation

The focus on increased knowledge generation is aimed at restoring, transforming and building the human pipeline in research and development (R&D). An increase in the pool of knowledge workers is one of the key enablers towards ensuring new technological knowledge, opportunities to develop new technologies and higher levels of contribution to sustained industrial competitiveness.

Expanding knowledge generation/production capacity is essential for increased efficiency gains across the economy. The target is to substantially increase the Gross Expenditure on R&D (GERD) as a percentage of the Gross Domestic Product (GDP). After being static at 0,73% of GDP, the latest measurement indicates an increase to 0,77% and then to 0,8%, as indicated in Figure 6 below. Despite the

small changes indicated in this Figure, this is the fifth consecutive year that GERD as % of GDP has increased in constant 2010 Rand values.

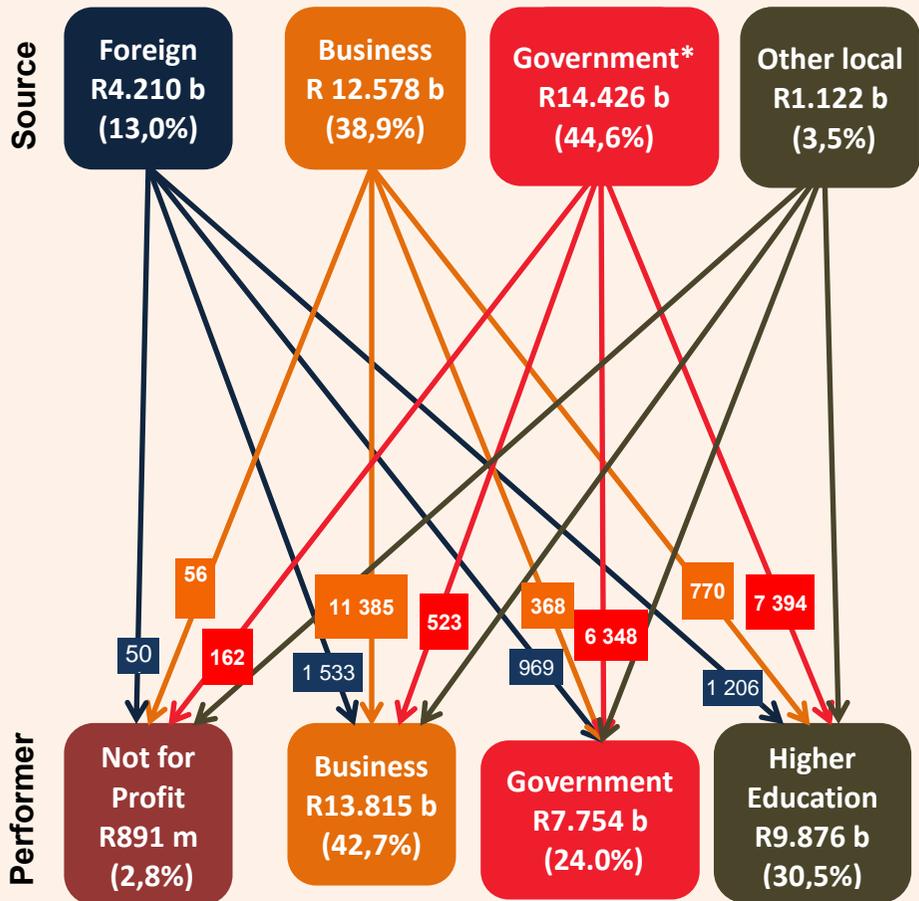
Figure 7. GERD as a % of GDP



Source: The DST

The sources of R&D funding and the various entities performing R&D are indicated in Figure 8 below.

