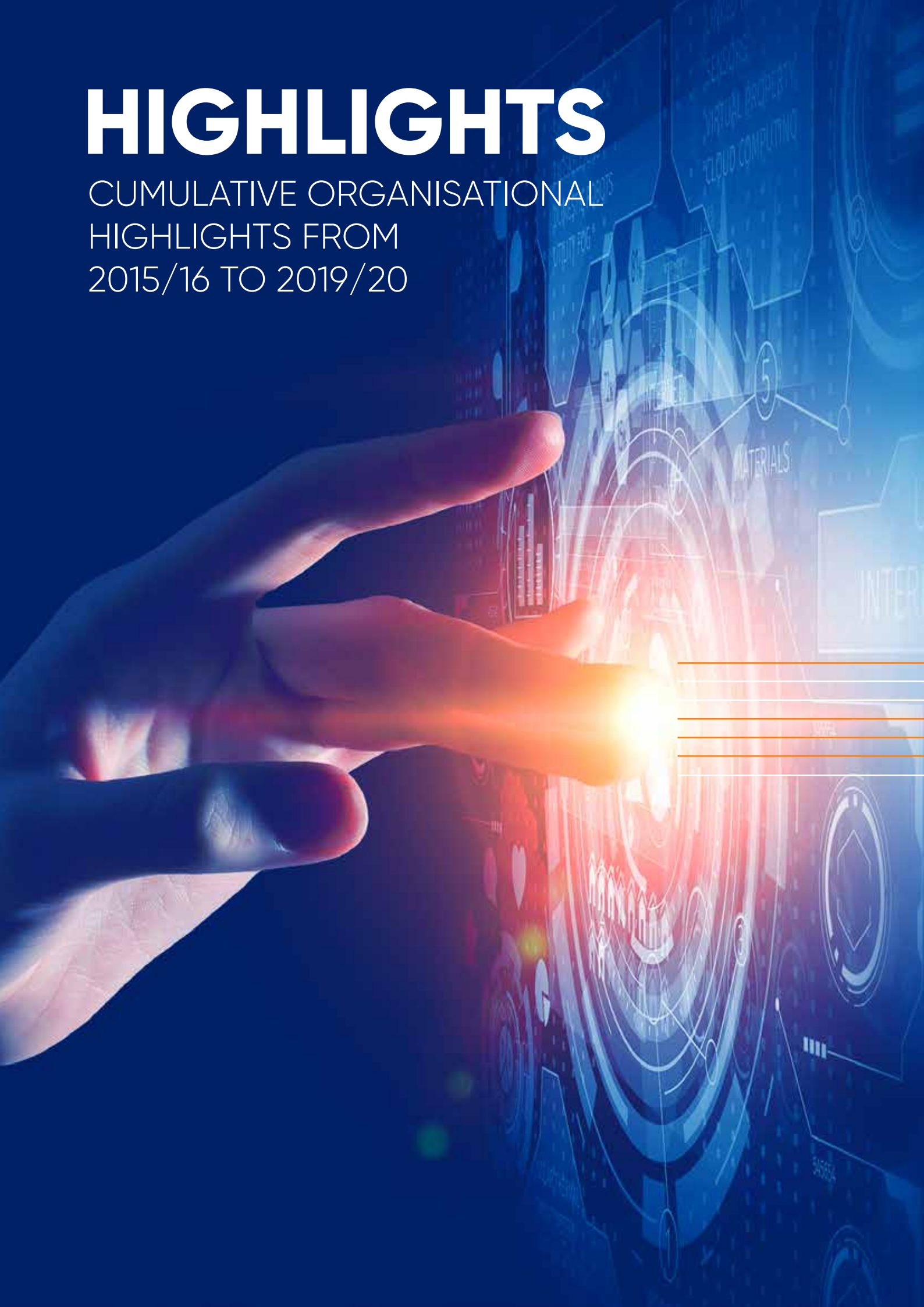
technology innovation
A G E N C Y
Innovating Tomorrow Together

ANNUAL REPORT 2019/20

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

HIGHLIGHTS

CUMULATIVE ORGANISATIONAL HIGHLIGHTS FROM 2015/16 TO 2019/20



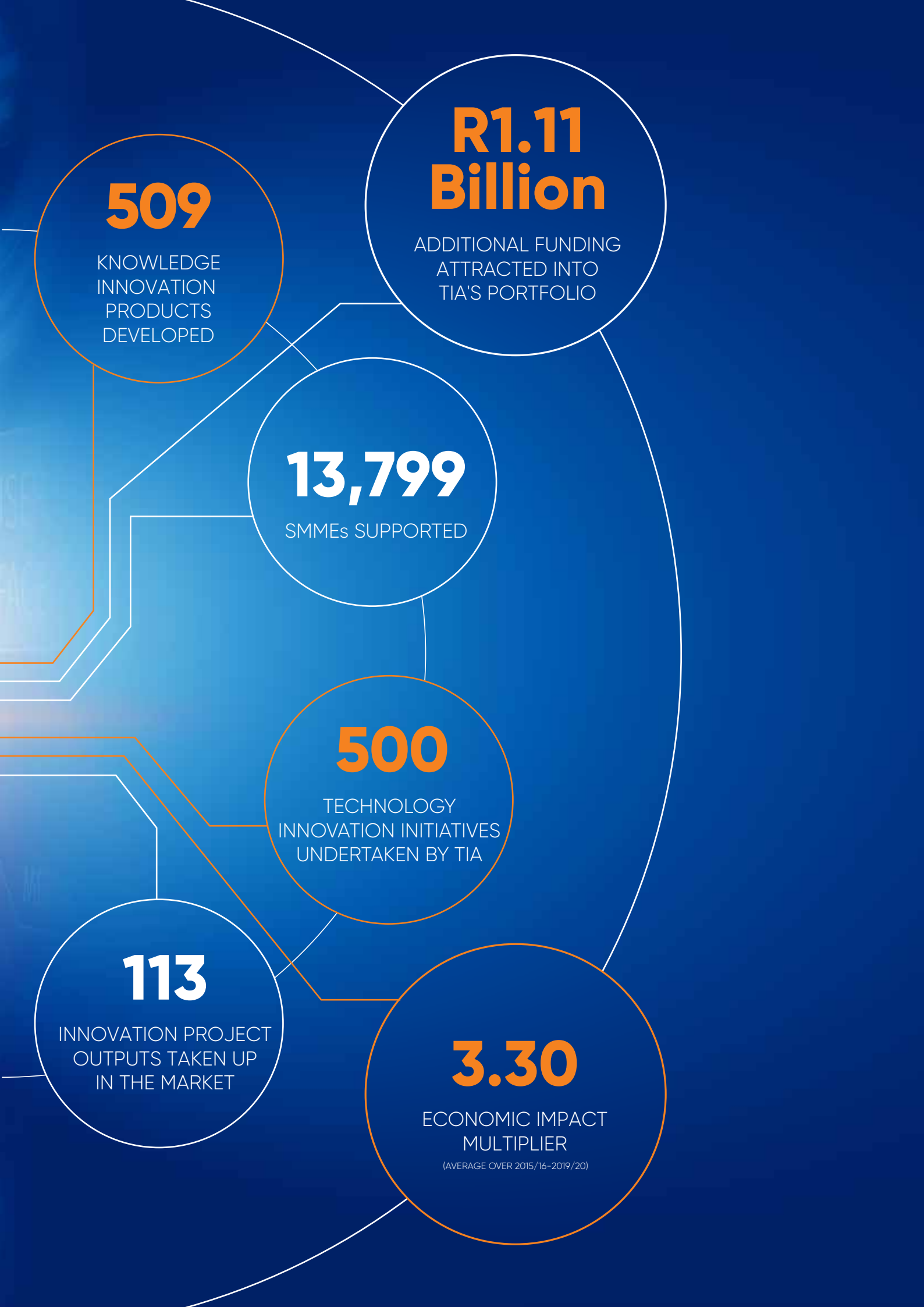

R1.11 Billion
ADDITIONAL FUNDING ATTRACTED INTO TIA'S PORTFOLIO
509
KNOWLEDGE INNOVATION PRODUCTS DEVELOPED
13,799
SMMEs SUPPORTED
500
TECHNOLOGY INNOVATION INITIATIVES UNDERTAKEN BY TIA
113
INNOVATION PROJECT OUTPUTS TAKEN UP IN THE MARKET
3.30
ECONOMIC IMPACT MULTIPLIER
(AVERAGE OVER 2015/16-2019/20)

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

4IR	Fourth Industrial Revolution
ABIPP	Agriculture Bio-economy Innovation Partnership Programme
AFS	Annual Financial Statements
AI	Artificial intelligence
AMD	Acid mine drainage
API	Active pharmaceutical ingredient
APP	Annual Performance Plan
ARC	Audit and Risk Committee
Bt	*Bacillus thuringiensis*
CEO	Chief Executive Officer
CH	Connected Hubs
CHM	Centre for Human Metabolomics
CleanTech	Clean technology
COVID-19	Coronavirus disease 2019
CPGR	Centre for Proteomic and Genomic Research
CPUT	Cape Peninsula University of Technology
DBSA	Development Bank of Southern Africa
DSI	Department of Science and Innovation
DTIC	Department of Trade, Industry and Competition
FMG	Forestry Molecular Genomics
GAP Biosciences	Gauteng Accelerator Programme Biosciences
GCIP	Global CleanTech Innovation Programme
GDP	Gross domestic product
GLSD	Geo-location Spectrum Database
GRAP	Generally Recognised Accounting Practices
H3D	Drug Discovery and Development Platform
HIV/AIDS	Human immunodeficiency virus infection and acquired immune deficiency syndrome
HR	Human resources
HR&REMCO	Human Resources and Remuneration Committee
ICASA	Independent Communications Authority of South Africa
ICGEB	International Centre for Genetic Engineering and Biotechnology
ICT	Information and Communication Technology
IDC	Industrial Development Corporation
IFC	Investment and Finance Committee
IID	Innovation for Inclusive Development
IKS	Indigenous knowledge systems
IoT	Internet of Things
IP	Intellectual property
ISDP	Innovation Skills Development Programme
ISO	International Organization for Standardization
IT	Information technology
KNeW™	Potassium Nitrate ex-Waste
KPI	Key performance indicator
KRISP	KwaZulu-Natal Research and Innovation Sequencing Platform
LIF	Leaders in Innovation Fellowship Programme
LSDs	Lysosomal storage disorders
m	Million
MTSF	Medium-Term Strategic Framework
NIPMO	National Intellectual Property Management Office
NMU	Nelson Mandela University
NSI	National System of Innovation
NWU	North-West University
OTT	Office of Technology Transfer
PFMA	Public Finance Management Act
PSPs	Proactive Support Programmes
R&D	Research and development
SA	South Africa
SABDI	South African BioDesign Initiative
SADC	Southern African Development Community
SAIS	Southern African Innovation Support Programme
SAMRC	South African Medical Research Council
SDGs	Sustainable Development Goals
SECR	Strategic Engagements and Corporate Relations
SEDA	Small Enterprise Development Agency
SFP	Seed Fund Programme
SHIP	Strategic Health Innovation Partnership Programme
SME	Small and medium enterprise
SMME	Small, medium and micro enterprise
SNP	Single nucleotide polymorphism
STI	Science, technology and innovation
TIA	Technology Innovation Agency
TICP	Technology Innovation Cluster Programme
TIH	The Innovation Hub
TPP	Technology Platforms Programme
TRL	Technology readiness level
TSP	Technology Stations Programme
UCT	University of Cape Town
UP	University of Pretoria
UWC	University of the Western Cape
UK	United Kingdom
WIPD	World IP Day
WIPO	World Intellectual Property Organization
YEI	Youth Entrepreneurship Initiative

PART A
GENERAL INFORMATION

Registered name	Technology Innovation Agency
Registration/constitution information	Technology Innovation Agency Act (Act 26 of 2008), read together with Sections 19-23 of the Science and Technology Laws Amendment Act (Act 7 of 2014)
Registered office address	TIA House, 83 Lois Avenue, Menlyn, Pretoria
Postal address	P.O. Box 172, Menlyn, Pretoria 0181
Telephone	012 472 2700
Email	info@tia.org.za
Website	www.tia.org.za
Social media	www.linkedin.com/company/technology-innovation-agency (LinkedIn) @tiaorgza (Twitter) www.facebook.com/TIAORGZA (Facebook)
External auditor	Rakoma and Associates Inc. Building B, Monte Circle Office Park, 178 Monte Casino Boulevard, Fourways, Johannesburg 2191
Banker	Standard Bank 30 Baker Street, Rosebank 2196, Johannesburg
Company Secretary	Mr Kobus Louw

1. FOREWORD BY THE CHAIRPERSON

Mr Butana Mboniswa
Interim Chairman of the Board

I am pleased to present the Technology Innovation Agency's Annual Report for 2019/20. This report represents the last year of the 2015-2020 strategic planning cycle. We reflect on our experiences of the past five years, both in terms of achievements and challenges, and take forward the lessons we have learnt to position TIA as a strategic national capability. The aim of TIA is to contribute to a functional and effective National System of Innovation (NSI), thereby ensuring that South Africa derives economic dividends from science, technology and innovation. Key to this is TIA's contribution over the last five years to the development of a functional NSI, promoting coordination within the NSI, building a strong pipeline of sufficiently de-risked technologies and enabling the commercialisation of no less than 85 technologies.

In 2019/20 TIA achieved an unqualified audit result and an overall performance of 90%. Key highlights included the organisation's increased focus on implementing the Bio-economy Strategy, fast-tracking the commercialisation of technologies, and increasing the range of NSI partnerships that have significantly contributed to TIA's results. At the heart of this has been TIA's efforts to intensify and expand our support to SMMEs, individual entrepreneurs and innovators who have developed solutions that directly respond to South Africa's socio-economic challenges.

A few specific achievements worth noting are:

- The agency's target of supporting the commercialisation of 12 technologies was significantly over-achieved. TIA supported the commercialisation of no less than 40 technologies in the year under review;
- The agency increased its funding capacity, with an additional R164.8 million raised through external sources. This represents the highest ever recorded external income since its establishment;
- The modelled impact of TIA's economic activity is R2.1 billion in new business activity, a GDP contribution of R744 million and employment creation in the form of 2,312 jobs (direct, indirect and induced); and
- TIA's economic impact multipliers are R3.48 million in new business activity and 3.83 or approximately four job opportunities for every R1 million spent.

TIA achieved these results against the backdrop of a challenging external environment. Firstly, in the first quarter the countrywide FeesMustFall campaign significantly disrupted operations at university technology transfer offices and technology stations - TIA's primary stakeholders. Secondly, the global COVID-19 pandemic reached South Africa's shores in the middle of the fourth quarter, causing universities to pre-emptively cease operating even before the national lockdown was announced.

Within the organisation, the Board dealt with several leadership challenges, all of which had the potential to expose the organisation to governance risks. Executive leadership positions were targeted for recruitment. After following internal processes, headhunting for the General Manager: Bio-Economy and General Manager: Sector Funding roles commenced in March 2020. These key executive positions have been filled at the time of writing this report.

TIA operated against a backdrop of a changing policy landscape. Key amongst these were the adoption of the White Paper on Science Technology and Innovation in March 2019, the adoption of the Medium-Term Strategic Framework, and the creation of a single Ministry into which both the Department of Science and Technology and the Department of Higher Education and Training report. These developments serve to reaffirm the relevance of TIA's mandate and yet challenge the organisation's intuitional capability, positioning in the NSI and its capacity to increase the rate of commercialisation to respond to the impact of the COVID-19 pandemic and imperatives of economic revival.

These therefore will remain the primary considerations of TIA as it enters the 2020-2025 strategic period.

Lastly, as with the preceding financial years, TIA has once again achieved an unqualified audit save for one matter of emphasis, i.e. irregular expenditure. The Board remains of the view, supported by independent legal opinions obtained, that the appointment of the Interim CEO was done correctly in compliance with the Act and with the support of key stakeholders. TIA incurred no financial loss as a result of this appointment. In fact the performance of the Agency benefitted considerably from the leadership of the Interim CEO, in particular in the area of cost savings.

I wish to thank the leadership at the Department of Science and Innovation, in particular the Honourable Minister Dr Bonginkosi Nzimande, the Director-General Dr Philemon Mjwara and his leadership team for their unwavering support through turbulent times in 2019/20. I also want to thank our previous chairpersons of the Board, Prof. Edward Kieswetter and Dr Stephen Lennon, who have steered the ship through challenging times in overseeing TIA's delivery of the last mile in the 2015-2020 strategic period. Lastly, a word of appreciation to the former TIA CEO Mr Barlow Manilal, the Interim CEO Ms Fuzlin Levy-Hassen, the Executive Management and TIA staff who have all shown commitment and dedication to deliver these impressive results.

Mr Butana Mboniswa
Interim Chairman of the Board

2. THE TIA BOARD

Prof. Edward Christian Kieswetter
Board Chairman
(until 6 August 2019)

Dr Stephen John Lennon
Interim Board Chairman
(from 9 August 2019 until 19 March 2020)

Mr Butana Mboniswa
Interim Board Chairman
(from 20 March 2020)

Dr Patience Lethabo Mlengana

Ms Joy Sebenzile Matsebula

Dr Mziwandile Madikizela

Dr Jan van de Loosdrecht

Mr Thabiso Gerald Ramasike

Ms Fuzlin Levy-Hassen
(until 12 June 2019)

3. CHIEF EXECUTIVE OFFICER'S OVERVIEW

Ms Fuzlin Levy-Hassen
Interim Chief Executive Officer

At the start of 2019/20, as we looked to conclude implementation of TIA's 2015-2020 Strategy, we could never have predicted the unexpected way that the year would end. A national lockdown looming in response to the spread of the novel Coronavirus and the early stages of an emerging global health and economic crisis has ushered in a new reality overnight.

Despite the uncertainty and change that we currently find ourselves in, I am pleased to present the 2019/20 TIA Annual Report which reflects the agency's activities and achievements in 2019/20, the final year of the 2015-2020 Medium-Term Strategic Framework (MTSF). It is important that we celebrate the successes of the past year and reflect on the agency's achievements over the five-year period.

TIA started the 2019/20 financial year with great zeal, having realigned its divisional reporting structure to create greater efficiency and have sharper focus in specific technology areas. TIA's support of technology development and innovation was undertaken by its three realigned divisions: Sector Funding, Bio-economy and Programmes. The Sector Funding Division supports the development and exploitation of technology innovations through the translation of innovative ideas into products and services and ultimately, the establishment of viable technology enterprises. The Bio-economy Division was established to stimulate a productive bio-economy in South Africa through innovation. The Programmes Division aims to stimulate a culture of innovation and provide enabling support through a range of interventions that enable the development of innovative solutions that address societal challenges.

Indeed, we are proud to report that TIA achieved 19 out of the 21 performance targets as set out in TIA's 2019/20 Annual Performance Plan (APP). This equates to a 90% achievement, the third-highest performance in the 2015-2020 strategic period following a performance of 93% in 2015/16 and 91% in 2018/19.

TIA disbursed R451.0 million to investees and beneficiaries during this year, with 3,269 small, medium and micro enterprises (SMMEs) having received support from TIA's network of 18 Technology Stations across the country, of which 1,514 were women-owned enterprises, 1,937 were youth-owned enterprises and 10 owned by persons with disabilities. During the financial year under review 40 innovation project outputs were taken up in the market, with six of these in TIA's Health portfolio and six from the Forestry Genomics Innovation Cluster.

Several new and resurgent technological and societal trends emerged over the MTSF period, including the Fourth Industrial Revolution (or 4IR as it is colloquially known), inclusive development and the United Nations' Sustainable Development Goals (SDGs), with sustainability and the water/drought crisis being of major concern to South Africa. Nevertheless, TIA's Strategy served the agency well through a strong technology development focus across broad technology areas. TIA was therefore able to adapt itself to deal with these trends by providing funding and enabling support. TIA's programmes such as the Global CleanTech Innovation Programme (GCIP), and Sector Funding Division units such as Information and Communication Technology (ICT), Energy and Natural Resources were all able to fund technology solutions to assist in responding to these trends.

TIA's implementation of the DSI approved Bio-economy Strategy has stimulated growth across the bio-economy value chain – from early stages of technology readiness through to market entry and commercialisation. In this reporting year, 82 knowledge innovation products were produced in the bio-economy sector through TIA's support, whilst 18 knowledge innovation outputs were taken up in the market. Further evidence of growth in the sector is shown in the additional funding of R240.4 million being attracted into the portfolio through 26 TIA supported programmes.

STRATEGIC PARTNERSHIPS

TIA's implementation of the Glass Pipeline and Hub and Spoke partnership models exceeded expectations in the year under review. The Industry Matching Fund, conceived by TIA as a vehicle to attract and 'crowd in' other funders in the South African NSI, was piloted in 2019/20. The fund serves as a model for TIA to leverage collaborative relationships with partners in the venture capital and angel investment communities, including private companies and multinationals, to foster technology development and commercialisation on a cost-sharing basis. In launching this instrument, TIA secured two angel investors, Dazzle Angels and Jozi Angels, as partners. Interest has grown during the course of 2019/20, with other funders joining as partners.

The SA SME Fund partnership with TIA has seen the agency leveraging a total of R491 million in support of the innovation ecosystem. The co-funding basis of this partnership has allowed TIA to leverage its R14 million contribution – a multiple of 35 times. Through this partnership, TIA and the SA SME Fund have established three specific strategic funds, namely the Venture Fund, the University Technology Fund and the Biotech Fund.

TIA's implementation of the DSI's Innovation for Inclusive Development (IID) programme saw it expanding its stakeholder network to community-based stakeholders. The agency led a grassroots innovation campaign in the Vhembe district of the Limpopo province. Engagements included potential grassroot innovators as well as the King and Royal Council of the Tshivhase Kingdom.
TIA's promotion of an African science, technology and innovation (STI) agenda centred around the implementation of the Africa Programme. Partnerships and innovation initiatives with countries such as Zambia, Tanzania, Egypt, and Mauritius served to cement TIA's role in supporting cross-border innovation partnerships between South African stakeholders and partners in the continent.

THE T.I.A. ETHOS

I am proud to say that TIA has maintained our focus on the "T.I.A." ethos of Teamwork, Impact and Accountability.

Teamwork – this year, TIA's internal ethos of teamwork was expanded into the NSI with the partnership initiatives put in place. Joint and multi-stakeholder delivery of innovation programmes and initiatives are not possible without a strong sense of team spirit through close working relations. Additionally, many of the targets achieved would not have been possible were it not for teamwork across divisional reporting lines within TIA. Whereas this has been ineffective in previous years due to the silo effect, traction is now being gained in developing cross-functional teams across divisional and unit lines in TIA to deliver on performance targets.

Impact – the independently-conducted economic impact assessment for the year continues to demonstrate TIA's impact on South Africa's economy and society broadly. TIA's multiplier is R3.48 million in new business activity and 3.83 (or approximately 4) job opportunities for every R1 million spent. During the year under review, through my office, dedicated attention was given to enhancing TIA's stakeholder relationships and credibility as technology funder of choice. The focused efforts in this regard have already begun to yield positive results, where positive and encouraging feedback was received from key stakeholders.

[1] *ISO = International Organization for Standardization.*

Accountability – a robust and stable control environment is non-negotiable for any Public Finance Management Act (PFMA) regulated entity. During the year under review the TIA maintained its ISO[1] 9001:2015 accreditation. It also achieved its ninth successive year of clean audits.

LOOKING AHEAD

TIA embarked on its 2020-2025 strategic planning process in 2019/20, which culminated in an approved Strategic Plan for the upcoming strategic cycle and an approved APP for 2020/21. The new strategy seeks to build upon the existing foundation that TIA has laid over the past five years. TIA has developed a strong pipeline of technologies that are ready to be taken up in the market. This bodes well for the agency's sharper focus on commercialisation. The rollout and implementation of the National Spatial Development Framework and the District Development Model in the upcoming strategic cycle will allow for a stronger TIA presence at provincial, local and district level – in partnership with key government departments – to deliver on specific developmental policies and plans.

TIA's focused Bio-economy Division enabled the agency to rapidly respond to the COVID-19 pandemic in the last few months of the year. TIA was able to leverage off its long-standing partnership with the South African Medical Research Council (SAMRC) and the DSI to establish a technology funding programme in response to the COVID-19 crisis. The programme goal was to support the local development of polymerase chain reaction and serological test kits to meet the predicted demand and pressure on South Africa's testing capabilities and infrastructure. Local manufacture and security of supply through import substitutions were key considerations in TIA's rapid response to the COVID-19 pandemic.

The COVID-19 pandemic and the associated restrictions imposed by government together with changes in the behaviour of individuals to avoid or minimise the transmission of the virus has led to an acceleration towards digitalisation and the adoption of digital technologies. This will force many enterprises and entrepreneurs to innovate in order to remain competitive and economically viable. TIA will need to respond to these rapidly-emerging trends swiftly in the upcoming financial year to assist with South Africa's economic recovery, particularly through contributing towards bridging the so-called 'digital divide' between individuals and entrepreneurs who do not have ready access to the Internet.

THANK YOU

I would like to thank the former Interim Board Chairperson, Dr Steve Lennon, who played a critical role in driving the strategic planning process with the agency. I would also like to thank TIA's Executive Management team in supporting my term as Interim Chief Executive Officer. A special thank you is extended to the acting General Managers and Executives who have guided TIA through turbulent times whilst still delivering on their own core portfolios.

TIA employees must also be recognised for their tireless efforts, long hours and dedication to the cause of supporting a strong innovation ecosystem in South Africa. Our staff members have participated in approximately 200 technology innovation initiatives during the year. TIA's aspiration to have an engaged NSI was indeed realised with a strong TIA presence through spearheading its own initiatives or supporting those in conjunction with stakeholders.

Ms Fuzlin Levy-Hassen
Interim Chief Executive Officer

4. THE EXECUTIVE MANAGEMENT TEAM

Ms Fuzlin Levy-Hassen
Interim CEO

Mr Werner van der Merwe
Chief Financial Officer

Ms Petro Dekker
Executive: Corporate Services

Mr Mohohlo Molatudi
Acting General Manager:
Bio-economy

Mr Elijah Mokhethi
Acting General Manager:
Sector Funding

Dr Anitha Ramsuran
Acting General Manager:
Programmes

Mr Patrick Krappie
Executive Manager:
Strategic Engagements and
Corporate Relations

Mr Malesela Lekoto
Executive Manager:
Legal Services

Mr Kobus Louw
Company Secretary

Note: Executive Managers shown above occupied their respective positions for the greater period in the year under review. For more details refer to Note 27 on page 170.

5. CHIEF FINANCIAL OFFICER'S OVERVIEW

Mr Werner van der Merwe
Chief Financial Officer

The agency has maintained a sound financial performance despite the tough prevailing economic climate based on TIA's financial results for 2019/20.

Disbursements for the purpose of technology development and innovation during the period under review increased by R49.1 million. This included higher disbursements to projects with technology development focus, and to those within the International Partnerships and the IID portfolios.

The Bio-economy Division's budget allocation of R185.5 million was fully disbursed during the current financial year. Specific contracted income also increased considerably due to the successful implementation of the Glass Pipeline and Hub and Spoke partnership models.

Notwithstanding the tough economic climate and other challenges such as the onset of the COVID-19 pandemic, TIA received an unqualified audit for the ninth consecutive year. This is in accord with the agency's commitment to maintain a healthy control environment that is governed by sound financial principles and policies.

REVENUE: PARLIAMENTARY GRANT AND SPECIFIC CONTRACTED AMOUNTS FROM DSI

Figure 1 shows TIA's revenue over the last five years. The parliamentary grant to TIA increased by an inflationary 5%, from R420.3 million in 2018/19 to R440.9 million in 2019/20. Specific contracted agreements recognised as income increased by 33%, from R110.0 million in 2018/19 to R146.1 million in 2019/20. This result is the best since TIA's inception, demonstrating TIA's ability to deliver on specific-purpose funding granted by DSI.

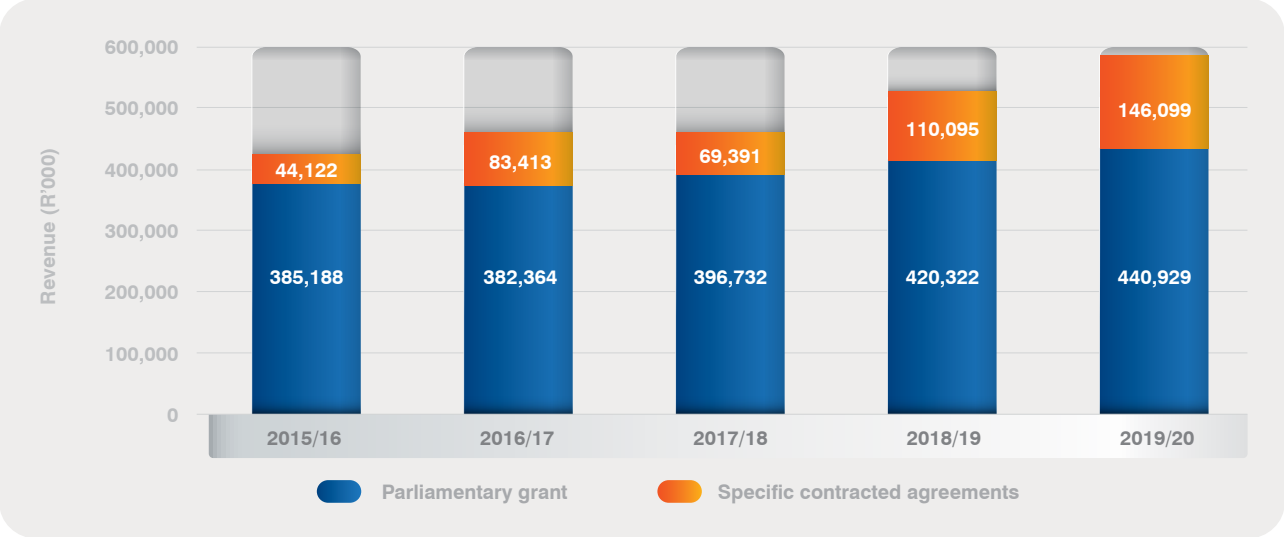


Figure 1: Five-year comparison of revenue

INVESTMENT AND OTHER INCOME

Figure 2 shows TIA's investment and other income over the last five years. Investment and other income decreased by 47%, from R35.1 million in 2018/19 to R18.7 million in 2019/20. This decrease is in line with the challenging economic climate experienced in 2019/20 and relates to lower loan repayments and royalties from investee companies. To address the ever-increasing demand for TIA funding there is a need for TIA to continue to identify and secure alternative sources of funding and revenue.

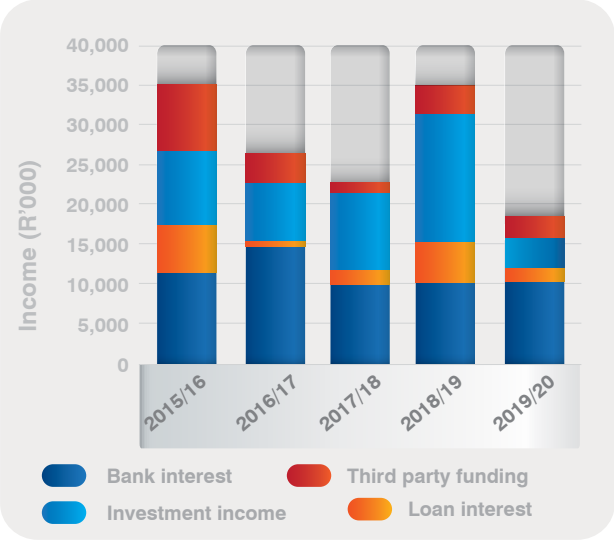


Figure 2: Five-year comparison of investment and other income contributions

ADMINISTRATIVE AND EMPLOYEE COSTS

Figure 3 shows TIA's administrative and employee-related expenditure over the last five years. During 2019/20 administrative expenditure decreased by 8%, this initiative driven by the Board and implemented by Management, allowing these additional funds to be reprioritised towards investment expenditure. This enabled TIA to achieve an increased efficiency ratio, with 2019/20 being the best achieved in the past three financial years.

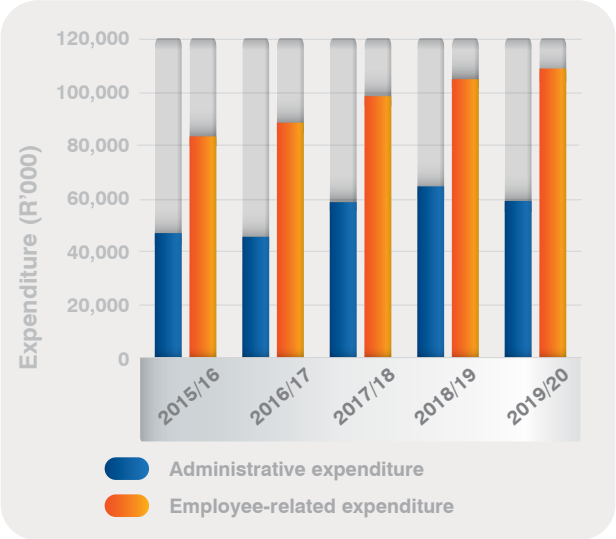


Figure 3: Five-year comparison of administrative and employee-related expenditure

Cost savings were realised through a reduction in the use of consultants. Instead, TIA relied more on its own internal expertise and capabilities. Additionally, the reduction in subscription and certification costs also contributed to these savings. Expenditure in these areas was limited to only those instances where a significant impact was to be derived. A decrease in travel expenditure was achieved by leveraging digital platforms to host meetings and other business engagements.

TIA's use of the National Treasury's Central Supplier Database allowed the agency to spread its purchasing reach to smaller suppliers who generally struggle with high barriers to entry into supply chains and procurement spend. TIA does not procure goods and/or services from suppliers who are not fully tax compliant, thereby contributing to the fiscus. During the period under review, the agency worked towards a consistent three-day payment turnaround time to support small businesses to manage their working capital.

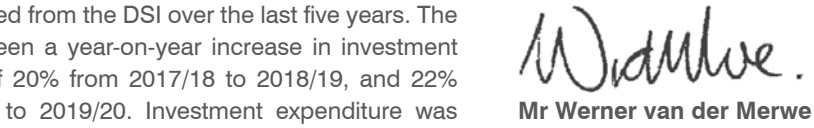
INVESTMENT AND PROJECT FUNDING

Figure 4 shows the funds disbursed by TIA against income received from the DSI over the last five years. The agency has seen a year-on-year increase in investment expenditure of 20% from 2017/18 to 2018/19, and 22% from 2018/19 to 2019/20. Investment expenditure was R451.0 million in 2019/20. The increase in investment expenditure is directly related to the decrease in administrative expenditure and an increase in specific contracted income. This improved the Agency's efficiency ratio from 69% in 2018/19 to 73% in 2019/20.

SURPLUS FUNDS

The agency realised a deficit of R13.5 million in 2019/20, compared to a surplus of R22.1 million in 2018/19. The deficit was funded through cash surpluses. Technology development is inherently a high-risk undertaking due to the unpredictable nature of the intended outcomes. In such an environment, there is a high probability that investee project-related milestones will not be achieved as planned, making it difficult to forecast and deliver zero surplus/deficit actuals at the end of each financial year. Section 53(3) of the PFMA stipulates that public entities must submit a request to National Treasury to retain any surplus funds.

TIA's five-year financial review is presented in Table 1, and the agency's detailed finances are available in Section 34 in Part E of this report.



Mr Werner van der Merwe
Chief Financial Officer

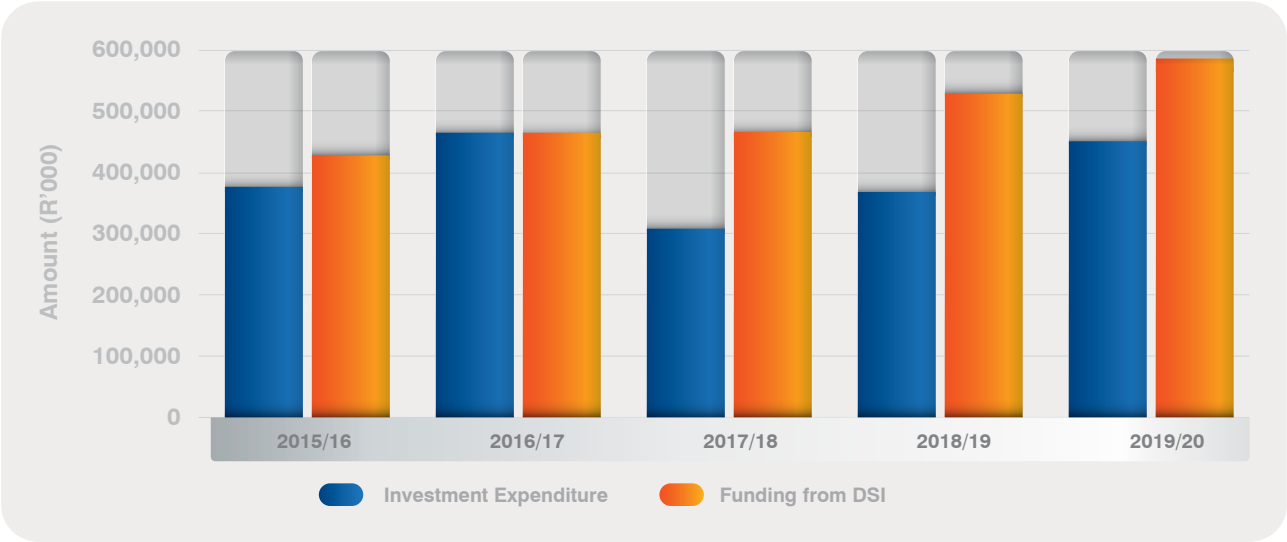


Figure 4: Five-year comparison of funds disbursed versus income received from the DSI

Table 1: Five-year financial review

STATEMENT OF FINANCIAL PERFORMANCE

	2015/16 (R million)	2016/17 (R million)	2017/18 Restated (R million)	2018/19 (R million)	2019/20 (R million)
Total revenue	**463**	**492**	**489**	**565**	**606**
Parliamentary grant	385	382	397	420	441
Specific contracted income	44	83	69	110	146
Other income	34	27	23	35	19
Total expenditure	**510**	**600**	**467**	**539**	**619**
Employee costs	84	89	99	105	109
Project funding disbursements	379	465	309	370	451
Administration costs	47	46	59	64	59
Surplus/(Deficit)	**-47**	**-108**	**22**	**26**	**-13**

STATEMENT OF FINANCIAL POSITION

	2015/16 (R million)	2016/17 (R million)	2017/18 Restated (R million)	2018/19 (R million)	2019/20 (R million)
Total assets	**210**	**122**	**188**	**238**	**209**
Property and equipment	13	16	21	19	13
Investment and funding assets	49	34	34	42	46
Cash and cash equivalents	132	65	127	167	145
Receivables	16	7	6	10	5
Total Liabilities	**65**	**83**	**114**	**143**	**143**
Committed conditional grants	44	54	88	81	88
Current liabilities	21	29	26	62	55
Net assets	**145**	**39**	**74**	**95**	**66**

Note: Amounts are rounded to the nearest million

EFFICIENCY RATIO

	2015/16 (%)	2016/17 (%)	2017/18 (%)	2018/19 (%)	2019/20 (%)
Efficiency Ratio	**74**	**78**	**66**	**69**	**73**

6. STATEMENT OF RESPONSIBILITY AND CONFIRMATION OF THE ACCURACY OF THE ANNUAL REPORT

To the best of my knowledge and belief, I confirm the following:

- All information and amounts disclosed in the annual report are consistent with the Annual Financial Statements (AFS) audited by Rakoma and Associates Inc.
- The annual report is complete, accurate and is free from any omissions.
- The annual report has been prepared in accordance with the guidelines on the annual report as issued by National Treasury.
- The AFS (Part E) has been prepared in accordance with Generally Recognised Accounting Practice (GRAP) standards.
- The accounting authority is responsible for the preparation of the AFS and for the judgements made in this information.
- The accounting authority is responsible for establishing and implementing a system of internal control that has been designed to provide reasonable assurance as to the integrity and reliability of the performance information, the human resources information and the AFS.
- The external auditors are engaged to express an independent opinion on the AFS.
- In our opinion, the annual report fairly reflects the operations, the performance information, the human resources information and the financial affairs of the entity for the financial year ended 31 March 2020.

Ms Fuzlin Levy-Hassen
Interim Chief Executive Officer

Mr Butana Mboniswa
Interim Chairperson of the Board

7. STRATEGIC OVERVIEW

VISION

Be a leading technology innovation agency that stimulates and supports technological innovation to improve the quality of life for all South Africans.

MISSION

Facilitate the translation of South Africa's knowledge resources into sustainable socioeconomic opportunities.

VALUES

TEAMWORK
Together we can do more. Fostering teamwork creates a TIA work culture that values collaboration and co-operation.

PROFESSIONALISM
At TIA we apply the most appropriate skills, competencies, experience and knowledge of best practices cohesively in conducting our work.

INTEGRITY
At TIA everyone strives to do what they said they would. "We Keep our word"

technology innovation AGENCY
Innovating Tomorrow Together

EXCELLENCE
TIA will be accountable to all stakeholders to deliver exceptionally high standards of work and performance.

INNOVATION
At TIA we foster a culture where we continually nurture and implement new ideas from our staff and stakeholders that enhances how we do things and deliver services.

TRANSPARENCY
Engage in inclusive open communication, hold each other accountable for our performance and conduct.

8. LEGISLATIVE AND OTHER MANDATES

TIA was established as a schedule 3A[2] public entity in terms of the PFMA (Act 1 of 1999, as amended by Act 29 of 1999). Its mandate is derived from the provisions of the TIA Act (Act 26 of 2008), read together with Sections 19-23 of the Science and Technology Laws Amendment Act (Act 7 of 2014) which establishes TIA as an agency to promote the development and exploitation, in the public interest, of discoveries, inventions, innovations and improvements.

TIA's objective is to support the state in stimulating and intensifying technological innovation to improve economic growth and quality of life for all South Africans by developing and exploiting technological innovations.

8.1 UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

The United Nations' SDGs entails ending poverty and hunger globally; combating inequality within and among countries; building peaceful, just and inclusive societies; protecting human rights; promoting gender equality and the empowerment of women and girls; and ensuring the lasting protection of the planet and its natural resources. Countries committed to the goals aim to create conditions for sustainable, inclusive and sustained economic growth, shared prosperity and decent work for all.

TIA provides scientific, engineering and technical support to SMMEs, particularly those that are black-owned, black women-owned and youth-owned. TIA also supports grassroots innovators in vulnerable and marginalised communities. These and other efforts assist in contributing to achieving the SDGs.

8.2 AFRICAN UNION AGENDA 2063

The African Union's long-term, people-centred Agenda 2063 is a strategic framework for the socioeconomic transformation of Africa. Efforts are underpinned by STI as multifunctional tools and enablers for achieving development goals on the continent. Agenda 2063 calls for diversifying sources of growth for Africa's economic performance and, over the long term, lifting large sections of the continent's population out of poverty. The strategic framework also fosters social transformation, economic industrialisation and entrepreneurship.

TIA plays a key facilitation role through collaboration with research and innovation institutions across the continent to implement joint technology development programmes and the provision of technical competence and entrepreneurial capacity development to increase the application of knowledge outputs in stimulating socioeconomic transformation.

8.3 NATIONAL DEVELOPMENT PLAN 2030

The National Development Plan recognises that developments in STI fundamentally alters the way people live, communicate and transact. The plan highlights that STI is key to equitable growth, economic advancement, and to improving health systems, education and infrastructure. The plan is in its second phase, during which "the country should lay the foundations for more intensive improvements in productivity".

[2]Schedule 3A entities are public entities that have the mandate to fulfil a specific economic or social government responsibility.

8.4 2015/16-2019/20 MEDIUM-TERM STRATEGIC FRAMEWORK

The 2015/16-2019/20 MTSF is the overarching government framework for the socioeconomic transformation of South Africa (SA) for the period under review. It identifies technology innovation as one of the critical policy areas required to speed up growth and transform the economy to create decent work and sustainable livelihoods. TIA has aligned its initiatives and contributes to the following four outcomes:

- **Outcome 2:** A long and healthy life for all South Africans.
- **Outcome 4:** Decent employment through inclusive economic growth.
- **Outcome 5:** A skilled and capable workforce to support an inclusive growth path.
- **Outcome 10:** Protect and enhance our environmental assets and natural resources.

8.5 WHITE PAPER ON SCIENCE, TECHNOLOGY AND INNOVATION

Cabinet's adoption of the White Paper on Science, Technology and Innovation in March 2019 signalled material policy shifts for STI to address transformation and inclusivity and the need for strong linkages and coordination within the NSI. These include strengthening the culture of innovation within government and society; improving policy coherence and more effective budget and programme coordination within the NSI; implementing monitoring and evaluation systems; creating a more enabling environment that advances innovation; developing local innovation ecosystems; and increasing investment in technology-based SMMEs and support to grassroots and social innovation projects.

8.6 BIO-ECONOMY STRATEGY

The Bio-economy Strategy seeks to use SA's bio-based resources to become a significant contributor to the country's economy by 2030 through the creation and growth of biotechnology-based industries. In turn, these new industries will generate and develop bio-based services, products and innovations in which new and existing companies will provide and use such solutions. The strategy provides a framework for investments and action by all relevant stakeholders in the NSI.

TIA is one of the primary implementation actors of the Bio-economy Strategy, which now includes indigenous knowledge systems (IKS).

9. ORGANISATIONAL STRUCTURE

A decision was taken not to fill these positions in the Board-approved structure during the year under review.

These two posts were combined into the position of General Manager: Programmes for the year under review.

Figure 5: TIA's Board-approved organisational structure

PART B
PERFORMANCE INFORMATION

10. SITUATIONAL ANALYSIS

10.1 SERVICE DELIVERY ENVIRONMENT

Universities fulfil a prominent role amongst TIA's NSI stakeholders, being TIA's Seed Fund Programme (SFP) implementation partners through Offices of Technology Transfer (OTTs). A recurring trend affecting the delivery of TIA's funding instruments at universities is the FeesMustFall campaigns which emerged in 2015/16. FeesMustFall campaigns typically begin in February or March and have a disruptive effect on the operations of universities for several months, extending as far as July as experienced in 2019. This affects delivery against the performance objectives set for the first and the fourth quarters in relation to instruments and programmes associated with universities.

Another aspect to note with respect to universities during the current year is the additional effect of the COVID-19 pandemic in SA. Universities took a decision to effect closure and evacuation of students from campuses much earlier in the last quarter of the financial year under review, whereas the national lockdown was announced by President Ramaphosa later in the quarter. The service delivery environment was thus negatively affected by these developments. This affected the ability of Technology Stations at universities to deliver the requisite support to SMMEs and TIA's final disbursements to OTTs under the SFP in particular.

Whilst the university sector faced challenges, positive developments were noted within the funding landscape in SA. The 2019 Southern African Venture Capital Association Report reveals growing venture capital activity in SA, with the venture capital community becoming increasingly less risk averse, investing in early-stage opportunities and start-up companies. This development has allowed TIA to leverage partnerships with venture capital companies to enhance its commercialisation efforts. TIA's Industry Matching Fund, piloted in 2019/20, has gained partners from the venture capital community, including Jozi Angels and Dazzle Angels. A healthy interest in this initiative has been observed during the year under review, and is expected to persist into the forthcoming year.