Figure 8. R&D funding flow diagram

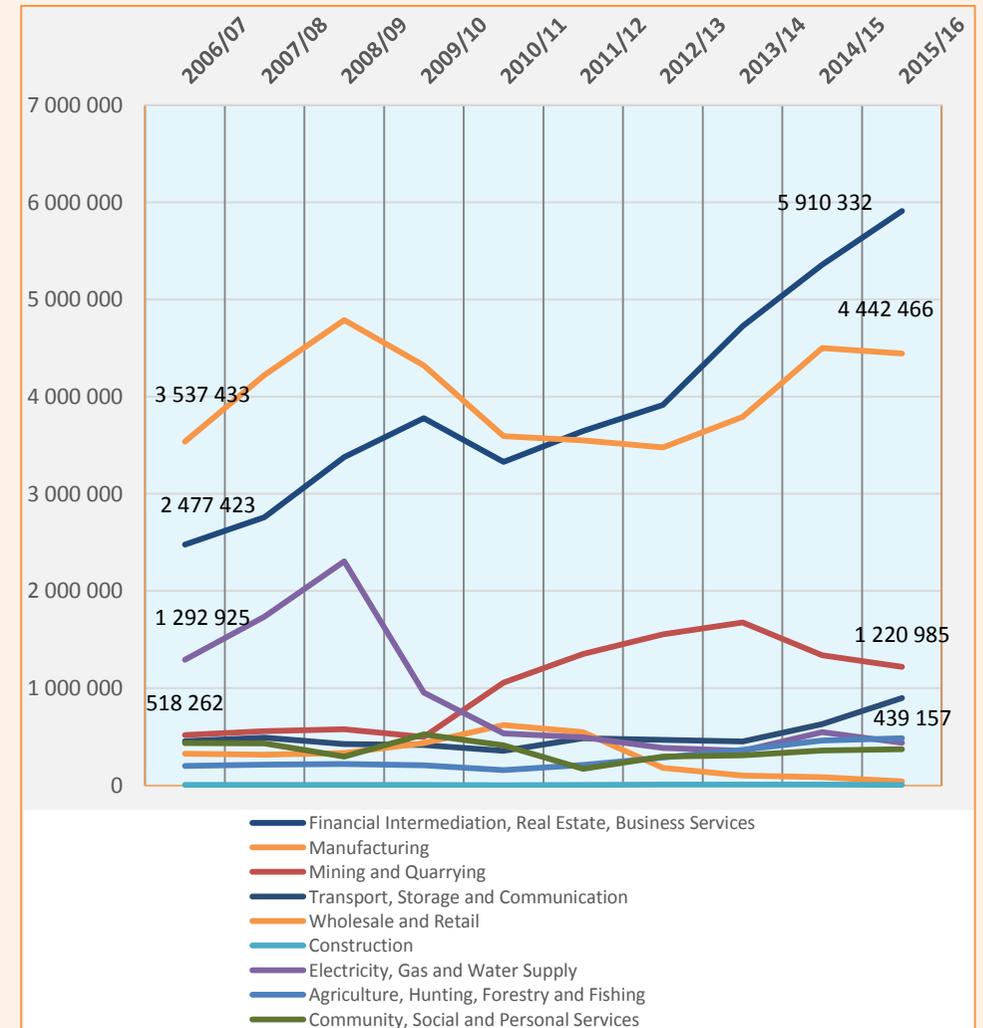


\* Government includes Science Councils

Source: The DST

The trends in business expenditure on R&D (BERD) for various sectors are given in Figure 9 below.

Figure 9. Business expenditure by sector (R' 000)



Source: The DST

## 2.2 Technology absorption and diffusion

In further support of technology transfer, diffusion and absorption, the DST has initiated the biennial Innovation Bridge (IB) technology showcase and matchmaking event. IB is aimed at enabling linkages and networking between South African, regional and international innovators, industry and public and private technology development and commercialisation funding partners.

The inaugural IB event was held in 2015 and was aimed at encouraging and accelerating the utilisation and commercialisation of existing and new knowledge and technologies that have been developed in South African research and technology development institutions. At that time, over 90 innovations, from 37 publicly-funded organisations, were exhibited. These included the latest technologies from the country's top research and technology development support institutions, including 16 universities, 14 TIA-supported companies, 6 science councils, and the South African National Space Agency (SANSA).

The event was attended by more than 700 participants, of which: 331 were large companies and SMMEs; 78 technology financiers; 121 representatives from local, provincial and national government; 24 international participants; and 199 research organisations. Overall, the 2015 IB outcomes included 227 new collaborations and 58 unique follow-on deals in the form of partnership and funding agreements.

The second national IB event was held on 15 September 2017 and saw a 42% increase in attendance (with over 1,070 attendees registered on the day). The event also recorded an 87% increase in exhibitors with a total of 69 exhibitors showcasing over 170 innovations (compared with 37 exhibitors and 92 innovations in 2015).

It is envisaged that the third IB showcase event will be held before the end of the 2018/19 financial year.

As part of the DST's ongoing efforts to create an enabling environment to stimulate technology transfer and diffusion, the Department also launched its Innovation Bridge Portal (IBP), (see [www.innovationbridge.info](http://www.innovationbridge.info)), at the IB event in September 2017. The IBP serves as an online platform to encourage greater ongoing interaction between industry, academia and government, as a complementary initiative to the biennial IB technology showcase and matchmaking events.

To this end, the IBP, on a year-round basis, now effectively enables:

- the profiling and marketing of South African technology innovation competencies and products, locally and internationally;
- the facilitation of access to funding and support for researchers, technology developers and technology entrepreneurs working in the STI space;
- matchmaking between researchers, technology developers and entrepreneurs with relevant financiers and supporting entities.

Further testing and enhancements to IBP functionalities will continue throughout 2018.

## 2.3 Ongoing harmonisation of innovation support initiatives

In 2015 the DST finalised its Commercialisation Framework (CF) as an overarching internal policy guideline for actions that can be taken in respect of the commercialisation activities of the Department. In 2017, the Department developed and finalised the CF implementation protocols as a guide to support the implementation of the CF approach. Specifically, the Protocols are aimed at enabling the systematic gathering of relevant evidence in support of decision-making on R&D investments and the realisation of any commercialisation opportunities in this regard.

The Protocols are now available to assist and support decision-making by partners and stakeholders in technology project management and commercialisation across the NSI. This is to be achieved by enabling the systematic implementation of a standard approach to risk mitigation, including:

- the adoption of portfolio management approaches; careful balancing of projects to manage high risk/high return (radical innovation) versus low risk/low return (incremental innovation);
- the Implementation of project management practices across the Department with a view to ensuring that:
  - High-risk areas are identified early and resolved;
  - Commercialisation partnerships established, and

- Market and SHE risks are well understood and managed.

It is envisaged that the CF implementation protocols will be shared with and, where appropriate, institutionalised through the Commercialisation Collaboration Forum (CCF).

The CCF was initiated in 2014 by the DST, together with partner organisations in the NSI, as a voluntary network of publicly-funded technology development and commercialisation funding and support organisations that contribute directly or indirectly to national technology commercialisation value chains.

Regular engagements at the CCF are intended to enable the sharing of information and best practice, as well as to enhance contact across the various government departments and entities involved in technology development and commercialisation.

Ultimately, the goal of the CCF is to develop an effective inter-departmental commercialisation collaboration strategic partnership to support the optimisation of government spending on technology development and commercialisation and to reduce any unnecessary duplication of commercialisation funding efforts.

To give effect to this goal, it is envisaged that the CCF will be formally established during the 2018/19 financial year, through nominations of representatives to serve on the CCF by the Directors-General of several government departments, and the heads of other entities including the DST, TIA, **the dti**, EDD, DSBD, SEDA, and the IDC, among others.

## 2.4 The Sovereign Innovation Fund

The establishment of the Sovereign Innovation Fund was endorsed at the July 2015 Cabinet Lekgotla and was included as a DST action item under the Nine-Point Plan. Subsequently the Fund was affirmed in 2016 as a national imperative when the President, in his State of the Nation Address, announced that the DST will "... finalise the Sovereign Innovation Fund, a public-private funding partnership aimed at commercialising innovations that are from ideas from the public and the private sectors"<sup>2</sup>.

Throughout 2016 and 2017, the DST engaged with a number of government departments and stakeholders, including National Treasury (NT), the dti, Economic Development Department (EDD), and the Department of Small Business Development

(DSBD). This was with a view to identifying the most appropriate modalities, and partnerships, towards the establishment of the Sovereign Innovation Fund (SoIF) as a public-private funding partnership aimed at harvesting and commercialising South African technology innovations for deployment in national and international markets.

NT has allocated funding of R1 billion per annum, commencing in the 2019/20 financial year, to provide support for innovation and SMEs. At present, the DST, together with the NT, DSBD and the Government Technical Advisory Centre (GTAC), is finalising recommendations, as a business case, for the initiation of the SoIF, commencing in the remainder of 2017/18 and throughout the 2018/19 financial years.