With the bio-economy being a key focus area for TIA, positive developments in the sector must be noted, as these have favourably impacted the ecosystem. The number of venture capital investments has grown steadily over the past five years within the broader bio-economy. Investments in health, food and beverages, and medical devices have increased, whereas life sciences, biotechnology and agriculture account for a smaller proportion of funding. The introduction of a private sector-funded Biotech Fund in 2019, in which TIA is a key partner, bodes well for the growing bio-economy related venture capital market in SA, and is in alignment with TIA's efforts to leverage such partnerships in the NSI.

A country-wide biotechnology community networking platform to promote integration of bio-based entrepreneurs and SMMEs into the mainstream bio-economy is no longer just a vision. TIA, with AfricaBio NPC[3] and the DSI, has given life to this vision through the launch of the BIO Africa Convention. Aligned to the delivery of the DSI's Bio-economy Strategy, there is a need to foster technology absorption from bio-innovators including integration into the supply chain of big corporates. The platform created will address this very need in a systemic and focused manner.

One of the key issues highlighted as requiring attention in the White Paper on Science, Technology and Innovation

[3] *NPC = Not for profit company*

relates to the challenge of fragmentation in the NSI. Consequently, TIA devoted concerted efforts to actively promote collaboration with key government funding instruments and institutions such as the Public Investment Corporation, the Development Bank of Southern Africa (DBSA) and the Industrial Development Corporation (IDC), and new initiatives such as the SA SME Fund to facilitate seamless integration of funding instruments in the NSI. In addition to innovation funding institutions, emphasis was also placed on intensifying collaboration with science councils. These efforts have begun to yield fruit for TIA investees and potential innovators in the ecosystem by expanding the footprint of offerings available. Whilst these are early attempts to address the issue of fragmentation, the traction gained thus far bodes well for future endeavours.

Another positive development within the NSI is the growth of technology entrepreneurship and in conjunction, the growth of additional support and development offerings in the NSI that are complementary to TIA's efforts. Over the MTSF, TIA has made headway in promoting a culture of innovation and entrepreneurship through its various programmes. There is an increase in the number of private-sector accelerator and incubation programmes now available to budding tech innovators, with many of these even technology- or sector-focused. Trends like the 4IR and robotics have made technology "cool" again and there is a growing public discourse on how best to optimise the outcomes of these opportunities. TIA has also been part of several hackathons, both with private sector and public-sector stakeholders. Opportunities arising out of a hackathon require an agile and well-connected NSI to bear fruit. TIA has played an active role in this regard.

TIA's plans over the MTSF period included aspirations to expand its investment profile across all nine provinces. Through its Hub and Spoke partnership model, TIA had a specific focus on bringing government departments, both national and provincial, into the mainstream innovation discourse. Active engagements between TIA and entities found areas for collaboration that had potential to yield high success initiatives in provinces themselves. However, following the national elections in May 2019, provincial governments saw changes in their leadership, especially with respect to Members of the Executive Council and Heads in provincial Departments of Economic Development. As such, newly formed provincial governments took the opportunity to reframe existing plans and strategies in line with the new planning cycle imperatives and strategic direction. As a result, some of TIA's planned initiatives with provincial departments experienced delays in initiation. As momentum began to pick up again towards the end of the financial year, restrictions imposed by the COVID-19 lockdown resulted in a deferment of these joint innovation initiatives.

Another significant trend that has expanded TIA's service delivery profile is the recognition of the need for an inclusive innovation paradigm in South Africa. An inclusive innovation agenda is one that leads to impact in rural communities, township economies and improvements in service delivery. This requires a funding mandate which extends beyond the formal economic sectors and TIA's traditional biotechnology and other technology-related fields.

The DSI has committed itself to contribute towards inclusive development through strengthening local systems of innovation and production that can support the creation of sustainable employment creation, wealth creation and elimination of poverty. As such, TIA has supported the DSI in launching and implementing its IID programme. Implementation has taken TIA as far as the Limpopo province, where, in collaboration with the Swiss Embassy, a successful roadshow and innovation scouting exercise took place. The event, held over two days in late June 2019 in the Vhembe District was attended by the Tshivhase King, 150 innovators, community members, government officials from the district municipality, technical vocational and educational training college students and students from the University of Venda.

TIA received 530 applications for technology development funding in 2019/20, a marginal 5% increase from the applications received in 2018/19. Seventy funding applications were submitted to the SFP, consisting of six submitted directly to TIA, 44 to University Seed Fund partners and 20 to SMME Seed Fund partners. Three applications were submitted to TIA's new Rapid Fund and one application to the Pre-commercialisation Fund.

The profile of applicants to the Technology Development Fund is summarised in Table 2. An encouraging increase was seen in African applicants, from 44% in 2018/19 to 72% in 2019/20. However, the number of female applicants to TIA remains low at 2% less than the 20% noted in 2018/19.

Table 2: Profile of applicants who applied for technology development funding in 2019/20

Demographic	Number of Applicants	Percentage
African	379	72%
Coloured	35	6%
Indian	39	7%
White	77	15%
Total	**530**	**100%**
Female	98	18%
Male	432	82%
Total	**530**	**100%**

Table 3 shows the application breakdown per sector/thematic area for technology development applications. In line with current technology trends, ICT received more than half of the total applications to TIA. Whilst at the lower end of percentage of total applications, green technologies are receiving a fair amount of attention at present in line with a growing focus on environmental sustainability worldwide.

Table 3: Applicants per sector/thematic area in 2019/20

Sector/Thematic Area	Number of Applicants	Percentage
ICT	305	58%
Advanced Manufacturing	54	10%
Energy	49	9%
Natural Resources	39	7%
Agriculture	30	6%
Health	19	4%
GCIP	34	6%
TOTAL	**530**	**100%**

10.2 ORGANISATIONAL ENVIRONMENT

10.2.1 FUNDING

In the year under review, TIA operated with a budget of R440.9 million. Forty-two percent (R185.5 million) of these funds are 'ring-fenced' specifically for the implementation of the Bio-economy Strategy, and approximately 9% percent (R40.5 million) to implement the TSP. The remainder of the budget, R214.9 million, at 49% of TIA's allocation, is deployed to meet the rest of its mandate and cover operational expenditure.

These funding constraints made it difficult for TIA to meet the high demand of applications for funding in other technology focus areas such as ICT, Energy, Advanced Manufacturing and Natural Resources, as well as funding applications submitted to programmes such as the SFP and the Youth Technology Innovation Programme (YTIP). In an effort to increase its funding capacity, the agency made efforts to improve the efficiency ratio such that it could allocate more funds towards technological innovation.

In stark contrast with these funding constraints, TIA continues to experience a high demand for funding from its market. In 2019/20 the agency received 530 applications for funding for the purposes of technology development. While this is TIA's core area of operations, the agency is only able to support a small portion of such applications every year due to funding constraints. The reason for this is that TIA supports multi-year projects and manages ring-fenced programmes on behalf of the DSI, with the result that the agency's discretionary funds are a fraction of its total budget.

TIA conducted an exercise in the second half of 2019/20 to analyse the agency's investment book and 'pipeline' of funding applications. The purpose was to prioritise TIA's project disbursements and rationalise the funding application pipeline according to the available budget. The analysis revealed that an amount of R518 million was requested in 2019/20, comprising multi-year project commitments, approved/planned new expenditure and pipeline applications. The bulk of this was for the Technology Development Fund, with smaller amounts for the Pre-commercialisation Fund, an internal Seed Fund call and the new Rapid Fund. The analysis excluded the SFP, YTIP and GCIP.

After a prioritisation and rationalisation process was conducted it was calculated that the projected disbursements were R139 million for the second half of the year. This amount comprised R65 million for pipeline applications and R74 million to meet multi-year project commitments. However, only R108 million was available, resulting in a shortfall of R31 million. Even this modest funding shortfall could not be met with TIA's limited allocation. This actual example illustrates the extent

to which TIA's modest levels of funding constrain the agency's ability to fund more projects for the purposes of technological innovation, with associated loss of potential socio-economic impact for the country.

10.2.2 EXECUTIVE LEADERSHIP

A fully and appropriately capacitated Executive Management cohort is key for organisational stability and to ensure TIA meets its goals and objectives. Mr Barlow Manilal was the Chief Executive Officer (and ex officio Board member) of TIA until 30 May 2019. He left the service of the agency on 30 June 2019 following a resolution by the Board for early termination of his contract, which was due to expire at the end of March 2020.

Ms Fuzlin Levy-Hassen assumed the role of Interim Chief Executive Officer (and ex officio Board member) from 13 June 2019. Ms Levy-Hassen was at the time a TIA board member and she resigned from the Board with effect from 12 June 2019 to take up this position. The Board finalised the recruitment process to identify a suitably skilled Chief Executive Officer in the period under review. At the time of writing this Annual Report the process to appoint a suitably skilled Chief Executive Officer was being conducted in consultation with the Minister.

It was anticipated that the positions of General Manager: Bio-Economy and General Manager: Sector Funding would be filled by the third quarter of 2019/20. However, the initial recruitment process to fill these positions was not successful. Headhunting commenced in March 2020. The Executive: Corporate Services position was filled on 1 April 2019. All Executive positions are filled on a 5-year contract basis.

10.2.3 SKILLS AND COMPETENCY AUDIT

As part of the initial phase of implementing the approved realigned structure (see Section 9), a skills and competency audit of current staff was conducted in 2019/20. The audit enabled the agency to identify the skills and knowledge required within the organisation in addition to the skills and knowledge that the organisation currently has. The skills gaps identified will enable focused training and development initiatives for each employee, per business unit, as well as for the whole organisation going forward. The skills audit information will be utilised when implementing TIA's Talent Management Strategy.

10.2.4 SYSTEMS

TIA's Information Technology (IT) Strategy focuses on business enablement and support through the implementation of functional systems for streamlined automation and business efficiency. As TIA's business evolves to align with the changing stakeholder demands and external landscape, IT will increasingly underpin every aspect of the new business model as an enabler to seamlessly deliver organisational mandate efficiently.

Stakeholders raised concerns regarding the lack of communication and long turnaround times in the period under review. To realise positive customer experiences and higher levels of customer satisfaction, the agency implemented a fully-fledged Customer Service Centre for customer relationship management, ensuring each customer receives the appropriate attention and services needed.

Since implementation in June 2019 the centre attended to 1,647 cases, with only two outstanding cases at 31 March 2020. The improved response time on escalations and a reduction in the number of cases is an indication of TIA's effort to address and attend to customer complaints and restore customer confidence in the agency.

10.2.5 PROCESSES

With the aspiration of becoming a world-class innovation agency, TIA aims to establish itself as a national competence to enable technology development and innovation in SA and beyond. To play this role effectively, TIA must facilitate the development, implementation and maintenance of organisation-wide quality management standards. During 2017/18, the organisation was officially accredited with ISO 9001: 2015 certification, after successfully passing the audit with no findings. The ISO 9001: 2015 certification was maintained during 2018/19 and 2019/20. This serves as a key building block to enhance the organisation's credibility, operational efficiency and service delivery that meets and exceeds customer needs and expectations.

10.2.6 RELATIONS WITH ORGANISED LABOUR

Negotiations with the National Education, Health and Allied Workers' Union concerning a multi-year agreement for a three-year period (2019/20 to 2021/22) were concluded during the third quarter of the year under review. This agreement will enable TIA management to implement annual salary increases (subject to National Treasury directives and affordability) earlier in 2020/21.

10.3 KEY POLICY DEVELOPMENTS AND LEGISLATIVE CHANGES

The sixth political administration saw the advent of a reconfigured Cabinet. This led to both the Department of Science and Technology and the Department of Higher Education and Training reporting to one Minister. A further significant development in 2019/20 was the renaming of the Department of Science and Technology to the Department of Science and Innovation.

While the Department of Higher Education and Training and the DSI continue to exist as separate departments, the fact that they now report to a single Ministry will have an impact on the NSI over time, although not much impact was experienced by TIA in 2019/20. However, the name change to DSI sends a strong signal that TIA's shareholder intends placing much more focus on innovation broadly in future. Not only does this underscore the importance of TIA's role in the innovation ecosystem, but it also sends a strong message that innovation needs to be given the appropriate level of attention in support of SA's socio-economic development broadly.

Following the adoption of the White Paper on Science, Technology and Innovation in March 2019 by Cabinet, the DSI devoted attention to the development of a Decadal Plan that will serve as the implementation master plan of the White Paper. The framework adopts a far broader national innovation system concept, i.e. one that is holistic, promotes inclusion, fosters sustainability and encourages protection of the environment. It recognises the non-linearity of innovation and appreciates the critical role of non-technological innovation and other types of innovation, e.g. innovation in the services sector and public sector innovation.

The year under review marked the fifth and final year in TIA's 2015-2020 strategic period. Accordingly, TIA directed its efforts to developing a new strategic plan for the 2020/21-2024/25 MTSF period and an APP for 2020/21 according to the Department of Performance Monitoring and Evaluation's new framework for strategic plans and APPs, reflecting government's new and enhanced approach which emphasises an outcome-based approach as opposed to an activity-based approach.

11. STRATEGIC OUTCOME ORIENTED GOALS

TIA's 2015-2020 Strategy defined three strategic objectives.

Strategic objective 1

Provide technology development funding and support in high-impact areas.

Strategic objective 2

Provide thought leadership and an enabling environment for technology innovation in collaboration with role players.

Strategic objective 3

Develop an effective and efficient internal environment to successfully execute the strategy.

The strategic objectives intended to position TIA

a) To provide SA with appropriate and effective support for innovation with high social and economic impact through a stimulating and enabling environment for technology innovation in collaboration with other role players (including role players in Africa and globally);
b) As a thought leader in technological innovation in SA; and
c) To build an effective and efficient organisation to successfully execute the strategy.

Key performance indicators (KPIs) were developed in order to deliver on TIA's mandate in alignment with the three overarching strategic goals set for the agency. Furthermore, to position the activities of TIA within the framework of the National Development Plan and other DST[4] priorities, TIA's performance plan was structured around three strategic outcome-oriented goals that directed the initiatives of agency throughout the year, as shown in Table 4.

Table 4: TIA's three strategic outcome-oriented goals

Goal No.	Strategic Outcome Oriented Goal Description	Associated KPIs
1	To support the commercialisation of technological innovations	1.1, 1.2 and 1.4
2	To increase infrastructure access for technology development	2.1 and 2.3
3	To stimulate an agile and responsive NSI	1.3 and 2.5

[4]The DSI was known as the DST at the time.

11.1 PERFORMANCE HIGHLIGHTS

Overall, TIA achieved 90% of its KPIs, with 19 out of its 21 targets being met. Tables 5, 6 and 7 presents TIA's performance against KPI targets for the agency's three strategic objectives.

Table 5: TIA's performance in 2019/20 against Strategic Objective 1: Provide technology development funding and support in high-impact areas

KPI	Description	Target	Actual	Deviation	Comment
1.1	No. of technologies, processes and services advancing by one or more Technology Readiness Levels (TRLs)	30	80	+50	TIA's core technology development portfolio performed well in 2019/20, with targets exceeded in the Bio-economy Division (Agriculture, Technology Innovation Cluster Programme or TICP, SABDI), Sector Funding (Natural Resources, ICT) and SFP.
1.2	No. of innovation project outputs taken up in the market	12	40	+28	An increased market appetite for technology derived products allowed for an over-achievement in this KPI. Notable sectors contributing to this from TIA's portfolio were Energy, ICT, Health and the Forestry Cluster (TICP).
1.3	Amount of additional funding attracted into TIA's portfolio	R157m	R331.9m	+R174.9	The attractiveness of TIA's Bio-economy programmes and initiatives through its Technology Platforms Programme (TPP) and TICP allowed an over-achievement of this target. In line with current interest in digital technologies, the ICT portfolio also contributed to this over-achievement.
1.4	Amount of income recognised	R145m	R145.1m	-	Target achieved.

Key: **Target met or exceeded** **Target not met**

Table 6: TIA's performance in 2019/20 against Strategic Objective 2: Provide thought leadership and an enabling environment for technology innovation in collaboration with role players

KPI	Description	Target	Actual	Deviation	Comment
2.1	No. of knowledge innovation products produced as a result of TIA funding and support programmes	100	161	+61	TIA performed well in its mandate to support the development of knowledge innovation products. YTIP and SFP (aimed at universities and SMMEs) contributed to exceeding the target. Additionally, its biotechnology-focused TPP and TICP as well as the Agriculture portfolio performed above expectation.
	2.1a Prototypes	49	76	+27	
	2.1b Intellectual property	12	18	+6	
	2.1c Technology demonstrators	36	43	+7	
	2.1d Technology transfers	3	24	+21	
2.2	No. of TIA-supported programmes receiving additional funding	33	45	+12	Over performance in this KPI was achieved through the Bio-economy initiatives and the SFP. TIA's focus in servicing these segments of the NSI has made these initiatives attractive to other NSI players.
2.3	No. of SMMEs receiving technology support	3,840	3,269	-571	Under-performance on KPI 2.3 is mostly attributed to delays in finalising the 2019/20 annual plan for the TSP, with associated delays in disbursements to the Technology Stations and the provision of support to the beneficiaries. Additionally, whilst TIA was making good progress in efforts to catch up and achieve this target, the lockdown associated with COVID-19 containment measures further undermined these efforts due to the early closure at most universities that host Technology Stations, thereby curtailing the provision of services to SMMEs and preventing the submission of some performance information to TIA. However, the TSP still rendered a spectrum of technological support services to a wide range of SMMEs, 81% of which are historically disadvantaged individuals.
2.4	No. of SMMEs owned by historically disadvantaged individuals assisted as percentage of total SMMEs receiving funding, support and/or technology services from TIA	69%	81%	+12%	
2.5	No. of technology innovation initiatives undertaken by TIA	42	200	+158	All divisions within the agency contributed to this over-achievement. However, significant engagement in the NSI is attributed to the Bio-economy Division, specifically TPP and TICP. TIA exceeded in achieving its aspiration to promote an engaged NSI. Exceeded targets in presentations, panel discussions and publications show an NSI that is more willing to share information amongst role players.
	2.5a Conference papers	1	2	+1	
	2.5b Presentations	14	86	+72	
	2.5c Policy recommendations	0	2	+2	
	2.5d Panel discussions	10	28	+18	
	2.5e Position papers	1	1	-	
	2.5f Publications[5]	1	53	+52	
	2.5g Think tanks	14	19	+5	
	2.5h Keynote addresses	1	9	+8	

Key: **Target met or exceeded** **Target not met**

[5]Publications here refers to the scientific/academic definition as well as those publications aimed at providing scientific information and opinions to the public.

Table 7: TIA's performance in 2019/20 against Strategic Objective 3: Develop an effective and efficient internal environment to successfully execute the strategy

KPI	Description	Target	Actual	Deviation	Comment
3.1	Investment approval turnaround time	15 weeks	> 54 weeks	Not achieved	Measures have been put in place to monitor and control TIA's investment approval turnaround time in the next financial year. This will include benchmarking TIA's turnaround time against that of similar funding agencies. TIA will focus on process improvements (particularly the agency's investment process) to achieve quicker turnaround times in the new financial year.
3.2	Number of NSI-related partnerships entered into	26	32	+6	TIA's Glass Pipeline unit's activities to actively engage various partners (including funders and industry) within the NSI have contributed to this over-achievement.

Key: **Target met or exceeded** **Target not met**

TIA's successful performance in delivering funding and support in order to advance ideas from proof of concept to demonstration and pre-commercialisation is evident in the performance presented for 2019/20.

Performance against KPI 1.1 shows that a significantly higher amount of technologies than anticipated were able to progress from lower to higher levels of technology and market readiness. This shows an actual achievement of 80 technologies against a target of 30. More importantly, TIA's efforts to support the translation of innovations towards commercial readiness showed a similar trend – the number of innovation project outputs taken up in the market was 40 at year end, against a planned target of 12 under KPI 1.2.

This result is promising for several reasons. Such performance can only be attained after sustained and dedicated efforts have been made towards de-risking technology development. This confirms TIA's strong position in the NSI regarding the support of technological innovations. The technology investment space is differentiated from the conventional business funding and venture capital support in that early investments into technology firms are typically high-risk. TIA's ability to provide an attractive pipeline to follow-on funders has been confirmed by its success in having innovation projects both maturing and taken up in the market at levels greater than planned for.

As technologies mature and advance towards commercialisation readiness, it is important to also take note of the knowledge innovation products produced as a result of TIA funding and support programmes (KPI 2.1). Knowledge innovation products can be compared, in analogy, to hardware and software – which need to work hand-in-hand. Prototypes and technology demonstrators constitute the hardware in this comparison, and intellectual property (IP) and technology transfers constitute the software. These are essential measures to determine how successful the enabling environment created by TIA is in advancing technology development. For 2019/20, all four measures exceeded planned targets, which a cumulative achievement of 161 innovation products produced, 61 more than the target.

TIA's ability to attract additional funding into its portfolio is quite evident across Strategic Objectives 1 and 2. KPI 1.3 (additional funding attracted into TIA's portfolio) saw an over-achievement by R174.9 million towards the funding of technology development in high-impact areas. This amount is specifically linked to units in TIA that contribute to the Bio-economy Strategy (viz. TPP and TICP) and the ICT portfolio.

TIA met its target for KPI 1.4 (amount of income recognised) for the year. This KPI, in part, is a measure of TIA's ability to disburse funding to intended beneficiaries where TIA was a contracted partner or a collaborator with other NSI entities in jointly delivering projects and initiatives. TIA was able to service its mandate to support innovators and investees with the funds disbursed as intended.

TIA-supported programmes receiving additional funding (KPI 2.2) also saw increased NSI interest, with 45 supported programmes receiving additional funds against an anticipated 33. The final year of the strategic cycle saw an intensive deployment of the Glass Pipeline partnership initiative. With support across TIA's divisions, the Glass Pipeline partnership initiative has already yielded high-impact partnerships that have progressed innovations and leveraged third party funding with key institutional and private sector funders.

The total number of SMMEs which received support (KPI 2.3) in 2019/20 was 3,269. This was 571 lower than the planned target of 3,840. The reason for the lower than anticipated performance is provided in Table 6.

However, in line with the definition of KPI 2.4 (number of SMMEs owned by historically disadvantaged individuals assisted as percentage of total SMMEs receiving funding, support and/or technology services from TIA), the percentage of targeted SMMEs was exceeded – 81% actual vs. 69% targeted. This result is encouraging given that transformation is a national priority.

Strategic outcome oriented goal 3 positioned the agency's activities to stimulate an agile and responsive NSI. The target linked to KPI 2.5 (TIA's thought leadership indicator) has been well exceeded. Efforts across the entire agency to actively participate and lead in thought leadership initiatives have led to a number of partnership opportunities that have already been cemented in the financial year. These KPIs (2.5 and 3.2 – strategic partnerships) are indirectly linked – TIA's strong presence in promoting an engaged NSI has made linkages possible, that were perhaps not usually expected or anticipated.

11.2 PERFORMANCE OVER THE 2015/16-2019/20 MTSF

Table 8 summarises TIA's overall performance against its strategic objectives over the 2015/16-2019/20 MTSF period.

Table 8: TIA's performance against its strategic objectives over the 2015/16-2019/20 MTSF period

Year	Strategic objective 1: Provide technology development funding and support in high-impact areas	Strategic objective 2: Provide thought leadership and an enabling environment for technology innovation in collaboration with role players	Strategic objective 3: Develop an effective and efficient internal environment to successfully execute the strategy	Overall % Achievement
2015/16	100%	100%	79%	93%
2016/17	75%	100%	80%	86%
2017/18	75%	95%	60%	85%
2018/19	100%	99.5%	50%	91%
2019/20	100%	97%	50%	90%

Key:

- **Strategic objective met or exceeded**
- **Strategic objective partially met (>50%; <80%)**
- **Strategic objective not met (≤50%)**

At the start of the 2015/16-2019/20 MTSF, during the strategic planning process, TIA was very deliberate in crafting its strategic objectives. As a funder, TIA sought to support and facilitate the development and progression towards commercialisation of industry-enhancing technologies in cooperation with the broader NSI stakeholders to ensure seamless absorption of technologies to the market.

In order to lower barriers to technology development and transfer within the NSI, TIA committed to introduce innovation-related schemes targeting specific groupings, and specialised equipment and expertise to innovators including SMMEs. Given its strong institutional positioning within the family of entities accountable to the Department of Science and Technology[6], it also sought to provide thought leadership within the NSI on technology innovation.

Targets developed in line with delivering Strategic Objective 1 were consistently exceeded over the 2015/16-2019/20 period (Table 9). As TIA enters the 2020/21-2024/25 strategic cycle, it has set a solid foundation from which to implement its new strategy. A stronger focus on commercialisation during the 2015/16-2019/20 period has resulted in 113 innovation project outputs being brought to the market based on support from TIA. This pre-commercialisation phase is the handover point to the larger funders in the NSI, who according to their respective mandates have access to the funds and capacity to industrialise and expand market presence for the technologies supported by TIA. The achievement of 113 is more than double the target set out at the start of the MTSF of 51.

Another notable achievement over the MTSF is the additional funding attracted to TIA's portfolio. Cumulatively over the period, TIA has managed to achieve double the target set out (R551 million target vs. R1.11 billion achieved). The portfolio of projects supported by TIA has been sufficiently attractive to a wide variety of stakeholders to have attracted this level of additional funding.

KPI 1.4 was revised in 2017/18 to be aligned to GRAP standards. From 2017/18 onwards, the measure accounted for TIA's ability to disburse funding amounts that it had leveraged through collaborations and partnerships within the NSI. The amount of income recognised, therefore, was the additional funding made available to benefit innovators and technology development. This amount has increased over the period, implying greater than expected activity was enabled in the ecosystem through financial disbursements.

Table 9: TIA's performance over the 2015/16-2019/20 MTSF period against Strategic Objective 1: Provide technology development funding and support in high-impact areas

KPI	Description		2015-2020	2015/16	2016/17	2017/18	2018/19	2019/20
1.1	No. of technologies, processes and services advancing by one or more TRLs	Target	102	6	12	26	28	30
		Actual	202	27	31	34	30	80
1.2	No. of innovation project outputs taken up in the market	Target	51	4	14	10	11	12
		Actual	113	9	31	19	14	40
1.3	Amount of additional funding attracted into TIA's portfolio	Target	R551m	R75m	R59m	R113m	R147m	R157m
		Actual	R1.11bn	R97.9m	R182m	R117m	R379.3m	R331.9m
1.4	Amount of external income raised[7]	Target	R222.0m	R98m	R124m	-	-	-
		Actual	R264.8m	R153.8m	R111m	-	-	-
1.4	Amount of income recognised[7]	Target	R395.3m	-	-	R142m	R108.3m	R145m
		Actual	R339.5m	-	-	R67m	R127.4m	R145.1m

Key: **Target met or exceeded** **Target not met**

[6] *The previous name of the DSI.*

[7] *KPI 1.4 was amended from cash receipts to be aligned with GRAP principles (income recognised). The targets were revised accordingly for the years reported.*

As shown in Table 10, TIA has funded the production of 509 knowledge innovation products (KPI 2.1) over the MTSF, exceeding its target of 350. This is encouraging as a portfolio of high-value IP is necessary for economic value to be returned to SA through technology investments. These indicators have longer-term implications for SA's transition to a knowledge-based economy – and have provided the broader NSI with further invest opportunities.

Both KPI 2.1 and KPI 2.2 were over-achieved in the MTSF. Hard work to nurture both its own programmes and those where TIA is a partner has made an overall positive impact in the NSI. A committed effort towards supporting the development of the bio-economy has made this achievement possible.

A year-on-year increase in the number of SMMEs receiving support and technology services from TIA is noted. Although the agency has fallen short on meeting its final target, the trend in increased SMME support activity in the NSI is very promising. The percentage of SMMEs owned by historically disadvantaged individuals receiving TIA support has increased. The set target was to have greater than 69% achievement at the end of the MTSF period, and TIA was able to increase this to 81%.

TIA's rationale in creating KPI 2.5 was for the agency to provide thought leadership for technology innovation in collaboration with others. TIA's success in this endeavour is evident as it exceeded the target four-fold. TIA has contributed to the advancement of creating an engaged NSI where cross-pollination of expertise and new ideas have been shared through conferences, publications, think tanks, panel discussions, position papers and even policy recommendations.

Table 10: TIA's performance over the 2015/16-2019/20 MTSF period against Strategic Objective 2: Provide thought leadership and an enabling environment for technology innovation in collaboration with role players

KPI	Description		2015-2020	2015/16	2016/17	2017/18	2018/19	2019/20
2.1	No. of knowledge innovation products produced as a result of TIA funding and support programmes	Target	350	30	46	83	91	100
		Actual	509	76	64	98	110	161
2.2	No. of TIA-supported programmes receiving additional funding	Target	122	7	25	27	30	33
		Actual	140	8	25	31	31	45
2.3	No. of SMMEs receiving technology support	Target	14,200	2,000	2,200	2,800	3,360	3,840
		Actual	13,799	2,197	2,261	2,800	3,272	3,269
2.4	No. of SMMEs owned by historically disadvantaged individuals assisted as percentage of total SMMEs receiving funding, support and/or technology services from TIA	Target	69%	Develop measure	63%	65%	67%	69%
		Actual	> 69% achieved	New	64.4%	54%	74%	81%
2.5	No. of technology innovation initiatives undertaken by TIA	Target	124	3	10	31	37	43[8]
		Actual	500	27	56	73	144	200

Key: **Target met or exceeded** **Target not met**

[8] *The target set for the MTSF was 43, however, the APP for 2019/20 showed the target as 42. Since the KPI has been significantly overachieved, the discrepancy of 1 is not material.*

As shown in Table 11, TIA's ability to meet its investment approval turnaround time, KPI 3.1, has diminished over the MTSF period. This trend has highlighted that extensive engagements are often required during the proposal development phase to advance and mature an application from initiation to final approval. Notwithstanding TIA's rigorous application evaluation and due-diligence process, complexity also arises from the level of articulation of a technology concept. Whilst TIA has made attempts at refining its due diligence process, its role as a de-risker for other funders and development finance institutions necessitates some level of detailed technology, IP and commercial analysis. It is TIA's experience that if deficiencies that are identified at the application stage are not adequately addressed by the applicant, that these innovators have a lower chance of long-term success in technology development.

KPI 3.2 was introduced for the year under review and represents TIA's efforts in expanding its partnership and stakeholder networks.

Table 11: TIA's performance over the 2015/16-2019/20 MTSF period against Strategic Objective 3: Develop an effective and efficient internal environment to successfully execute the strategy

KPI	Description		2015-2020	2015/16	2016/17	2017/18	2018/19	2019/20
3.1	Investment approval turnaround time	Target	14 weeks	18 weeks	16 weeks	16 weeks	16 weeks	15 weeks
		Actual	Target not met	12 weeks	13 weeks	27 weeks	46 weeks	54 weeks
3.2	Number of NSI-related partnerships entered into (new in 2019/20)	Target	26	-	-	-	-	26
		Actual	32	-	-	-	-	32

Key: **Target met or exceeded** **Target not met**

12. PERFORMANCE INFORMATION

12.1 BIO-ECONOMY DIVISION

12.1.1 DIVISIONAL OVERVIEW

The Bio-economy Division supports the development and exploitation of bio-based technological innovations by enabling and facilitating the conversion of technology ideas into commercial opportunities. This is achieved through the provision of financial and non-financial support to advance technology development and to facilitate commercialisation and market uptake in agriculture, health, industrial biotechnology and IKS. TIA funds and supports projects, programmes and related initiatives to realise the objectives of the DSI's Bio-economy Strategy. Table 12 shows the Bio-economy Division's investment expenditure for 2018/19 and 2019/20 at unit level. Overall the Division achieved 82 knowledge innovation products produced, 45 technologies advancing by one or more TRLs and 18 knowledge innovation outputs taken up in the market. Additionally, R240.4 million was attracted into the Bio-economy portfolio through 26 of its supported programmes which received additional funding.

Table 12: Investment expenditure for the Bio-economy Division in 2018/19 and 2019/20

Programme/ Unit	2019/2020			2018/2019		
	Budget (R million)	Actual expenditure (R million)	(Over)/under expenditure (R million)	Budget (R million)	Actual expenditure (R million)	(Over)/under expenditure (R million)
Agriculture	49.1	50.1	(1.0)	28.5	19.0	9.4
Health	22.3	21.4	1.0	7.7	7.8	(0.1)
TPP	56.2	83.6	(27.4)	65.1	66.5	(1.4)
TICP	15.0	31.9	(16.9)	26.2	22.2	4.0
Total	**142.6**	**187.0**	**(44.3)**	**127.5**	**115.5**	**11.9**

The Bio-economy Division exceeded its investment expenditure budget for 2019/20. This means that the Division was able to disburse a greater amount of funds to investees and programmes than anticipated. Greater investment expenditure was realised in the financial year due to lower operational and administrative costs. This is an improvement compared to 2018/19, where units in the Division were constrained in their ability to spend as planned, mostly related to investee project-related milestones not being achieved as intended.

The additional funds available in 2019/20 made it possible to assist more projects and programmes in the Division to further their delivery on strategic outcome-oriented goals. The Division contributed to Strategic Outcome Oriented Goal 1 – which focuses on supporting the commercialisation of technological innovations – in the following manner.

- 56% of the agency's technologies that advanced by one or more TRLs (KPI 1.1) can be attributed to the Bio-economy Division, with the major contributors being Agriculture, TICP and the contracted SABDI programme.
- The Division also contributed 45% of the agency's projects that were taken up in the market (KPI 1.2). The main contributors were Health and the Forestry Genomics Cluster (TICP).
- Through both its project and programmatic approach to funding innovation, the Division's portion of income recognised (KPI 1.4) was 25% of the agency's total income recognised.

In support of Strategic Outcome Oriented Goal 2 (increased infrastructure access for technology development), the Division's performance is summarised as follows.

- Fifty one percent of the knowledge innovation products produced as a result of the agency's funding and support programmes were attributed to the Bio-economy Division – with notable performance from TPP, TICP and Agriculture.
- Infrastructure access for innovators in the South African Bio-economy ecosystem has been provided primarily through the TPP, with other units playing a supporting role.

The Bio-economy Division's contributions towards Strategic Outcome Oriented Goal 3 (stimulating an agile and responsive NSI) are as follows.

- Approximately 72% of the additional funding attracted into TIA's portfolio (KPI 1.3) can be attributed to the Division. The TPP and TICP have proven to be attractive to external stakeholders and have gained considerable financial interest.
- The Division contributed approximately 64% of the thought leadership initiatives (KPI 2.5) undertaken by the organisation.

MARKET ENTRY SUCCESSES

As technologies progress to a stage of complete development, there are market entry milestones which are essential to ascertain the market appetite for large-scale market entry. Whilst these are essential parts of the technology innovation journey, they are also crucial to promote market uptake of the developed technologies. The following market entry successes are highlighted for the Bio-Economy Division.

Agriculture

Microwave pasteurisation technology allows for the prevention of Salmonella enteritis transmission when using raw eggs in the food processing industry. The development of this technology, starting as early as 2002, has been through many phases of technology progression and has now in 2019 been exclusively licensed for market exploitation.

An early investment of R13.2 million by TIA predecessor the Innovation Fund, followed by a TIA investment of R4.6 million (matched Rand-for-Rand by the consortium, thus total R9.2 million), has seen the technology advance from an initial two-lane pasteuriser (approximately 4,000 eggs per hour) to an automated 16-lane system with a throughput of 48,000 eggs per hour.

Various industry in-situ trials have been concluded and TIA's investment and support from 2012 to present has brought the technology to TRL 8. An international patent has also been granted. The technology was developed from inception to completion through a consortium comprising academia, a science council, and industry partners (UP, Council for Scientific and Industrial Research (CSIR), Delphius Technologies & Consultancy CC and Eggbert Eggs).

MARKET ENTRY SUCCESSES (CONTINUED)

Forestry Genomics Cluster	The development of DNA fingerprinting services for the forestry sector began as early as 2004, initially for eucalyptus and then for pine species. The groundwork in this endeavour led to an expansion of scientific capability covering clonal identification, parentage analysis and ancestry informative panels for tree species and hybrid identification. Over the years, through DNA fingerprinting services, the FMG Programme has produced DNA profiles for over 50,000 trees representing a large proportion of the key tree breeding germplasm in South Africa. Since inception, an estimated R14.6 million has been invested collectively through the Cluster and industry for the development and implementation of DNA fingerprinting services. Sappi and Mondi were early industry partners, followed by York Timbers and Hans Merensky, with SAFCOL and NCT Forestry Co-Operative Limited being more recent FMG consortium members. TIA's role as funder and principal supporter of the Forestry Genomics Cluster, in conjunction with the team from University of Pretoria (UP) led by Prof. Zander Myburg, has allowed these services to continue to greatly benefit the Forestry sector in South Africa.
Forestry Genomics Cluster	Challenges faced by the forestry sector such as receding forest-lands due to deforestation, compels the use of high-end genetic science to optimise tree breeding programmes and forestry outputs. Starting in 2014, the FMG consortium co-led the development of a multi-species DNA marker chip – specifically a 60,000 single nucleotide polymorphism (SNP) chip was developed for Eucalyptus. The FMG Programme was one of the initial Consortium members and early adopters of the technology, whose cost at the time was $51 per tree. The SNPs serve as markers for desirable traits for forestry breeding programmes. The various scientific development phases that led to a complete chip offering cost in the range of $120,000. The South African FMG was part of a consortium (Eucalypt SNP Array Initiative, ESAI) comprising 17 international organisations from nine countries, that will use the technology to genotype 28,800 eucalypt trees using the SNP chip over a three-year period, starting June 2019. The latest scientific development of this technology has led to an increased 72,000 SNP chips, providing insight into a greater amount of genetic mutations, whilst reducing the cost to $20, for the FMG, per tree.

Forest Molecular Genomics

"Over the past three years, TIA's successful partnership with the Forest Molecular Genomics Programme at UP has led to the development of novel genome-based breeding technologies for fast-growing eucalypt and pine tree species that produce the bulk of our country's timber, pulp and biorefinery products. TIA's support has been crucial to the development of local talent, leadership and innovation in plant biotechnology research. These young leaders will drive the emergence of a thriving bio-based economy with improved woody biomass feedstocks replacing fossil carbon materials to ensure a more prosperous and sustainable future for our country."

Prof. Zander Myburg, University of Pretoria

TESTIMONIAL

TIA IMPACT IN THE BIO-ECONOMY ECOSYSTEM THROUGH THE TECHNOLOGY PLATFORM PROGRAMME

TIA's strong presence in the South African bio-economy would not be possible without the TPP – which provides an all-encompassing technology-focus support to the bio-economy. Unlike TIA's investments into individual technology projects in other sections of its business, the Platforms have a systemic impact based on their specialised operating models. The statistics presented show the benefit of a sustained investment into the bio-economy, which would not be possible through discrete or once-off support initiatives.

The TPP has supported 570 projects in the bio-economy over the 2015/16-2019/20 MTSF. Table 13 shows that the development phase (TRL 3-7), which constitutes TIA's core focus, represented the largest percentage supported through the Platforms. Earlier phases (TRL 1-2) are the second highest development stage supported, indicating a healthy pipeline from which to integrate into mainstream technology development.

Universities, large entities and/or consortiums and private individuals formed the greater percentage of project originators over the five-year period. A larger percentage of SMMEs supported in 2019/20 is promising for the bio-economy. Health and industrial biotechnology were consistently dominant focus areas of projects supported.

Table 13: Categorisation of projects supported by the TPP (2015/16-2019/20)

	2015/16	2016/17	2017/18	2018/19	2019/20
Total number of projects	**102**	**119**	**113**	**98**	**138**
Project TRL					
1-2	29%	19%	15%	14%	20%
3-7	65%	63%	66%	66%	67%
8-9	6%	11%	9%	10%	9%
Other (work undertaken spanning multiple TRLs)	-	7%	10%	10%	4%
Client affiliation					
Private	28%	36%	12%	10%	14%
University	32%	31%	67%	83%	49%
Other (e.g. consortiums)	22%	18%	7%	1%	21%
Science council	8%	7%	6%	-	5%
Government	7%	5%	3%	6%	3%
SMME	3%	3%	5%	-	12%
Focus area					
Health	50%	48%	56%	64%	62%
Agriculture	11%	7%	8%	4%	8%
Industrial biotechnology	38%	41%	34%	26%	24%
Food and beverage	1%	2%	1%	4%	4%
Other	-	2%	1%	2%	2%

The Technology Platforms are able to stimulate the sector through their proximity to universities and researchers. To this end they provide support to students and interns going through the academic ranks. Table 14 summarises the academic profile of students supported by the Platforms. Whilst postgraduate programmes such as Masters and PhD degree-track students have been supported, there is still a noteworthy profile of undergraduate and Honours level students supported. Post-doctoral support has consistently improved, while gender parity has been marginally achieved over the five-year period. Black students have made up just over half of the 338 students supported. This bodes well for transformational aspirations towards the development of a strong black academic base in the bio-economy.

The TPP has enabled upstream and downstream institutional capacity building at research, development and bio-entrepreneurial level, thereby contributing to industry competitiveness.

Table 14: Academic and demographic profile of students supported by the TPP (2015/16-2019/20)

	2015/16	2016/17	2017/18	2018/19	2019/20
Number of students/interns supported at Technology Platforms	**49**	**98**	**53**	**56**	**82**
Level of education					
Undergraduate	11%	10%	12%	13%	6%
Graduate	-	-	3%	7%	20%
Honours	18%	8%	7%	8%	1%
Masters	39%	29%	23%	15%	22%
PhD	25%	31%	31%	32%	18%
Post-doctoral	7%	22%	24%	25%	33%
Gender					
Male	48%	45%	53%	52%	54%
Female	52%	55%	47%	48%	46%
Race					
Black	54%	45%	51%	54%	55%
White	31%	36%	26%	25%	23%
Coloured	4%	4%	6%	5%	6%
Indian	9%	12%	13%	13%	15%
Other	2%	3%	4%	3%	1%

Other innovation and support indicators are shown in Table 15 for the period 2016/17-2019/20. Through the Platforms alone, the bio-economy has seen a substantial number of knowledge innovation products developed. Translation into market uptake has ranged 4% to 19% over the four-year period. The latest developments in the sector, especially where TIA has played a leading role, are focused on support of bio-entrepreneurial ventures. The momentum and track record achieved over the period will facilitate consistent market uptake and translation, barring any disruptive events due to unanticipated market forces.

In addition, the development of black-owned SMMEs in the bio-economy will benefit from the next phase of interventions. The number of training opportunities for individuals and Platform staff has allowed specialist skills to be embedded in the programme over the period.

Table 15: TPP innovation and support indicators (2016/17-2019/20)

Indicator	2016/17	2017/18	2018/19	2019/20
Number of technologies developed/knowledge innovation products	28	21	43	50
Number of projects taken up in market	5	4	2	3
Number of projects with third-party funding	5	4	10	9
Number of black-owned SMMEs supported	-	6	9	9
Individuals trained	-	>100	305	358
Platforms staff trained	-	130	140	325*
Individuals trained (incubation support)	-	2	6	2

**Task Applied Sciences new partnership to TPP portfolio and CUBIC included.*

TECHNOLOGY PLATFORMS PROGRAMME

POSITRON EMISSION TOMOGRAPHY-COMPUTED TOMOGRAPHY RESEARCH FACILITY

The Cape Universities Body Imaging Centre, a TIA-funded technology platform, launched its Positron Emission Tomography-Computed Tomography core research facility during 2019/20 (Figure 6). This facility will advance South Africa's capability to conduct large-scale clinical studies and seek solutions for diseases with high prevalence in South Africa such as cancer, tuberculosis, and cardiovascular and neurological diseases. Strategically, this investment supports the expansion of infrastructure in the bio-economy and is a part of TIA's ongoing contribution to strengthen South Africa's capabilities to participate in strategic areas such as precision medicine.

The cutting-edge imaging facility was co-funded by TIA, the Bill & Melinda Gates Foundation, Aspen Holdings and the University of Cape Town. It will allow researchers to monitor progression from infection to disease and provide early indication of the efficacy of new drugs and drug combinations in a non-invasive manner. The facility will be particularly useful for clinical studies in tuberculosis, which is the leading cause of death in South Africa.

Figure 6: The Positron Emission Tomography-Computed Tomography facility at the Neuroscience Centre on the University of Cape Town Groote Schuur Hospital campus

12.1.2 AGRICULTURE

Aims to contribute to the development of high-growth and high-impact technologies, products and services that will result in a competitive, broad-based, inclusive and sustainably growing agriculture sector in South Africa, Africa and globally.

Focus Areas

- Breeding and productive technologies in livestock and field crops
- Animal and plant health and nutrition
- Agro-processing and post-harvest technologies

Objectives

- Facilitating commercialisation of agriculture projects and investments
- Facilitating co-funding and next round funding of agriculture projects and investments

Support activities include providing funding to key projects as well as non-financial support:

- Identifying new agriculture technology innovators
- Facilitating access to networks of agriculture technology innovators
- Interacting with research communities and other partners or investors
- Attracting follow-on funding to commercialise technologies

The performance of Agriculture for the year under review is summarised in Table 16.

Table 16: Agriculture performance information for 2019/20

Description	Achievement
Disbursements	R50.1m
Active disbursing projects (exposure)	R73.0m
New projects from open call process	4
New projects from the Agriculture Bio-economy Innovations Partnership Programme (ABIPP) call for proposals	5
Number of technologies, processes and services advancing by one or more TRLs	21
Number of innovation project outputs taken up in the market	2
Amount of additional funding attracted into TIA's portfolio	R63.5m
Amount of income recognised	R25.4m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	20
Number of TIA-supported programmes receiving additional funding	5
Number of technology innovation initiatives undertaken by TIA	10
Investment approval turnaround time	52 weeks
Number of NSI-related partnerships entered into	1

PROJECT EXAMPLE: POINT OF CARE DIAGNOSTICS FOR INFECTIOUS DISEASES

This technology was developed by the CSIR and has been funded by TIA since 2013 for an amount of R16 million. Under TCIP, the technology has been further developed and is now being supported by Agriculture to showcase and validate the technology in a controlled environment.

The technology is used to detect foot and mouth disease in cattle, with the potential to detect avian influenza in poultry. By being able to detect and determine the disease status of a livestock population government is in a position to respond and take the appropriate action. Typical users include entities involved in disease surveillance such as national and provincial government departments; commodity groups; and regional, communal, commercial and emerging farmers.

As a result of TIA's support the CSIR created a spin-out start-up company called TokaBio to commercialise the technology. The company has been able to secure the requisite regulatory approvals to deploy the technology in various African countries like Botswana, Rwanda and Lesotho. The government of Rwanda is currently trialling the diagnostic technology to monitor the health status of their livestock population and ensure that they remain competitive and are able to access global markets (Figure 7).

Figure 7: The TokaBio laboratory in Rwanda

12.1.3 HEALTH

Aims to develop healthcare technological innovations that prevent, diagnose and treat priority diseases in the country, which will assist in improving public health and the quality of life. Through improved technology healthcare products and services, the unit intends to contribute to SA's social and economic development through translation of knowledge resources and research and development (R&D) to products that contribute to better health outcomes for South African citizens and advance the country's global competitiveness in health-related areas.

Focus Areas

- Medical devices and diagnostics
- Pharmaceuticals and bio-pharmaceuticals
- IKS and complimentary medicines
- Priority diseases include HIV/AIDS, tuberculosis, malaria and non-communicable diseases such as cardiovascular disease, cancer and diabetes

Objectives

- Invest in affordable healthcare product projects
- Increase development of drugs especially in areas affected by HIV, malaria and tuberculosis
- Improve the current medical devices and diagnostic products and exploit expertise in cardiac and orthopaedic devices
- Develop the ability to manufacture vaccines locally
- Support local active pharmaceutical ingredient manufacturing

Support activities include providing funding for the development, registration, manufacturing and commercialisation of key projects as well as non-financial support that connects projects with

- Service providers that can assist in development of technologies;
- Downstream funders that could provide additional funding or facilitate the commercial uptake of technologies; and/or
- Potential customers that could commercially uptake technologies.

Provides support to innovators (who could be professors, researchers or technology developers) with projects between TRLs 4-8 that may already have companies established, where these are typically start-ups or SMMEs; or to innovators within universities and science councils.

The performance of Health for the year under review is summarised in Table 17.

Table 17: Health performance information for 2019/20

Description	Achievement
Disbursements	R21.4m
Active disbursing projects (exposure)	R115.4m
New projects from open call process	2
Number of technologies, processes and services advancing by one or more TRLs	4
Number of innovation project outputs taken up in the market	6
Amount of additional funding attracted into TIA's portfolio	R29.2m
Amount of income recognised	R8.3m
Number of technology innovation initiatives undertaken by TIA	16

PROJECT EXAMPLE: BIODX

Biodx Biological Chemical Technologies (Pty) Ltd is a technology-based company established in 2007 that has developed a proprietary technology (DECONT-X™) based on citrus extracts. The company worked with the CSIR over an eight-year period to develop DECONT-X™, a mild organic biocide tailored for applications in the agricultural, food and beverage, health and industrial industries.

The technology is used to develop environmentally friendly, safe and non-toxic biocides that do not contain any metals, formaldehyde or phenol groups and that is biodegradable, non-toxic and non-corrosive. The technology is relevant for accessing European markets, especially where the European Commission has banned the use of toxic chemicals in food production in the European Union.

TIA provided an amount of R14.3 million through the Technology Development Fund in 2014 and the Pre-Commercialisation Fund in 2016, to develop green biocide (DECONT-A™), a derivative of DECONT-X™, to specifically meet the product specifications of Eskom and to position the product for the European industrial water sector. The funding also included product registration in the European Union as the final milestone. The company is now involved in production of the biocide that can be used to decontaminate surfaces in response to COVID-19. Figure 8 - Figure 10 shows the effects of applying the Biodx biocide in an industrial test setting.

Figure 8: Biodx industrial test-site

Figure 9: Water before treatment

Figure 10: Water after treatment

TESTIMONIAL

BIODX

"There are a number of factors that influence the qualification of a company's compliance to inventive, innovative and new. Biodx, after having won an award at the inaugural annual Innovation Bridge (2015) in green biocides in the 'Innovation most likely to find widespread markets internationally' category, has put this to the ultimate qualification challenge of registering a biocide in Europe. The main criteria for a biocide to be accepted for registration in Europe is that it has to be inventive, innovative and new. Biodx expects this registration in the last quarter of 2020 after a five year and R20 million investment for this compliance.

TIA contributed significantly throughout the period 2014-2016 by educating the entrepreneur in good governance, particularly the aspects referencing King IV. Dr Anita Burger and her team de-risked Biodx by moulding the company into a professional operational and behavioural framework. This was substantiated when Biodx succeeded in raising further funding from the IDC.

Biodx is now a TRL 7 company and recognises the significant positive impact TIA had on Biodx throughout the R&D stages of the company."

Burt Rodrigues, Chief Executive Officer, BIODX

12.1.4 TECHNOLOGY PLATFORMS PROGRAMME

The TPP aims to facilitate access to cutting-edge technological capabilities by investing in and supporting entities to acquire appropriate technologies and expertise that in turn lowers the barriers for others to innovate. The Programme supports the development of technologies with commercialisation potential and contributes to the creation of a vibrant bio-economy. The programme also provides funding and expert support to host institutions to acquire high-end infrastructure and to develop scientific and technical expertise necessary to build long-term strategic capabilities. It supports a wide range of technology innovators within the NSI inclusive of universities, science councils, SMMEs and international organisations.

The Programme enables the provision of technology development services, from proof of concept stage up to commercialisation, specialised training and capacity development opportunities for role-players in multiple value chains. The programme is a critical element of TIA's implementation of the Bio-economy Strategy.

The Platforms collectively hosted a total of 138 projects during the period under review. Health-related projects comprise 62% of the portfolio, followed by industrial biotechnology projects (24%). Strategic partners include higher education institutions, science councils and international funders.

The platforms are as follows.

- Bioprospecting Platform (University of Venda)
- SAENSE - Metagenomics Platform (University of the Free State)
- National Metabolomics Platform (North-West University (NWU))
- Drug Discovery and Development Platform - H3D (University of Cape Town (UCT))
- Centre for Proteomics and Genomics Research - CPGR (Cape Town)
- Biosafety South Africa (Somerset West)
- Bioprocessing Platform (Umbogintwini)
- Cape Universities Body Imaging Centre (joint initiative between UCT, Stellenbosch University, SAMRC and Siemens)
- TASK Applied Sciences (Cape Town)
- KwaZulu-Natal Research Innovation and Sequencing Platform - KRISP (University of KwaZulu-Natal)

The performance of TPP for the year under review is summarised in Table 18.

Table 18: TPP performance information for 2019/20

Description	Achievement
Disbursements	R83.6m
Number of technologies, processes and services advancing by one or more TRLs	3
Number of innovation project outputs taken up in the market	3
Amount of additional funding attracted into TIA's portfolio	R131.1m
Amount of income recognised	R0.2m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	47
Number of TIA-supported programmes receiving additional funding	8
Number of SMMEs receiving technology support	28
Number of technology innovation initiatives undertaken by TIA	53

PROJECT EXAMPLE: LYSOSOMAL STORAGE DISEASES

Sanofi Genzyme, in collaboration with the Centre for Human Metabolomics, launched a ground-breaking initiative in April 2019 that allows for enzyme assay analysis for lysosomal storage disorders (LSDs) to be performed in SA for the first time with a quick two-week turnaround time. Previously most of the specific diagnostic tests for LSDs were performed at either European or American based laboratories, which could take up to eight weeks to complete.

The National Metabolomics Platform developed a quantitative measurement for six LSD diseases, namely Gaucher disease, Fabry disease, Pompe disease, Krabbe disease, Mucopolysaccharidosis type I and Niemann-Pick type A and B enzyme activities from dry blood spots. This joint development took two years and led to the commercialisation of IP in the technology platform in collaboration with a multinational biotech company. This has led to quicker diagnosis of patients and the generation of revenues from a service that was previously not available in South Africa.

Figure 11: The Lysosomal storage diseases project team

12.1.5 TECHNOLOGY INNOVATION CLUSTER PROGRAMME

Technology innovation clusters are collaborative programmes, aimed at leveraging the strengths of multiple partners to drive a technology solution and alleviate common industry challenges, thereby lowering the barriers to innovation in the sector. Cluster interventions entail the provision of support from the proof of concept stage, focusing on projects that are likely to be commercialised by the industry. This is enabled through the provision of funding, technical support and business enabling services, including the development of human and intellectual capital.

TIA has adopted the TICP model as a mechanism to drive coordinated multi-party R&D initiatives. As a collaborative programme, its aim is to leverage the strengths of partners to develop technology solutions. TIA specifically plays a funding, connector and facilitation role and is therefore the catalyst for establishing and managing Technology Innovation Clusters. Its purpose is to facilitate greater collaboration within the existing ecosystem by leveraging the strengths of respective partnering groups. The main objective of the Programme is to address national priorities or areas of strategic social and economic importance through the utilisation of technology innovation.

The Clusters established and managed by the TICP are depicted in Table 19.

Table 19: TICP portfolio

Cluster	Host institution	Description
Beef Genomics	Agricultural Research Council	Develop enhanced breeding programme including genotypes and difficult to select traits.
Dairy Genomics	University of Pretoria	Develop enhanced breeding programme including genotypes.
Forestry Molecular Genomics	University of Pretoria	Implementation of genomics and biotechnology in the forestry ecosystem.
Active Pharmaceutical Ingredient	Noth-West University	Develop an active pharmaceutical ingredient (API) small-molecule manufacturing industry in South Africa.
uYilo Electric Mobility	Nelson Mandela University (NMU)	To facilitate the development of e-mobility technologies such as energy storage in South Africa.
Animal Health Cluster	University of Pretoria, Agricultural Research Council, Council for Scientific and Industrial Research, Onderstepoort Biological Products	Improved new vaccines, pharmaceuticals and diagnostics for the industry.

Key strategic partners in the TICP include higher education institutions, science councils, government departments, technology incubators and the private sector.

The performance of TICP for the year under review is summarised in Table 20.

Table 20: TICP performance information for 2019/20

Description	Achievement
Disbursements	R31.9m
Number of technologies, processes and services advancing by one or more TRLs	15
Number of innovation project outputs taken up in the market	7
Amount of additional funding attracted into TIA's portfolio	R13.8m
Amount of income recognised	R3m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	14
Number of TIA-supported programmes receiving additional funding	10
Number of technology innovation initiatives undertaken by TIA	35

PROJECT EXAMPLE: ACTIVE PHARMACEUTICAL INGREDIENT CLUSTER

The establishment of the API Cluster was a significant achievement for TIA in 2019/20. The API Cluster aims to promote technology development and commercialisation of API manufacturing in SA by focusing on the synthesis of small molecule APIs for human health using modern manufacturing technology. Emerging trends and competitiveness of the industry are strong motivators to enhance the security of supply of critical drugs and address the imbalance of imports versus export in this sector, positioning the country as a strategic regional API manufacturing hub.

The Cluster will drive the development of an innovative, competitive and world-class API manufacturing industry in SA through leveraging the existing skills, technologies and facilities. The advent of the Cluster represents an aggressive locally developed technology strategy which can be used to leverage collaboration and partnerships within the pharmaceutical sector. The strategy will be underpinned by realigning current capabilities residing at various universities, research institutes and commercial companies towards a focused API process synthesis and engineering programme.

The target is the development of drug master files for competitive manufacturing of targeted APIs and leveraging this to set up a commercial pipeline for local API manufacturing. The intention is to successfully demonstrate SA's potential self-reliance to establish API manufacturing capabilities.

The investment in the establishment of local API manufacturing capabilities will have several direct and indirect benefits, as follows.

- Reducing SA's reliance on imported APIs, thereby contribution towards reducing the national trade deficit in the pharmaceutical sector
- Leverage funds from local and international funding sources
- Job creation through the establishment of new manufacturing facilities, SMME development and supporting the advancement of black entrepreneurship in the pharmaceutical manufacturing sector
- Improved industry productivity
- Training and capacity building for the pharmaceutical sector across the value chain
- Development and diversification of the chemicals sector, export of APIs to the Southern African Development Community (SADC) region and human capital development

12.1.6 CONTRACTED BIO-ECONOMY PROGRAMMES

The Bio-economy Division manages three contracted programmes on behalf of the DSI. They are the Strategic Industrial Bio-innovation Programme, which is aligned to the Industrial Biotechnology portfolio; SABDI, which is a cross-cutting programme supporting health, agriculture and industrial biotechnology; and ABIPP, a multi-disciplinary programme supporting various agriculture industries such as aquaculture and grain production. The total portfolio of investments under these programmes increased by eight projects (three under SABDI and five to support the aquaculture value chain under ABIPP). Accordingly, the number of projects within the contracted programmes has grown to 35 projects with a combined value of R88.1 million.

The bio-economy focus areas within the contracted programmes are the agriculture sector (82%), followed by environment (15%) and health (3%). The projects predominantly involve small enterprises (54%), followed by universities (35%) and science councils (11%).

The contracted Bio-economy Programmes' performance for the year under review is summarised in Table 21.

Table 21: Bio-economy Division: contracted programmes' performance for 2019/20

Description	Achievement
Disbursements	R21.4m
Active disbursing projects (exposure)	R115.4m
New projects from open call process	2
Number of technologies, processes and services advancing by one or more TRLs	4
Number of innovation project outputs taken up in the market	6
Amount of additional funding attracted into TIA's portfolio	R29.2m
Amount of income recognised	R8.3m
Number of technology innovation initiatives undertaken by TIA	16

PROJECT EXAMPLE: OPEN GENOME PROJECT

Prof. Maritha Kotze is a leading breast cancer expert based at Stellenbosch University. She co-founded SMME Gknowmix, which enables health professionals to apply leading-edge genomic knowledge to health and disease management, without the need for a degree in genetics. Family-inherited cancers are well-profiled, however most cancers today arise through environmental risk and these complex mutations are not well-characterised.

The Open Genome Project incorporates an array of patient genetic data with disease symptoms, family history, treatment options, environmental risk, etc. to effectively treat and manage breast cancer. Clinicians, scientists, genetic counsellors and other professionals provide input into the algorithm so that a composite three-dimensional profile of each patient is obtained to effectively treat the disease. It is termed 'open' because new information is being continually added for the breast cancer genome.

The Open Genome Project is one of the first true precision medicine projects in South Africa and has been receiving increased international attention because of its holistic approach in the treatment of complex diseases such as breast cancer. It is already being used to treat patients as the number of major medical aid companies buying into the project is growing. The treatment approaches are not only cost-effective but improve the quality of life for patients. The project is expected to deliver a precision medicine treatment system for breast cancer which incorporates patient genetic and disease data to provide treatment options based on collective expert knowledge. The system depicted in Figure 12 can effectively be used to model any complex disease for effective treatment outcomes.

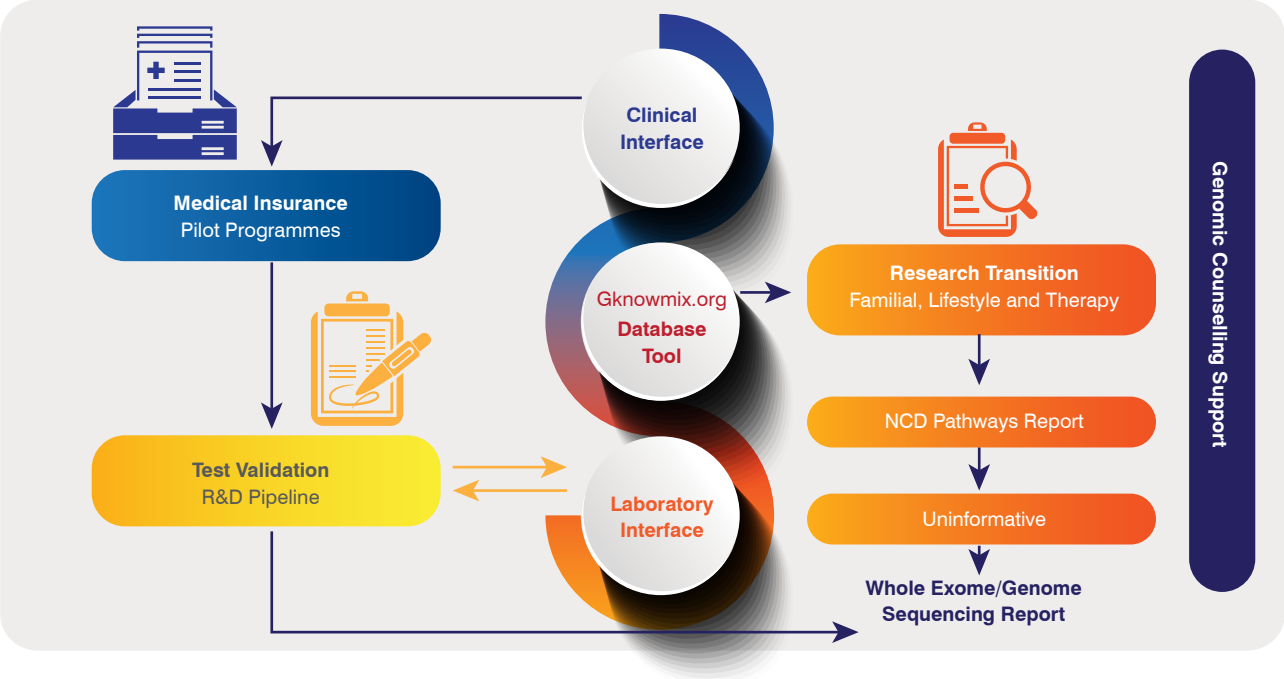


Figure 12: The three-pronged multi-platform pathology-supported genetic testing framework

12.2 SECTOR FUNDING DIVISION

12.2.1 DIVISIONAL OVERVIEW

The Sector Funding Division comprises the Advanced Manufacturing, Energy, ICT and Natural Resources business units. The Division contributed to the achievement of the organisation's Strategic Outcome Oriented Goals by providing the necessary financial and non-financial support to its portfolio of contracted investees who are developing technologies within the respective technology domains.

Table 22 shows the Sector Funding Division's investment expenditure for the year under review at unit level. Overall, the investment expenditure presented allowed the Division to achieve nine knowledge innovation products being produced, 24 technologies advancing by one or more TRLs and 17 innovation outputs taken up in the market. The activities associated with the expenditure also contributed to attracting R68.5 million into the Sector Funding portfolio.

Table 22: Investment expenditure for the Sector Funding Division in 2018/19 and 2019/20

Programme/Unit	2019/2020			2018/2019		
	Budget (R million)	Actual expenditure (R million)	(Over)/under expenditure (R million)	Budget (R million)	Actual expenditure (R million)	(Over)/under expenditure (R million)
Advanced Manufacturing	15.2	18.3	(3.1)	21.1	22.5	(1.4)
Energy	14.0	18.9	(4.9)	14.6	20.0	(5.3)
ICT	20.0	25.9	(5.9)	10.5	15.1	(4.6)
Natural Resources	20.5	20.7	(0.2)	20.3	20.3	(0.0)
Total	**69.7**	**83.8**	**(14.1)**	**66.5**	**77.9**	**(11.3)**

The Sector Funding Division exceeded its investment expenditure budget for 2018/19 and 2019/20. This implies that the Division was able to disburse a greater amount of funds to investees than anticipated. In 2018/19, additional funds were made available to projects where investee project-related milestones were not achieved as planned in other divisions. For 2019/20, due to lower operational and administrative costs, investment expenditure was increased. These additional funds made it possible to assist more projects in support of developing technological innovations, and to mobilise other NSI players in collaboratively providing the necessary support towards commercialisation of technological innovations.

The Division contributed to Strategic Outcome Oriented Goal 1 – which focuses on supporting the commercialisation of technological innovations – in the following manner.

- 30% of the agency's technologies that advanced by one or more TRL can be attributed to the Sector Funding programme with the major contributors being Natural Resources and ICT.
- The Division also contributed 43% of the agency's projects that were taken up in the market. The main contributors were Energy and ICT.
- Through its project-focus approach to funding innovation, the Division's portion of income recognised was 5% of the agency's total.

The Sector Funding Division's contributions towards Strategic Outcome Oriented Goal 3 (stimulating an agile and responsive NSI) are as follows.

- Approximately 21% of the additional funding attracted into TIA's portfolio can be attributed to the Division. The main contributor to this is ICT. The achievement of this KPI demonstrates the Division's ability to collaborate, in an ecosystem approach, with other stakeholders in the NSI.
- The Division contributed approximately 24% of the thought leadership initiatives conducted by the organisation. This demonstrates the ability of the Division to pull the NSI together towards a common goal, to improve the lives of South Africans.

This financial year is the last reporting period under the 2015/16-2019/20 strategic period. In the past five years, emphasis was on technology development which has created a good pipeline for technology commercialisation efforts earmarked in the upcoming 2020-2025 strategic period. More than 117 technologies have been taken up in the market during the past five years.

Table 23 shows funds disbursed by the Sector Funding Division over the past five years to contracted investees to develop their technologies, as well as funds leveraged and attracted to the Division.

Table 23: Funds disbursed by the Sector Funding Division over the 2015/16-2019/20 strategic period

	Funds disbursed (R million)					
	2015/16	2016/17	2017/18	2018/19	2019/20	TOTAL
Disbursements	54.3	62.1	70.3	77.9	83.8	348.4
Leveraged funds	1.7	53.5	24.5	51.5	68.5	199.7
Funds attracted to the Sector Funding Division	11.1	3.1	1.5	3.5	7.1	26.3

During 2019/20, a total of R1.2 million was received as royalty payments from two funded projects.

- Advanced Imaging Technology – specialises in image and signal processing, hardware and software development, advanced data analysis, x-ray imaging, embedded systems and system integration.
- Bandwidth Adaptive Real-Time Video Broadcasting – a technology that opens the opportunity to build a new Pan-African unmanaged mobile Internet television industry. The Micro-Enterprise Media Engine platform is an appropriate technology for high and low infrastructure regions to broadcast live television streams over the mobile Internet with better picture quality than is currently possible with existing solutions and at significantly lower cost.

MARKET ENTRY SUCCESSES

As technologies progress to a stage of complete development, there are market entry milestones which are essential to ascertain the market appetite for large-scale market entry. Whilst these are essential parts of the technology innovation journey, they are also crucial to promote market uptake of the developed technologies.

Energy		HyPlat (Pty) Ltd, a spin-off from the UCT's HySA Catalysis programme, has developed a membrane electrode assembly - a critical component in hydrogen fuel cells. The technology entered the TIA portfolio at TRL 4. With TIA's support over the last three years and the injection of R28 million in funding, it is now at TRL 6 and in the initial stages of market uptake. The company has attracted potential investors who are in the process of concluding an equity investment deal which will inject the necessary funding that will result in growing the company and commercialising the membrane electrode assembly technology in more fuel cell markets.
Advanced Manufacturing		The polymer nanocomposites advanced packaging material is a technology that entered the portfolio at TRL 3. The agency committed approximately R14 million to develop the technology which would benefit the food packaging sector, offering amongst other benefits, extended shelf life of food products. Within the 36-month technology development phase, the technology has already been demonstrated in an industrial setting at a potential manufacturer and was well received, however further refinements are required. The technology has been developed to TRL 6, and with further refinements, the investee is in good stead for its eventual full entry into the market.
ICT		Technovera is a social impact start-up that is solving last-mile inefficiencies for chronic medication access in Africa by reducing collection times and queues in public healthcare facilities. Its offering, Pelebox, is a smart-locker solution that enables the efficient collection of repeat medication at health care facilities. Technovera's Pelebox supports the agenda for universal access to quality care and aligns with the Sustainable Development Goal 3 targets of ensuring healthy lives and promoting the wellbeing for all. TIA's investment of R240,800 over a three-month period has brought the technology solution closer to sustainable commercial scale through the development of software automation components. It entered TIA's portfolio at TRL 7 and TIA's support has taken it to TRL 8 whilst supporting it to commercial market entry.

12.2.2 ADVANCED MANUFACTURING

Advanced Manufacturing aims to utilise technological innovations as a driver to support the development of a knowledge economy in manufacturing, by accelerating both the manufacturing capability and the knowledge intensity of the industry, to increase and sustain the competitiveness and innovation in SA's manufacturing industry.

Focus Areas

- Chemicals, electronics, materials and automation
- Photonics and aerostructures
- Production technologies and advanced electronics
- 4IR technologies

Objectives

- To facilitate commercialisation of TIA projects/ investments
- To facilitate co-funding and next round funding of TIA projects/investments
- To participate, co-ordinate and contribute to building the advanced manufacturing innovation ecosystem and seek alignment with key stakeholders (such as the DSI's Advanced Manufacturing Technologies Directorate and other actors in the manufacturing sector)

The performance of Advanced Manufacturing for the year under review is summarised in Table 24.

Table 24: Advanced Manufacturing performance information for 2019/20

Description	Achievement
Disbursements	R18.3m
Active disbursing projects (exposure)	R77,4m
Number of technologies, processes and services advancing by one or more TRLs	3
Number of innovation project outputs taken up in the market	3
Amount of additional funding attracted into TIA's portfolio	R5.8m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	1
Number of technology innovation initiatives undertaken by TIA	12

PROJECT EXAMPLE: NOVELQUIP

Current methods of tree planting are inefficient, requiring a collection of high-cost equipment and exposing workers to harsh, strenuous and unsafe working conditions. The Novelquip project entails the development of a fully-automated seedling planter called the ProPlant for forestry application. The need for modernised tree planting solutions is underscored by the imperative to combat climate change and deforestation and to cater to the need for timber and wood by-products of the world's growing populations.

The ProPlant is the world's first fully mechanised seedling planter that prepares the soil, extracts the seedling from the nursery tray, plants the seedling, and applies water, fertiliser and herbicide. The system digitally transforms planting operations with its global positioning system and management software, which facilitates planning, execution and reporting. Intended users include commercial foresters and their contractors as well as governments, corporates and non-governmental organisations undertaking natural forest regeneration projects.

In the year under review Novelquip successfully trialled its ProPlant single head planter (Figure 13) with forestry partners in Brazil and SA. It also secured an agreement with a leading international original equipment manufacturer to integrate the ProPlant technology onto the manufacturer's existing platform with a view to distribute the product globally.

Figure 13: Field trials of the Novelquip ProPlant single head planter

12.2.3 ENERGY

Energy supports the development of innovative energy technologies that will result in a competitive and sustainable energy industry that promotes South Africa's transition to a low carbon economy, with a particular emphasis on renewable and energy storage technologies. The business unit provides support to technology innovators in the energy sector with projects between TRLs 3-8 that have the potential for commercial impact and improve the quality of life of South Africans.

Focus areas

- Renewable energy
- Energy storage
- Hydrogen and fuel cells
- Energy management and clean coal technologies

Objectives

- To fund energy-related technological innovations that will have an impact on the quality of lives of all South Africans, including the youth, disabled people and rural communities
- To provide non-financial support by leveraging new and existing relationships to assist TIA-funded technologies

The performance of Energy for the year under review is summarised in Table 25.

Table 25: Energy performance information for 2019/20

Description	Achievement
Disbursements	R18.9m
Active disbursing projects (exposure)	R68.6m
New projects	2
Number of technologies, processes and services advancing by one or more Technology Readiness Levels	3
Number of innovation project outputs taken up in the market	3
Amount of additional funding attracted into TIA's portfolio	R10.0m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	1
Number of technology innovation initiatives undertaken by TIA	8

PROJECT EXAMPLE: COMPRESSED AIR ENERGY STORAGE

This project involves the development of a mechanism that uses compressed air to efficiently store energy generated for use at a later date (Figure 14). It enables the storage of electrical energy using compressed air as an alternative to other energy storage technologies such as batteries. This contributes to the reduction of electricity costs as a result of using energy generated during off periods.

Figure 14: The compressed air energy storage system

12.2.4 INFORMATION AND COMMUNICATION TECHNOLOGY

The business unit supports the development and exploitation of ICT-driven innovations with a broad social-economic impact, thereby addressing unemployment, inequality and poverty. It further supports grassroots innovators and the development of technologies that will increase SA's competitiveness and participation in the 4IR. The business unit provides support to ICT innovators with projects from TRLs 3-8 that may already have companies established.

Focus Areas

- Broadband
- Service economy
- Industry applications

The performance of ICT for the year under review is summarised in Table 26.

Table 26: ICT performance information for 2019/20

Description	Achievement
Disbursements	R25.9m
Active disbursing projects (exposure)	R36.4m
New projects	9
Number of technologies, processes and services advancing by one or more TRLs	10
Number of innovation project outputs taken up in the market	10
Amount of additional funding attracted into TIA's portfolio	R50.2m
Amount of income recognised	R4.1m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	4
Number of technology innovation initiatives undertaken by TIA	15

PROJECT EXAMPLE: DIGITAL IMAGING SOLUTIONS

Digital Imaging Solutions is a radiology medical ultrasound imaging artificial intelligence (AI) solution for improved performance in breast cancer screening (Figure 15). The system will reduce diagnostic and therapeutic errors that are inevitable in human clinical practice. The medical practitioners simply upload images and have the results presented through a user frontend interface.

TIA's investment will enable the implementation of the AI algorithms for ultrasound image processing. The project entails developing a deep learning ultrasound image processing engine that can identify and classify breast cancer lumps. The uniqueness of the model is that it not only detects the cancer, but also diagnoses which type of cancer it is. The scope of the project is focused on ductal and lobular cancer, which represent 95% of breast cancer cases.

The project will enable medical practitioners to diagnose cancer patients quicker and more accurately than currently and offers more opportunities for predictive diagnostics in medical imaging radiology. Delays in diagnosis often involve a biopsy and a battery of other tests which impacts the time to treatment and the quality of life for patients. The technology also fits with government's objectives concerning the management of non-communicable disease by addressing access to early breast cancer detection and diagnosis.

Figure 15: The radiology medical ultrasound imaging AI solution for fast and accurate diagnosis of breast cancer

12.2.5 NATURAL RESOURCES

Natural Resources supports initiatives to ensure water security by using advanced technologies to improve efficiencies in water management, thereby supporting national efforts to solve the water crisis. This business unit also contributes towards enhancing the competitiveness of SA's natural resource industries, through waste management initiatives, and the exploitation and beneficiation of mineral resources. Innovators typically include SMMEs who have developed matured technologies.

Focus Areas

- Mining processing
- Mineral value addition
- Water resources, environmental management and waste management

Objectives

- Improving mining production to render it more efficient, safe and competitive
- Ensuring water security and containing water leaks
- Beneficiation of waste
- Upgrading and adding value to minerals
- Developing skills to improve technology development and the commercialisation of resultant technologies

The performance of Natural Resources for the year under review is summarised in Table 27.

Table 27: Natural Resources performance information for 2019/20

Description	Achievement
Disbursements	R20.7m
Active disbursing projects (exposure)	R78.3m
New projects	5
Number of technologies, processes and services advancing by one or more TRLs	8
Number of innovation project outputs taken up in the market	2
Amount of additional funding attracted into TIA's portfolio	R2.4m
Amount of income recognised	R3.0m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	3
Number of technology innovation initiatives undertaken by TIA	13
Investment approval turnaround time	78 weeks

PROJECT EXAMPLE: TRAILBLAZER TECHNOLOGIES

Trailblazer technology aims to provide a disruptive solution using its novel and widely patented KNeW™ (Potassium Nitrate ex-Waste) process for treating harmful industrial and mining effluents such as acid mine drainage (AMD), shown in Figure 16. The KNeW™ process seeks to not only eliminate waste but to convert harmful by-products into saleable materials for use in the fertiliser industry.

The demonstrated KNeW™ process functions as an integrated process together with the two ancillary processes, namely the ZIX_ZAG configuration and the Nitric Acid Absorber process. The ZIX-ZAG configuration is aimed at improving the process efficiency of the KNeW™ process. The nitric acid absorber facility produces nitric acid which is an essential ingredient in the manufacturing of the fertiliser. Producing the nitric acid along with the KNeW™ process increases the overall profitability of the technology as nitric acid is expensive to transport.

An important outcome of this technology is a continuous and efficient KNeW™ process with its ancillary processes which can be sold as separate technologies or as a sellable full technology package. The KNeW™ process has been operated continuously, optimised and has treated real mine effluent. A demonstration of this process has produced a high quality water product.

Typical users of this technology include mining companies that produce AMD and manufacturing industries, as well as government departments tasked with wastewater treatment and AMD treatment decanting from abandoned mines. The project has registered IP in China and the United States. There is also interest to construct a similar plant in Mexico.

Figure 16: A ring of PLC-controlled multiport valves for resin regeneration; dilute nitric acid to regenerate the cation resin and methanol for the anion resin with a portion of the annex line at the back

12.3 PROGRAMMES DIVISION

12.3.1 DIVISIONAL OVERVIEW

The Programmes Division aims to stimulate a culture of innovation and provide enabling support through a range of interventions that enable the development of innovative solutions that address societal challenges. Support is provided through increasing access for innovators and SMMEs to science, engineering and technology infrastructure and expertise, direct funding and skills development. The Division targets broader society, from universities and science councils to cooperatives and communities.

Table 28 shows the Programmes Division's investment expenditure for the year at unit level. Overall, the Division produced 70 knowledge innovation products, 11 had technologies advancing by one or more TRLs and saw five innovation outputs taken up in the market. The activities associated with the expenditure also contributed to attracting R23.0 million into the Programme Division's portfolio and allowed 19 of its supported programmes to receive additional funding. Investment expenditure enabled the support of 3,241 SMMEs in the year.

The Programmes Division marginally exceeded its investment expenditure budget for 2019/20. This means that the Division was able to disburse more funds to investees and programmes than anticipated. Where investment expenditure was lower than anticipated, in certain programmes, due to investee project-related milestones not being achieved as intended, these funds were reallocated to the SFP, allowing an additional R4.0 million to reach relevant beneficiaries. Comparing to 2018/19, the SFP in both financial years was able to accommodate the support of additional innovators.

Table 28: Investment expenditure for the Programmes Division in 2018/19 and 2019/20

Programme/Unit	2019/2020			2018/2019		
	Budget (R million)	Actual expenditure (R million)	(Over)/under expenditure (R million)	Budget (R million)	Actual expenditure (R million)	(Over)/under expenditure (R million)
SFP	28.4	32.7	(4.3)	14.0	38.5	(24.5)
TSP	96.5	96.5	0.0	100.7	100.5	0.2
ISD	5.0	4.0	1.0	11.1	12.7	(1.6)
GCIP	4.0	2.4	1.6	5.5	4.9	0.6
YTIP	3.0	1.4	1.7	4.9	2.2	2.7
Total	**136.9**	**137.0**	**(0.0)**	**136.2**	**158.8**	**(22.6)**

The Division contributed to Strategic Outcome Oriented Goal 1 – which focuses on supporting the commercialisation of technological innovations – in the following manner:

- 14% of the agency's technologies that advanced by one or more TRLs can be attributed to the Programmes Division with the major contributor being the SFP.
- The Division also contributed 13% of the agency's projects that were taken up in the market (through the SFP).
- With both a project and programmatic approach to funding innovation, the Division's portion of income recognised was 38% of the agency's total.

In support of Strategic Outcome Oriented Goal 2 (increased infrastructure access for technology development), the Division's performance is summarised as follows:

- 43% of the knowledge innovation products produced as a result of the agency's funding and support programmes were attributed to Programmes – with notable performance from YTIP and SFP.
- 99% of all SMMEs receiving technology support were assisted through the Division. 81% of SMMEs receiving agency support were owned by historically disadvantaged individuals.
- Technology infrastructure access for innovators within the broader innovation ecosystem has been provided through the TSP, with 18 Technology Stations across the country.

The Programmes Division's contribution towards Strategic Outcome Oriented Goal 3 (stimulating an agile and responsive NSI) are as follows:

- About 7% of the additional funding attracted into TIA's portfolio can be attributed to the Division. ISDP and SFP were amongst the programmes of interest to external stakeholders.
- The Division contributed approximately 12% of the thought leadership initiatives conducted by the agency.

MARKET ENTRY SUCCESSES

As technologies progress to a stage of complete development, there are market entry milestones which are essential to ascertain the market appetite for large-scale market entry. Whilst these are essential parts of the technology innovation journey, they are also crucial to promote market uptake of the developed technologies.

Seed Fund Programme	 Vula Mobile developed and deployed to the market an idea to improve healthcare by linking registered health workers with specialists via specialised apps and an online dashboard. Funding of R637,500 was awarded through the Cape Design Institute Design Innovation Seed Fund in 2018. The funding has enabled Vula to reach important development milestones and assisted to take the technology from TRL 3 to TRL 8. Specific functions were added to the company's apps and server which enabled both growth and early commercialisation.  Vula has expanded from use in one hospital and one specialty to use in 2,191 health practices and 44 specialties across six provinces. Vula has grown rapidly with 9,100 registered health workers and 180,000 patients being helped. The company's first national service was launched, the National Vaccine Helpline, and it was also appointed as the national referral system by the National Department of Health.
Seed Fund Programme	 Developed by Prijap Biolife Biotechnologies (Pty) Ltd, Prijap Health is an organic herbal plant-based liquid that assists with immune boosting and general herbal health management and vitality that can contribute to improving the body's ability to fight off and recover from infections. TIA disbursed R380,529 to the project in 2018 through The Innovation Hub (TIH). Funding assisted the company to finalise the development and testing of herbal medicine with CSIR, scale up production to meet manufacturing standards at TIH Biopark laboratory space, and conduct market testing by supplying pharmacies in retail outlets. The herbal medicine is currently available through direct sales as well as in some pharmacies.
Technology Stations Programme	 The Institute of Advanced Tooling at Walter Sisulu University assisted an existing SMME to develop and manufacture moulds to produce high-performance carbon fibre surfboard fins. The product, developed within the span of a month with TIA support of R300,000, has been successfully demonstrated and commercialised with sales in SA and internationally. Commercialisation was made possible through the support of the Technology Station.

IMPACT OF TECHNOLOGY STATION IN A COMMUNITY

BELLINGHAM AND SMITH CRICKET BATS

The eNtsa Technology Station at NMU has been supporting Bellingham and Smith to manufacture cricket bats in Thornhill, a rural village in the Sarah Baartman District Municipality of the Eastern Cape (Figure 17). Through eNtsa's intervention the initial production figures of 50 minutes per unit (22 units per day) have been improved to eight minutes per unit (50 units per day). Nine hundred units had been produced over a three-month period, and the company has begun export negotiations with potential distributors.

Figure 17: The Bellingham and Smith factory interior

12.3.2 SEED FUND PROGRAMME

The SFP assists researchers based at universities, science councils and SMMEs through the provision of funding to translate their research outputs into fundable ideas for further development. The programme provides conditional grant funding for technologies between TRLs 3-8. The SFP supports innovators to achieve the following goals.

- Advance or mature research outputs and ideas to develop prototypes, proof of concept and business cases that could be used to attract follow-on funding opportunities and for further technology development
- De-risk research outputs for follow-on funding to attract other funders
- Assist innovators with small-scale trials and market testing
- Demonstrate innovation value propositions to attract commercial partners

The SFP is implemented in partnership with university and science council OTTs and together with regional development agencies and incubators. The programme has 33 active implementing partners, comprising 23 universities, three science councils, two regional development agencies and five technology incubators. A total of R32.7 million has been disbursed to university researchers and SMMEs to assist in developing their technologies, constituting a total of 64 new funded applications (Table 29).

Table 29: SFP recipients with number of funded applications and investment exposure by type of recipient

SFP recipient type	No. of applications funded in 2019/20	Investment exposure 2019/20
University	44*	R22.0m
SMME	20	R10.7m
Total	**64**	**R32.7m**

***37** new applications were funded from TIA's budget, while **seven** were funded from the surplus budgets the partners had retained from projects completed with surplus funds and terminated projects.

Applications to the programme during the year under review according to TIA focus areas are presented in Figure 18.

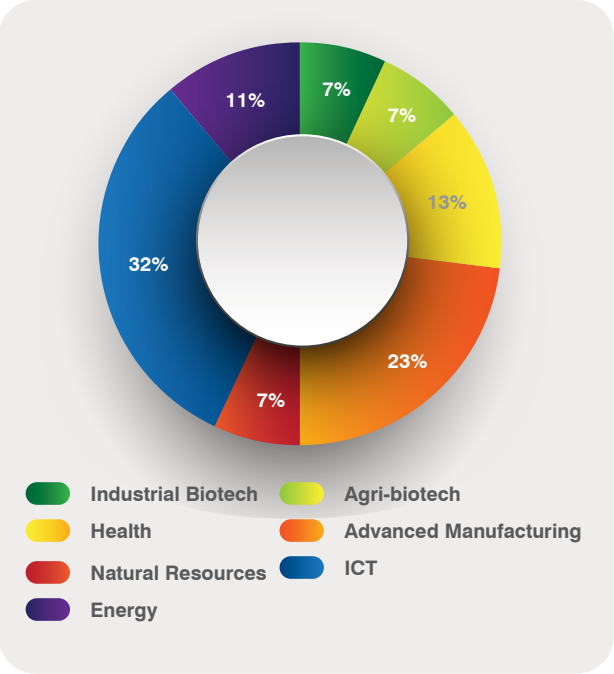


Figure 18: Sectoral spread of SFP applications in 2019/20

The performance of SFP for the year under review is summarised in Table 30.

Table 30: SFP performance information for 2019/20

Description	Achievement
Number of technologies, processes and services advancing by one or more TRLs	10
Number of innovation project outputs taken up in the market	4
Amount of additional funding attracted into TIA's portfolio	R13.7m
Amount of income recognised	R14.9m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	24
Number of TIA-supported programmes receiving additional funding	12
Number of technology innovation initiatives undertaken by TIA	4

SMME SEED FUND PROJECT EXAMPLE: THE SMARTBLADE VIDEO LARYNGOSCOPE

Mr Nick Nevin and Dr Caroline Corbett developed a SmartBlade Video Laryngoscope medical device (Figure 19) that harnesses smartphone technology to enable guided laryngoscopy, thus facilitating endotracheal intubation. Currently video laryngoscopy is cost-prohibitive to the individual clinician, small clinic and ambulance service. SmartBlade will thus enable single operators of varied skill levels to intubate difficult airways in a cost-effective way.

The SmartBlade project was funded by the TIA in March 2017 to the value of R484,275 through the SMME Seed Fund implementing partner Craft and Design Institute. The project was subsequently incubated at the Savant Technology Incubator with an objective of prototype development, premarket sample manufacture, market research as well as regulatory research to establish the product registration requirements. The project completed the intended activities successfully, resulting in the filing of two provisional patents and a design registration. Prototypes were manufactured and pre-clinical trials conducted using the SmartBlade technology, producing good results. The Android app was developed and is being tested. The company has secured follow-on funding of R9.5 million from Savant Venture Fund in May 2019 for technology optimisation and commercialisation.

Figure 19: The SmartBlade Video Laryngoscope device

UNIVERSITY SEED FUND PROJECT EXAMPLE: BAMBARA GROUND NUT FLOUR AND FIBRES

Cape Peninsula University of Technology (CPUT) researchers, lead by Prof. Victoria Jideani from the Department of Food Science and Technology, has used the Bambara Groundnut as a raw material to develop several gluten-, lactose- and cholesterol-free value-added products. These include dairy substitutes and baked goods. The products have the potential to be rapidly scaled up to provide niche and alternative products that are nutritious and marketable. The Bambara groundnut is rich in protein, fibre and antioxidants and contains added probiotics for maintaining good balance and composition of intestinal flora.

The project received funding to the total value of R644,400 under the University Seed Fund through the CPUT's OTT in 2017, with the objectives of upscaling the flour and dietary fibre production process, developing a recipe book and making different kinds of products for market testing.

The project demonstrated the flour-based products (Figure 20) in June 2019. The demonstration was performed primarily to attract commercial partners and follow-on investors and was well attended by the IDC, Wesgro and Invenfin. The CPUT OTT is leading the commercialisation process. It is proposed that the IP is licensed to a third-party that will manufacture and sell the Bambara products.

Figure 20: Bambara Ground nut flour-based products

SEED FUND PERFORMANCE 2015-2020

- **University Seed Fund**

In the period 2015/16-2019/20 a total of 329 applications were funded to the total value of R162.6 million under the University Seed Fund.

Figure 21 shows a noticeable decline in the number of applications and budget over time. At the start of the MTSF, the SFP limit per application was R650,000. This limit was increased to between R850,000 and R1 million allowed per project by 2019. Simultaneously, decreases in the MTEF allocation also meant that less money was available for the SFP compounded by the end of the three-year DSI Seed Fund contract in 2018. The impact on the SFP is evident in the downward trend. In 2019 however, DSI was able to make available an additional R14 million to the SFP, the increased number of applications is shown, and disbursements were balanced out due to additional funds available.

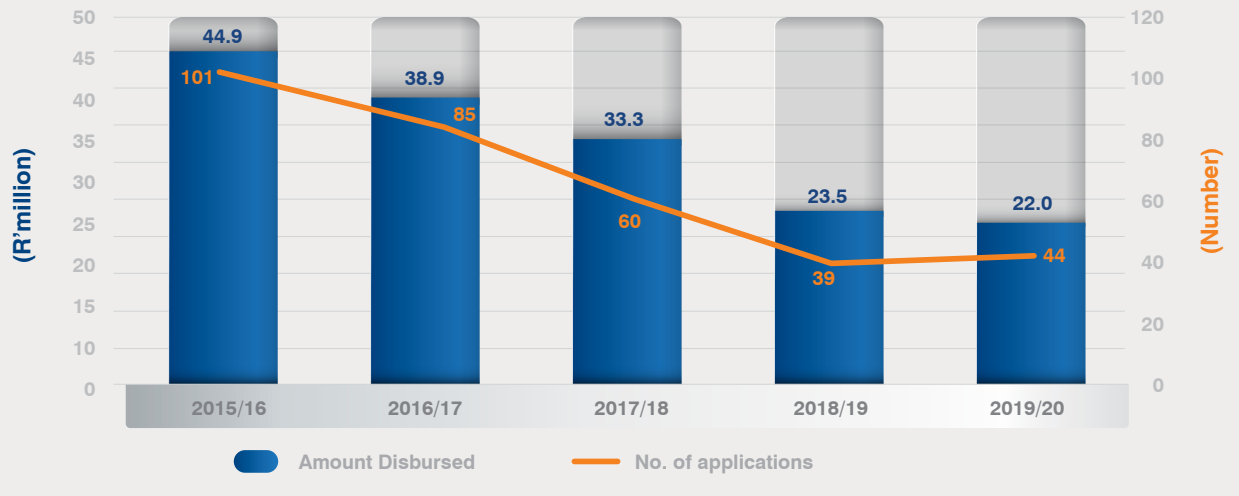


Figure 21: Funding applications and disbursements for the University Seed Fund over the period 2015-2020

The number of applications received by SFP partners is shown in Figure 22. The traditional academic universities have been the most successful amongst their counterparts. Having built up a strong research base and with strong capacitation of OTT staff, these universities are able to best reap the benefits.

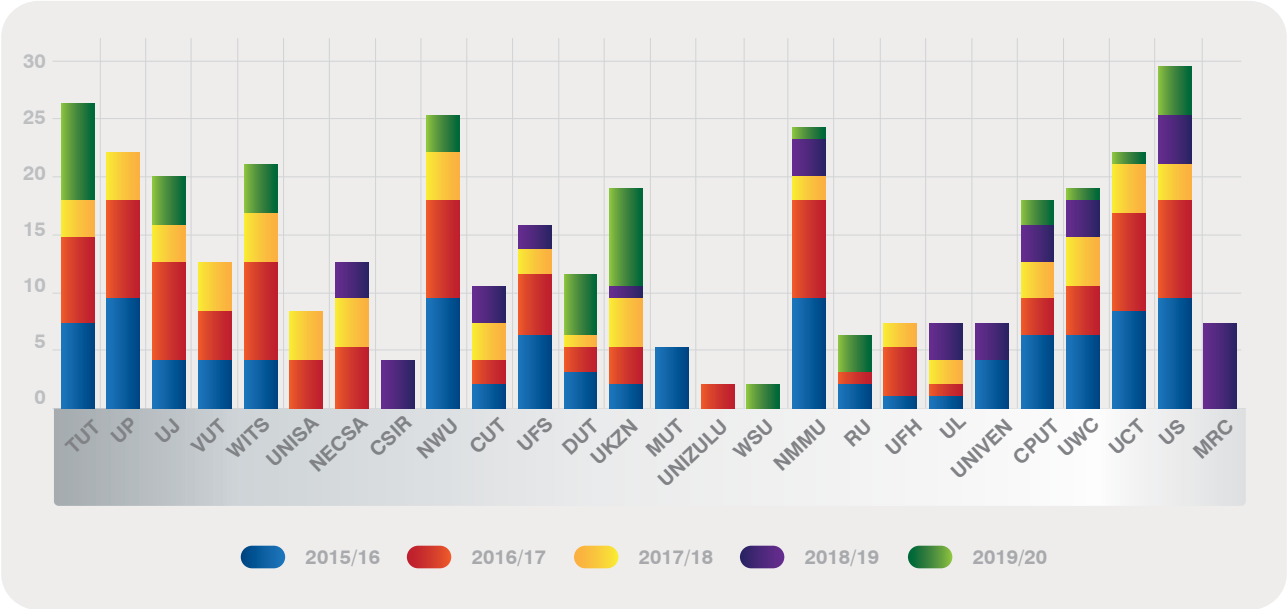


Figure 22: University Seed Fund applications per institution per year over the period 2015-2020

The historically disadvantaged academic universities, which are less resourced, were not as successful as their better-resourced counterparts, with the exception of the University of the Western Cape (UWC). These institutions formed 13% of the total funding disbursed to all universities. Institutional challenges such as low industry collaboration and lack of capacity and expertise in the university OTTs have impeded their success in the Seed Fund portfolio.