## 2.5 Localisation

One of the most effective demand-side innovation instruments remains the leveraging of public procurement. The DST implemented the Technology Localisation Programme (TLP) in support of government's drive to increase the level of local production related to public (and recently, also private) procurement.

The TLP provides technological support to firms and sectors to improve their competitiveness and ability to qualify and secure contracts linked to public procurement – either directly with State Owned Companies (SOCs) or through contracting with international Original Equipment Manufacturers (OEMs) that have secured major contracts with SOCs. The programme, implemented by the Technology Localisation Implementation Unit (TLIU) hosted by the CSIR, has achieved substantial success and is increasingly being recognised as the national nodal point for supplier development and technology assistance.

The success achieved to date and the recognition of a need to further upscale the programme has resulted in its expansion to support increased local production, most notably in the mining equipment manufacturing industry.

TLP interventions are offered based on several instruments:

- Firm-level Technology Assistance Packages (FTAPs): these ensure that a third party (e.g. university or science council) provides technology assistance, such as skills, equipment, designs, manufacturing systems, etc. to an approved firm to increase its competitiveness through new or improved processes, products, and skills.
- Sector-Wide Technology Assistance Package (SWTAP): this provides technology assistance for a range of firms in a sector.

<sup>2</sup> 2016 State of the Nation Address (SONA). <http://www.gov.za/speeches/president-jacob-zuma-state-nation-address-2016-11-feb-2016-0000> Accessed on 27 June 2016

- **Technology Development Grants:** these provide funding to mature local technologies that might be used in local procurement.
- **Experiential Training Programme:** This enables predominantly P1 and P2 students to complete their practical training, thereby enabling them to complete their qualifications.
- **Firm benchmarking:** This assesses a firm's management and technological capability to define development areas, but also to transfer knowledge. There are currently more than 5,800 South African manufacturing firms profiled in the database, of which more than 800 firms have been benchmarked. The database is continuously maintained and expanded with the aim of facilitating new supply chain relationships - an essential requirement both for new OEM subsystem providers (who might have secured a new contract in South Africa) and for existing, especially small, firms which might not yet be incorporated into a supply chain.

## Key Action Programmes

### 1. Strategy for the adoption/diffusion of locally developed technologies

#### Nature and purpose of the intervention

The socio-economic impact of research and technology development is realised when the respective technologies are absorbed in the market or into society. During August 2016, the Lekgotla identified the need to enhance the diffusion of locally developed technologies, resulting in a request to the DST, supported by **the dti**, to develop a strategy for the diffusion of locally developed technologies. A review of available technologies, as well as government programmes where there are opportunities for the use of these technologies, has identified three initial areas of potential; namely, defence and security technologies, social infrastructure technologies and health technologies.

Phase 1 (2016/17 to 2019/20) will focus on identifying opportunities for diffusing ready or near-ready locally developed technologies arising from investments made by the DST and its entities. Arrangements are being made to interact with the relevant lead departments and agencies in these areas to finalise the procurement modalities of potential technologies by the end of the 2018/19 financial year.

In parallel to taking forward these short-term opportunities, the DST, in collaboration with **the dti** and EDD, is working on a more detailed strategy that will include looking at issues such as measures which will be required to accelerate the commercialisation of locally developed technologies as well as engagements with the private sector on new opportunities (for example, mining technologies and equipment as identified during the Mining Phakisa). The more detailed strategy is planned for finalisation and submission to Cabinet in the first half of 2017.

Due to DST staff capacity constraints, this initiative did not commence as originally planned, only kicking off in Q3 2017/18. Progress to date has mostly centred on consulting with key agencies to conceptualise selected elements of the strategy and to create awareness of the overall strategy. In addition, the approach approved by Cabinet is that the primary focus will be on government procurement, and no longer on private sector partnerships, although this does not preclude the involvement of the private sector in the initiative.

#### Targeted outcome

Increased diffusion of locally developed technologies to accelerate the creation of successful products, processes and services or social and/or economic impact.

#### Key milestone

2018/19 Q4: The formalisation of the strategy for the diffusion of locally developed technologies.