The universities of technology on the other hand have seen moderate success as evident in the application pipeline to the Fund. Success factors include their product development focus and hosting of Technology Stations – giving access to state-of-the-art equipment and expertise. The overall growth in activity in the university research and technology transfer space can be attributed to TIA's SFP.

- **SMME Seed Fund**

In the period 2015/16-2019/20 a total of 217 applications were funded to a total value of R112 million (Figure 23). Ten regional development agencies and incubators disbursed and managed the funds.

Figure 23: Disbursements for the SMME Seed Fund over the period 2015/16-2019/20

Funding trends are in line with those presented for the University Seed Fund above. It should be noted that zero disbursements were made in 2017/18. This was due to the funding being made available at the end of 2016/17 which was therefore only utilised in 2017/18 for the SMME Seed Fund.

Over the course of the MTSF the funding model for the SMME Seed Fund changed. Whereas funds were disbursed upfront in the early stages of the Fund's implementation, TIA moved to the use of a call system to solicit applicants and integrated this into TIA's existing investment approval process.

Performance per province (2015-2019)

Figure 24 shows that the Gauteng, Western Cape and KwaZulu-Natal provinces have enjoyed greater SFP application success across both the university-focused and SMME-focused SFPs compared to other provinces. This is mainly because these provinces have more universities, which is where innovative and entrepreneurial activities tend to concentrate.

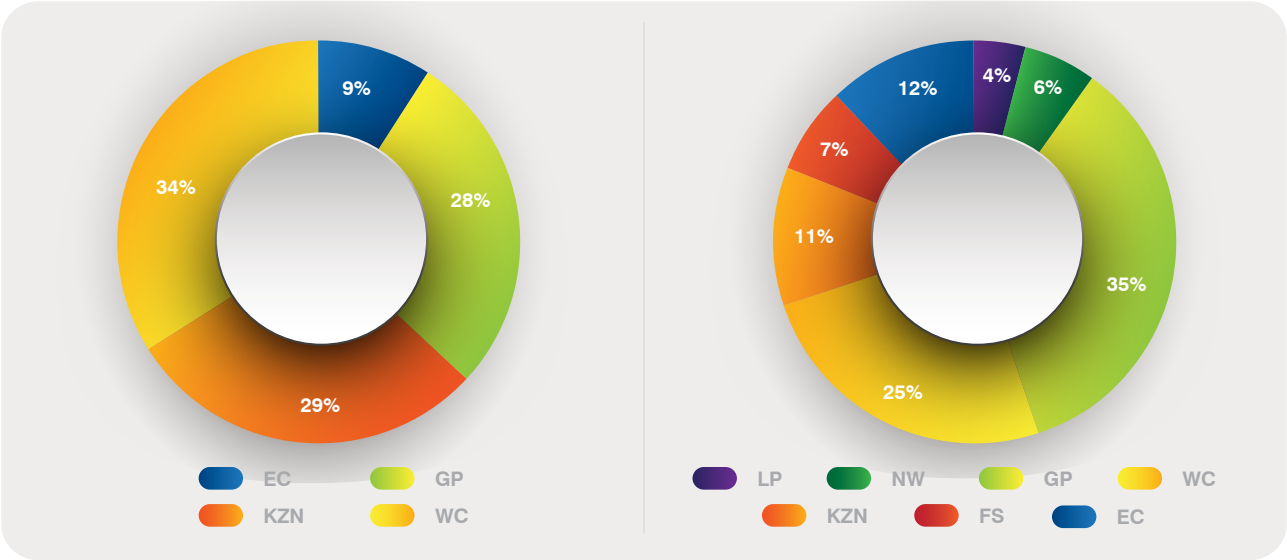


Figure 24: Provincial split for the SFP over the period 2015-2019 for the SMMEs portfolio (left) and the university portfolio (right)

TESTIMONIAL

Savant Technology Incubator

Savant has been a partner of TIA over many years having prepared and taken numerous projects to TIA for funding across the different funding mechanisms - Technology Development, Seed Fund, etc.

Savant has also been an SMME Seed Fund administration partner since 2016 having seen the extraordinarily positive impact of this funding mechanism across a range of early stage technology business and we look forward to the Seed Fund instrument being reinstated and expanded as soon as possible. TIA has also lately joined the Savant Venture Fund as a partner to further extend the range of funding support instruments available to early stage technology companies.

TIA plays a key role in the early stage funding space and we look forward to our close collaboration into the future.

Francois Malan, CEO & Executive Director: Projects, Savant Technology Incubator

SEED FUND

INTELLIGENT GEYSERS WITH REMOTE ACCESS (STELLENBOSCH UNIVERSITY)

Thinus Booysen and his students developed the Geasy, an Internet of Things (IoT) system that allows remote access to and intelligent management of electrical and solar water geysers. The device realises electricity savings through energy optimisation and demand management through centralised control.

The project was funded by the TIA Seed Fund to the value of **R420,000** through **InnovUS**, which led to the inception of BridgIoT in 2015, a Stellenbosch University spinout that was incubated at **The Launchlab**. The funding was used to take the product from prototype to a potential commercial product with the objective of piloting and further development for mass production. The product was completed as intended and has seen multiple additions and revisions. Currently, BridgIoT is producing the sixth generation of the Geasy.

The Seed Fund project resulted in the filing of two provisional patents on water heater control, the establishment of a commercial venture, multiple commercial products, and large scale pilot and commercial ventures. The product has evolved into spin-off products filling specific niches in the market; such as a smart water meter unit (Dropula), an energy monitoring device (Wattson) and heating, ventilation and cooling control units, with the current development of a multi-geyser controller for high-density property developers and refinement of the Wattson unit, again through TIA funding. A joint venture with an insurance partner has also been set up with products that service that industry. BridgIoT has evolved its value offering to allow other companies to leverage its technology for their purposes and sales through a business-to-business platform enabling use and reselling of its device and services, empowering the move to IoT and creating job opportunities.

The commercial entity, BridgIoT, has used the technology to complete multiple projects, including a multi-million rand project by the Water Research Commission, and a multi-million rand water-saving campaign – the #SmartWaterMeterChallenge, – at 352 schools in the Western Cape province during the #DayZero drought. This project was able to save an estimated 760 million litres of water between November 2017 and February 2020, with an estimated value of R52 million.

SEED FUND *(continued)*

PILOTING, DESIGNING AND PATENTING OF HERBAL PRODUCTS FOR COMMERCIALISATION "CREATION NERVINE® AND CREATION ARTHRITIS® TEAS" (WALTER SISULU UNIVERSITY)

Prof. Adebola Oyedeji and her team produced two herbal tea prototypes which originated from a community and IKS-based research. Creation Arthritis and Creation Nervine teas were developed from a blend of nine different herbs through scientific and preclinical validation. According to the research team's knowledge, Creation Arthritis and Creation Nervine teas are the only herbal teas of their kind with such a formulation and blend and are condition-specific, i.e. in the management and treatment of arthritis, mental disorders and related health conditions. This kind of specificity together with the herbal plants blending and formulation gives a competitive edge over other products in the market. Further financial support and investments will assist the team to break barriers to market access, and Creation teas are most likely to compete with leading herbal tea brands in South African and international markets.

The project was funded by the TIA Seed Fund in July 2017 to the value of R500,000 with an objective of prototype development, business plan development, market survey and IP protection for commercialisation. The project is currently at pre-commercialisation phase. What is more exciting is the demonstration of the translation of IKS through scientific research and validation into commercial products, more so the potential to create employment opportunities for the rural communities in the Eastern Cape province.

The project resulted in the development of two herbal tea products. Preclinical testing was conducted on the two products, and a trademark was obtained and granted in 2020. A market survey and business plan development have been commissioned to take the fundraising and commercialisation activities forward.

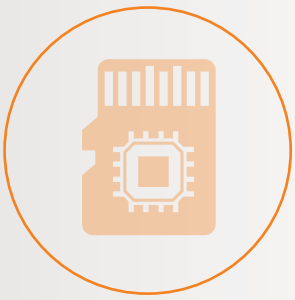
SEED FUND *(continued)*

JONGA (SAVANT TECHNOLOGY INCUBATOR)

Jonga is a start-up security company founded in 2016 by Ntsako Mgiba and Ntando Shezi. It is a low-cost, community-based home security alarm system for townships and other low-income communities. The solution consists of a motion sensor module and mobile application that detects and notifies homeowners of intrusions in their household, prompting the user to activate a panic signal, thereby eliciting the assistance of the community. Jonga has been incubated at Savant Incubator since 2016, receiving assistance in development and commercialisation.

Jonga received support from the TIA Seed Fund amounting to R654,380 in 2018 through Savant Incubator with the purpose of further developing the prototype including development of moulds, electronics, communication networks and app development, and to conduct market testing in Khayelitsha. Over the period supported the technology moved from TRL 2 to TRL 6. Furthermore, the Jonga Phone application launched in the Google Play Store and 15 Jonga devices were manufactured and certified by Sigfox. The device and app were tested by residential community members with positive feedback.

Jonga has subsequently secured follow-on seed funding of R1.5 million in October 2019 from the Savant Venture Fund to implement its go-to-market strategy. In addition, Jonga received Independent Communications Authority of South Africa (ICASA) certification. The Jonga security device will potentially be used by security companies, businesses and households.



SEED FUND *(continued)*

ADRENALINE AUTO INJECTOR (UCT)

A UCT team of Associate Prof. Mike Levin, Head of Division of Asthma and Allergy, Associate Prof. Sudesh Sivarasu and Mr Gokul Nair at the Division of Biomedical Engineering developed an adrenaline auto injector device that treats anaphylaxis, a severe allergic reaction which may cause death within a few minutes if not treated as soon as possible. The device is a reloadable adrenaline cartridge with the option of using needles of variable lengths. This solution is expected to not only be much cheaper than the current available devices but would also cater for different body types.

The Adrenaline Auto Injector project was funded by the UCT TIA Seed Fund in 2016/2017 to the value of R494,080. Over the course of the project, several achievements and milestones were noted, specifically improved design of the device (computer-aided design, performance studies and simulations), prototype manufacturing (multiple versions manufactured for testing), tests and trials (bench studies, porcine model studies and comparative studies against industry leading products) and a market study. Multiple partnerships were established with industry and funders.

The project was successfully completed with a number of design improvements made and multiple studies concluded to establish efficacy. This informed the commercial opportunity and catalysed Mr Gokul Nair and Mr Giancarlo Beukes to create the spinout company, **Impulse Biomed**.

Follow-on funding involved a project with the Centre for Rapid Prototyping and Manufacturing, a Technology Station at the Central University of Technology. The project aimed to industrialise the design produced from the TIA Seed Fund project. Most significantly is an award from the DTIC's Technology and Human Resource for Industry Programme to complete the registration, development and trial of the device toward commercialisation. The team also managed to raise an equity investment from angel investors as a seed investment to fund the operations and commercialisation of their technologies.

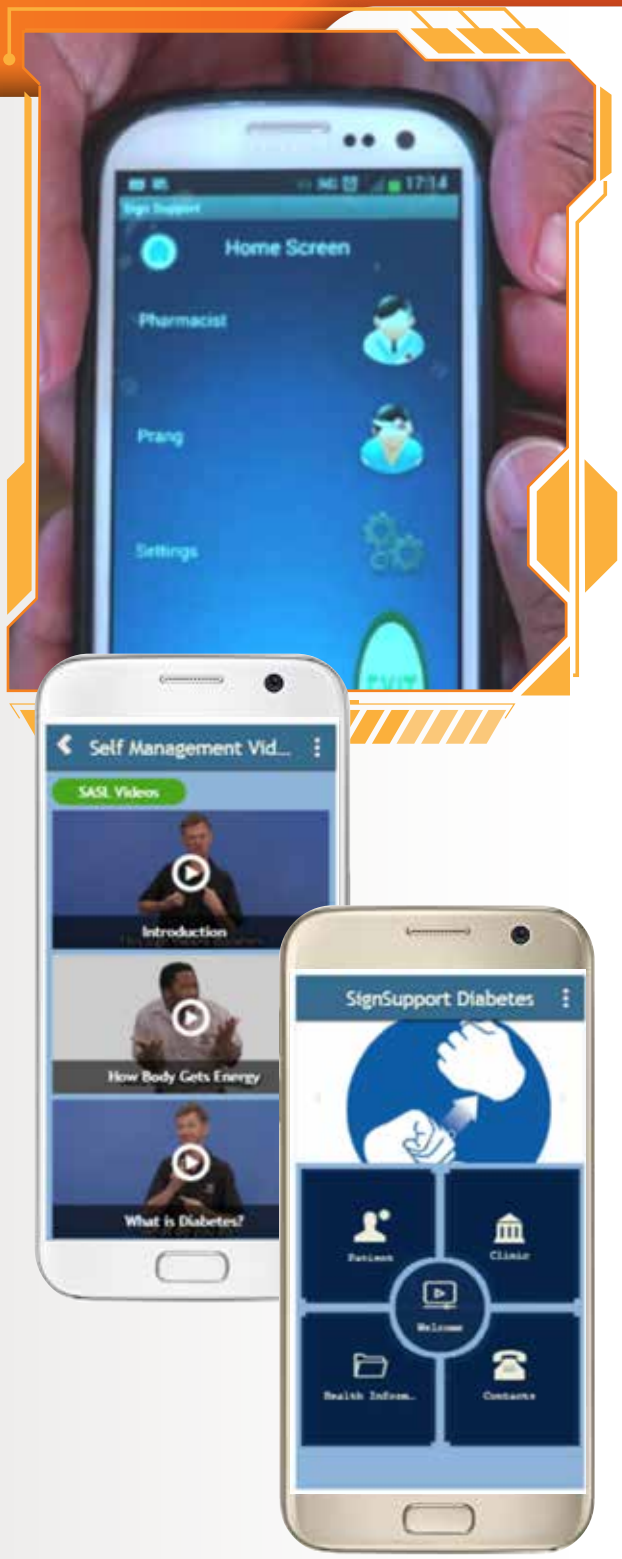
SEED FUND *(continued)*

SIGNSUPPORT FOR DIABETES SELF-MANAGEMENT (UWC)

In an effort to bridge communication and information gaps between deaf people (with a large percentage illiterate) and hearing people, a mobile app suite called SignSupport was developed by Prof. Bill Tucker and his team at UWC. SignSupport is a mobile app that unlocks pre-recorded South African sign language videos stored on a phone to provide information to deaf people in sign language. The solutions are co-designed with deaf communities in the Western Cape province and can be adapted to various limited communications scenarios (e.g. interaction between a deaf person and a pharmacist on how medication should be administered). The intention is to tailor the ICT user experience to the specific needs of deaf people so that they can access information that is normally easily accessible to hearing people.

The project received funding from the TIA Seed Fund in March 2018 to the value of R644,000 to refine existing prototypes and implement the design for diabetes self-management, and to develop a business plan for taking this platform to the market. All intended activities were successfully completed and additional content was developed for an emergency medical services app and a deaf contact centre, and a rich media contact centre that allows deaf users of the apps to contact a deaf healthcare worker or interpreter for more information or clarification, in sign language.

The project resulted in copyright for the three prototypes developed, viz. the mobile app for diabetes self-management, the mobile app for emergency medical services requests, and the technology extensions required for the deaf contact centre to enable the sending, receiving and management of text and video content to be forwarded to the appropriate 'hearing' contact centre. More information is available at www.signsupport.org.



SEED FUND *(continued)*

MATHS WHARTELS™ (NWU)

Poor mathematics achievement at primary school level is a global problem and is often seen as the obstacle to obtaining qualifications in the fields of science, medicine, technology and engineering. An educational psychologist and academic at NWU's Faculty of Health Sciences has developed a mobile application and a board game that has been proven to promote children's love for maths. Maths Whartels™ is a game that improves mathematics skills from an early developmental phase by focusing on neuropsychological processes to master mathematics concepts.

The Maths Whartels™ has been designed for pre-primary and primary school learners and is aimed at improving children's mathematics achievement by focusing on cognitive aspects (math concepts, metacognition and information processing, critical thinking, and problem-solving) and neuro-psychological facets (including executive functioning, study orientation, mathematics anxiety, and mathematics resilience). The Maths Whartels™ is an innovation developed by Dr Petro Erasmus from NWU and the project was funded by the TIA Seed Fund in June 2018 with an objective of developing the mathematics board game including an interactive mobile application.

By using the newest technology, Maths Whartels™ aims to facilitate self-directed learning by changing the learners' mathematical mindset and thinking by including principles used in play therapy to optimise learning and understanding such as puppets characters, board games and storytelling. The game is intended for be used by educational psychologists, mathematics educators, parents and primary school learners.

The Seed Fund project resulted in the development of the Maths Whartels™ board game and a proof of concept of the mobile application, which was demonstrated on an Android device. The board game is available to parents, therapists and teachers. A license agreement for the Maths Whartels™ board game has been signed with Mindmuzik for manufacturing and distribution.

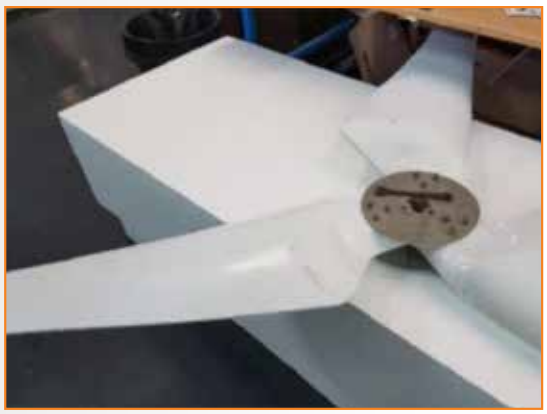
SEED FUND *(continued)*

HIGH-YIELD SMALL WIND TURBINE (NMU)

High-Yield Small Wind Turbine is an NMU project, funded by SFP to the amount of R48,000 in April 2016. The objective of the project was to investigate the feasibility of establishing an inexpensive turbine blade manufacturing plant and assembling a high-yield, small wind turbine. Small wind turbines are often installed in urban and semi-urban areas, and the end users are typically individual homeowners, farmers, or businesses that intend to support their own energy requirements.

TIA funding was sought to improve the financial viability of small wind turbines and develop a market-ready wind turbine that has a better return on investment than is currently available. With the support of the TIA SFP, the NMU's High -Yield Small Wind Turbine blade was designed to increase yield during short wind variations and to increase yield at lower wind speeds. Furthermore, an inexpensive and rapid manufacturing process was also developed to make the blade more price competitive compared with existing blades.

To enhance the commercialisation viability of this project, the Innovation Office at NMU has procured the services of an external independent consultant to conduct an industry analysis and recommend viable strategies to commercialise the project. Technology development funds are being sought to implement the recommended strategies.



12.3.3 TECHNOLOGY STATIONS PROGRAMME

The TSP enables academia and industry to take part in technology transfer and development by facilitating their interaction and reducing barriers to market access through subsidised services offered by a network of 18 Technology Stations, located across the country.

The programme provides technology innovators in targeted industries and communities access to state-of-the-art equipment, infrastructure and expertise in specialised fields that would not otherwise be available or affordable to commercialise their innovations.

Support services provided by the Technology Stations spans from prototyping up until pre-commercialisation. It includes testing and analytical services, rapid prototyping and manufacturing, consultation, technology audit and feasibility study, process or product improvements, applied development, engineering and design, R&D and technology demonstration and training. The programme supports mainly SMMEs, individual innovators and researchers.

During the period under review, the programme recorded the following.

- 43 SMMEs secured business contracts, which could result in the retention and creation of jobs.
- 10 people with disabilities were supported.
- 1,937 young people and 1,514 black women-owned SMMEs received support.
- 140 students were afforded the opportunity to work on industry projects at the Technology Stations in the manufacturing and agro-processing sectors due to leveraged direct income.
- A further 640 product testing, technology simulations and/or analysis of products were supported in applications of at least 125 disclosures in R&D at the respective universities with firms to facilitate advancing the products/services to market for commercialisation.

Strategic partners include 11 universities, the Small Enterprise Development Agency (SEDA), the National Intellectual Property Management Office (NIPMO) and the South African Technology Network.

The performance of TSP for the year under review is summarised in Table 31.

Table 31: TSP performance information for 2019/20

Description	Achievement
Disbursements	R96.5m
Number of innovation project outputs taken up in the market	1
Amount of additional funding attracted into TIA's portfolio	R34.3m
Amount of income recognised	R52.9m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	41
Number of SMMEs receiving technology support	3,216
Number of SMMEs owned by historically disadvantaged individuals assisted as percentage of total SMMEs receiving funding, support and/or technology services from TIA	81%
Number of technology innovation initiatives undertaken by TIA	7

PROJECT EXAMPLE: OKARA ENERGY

OKARA Energy is a start-up enterprise, launched in 2019 by two NMU engineering graduates who aim to provide engineering solutions in the renewable energy sector. OKARA identified that local wind turbines required maintenance to be performed, where torque arm bearings and pins needed to be removed and replaced. Previous attempts by local and international service providers resulted in damage to the turbine. eNtsa assisted OKARA Energy with a technical evaluation of the available engineering technologies, testing of the pin material and providing a conceptual design layout for the identified diamond-wire cutter solution. OKARA energy completed a functional design, fabricated and iterated the diamond-wire cutter to be commercially operational (Figure 25).

The assistance provided by eNtsa resulted in OKARA Energy successfully completing a R2 million contract. This in turn led them to become the dedicated engineering service provider for a SA wind farm, and securing a further R1.1 million contract to perform oil services on wind turbines using their own designs and equipment. Five jobs were created through the awarding of this contract. OKARA is currently engaging with eNtsa as it explores new contracts within the renewable energy sector with an estimated value of R5 million.

Figure 25: Concept design (left), prototype diamond wire cutter (centre), oil service equipment on site (right)

TESTIMONIAL

OKARA Energy

OKARA Energy (Pty) Ltd was formed in April 2019 with the intention to deliver excellent engineering service in the renewable energy industry. As the founders we have a keen interest in innovative and cutting-edge engineering solutions in renewable energy, and we believe that South Africa can once again become an industry leader in the world.

OKARA Energy continuously investigates first world solutions to technical issues whereafter we try to develop them further locally. Together with the eNtsa Technology Station we strive to provide solutions that differ from the conventional methods; solutions that increase efficiency and decrease down-time for our clients. In these trying times that our economy finds itself in, we hope to create more employment opportunities as our business grows.

To date we have completed three major projects in the wind industry and multiple other smaller projects with the help of eNtsa and its subsidies. We currently have five permanent employees and will be employing two more previously disadvantaged personnel. We strive to provide an interactive work environment which focuses on the upliftment of our employees in order to inspire and motivate them personally. We believe in an open dialogue throughout the business structure and maintaining and nurturing relationships, in the end this is why OKARA Energy was fortunate enough to excel.

With funding and support given to date, and with future project opportunities being identified, we hope that continued support will not only allow us to grow as an entity but allow us to have an impact on South Africa, its people and its future.

Hugo Truter and Daniel Nel, Directors, OKARA Energy (Pty) Ltd

12.3.4 INNOVATION SKILLS DEVELOPMENT PROGRAMME

The ISDP stimulates a culture of innovation within the NSI, through interventions that promote technology entrepreneurship and an innovation mindset. The main beneficiaries of the programme are predominantly TIA investees, the youth and communities that operate largely outside the formal systems of innovation. The programme provides focused and targeted training interventions to strengthen the entrepreneurial capacity of researchers and innovators, thereby providing them with the skills to innovate and take their technologies to market. In doing so, TIA works with a range of strategic partners within the enterprise development ecosystem. A key aspect of the ISDP's value chain positioning within the innovation ecosystem is to equip TIA's technology start-ups with international accelerator programmes. The focus is on business readiness level, market readiness level, and investment readiness level, with commercialisation of the developed technologies giving impetus to ISDP business unit activities.

ISDP OFFERINGS

FUTR500 is a youth-focused programme that aims to develop the top 500 South African young minds in innovation leadership, competency and practice. The programme provided 37 internship placements internally within TIA and its entities, such as Platforms and Technology Stations and 43 placements externally through partner internship programmes for the year under review.

The Next Generation 100 programme is an accelerator programme and is aimed at developing scientists, engineers and innovators with the appropriate entrepreneurial potential through a series of workshops, together with mentoring support to the top candidates, tailored to fast-track their entrepreneurial venture in a 12-18 month timeframe. The programme supported 100 SMMEs for the year under review.

The Swiss Venture Leaders Accelerator Programme, United Kingdom Newton Fund Leaders in Innovation Fellowship Programme and the Gauteng Accelerator Programme (GAP) have had significant transformational impact on the Next Generation 100 programme's demographics. The NexGen 100 Programme cohort consisted of approximately 84% black individuals for the year. The programme provided ongoing support for 4IR soft skills training to 3,000 community college learners.

Strategic partners include the Energy and Water Sector Education Training Authority; the Media, Information and Communication Technologies Sector Education and Training Authority; SkillsBook; CSIR; the British Council; the UK Newton Fund Programme; the UK Royal Academy of Engineering under the Newton Fund Programme; Knowledge Transfer Network; Investec; Stanford University; Swiss University of Basel; Swiss Embassy; Institute for Young Entrepreneurs; TIH; DSI; IDC; Leadership Business Consulting Silicon Valley; Microsoft Africa; Liquid Telecom; the DBSA; the Department of Environmental Affairs and several sector education and training authorities.

The performance of ISDP for the year under review is summarised in Table 32.

Table 32: ISDP performance information for 2019/20

Description	Achievement
Disbursements	R4.0m
Amount of additional funding attracted into TIA's portfolio	R5.9m
Amount of income recognised	R2.2m
Number of TIA-supported programmes receiving additional funding	4
Number of SMMEs receiving technology support	25
Number of technology innovation initiatives undertaken by TIA	4

The NexGen100 programme is implemented through international partnerships to enhance international market access capabilities of highly competitive and promising South African technologies that have global outlook. NexGen 100 Programmes consist of the following:

- Leaders in Innovation Fellowship (LIF)
- Swiss Venture Leaders Programme
- Youth Entrepreneurship Initiative (YEI)
- Gauteng Accelerator Programme (GAP)

Leaders in Innovation Fellowship

The TIA implementation of the LIF programme stems from its historic association with the UK Newton Fund through a bilateral arrangement between the UK government and the DSI. Over the past five years, ISDP has implemented the programme with its UK delivery counterpart, the Royal Academy of Engineering. The primary objective of the cooperation agreement between TIA and the Royal Academy of Engineering to deliver on the LIF programme is to create and capacitate innovators and researchers with business modelling tools. This will lead to a strengthened entrepreneurship capacity of researchers and innovators for commercialisation of their research or innovations projects, whilst creating networks and promoting collaboration within the LIF country participants.

PROJECT EXAMPLE: LIGNO-PELLET BIOPOLYMER

Addressing the global issue around increasing levels of plastic pollution both on land and in the oceans, Tshepo Mangoele and team developed a bio-plastic solution (Figure 26) that is biodegradable, compostable and dissolvable in water. These offerings set it apart from other bioplastics available in the market, and which are mainly imported into South Africa. The product offering is completely plant based and involves the extraction of lignin (natural polymer from plants) from pulp and paper waste. Since the product looks like its conventional plastic counterpart, it is easy to substitute into a variety of market offerings. However, straws and cutlery will be the focus of the business' primary market entry with the developed bio-technology. TIA has provided business training and coaching, whilst connecting the innovator to potential market access partners in the UK through the LIF programme.

The CSIR was a development partner to the team in the year prior to the LIF programme participation. Tshepo Mangoele was the joint first place winner at the LIF Cohort 6 "SA LIF 6 Pitching Session" which took place in January 2020 in the UK.

Figure 26: Sample of the bio-plastic developed by the winning LIF team

Swiss Venture Leaders

In giving effect to the bilateral agreement signed between the South African government and the Swiss Federal Council on Scientific and Technological Cooperation, the University of Basel and TIA have for the past nine years embarked on and implemented various STI projects and initiatives. One of the key initiatives is the Swiss Venture Leaders programme which over the past decade has evolved into a flagship programme amongst the Embassy of Switzerland, SA and TIA. The key partners bring value to the programme by its co-funding ability, and support to facilitation of the exchange programme between South African and Swiss entrepreneurs and innovators.

PROJECT EXAMPLE: IMPULSE BIOMEDICAL ZIBIPEN

Impulse Biomedical is a medical device engineering company that designs, develops, manufactures and sells affordable medical devices aimed towards emerging world markets. Impulse has developed the ZiBiPen (Figure 27), a reloadable adrenaline auto injector that is used in the emergency treatment of anaphylaxis. Anaphylaxis is a life-threatening condition where the human body suffers an allergic reaction to foreign substance (or antigen) introduced, whether orally, by injection or of any other intimate exposure. With the ZiBiPen, Impulse aims to provide patients with a device that caters for variations in weight and body type, and is safe, quick to use, and affordable.

Impulse Biomedical was one of the winners at the Swiss Venture Leader Programme pitch event, which took place in October 2019 at the Institut für Jungunternehmen Startup Space in Zürich. This enabled the company to be part of the 2019 Swiss/SA programme in Switzerland. TIA made available its Technology Station support to Impulse for the development of low production moulds (approximately 200 prototypes) for the ZiBiPen, carried out by the Central University of Technology's Product Development Technology Station. TIA's funding contribution was R500,000 in total. TIA's connector role to the DTIC's Technology and Human Resources for Industry Programme opened up funds of approximately R15 million to the project.

Figure 27: Impulse Biomedical ZiBiPen

Gauteng Accelerator Programme[9]

TIH and TIA in collaboration with Emory University in Atlanta, Georgia are partners in the GAP Biosciences programme. GAP Biosciences is a unique programme that assists scientists and entrepreneurs to pursue commercially viable opportunities for their cutting-edge bioscience technologies. This highly successful programme was launched in 2012, reaching the top bioscientists in Gauteng, and culminating in over R2 million seed funding for the top business plans. The programme identifies the most innovative and ground-breaking bioscience technologies and accelerates the selected contestants closer to commercial success.

The GAP Biosciences programme seeks to address the gap that exists between the prototype stage and commercialisation of life science technologies. Scientists working in an R&D environment do not always have the requisite business skills to commercialise their prototypes. To address this, GAP Biosciences seeks to provide essential business skills specifically to these scientists, and is aimed at facilitating the commercialisation of bioscience technologies.

The first component of the programme is a five-day technology entrepreneurship workshop presented by experienced local industry experts. This workshop presents an overview of business essentials to all individuals willing to establish science and technology-based ventures.

The second component of the programme is the Business Plan Competition segment. Applications are open to individuals or teams with bioscience technologies that are technically sound and beyond proof of concept. During the competition, semi-finalists work with mentors in various fields to develop a bankable business plan over the course of approximately five months. The Business Plan Competition includes the Executive Education Week, an intensive week-long programme run by Emory University's Goizueta Business School. This programme focuses on subjects unique to bioscience start-up companies by developing behaviours and skills within the teams to drive performance and create long-term value.

[9] *Source: https://www.openix.co.za/openix/bioscience*

At the end of the programme, the semi-finalist teams present their business plans to a panel of selected judges in a closed forum. The winning team will receive the following:

- Incubation at The Innovation Hub's BioPark@Gauteng or associated incubators in other provinces for a period of one year where all rental and associated costs will be covered, excluding selected operational costs
- Seed fund to be shared across all GAP categories
- Mentors with whom they will work as they further develop their business
- Business support (legal, intellectual property, technical, commercial, etc.)

PROJECT EXAMPLE: SAWUBONA MYCELIUM

Sawubona Mycelium (Pty) Ltd (Figure 28) is a 100% black-owned (and 50% black female-owned) small enterprise supported by the TIA Bioprocessing platform. The company won first prize in the Biosciences category in the 2019 GAP Innovation Competition for its high-value products derived from mycelium fermentation. The competition aims to develop and recognise entrepreneurs and companies that have the potential not only to create jobs, but address the triple challenge of poverty, inequality and unemployment. Sawubona Mycelium will receive commercialisation support, seed funding and a year of incubation support at one of TIH's business incubators.

Figure 28: The Sawubona Mycelium team featuring Prof. Hesham, Director IBD, UTM Malaysia at the 2019 Bio Africa Convention in Durban

INNOVATION SKILLS DEVELOPMENT PROGRAMME DEMOGRAPHICS AND IMPACT OVER THE MTSF PERIOD

A summary of TIA's ISDP's demographics is presented in Figure 29. The ISDP Unit raised in excess of R60 million from its partners over the five-year period. A total of 13,173 individuals have benefited as described through the ISDP offerings. The systemic impact in the NSI has been in support of transformation imperatives, with 54% of beneficiaries being female, 94% were youth and 87% were black.

Programme	Gender		Race			
	Male	Female	African	Coloured	Indian	White
NexGen100	159	209	263	77	20	7
Futur500	289	218	481	6	10	8
Systemic	6,767	5,531	10,762	26	48	1,471
Total	7,215	5,958	11,506	109	78	1,486
	13,173		13,173			

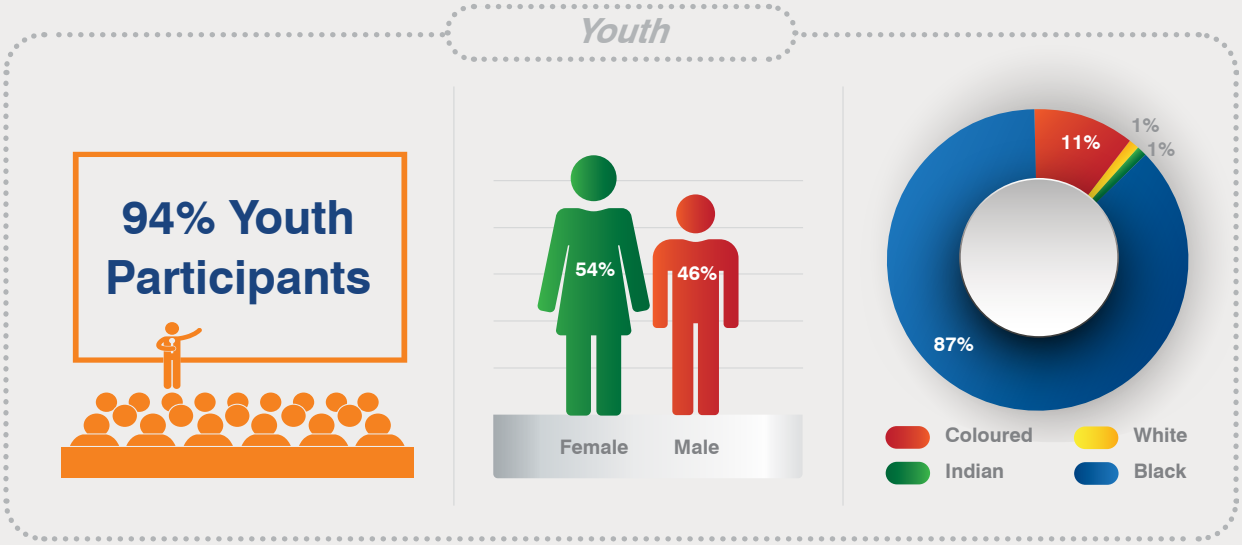


Figure 29: Profile of ISDP beneficiaries over the period 2015/16-2019/20

Implementation of the LIF has allowed 82 participants to go through the programme (Table 33). A highlight for the year is that 79% of participants are youth. Investment in the selected innovators began before attendance in the programme in the UK (i.e. pre-LIF) and continued upon the cohort's return to South Africa (i.e. post-LIF support). Both phases are important to support in the innovator's journey to success, with technology development and business support being key ingredients of potential success stories arising out of the programme. TIA's cumulative funding support of R47 million was spent as follows: 73% pre-LIF and 27% post-LIF. The external funding leveraged, R86.7 million, had profile: 41% Pre LIF and 59% Post LIF. The innovators were therefore well supported throughout the programme phases, thus solidifying the impact of the programme on the cohort upon return to South Africa.

Table 33: Summary of LIF demographics

Year	Gender		Race				Total
	Male	Female	African	Coloured	Indian	White	
2019	9	5	9	1	1	3	14
2018	4	10	12	1	0	1	14
2017	8	3	6	0	1	4	11
2016	11	4	8	3	1	3	15
2015	9	5	3	2	0	9	14
2014	13	1	4	1	0	9	14
Total	54	28	42	8	3	29	82

Statistics for the Swiss Venture Leaders Programme is given in Table 34.

Table 34: Summary of Swiss Venture Leader Demographics

Year	Gender		Race				Total
	Male	Female	African	Coloured	Indian	White	
2019	15	7	19	0	2	1	22
2018	15	13	17	2	5	4	28
2017	6	4	2	0	0	8	10
2016	20	11	15	0	0	16	31
2015	23	8	10	0	1	20	31
2014	17	5	8	1	1	12	22
2013	15	4	5	0	1	13	19
Total	**111**	**52**	**76**	**3**	**10**	**74**	**163**

The impact of the GAP programme in the NSI (Figure 30) is summarised as follows.

- Twenty six GAP Bioscience winners have been incubated since funding support by TIA. Of the 26, 58% are owned by women, 65% by African individuals and 73% by people above 35 years old. The differences in ownership by age points out the inherent focus on the research products. Most researchers who have reached the level of bringing a prototype for commercialisation would undergo time consuming training and work/research.
- Approximately R6 million has been invested in the companies through TIA, TIH and money sourced directly by TIH. From this investment, companies have managed to leverage about eight-fold value.
- Fifty five knowledge-based jobs were created with 53% of these being youths. This bodes well for transformation in the sector, as the trends have revealed that entrepreneurs are indeed employing youth, females and previously disadvantaged individuals in greater numbers.
- Of the 26, none have exited the programme or failed which means they are still on the path to commercialisation. Twenty-one percent of these winners have already graduated with successful and sustainable businesses and form part of the alumni. The success rate is 10-fold the usual global success rate of the biotech companies. Continual support is required even in the alumni to ensure more than five years of sustainable trading.

Additionally, TIA's participation over the five-year MTSF period expanded to include the GAP Medical competition with TIH, and also saw the provincial footprint of the programme expanded. Over the first six years since its inception, the GAP competitions (including GAP Green, GAP ICT and the Gauteng Accelerator Township Economy) have attracted more than 500 entries and invested over R10 million in seed funding and incubation support to over 55 start-ups in all sectors.

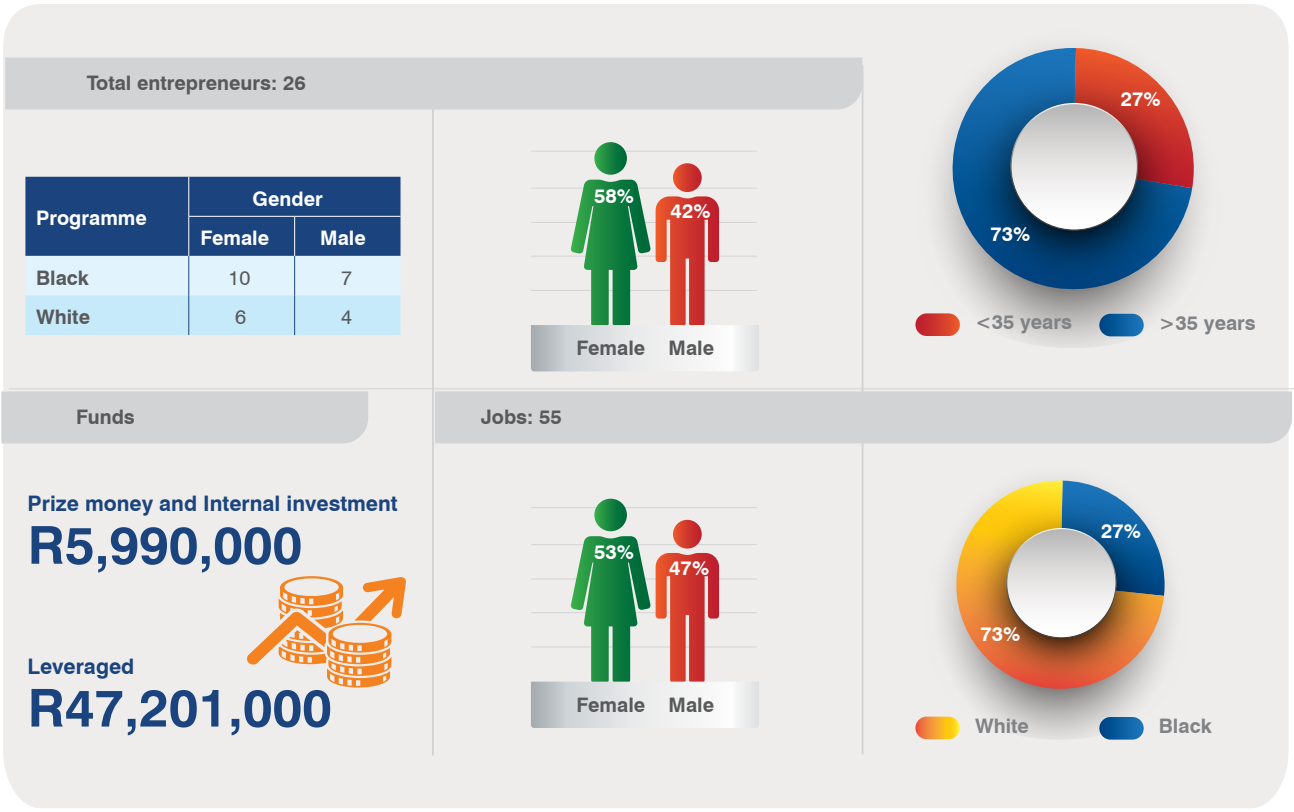


Figure 30: GAP overview

12.3.5 GLOBAL CLEANTECH INNOVATION PROGRAMME

The Global CleanTech Innovation Programme (GCIP) aims to promote and accelerate clean technology innovations that reduce or optimise the use of natural resources and support small businesses to be viable and 'investment-ready'. Green investments (investment activities that concentrate on companies that try to preserve natural resources) help in minimising South Africa's dependence on fossil fuels, which will in turn reduce air pollution and carbon emissions. Relevant sectors include bioprocessing, clean technology and medical devices.

The GCIP was incorporated into TIA in January 2018 after four years as a donor-funded project with TIA the host and national implementer. Founding partners were the United Nations Industrial Development Organization as the project developer and international implementer, and the Global Environment Facility as the principal funder.

The GCIP-SA also aims to:

- Build a local entrepreneurial ecosystem by identifying the most promising innovative local clean technologies;
- Support, promote and 'de-risk' the technologies of participating companies;
- Promote and develop clean technologies by working with various national programmes, funds and competitions; and
- Connect the most promising start-ups with potential investors, customers and partners.

By acting as a competition-based business the accelerator programme trains, mentors, assists with access to capital, showcases innovations of participants, and ultimately awards a cash prize to the winners.

The programme support innovators, typically SMMEs and start-ups that are seeking to commercialise their projects and take them to market. In 2019/20, 20 entrepreneurs participated in the programme, of which 85% are historically disadvantaged individuals with R2.4 million disbursed to recipients/beneficiaries in this period. Strategic partners include universities, Africawide, Skeg product development and other GCIP participating countries such as Morocco and India.

The accelerator programme has the following offerings:

- **Training:** national academy, webinars, regional business clinics, mock judging
- **Mentoring:** local and international mentors (generalists and specialists)
- **Access to capital:** exposure to public investors, strategic investors, angel groups, venture capital firms - through TIA, the United Nations Industrial Development Organization and the Chief Technology Officer Network
- **Showcasing:** exposure to local and global markets through media and participation in events (e.g. Global Forum)
- **Awards:** cash award for all finalists, plus an overseas trip for the winners and runners-up

PROJECT EXAMPLE: iWATER

Prof. Esta van Heerden, CEO of iWater, was the top female GCIP in 2019. iWater is a leading technology company focused on the management of microbial metabolic dynamics, which represents the new wave associated with the treatment of pollutants. The company's biotechnological innovation lies in the management of metabolic microbial dynamics (i.e. bacterial metabolisms) in the environment to clean up contaminated water. This is the latest methodology put forward to deal with the treatment of pollutants. The innovation is delivered through newly developed modular treatment plants (Figure 31) to allow management of biological activities to guarantee clean water. The technology is a direct contributor to the achievement of Sustainable Development Goal 6 – to ensure availability and sustainable management of water and sanitation for all. TIA's support included participation in GCIP Accelerator Programme, where the company was supported in its creation of a pitch deck, including mentoring to establish a direct marketing and client engagement strategy.

Figure 31: Modular water treatment rental units

12.3.6 YOUTH TECHNOLOGY INNOVATION PROGRAMME

The YTIP creates an environment that inspires and enables the development of youth-led technology enterprises. The programme provides support to young individuals aged between 18 and 30 (mostly previously disadvantaged youth from rural areas and townships) who have innovative ideas with potential for commercialisation. Support takes the form of funding and/or vouchers of up to R1 million. The YTIP provides support across the following service offerings.

- Prototype development at TIA-funded Technology Stations and Platforms
- IP protection
- Stipend per person per annum for up to four people for use towards establishing an enterprise
- Business coaching
- Incubation services for two years at an incubator recognised by TIA

The performance of YTIP for the year under review is summarised in Table 35.

Table 35: YTIP performance information for 2019/20

Description	Achievement
Disbursements	R1.4m
Number of technologies, processes and services advancing by one or more TRLs	1
Amount of additional funding attracted into TIA's portfolio	R0.8m
Number of knowledge innovation products produced as a result of TIA funding and support programmes	9
Number of TIA-supported programmes receiving additional funding	2
Number of technology innovation initiatives undertaken by TIA	5

PROJECT EXAMPLE: BIO-PESTICIDE PRODUCTION FROM ORGANIC WASTE

The project entails development and testing of a process of producing a bio-pesticides made from kitchen organic waste materials through a solid-state fermentation technology. The aim of the project was to establish a technology process to produce an environmentally friendly pesticide that has low input cost and is less complex. The innovator, Galaletsang Tsontswane from the North West province, received funding in the amount of R675,530 for the development of the process and validation of the bio-pesticides in collaboration with the Downstream Chemicals Technology Station at NMU.

This technology process development advanced from proof of concept to demonstration stage. The process of harvesting the *Bacillus thuringiensis* (Bt) bio-pesticides from kitchen waste such as vegetables and porridge was established, and a biological examination was conducted on to evaluate of their effectiveness. The demonstration successfully validated the efficacy of the Bt bio-pesticides in comparison with a commercial product (Figure 32). The results indicated that there were no significant scientific differences in efficacy between the Bt bio-pesticide and the commercial product.

This technology process enables preparation of the Bt bio-pesticides in smaller volumes and is suitable for setup with an easy process management and without the use of expensive equipment and inputs, making it more suitable for small-scale farmers. The Bt bio-pesticide is commonly targeted to control insects group including beetles, mosquitoes, black flies, caterpillars and moths. An additional benefit is its low toxicity to people and other mammals.