**Lead departments / agencies:** DST, **the dti**

**Supporting departments / agencies:** EDD, DoD, DoH, TIA, CSIR, SEDA, NIPMO, PIC

## 2. Science, Technology and Innovation Plan of Action in response to the Digital Industrial Revolution

### Nature and purpose of the intervention

The Digital Industrial Revolution (DIR) is seen as likely to have profoundly disruptive effects in many spheres, not least of which is jobs and employment. Economic opportunities exist, but new industries are creating fewer jobs, and those jobs require advanced skills. Furthermore, technologies such as artificial intelligence and robotics may disrupt or destroy many jobs in the services sector and in labour-intensive industries. Increased digitisation will also necessitate more attention being paid to associated risks such as cybersecurity, privacy and data security.

South Africa does not of course exist in isolation, but in a hyper-connected world of social media, blockchain and networked devices. It is therefore imperative that it actively prepares and responds to take advantage of the social and economic change brought on by the DIR and mitigates against the possible negative consequences.

Economists and historians broadly acknowledge that long-run economic growth is determined primarily by productivity growth, which in turn is driven by technological change created by scientific, technological and knowledge-based capabilities. Given the imperative to develop these capabilities, the DST will develop a comprehensive long-term science, technology and innovation (STI)-based plan of action in response to the DIR.

### Targeted outcomes

Consultation, deep policy learning and the development of a comprehensive long-term STI-based plan of action to address socio-economic development in the context of the DIR for the forthcoming MTEF cycle and the DST's Decadal Plan.

### Key milestones

2018/19 Q3: Baseline study of local publicly-funded research organisations and universities; review of global academic and grey literature; coordinating and synergising existing DST R&D initiatives into a Converging Technologies Platform.

2019/20 Q4: A comprehensive long-term STI plan of action to address socio-economic development in the context of the DIR.

**Lead departments / agencies:** DST, the dti, EDD

**Supporting departments / agencies:** HSRC, CSIR, TIA, DTPS, DoL, DHET, DBE, EDD, NIPMO, NACI

## 3. Technology localisation

### Nature and purpose of the intervention

As mentioned in the section above, the technology localisation programme is aimed at increasing the level of local production by increasing the capability and competitiveness of local firms through tailored technology assistance at both firm and sectoral level.

Besides the desired outcome of increased local production (implying retained or increased jobs and reduced imports) based on public procurement, the technology localisation approach is also being applied in non-public procurement areas such as the manufacturing of mining equipment.

### Targeted outcomes

- Conclusion of inter-departmental discussions (DPE, dti, DoT, DPME) on the optimisation of the technology localisation programme, resulting in a single, coordinated programme to increase the level of local production, leveraged on the back of public procurement.
- In a number of developed countries, the needs expressed in a public procurement contract are also leveraged to initiate an innovation, thereby helping to introduce a new product/service to the market and also helping to increase the global competitiveness of the local sector that supports this innovation.

### Key milestones

2018/19 Q4:

- a) A coordinated implementation agreement on how to increase the level of local production by leveraging public procurement.
- b) A pilot project/procurement that leverages a public procurement need to initiate an innovation.

**Lead departments/agencies:** DST, the dti

**Supporting departments / agencies:** DPME, DPE

## 5.1. The CSIR and innovation-led industrial development

### Situational analysis



The role of innovation in driving economic competitiveness is well established. Key national institutions and departments (DST, dti, CSIR, IDC) are exploring opportunities to improve South Africa's economic competitiveness through science and technology.

Investments in science, technology and innovation have the potential to grow the economy through a) the creation of new firms and increased competitiveness of existing firms; b) increased exports and reduced imports; c) lowering of entry barriers to create opportunities for emerging black and female entrepreneurs.

The CSIR mandate in particular calls for the organisation to foster industrial and scientific development through directed multi-disciplinary research and technological innovation to improve the quality of life of South Africans.

These key institutions have invested significantly in the development of strategies that aim to amplify the focus on industrial development. Primarily, the strategies identify sectors and value chains where South Africa can carve a competitive advantage through adoption of advances in science, engineering and technology, while leveraging our mineral and other natural resource wealth. The strategies take into account learnings from countries that are leading the digital revolution (Germany, UK, Australia, USA), but are crafted to address South Africa's unique challenges and take advantage of local and regional opportunities.

## Key Action Programme

### 1. Bridge the gap between research, development and industrial application at pace and scale

#### Nature and purpose of the intervention

The CSIR and role-players in the National System of Innovation (NSI) are developing industry-facing translational research programmes and associated infrastructure to bridge the gap between research, development and industrial application at pace and scale.