Figure 32: Plant Bioassay for Bt bio-pesticides efficacy testing showing treated cabbage plants with healthy leaves and non-treated plants with dried leaves

13. STRATEGIC PARTNERSHIPS

13.1 STRATEGIC ENGAGEMENTS AND CORPORATE RELATIONS

13.1.1 UNIT OVERVIEW

The TIA business development function is housed in the Strategic Engagements and Corporate Relations (SECR) Unit. It is primarily responsible for the establishment of strategic partnerships with a range of role players in the NSI, both nationally and internationally. It does this to:

- Attract a pipeline of high-quality fundable projects, through formalised institutional relationships with public research institutions, development finance institutions and international partners;
- Grow the pool of downstream partners to accelerate market uptake for projects in which TIA has invested; and
- Leverage co-funding and follow-on funding to augment TIA's funding base, thereby reducing its dependence on the fiscus.

Table 36 shows the SECR Unit's investment expenditure for 2018/19 and 2019/20 at unit level. In line with the mandate of the unit, investment expenditure allowed the achievement of R43 million income recognised, the support of 53 grassroots innovators, and the securing of 31 new partnership agreements for the agency.

Table 36: Investment expenditure for the SECR unit in 2018/19 and 2019/20

Programme/Unit	2019/2020			2018/2019		
	Budget (R million)	Actual expenditure (R million)	(Over)/under expenditure (R million)	Budget (R million)	Actual expenditure (R million)	(Over)/under expenditure (R million)
IID*	18.1	22.1	(4.0)	10.7	10.7	0.0
International. Partnerships (including special programmes**)	6.5	20.6	(14.2)	8.9	6.9	2.0
Total	**24.6**	**42.7**	**(18.2)**	**19.6**	**17.6**	**2.0**

** The additional R4 million reflected for 2019/20 is due to salaries and wages paid to contract employees working in the IID Programme Project Management Office.*

*** Special programmes counted within International Partnerships include the Africa Programme and TIA's support of the Bio Africa Convention.*

Stakeholder interest in the TIA Glass Pipeline partnership model was positive in both the upstream and downstream end of the innovation value chain, allowing the formation of partnerships to create a seamless innovation environment. Additionally, TIA has worked closely with various funding institutions to set up mechanisms for multidisciplinary assessment committees to promote porous boundaries and provide a singular view of all projects funded by TIA. The end goal was to ensure a smooth hand-over once investees exit the TIA funding cycle.

The key partnerships that TIA forged in 2019/20 are as follows.

Funders	
Dazzle Angels	**Dazzle Business Angels**
IDC	**IDC**
Jozi Angels	**Jozi Business Angels**
MASISIZANE FUND	**Old Mutual Masisizane Fund**
sa sme FUND	**SA SME Fund**
SAVANT	**Savant Venture Fund**
UNIVERSITY TECHNOLOGY FUND	**University Technology Fund**
iSP	**International Sunshine Power Incubator**

Industry	
BLACK BUSINESS COUNCIL	**Black Business Council**
INYOSI EMPOWERMENT	**Inyosi Empowerment**
Johnson & Johnson	**Johnson & Johnson**
MEMSA	**Mining Equipment Manufacturers of South Africa**
mlab	**M-Labs**
NKA THUTO	**Nkathutho Edu Propellor**
ONE BIO	**OneBIO**
TASK	**TASK Foundation**

13.1.2 PARTNERSHIPS FOR FUNDING (CO-FUNDING/ COMMERCIALISATION)

TIA established the Industry Matching Fund in 2018 as a partnership model to strengthen collaboration with the private sector, in particular, co-funding and follow-on funding to promote the commercialisation of funded technologies. Built around three strands of venture capital and angel investors, and private corporate and institutional investors, the Fund grew in 2019 with TIA securing the participation of one of the most significant players in the NSI, the SME Fund - a private sector-led partnership born out of the 'CEO Initiative' between the South African Government and CEOs of 50 JSE-listed companies to stimulate the economy and create jobs. Through this partnership, TIA joined forces with the SA SME Fund to create three dedicated funds.

- The Savant Venture Fund supports early-stage technologies through start-up formation. TIA has contributed R1.5 million towards this fund, and the SME Fund has contributed R110 million.
- OneBIO is the implementing vehicle for the Biotechnology Fund to provide incubation and commercialisation support to biotechnology investments in support of the Bio-economy Strategy. Some of the focus areas under this fund include precision farming and medical devices.
- The University Technology Fund is a complimentary instrument to the existing Seed Fund, established to intensify and accelerate the translation and commercialisation of publicly-funded research, primarily from universities and science councils providing market access opportunities the SA SME corporate community.

Through the Industry Matching Fund, TIA has partnered with three investment vehicles: Dazzle Angels, a female owned angel fund that exclusively supports women- or co-owned start-ups; along with Jozi Angels, a network of several angel investors supporting early-stage companies and helping them grow through knowledge, networks and capital. This partnership is based on a 1:1 co-investment ratio into deals. TIA also partnered with a black-owned venture capital fund, WZ Capital, that assists entrepreneurs with scalable, disruptive concept. The firm assists with early-stage start-ups, with a funding limit of up to R1 million.

Lastly TIA, in partnership with the IDC and other partners, has established the Natural Indigenous Products Fund to promote the development of a viable and competitive indigenous knowledge sector, capitalising on the country's unique and diverse biodiversity found in its indigenous plants and herbs. The objective of the fund is to provide funding for commercialisation and technical assistance for enterprises in the indigenous natural products sector. This industry is based on the development and production of finished products or ingredients for the nutritional, pharmaceutical and cosmetic markets.

13.1.3 STRENGTHENING COORDINATION WITH SCIENCE COUNCILS AND REGULATORS

A critical success factor in TIA's commercialisation efforts is a 'pipeline' of quality investable projects. With universities and science councils constituting important stakeholders for this purpose, a large part of TIA's efforts in the year under review focused on establishing targeted partnerships that are underpinned by specific mechanisms to promote the seamless transition of projects into the agency's funding cycle. In this regard, TIA continued to formalise new partnerships with organisations such as the National Health Laboratory Service, Sentech, Mintek, the Mining Health and Safety Council, the CSIR and the Water Research Commission.

AGRICULTURAL RESEARCH COUNCIL

TIA supports several projects at the Agricultural Research Council, including a cassava field trials project and a project called Biocontrol sheet as a fungicide. Through the ABIPP, TIA also funds the Honeybush R&D Programme, with funding totalling R1.5 million advanced in the period under review.

CSIR

TIA funds two agriculture-related projects at the CSIR. The first is the point of care diagnostics for infectious livestock diseases project. Disbursements totalling R2.9 million were made in 2019/20, and the project achieved TRL 7 in the period under review. A new aloe ferox product and process development project was approved for funding under the ABIPP in March 2020, entailing the development of new technologies and products with three agro-processing businesses and community enterprises in the Eastern Cape province to enable market access.

There are three manufacturing-related projects which TIA supports at the CSIR. The first is the Multicam QUVIR project, a special electrical corona discharge viewing technology that can be used as a preventative maintenance tool for power utilities. The project has progressed well and is at a pre-commercial stage, with commercial uptake discussions having commenced with a potential manufacturing partner. The second is the GasCam project which seeks to develop a camera technology that can detect hazardous gas leaks in industrial setting. This project is still in the early stages, and has experienced some technical challenges during the development. The CardioFlow project is the third project. It seeks to develop a low-cost medical device for cardiac screening in primary health care environment. This project has entered the clinical trial phase.

The final TIA-funded project is the polymer nanocomposite project. This nanotechnology-related project has undergone testing with industrial partners. Further development work is required to address issues that were encountered during the industrial trials.

CSIR AND ICASA

Since 2018 TIA has been supporting the CSIR to develop a technology system that solves the problem of spectrum under-utilisation in the country. The Geo-Location Spectrum Database (GLSD) system intelligently identifies the unused spectrum areas – commonly referred to as television white spaces – and dynamically allocates spectrum to its users i.e. telecommunication service providers. The television white spaces spectrum can be used to provide affordable broadband internet services to underserved areas, and for IoT services.

The GLSD technology has been instrumental in assisting ICASA to develop the television white spaces regulations for SA. The CSIR project team is currently contracted to ICASA, offering a module of this technology for the next three years and supporting ICASA in managing the television white spaces environment until full commercial exploitation of the spectrum takes place in this area. There is a growing trend to have television white spaces regulation across the Communication Regulator of Southern Africa's community and beyond the region in countries such as Ghana, Nigeria, Kenya and Uganda. The CSIR's GLSD technology is at the forefront in most of these developments.

Through the GLSD technology (and others) the TIA is supporting the national achievement of ubiquitous and cheap internet access to the rural poor, and is creating opportunities for interested television white spaces network operators. For example, Morai Networks (a small black-owned operator) is the recipient of TIA funding to enable affordable broadband internet access in rural areas of the Eastern Cape province by taking advantage of the television white spaces. If successful, Morai Networks will be the world's first commercial case of the television white spaces that uses dynamic spectrum allocation (as provided by GLSD).

SAMRC

In response to the COVID-19 pandemic TIA partnered with the DSI and the SAMRC to leverage off the SAMRC's expertise in funding national research and innovation health-related responses aimed at reducing the impact of the COVID-19 pandemic. An amount of R5 million was made available by TIA for a COVID-19 Innovation Response Fund managed by the SAMRC.

Diagnostics (test kits and reagents) were chosen as the key area for intervention. This area was prioritised due to the lengthy process for coronavirus infections tests. Such tests, which require a throat or nose swab followed by transporting the samples to a laboratory together with test kits, typically take 24 hours for results to become available. Shortening this turnaround time was deemed crucial to slowing the spread of the disease. Furthermore, locally-developed and manufactured diagnostic tools and kits would enable import substitution, create jobs, and thereby reduce the financial burden of managing the pandemic and its effects on the economy.

A key objective for Health is to enhance South Africa's global competitiveness in the health arena and to deliver socio-economic value through technological innovation in healthcare products and services addressing the prevention, diagnosis and/or treatment of priority disease areas in South Africa. In ensuring cohesion along the RDI value chain with key sectoral role players, the TIA Health investment portfolio aims to respond to the needs within the South African healthcare system in a collaborative manner by working closely with the Strategic Health Innovation Partnership Programme (SHIP) at the SAMRC. This allows TIA to leverage from established governance structures such as the SHIP steering committee as well as that within the Global Health Innovation Accelerator. This relationship between TIA and SAMRC through SHIP has allowed:

- Alignment, funding and support of technologies that deliver on national and TIA Health strategic priorities as defined by the Department of Health and DSI;
- Close collaboration and interaction with key national health research institutes such as the SAMRC and the National Health Laboratory Service;
- Support of the development of a pipeline of medical device technologies through investing into the Medical Device and Diagnostic Cluster hosted at the SAMRC; and
- Supporting the Precision Medicine Programme and DIPLOMICS aimed at supporting and developing precision medicine innovation.

Additionally, TIA's collaborative approach in the NSI is evident in this long-standing partnership with the SAMRC.

Other initiatives that have been set in motion between TIA and SAMRC during the year include the following:

- Supporting the development of local API manufacturing capabilities through ongoing project investment and support to Chemical Process Technologies Pharma as well the API Cluster hosted at the NWU
- Investment into digital health solutions to broaden health care access
- Investment of key diagnostic and testing technologies for COVID-19
- Investigating opportunities and collaboration to support local vaccine manufacturing in response to COVID-19 as part of the national initiative to not only respond to the crisis but increase and capacitate local manufacturing with Biovac as the anchor partner
- Using TIA funds as leverage to attract other funds into the programme's activities

MINTEK

SA has a severe and persistent problem of AMD decant from mines post-closure, particularly in the Witwatersrand and eMalahleni areas. The waters often are acidic, contain heavy metals and have significantly high concentrations of sulphate. To address the issues, Mintek has developed a passive biological sulphate reduction process. It is a low-tech, low-cost, low-maintenance niche technology aimed at treating relatively low volumes of mine waters emanating from post-mine closure or decant from abandoned mines.

Mintek, together with Anglo Coal, submitted a funding application to TIA to upscale and demonstrate a biological process for the treatment of AMD. An amount of R10.7 million was approved by TIA and the project has co-funding from Mintek and Anglo Coal in the order of R4.5 million and R6.9 million, respectively. Anglo Coal will also be the first customer of the technology.

13.1.4 INTERNATIONAL PARTNERSHIPS

The White Paper on Science, Technology and Innovation (March 2019), defines a specific policy intent (5.9), to "expand internationalisation and science diplomacy". TIA's international partnership strategy is premised on three pillars. These are promoting the internationalisation of promising South African entrepreneurs with global technologies to enable market access and international networking; attracting international resources through joint innovation initiatives with international partners; and promoting the African agenda.

PILLAR 1: INTERNATIONAL MARKET ACCESS AND NETWORKING

Through this pillar, TIA works to promote exposure of promising South African entrepreneurs to international markets, training and partnerships opportunities. Three key programmes in this regard, are pertinent.

- **Leaders in Innovation Fellowship Programme**

TIA implements the "Leaders in Innovation Fellowship" in partnership with the Royal Academy of Engineering under the UK Newton Fund. On an annual basis, TIA selects at least 10 innovators with promising technologies to receive two-weeks' training in the UK, hosted by the Academy. The 2019/20 cohort, hosted in January 2020, represented the 6th annual iteration ('LIF 6') and consisted of 14 participants - by far the largest group since the launch of the programme in 2014. The training covers a wide range of areas with specific focus on commercialisation. Additional activities include visits to innovation hubs, technology start-ups, venture capital informal pitching and networking sessions throughout the two weeks.

The last day of the LIF 6 UK training culminated into a pitching session with SA and Kenya presenting their final pitches before a prestigious UK panel of judges. The SA cohort made a great impression with the level of knowledge gained and the presentations. The winners of the SA LIF 6 Pitching Session are as follows.

- **1st Prize:** Lingno Pellet biodegradable, bio-compastable, price-competitive Bioplolymer – Tshepo Mangoele
- **1st Prize:** ARV Medi Patch – Maryam Jordaan
- **2nd Prize:** FundaBotix Maths & Science Edu and 4IR Skills Platform – Ntombi Banda
- **3rd Prize:** Novelquip, Robotic Tree Planting Arm - Stephanus Viljoen

- **Swiss Venture Leaders**

TIA has a long-standing relationship with Switzerland, particularly through the Swiss-SA Joint Research Programme, dating back to 2011. The programme aims to promote skills development of South African entrepreneurs to participate in global markets and expose them to investors through pitching sessions. This partnership has largely been driven by the Swiss Embassy in SA and formally with the University of Basel as the counterpart implementing partner.

TIA implements the Joint Research Programme through a special vehicle, the Swiss Venture Leaders Programme, that sees 12 to 15 South African entrepreneurs travel to Switzerland for an intensive training programme hosted by the University of Basel, and market exposure by the Swiss Venture Leaders. In the reporting period, 15 entrepreneurs, selected through a competitive process, participated in the Venture Leaders programme in October 2019 in Lausanne and Zurich where two entrepreneurs made significant gains. The first, Raphta, developed a pioneering facial recognition and edge intelligence technology, won the Pitchfest in Switzerland. Following this achievement, Raphta successfully deployed its technology to the first university in SA. Raptha's technological innovation has also found application in the current COVID-19 pandemic, with numerous options to deploy the AI developed technology in the health sector. The second, Impulse Biomed, received follow-on grant funding to the value of R15 million to assist with the development of its medical device ZiBiPen.

RAPTHA

Participation in TIA's Innovation Skills Development NexGen100 Programme has led to Raphta winning the Innovation Summit Inventors Garage and Swiss SA Venture Leader Pitch battle in Switzerland in 2019. Raphta is one of three top AI companies representing Africa in France, at the SAIS YEI programme.

Raphta managed to successfully deploy its pioneering facial recognition and edge intelligence technology to the first university in South Africa late last year. Raphta signed a strategic commercial partnership with a leading JSE-listed ICT company to scale the technology to 1,000 universities and colleges serving 2-million students in South Africa, the rest of Africa, Australia, Europe and East Asia. Raphta is continuing to work with the University of Johannesburg and Joburg Water to bring to market its water leakage detection imaging technology. The company was recently selected as one of the 10 Most Disruptive Face & Image Recognition Solution Providers of 2020 internationally by Analytics Insight. Senisha Moonsamy Head of ISD has assisted Raptha to seek funding from angel funders, private equity and venture capital funders we are awaiting the outcome from both local and international funders. I thank TIA for the assistance thus far!

Tshidiso Radinne, Chief Executive and Innovation Officer, Raphta

TESTIMONIAL

- **Youth Entrepreneurship Initiative**

The YEI is a multi-country global accelerator programme established by the French government, aimed at enabling science-based, early-stage companies to understand and take advantage of the French research and innovation ecosystem, providing market access opportunities in France and global markets through a two-week resident programme. Since its launch in 2016, the SA YEI has seen a total of 15 South African companies within the TIA portfolio participate in the programme. For 2019/20, the global YEI, based on the theme of AI, saw the selection of three South African start-ups from among a pool of 37 applications that were scheduled to travel to France in early March 2020. However, due to the COVID-19 pandemic and the subsequent lockdowns in both countries, the visit has been postponed to September 2020.

- **Supporting the SDGs**

The DSI, together with the United Nations Commission for Africa, hosted an event on harnessing STI in implementing the SDGs in Morocco. This event was held during the 4th Session of the Africa Regional Forum on Sustainable Development that was held in Marrakech, Morocco in April 2019. TIA provided support to four innovators to exhibit at the event in a manner that demonstrates impact in the implementation of the SDGs.

- Mr Jay Siya Masibulele from Zenzeleni, an ICT mesh networking innovation for deployment in rural areas. The technology provides a low-cost, low-energy system using scattered node devices rather than central masts or beacons.
- Ms Louise Williamson from Mashesha Stoves, a multi-awarded innovation in safe and clean cooking. Designed and engineered to be environmentally conscious, Mashesha Stoves provide a safe and quicker cooking alternative while at the same time reducing the impact on indigenous resources.
- Ms Lungelwa Tyali from The SolarTurtle, a solar Kiosk that has been designed for unparalleled security and maximum portability. These container-based solar kiosks are assembled off site and are then deployed by simply offloading the container and unfolding the panels towards the sun at a designated site in rural or peri-urban areas.
- Mr Luyanda Vappie from Project Prism has developed a product intended to change the way personal computing is done by incorporating the keyboard, mouse and monitor into one small computing unit. The product uses projection technology for a computer screen and laser technology for the keyboard and mouse input devices.

Through this platform, the investees received follow-up enquiries from Cameroon, Eswatini, Burkina Faso and Zambia.

TIA, once again, supported the participation of two investees, Root Tech and Solar Turtle, to the 4th annual Multi-Stakeholder Forum on STI for the SDGs, held in New York in May 2019. The DSI hosted a side event, together with the United Nations Commission for Africa, showcasing Africa's innovative solutions towards the implementation of the SDGs.

Lastly DSI invited TIA to participate in the Africa STI for Sustainable Development Forum hosted at the 6th Africa Regional Forum for Sustainable Development in Victoria Falls, Zimbabwe in February 2020. The forum was co-organised by the United Nations in collaboration with the African Union and the DSI. The theme was "AGENDA 2030 - A decade for delivery for the Sustainable Development Goals and AGENDA 2063". The innovators, Microbial fuel cells; Nomahlubi Nazo; Bio-plastic and Pelebox, were given exposure to showcase their innovation and opportunities to network with key stakeholders across the continent, peer learning and industry linkages that could be pivotal in their growth and market access across the African continent.

PILLAR 2: ATTRACTING INTERNATIONAL RESOURCES THROUGH JOINT INNOVATION COLLABORATION

The year under review marked the scaling up of TIA's internationalisation strategy with the launch of more decisive joint innovation initiatives under the umbrella of the highly regarded EUREKA and Eurostars programme of the European Commission. Implemented by TIA on behalf of the DSI, this programme has seen two initial projects funded under the programme.

- The first, Biolarix, is developing a proprietary method for enabling oral formulations for complex biological compounds. Complex biological compounds such as monoclonal antibodies are typically administered intravenously. This is a burden on the side of the patient, very cost and time inefficient and, in some parts of the world, presents a clear health risk. An oral formulation would, therefore, be the solution, whereby the patient can take a capsule orally and the pharmacon will eventually enter the bloodstream via the gut in a controlled way.

- The second is PRO-LAB, funded under ERA-NNETS, a novel lead-acid battery based on ultralightweight grids and nano-crystalline lead oxide material. The project proposes to deliver a step-change in lead-acid battery performance by developing a unique battery technology based on patent-protected ultralightweight grids and nano-crystalline lead oxide compounds. The project will involve extensive materials research and novel battery designs to fully optimise battery operation, resulting in a doubling of energy density over conventional lead acid batteries from approximately 50 Wh/kg to approximately 100 Wh/kg, which would significantly improve battery performance, size, weight and cost.

In addition, TIA launched, on behalf of the DSI, South Africa's maiden multi-lateral call on disruptive technologies together with the governments of Austria, Germany, Spain and South Korea. As a EUREKA associate member country, SA, through the DSI is making a substantial investment into this call that will see a few highly competitive projects funded under selected thematic areas of AI; renewable energy; high-speed travel, robotic innovations, autonomous vehicles and advanced virtual reality; disruptive manufacturing; big data and digital disruption; as well as agricultural disruptive technologies.

PILLAR 3: PROMOTING THE AFRICAN AGENDA

TIA's endeavours to support the African agenda stem from the White Paper on Science, Technology and Innovation which states that "South Africa's cooperation strategies in Africa should therefore prioritise efforts to strengthen its own and partner countries' STI systems. The aim should be to promote and facilitate cross-border research networks, shared technology innovation platforms, mutual learning, an integrated African STI agenda that encourages development and competitiveness, as well as funding partnerships".

In this vein, TIA continued to build on initiatives to promote the scaling up of research output arising from historical bilateral research investments by the DSI with Zambia, investing in four new R&D projects between universities in SA and two universities in Zambia. In the same vein, TIA partnered with M-Lab to launch a new joint innovation programme on ICTs (TWIGA) working with BuniHub in Tanzania to support the development of ICT solutions that address challenges in the two countries. During this period, TIA added new partnerships, signing agreements with the Egyptian Academy of Scientific Research and Technology and the Mauritian Innovation Agency. The partnerships will serve as a strong basis for promoting cross-border innovation partnerships between South African stakeholders and partners on the continent.

TIA signed a contract with the Finnish Ministry of Foreign Affairs to implement the second phase of the Southern African Innovation Support (SAIS) Programme, a regional innovation programme implemented with four other partner countries in the SADC region, namely Botswana, Namibia, Tanzania and Zambia. The programme aims to improve the capacity of technology entrepreneurship support institution enterprises to innovate and enter new market; and create an enabling environment for inclusive innovation, with an emphasis on women and the youth.

In its role as SA's national focal point, TIA provided technical, logistical and financial support for the effective implementation of the programme in SA. This has been crucial to enable the participation of South African entrepreneurs and support intermediaries in funding competitions out of which 11 South African applicants successfully secured grant funding from SAIS to the value of R33.7 million; five technology entrepreneurs showcased their innovations at SAIS- related events in Botswana; 44 participated in awareness campaigns, training and other partnership events within the SADC region; as well as supporting three companies to participate at the annual SLUSH event in Helsinki through the Connected Hubs programme.

13.1.5 INNOVATION FOR INCLUSIVE DEVELOPMENT

The IID initiative is a DSI contracted programme comprising grassroots innovation, innovation for service delivery and innovation for local economic development.

Aims

- To support a transformation agenda that seeks to increase the participation of previously disadvantaged and marginalised individuals in the National System of Innovation.
- To support an inclusive innovation agenda that positions itself to contribute to the discourse around township and rural economic development, the township economies and improvements in service delivery all of which should help TIA to respond to the needs of the poor.
- To achieve full deployment of the TIA mandate that extends TIA's services to all sectors beyond the traditional biotech and industrial sectors.

Focus areas

- Grassroots innovation
- Innovation for service delivery
- Innovation for local economic development

These areas are informed by the DSI's IID Strategy which defines the agenda and focus for each of the areas and the projects implemented.

TIA supports communities through a range of publicly-funded implementing agencies (universities and science councils) and publicly-funded entrepreneurs who have technologies at demonstration stage for deployment and diffusion. Through the Grassroots Innovation Programme, support is provided for innovators with innovative solutions to potentially uplift communities who do not have access to research and innovation networks.

Strategic partners include local, provincial and national government; agencies that support social and grassroots innovation; impact investors; science councils; higher education institutions, the DTIC; IDC; SEDA; NIPMO; international partners; embassies and non-profit organisations.

The performance of IID for the year under review is summarised in Table 37.

Table 37: IID performance information for 2019/20

Description	Achievement
Disbursements	R22.1m
Amount of additional funding attracted into TIA's portfolio	R3.7m
Amount of income recognised	R22.1m
Number of TIA-supported programmes receiving additional funding	3
Number of technology innovation initiatives undertaken by TIA	3

PROJECT EXAMPLE: ICT MATURITY ASSESSMENT FOR SCHOOLS

The electronic version of the paper-based ICT Maturity Assessment Tool is used to measure the "eReadiness" maturity level of schools in SA. In addition to the eReadiness of schools, the tool also assesses the physical infrastructure of schools, network coverage, device accessibility, staff proficiency and development across all five quintile levels. This will ultimately identify any inconsistencies between schools on the same quintile levels and indicate whether schools are ready to receive ICT devices or ICT as part of their curriculum. This is a decision support tool for the Department of Basic Education, and will enable the Department to provide appropriate ICT interventions and infrastructure based on the ICT maturity level of the school. The Department has expressed a committed to roll out the tool to all schools in SA.

Users can access the application via Android phone or the web application in order to assess or measure the ICT maturity level of any school in SA. Potential users are principals, deputy principals and heads of departments of South African schools, as well as the Department of Basic Education.

13.2 STRATEGIC NSI EVENTS

Stimulating an agile and responsive NSI is the focus of TIA's Strategic Outcome-Oriented Goal 3. TIA's thought leadership role is multi-dimensional in this regard: from forging key partnerships and alliances through to playing a leading role in technology commercialisation discourse, TIA's contributions have also been made through its participation in key events during the course of the year.

TIA has not limited itself to select signature events but has shared the stage with its key partners and sister entities in the NSI, entrenching a culture of solidarity, that is, one where all-round systemic support to innovators is the core and silos are broken down.

13.2.1 WORLD IP DAY

The World Intellectual Property Organization (WIPO) member states designated the 26th of April as the World Intellectual Property Day (WIPD).

WIPO is a global forum for intellectual property services, policies, information and cooperation. Its objectives are to entice local communities to promote the awareness of intellectual property, based on a theme set for each year. The theme for 2019 was "Reaching for Gold: IP in Sports".

With TIA's deep understanding of the importance and value of IP in South Africa, TIA supported CIPC, NIPMO and University OTT's in the country-wide WIPD-focused events.

These engagements allowed TIA to play its innovation thought leadership role, complementing its sister entity, NIPMO, who is the IP custodian in the NSI. Additionally, participating afforded TIA the opportunity to showcase the value of IP in past projects that have been successful in the market.

TIA's participation involved:

In Bloemfontein, at Central University of Technology:

1. Panel discussion participation, comprising representatives from CIPC, TIA (Ms Thamaray Govender Intellectual Property Manager), NIPMO, and a TIA supported innovator (Mr Ralph Mentjies - Ibhayi Dental) (Figure 33)
2. Showcasing of Ibhayi Dental. The company is developing a silicone based micro-chipped smart custom-made mouth guard, which will measure threshold impact (concussion) by setting off a warning via bright LED light informing parent and coach of the impact, thereby making detection possible by untrained individuals and not only medical professionals.

Figure 33: Panel discussion Let's Talk IP at Central University of Technology Boet Troskie Hall, flighted by Business Day Television From left Panel Facilitator Ms Nastassia Arendse, TIA Innovator (Mr Ralph Mentjies), Ms Kerry Faul Director of South Africa's National Intellectual Property Management Office(NIPMO), Mr Fredrick Matongo Deputy Director: Innovation & Technology Transfer - Central University of Technology, Free State, Ms Thamaray Govender Intellectual Property Manager, Technology Innovation Agency (TIA) and Mr Lungile Dukwana, Chief Strategy Executive from Companies and Intellectual Property Commission (CIPC).

Gauteng

Main WIPD event held at Tshimologong Precinct in Johannesburg (Figure 34). TIA Executive Manager: Mr Malesela Lekoto delivered the key-note address and TIA both facilitated and was represented in the panel discussion for the event.

Port Elizabeth

Presentation by Ms Tshembani Khupane, Seed Fund Programme Manager on TIA's Seed Fund mechanics at the Nelson Mandela University.

Venda

Presentation by Ms Tshembani Khupane, Seed Fund Programme Manager on TIA's Seed Fund mechanics at the University of Venda. Important to note is that the TIA, CIPC and NIPMO partnership extended its reach, and for the first time the Limpopo Province (University of Venda and Premiere's Office) were part of the WIPD initiatives.

Figure 34: Mr Garth Williams (Research Intelligence Specialist, TIA), Ms Phumela Gantsho (IP Manager, HSRC) and Prof. Gary Atkinson-Hope (Managing Director, TechIPI.) at the Tshimologong WIPD event.

13.2.2 BIO AFRICA CONVENTION

The second Bio Africa Convention took place in Durban in August 2019 under the theme "Africa, transcending consumerism, leading innovation". The participation of approximately 300 companies and 60 exhibitors demonstrated the growing importance of the convention as a marketplace for bio-based ideas. Another positive indicator was the strong participation by small enterprises, which are known to be critical for the growth of the South African bio-economy.

The convention also attracted more than 900 attendees and provided a platform for discourse and knowledge-sharing among policymakers, innovators, financiers and academics on opportunities for technology innovation and financing. The convention provided training opportunities for various biotechnology practitioners through preconvention workshops in biosimilars, biosafety and technology transfer. TIA had a strong brand presence at the Bio Africa Convention, as seen in Figure 35 and Figure 36.

Figure 35: TIA Interim CEO Ms Fuzlin Levy-Hassen addressing convention delegates

Figure 36: TIA attendees at the 2019 BIO Africa Convention

In addition to TIA's financial support of the event, the following TIA-funded projects were showcased at the convention, providing marketing and business development opportunities to entrepreneurs.

Foi Science, a Grassroots Innovation Programme (GIP) investee, formulates and manufactures medical dressings and high-end skincare products made from food and agricultural waste, sold through a mobile app. Sales agreements were entered into with several clients, and a letter of intent obtained from Shekinah Beauty (Pty) Ltd. Foi Science subsequently secured laboratory space at the Nelson Mandela Bay Science and Technology Centre, with 10 interns from Siyaya Skills Institute to be trained to make products.

Saffron is grown and cultivated from the crocus sativa bulb, an autumn-blooming crocus. Each bulb produces only one flower and each flower produces three stigmas, from which saffron spice originates. The Saffron project, funded by YTIP, aims to develop an optimum growth model for saffron in South African conditions and offer the spice at a much lower price when compared to imported saffron. The project was the subject of significant interest from local and international delegates at the convention. The Agricultural Research Council has subsequently expressed interest in assisting the project with determining the optimal conditions for the growth of saffron locally.

PRE-CONVENTION ACTIVITIES AND/OR SIDE EVENTS

The BIO Africa Convention was preceded by a series of six workshops that served as build-ups to the main convention. TIA organised and hosted two of these, one hosted by the BioProcessing Platform in partnership with the International Centre for Genetic Engineering and Biotechnology (ICGEB) and the other by BioSafety SA. The DSI funded the attendance and participation of 100 students from 19 South African institutions and other African countries in the convention.

a) Workshop 1 (Biosafety), in partnership with the International Centre for Genetic Engineering & Biotechnology (ICGEB). The first workshop had over 30 delegates from the SADC region. This was held at the SA Sugar Research Institute in Mount Edgecombe, north of Durban.
b) Workshop 2 (Biosimilars), in partnership with ICGEB. 20 delegates from industry attended this workshop, held at the Umbogintwini Bioprocessing Platform.

13.2.3 SA INNOVATION SUMMIT

The SA Innovation Summit is a platform for nurturing, developing and showcasing African innovation, as well as facilitating innovation thought-leadership. Created to support and promote innovation and facilitate collaboration within its own eco-system, the initiative brings together corporates, thought leaders, inventors, entrepreneurs, academia and policy makers to amplify South Africa's renowned competitive edge and to inspire sustained economic growth across the continent of Africa.

At the heart of the annual SA Innovation Summit is the innovator and entrepreneur and through collaboration and partnerships, these African gems are sourced and provided with a platform to showcase what they do best. The entrepreneurial competitions (e.g., Figure 37) were a highlight at this year's SA Innovation Summit and a space was created where meaningful connections were formed, linking the entrepreneur with potential investors and the funding they need to grow their business.

The Inventors Garage, is an easily accessible competition for inventors, entrepreneurs and organisations who have a working prototype or product from proven concept to early commercialisation. The 2019 Inventors Garage competition was sponsored by TIA's ISDP where the winner stood a chance to win R10,000 in cash and business support from TIA. Finalists also received the opportunity to exhibit their invention, prototype or design at the SA Innovation Summit and connect with all the attendees. The Inventors Garage naming rights now belong to TIA and 2019 served as a good launchpad for this brand. TIA supported innovators FundaBotix (Figure 38) and Neo Green Coal (Figure 39) are just two of the TIA supported innovators who exhibited at the SA Innovation Summit.

Figure 37: TIA Interim CEO Ms Fuzlin Levy-Hassen with Pitching Den judges at SA Innovation Summit

Figure 38: FundaBotix team (supported by TIA through LIF Cohort 6) exhibiting at the Innovation Summit

Figure 39: Neo Grow Green Coal at Innovation Summit – Sello Malinga - supported by TIA through Swiss SA partnership

13.2.4 SARIMA CONFERENCE

TIA through the Seed Fund is a partner to the SARIMA Conference 2019, which had 'Global Future - Local Needs' as its theme. Participation at the event gave TIA an opportunity to highlight the agency's role in supporting further research and development of innovations that may meet local needs, whilst responding to global opportunities.

At the event TIA was represented by its Interim CEO in a plenary session discussion (Figure 40) that looked at the African continent's 10 year strategy for Science, Technology and Innovation, which aims to accelerate Africa's transition to an innovation led knowledge based economy, and South Africa's National Development Plan, where one of its three priority areas for progress is "Improving the quality of education, skills development and innovation".

Points that were addressed during the plenary session

- How do we meet local needs while ensuring our research and innovation remains globally relevant?
- Does our research offer us a place on the future global stage but tackle local problems?
- What is the role of research and innovation management in connecting us globally and keeping us locally relevant?

TIA's participation at the SARIMA Conference allowed the agency to engage with research and innovation management practitioners with the aim to strengthen institutional capabilities across the SADC region.

Figure 40: Opening Plenary: Global Future - Local Needs - From left Dr Therina Theron, Prof. David Kaplan, Dr Emilia Nhalevilo, Mr Ketso Gordhan, Ms Fuzlin Levy-Hassen (TIA Interim CEO) and Rapelang Rabana

13.2.5 INNOVATION BRIDGE AND SCIENCE FORUM

The Innovation Bridge technology matchmaking and showcasing event was combined with the Science Forum South Africa in 2019. The annual event was attended by approximately 3,000 delegates, and is aimed at encouraging and accelerating the utilisation and commercialisation of existing and new knowledge and technologies that have been developed by publicly funded South African research and technology development institutions. A significant highlight for the year was TIA's support of and participation in the 2019 Innovation Bridge and Science Forum South Africa, which resulted in many significant deals and agreements being entered into.

TIA activities at the event

1. Hosted a side event on technology transfer and commercialisation matchmaking for intellectual property between universities and science councils, and industry.
2. Hosted a parallel session with the Public Investment Corporation, the SA SME Fund, the Land Bank, IDC and DBSA on the impact of investing for innovation.
3. Exhibited 24 start-ups that are TIA investees and 40 technologies funded by the TIA Seed Fund and Technology Development Fund from universities and science councils to the investment value of no less than R150 million. Minister Nzimande interacted with investees, getting to learn more about the innovations themselves and the innovator journey to date (Figure 41).

NOTABLE DEALS

During the event TIA partnered with the Small Enterprise Development Agency (SEDA) and Kisch creating a platform to link university and science council IP with industry. This initiative resulted in the following commercialisation deals:

a) Agricultural Research Commission has secured a commercial deal with CapeBIO, trading biotech company that has also secured offtakes with the Americans market, for antibodies and the Elisa test. This deal won the Technology Transfer Matchmaking IP pitch side evet prize of R125,000, with R25,000 cash from TIA towards any activities of progressing the joint venture, and the R100,000 towards IP legal services from Kisch IP.

b) University of Zululand has secured a license and production deal with Golden Goose, a trading entity with products at major Retail stores (including SPAR) for sorghum started cultures and flour, that Golden goose will ad as a product line. This deal won the Technology Transfer Matchmaking IP pitch side event prize of R125,000, with R25,000 cash from TIA towards any activities of progressing the joint venture, and the R100,000 towards Business Development services from SEDA.

Figure 41: Minister Blade Nzimande and TIA's Interim CEO Ms Fuzlin Levy-Hassen interacting with exhibitors at the Innovation Bridge

14. BENEFICIARY PERCEPTIONS OF AND EXPERIENCES WITH TIA

TIA commissioned Urban-Econ Development Economists (hereinafter "Urban-Econ") to interview its beneficiaries to determine their perceptions of and experience with TIA. A total of 22 beneficiaries were interviewed and provided responses to a set of pre-defined questions.

14.1 PERCEPTIONS OF TIA

Figure 42 presents TIA beneficiaries' perceptions of TIA. Most respondents had generally positive responses. All respondents were of the view that TIA is fulfilling its mandate.

A majority of beneficiaries stated that TIA has significantly stimulated and intensified technological innovation (84%) and that the agency is critical in addressing the country's social and economic challenges (71%).

Many expressed that TIA's role is more indirect, as the reach of addressing the social and economic challenges in SA is largely dependent on the commercialisation and success of the projects and programmes that are funded and supported. This also applies to the view of TIA's role in contributing to the SDGs.

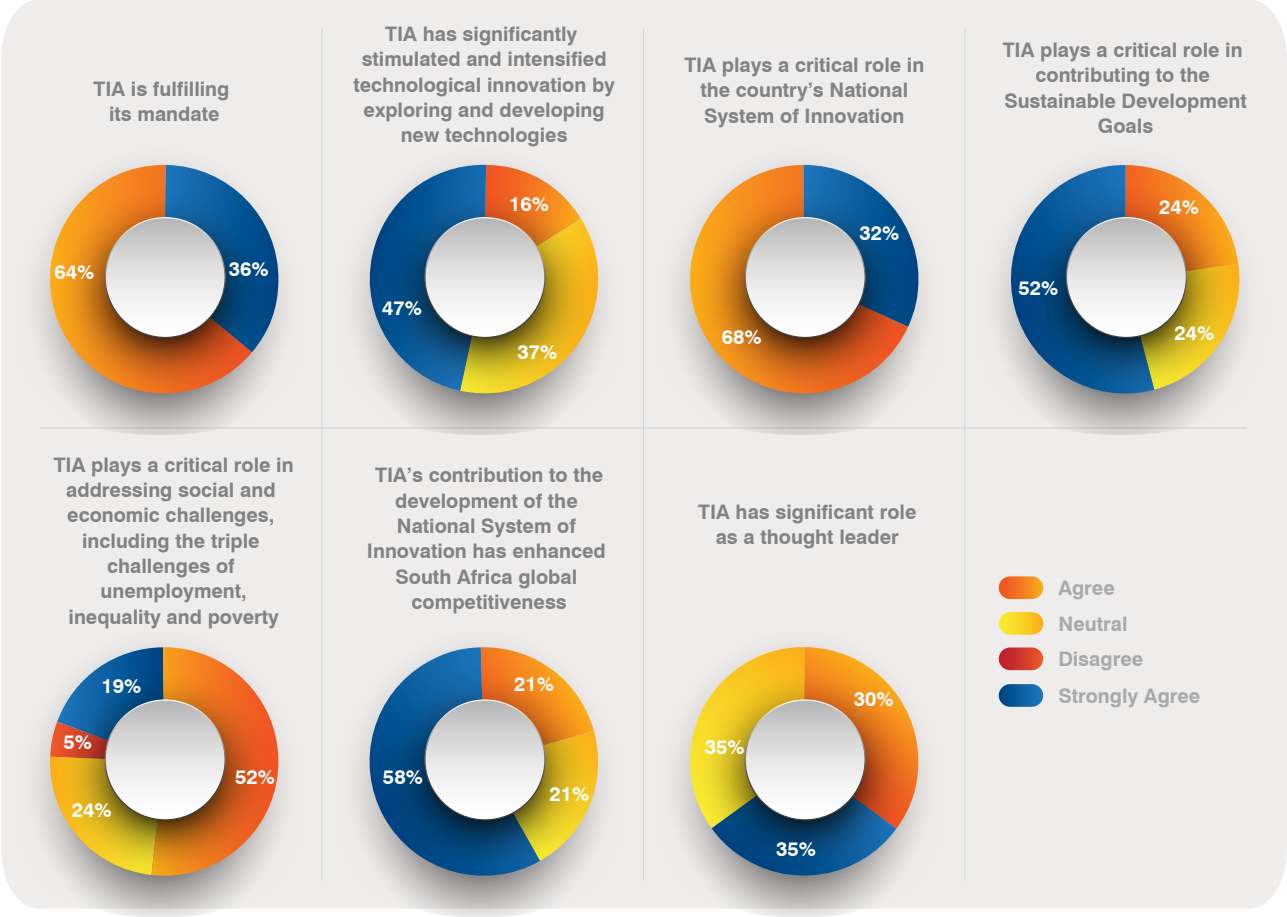


Figure 42: Beneficiary perceptions of TIA

All respondents agreed that TIA plays a critical role in the country's NSI, with 68% strongly agreeing. TIA's role and contribution to the NSI are unquestionable as not a single respondent disagreed about TIA's impact in this regard. Respondents stated that TIA plays a critical role in SA's NSI as it is willing to take on high-risk projects at an early state and significantly support its development, which other financiers or organisations would not have the risk appetite.

Approximately 58% of respondents strongly agreed that TIA's contribution to the development of the NSI has enhanced SA's global competitiveness. However, not all respondents felt as strongly about TIA's role as a thought leader in the country. Although there were no disagreements with the statement, 30% of the respondents were neutral and felt that TIA could do more.

14.2 EXPERIENCE WITH TIA

Figure 43 presents TIA beneficiaries' experience with TIA. All respondents agreed that TIA's assistance and support services are valid and suited to their priorities and needs. A significant portion (55%) stated that TIA's assistance was exceptionally suited. This was addressed by respondents who indicated that TIA is flexible, within reason, to allow businesses to develop projects as circumstances change or evolve. Respondents were particularly satisfied that TIA understood that beneficiaries required some degree of flexibility to ensure the success of certain deliverables.

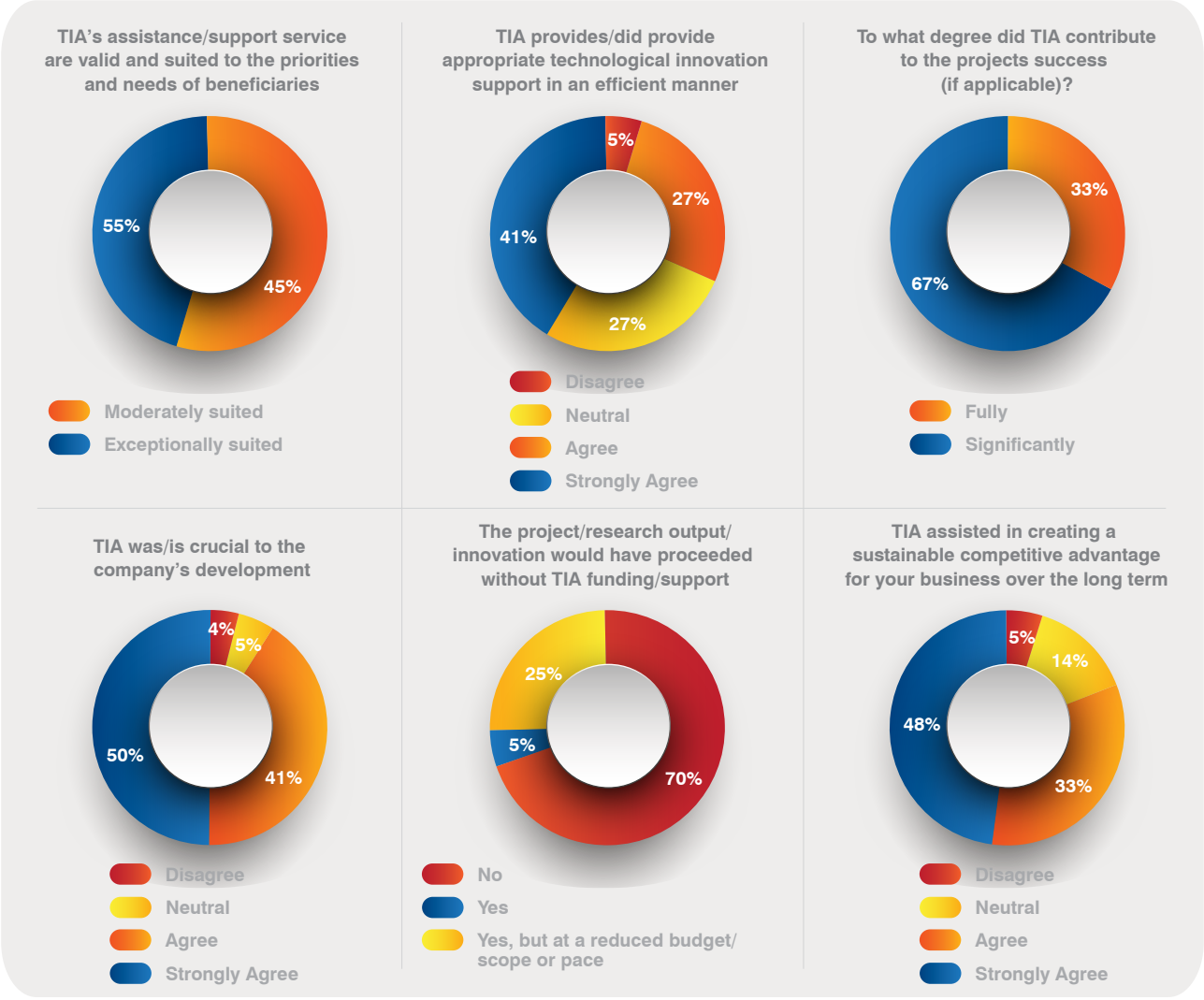


Figure 43: Beneficiary experience with TIA

It was found that TIA's services are relevant and it performed relatively well to meet the needs of its beneficiaries. While each project requires individual attention and has specific needs, most respondents experienced the following.

- Funding requirements were critical in the development of the projects. TIA played a critical role in this regard and incorporated the right approaches in monitoring and evaluation practices.
- In certain projects, access to skills was a necessity. TIA played a role as an enabler to ensure projects were equipped with the necessary skills to meet the projects' development needs.
- It was found that several respondents required funding and security to progress projects to commercialisation. In most instances, TIA has been an effective connector by linking beneficiaries to other potential funders and institutions. This remains a significant task that TIA must ensure is met as it is often found that high economic and social impacts materialise only after projects are commercialised.

Generally, the priorities and needs of the respondents were met and respondents were in constant communication with their respective project managers to ensure projects remain on track. This is a critical aspect of the success of beneficiaries delivering agreed-upon outputs and/or deliverables.

Furthermore, it was found that TIA provided appropriate technological innovation support (68% of respondents strongly agreed or agreed). However, respondents felt there is some scope for improvement as some respondents only received funding. The critical issues relating to TIA's support that beneficiaries said need to be addressed include the following:

- Quicker turnaround times on milestone assessments
- Quicker turnaround times to distribute funding
- More involvement in post-development processes and activities
- Reduced and streamlined submission requirements
- Reduced administrative burden
- Improved legal support
- Improved public awareness of the organisation through increased promotion and marketing
- Improved leveraging international network and linking international organisations to local business and institutions
- Further developed relationships with universities in SA to facilitate technology development (according to several respondents, this is a high-potential opportunity that can easily be unlocked)

The study found that the overall experience with TIA was positive, with 59% of respondents stating that the general support received from TIA was exceptional. When asked to elaborate, a specific response was that TIA had provided a dedicated Programme and Business Development Manager, which significantly enhanced the progress of the project and played a critical role in connecting the respondent with different government departments.

Respondents also stated that TIA was exceptional in providing network opportunities, facilitated through conferences and forums and linking respondents with other businesses or institutions. Several respondents also stated that TIA played a significant role in assisting other funding opportunities. Respondents highlighted that being funded by TIA added a high level of credibility when approaching other funders and/or investors.

TIA's support and impact have not only benefited the development of a project but were indeed significant in the survival of these projects. TIA's support and contribution were highlighted as essential as 70% of respondents would have not been able to progress without TIA's support and 25% would have been able to proceed but at a reduced budget/scope. It was further recorded that TIA either significantly or fully contributed to the project's success.

A larger percentage of respondents stated that TIA has improved their efficiency and technological know-how (62%) and improved their company's competitive advantage (81%). Further supporting these positive views of TIA's impact, 91% believe that TIA was/is crucial to their company's development. Respondents also indicated that the business support from TIA was highly impactful, where 81% of respondents stated that TIA assisted in improving their companies' competitive advantage.

It was further found that benefits derived from TIA's support continued after the support ceased. This was mainly in the form of TIA providing networking opportunities and any further facilitation required. All respondents either agreed or strongly agreed that TIA, as a public technology innovation/ development intervention, should be continued.

15. ECONOMIC IMPACT

TIA commissioned Urban-Econ to undertake an economic impact assessment of TIA's activities for the year under review. Urban-Econ makes use of economic modelling and one-on-one investee interviews to quantify this impact. Modelling entails using the Social Accounting Matrix, an economic impact model that determines the economic impact of an intervention; in this case, the agency's activities on the economy.

15.1 ECONOMIC MODELLING

The modelled impact of TIA's economic activity is shown in Table 38. TIA disbursed R604 million in 2019/20 through a combination of operational expenses and grants to beneficiaries. Using the Social Accounting Matrix, the modelled impact of TIA's economic activity is new business activity of R2.1 billion, a gross domestic product (GDP) contribution of R744 million, employment creation in the form of 2,312 jobs (direct, indirect and induced), income of R296 million and taxes of R121 million.

Table 38: Impact of TIA's economic activity

	Direct	Indirect	Induced	Total
New Business Activity (R million)	604	1,133	363	2,100
GDP (R million)	103	488	153	744
Employment (number)	46	1,746	520	2,312
Income (R million)	12	218	66	296
Tax (R million)	91	22	8	121

TIA's economic impact multipliers are depicted in Table 39. TIA's multiplier is R3.48 million in new business activity and 3.83 (or approximately 4) job opportunities for every R1 million spent, based on the impact of TIA's core activities and administrative operations.

Table 39: TIA's economic impact multipliers

	Direct	Indirect	Induced	Total
New business activity	1.00	1.88	0.60	3.48
GDP	0.17	0.81	0.25	1.23
Employment	0.08	2.89	0.86	3.83
Income	0.02	0.36	0.11	0.49
Tax	0.15	0.04	0.01	0.20

A comparison of TIA's economic impact multipliers over the period 2010/11-2019/20 is presented in Figure 44. It should be noted that while TIA's economic multipliers appear to have trended up over the years, that this is not an indication of TIA's performance in any way. Rather, it reflects a variance in the funding mix across economic subsectors over the years, as each economic subsector has a different set of multipliers.

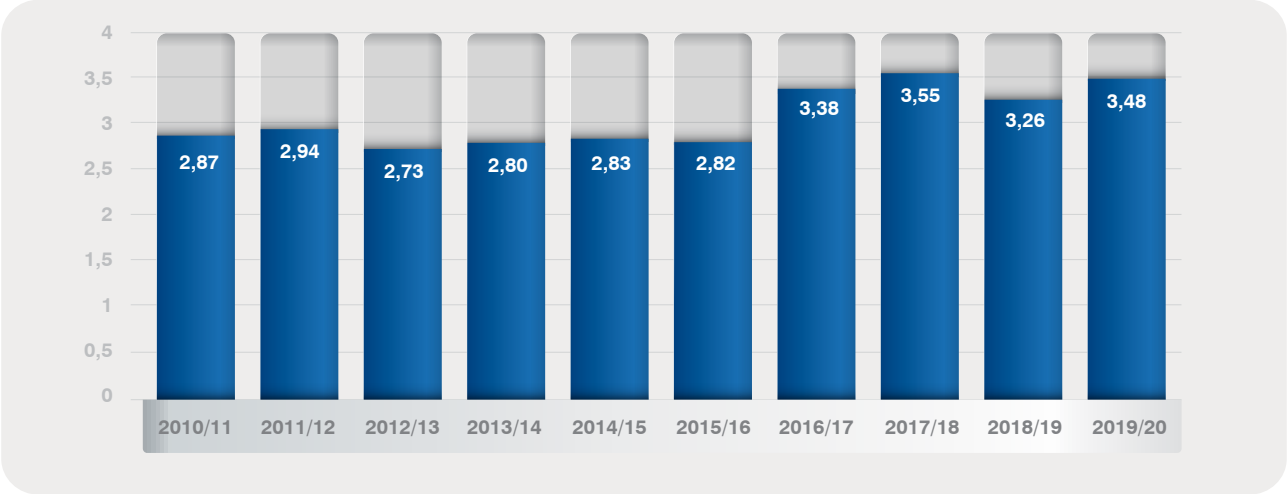


Figure 44: Comparison of TIA's economic impact multipliers for the period 2010/11-2019/20

15.2 INVESTEE IMPACTS

Urban-Econ interviewed 22 TIA investees to determine the impact that TIA's support had on them. The consolidated impacts for these projects are provided in Figure 45.

It is clear that respondents reported significant impacts attributed to TIA's assistance. TIA's impacts are mainly economic in nature, specifically improved business activity, performance and competitiveness for small businesses (including increased revenue); increased salaries and wages; increased employment; skills development; taxes paid; and additional funding attracted. These impacts are especially significant when considering that these companies are mostly SMMEs.

ROLE OF TIA

Funder Role in **95%** of projects

Connector Role in **86%** of projects

Enabler Role in **55%** of projects

Facilitator Role in **73%** of projects

INTENDED IMPACT OF THE INNOVATIONS

86% Have **economic** applications

73% Have **social** applications

68% Have **environmental** applications

IMPACTS (REPORTED)

147 Jobs created

67 Black	102 Youth
Women 73	Foreign 3

50 Masters/PHDs supported

18 Black	40 Youth
Women 40	Foreign 6

36 Interns working

19 Black	33 Youth
Women 19	Foreign n/a

162 Trained

90 Black	135 Youth
Women 80	Foreign 6

INCREASED ATTRIBUTED TO TIA SUPPORT/COLLABORATION

Salaries and wages

+R23.2 million

(11 respondents provided a response)

Taxes paid

+R3.1 million

(7 respondents provided a response)

Government incentive accessed

+R190 000

(1 respondent provided a response)

Additional co-funding attracted

+R14.9 million

(10 respondents provided a response)

Figure 45: Characteristics and reported impact and benefit of TIA support to 22 investees

Urban-Econ engaged with TIA investees to determine the intended or actual impacts of the innovations supported. The results are shown in Figure 46.

The intended impacts of supported innovations after commercialisation revealed some surprising results. Almost 60% of investees believe their innovation would have an environmental benefit. The next highest intended impact is employment creation, followed by income generation and addressing health issues.

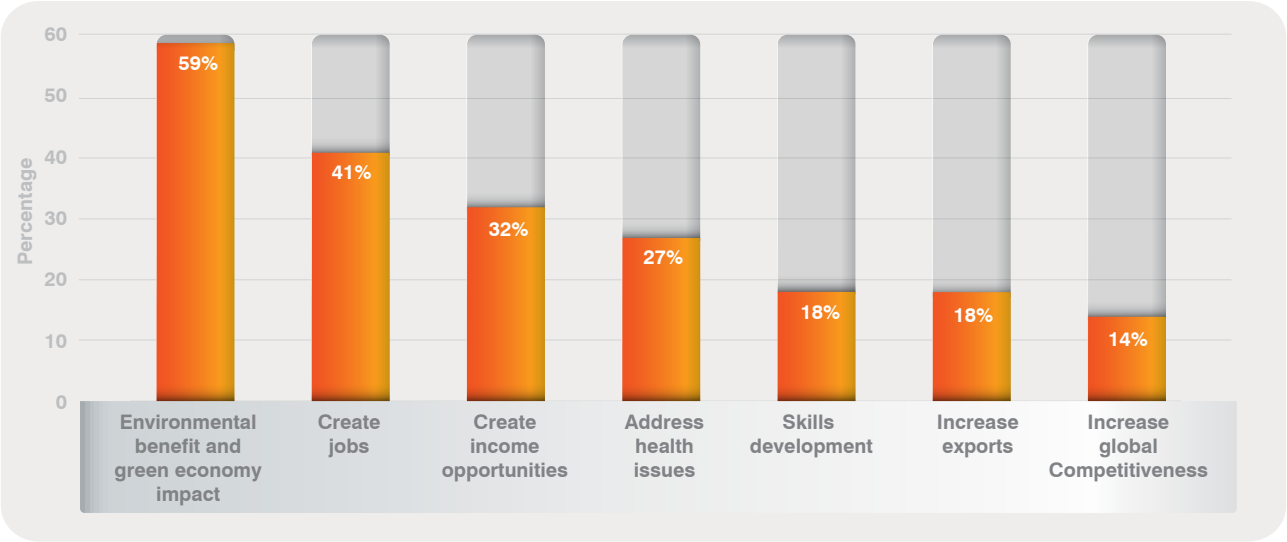


Figure 46: Intended impacts of supported innovations after commercialisation

In terms of the sustainability and durability of the impacts, 70% of the respondents indicated that the impacts of their respective projects would be sustainable and durable. The balance of the respondents were uncertain or indicated that funding, support and/or government intervention or legislation would play a part in determining if the impacts would be sustainable and durable.

It is significant that that 23% of respondents were able to produce a product better than expected or as outlined in the original scope (Figure 47). This incorporates several spin-off benefits, contributing not only to an improved version of the innovation, but also to improved commercial competitiveness that could lead to increased revenue, productivity and employment.

Additionally, 23% of the respondents stated that an unintended/non-anticipated effect of the innovation was the ability to produce secondary or spin-off products that would generate a second revenue stream. This is a strong indication that innovations are not purely limited to the original scope but can also evolve, mature and expand.

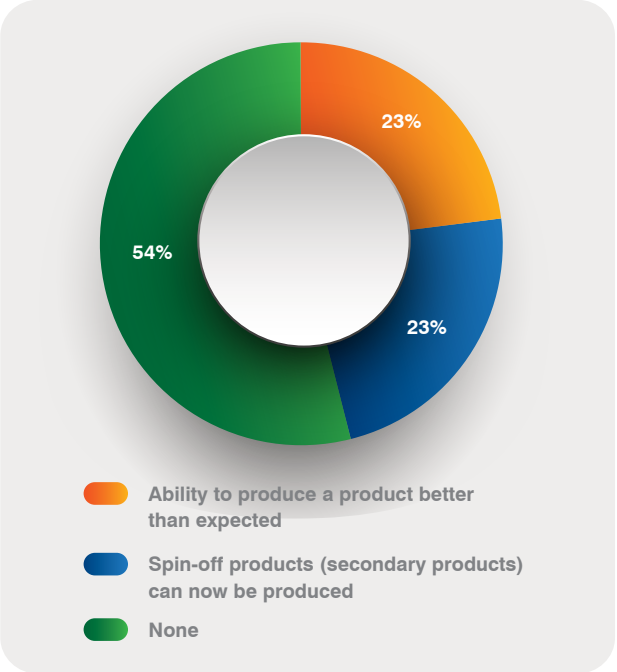


Figure 47: Unintended effects or effects not anticipated during product development

PART C
GOVERNANCE

16 PORTFOLIO COMMITTEES

TIA is accountable to Parliament through the Portfolio Committee on Higher Education, Science and Technology. During the financial year under review, TIA attended sessions before the Portfolio Committee to present its 2018/19 Annual Report on 9 October 2019, 13 November 2019 and 10 March 2020.

At the first of the abovementioned sessions, the Portfolio Committee indicated that TIA's 2018/19 Annual Report did not adequately cover the circumstances under which former CEO, Mr Barlow Manilal, left the organisation. The Committee also expressed concern about the fact that the then Board Chairman was not present at the session.

TIA presented a revised 2018/19 Annual Report to the Portfolio Committee on 13 November 2019, providing an explanation for the Board's decision not to renew Mr Manilal's contract as CEO. The Committee raised concerns about the costs incurred by the organisation to pay for international travel of the then Interim Board Chairman, who is resident in Australia. The Committee also expressed concerns regarding a tender which had been submitted to TIA by the then Interim CEO, Ms Fuzlin Levy-Hassen, when she was a non-executive Board member of the organisation. The session concluded with a discussion of TIA's performance and TIA was requested to report back on a number of performance-related issues.

At the session held on 10 March 2020, TIA provided feedback to the Portfolio Committee about performance-related matters including support to SMMEs and the higher education sector, addressing the challenges of grassroots innovators, stakeholder relations and turnaround times, employment equity demographics and vacancies in senior management positions, and other matters. Concerning the aforementioned bid submitted by Ms Levy-Hassen it was reported that her tender was never considered by TIA since Board members were not allowed to tender for TIA work, notwithstanding Ms Levy-Hassen's offer to resign as a Board member should her bid be successful.

TIA's Board Charter was subsequently amended to include a Code of Conduct, emphasising the fact that Board members are not permitted to undertake remunerated work for the organisation.

17. EXECUTIVE AUTHORITY

The Executive Authority is accountable to the Legislature/ Parliament in terms of the achievement of the goals and objectives of TIA. The Executive Authority takes an interest in risk management to the extent necessary to obtain comfort that properly established and functioning systems of risk management are in place to protect TIA against significant risks. As risk management is an important tool to support the achievement of this goal, it is important that the Executive Authority provides leadership to governance and risk management.

TIA's Executive Authority is the Honourable Minister of Higher Education, Science and Innovation, Dr Bonginkosi Emmanuel Nzimande.

The following reports were submitted to the Executive Authority:

- 2019/20 Quarter 1 Report (25 July 2019)
- 2019/20 Quarter 2 Report (24 October 2019)
- 2019/20 Quarter 3 Report (21 January 2020)
- 2019/20 Quarter 4 Report (20 April 2020)
- 2018/19 Annual Report (submission 6 September 2019, resubmission 27 November 2019)

18. ACCOUNTING AUTHORITY

TIA's accounting authority is the TIA Board, which was appointed on 1 May 2017 by the agency's then executive authority, the former Minister of Science and Technology, Ms Grace Naledi Mandisa Pandor. The Board has completed three years of its four-year term of office.

The Board is, in terms of Section 5 of the TIA Act, responsible for the management and control of the agency. Board members are appointed by the Minister on the grounds of their knowledge and experience in technological innovation, technology management, IP and commercialisation thereof and business skills which, when considered collectively, should enable them to attain the objectives of the agency.

The Board considers the practice of good corporate governance as a fundamental component contributing to the success of TIA's business. In the pursuit of, and in its commitment to the highest standards of governance, the Board provides strategic oversight and effective direction by adhering to the relevant codes of best practice, principles of fairness, integrity, responsibility, accountability and transparency.

18.1 BOARD CHARTER

A Board Charter is in place, which sets out the roles and responsibilities of the Board in relation to the agency and to govern the conduct of the Board. The Board Charter is central to determining how the Board interacts with management, the shareholder and other stakeholders. In addition, Board members' responsibilities and limitations are primarily set out in the TIA Act, the PFMA, the King reports on Corporate Governance for SA, and the common law of SA.

The Board is responsible for:

- Acting as the focal point for, and custodian of, corporate governance by managing its relationship with management, the shareholder and other stakeholders of the agency along sound corporate governance principles;
- Providing effective leadership on an ethical foundation;
- Appreciating that stakeholders' perceptions affect the agency's reputation;
- Adoption of strategic plans;
- Appointing a suitably skilled and qualified person as the CEO of the agency, which appointment must be made after following a transparent and competitive selection process;
- Retaining full and effective control over the agency, and monitoring management in implementing Board plans and strategies;
- Monitoring of operational performance and management;
- Ensuring that the agency complies with all relevant laws, regulations and codes of business practice;
- Ensuring that the agency communicates with its internal and external stakeholders openly and promptly and with substance prevailing over form;
- Developing a code of conduct that addresses conflicts of interest, particularly relating to Board members and management;
- Ensuring that there is an appropriate balance of power and authority on the Board, such that no individual or select individuals can dominate the Board's decision-making;
- Defining and monitoring the information needs of the Board;
- Identification and monitoring of the non-financial aspects relevant to the business of the agency; and
- Through its subcommittees, prioritise and manage risks which seek to impede the business of TIA.

18.2 COMPOSITION OF THE BOARD

Table 40 provides a detailed list of TIA Board members for 2019/20, together with their dates of appointment and resignation, their qualifications, their areas of expertise, their board directorships and other committees or task teams they serve on.

Table 40: TIA Board members and their particulars

Prof. Edward Christian Kieswetter (Chairman)

Dates appointed and resigned
1 May 2017 to 6 August 2019

Qualifications
- MCom (Cum Laude)
- MSc Ed (Cognitive Development)
- MBA
- BEd Hons (Mathematics and Science)
- PG Dip Ed (Engineering and Mathematics)
- Engineering Dip (Electrical)
- Industrial Instrumentation Apprenticeship

Area of expertise
- Leadership
- Governance
- Technology and innovation management
- Financial management

Board Directorships
- None

Other Committees or task teams
- None

Dr Stephen John Lennon (Interim Board Chairman from 9 August 2019 to 19 March 2020 and current Chairperson of the Investment and Finance Committee)

Date appointed
1 May 2017 to date

Qualifications
- PhD (Physical Metallurgy)
- MSc Engineering (Physical Metallurgy)
- BSc Chemistry
- Applied Chemistry Senior Management Programme
- Prince of Wales Business and Environment Programme

Area of expertise
- Business development
- Energy
- Technological innovation

Board Directorships
- PKKPAC Aboriginal Corporation
- Shanduvan Pty Ltd
- Solajoule Pty Ltd

Other Committees or task teams
- None

Table 40: TIA Board members and their particulars (continued)

Mr Thabiso Gerald Ramasike (member and and current Chairperson of the Audit and Risk Committee)

Date appointed
1 May 2017 to date

Qualifications
- BCom
- BANKSETA International Executive Development
- Senior Executive Leadership Development Programme
- Certified Associate (CAIB (SA))

Area of expertise
- Businessman
- Strategist
- Public speaker
- Philanthropist

Board Directorships
- Kwena Fund Managers
- Kwena Franchise Fund
- Eic Wealth Investors
- Ramasike Investment Club
- Thabiso Ramasike Investments
- Mes Mould Empower Serve
- Bushveld Crushers
- African Unity Life
- Tuleka Group

Other Committees or task teams
- Member: Audit and Risk Committees of South African Revenue Service
- MES
- African Unity Insurance Limited;
- Chairperson: Social, Ethics, Transformation & Sustainability Committee (African Unity Insurance Limited)

Ms Joy Sebenzile Matsebula (member and current Chairperson of the Human Resources and Remuneration Committee)

Date appointed
1 May 2017 to date

Qualifications
- MSc (Biometrics)
- BSc Natural Sciences
- Environmental Sciences and Biometrics

Area of expertise
- Social justice
- Human rights
- Disability mainstreaming
- Governance
- Statistics
- Scientific research
- Monitoring & evaluation

Board Directorships
- Centre for Alternative & Augmentative Communication
- First Rand Foundation
- Lanseria International Airport
- South African Development Trust for Disabled People
- Lindandanda Consulting Investments & Trading
- Petatex
- Ugqozi-Lwe Transfarms Co-Operative Limited
- Knapsm Properties Co-Operative Limited
- Compelling Communications Advertising Agency
- Sebenzile Matsebula Foundation
- Dempower
- Taquanta Securities
- Dec Investment Holding Company
- Taquanta Asset Managers
- Powder Active Technologies
- Taquanta Investment Holdings
- Motswako Office Solutions
- Kuzuko Lodge
- Divuseni Trading and Investments
- South African Businesswomen in the Arts Association

Other Committees or task teams
- None

Table 40: TIA Board members and their particulars (continued)

Mr Butana Mboniswa (Interim Board Chairman from 20 March 2020 to date)

Date appointed
8 August 2019 to date

Qualifications
- MSc Biochemistry
- BSc (Hons) Biochemistry
- Corporate Governance course
- GAP Biosciences Executive Education course
- Personal Mastery and several management courses
- Advanced Leadership Programme

Area of expertise
- Leadership
- Chemical bioscience
- Chemical science
- Technology management

Board Directorships
- Sereko Technology & Innovation Advisors
- Sereko Projects
- Tlokwe Health Professional Group
- Inqaba Biotechnical Industries
- Black Science Technology Engineering Professionals

Other Committees or task teams
- None

Ms Fuzlin Levy-Hassen (member from 1 May 2017 to 12 June 2019; Interim CEO and ex officio Board member from 13 June 2019)

Dates appointed and resigned
1 May 2017 to 12 June 2019
(Interim CEO from 13 June 2019)

Qualifications
- Chartered Accountant CA(SA)
- B Com (Hons) Accounting
- Post Graduate Diploma in Accounting
- Bachelor of Commerce
- Certificate in Venture Capital

Area of expertise
- Chartered accountancy
- Deal sourcing
- Audits
- Company & risk analysis
- Turnaround strategies
- Technology innovation & commercialisation
- Venture capital
- Private equity
- Investment banking
- Due diligence
- Post investment management
- Lecturing

Board Directorships
- Zasfr Holdings (Pty) Ltd

Other Committees or task teams
- Member: Audit Committee (Bankmed)

Mr Barlow Manilal (CEO and ex officio Board member)

Dates appointed and resigned
1 April 2015 to 30 May 2019

Qualifications
- Masters (Supply Chain Management)
- BSc Hons (Industrial Technology and Management)
- Dip (Master Management)
- Dip (Project Management)
- Dip (Quality Management)
- Dip (Production Management)
- Principles of Production and Inventory Management
- Basics of Supply Chain Management

Area of expertise
- Management
- Industrial engineering supply chain management
- Project engineering
- Manufacturing

Board Directorships
- None

Other Committees or task teams
- Chairperson: Photonics Prototyping Facility (CSIR National Laser Centre)
- Member: Industrial Development Advisory Panel (CSIR)

Dr Jan van de Loosdrecht (member)

Date appointed
1 May 2017 to date

Qualifications
- PhD Chemistry
- MSc Chemistry
- MBA

Area of expertise
- Technology innovation
- Technology management
- Technology development
- Technology commercialisation
- Intellectual Property

Board Directorships
- None

Other Committees or task teams
- None

Table 40: TIA Board members and their particulars (continued)

Dr Mziwandile Madikizela (member)

Date appointed
1 May 2017 to date

Qualifications
- PhD (Biochemistry)
- MSc (Biochemistry)
- MBA
- BSc Hons (Biochemistry)
- Certificate in Technology Management
- Executive coaching
- Certificate in Programme Leadership Coaching

Area of expertise
- Consultant: STI
- Executive coach
- Technology management research
- Commercialisation
- Innovation management
- Regional innovation systems
- Molecular parasitology
- Cancer research
- Clinical trials

Board Directorships
- Onderstepoort Biological Products
- New Africa Biofuels
- Acme Resources
- Stellachem
- Razocure Medical Products

Other Committees or task teams
- Member: Remuneration & R&D Board Committee (Onderstepoort Biological Products)

Dr Patience Lethabo Mlengana (member)

Date appointed
1 May 2017 to date

Qualifications
- PhD (Biochemistry)
- MSc (Biochemistry)
- MBA
- BSc Hons (Biochemistry)
- Certificate in Technology Management
- Executive coaching
- Certificate in Programme Leadership Coaching

Area of expertise
- Information Technology
- Market research
- Product management
- Commercial property

Board Directorships
- Tshahani Resources
- Century Property Estates
- Angels City
- PWM Technologies
- Nyathela Consulting 2
- Mhlari Kulaleni Agricultural Primary Co-Operative Ltd
- Inqubela Agricultural Co-Operative Ltd
- Zakele Consulting
- F Cubed South Africa
- Cyclo Capital
- PMM Property Holdings
- Vi Women's Investments

Other Committees or task teams
- None

The Board convened for a total of nine meetings in the period under review. The dates of the meetings and Board member attendance is provided in Table 41.

Table 41: Board meeting dates and attendance record

Member	No. of meetings attended	30/5/2019	22/7/2019	29/7/2019	2/9/2019	28/10/2019	28/11/2019	17/12/2019	20/1/2020	27/2/2020
Prof. Edward Kieswetter	1	√	x	x	-	-	-	-	-	-
Dr Stephen Lennon	9	√	√	√	√	√	√	√	√	√
Mr Thabiso Ramasike	9	√	√	√	√	√	√	√	√	√
Dr Jan van de Loosdrecht	8	√	√	√	√	√	x	√	√	√
Dr Mziwandile Madikizela	9	√	√	√	√	√	√	√	√	√
Ms Sebenzile Matsebula	8	√	x	√	√	√	√	√	√	√
Dr Patience Mlengana	5	√	√	√	x	√	x	√	x	x
Mr Butana Mboniswa	6	-	-	-	√	√	√	√	√	√
Ms Fuzlin Levy-Hassen	7	√	√	√	√	x	√	x	√	√
Mr Barlow Manilal	1	√	-	-	-	-	-	-	-	-

The Board has recognised the relevance and significance of TIA's role in the NSI, and has prioritised the Bio-economy Strategy, the TSP, and commercialisation for the successful implementation of TIA's mandate. The Board met at a strategy session workshop from 28-30 October 2019 to define areas for improvement and determine prospective initiatives to strengthen TIA's position in the NSI.

18.3 COMMITTEES

The Board operates and conducts itself through three standing subcommittees, viz. the Audit and Risk Committee, the Investment and Finance Committee, and the Human Resources and Remuneration Committee. The Board's devolution of responsibilities, therefore, falls on these three subcommittees, which meet independently and report regularly to the full Board through their respective chairpersons.

18.3.1 AUDIT AND RISK COMMITTEE

The Audit and Risk Committee (ARC) is constituted in terms of Section 77 of the PFMA, read with Chapter 27 of the Treasury Regulations.

The ARC assists the Board in discharging its duties relating to the safeguarding of assets, the operation of adequate systems, control processes and the preparation of accurate financial reporting and statements in compliance with all applicable legal requirements, accounting and auditing standards. The ethical function of a Social and Ethics Committee as envisaged in the Companies Act 71 of 2008 were incorporated into the Terms of Reference of the ARC during the year under review.

During the reporting period, the Committee monitored the effectiveness of TIA's internal controls, governance and compliance with its risk management framework. A combined assurance plan was approved to ensure that

the agency adopts a coordinated approach to all assurance activities. Whilst several material risks emerged, no internal or external audit findings have come to the attention of the Committee to indicate that any material breakdown of internal controls occurred during the year under review.

The Committee convened for a total of six times in the period under review as shown in Table 42.

Table 42: ARC meeting dates and attendance record

Member	No. of meetings attended	28/5/ 2019	23/7/2019	14/8/2019	14/11/2019	20/1/2020	14/2/2020
Mr Thabiso Ramasike (Chairman from 14 August 2019 to date)	6	√	√	√	√	√	√
Dr Stephen Lennon (Chairman until 14 August 2019)	6	√	√	√	√	√	√
Dr Jan van de Loosdrecht	5	√	√	√	x	√	√

18.3.2 INVESTMENT AND FINANCE COMMITTEE

The Investment and Finance Committee (IFC) provides oversight and advice to the Board on issues central to the Board's core mandate. The Committee makes funding decisions in pursuit of TIA's mandate and strategic objectives within the specific thresholds determined in, and guided by the Investment Framework Policy, as prescribed by Section 5(3) of the TIA Act.

The IFC considers investment proposals where TIA's exposure per project is above R15 million but below or equal to R30 million, and oversees the management of financial resources within its delegated authority. The Committee further considers ad hoc matters as delegated to the Committee by the Board from time to time.

During the reporting period, the Committee approved an amount of R16.4 million for a project to develop a system for providing high-speed internet to buildings in built-up areas. Other projects approved by the Committee include R22.3 million to develop prototype agricultural machines for soil preparation, regeneration, rehabilitation and remediation of non-arable and arable land. The Committee also approved R14.7 million towards development of a vaccine against tick bite fever caused by the African Blue Tick, and R19.7 million for a project to develop a portfolio of semiconductor technologies used to build cheaper radio front-ends for various wireless communication equipment such as 5G transmitters and automotive radar systems.

The Committee convened for a total of four times in the period under review as shown in Table 43.

Table 43: IFC meeting dates and attendance record

Member*	No. of meetings attended	21/5/ 2019	15/8/ 2019	20/11/ 2019	17/2/ 2020
Ms Fuzlin Levy-Hassen (Chairperson until 20 June 2019)	1	√	-	-	-
Mr Butana Mboniswa (Chairman from 20 November 2019 to 19 March 2020)	2	-	-	√	√
Dr Stephen Lennon	4	√	√	√	√
Dr Jan van de Loosdrecht	2	x	√	x	√
Dr Mziwandile Madikizela	4	√	√	√	√

**Between 21 June and 19 November 2019 the IFC chairmanship was rotational.*

18.3.3 HUMAN RESOURCES AND REMUNERATION COMMITTEE

The Human Resources and Remuneration Committee (HR&REMCO) derives its authority from the Board and was established in order to oversee and provide advice to the Board on issues central to TIA's human resource capability, design and strategy as well as remuneration and succession planning.

The Committee is responsible for ensuring that TIA develops a framework, policies, guidelines and an environment that allows the agency to employ, reward and retain dedicated, motivated, efficient and loyal employees so as to achieve TIA's long-term strategic goals. The social functions of a Social and Ethics Committee as envisaged in the Companies Act 71 of 2008 were incorporated into the Terms of Reference of the HR&REMCO during the year under review, dealing with matters such as environment, health and safety, consumer relationships, labour and employment.

During the period under review the Committee focused on each element of the human resources value chain. In terms of strategic alignment, the Committee considered and approved the realigned structure, which will enhance organisational performance by ensuring that cross-cutting thematic areas are capacitated and foster synergies and efficiencies for portfolio management.

The TIA remuneration and rewards philosophy was independently benchmarked with comparable organisations to enable TIA to attract and retain the required skills. Talent management remains an important area and to build a strong leadership pipeline, phase 2 of the Cadet Leadership Development Programme was completed successfully. The Committee monitored alignment with the Employment Equity Plan, and strengthened human resources (HR) governance with oversight over HR risk management practices and HR policies.

The Committee convened for a total of six times in the period under review as shown in Table 44.

Table 44: HR&REMCO meeting dates and attendance record

Member	No. of meetings attended	16/5/2019	17/7/2019	14/8/2019	12/11/2019	14/1/2020	18/2/2020
Ms Sebenzile Matsebula (Chairperson)	5	√	√	x	√	√	√
Dr Mziwandile Madikizela	6	√	√	√	√	√	√
Dr Patience Mlengana	5	√	√	√	x	√	√
Mr Thabiso Ramasike	6	√	√	√	√	√	√

18.4 REMUNERATION OF BOARD MEMBERS

Board members receive fees for services they render to the Board and the executive authority in accordance with the relevant tariffs as determined by National Treasury, and which are regulated and updated from time to time, and approved by the Minister. All Board members' travel costs in relation to executing their duties as TIA Board members, such as airfare and car hire, are paid for by TIA. Board members are also reimbursed for incidental expenses such as airport parking, toll fees and transfer fares. For the use of their personal vehicles in conducting TIA's business, they are reimbursed per kilometre as permitted by TIA's Travel Policy. The breakdown of each members' remuneration is presented in note 27 (members' emoluments) of the annual financial statement, presented in Part E.

19. RISK MANAGEMENT

ARC provides an oversight role on the effectiveness of TIA's risk management process, which is integrated and central to its strategic planning process. TIA has an approved Risk Management Policy and risk assessments are conducted annually to determine the effectiveness of mitigation strategies and to identify emerging risks. TIA has identified, analysed, evaluated, monitored and reported on the risk exposure emanating from the strategic and operational risks impacting on the accomplishment of its set strategic goals and objectives, in accordance with the approved Risk Management Policy.

TIA's enterprise-wide risk management activities and initiatives were consistently aligned to best international practices (Committee on Sponsoring Organisation Enterprise Risk Management Framework, ISO31000 on Enterprise Risk Management Framework, King IV Report on Corporate Governance in SA, the Public Sector Risk Management Framework and Institute of Risk Management South Africa risk principles). Accordingly, ARC can report that the risk management processes for the period under review were efficient and effective.

20. INTERNAL CONTROL UNIT

Whilst the agency does not have a separate Internal Control unit, TIA's management has established and maintained an effective system of internal controls. The objectives of the system of internal control is to ensure that

- Risks are properly managed;
- Assets are safeguarded;
- Financial and operational information is reliable;
- Operations are effective and efficient; and
- Laws, regulations and contracts are complied with.

Internal Audit assesses whether the internal controls upon which management relies to mitigate the risks to acceptable levels are appropriate and functioning as intended and develops recommendations for enhancement or improvements in the internal control environment.

21. INTERNAL AUDIT

21.1 PURPOSE AND OBJECTIVES

It is a requirement of the PFMA that an Internal Audit function must exist for public entities. The primary objective of the Internal Audit function is to provide management and ARC with an independent and objective level of assurance. By partnering and collaborating with management, this assurance is designed to add value and improve TIA's operations, its internal control environment, risk management and governance processes. In addition, Internal Audit assists TIA to accomplish its objectives by bringing a risk-based, systematic and disciplined approach to evaluating and improving the effectiveness of risk management, internal control and governance processes.

The Internal Audit function remains in-house and the unit has maintained its independence by reporting functionally to ARC and administratively to the CEO. The unit has established processes and procedures, supported by a sound internal audit methodology. The purpose, authority and responsibility of internal audit are encapsulated in the internal audit charter, which is approved annually by ARC.

21.2 KEY INTERNAL AUDIT ACTIVITIES

The primary scope of the Internal Audit function is to provide TIA with an independent capability to perform assurance audits that are consistent with the relevant legislation, responds to TIA's priorities and are aligned to TIA's objectives. The function provides value-added assurance, supports positive change within TIA and supports stewardship and accountability in the spending of public funds. Internal Audit focuses on the following key activities (amongst others):

- Risk areas are adequately identified and addressed
- Breakdowns in key internal controls are identified, reported on and that in response to these instances, appropriate improvements can be recommended and agreed with management for implementation
- Non-compliance with TIA's corporate governance, policies and procedures, applicable regulations and statutory requirements are identified and that implementation plans are put in place to address and resolve these matters

21.3 SUMMARY OF WORK DONE IN 2019/20

In accordance with the National Treasury requirements an Annual Internal Audit Plan was prepared for 2019/20, which was approved by TIA's ARC, as required.

During the period under review, an annual allocation of resources to audit activities was established on the basis of a systematic risk-based assessment, taking into account various financial and operational internal and external risks, policies, processes, the requirements of the PFMA, Treasury regulations, etc. In line with the approved Annual Internal Audit Plan, audits were conducted across various TIA functional areas. Additionally, a certain amount of capacity was utilised for once-off projects, special investigations and requests from management, ARC and the Board.

From an overarching perspective, during the period under review the Internal Audit team completed all the planned audit activities, which includes internal assurance audits, project/programme audits, advisory assignments and ad-hoc requests. In this regard, no evidence was presented to suggest that there were material breakdowns in, or threats to, the internal control environment. A year-on-year comparison in internal audit showed an improvement in certain critical areas, while significant concerns in other areas were identified. All recommendations provided by internal audit have been appreciated and adopted by TIA management, where applicable. In terms of critical and repeat findings, management has demonstrated a commitment to remedy and better manage areas of weakness, with noticeable improvements already made.

22. COMPLIANCE WITH LAWS AND REGULATIONS

TIA has implemented sufficient and adequate processes, procedures, policies and frameworks to ensure that the agency complies with legislative or regulatory matters impacting TIA. The Internal Audit planning process identifies audit areas in a manner that ensures compliance with legislative requirements and supports a value-added audit process. Non-compliance with applicable regulations and statutory requirements are identified and guidance is provided for implementation plans to address and resolve these matters of non-compliance.

23. MINIMISING CONFLICT OF INTEREST

Annually, and on an ad hoc basis through active solicitation, Board members are required to disclose potential conflicts of interest. During the period under review, disclosures received from members were closely scrutinised by the Company Secretary and the ARC Chairman. No conflicts or potential conflicts of interests were noted. Where required, members were excused from matters which have given rise to conflicts of interests. Members are regularly encouraged to disclose potential conflicts at every meeting.

24. CODE OF CONDUCT

To support good governance, TIA adopted a code of ethics and values as part of its policies and procedures. The code is adhered to in TIA's dealings with all stakeholders and organisations – internally, externally, nationally and globally.

25. HEALTH, SAFETY AND ENVIRONMENTAL ISSUES

TIA is committed to prioritising the safety of employees and visitors by ensuring safe and secure working environments. TIA ensures compliance to occupational health and safety governance obligations by maintaining offices and providing the necessary equipment. The internal occupational health and safety measures implemented are aimed at protecting employees and visitors. Regular inspections are conducted in the workplace to identify and minimise hazards that could potentially affect the safety of employees and visitors or expose them to health risks. Health and safety representatives have also been trained to respond to office environment emergencies.

Emergency evacuation exercises were conducted to ensure that all employees are familiar with the emergency procedures and to test TIA's state of preparedness in case of emergencies. The fire equipment, backup generator and uninterrupted power supply systems have been regularly tested throughout the year to avoid operation disruptions and ensure business continuity.

TIA complied fully with the national lockdown announced by President Ramaphosa on 23 March 2020 in response to the emerging global COVID-19 pandemic. Accordingly, TIA employees worked remotely when SA went into lockdown on 26 March 2020.

26. COMPANY SECRETARY

The Company Secretary provides the Board with professional and independent guidance on corporate governance and its legal duties. In addition to coordinating the functioning of the Board and its Committees, the Company Secretary acts as a central source of information and advice to the Board on matters of ethics, adherence to good corporate governance principles, compliance with procedures and applicable statutes and regulations.

In accordance with Principle 10 of the King IV Report on Corporate Governance for SA, 2016 (King IV™ 2016), the Company Secretary reports functionally to the Board, and administratively to the CEO as the designated member of the executive management for this purpose. The Company Secretary is not a Board member, and has unfettered access to the Board, but maintains an arms-length relationship with the Board and its members. The appointment of the Company Secretary, Mr Louw, including his employment contract and remuneration, was approved by the Board.

The Company Secretary has certified that, to the best of his knowledge and belief, TIA has lodged with the Registrar of Companies for the financial year ended 31 March 2020 all such returns as are required in terms of the Companies Act 71 of 2008, and that such returns are true, correct and up to date. In addition, he has certified that TIA has lodged with the Minister of Higher Education, Science and Innovation the financial statements in respect of the preceding financial year.

27. SOCIAL RESPONSIBILITY

TIA held its annual internal TIA Cares Charity Event in October 2019. In support of this initiative TIA employees were asked to nominate a charity to support and also volunteer to be part of the Charity Team. The two charities selected for support were the Makhoma Retirement Centre, an old age home in Soshanguve (Figure 48), and the Thutong Children's Home in Mamelodi (Figure 49).

Fourteen TIA employees volunteered to be part of the Charity Team. The team decided to fill Christmas boxes full of essential items for each occupant at the two homes, to be delivered to the homes in December 2019. After engaging with the two homes, Makhoma Retirement Centre identified a need for adult nappies, cleaning wipes, toothbrushes, soap, cleaning products, pillows, mattress protectors and night clothes, and Thutong Children's Home requested for school bags, long grey socks, stationery, green jackets, school shoes, winter gowns and casual clothes.

Charity Team volunteers (Figure 50) were assigned to various TIA business units, who were each allocated an elderly person or a child. Due to the generosity of TIA employees not only did the Charity Team manage to fill all Christmas boxes with the requested items, there were also surplus funds to buy each of the homes' care-givers a present and essential groceries for December.

Figure 48: Residents of Makhoma Retirement Centre get a visit from TIA

Figure 49: Residents of Thutong Children's Home receive their Christmas boxesfrom TIA

Figure 50: The TIA Charity Team

28. AUDIT AND RISK COMMITTEE REPORT

We are pleased to present our report for the financial year ended 31 March 2020.

28.1 AUDIT AND RISK COMMITTEE STATEMENT

The ARC is appointed in terms of Section 94(2) of the Companies Act (2008) and Section 51 of the PFMA, read with Principle 8 of King IV. The Committee has performed its duties and carried out its responsibilities in accordance with its annually reviewed charter, and has executed specific duties delegated to it by the Board. Amongst others, the charter charges the committee with the following responsibilities.

- Examine and review the AFS and report on the final results.
- Appoint and evaluate the qualification, appropriateness, eligibility and independence of the external auditor.
- Approve the internal audit plan, internal audit charter and fees of the external auditor.
- Evaluate the scope and effectiveness of the internal audit function to ensure that effective internal controls have been identified and are in place.
- Ensure TIA complies with legal and financial regulatory requirements.
- Evaluate the adequacy and efficiency of the internal control systems, accounting practices, information systems and auditing processes applied in the management of TIA.
- Discharge its duties relating to the safeguarding of assets, the implementation of adequate IT systems, effective control processes and the preparation of accurate financial reporting and statements in compliance with all applicable legal requirements and accounting standards.
- Monitor financial and all other risks, ensuring that mitigating action plans are in place.

28.2 AUDIT COMMITTEE RESPONSIBILITY

The Audit Committee reports that it has complied with its responsibilities arising from Section 51 (1)(a)(ii) of the PFMA and Treasury Regulation 27.1. The Audit Committee also reports that it has adopted appropriate formal terms of reference as its Audit Committee Charter, has regulated its affairs in compliance with this charter and has discharged all its responsibilities as contained therein, except that we have not reviewed changes in accounting policies and practices.

28.3 THE EFFECTIVENESS OF INTERNAL CONTROL

Internal Audit is responsible for the evaluation of the effectiveness of TIA's internal controls, including recommending improvement of the same. Therefore, Internal Audit must determine whether the internal controls designed and applied by management are adequate and functions as intended.

Our review of the findings of the Internal Audit work, which was based on the risk assessments conducted in the public entity revealed certain weaknesses, which were then raised with the public entity.

Internal Audit provided the following assurance to TIA management and the Board during the year under review.

- Assets are adequately and appropriately safeguarded.
- Funds disbursed by TIA are managed economically, effectively and efficiently.
- Applicable laws, regulations and directives are complied with.
- Resources are acquired economically, utilised efficiently and are adequately protected.
- Significant financial, managerial and operating information is accurate, reliable and timely available.
- Internal controls and systems (including IT systems) and corporate governance practices are efficient and effective.
- Acts, regulations, policies, procedures and contracts are complied with.
- Financial and operating information is effective.
- Provided recommendations for improvement of the efficiency and effectiveness of operations.

Whilst several areas of concern were identified, there is reasonable assurance that the most significant risks at TIA are at acceptable levels. However, attention is required to improve the efficiency, effectiveness and adequacy of its governance, risk management and internal control processes.

28.4 IN-YEAR MANAGEMENT AND MONTHLY/ QUARTERLY REPORTING

In 2019/20, TIA reported quarterly to its executive authority as per requirements contained in Section 5.3.1 of the Treasury Regulations, read together with Sections 27(4) and 40 of the PFMA. In the period under review, the ARC ensured compliance with Section 5.3.1 for the establishment of such procedures. In consideration of the reports during the year, the committee guided management in reviewing targets and assessing the adequacy of quarterly performance reports against the targets.

The public entity has reported monthly and quarterly to National Treasury as is required by the PFMA.

28.5 EVALUATION OF FINANCIAL STATEMENTS

ARC reviewed the AFS and agreed that the statement presented fairly, in all material respects, the consolidated financial position of TIA. The committee concluded that it was satisfied that the statements complied with GRAP.

28.6 EXTERNAL AUDITOR

The external auditors, Rakoma and Associates Inc., remain on record with oversight by the office of the Auditor-General of South Africa. ARC was satisfied that the external auditors have complied with Sections 90(2)(b) and 94(8) of the Companies Act (2008), as amended, and confirmed that there are no conflicts of interest as determined by the criteria prescribed by the Independent Regulatory Board for Auditors. ARC, in consultation with management, agreed to the terms contained in the engagement letter, audit plan and audit fees for the financial year ended 31 March 2020. In consideration of the external audit plan, the committee was satisfied that it is comprehensive and adequately interrogates the risk areas identified. The external auditors remain independent and no non-audit services were provided. In further consideration of their services and engagement with the external auditors, ARC was satisfied that:

- The quality and effectiveness of their services were appropriate;
- In camera sessions excluding management were held when required; and
- Written assurance was provided to confirm that Rakoma and Associates Inc. maintained its integrity as a firm through open and transparent processes, and accordingly posed no risk to TIA during the execution of its duties.

28.7 REPORT OF THE INDEPENDENT AUDITOR

We have reviewed the entity's implementation plan for audit issues raised in the prior year and we are satisfied that the matters have been adequately resolved except for the following:

- Associate and subsidiary records were not appropriately updated

ARC accepts the conclusions of the independent auditor on the AFS and is of the opinion that the audited AFS be accepted and read together with the report of the independent auditor.

28.8 GOING CONCERN

Management provided assurance that TIA is a going concern. Through its annual funding allocation received from its executive authority, income from royalties and interest received, there appeared to be no indicators to suggest that TIA will not continue as a going concern for the next 12 months.

28.9 REPORTABLE IRREGULARITIES

No reportable irregularities were identified by the external auditors.

28.10 FRAUD PREVENTION

A policy and procedure is in place, along with an anonymous ethics line, to manage potential concerns raised. During the period under review, no complaints or concerns about potential fraud were raised.

ARC assists the Board in discharging its duties regarding the identification, responsiveness and mitigation strategies in relation to fraud prevention. In this regard, ARC has ensured that fraud prevention policies and procedures are in place, along with an anonymous ethics line to manage matters relating to fraud and ARC regularly evaluates the effectiveness of these processes.