This approach responds directly to the lack of large-scale industrial research and development infrastructure in the country, and the dti priorities of public infrastructure-driven industrialisation providing stronger support for localisation and advanced manufacturing - with a primary focus on sectors where South Africa can compete in global markets and on programmes that leverage South Africa's resource advantage.

This approach builds on the Industry Innovation Partnerships Programme (IIPF), which seeks to attract private-sector investment in translating R&D outputs into commercial products by providing specialised prototyping, piloting and upscaling infrastructure to bridge the gap between the lab and the market. It also amplifies other DST and dti-supported programmes like the Technology Localisation Implementation Unit, Aerospace Industry Support Initiative and the National Cleaner Production Centre.

To be successful, the initiatives must attain national level programme status; with the support of industry players (public and private), policy makers, development funding institutions and innovation partners such as universities and other research institutions, both local and international. The rationale for this approach is that all role players in the system would be required to be fully onboard for the programmes to achieve the desired impact. Thus, each initiative will be positioned as a **national strategic asset** to the sector or cluster of sectors.

The translational programmes and associated infrastructure will focus on:

- improving the supply chain competitiveness of South African SMMEs in high-value manufacturing industries such as aerospace, automotive and defence to step up exports and capture a growing share of global high-value manufacturing;
- developing advanced materials and additive manufacturing to reinforce high-value manufacturing sectors;

- establishing a bioprocess initiative harnessing advances in chemistry, synthetic biology and biotechnology to convert South Africa's resource advantage into a chemicals and materials advantage;
- catalysing local manufacturing of critical drugs through a pharmaceuticals initiative to develop and scale up production of active pharmaceutical ingredients;
- continued implementation of mining revitalisation activities under the South African Mining Extraction Research Development and Innovation (SAMERDI) initiative;
- establishment of an agro-processing programme to expand the national product portfolio, add and redistribute value for an inclusive and growing agricultural sector;
- institutionalising a collaborative Digital Industrial Revolution (Industry 4.0) initiative to capacitate the CSIR and its partners in the NSI to adopt advances in production;
- establishing a nexus initiative as a national strategic decision-support capability designed to address issues relating to the interaction between the natural environment and industrial development activities. (Addressing competing demands for natural resources such as water, waste and energy).

### Targeted outcomes

The strategic programmes will aim to improve the performance of the South African economy, with a view of reversing the de-industrialisation trend. Programmes will be implemented (or continued) for improving competitiveness of small and medium enterprises (SMEs) with a view to strengthening supply chains in key economic sectors. For large and emerging industry, five cross-cutting thematic areas will apply to all the manufacturing-related initiatives, notably:

- product innovation (including a life-cycle management approach to product design);
- manufacturing process (e.g. forming, joining, machining technologies);
- manufacturing automation (includes precision measurement and automation);
- manufacturing systems (includes planning, manufacturing, execution and control, operations management etc.); and

- business model innovation.

These initiatives aim to create innovation ecosystems to assist South African companies to adopt, catch up and excel in the implementation of DIR technologies that are profoundly shaping how companies and countries compete now and will in the foreseeable future, revolutionising both local manufacturing and service delivery.

Critically important is that the interventions to be implemented should create opportunities for:

- adoption of new manufacturing technologies and approaches (Internet of things, cloud computing, big data analysis etc.) underpinning competitive manufacturing platforms and support services, new technologies, new applications, new products and services);
- creation of new industries;
- new models for robust industry innovation partnerships;
- development of functional solutions and rapid commercialisation of technologies;
- workforce transformation and future skills development, supporting artisans and harnessing ICT to create jobs for the youth;
- technological and business model innovation;
- research and development;
- provision of support infrastructure for regulatory/standards and policy development;
- deepening collaboration in innovation on the continent, in line with Africa Vision 2063.

### Key milestones

2018/19 Q2: Support a national Digital Industrial Revolution Initiative with contribution from the private sector and civil society to support key manufacturing sectors.

2018/19 Q4: Support the agro-processing and high-value pharmaceuticals manufacturing initiatives.

**Lead departments/agencies:** CSIR, DST

**Supporting departments:** the dti, DPME, EDD, NPC, IDC, TIA