28.11 RISK MANAGEMENT

Risk management remains central to TIA's business. Key strategic risks were identified and deliberated on by management and the Board. Risks were evaluated in terms of impact and likelihood. Appropriate actions and action plans have been considered and implemented, where required, to mitigate risks. Management is aware of the need to improve risk management in so far as the following:

- Better treatment of residual risks
- Detailed explanations of risks and corresponding actions of mitigation

Through its Risk Management Committee, management regularly reviews risk-related internal control processes. Actions are delegated to staff with the encouragement to embed risk management in the execution of their daily tasks.

28.12 INFORMATION TECHNOLOGY GOVERNANCE

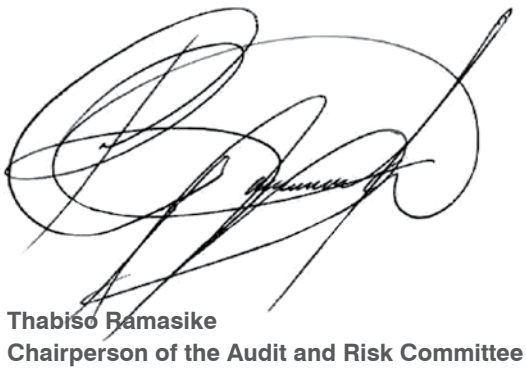
ARC is responsible for monitoring IT governance. The approved IT policies that are in place and the procedures that have been implemented safeguard TIA's IT systems and information, and draw on the agency's disaster recovery plans when necessary. There were no material weaknesses found in TIA's IT environment during the period under review.

28.13 GOVERNANCE ON QUALITY

The Board was pleased to learn of management having secured the recertification of TIA's ISO 9001:2015 standard following a surveillance audit in the fourth quarter of 2019/20. This standard is used to demonstrate the agency's ability to consistently provide products and services that meet customer and regulatory requirements.

28.14 CONCLUSION

ARC executes its mandate independently and rigorously and will continue to support the Board and the shareholder, taking advice of the internal and external auditors in the oversight of the organisation.



Thabiso Ramasike
Chairperson of the Audit and Risk Committee

PART D

HUMAN RESOURCE MANAGEMENT

TIA's HR unit resides within the Corporate Services Division. This division adds value to TIA by creating an enabling environment for the development of a high-performance culture, by nurturing and growing the human resource capacity, identifying and developing technology platforms that will enhance communication and operational efficiency, and building the TIA knowledge management architecture to enable informed and quick decision making.

29. CADET LEADERSHIP DEVELOPMENT PROGRAMME

On the front of leadership development, TIA implemented its second cadet leadership development programme in 2019. This programme enables TIA to build leadership capabilities across the organisation. The programme follows a blended approach, comprising of 70% work-related group projects, intended to shape the organisational culture, 20% on coaching and 10% on classroom learning. The class of 2019 (Figure 51) achieved a pass rate of 87%.

Ms Moloko Motheketlela
Portfolio Manager: Agriculture

Ms Petunia Nkadimeng
HR Officer

Ms Prudence Mononyane
Coordinator: Energy

Mr Iodien Rensburg
Portfolio Manager: Commercialisation - Advanced Manufacturing

Mr Sibusiso Nomnqa
Trainee Portfolio Manager: Commercialisation - Agriculture

Mr Khumo Mosiane
Network and Infrastructure Specialist

Ms Nqangi Mjimba
Portfolio Manager: Natural Resources

Ms Dineo Masokoane
Portfolio Manager: Natural Resources

Ms Tshembani Khupane
Programme Manager: SFP

Ms Buang Selepe
Coordinator: SECR

Ms Nanga Mjila
Programme Manager: TSP

Ms Nomzamo Sandlana
Coordinator: TSP

Ms Wisani Matsimbi
'Patron' and Head: HR

Ms Lorraine Modisha
Personal Assistant to Acting General Manager: Inclusive Innovation, Youth and Skills

Dr Lubabalo Mafu
Research Scientist

Figure 51: Cadet Leadership Development Programme class of 2019

30. HUMAN RESOURCES OVERSIGHT STATISTICS

30.1 PERSONNEL COSTS BY PROGRAMME

Table 45: Personnel costs by programme for 2019/20

Programme	Total expenditure for the entity (R'000)	Personnel expenditure (R'000)	Personnel expenditure as a % of total expenditure (R'000)	No. of employees remunerated over the period under review	Average personnel cost per employee (R'000)
Administration	115,880	62,962	54.3%	88	715
Technology Development	181,271	23,807	13.1%	36	661
Enabling Environment	322,052	22,229	6.9%	31	717
Total	**619,203**	**108,998**	**17.6%**	**155**	**703**

The Technology Development programme and the Enabling Environment programme are TIA's core business units. Most of TIA's expenditure relates to specific disbursements for technology development, supporting an enabling environment for innovation and related, with personnel expenditure accounting for 18% of total expenditure. Expenditure by the Administration programme relates to personnel expenditure and other operational expenditure.

30.2 PERSONNEL COST BY SALARY BAND

Table 46: Personnel cost by salary band for 2019/20

Level	Personnel expenditure (R'000)	% of personnel expenditure to total personnel cost	Number of employees remunerated over the period under review	Average personnel cost per employee (R'000)
Top management	12,388	11.3%	5	2,478
Senior management	28,539	26.2%	26	1,098
Professional qualified	44,250	40.6%	67	660
Skilled	14,924	13.7%	47	317
Semi-skilled	848	0.8%	4	212
Unskilled	559	0.5%	6	93
Other*	7,490	6.9%	n/a	n/a
Total	**108,998**	**100.0%**	**155**	**703**

**Other costs include Board remuneration, workman's compensation and other provisions*

Personnel expenditure for top management includes remuneration paid to the former CEO, Mr Barlow Manilal as well as remuneration paid to the Interim CEO, Ms Fuzlin Levy-Hassen. This resulted in an inflated average cost per employee for top management.

30.3 PERFORMANCE REWARDS

Table 47: Performance rewards for 2019/20

Level	Performance rewards (R'000)	Personnel expenditure (R'000)	% of performance rewards to total personnel cost
Top management	1,015	12,388	8.2%
Senior management	1,475	28,539	5.2%
Professional qualified	2,107	44,250	4.8%
Skilled	753	14,924	5.0%
Semi-skilled	26	848	3.1%
Unskilled	32	559	5.7%
Other*	n/a	7,490	n/a
Total	**5,408**	**108,998**	**4.3%**

** Other costs include Board remuneration, workman's compensation and other provisions*

Aligned to the Remuneration and Rewards Policy, performance-based incentives are paid only to employees who met certain performance criteria. The incentive is determined based on the performance of the employee and translates into a percentage of the employees' total cost to company.

30.4 TRAINING COSTS

Table 48: Training costs for 2019/20

Programme/activity/ objective	Personnel expenditure (R'000)	Training expenditure (R'000)	Training expenditure as a % of personnel cost	No. of employees trained	Average training cost per employee (R'000)
Administration	62,962	529	0,8%	56	9,5
Technology Development	23,807	750	3,2%	24	31,2
Enabling Environment	22,229	748	3,4%	28	26,7
Total	**108,998**	**2,027**	**1,9%**	**108**	**18,8**

The agency conducted a skills and competency audit during 2019/20 which will allow for focused training interventions from 2020/21 onwards.

30.5 EMPLOYMENT AND VACANCIES

Table 49: Employment and vacancies by programme for 2019/20

Programme	2018/19 Number of employees	2019/20 Approved posts	2019/20 Number of employees	2019/20 Vacancies	% of vacancies
Administration	80	92	75	17	18%
Technology Development	30	45	31	14	31%
Enabling Environment	46	55	46	9	16%
Total	**156**	**192**	**152**	**40**	**21%**

Table 50: Employment and vacancies by salary band for 2019/20

Level	2018/19 Number of employees	2019/20 Approved posts	2019/20 Number of employees	2019/20 Vacancies	% of vacancies
Top management	3	6	3	3	50%
Senior management	24	28	21	7	25%
Professional qualified	72	90	70	20	22%
Skilled	47	58	48	10	17%
Semi-skilled	4	4	4	0	0%
Unskilled	6	6	6	0	0%
Total	**156**	**192**	**152**	**40**	**21%**

30.6 EMPLOYMENT CHANGES

Table 51: Employment changes by salary band for 2019/20

Level	Employment at beginning of period (31 March 2019)	Appointments	Terminations	Employment at end of period (31 March 2020)
Top management	3	2	2	3
Senior management	24	2	5	21
Professional qualified	72	8	10	70
Skilled	47	6	5	48
Semi-skilled	4	0	0	4
Unskilled	6	0	0	6
Total	**156**	**18**	**22**	**152**

30.7 REASONS FOR STAFF LEAVING

Table 52: Reasons for staff leaving for 2019/20

Reason	Number	% of total number of staff leaving
Death	0	0.0%
Resignation	16	72.7%
Dismissal	4	18.2%
Retirement	0	0.0%
Ill health	0	0.0%
Expiry of contract	2	9.1%
Other	0	0.0%
Total	22	100%

30.8 LABOUR RELATIONS: MISCONDUCT AND DISCIPLINARY ACTION

Table 53: Misconduct and disciplinary action for 2019/20

Nature of disciplinary action	Number
Verbal warning	0
Written warning	2
Final written warning	2
Dismissal	3

30.9 EQUITY TARGET AND EMPLOYMENT EQUITY STATUS

TIA is committed to transformation, and the recruitment of women, youth and people with disabilities is foundational to this national priority. TIA's employment equity profile as at 31 March 2020 is depicted in Figure 52.

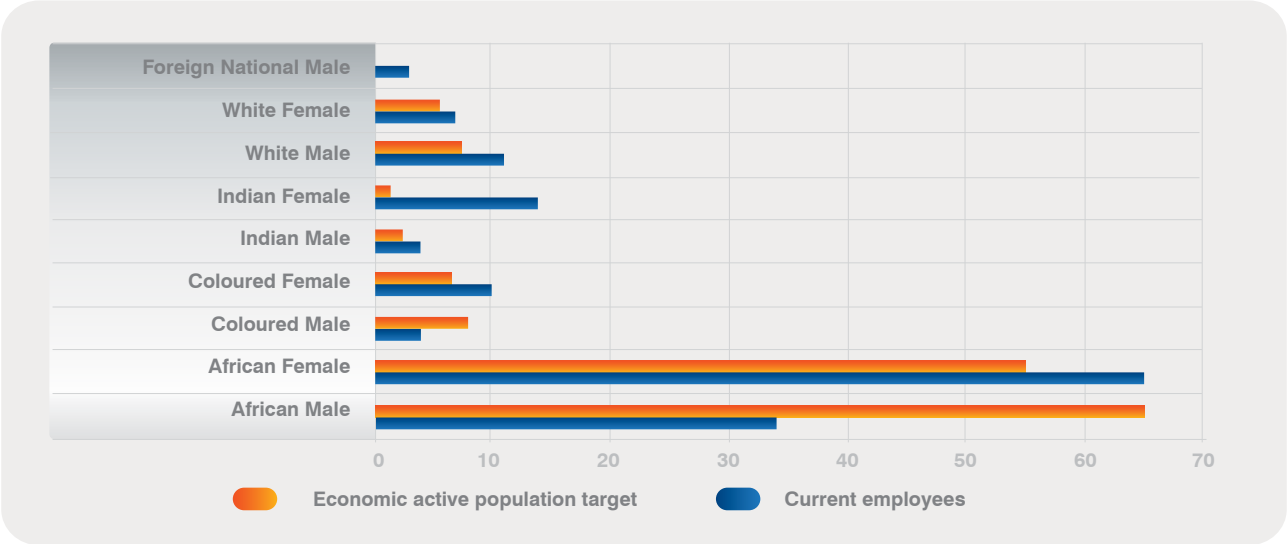


Figure 52: TIA's employment equity profile as of 31 March 2020

To align with the economic active population recruitment practises in 2020/21 will focus on the recruitment of African males and Coloured males.

As at 31 March 2020, 63.2% of TIA's staff were female, 28.9% are classified as youth (between the age of 20 and 35) and 5.3% were people with disabilities (against a target of 3%). The employment equity demographics and occupational levels in each of these categories are presented in Figure 53 and Tables 54-56.

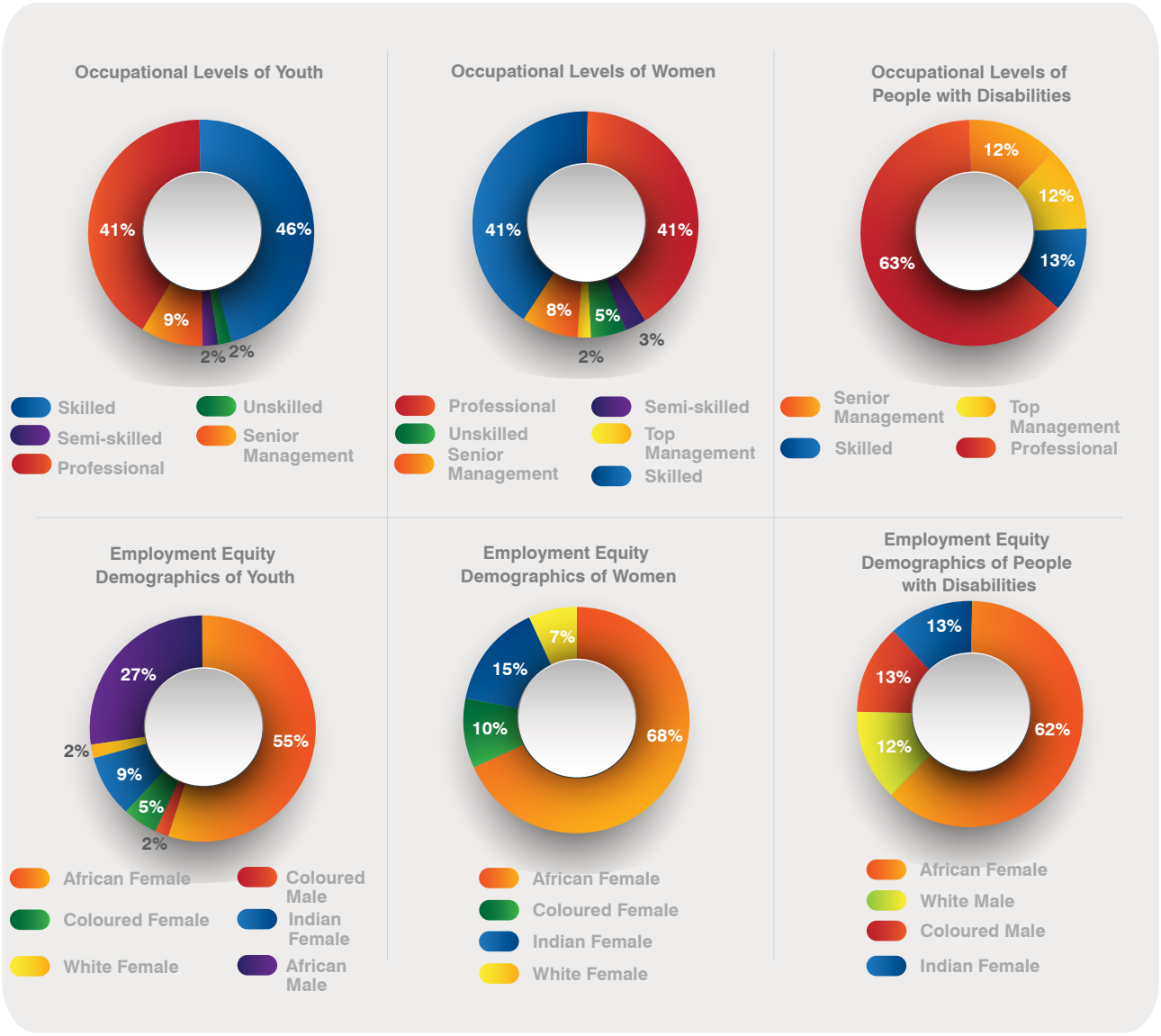


Figure 53: Employment equity demographics and occupational levels of women, youth and people with disabilities within the respective employment segment

Table 54: Female employees

Level	African		Coloured		Indian		White	
	Current	Target	Current	Target	Current	Target	Current	Target
Top management	0	2	1	0	0	0	1	1
Senior management	4	4	0	0	2	2	2	2
Professional qualified	22	22	3	3	10	10	4	4
Skilled	32	32	5	5	2	2	0	0
Semi-skilled	2	2	1	1	0	0	0	0
Unskilled	5	5	0	0	0	0	0	0
Total	**65**	**67**	**10**	**9**	**14**	**14**	**7**	**7**

Table 55: Male employees

Level	African		Coloured		Indian		White	
	Current	Target	Current	Target	Current	Target	Current	Target
Top management	0	3	0	0	0	0	1	0
Senior management	7	9	1	3	2	2	3	3
Professional qualified	16	26	3	3	2	2	7	7
Skilled	9	9	0	0	0	0	0	0
Semi-skilled	1	1	0	0	0	0	0	0
Unskilled	1	1	0	0	0	0	0	0
Total	**34**	**49**	**4**	**6**	**4**	**4**	**11**	**10**

Table 56: People with disabilities

Level	Female		Male	
	Current	Target	Current	Target
Top management	0	0	1	1
Senior management	1	1	0	0
Professional qualified	4	4	1	1
Skilled	1	1	0	0
Semi-skilled	0	0	0	0
Unskilled	0	0	0	0
Total	**6**	**6**	**2**	**2**

PART E
FINANCIAL INFORMATION

BOARD'S RESPONSIBILITIES AND APPROVAL

The Board is required by the Public Finance Management Act (Act 1 of 1999 as amended) to maintain adequate accounting records and is responsible for the content and integrity of the annual financial statements and related financial information included in this report. It is the responsibility of the Board to ensure that the annual financial statements fairly present the state of affairs of the entity as at the end of the financial year and the results of its operations and cash flows for the period then ended. The external auditors are engaged to express an independent opinion on the annual financial statements and were given unrestricted access to all financial records and related data.

The annual financial statements have been prepared in accordance with the Standards of Generally Recognised Accounting Practice (GRAP) including any interpretations, guidelines and directives issued by the Accounting Standards Board.

The annual financial statements are based upon appropriate accounting policies consistently applied and supported by reasonable and prudent judgements and estimates.

The Board acknowledges that they are ultimately responsible for the system of internal financial control established by the economic entity and place considerable importance on maintaining a strong control environment. To enable the Board to meet these responsibilities, the Board sets standards for internal control aimed at reducing the risk of error in a cost effective manner. The standards include the proper delegation of responsibilities within a clearly defined framework, effective accounting procedures and adequate segregation of duties to ensure an acceptable level of risk. These controls are monitored throughout the economic entity and all employees are required to maintain the highest ethical standards in ensuring the economic entity's business is conducted in a manner that in all reasonable circumstances is above reproach. The focus of risk management in the economic entity is on identifying, assessing, managing and monitoring all known forms of risk. While operating risk cannot be fully eliminated, the economic entity endeavours to minimise it by ensuring that appropriate infrastructure, controls, systems and ethical behaviour are applied and managed within pre-determined procedures and constraints.

The Board is of the opinion, based on the information and explanations given by management, that the system of internal control provides reasonable assurance that the financial records may be relied on for the preparation of the annual financial statements. However, any system of internal financial control can provide only reasonable, and not absolute, assurance against material misstatement.

The Board has reviewed the economic entity's cash flow forecast for the year to 31 March 2020 and, in the light of this review and the current financial position, they are satisfied that the economic entity has access to adequate resources to continue in operational existence for the foreseeable future.

The external auditors are responsible for independently reviewing and reporting on the economic entity's annual financial statements. The annual financial statements have been examined by the economic entity's external auditors and their report is presented on page 131.

The annual financial statements set out on page 134 to 176, which have been prepared on the going concern basis, were approved by the Board on 30 September 2020. and were signed on its behalf by:

Mr BA Mboniswa
Interim Chairperson

INDEPENDENT AUDITOR'S REPORT
TO PARLIAMENT ON TECHNOLOGY INNOVATION AGENCY GROUP

REPORT ON THE AUDIT OF THE CONSOLIDATED AND SEPARATE FINANCIAL STATEMENTS

OPINION

1. We have audited the consolidated and separate financial statements of the Technology Innovation Agency Group set out on pages 134 to 176, which comprise the consolidated and separate statement of financial position as at 31 March 2020, consolidated and separate statement of financial performance, statement of changes in net assets, cash flow statement and statement of comparison of budget information with actual amounts for the year then ended, as well as the notes to the consolidated and separate financial statements, including a summary of significant accounting policies.

2. In our opinion, the consolidated and separate financial statements present fairly, in all material respects, the consolidated and separate financial position of the Technology Innovation Agency as at 31 March 2020 and their financial performance and cash flows for the year then ended in accordance with South African Standards of Generally Recognised Accounting Practices (GRAP) and the requirements of the Public Finance Management Act of South Africa, 1999 (Act No.1 of 1999) (PFMA).

CONTEXT FOR THE OPINION

3. We conducted our audit in accordance with the International Standards on Auditing (ISAs). Our responsibilities under those standards are further described in the auditor's responsibilities for the audit of the consolidated and separate financial statements section of this auditor's report.

4. We are independent of the public entity in accordance with Sections 290 and 291 of the Independent Regulatory Board for Auditors' Code of professional conduct for Registered Auditors (revised January 2018), Parts 1 and 3 of the Independent Regulatory Board for Auditors' Code of Professional Conduct for Registered Auditors (revised November 2018) (together the IRBA Codes) and other independence requirements applicable to performing audits of financial statements in South Africa. We have fulfilled our other ethical responsibilities, as applicable in accordance with the IRBA Codes and in accordance with other ethical requirements applicable to performing audits in South Africa. The IRBA Codes are consistent with the corresponding sections of the International Ethics Standards Board for Accountants' Code of ethics for professional accountants and the International Ethics Standards Board for Accountants' International code of ethics for professional accountants (including International Independence Standards) respectively.

5. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

EMPHASIS OF MATTER

6. We draw attention to the matter below. Our opinion is not modified in respect of that matter.

IRREGULAR EXPENDITURE

7. Irregular expenditure as disclosed in note 30 to the financial statements, the public entity incurred irregular expenditure of R2 827 309, as it did not follow the appropriate processes for the appointment of the Interim CEO.

RESPONSIBILITIES OF ACCOUNTING AUTHORITY FOR THE FINANCIAL STATEMENTS

8. The Board of directors, which constitutes the accounting authority, is responsible for the preparation and fair presentation of the consolidated and separate financial statements in accordance with GRAP and the requirements of the PFMA and for such internal control as the accounting authority determines is necessary to enable the preparation of consolidated and separate financial statements that are free from material misstatement, whether due to fraud or error.

9. In preparing the consolidated and separate financial statements, the accounting authority is responsible for assessing the public entity's ability to continue as a going concern, disclosing, as applicable, matters relating to going concern and using the going concern basis of accounting unless the accounting authority either intends to liquidate the public entity or to cease operations, or has no realistic alternative but to do so.

INDEPENDENT AUDITOR'S REPORT
TO PARLIAMENT ON TECHNOLOGY INNOVATION AGENCY GROUP (CONTINUED)

AUDITOR'S RESPONSIBILITIES FOR THE AUDIT OF THE CONSOLIDATED AND SEPARATE FINANCIAL STATEMENTS

10. Our objectives are to obtain reasonable assurance about whether the consolidated and separate financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the ISAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated and separate financial statements.

11. A further description of our responsibilities for the audit of the consolidated and separate financial statements is included in the annexure to this auditor's report.

REPORT ON THE AUDIT OF THE ANNUAL PERFORMANCE REPORT

INTRODUCTION AND SCOPE

12. In accordance with the Public Audit Act of South Africa of 2004 (PAA) and the general notice issued in terms thereof, we have a responsibility to report on the usefulness and reliability of the reported performance information against predetermined objectives for selected programmes presented in the annual performance report. We performed procedures to identify material findings but not to gather evidence to express assurance.

13. Our procedures address the usefulness and reliability of the reported performance information, which must be based on the approved performance planning documents of the public entity. We have not evaluated the completeness and appropriateness of the performance indicators included in the planning documents. Our procedures do not examine whether the actions taken by the public entity enabled service delivery. Our procedures also do not extend to any disclosures or assertions relating to planned performance strategies and information in respect of future periods that may be included as part of the reported performance information. Accordingly, our findings do not extend to these matters.

14. We evaluated the usefulness and reliability of the reported performance information in accordance with the criteria developed from the performance management and reporting framework, as defined in the general notice, for the following selected programmes presented in the annual performance report of the public entity for the year ended 31 March 2020.

Programmes	Pages in the annual performance report
Programme 2: Innovation Funding and Pre-Commercialisation Support	50 - 56
Programme 3: Innovation Enabling Support	35 - 50 and 57 - 81

15. We performed procedures to determine whether the reported performance information was properly presented and whether performance was consistent with the approved performance planning documents. We performed further procedures to determine whether the indicators and related targets were measurable and relevant, and assessed the reliability of the reported performance information to determine whether it was valid, accurate and complete.

16. We did not identify any material findings on the usefulness and reliability of the reported performance information for these programmes:
    - Programme 2: Innovation Funding and Pre-Commercialisation Support
    - Programme 3: Innovation Enabling and Support

OTHER MATTER

17. We draw attention to the matter below. Our opinions are not modified in respect of this matter.

ACHIEVEMENT OF PLANNED TARGETS

18. Refer to the annual performance report on pages 28 to 30 for information on the achievement of planned targets for the year and explanations provided for the under/over-achievement of a significant number of targets.

REPORT ON THE AUDIT OF COMPLIANCE WITH LEGISLATION

INTRODUCTION AND SCOPE

19. In accordance with the PAA and the general notice issued in terms thereof, we have a responsibility to report material findings on the public entity's' compliance with specific matters in key legislation. We performed procedures to identify findings but not to gather evidence to express assurance.

20. We did not identify any material findings on compliance with the specific matters in key legislation set out in the general notice issued in terms of the PAA.

INDEPENDENT AUDITOR'S REPORT
TO PARLIAMENT ON TECHNOLOGY INNOVATION AGENCY GROUP (CONTINUED)

OTHER INFORMATION

21. The accounting authority is responsible for the other information. The other information comprises the information included in the annual report which includes Part A: General Information, Part B: Performance Information, Part C: Governance and Part D: Human Resource Management. The other information does not include the consolidated and separate financial statements, the auditor's report and those selected programmes presented in the annual performance report that have been specifically reported in this auditor's report.

22. Our opinion on the financial statements and our findings on the reported performance information and compliance with legislation do not cover the other information and we do not express an audit opinion or any form of assurance conclusion thereon.

23. In connection with our audit, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the consolidated and separate financial statements and the selected programmes presented in the annual performance report, or our knowledge obtained in the audit, or otherwise appears to be materially misstated. We have no material inconsistencies to report.

INTERNAL CONTROL DEFICIENCIES

24. We considered internal control relevant to our audit of the consolidated and separate financial statements, reported performance information and compliance with applicable legislation; however, our objective was not to express any form of assurance on it. We did not identify any significant deficiencies in internal control.

OTHER REPORTS

25. We draw attention to the following engagements conducted by various parties which had, or could have, an impact on the matters reported in the public entity's financial statements, reported performance information, compliance with applicable legislation and other related matters. These reports did not form part of our opinion on the financial statements or our findings on the reported performance information or compliance with legislation.

AUDIT OF SPECIFIC FOCUS AREAS

26. We performed the audit of specific focus areas on the termination of the employment contract of the former CEO and the appointment of the Interim CEO. The conclusion was that the termination of the former CEO was not in compliance with the policies and procedures of the public entity. The appointment of the Interim CEO was not in compliance with the TIA Act thus resulting in irregular expenditure.

INTERNAL AUDIT INVESTIGATION

27. An investigation into the allegations was initiated by Internal Audit, to review the relevant documentation and processes followed by one of TIA's funded project's. In this regard, internal audit's view was that there was no substantive proof/evidence to support the allegations submitted by an alleged ex-employee of this project.

28. A limited audit was performed on one of the projects funded by the entity with the primary objective of determining whether the funds disbursed were used economically, effectively, efficiently and in line with the agreed project plan. It was concluded that the funds audited appear to have been directed towards project related costs, with the exception of the items for which supporting documents could not be provided, as well as the amounts that have been reported as being fraudulent.

29. An investigation on a follow-up protected disclosure matter, based on allegations made by an unnamed TIA employee. The allegations made includes matters relating to alleged racial discrimination, non-compliance with the Public Finance Management Act (PFMA) as well as non-compliance with various other governance principles. It was concluded that there is no substantive evidence to support any of the allegations made in the follow-up protected disclosure.

AUDITOR TENURE

30. In terms of the IRBA rule published in Government Gazette Number 39475 dated 4 December 2015, We report that Rakoma and Associates Incorporated has been the auditor of Technology Innovation Agency for two years.

Rakoma and Associates Incorporated
Per: Eugene Lufhugu
Partner
Registered Auditor
30 September 2020

RAKOMA
& ASSOCIATES INC.

STATEMENT OF FINANCIAL POSITION AS AT 31 MARCH 2020

		(R thousands)			
		Economic entity		Controlling entity	
	Note(s)	2020	2019	2020	2019
Assets					
Current Assets					
Loans and receivables	7	5,754	6,055	5,754	6,055
Trade and other receivables	10	880	1,891	880	1,891
Pre-payments	9	3,947	2,247	3,947	2,247
Cash and cash equivalents	11	147,540	169,242	144,949	166,911
		158,121	**179,435**	**155,530**	**177,104**
Non-Current Assets					
Property and equipment	3	10,118	15,175	10,118	15,175
Intangible assets	4	3,028	3,434	3,028	3,434
Investments in controlled entities	5	-	-	2,189	-
Investments in associates	6	555	1,085	-	-
Loans and receivables	7	11,392	15,916	11,392	15,916
Other financial assets	8	26,300	26,300	26,300	26,300
		51,393	**61,910**	**53,027**	**60,825**
Total Assets		**209,514**	**241,345**	**208,557**	**237,929**
Liabilities					
Current Liabilities					
Finance lease obligation	12	325	234	325	234
Operating lease liability		570	341	570	341
Trade and other payables	14	53,919	61,830	53,514	61,427
		54,814	**62,405**	**54,409**	**62,002**
Non-Current Liabilities					
Finance lease obligation	12	173	298	173	298
Committed conditional grants and receipts	13	88,356	81,120	88,356	81,120
		88,529	**81,418**	**88,529**	**81,418**
Total Liabilities		**143,343**	**143,823**	**142,938**	**143,420**
Net Assets		**66,171**	**97,522**	**65,619**	**94,509**
Accumulated surplus		66,171	97,598	65,619	94,509
Non-controlling interest		-	(76)	-	-
Total Net Assets		**66,171**	**97,522**	**65,619**	**94,509**

STATEMENT OF FINANCIAL PERFORMANCE

FOR THE YEAR ENDED 31 MARCH 2020

		(R thousands)			
		Economic entity		Controlling entity	
	Note(s)	2020	2019	2020	2019
Revenue					
Revenue	15	587,028	530,417	587,028	530,417
Other income	16	4,206	19,533	6,395	19,533
Interest received	17	12,525	15,647	12,262	15,575
Surplus on equity accounted investments	6	-	1,085	-	-
Total revenue		**603,759**	**566,682**	**605,685**	**565,525**
Expenditure					
Employee-related costs	18	(108,998)	(105,087)	(108,998)	(105,087)
Project funding expenditure	19	(450,989)	(369,730)	(450,989)	(369,730)
Depreciation and amortisation		(6,187)	(9,372)	(6,187)	(9,372)
Lease rentals on operating lease		(10,810)	(9,706)	(10,810)	(9,706)
Impairment	20	(1,465)	(533)	(1,465)	(533)
Deficit from equity accounted investments	6	(530)	-	-	-
Other operating expenses	21	(40,756)	(48,703)	(40,754)	(49,044)
Total expenditure		**(619,735)**	**(543,131)**	**(619,203)**	**(543,472)**
(Deficit)/surplus for the year		**(15,976)**	**23,551**	**(13,518)**	**22,053**
Attributable to:					
Owners of the controlling entity		(16,052)	23,522	(13,518)	22,053
Non-controlling interest		76	29	-	-
		(15,976)	**23,551**	**(13,518)**	**22,053**

STATEMENT OF CHANGES IN NET ASSETS

FOR THE YEAR ENDED 31 MARCH 2020

Economic entity	(R thousands)			
	Accumulated surplus	Total attributable to owners of the economic entity / controlling entity	Non controlling interest	Total net assets
Balance at 01 April 2018	**74,076**	**74,076**	**(105)**	**73,971**
Surplus for the year	23,522	23,522	29	23,551
Balance at 01 April 2019	**97,598**	**97,598**	**(76)**	**97,522**
Payment of surpluses to National Treasury	(15,372)	(15,372)	-	(15,372)
Surplus for the year	(16,052)	(16,052)	76	(15,976)
Balance at 31 March 2020	**66,171**	**66,171**	**-**	**66,171**
Controlling entity				
Balance at 01 April 2018	**72,456**	**72,456**	**-**	**72,456**
Surplus for the year	22,053	22,053	-	22,053
Balance at 01 April 2019	**94,509**	**94,509**	**-**	**94,509**
Payment of surpluses to National Treasury	(15,372)	(15,372)	-	(15,372)
Surplus for the year	(13,518)	(13,518)	-	(13,518)
Balance at 31 March 2020	**65,619**	**65,619**	**-**	**65,619**

CASH FLOW STATEMENT AS AT 31 MARCH 2020

		(R thousands)			
		Economic entity		Controlling entity	
	Note(s)	2020	2019	2020	2019
Cash flows from operating activities					
Receipts					
Grants		587,028	530,417	587,028	530,417
Interest income		10,769	10,393	10,506	10,321
Other receipts		4,047	19,708	3,517	19,697
		601,844	**560,518**	**601,051**	**560,435**
Payments					
Employee related costs		(108,998)	(105,087)	(108,998)	(105,087)
Project funding expenditure		(450,989)	(369,730)	(450,989)	(369,730)
Other payments		(57,975)	(34,563)	(57,442)	(34,549)
		(617,962)	**(509,380)**	**(617,429)**	**(509,366)**
Net cash flows from operating activities	23	**(16,118)**	**51,138**	**(16,378)**	**51,069**
Cash flows from investing activities					
Purchase of property and equipment	3	(1,879)	(5,145)	(1,879)	(5,145)
Purchase of intangible assets	4	(685)	(2,314)	(685)	(2,314)
Repayment of loans from economic entities		5,116	3,789	5,116	3,789
Net cash flows from investing activities		**2,552**	**(3,670)**	**2,552**	**(3,670)**
Cash flows from financing activities					
Repayment of surpluses		(15,372)	-	(15,372)	-
Conditional grants received		154,298	106,358	154,298	106,358
Conditional grants paid		(147,062)	(113,510)	(147,062)	(113,510)
Net cash flows from financing activities		**(8,136)**	**(7,152)**	**(8,136)**	**(7,152)**
Net increase/(decrease) in cash and cash equivalents		**(21,702)**	**40,316**	**(21,962)**	**40,247**
Cash and cash equivalents at the beginning of the year		169,242	128,926	166,911	126,664
Cash and cash equivalents at the end of the year	11	**147,540**	**169,242**	**144,949**	**166,911**

STATEMENT OF COMPARISON OF BUDGET AND ACTUAL AMOUNTS FOR THE YEAR ENDED 31 MARCH 2020

Controlling entity	Approved budget	Adjustments	(R thousands) Final Budget	Actual amounts on a comparable basis	Difference between final budget and actual
Statement of Financial Performance					
Revenue					
DST allocation	440,929	-	440,929	440,929	-
Other income	145,000	-	145,000	152,494	7,494
Interest received	8,000	5,000	13,000	12,262	(738)
Total revenue	**593,929**	**5,000**	**598,929**	**605,685**	**6,756**
Expenditure					
Employee related costs	(143,158)	33,500	(109,658)	(108,998)	660
Project related funding	(380,734)	(73,800)	(454,534)	(450,989)	3,545
Other operating expenditure	(70,037)	10,300	(59,737)	(59,216)	521
Total expenditure	**(593,929)**	**(30,000)**	**(623,929)**	**(619,203)**	**4,726**
(Deficit)/surplus	**-**	**(25,000)**	**(25,000)**	**(13,518)**	**11,482**
Actual amount on comparable basis as presented in the Budget and Actual Comparative Statement	**-**	**(25,000)**	**(25,000)**	**(13,518)**	**11,482**

ACCOUNTING POLICIES AS AT 31 MARCH 2020

1. PRESENTATION OF ANNUAL FINANCIAL STATEMENTS

The annual financial statements have been prepared in accordance with the Standards of Generally Recognised Accounting Practice (GRAP), issued by the Accounting Standards Board in accordance with Section 91(1) of the Public Finance Management Act (Act 1 of 1999).

These annual financial statements have been prepared on an accrual basis of accounting and are in accordance with historical cost convention as the basis of measurement, unless specified otherwise. They are presented in South African Rand. Amounts rounded off to the nearest thousand.

These accounting policies are consistent with the previous period.

1.1 CONSOLIDATION

BASIS OF CONSOLIDATION

Consolidated annual financial statements are the annual financial statements of the economic entity presented as those of a single entity.

The consolidated annual financial statements incorporate the annual financial statements of the controlling entity and all controlled entities which are controlled by the controlling entity.

Consolidated annual financial statements are prepared using uniform accounting policies for like transactions and other events in similar circumstances.

Control exists when the controlling entity has the power to govern the financial and operating policies of another entity so as to obtain benefits from its activities.

The revenue and expenses of a controlled entity are included in the consolidated annual financial statements from the transfer date or acquisition date as defined in the Standards of GRAP on Transfer of functions between entities under common control or Transfer of functions between entities not under common control. The revenue and expenses of the controlled entity are based on the values of the assets and liabilities recognised in the controlling entity's annual financial statements at the acquisition date.

The annual financial statements of the controlling entity and its controlled entities used in the preparation of the consolidated annual financial statements are prepared as of the same date.

When the end of the reporting date of the controlling entity is different from that of a controlled entity, the controlled entity prepares, for consolidation purposes, additional annual financial statements as of the same date as the annual financial statements of the controlling entity unless it is impracticable to do so. When the annual financial statements of a controlled entity used in the preparation of consolidated annual financial statements are prepared as of a date different from that of the controlling entity, adjustments are made for the effects of significant transactions or events that occur between that date and the date of the controlling entity's annual financial statements. In any case, the difference between the end of the reporting date of the controlled entity and that of the controlling entity is no more than three months. The length of the reporting periods and any difference between the ends of the reporting dates is the same from period to period.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

Adjustments are made when necessary to the annual financial statements of the controlled entities to bring their accounting policies in line with those of the controlling entity.

All intra entity transactions, balances, revenues and expenses are eliminated in full on consolidation.

Non controlling interest in the net assets of the economic entity is identified and recognised separately from the controlling entity's interest therein, and is recognised within net assets.

Changes in a controlling entity's ownership interest in a controlled entity that do not result in a loss of control are accounted for as transactions that affect net assets.

INVESTMENT IN ASSOCIATES

An associate is an entity, over which the investor has significant influence and that is neither a controlled entity nor an interest in a joint venture. Significant influence is the power to participate in the financial and operating policy decisions of an activity but is not control or joint control over those policies.

An investment in an associate is accounted for using the equity method. Under the equity method, investments in associates are carried in the consolidated statement of financial position at cost adjusted for post acquisition changes in the economic entity's share of net assets of the associate, less any impairment losses.

The economic entity's share of the surplus or deficit of the investee is recognised in surplus or deficit.

The most recent available annual financial statements of the associate are used by the economic entity in applying the equity method. When the reporting dates of the economic entity and the associate are different, the associate prepares, for the use of the economic entity, annual financial statements as of the same date as the annual financial statements of the economic entity unless it is impractical to do so.

When the annual financial statements of an associate used in applying the equity method are prepared as of a different date from that of the economic entity, adjustments are made for the effects of significant transactions or events that occur between that date and the date of the economic entity's annual financial statements. In any case, the difference between the end of the reporting dates of the associate and that of the economic entity is no more than three months. The length of the reporting dates and any difference between the ends of the reporting dates is the same from period to period.

The economic entity's annual financial statements are prepared using uniform accounting policies for like transactions and events in similar circumstances.

Deficits in an associate in excess of the economic entity's interest in that associate are recognised only to the extent that the economic entity has incurred a legal or constructive obligation to make payments on behalf of the associate. If the associate subsequently reports surpluses, the economic entity resumes recognising its share of those surpluses only after its share of the surpluses equals the share of deficits not recognised.

The controlling entity discontinues the use of the equity method from the date that it ceases to have significant influence over an associate and account for the investment in accordance with the Standards of GRAP on Financial instruments from that date, unless the associate becomes a controlled entity or a joint venture, in which case it is accounted for as such. The carrying amount of the investment at the date that it ceases to be an associate is regarded as the fair value on initial recognition as a financial asset in accordance with the Standards of GRAP on Financial instruments.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

1.2 SIGNIFICANT JUDGEMENTS AND SOURCES OF ESTIMATION UNCERTAINTY

In preparing the annual financial statements, management is required to make estimates and assumptions that affect the amounts represented in the annual financial statements and related disclosures. Use of available information and the application of judgement are inherent in the formation of estimates. Actual results in the future could differ from these estimates which may be material to the annual financial statements. Significant judgements include:

TRADE RECEIVABLES AND LOANS AND RECEIVABLES

The economic entity assesses its loans and receivables for impairment at the end of each reporting period. In determining whether an impairment loss should be recorded in surplus or deficit, the surplus makes judgements as to whether there is observable data indicating a measurable decrease in the estimated future cash flows from a financial asset.

The impairment for loans and receivables is calculated on an individual basis, based on historical losses, financial position of the entity, repayment terms and the commercial viability of the business.

IMPAIRMENT TESTING

The recoverable amounts of individual assets have been determined based on the higher of value in use calculations and fair values less costs to sell. These calculations require the use of estimates and assumptions. It is reasonably possible that the assumptions used may change which may then impact our estimations and may then require a material adjustment to the carrying value of tangible assets.

The economic entity reviews and tests the carrying value of assets when events or changes in circumstances suggest that the carrying amount may not be recoverable. If there are indications that impairment may have occurred, estimates are prepared of expected future cash flows for each asset. Expected future cash flows used to determine the value in use of other assets which are inherently uncertain and could materially change over time.

ALLOWANCE FOR DOUBTFUL DEBTS

On debtors an impairment loss is recognised in surplus and deficit when there is objective evidence that it is impaired. The impairment is measured as the difference between the debtors carrying amount and the present value of estimated future cash flows discounted at the effective interest rate, computed at initial recognition.

1.3 PROPERTY AND EQUIPMENT

Property and equipment are tangible non-current assets that are held for use in the production or supply of goods or services, rental to others, or for administrative purposes, and are expected to be used during more than one period.

The cost of an item of property and equipment is recognised as an asset when:

- it is probable that future economic benefits or service potential associated with the item will flow to the economic entity; and
- the cost of the item can be measured reliably.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

PROPERTY AND EQUIPMENT IS INITIALLY MEASURED AT COST

The cost of an item of property and equipment is the purchase price and other costs attributable to bring the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. Trade discounts and rebates are deducted in arriving at the cost.

Where an asset is acquired through a non-exchange transaction, its cost is its fair value as at date of acquisition.

Where an item of property and equipment is acquired in exchange for a non monetary asset or monetary assets, or a combination of monetary and non monetary assets, the asset acquired is initially measured at fair value (the cost). If the acquired item's fair value was not determinable, its deemed cost is the carrying amount of the asset(s) given up.

When significant components of an item of property and equipment have different useful lives, they are accounted for as separate items (major components) of property and equipment.

Costs include costs incurred initially to acquire or construct an item of property and equipment and costs incurred subsequently to add to, replace part of, or service it. If a replacement cost is recognised in the carrying amount of an item of property and equipment, the carrying amount of the replaced part is derecognised.

Recognition of costs in the carrying amount of an item of property and equipment ceases when the item is in the location and condition necessary for it to be capable of operating in the manner intended by management.

Items such as spare parts, standby equipment and servicing equipment are recognised when they meet the definition of property and equipment.

Property and equipment are depreciated on the straight line basis over their expected useful lives to their estimated residual value.

Property and equipment is carried at cost less accumulated depreciation and any impairment losses.

The depreciable amount of an asset is allocated on a systematic basis over its useful life.

Each part of an item of property and equipment with a cost that is significant in relation to the total cost of the item is depreciated separately.

The depreciation method used reflects the pattern in which the asset's future economic benefits or service potential are expected to be consumed by the economic entity. The depreciation method applied to an asset is reviewed at least at each reporting date and, if there has been a significant change in the expected pattern of consumption of the future economic benefits or service potential embodied in the asset, the method is changed to reflect the changed pattern. Such a change is accounted for as a change in an accounting estimate.
The economic entity assesses at each reporting date whether there is any indication that the economic entity expectations about the residual value and the useful life of an asset have changed since the preceding reporting date. If any such indication exists, the economic entity revises the expected useful life and/or residual value accordingly. The change is accounted for as a change in an accounting estimate.

The depreciation charge for each period is recognised in surplus or deficit.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

Items of property and equipment are derecognised when the asset is disposed of or when there are no further economic benefits or service potential expected from the use of the asset.

The gain or loss arising from the derecognition of an item of property and equipment is included in surplus or deficit when the item is derecognised. The gain or loss arising from the derecognition of an item of property and equipment is determined as the difference between the net disposal proceeds, if any, and the carrying amount of the item.

1.4 INTANGIBLE ASSETS

An asset is identifiable if it either:

- is separable, i.e. is capable of being separated or divided from an entity and sold, transferred, licensed, rented or exchanged, either individually or together with a related contract, identifiable assets or liability, regardless of whether the entity intends to do so; or
- arises from binding arrangements (including rights from contracts), regardless of whether those rights are transferable or separable from the economic entity or from other rights and obligations.

A binding arrangement describes an arrangement that confers similar rights and obligations on the parties to it as if it were in the form of a contract.

An intangible asset is recognised when:

- it is probable that the expected future economic benefits or service potential that are attributable to the asset will flow to the economic entity; and
- the cost or fair value of the asset can be measured reliably.

The economic entity assesses the probability of expected future economic benefits or service potential using reasonable and supportable assumptions that represent management's best estimate of the set of economic conditions that will exist over the useful life of the asset.

Where an intangible asset is acquired through a non exchange transaction, its initial cost at the date of acquisition is measured at its fair value as at that date.

Intangible assets are carried at cost less any accumulated amortisation and any impairment losses.

An intangible asset is regarded as having an indefinite useful life when, based on all relevant factors, there is no foreseeable limit to the period over which the asset is expected to generate net cash inflows or service potential. Amortisation is not provided for these intangible assets, but they are tested for impairment annually and whenever there is an indication that the asset may be impaired. For all other intangible assets amortisation is provided on a straight line basis over their useful life. The amortisation period and the amortisation method for intangible assets are reviewed at each reporting date.

Amortisation is provided to write down the intangible assets, on a straight line basis, to their residual values as follows:

Item	Depreciation method	Average useful life
Computer software	Straight line	2 - 3 years

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

1.5 INVESTMENTS IN CONTROLLED ENTITIES

ECONOMIC ENTITY ANNUAL FINANCIAL STATEMENTS

Investments in controlled entities are consolidated in the economic entity annual financial statements. Refer to the accounting policy on Consolidations (Note 1.1).

CONTROLLING ENTITY ANNUAL FINANCIAL STATEMENTS

In the entity's separate annual financial statements, investments in investments in controlled entities are carried at cost. The entity applies the same accounting for each category of investment.

The entity recognises a dividend or similar distribution in surplus or deficit in its separate annual financial statements when its right to receive the dividend or similar distribution is established.

Investments in controlled entities that are accounted for in accordance with the accounting policy on Financial instruments in the consolidated annual financial statements, are accounted for in the same way in the controlling entity's separate annual financial statements.

1.6 INVESTMENTS IN ASSOCIATES

ECONOMIC ENTITY ANNUAL FINANCIAL STATEMENTS

An investment in an associate is accounted for using the equity method. Under the equity method, the investment is initially recognised at cost and the carrying amount is increased or decreased to recognise the economic entity's share of the surpluses or deficit of the investee after acquisition date. The use of the equity method is discontinued from the date the economic entity ceases to have significant influence over an associate.

Any impairment losses are deducted from the carrying amount of the investment in associate.

Distributions received from the associate reduce the carrying amount of the investment.

Surpluses and deficit resulting from transactions with associates are recognised only to the extent of unrelated investors' interests in the associate.

The most recent available annual financial statements of the associate are used by the investor in applying the equity method. When the end of the reporting period of the investor is different from that of the associate, the associate prepares, for the use of the investor, annual financial statements as of the same date as the annual financial statements of the investor unless it is impracticable to do so.
The recognition of the economic entity's share of losses is discontinued once the economic entity's share of losses of an associate equals or exceeds its interest in the associate.

CONTROLLING ENTITY ANNUAL FINANCIAL STATEMENTS

An investment in an associate is carried at cost.

The entity applies the same accounting for each category of investment.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

The entity recognises a dividend or similar distribution in surplus or deficit in its separate annual financial statements when its right to receive the dividend or similar distribution is established.

1.7 FINANCIAL INSTRUMENTS

A financial instrument is any contract that gives rise to a financial asset of one entity and a financial liability or a residual interest of another entity.

The amortised cost of a financial asset or financial liability is the amount at which the financial asset or financial liability is measured at initial recognition minus principal repayments, plus or minus the cumulative amortisation using the effective interest method of any difference between that initial amount and the maturity amount, and minus any reduction (directly or through the use of an allowance account) for impairment or un-collectibility.

Credit risk is the risk that one party to a financial instrument will cause a financial loss for the other party by failing to discharge an obligation.

Currency risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in foreign exchange rates.

Derecognition is the removal of a previously recognised financial asset or financial liability from an entity's statement of financial position.

Fair value is the amount for which an asset could be exchanged, or a liability settled, between knowledgeable willing parties in an arm's length transaction.

A financial asset is:

- cash;
- a residual interest of another entity; or
- a contractual right to:
  - receive cash or another financial asset from another entity; or
  - exchange financial assets or financial liabilities with another entity under conditions that are potentially favourable to the entity.

A financial liability is any liability that is a contractual obligation to:

- deliver cash or another financial asset to another entity; or
- exchange financial assets or financial liabilities under conditions that are potentially unfavourable to the entity.

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates.

Liquidity risk is the risk encountered by an entity in the event of difficulty in meeting obligations associated with financial liabilities that are settled by delivering cash or another financial asset.

Loans payable are financial liabilities, other than short term payables on normal credit terms.

A financial asset is past due when a counterparty has failed to make a payment when contractually due.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

Transaction costs are incremental costs that are directly attributable to the acquisition, issue or disposal of a financial asset or financial liability. An incremental cost is one that would not have been incurred if the entity had not acquired, issued or disposed of the financial instrument.

Financial instruments at amortised cost are non derivative financial assets or non derivative financial liabilities that have fixed or determinable payments, excluding those instruments that:

- the entity designates at fair value at initial recognition; or
- are held for trading.

Financial instruments at cost are investments in residual interests that do not have a quoted market price in an active market, and whose fair value cannot be reliably measured.

CLASSIFICATION

The entity has the following types of financial assets (classes and category) as reflected on the face of the statement of financial position or in the notes thereto:

Class	Category
Investment in controlled entities	Financial assets at cost
Investment in associates	Financial assets at cost
Other financial assets	Financial assets at cost
Cash and cash equivalents	Financial asset measured at amortised cost
Loans and receivables	Financial asset measured at amortised cost

The entity has the following types of financial liabilities (classes and category) as reflected on the face of the statement of financial position or in the notes thereto:
`

Class	Category
Trade and other payables	Financial liability measured at amortised cost
Finance lease obligation	Financial liability measured at amortised cost

1.8 LEASES

A lease is classified as a finance lease if it transfers substantially all the risks and rewards incidental to ownership. A lease is classified as an operating lease if it does not transfer substantially all the risks and rewards incidental to ownership.

When a lease includes both land and building elements, the entity assesses the classification of each element separately.

FINANCE LEASES - LESSEE

Finance leases are recognised as assets and liabilities in the statement of financial position at amounts equal to the fair value of the leased property or, if lower, the present value of the minimum lease payments. The corresponding liability to the lessor is included in the statement of financial position as a finance lease obligation.

The discount rate used in calculating the present value of the minimum lease payments is the interest rate implicit in the lease.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

Minimum lease payments are apportioned between the finance charge and reduction of the outstanding liability. The finance charge is allocated to each period during the lease term so as to produce a constant periodic rate of on the remaining balance of the liability.

Any contingent rents are expensed in the period in which they are incurred.

OPERATING LEASES - LESSEE

Operating lease payments are recognised as an expense on a straight line basis over the lease term. The difference between the amounts recognised as an expense and the contractual payments are recognised as an operating lease asset or liability.

1.9 IMPAIRMENT OF CASH GENERATING ASSETS

Cash generating assets are assets used with the objective of generating a commercial return. Commercial return means that positive cash flows are expected to be significantly higher than the cost of the asset.

Impairment is a loss in the future economic benefits or service potential of an asset, over and above the systematic recognition of the loss of the asset's future economic benefits or service potential through depreciation (amortisation). Carrying amount is the amount at which an asset is recognised in the statement of financial position after deducting any accumulated depreciation and accumulated impairment losses thereon.

A cash generating unit is the smallest identifiable group of assets used with the objective of generating a commercial return that generates cash inflows from continuing use that are largely independent of the cash inflows from other assets or groups of assets.

Costs of disposal are incremental costs directly attributable to the disposal of an asset, excluding finance costs and income tax expense.

Depreciation (amortisation) is the systematic allocation of the depreciable amount of an asset over its useful life.

Fair value less costs to sell is the amount obtainable from the sale of an asset in an arm's length transaction between knowledgeable, willing parties, less the costs of disposal.

Recoverable amount of an asset or a cash generating unit is the higher its fair value less costs to sell and its value in use.

Useful life is either:
- the period of time over which an asset is expected to be used by the economic entity; or
- the number of production or similar units expected to be obtained from the asset by the economic entity.

VALUE IN USE

Value in use of a cash generating asset is the present value of the estimated future cash flows expected to be derived from the continuing use of an asset and from its disposal at the end of its useful life.

When estimating the value in use of an asset, the economic entity estimates the future cash inflows and outflows to be derived from continuing use of the asset and from its ultimate disposal and the economic entity applies the appropriate discount rate to those future cash flows.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

1.10 EMPLOYEE BENEFITS

SHORT TERM EMPLOYEE BENEFITS

The cost of short term employee benefits (those payable within 12 months after the service is rendered, such as paid vacation leave and sick leave, bonuses, and non monetary benefits such as medical care), are recognised in the period in which the service is rendered and are not discounted.

The expected cost of compensated absences is recognised as an expense as the employees render services that increase their entitlement or, in the case of non accumulating absences, when the absence occurs.

The expected cost of surplus sharing and bonus payments is recognised as an expense when there is a legal or constructive obligation to make such payments as a result of past performance.

DEFINED CONTRIBUTION PLANS

Payments to defined contribution retirement benefit plans are charged as an expense as they fall due.

Payments made to industry managed (or state plans) retirement benefit schemes are dealt with as defined contribution plans where the entity's obligation under the schemes is equivalent to those arising in a defined contribution retirement benefit plan.

1.11 CONTINGENCIES

Contingent assets and contingent liabilities are not recognised. Contingencies are disclosed in note 25.

1.12 REVENUE FROM EXCHANGE TRANSACTIONS

Revenue is the gross inflow of economic benefits or service potential during the reporting period when those inflows result in an increase in net assets, other than increases relating to contributions from owners.

An exchange transaction is one in which one entity receives assets or services, or has liabilities extinguished, and directly gives approximately equal value (primarily in the form of goods, services or use of assets) to the other party in exchange. Fair value is the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction.

MEASUREMENT

Revenue is measured at the fair value of the consideration received or receivable, net of trade discounts and volume rebates.

INTEREST AND ROYALTIES

Revenue arising from the use by others of entity assets yielding interest, royalties and dividends or similar distributions is recognised when:

- it is probable that the economic benefits or service potential associated with the transaction will flow to the entity;, and
- the amount of the revenue can be measured reliably.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

Interest is recognised using the effective interest rate method for financial instruments. Interest levied on transactions arising from exchange or non exchange transactions is classified based on the nature of the underlying transaction.

Interest will not accrue on loans and receivables where there is an indication that payment will be deferred in the short term.

Royalties are recognised as they are earned in accordance with the substance of the relevant agreements.

1.13 REVENUE FROM NON EXCHANGE TRANSACTIONS

Revenue comprises gross inflows of economic benefits or service potential received and receivable by an entity, which represents an increase in net assets, other than increases relating to contributions from owners.

Control of an asset arises when the entity can use or otherwise benefit from the asset in pursuit of its objectives and can exclude or otherwise regulate the access of others to that benefit.
Exchange transactions are transactions in which one entity receives assets or services, or has liabilities extinguished, and directly gives approximately equal value (primarily in the form of cash, goods, services, or use of assets) to another entity in exchange.

Non exchange transactions are transactions that are not exchange transactions. In a non exchange transaction, an entity either receives value from another entity without directly giving approximately equal value in exchange, or gives value to another entity without directly receiving approximately equal value in exchange.

RECOGNITION

An inflow of resources from a non exchange transaction recognised as an asset is recognised as revenue, except to the extent that a liability is also recognised in respect of the same inflow.

As the entity satisfies a present obligation recognised as a liability in respect of an inflow of resources from a non exchange transaction recognised as an asset, it reduces the carrying amount of the liability recognised and recognises an amount of revenue equal to that reduction.

MEASUREMENT

Revenue from a non exchange transaction is measured at the amount of the increase in net assets recognised by the entity.

When, as a result of a non exchange transaction, the entity recognises an asset, it also recognises revenue equivalent to the amount of the asset measured at its fair value as at the date of acquisition, unless it is also required to recognise a liability. Where a liability is required to be recognised it will be measured as the best estimate of the amount required to settle the obligation at the reporting date, and the amount of the increase in net assets, if any, recognised as revenue. When a liability is subsequently reduced, because the taxable event occurs or a condition is satisfied, the amount of the reduction in the liability is recognised as revenue.

1.14 INVESTMENT INCOME

Investment income is recognised on a time proportion basis using the effective interest method.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

1.15 FRUITLESS AND WASTEFUL EXPENDITURE

Fruitless expenditure means expenditure which was made in vain and would have been avoided had reasonable care been exercised.

All expenditure relating to fruitless and wasteful expenditure is recognised as an expense in the statement of financial performance in the year that the expenditure was incurred. The expenditure is classified in accordance with the nature of the expense, and where recovered, it is subsequently accounted for as revenue in the statement of financial performance.

1.16 IRREGULAR EXPENDITURE

Irregular expenditure as defined in Section 1 of the PFMA is expenditure other than unauthorised expenditure, incurred in contravention of or that is not in accordance with a requirement of any applicable legislation, including:

(a) this Act; or
(b) the State Tender Board Act, 1968 (Act No. 86 of 1968), or any regulations made in terms of the Act; or
(c) any provincial legislation providing for procurement procedures in that provincial government.

1.17 SEGMENT INFORMATION

A segment is an activity of an entity:

- that generates economic benefits or service potential (including economic benefits or service potential relating to transactions between activities of the same entity);
- whose results are regularly reviewed by management to make decisions about resources to be allocated to that activity and in assessing its performance; and
- for which separate financial information is available.

Reportable segments are the actual segments which are reported on in the segment report. They are the segments identified above or alternatively an aggregation of two or more of those segments where the aggregation criteria are met.

MEASUREMENT

The amount of each segment item reported is the measure reported to management for the purposes of making decisions about allocating resources to the segment and assessing its performance. Adjustments and eliminations made in preparing the entity's financial statements and allocations of revenues and expenses are included in determining reported segment surplus or deficit only if they are included in the measure of the segment's surplus or deficit that is used by management. Similarly, only those assets and liabilities that are included in the measures of the segment's assets and segment's liabilities that are used by management are reported for that segment. If amounts are allocated to reported segment surplus or deficit, assets or liabilities, those amounts are allocated on a reasonable basis.

1.18 BUDGET INFORMATION

An economic entity is typically subject to budgetary limits in the form of appropriations or budget authorisations, which is given effect through authorising legislation, appropriation or similar.

General purpose financial reporting by an economic entity shall provide information on whether resources were obtained and used in accordance with the legally adopted budget.

ACCOUNTING POLICIES AS AT 31 MARCH 2020 (CONTINUED)

The approved budget is prepared on an accrual basis and presented by economic classification linked to performance outcome objectives.

The approved budget covers the fiscal period from 01/04/2019 to 31/03/2020.

The budget for the economic entity includes all the entities approved budgets under its control.

The annual financial statements and the budget are on the same basis of accounting therefore a comparison with the budgeted amounts for the reporting period have been included in the Statement of comparison of budget and actual amounts.

The Statement of comparative and actual information has been included in the annual financial statements as the recommended disclosure when the annual financial statements and the budget are on the same basis of accounting as determined by National Treasury.

1.19 RELATED PARTIES

A related party is a person or an entity with the ability to control or jointly control the other party, or exercise significant influence over the other party, or vice versa, or an entity that is subject to common control, or joint control.

Control is the power to govern the financial and operating policies of an entity so as to obtain benefits from its activities.

Related party transactions are a transfer of resources, services or obligations between the reporting entity and a related party, regardless of whether a price is charged.

Significant influence is the power to participate in the financial and operating policy decisions of an entity, but is not control over those policies.

Management is those persons responsible for planning, directing and controlling the activities of the economic entity, including those charged with the governance of the economic entity in accordance with legislation, in instances where they are required to perform such functions.

Close members of the family of a person are those family members who may be expected to influence, or be influenced by that person in their dealings with the economic entity.

The economic entity is exempt from disclosure requirements in relation to related party transactions if that transaction occurs within normal supplier and/or client/recipient relationships on terms and conditions no more or less favourable than those which it is reasonable to expect the economic entity to have adopted if dealing with that individual entity or person in the same circumstances and terms and conditions are within the normal operating parameters established by that reporting entity's legal mandate.

Where the economic entity is exempt from the disclosures in accordance with the above, the economic entity discloses narrative information about the nature of the transactions and the related outstanding balances, to enable users of the entity's financial statements to understand the effect of related party transactions on its annual financial statements.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020

2. NEW STANDARDS AND INTERPRETATIONS

No new standards were adopted in the year under review.

	(R thousands)					
	2020			2019		
	Cost	Accumulated depreciation and impairment	Carrying value	Cost	Accumulated depreciation and impairment	Carrying value

3. PROPERTY AND EQUIPMENT

ECONOMIC ENTITY

Furniture and office equipment	30,819	(23,361)	7,458	30,667	(19,287)	11,380
Motor vehicles	371	(288)	83	371	(227)	144
Leasehold improvements	7,058	(7,011)	47	6,989	(6,721)	268
Laboratory equipment	11,218	(8,688)	2,530	10,944	(7,561)	3,383
Total	**49,466**	**(39,348)**	**10,118**	**48,971**	**(33,796)**	**15,175**

CONTROLLING ENTITY

Furniture and office equipment	30,819	(23,361)	7,458	30,667	(19,287)	11,380
Motor vehicles	371	(288)	83	371	(227)	144
Leasehold improvements	7,058	(7,011)	47	6,989	(6,721)	268
Laboratory equipment	11,218	(8,688)	2,530	10,944	(7,561)	3,383
Total	**49,466**	**(39,348)**	**10,118**	**48,971**	**(33,796)**	**15,175**

	(R thousands)				
	Opening balance	Additions	Disposals	Depreciation	Total

RECONCILIATION OF PROPERTY AND EQUIPMENT - ECONOMIC ENTITY - 2020

Furniture and office equipment	11,380	1,536	(249)	(5,209)	7,458
Motor vehicles	144	-	-	(61)	83
Leasehold improvements	268	69	-	(290)	47
Laboratory equipment	3,383	274	-	(1,127)	2,530
	15,175	**1,879**	**(249)**	**(6,687)**	**10,118**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)					
	Opening balance	Additions	Disposals	Other changes, movements	Depreciation	Total
RECONCILIATION OF PROPERTY AND EQUIPMENT - ECONOMIC ENTITY - 2019						
Land and buildings	1,700	-	(1,700)	-	-	-
Furniture and office equipment	12,667	3,778	(27)	166	(5,204)	11,380
Motor vehicles	102	71	-	-	(29)	144
Leasehold improvements	2,257	506	-	-	(2,495)	268
Laboratory equipment	3,775	790	-	-	(1,182)	3,383
	20,501	**5,145**	**(1,727)**	**166**	**(8,910)**	**15,175**
RECONCILIATION OF PROPERTY AND EQUIPMENT - CONTROLLING ENTITY - 2020						
Furniture and office equipment	11,380	1,536	(249)	-	(5,209)	7,458
Motor vehicles	144	-	-	-	(61)	83
Leasehold improvements	268	69	-	-	(290)	47
Laboratory equipment	3,383	274	-	-	(1,127)	2,530
	15,175	**1,879**	**(249)**	**-**	**(6,687)**	**10,118**
RECONCILIATION OF PROPERTY AND EQUIPMENT CONTROLLING ENTITY 2019						
Land and buildings	1,700	-	(1,700)	-	-	-
Furniture and office equipment	12,667	3,778	(27)	166	(5,204)	11,380
Motor vehicles	102	71	-	-	(29)	144
Leasehold improvements	2,257	506	-	-	(2,495)	268
Laboratory equipment	3,775	790	-	-	(1,182)	3,383
	20,501	**5,145**	**(1,727)**	**166**	**(8,910)**	**15,175**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

PLEDGED AS SECURITY

None of the assets above have been pledged as security or have restrictions on title.

DEPRECIATION RATES

Depreciation related to technology platform programmes is included in project expenditure.

The depreciation methods and average useful lives of property and equipment have been assessed as follows:

Item	Depreciation method	Average useful life
Leasehold improvements	Straight line	Shorter of the period of the lease agreement or the useful life
Furniture and office equipment	Straight line	2 - 13 years
Motor vehicles	Straight line	2 - 12 years
Laboratory equipment	Straight line	5 - 10 years

	(R thousands)					
	2020			2019		
	Cost	Accumulated depreciation and impairment	Carrying value	Cost	Accumulated depreciation and impairment	Carrying value
4. INTANGIBLE ASSETS						
ECONOMIC ENTITY						
Computer software	11,182	(8,154)	3,028	10,496	(7,062)	3,434
CONTROLLING ENTITY						
Computer software	11,182	(8,154)	3,028	10,496	(7,062)	3,434

	(R thousands)			
	Opening balance	Additions	Amortisation	Total
RECONCILIATION OF INTANGIBLE ASSETS - ECONOMIC ENTITY - 2020				
Computer software	3,434	686	(1,092)	3,028
RECONCILIATION OF INTANGIBLE ASSETS - ECONOMIC ENTITY - 2019				
Computer software	3,173	2,314	(2,053)	3,434

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Opening balance	Additions	Amortisation	Total
RECONCILIATION OF INTANGIBLE ASSETS - CONTROLLING ENTITY - 2020				
Computer software	3,434	686	(1,092)	3,028
RECONCILIATION OF INTANGIBLE ASSETS - CONTROLLING ENTITY - 2019				
Computer software	3,173	2,314	(2,053)	3,434

RESTRICTED TITLE

None of the above intangible assets have restrictions in title or have been pledged as security.

Name of company	Reporting period end	% holding 2020	% holding 2019	Carrying amount 2020	Carrying amount 2019
5. INVESTMENTS IN CONTROLLED ENTITIES					
Active investments					
Bio2Biz (Pty) Ltd*	31 Dec	100.0%	58.8%	2,189	-
Investments in the process of deregistration/liquidation					
Capelands Nurseries (Pty) Ltd	31 Mar	100.0%	100.0%	-	-
iThemba Pharmaceuticals (Pty) Ltd	31 Dec	50.1%	50.1%	-	-
Natural Carotenoids South African (Pty) Ltd	31 Jul	98.8%	98.8%	-	-
				2,189	-

*During the current financial year TIA obtained 100% shareholding in the subsidiary.

The carrying amounts of controlled entities are shown net of impairment losses.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

CONTROLLED ENTITY'S REPORTING DATE IS DIFFERENT FROM THAT OF THE CONTROLLING ENTITY

Some of the controlled entities have reporting dates that differ from the controlling entity. If the reporting date is within a 3 month period of the reporting period of the controlling entity, the annual financial statements for that period were used in consolidating the results of the entity. The management accounts for the entities were reviewed in order to ensure that no significant changes took place between the reporting date and 31 March 2020.

Where the reporting dates differ with more than 3 months, a review of the financial affairs of the entity is performed up to the reporting date of the controlling entity and this is used for consolidation purposes.

Name of entity	Reporting period end	% holding 2020	% holding 2019	Carrying amount 2020	Carrying amount 2019
6. INVESTMENTS IN ASSOCIATES					
Active investments					
Lifeassay (Pty) Ltd	28 Feb	26.0%	26.0%	555	1,085
Ribotech (Pty) Ltd	31 Aug	35.0%	35.0%	-	-
Tenacent SA (Pty) Ltd	28 Feb	20.0%	20.0%	-	-
Investments in the process of deregistration/liquidation					
Bio Career Technology (Pty) Ltd*	28 Feb	- %	51.0%	-	-
Commercial Aquaculture (Pty) Ltd	28 Feb	34.0%	34.0%	-	-
Control Maze (Pty) Ltd*	28 Feb	- %	51.0%	-	-
Edgi Tech (Pty) Ltd	28 Feb	26.0%	26.0%	-	-
Eyeborn (Pty) Ltd	31 Mar	25.0%	25.0%	-	-
Femtech (Pty) Ltd	28 Feb	69.0%	69.0%	-	-
Geratech Zirconium Beneficiation (Pty) Ltd**	28 Feb	- %	34.0%	-	-
Mycoroot (Pty) Ltd	28 Feb	25.0%	25.0%	-	-
Niocad (Pty) Ltd	28 Feb	22.0%	22.0%	-	-
Nkomazi Chemicals (Pty) Ltd	30 Jun	35.7%	35.7%	-	-
Silverlake Trading (Pty) Ltd	28 Feb	28.0%	28.0%	-	-
Stellenbosch Wind Energies Technologies (Pty) Ltd*	31 Mar	- %	26.0%	-	-
				555	**1,085**

* These investments were deregistered during the current financial year.

**This investment was written off during the current financial year, this Company has been liquidated.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019

The carrying amounts of associates are shown net of impairment losses.

Although the controlling entity holds more than 50% of the voting powers in some of the entities, the investment is not considered a controlled entity because the controlling entity does not have control over the entity due to voting rights/ appointment powers of directors. These investments are therefore classified as investments in associates.

MOVEMENTS IN CARRYING VALUE

Opening balance	1,085	-	-	-
Share of surplus/deficit	(530)	1,085	-	-
	555	**1,085**	**-**	**-**

PRINCIPAL ACTIVITIES

LifeAssay Diagnostics (Pty) Ltd	Manufacture of vitro diagnostics test kits
Ribotech (Pty) Ltd	Manufacturing of rHOG CSF. Product is used in cancer treatment
Tenacent (Pty) Ltd	Development and sales of technical devices for the control of containers

All the above entities are incorporated in South Africa.

SUMMARY OF CONTROLLED ENTITY'S INTEREST IN ASSOCIATE

Total assets	23,164	30,515
Total liabilities	(156,793)	(156,001)
Revenue	22,002	40,865
Deficit	(12,709)	(3,111)

ASSOCIATES WITH DIFFERENT REPORTING DATES

Some of the associates have reporting dates that differ from the controlling entity. If the reporting date is within a 3 month period of the reporting period of the controlling entity, the annual financial statements for that period were used in consolidating the results of the entity. The management accounts for the entities were reviewed in order to ensure that no significant changes took place between the reporting date and the year end.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019

UNRECOGNISED SHARE OF LOSSES OF ASSOCIATES

The economic entity has discontinued recognising its share of the deficit of associate companies, as the investment is held at and the economic entity has no obligation for any deficit of the associate. The total unrecognised deficit for the current period amount to R1,786,856 (2019: R1,690,376). The accumulated unrecognised deficit to date amount to R46,659,073 (2019: R57,449,873).

7. LOANS AND RECEIVABLES

OTHER ENTITIES

Agriprotein (Pty) Ltd	12,961	15,631	12,961	15,631
The loan has fixed monthly repayment terms and interest accrues at prime				
Geoaxon Holdings (Pty) Ltd*	-	1,484	-	1,484
The loan has fixed monthly repayment terms and interest accrues at 15.5%				
Synexa (Pty) Ltd	4,185	4,856	4,185	4,856
This loan has fixed quarterly repayment terms over a period of 6 years and accrues interest at prime				
	17,146	**21,971**	**17,146**	**21,971**
Non current assets	11,392	15,916	11,392	15,916
Current assets	5,754	6,055	5,754	6,055
	17,146	**21,971**	**17,146**	**21,971**

LOANS TO ECONOMIC ENTITIES IMPAIRED

* This investment was impaired during the current financial year due to receipts from the investee not being probable.

As of 31 March 2020, loans to economic entities of R 132,584,584 (2019: R 150,417,691) were impaired and provided for. The movement from the prior year to current year includes the sale of previously impaired investee companies as well as current year impairment.

The creation and release of provision for impaired receivables has been included in operating expenses in the statement of financial performance. Amounts charged to the allowance account are generally written off when the recovery of such amounts are improbable.

The economic entity does not hold collateral as security.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019

8. OTHER FINANCIAL ASSETS

The Biological and Vaccines Institute of SA (Pty) Ltd *12.5% shareholding*	26,300	26,300	26,300	26,300

9. PREPAYMENTS

The increase in prepayments is due to the renewal of 3 year licences in the current financial year.

10. TRADE AND OTHER RECEIVABLES

Trade debtors	415	1,472	415	1,472
Deposits	329	323	329	323
Other receivables	136	96	136	96
	880	**1,891**	**880**	**1,891**

FAIR VALUE OF TRADE AND OTHER RECEIVABLES

The entity is of the opinion that the carrying value approximates the fair value of trade and other receivables at period end, due to the short term nature of these balances.

TRADE AND OTHER RECEIVABLES PAST DUE BUT NOT IMPAIRED

Trade and other receivables which are less than 3 months past due are not considered to be impaired. At 31 March 2020, R - (2019: R-) were past due but not impaired.

TRADE AND OTHER RECEIVABLES IMPAIRED

As of 31 March 2020, trade and other receivables of R1,062,489 (2019: R1,062,489) were impaired and provided for.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019
The ageing of these loans is as follows:				
3 to 6 months	-	1,062	-	1,062
Over 6 months	1,062	-	1,062	-

RECONCILIATION OF PROVISION FOR IMPAIRMENT OF TRADE AND OTHER RECEIVABLES

Opening balance	1,062	533	1,062	533
Provision for impairment	-	531	-	531
Amounts written off as uncollectible	-	(2)	-	(2)
	1,062	**1,062**	**1,062**	**1,062**

The creation and release of provision for impaired receivables have been included in operating expenses in deficit. Amounts charged to the allowance account are generally written off when there is no expectation of recovering additional cash.

No collateral is held as security.

11. CASH AND CASH EQUIVALENTS

Cash and cash equivalents consist of:				
Cash on hand	10	20	10	20
Bank balances	147,530	169,222	144,939	166,891
	147,540	**169,242**	**144,949**	**166,911**

The entity is of the opinion that the carrying value approximates the fair value of cash and cash equivalents at period end, due to the short term nature of these balances.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019
12. FINANCE LEASE OBLIGATION				
Minimum lease payments due				
- within one year	325	234	325	234
- in second to fifth year inclusive	173	298	173	298
Present value of minimum lease payments	**498**	**532**	**498**	**532**
Present value of minimum lease payments due				
- within one year	325	234	325	234
- in second to fifth year inclusive	173	298	173	298
	498	**532**	**498**	**532**
Non current liabilities	173	298	173	298
Current liabilities	325	234	325	234
	498	**532**	**498**	**532**

It is economic entity policy to lease certain office equipment under finance leases.

The average lease term is 3 years and the average effective borrowing rate is 0% (2019: 0%).

Interest rates are fixed at the contract date. All leases have fixed repayments.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019

13. COMMITTED CONDITIONAL GRANTS AND RECEIPTS

Committed conditional grants and receipts comprises:				
Africa Programme	6,761	3,763	6,761	3,763
Agriculture bio economy partnership programme	8,353	10,396	8,353	10,396
Biosafety communication strategy	-	8	-	8
Fibrelux technology diffusion initiative	35	33	35	33
Forest molecular genomics	133	64	133	64
ICT flagship programme	213	3,000	213	3,000
Innovation bridge	4	221	4	221
Innovation for inclusive development	42,405	34,785	42,405	34,785
Joint technology innovation programme	1,291	1,200	1,291	1,200
Limpopo agri food technology station	123	115	123	115
Nuclear medicine	2,140	2,000	2,140	2,000
SABDI (Biodesign initiative programme)	13,566	21,316	13,566	21,316
Seed fund programme	58	-	58	-
Strategic industrial bio innovation programme	871	680	871	680
Sugarcane research projects	1,402	2,265	1,402	2,265
Technology station programme	11,001	1,274	11,001	1,274
	88,356	**81,120**	**88,356**	**81,120**
MOVEMENT DURING THE YEAR				
Balance at the beginning of the year	81,120	88,272	81,120	88,272
Additions during the year	154,298	106,358	154,298	106,358
Income recognition during the year	(147,062)	(113,510)	(147,062)	(113,510)
	88,356	**81,120**	**88,356**	**81,120**

14. TRADE AND OTHER PAYABLES

Trade payables	8,082	19,577	7,677	19,174
Employee related accruals	10,776	9,485	10,776	9,485
Other payables	35,061	32,768	35,061	32,768
	53,919	**61,830**	**53,514**	**61,427**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019

15. REVENUE FROM NON EXCHANGE TRANSACTIONS

DST allocation received during the year	440,929	420,322	440,929	420,322
Committed conditional grant funding recognised for:				
Africa programme	7,452	1,205	7,452	1,205
Agriculture bio economy partnerships programme	23,914	15,909	23,914	15,909
Biosafety communication strategy	-	336	-	336
Forest molecular genomics	3,000	6,688	3,000	6,688
ICT flagship programme	3,000	-	3,000	-
Innovation bridge	228	(132)	228	(132)
Innovation for inclusive development	22,104	10,682	22,104	10,682
SABDI (Biodesign initiative programme)	9,188	4,490	9,188	4,490
Seed fund programme	14,868	-	14,868	-
Social programme housing	-	215	-	215
Strategic industrial bio innovation programme	9,460	8,360	9,460	8,360
Technology station programme	52,885	62,342	52,885	62,342
	587,028	**530,417**	**587,028**	**530,417**

16. OTHER INCOME

Royalties received	1,641	1,291	1,641	1,291
Sundry receipts	160	438	160	438
ESWETA funding received	2,405	2,865	2,405	2,865
Income from investment	-	-	2,189	-
Reversal of provision	-	14,939	-	14,939
	4,206	**19,533**	**6,395**	**19,533**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019
17. INVESTMENT REVENUE				
Interest revenue				
Interest earned – loans and receivables	1,756	5,254	1,756	5,254
Interest earned – bank	10,769	10,393	10,506	10,321
	12,525	**15,647**	**12,262**	**15,575**
18. EMPLOYEE-RELATED COSTS				
Remuneration	101,599	97,535	101,599	97,535
Defined contribution plans	7,399	7,552	7,399	7,552
	108,998	**105,087**	**108,998**	**105,087**
19. PROJECT FUNDING EXPENDITURE				
Project grants - third party	450,989	369,730	450,989	369,730
Project funding is made up of the following:				
Africa programme	7,425	1,205	7,425	1,205
Global cleantech innovation programme	2,378	4,879	2,378	4,879
Innovation for inclusive development	22,104	10,684	22,104	10,684
Innovation skills development programme	4,041	12,700	4,041	12,700
Seed fund programme	32,688	38,530	32,688	38,530
Technology development	155,833	106,699	155,833	106,699
Technology innovation cluster programme	31,930	22,155	31,930	22,155
Technology platform programme	83,560	66,534	83,560	66,534
Technology station programme	96,501	100,543	96,501	100,543
Thought leadership	13,183	3,630	13,183	3,630
Youth technology innovation programme	1,346	2,171	1,346	2,171
	450,989	**369,730**	**450,989**	**369,730**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019
20. IMPAIRMENT				
Impairment of financial assets at amortised cost	1,465	533	1,465	533
21. OTHER OPERATING EXPENSES				
Other operating expenses include expenditure such as:				
Auditors' remuneration	1,248	568	1,248	568
Cleaning	525	629	525	629
Consulting and professional fees	7,904	10,135	7,904	10,135
Electricity	1,729	1,573	1,729	1,573
IT expenses	6,167	5,843	6,167	5,843
Marketing	2,271	3,081	2,271	3,081
Placement fees	803	1,481	803	1,481
Printing and stationery	671	566	671	566
Repairs and maintenance	262	227	262	227
Security	1,264	1,154	1,264	1,154
Sponsorships	873	2,332	873	2,332
Subscription and certification costs	1,893	3,277	1,893	3,277
Telephone and fax	822	911	822	911
Training	4,050	5,602	4,050	5,602
Travel	8,151	8,972	8,151	8,972

22. TAXATION

The controlling entity is exempt from income tax in terms of the provisions of Section 10(1)(cA)(i) of the Income Tax Act.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019

23. CASH (USED IN) GENERATED FROM OPERATIONS

(Deficit) surplus	(15,976)	23,551	(13,518)	22,053
Adjustments for:				
Depreciation and amortisation	7,779	10,965	7,779	10,965
Deficit/(surplus) from equity accounted investments	530	(1,085)	-	-
Income from investment in subsidiary	-	-	(2,189)	-
Debt impairment	1,465	533	1,465	533
Impairment	-	(15,305)	-	(15,305)
Interest on loan accounts	(1,756)	(5,254)	(1,756)	(5,254)
Assets written off	249	1,561	249	1,561
Changes in working capital:				
Trade and other receivables	1,011	(390)	1,011	(384)
Prepayments	(1,700)	563	(1,700)	563
Trade and other payables	(7,720)	35,999	(7,719)	36,337
	(16,118)	**51,138**	**(16,378)**	**51,069**

24. COMMITMENTS

Authorised operational expenditure				
Already contracted for but not provided for				
• Travel	-	184	-	184
• Consultancy	341	2,424	341	2,424
• Other	2,430	550	2,430	550
• 2017/2018 retained surplus	-	15,300	-	15,300
	2,771	**18,458**	**2,771**	**18,458**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019
Contracted investment expenditure payable within 12 months				
• Project funding expenditure	118,318	90,062	118,318	90,062
Total operational commitments				
Already contracted for but not provided for	2,771	18,458	2,771	18,458
Contracted investment expenditure payable within 12 months	118,318	90,062	118,318	90,062
	121,089	**108,520**	**121,089**	**108,520**
Operating leases - as lessee (expense)				
Minimum lease payments due				
- within one year	8,750	10,232	8,750	10,232
- in second to fifth year inclusive	3,353	11,477	3,353	11,477
	12,103	**21,709**	**12,103**	**21,709**

Operating lease payments represent rentals payable by the economic entity for certain of its offices. Leases are negotiated for an average term of five years and rentals are fixed for an average of three years. No contingent rent is payable.

25. CONTINGENCIES

CONTINGENT LIABILITIES

Funding agreements:

These agreements will be funded using surplus cash and funds to be allocated in the financial periods in which these agreements become payable.

Funding agreements	61,383	50,410	61,383	50,410

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019

Legal proceedings:

There are several legal proceedings that are currently ongoing, these legal proceedings relate to prior or existing investments made by the Technology Innovation Agency, either for refunds of grants, repayment of loans or incorrect disclosure on the value of shares sold.

The estimated costs are as follows:

Legal costs	2,640	-	2,640	-

CONTINGENT ASSETS

This matter relates to a sale of shares transaction whereby the Controlling entity disposed of its 49% shareholding in Kapa Biosystems (Pty) Ltd to Kapa Biosystems Inc. It later transpired that the purchase price for the shares was significantly undervalued and that TIA was in fact entitled to an additional amount. The arbitration in this matter is presently ongoing. The amount owing to the Controlling entity is uncertain at this time.

26. RELATED PARTIES

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Relationships	
Members	Refer to members' emoluments note 27
Controlled entities	Refer to note 5
Associates	Refer to note 6
National Department	Ministry of Science and Innovation
National Government Business Enterprise	Council for Scientific and Industrial Research
National Public Entities	Agricultural Research Council/ Medical Research Council of South Africa The South African Nuclear Energy Corporation Mintek

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)	
	Controlling entity	
	2020	2019
RELATED PARTY BALANCES		
COMMITMENTS WITH RELATED PARTIES		
Ministry of Science and Innovation	(34,552)	(32,535)
COMMITTED CONDITIONAL GRANTS		
Ministry of Science and Innovation	(88,356)	(81,120)
RELATED PARTY TRANSACTIONS		
ALLOCATIONS RECEIVED		
TIA – Ministry of Science and Innovation	(588,796)	(526,680)
SURPLUS FUNDS RETURNED		
TIA – Ministry of Science and Innovation	-	10,024
TIA – National Treasury	15,372	-
TRANSACTIONS WITH		
TIA – Agricultural Research Council	1,498	-
TIA – Council for Scientific and Industrial Research	27,056	16,584
TIA – Medical Research Council for South Africa	4,800	4,451
TIA – Mintek	55	-
TIA – The South African Nuclear Energy Corporation	2,000	-

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

27. MEMBERS' EMOLUMENTS

EXECUTIVE MEMBERS

	(R thousands)			
	Emoluments	Annual Bonus	Allowances*	Total
2020				
Mr B Manilal CEO (until 12/06/2019)**	3,377	727	-	4,104
Ms F Levy Hassen Interim CEO (from 13/06/2019)	2,818	-	11	2,829
Mr W van der Merwe	2,411	288	23	2,722
Ms J Hechter (until 11/06/2019)	257	141	61	459
Ms P Dekker	1,668	-	-	1,668
Ms S Pillay (acting until 30/06/2019)	278	-	39	317
Mr V Skosana (acting until 30/06/2019)	287	-	41	328
Dr A Ramsuran (acting from 01/07/2019 until 29/02/2020)	690	124	199	1,013
Mr M Molatudi (acting from 18/07/2019)	1,139	-	172	1,311
Mr E Mokhethi (acting from 18/07/2019)	786	-	102	888
Mr P Krappie (from 01/08/2019)	1,180	264	32	1,476
Mr M Lekoto (from 01/08/2019)	844	-	83	927
	15,735	**1,544**	**763**	**18,042**

** The annual bonus amount includes the bonus for 2 financial years.

2019				
Mr B Manilal CEO	3,012	-	15	3,027
Mr W van der Merwe	2,348	324	26	2,698
Ms S Pillay (acting)	964	152	156	1,272
Mr V Skosana (acting)	1,087	141	160	1,388
Ms M Matlolane (acting)	1,260	175	191	1,626
Ms J Hechter (acting)	1,250	198	184	1,632
	9,921	**990**	**732**	**11,643**

* Allowances including the following: cell phone, car, acting, and travel and subsistence.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)		
	Members' fees	Allowances*	Total
BOARD MEMBERS			
2020			
Mr BA Mboniswa (from 01/08/2019)	97	4	101
Dr J Coates (resigned 28/02/2019)	-	2	2
Dr SJ Lennon	341	3	344
Ms F Levy Hassen (resigned 13/06/2019) (ex officio)	31	-	31
Dr M Madikizela	162	12	174
Ms JSP Matsebula	157	20	177
Dr PL Mlengana	77	-	77
Mr TG Ramasike	214	14	228
Dr J van de Loosdrecht	61	-	61
	1,140	**55**	**1,195**
2019			
Prof. EC Kieswetter	94	-	94
Dr J Coates	134	-	134
Dr SJ Lennon	103	-	103
Ms F Levy Hassen (ex officio)	124	-	124
Dr M Madikizela	140	-	140
Ms JSP Matsebula	76	-	76
Dr PL Mlengana	61	-	61
Mr TG Ramasike	155	-	155
Dr J van de Loosdrecht	106	-	106
	993	**-**	**993**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Less than 1 year	Between 1 and 2 years	Between 2 and 5 years	Over 5 years

28. RISK MANAGEMENT

FINANCIAL RISK MANAGEMENT

The economic entity's activities expose it to a variety of financial risks: market risk (including currency risk, fair value interest rate risk, cash flow interest rate risk and price risk), credit risk and liquidity risk.

LIQUIDITY RISK

The economic entity's risk to liquidity is a result of the funds available to cover future commitments. The economic entity manages liquidity risk through an ongoing review of future commitments and credit facilities.

ECONOMIC ENTITY

At 31 March 2020				
Trade and other payables	53,919	-	-	-
Finance lease liability	325	173	-	-
At 31 March 2019				
Trade and other payables	61,830	-	-	-
Finance lease liability	234	298	-	-

CONTROLLING ENTITY

At 31 March 2020				
Trade and other payables	53,514	-	-	-
Finance lease liability	325	173	-	-
At 31 March 2019				
Trade and other payables	61,427	-	-	-
Finance lease liability	234	298	-	-

CREDIT RISK

Credit risk consists mainly of cash deposits, cash equivalents and trade debtors. The entity only deposits cash with major banks with high quality credit standing and limits exposure to any one counter party.

Loans and receivables, investment in controlled entities, investment in associates and other investments consist mainly of funding granted to start up companies. The exposure to credit risk is managed through ongoing review of the operating results and financial position of the investee companies. Should the entity have doubt over the recoverability of the loan of the value of the investment, the loan/investment is impaired and further funding is carefully considered.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity - 2020	Economic entity - 2019	Controlling entity - 2020	Controlling entity - 2019
Financial assets exposed to credit risk at year end were as follows:				
Financial instrument				
Cash and cash equivalents	147,540	169,242	144,949	166,911
Trade and other receivables	880	1,891	880	1,891
Loans and receivables	17,146	21,971	17,146	21,971

The entity has little doubt over the recoverability of trade and other receivables not considered to be impaired at year end.

The entity has reviewed the financial position of each of the entities where they have not impaired the loan disbursed or investment made to the investee company based on the management is of the opinion that at the period end the amount is recoverable.

MARKET RISK

INTEREST RATE RISK

Changes in interest rates will affect the revenue from exchange transaction revenue stream as the return on investment of surplus funds is linked to the prime rate.

CASH FLOW INTEREST RATE RISK

	Current interest rate	Due in less than a year	Due in one to two years	Due in two to three years	Due in three to four years	Due after five years
Financial instrument						
Cash reserves at CPD	5.58%	129,584	-	-	-	-
Cash reserves at Standard Bank	4.15%	15,356	-	-	-	-
Other cash reserves at commercial banks	Various	2,591	-	-	-	-

FOREIGN EXCHANGE RISK

The economic entity does not hedge foreign exchange fluctuations.

The economic entity reviews its foreign currency exposure, including commitments on an ongoing basis.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Economic entity		Controlling entity	
	2020	2019	2020	2019

29. FRUITLESS AND WASTEFUL EXPENDITURE

Opening balance as previously reported	80	80	-	-

Economic Entity: The nature of the expenses that could have been avoided are interest and penalties on PAYE for two controlled entities which were subsequently deregistered.

30. IRREGULAR EXPENDITURE

Opening balance as previously reported	7,923	7,923	-	-
Current year	2,829	-	2,829	-
Closing balance	**10,752**	**7,923**	**2,829**	**-**

NARRATIVE

Economic entity: 13 controlled entities were inherited when the trusts (Biopad, Lifelab, Plantbio, Thumisano, Innovation Fund, Cape Biotech Trust) were combined to form TIA. The entities were not set up to comply with the detail requirements of Treasury Regulation 16A6.1. The controlling entity is continuing to exit these entities and of the original 13 only 5 are remaining.

Controlling entity: Irregular expenditure has been highlighted, which relates to the manner in which the Interim CEO, Ms Fuzlin Levy-Hassen, was appointed and the remuneration paid to her for services rendered in this capacity during the reporting period.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS
AS AT 31 MARCH 2020 (CONTINUED)

31. SEGMENT INFORMATION

GENERAL INFORMATION

IDENTIFICATION OF SEGMENTS

The economic entity is organised and reports to management on the basis of four major functional areas and administration: Bio economy, Sector funding, Strategic Engagements and Corporate Relations and Administration. The segments were organised around the type of service delivered and the target market within the National System of Innovation. Management uses these same segments for determining strategic objectives. Segments were aggregated for reporting purposes. The segments have changed from the prior financial year as the current mechanism of reporting is more accurate and aligned to the new 5 year strategic plan.

Information reported about these segments is used by management as a basis for evaluating the segments' performances and for making decisions about the allocation of resources. The disclosure of information about these segments is also considered appropriate for external reporting purposes.

	(R thousands)				
	Bio economy	Sector Funding	Programmes	Administration and strategic engagements	Total
SEGMENT SURPLUS OR DEFICIT					
CONTROLLING ENTITY - 2020					
Revenue					
Revenue	229,269	57,499	154,050	146,210	587,028
Interest received	1,756	-	-	10,506	12,262
Other Income	456	1,346	2,178	2,415	6,395
Total segment revenue	**231,481**	**58,845**	**156,228**	**159,131**	**605,685**
Entity's revenue					**605,685**
Expenditure					
Employee-related costs	14,983	15,139	15,914	62,962	108,998
Project funding expenditure	192,668	84,396	173,925	-	450,989
Other operating expenditure	1,364	1,058	3,876	52,918	59,216
Total segment expenditure	**209,015**	**100,593**	**193,715**	**115,880**	**619,203**
Total segmental deficit					**(13,518)**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

AS AT 31 MARCH 2020 (CONTINUED)

	(R thousands)			
	Technology development	Technology enabling and support	Administration and strategic engagements	Total
CONTROLLING ENTITY - 2019				
Revenue				
Revenue	97,930	262,043	170,444	530,417
Interest received	5,254	-	10,321	15,575
Other income	16,230	3,256	47	19,533
Total segment revenue	**119,414**	**265,299**	**180,812**	**565,525**
Entity's revenue				**565,525**
Expenditure				
Employee-related costs	27,458	14,993	62,636	105,087
Other expenses	2,713	4,409	61,533	68,655
Project funding expenditure	106,699	263,031	-	369,730
Total segment expenditure	**136,870**	**282,433**	**124,169**	**543,472**
Total segmental surplus				**22,053**

32. BUDGET DIFFERENCES

MATERIAL DIFFERENCES BETWEEN BUDGET AND ACTUAL AMOUNTS

The entity managed its budget through constantly comparing the forecast of actual expenditure to the budget. Through this control mechanism the entity was able to allocate savings in employee costs, created due to vacancies not filled, as well as savings in operating expenditure to project expenditure. This enabled the entity to be agile and therefore minimise cash surpluses. No material variances incurred during the financial year.

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