

DST Strategic Plan (2015-2020)



Presentation to the Select
Committee
06 May 2015 by
DG Dr Phil Mjwara



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



Outline of the Presentation

- Vision, mission, values
- National Development Plan (NDP) and the role of Science Technology and Innovation (STI);
 - **STI's contribution to eradication of inequality, poverty and unemployment;**
- The situational analysis
 - **STI's contribution to socioeconomic development.**
 - **Knowledge generation and exploitation.**
- The strategic outcome-oriented goals.
- Financing.
- Conclusion.



Vision and Mission

Vision

Increased well-being and prosperity
through science, technology and
innovation

Mission

To provide leadership, an enabling
environment, and resources for science,
technology and innovation in support of South
Africa's development.





NDP and the role of STI (1)

- The NDP acknowledges economic development is a longer-term project and that innovation should grow in importance over time.
- Identifies three phases:
 - The **first phase (2012-2017)**, the focus should be on 'intensifying research and development (R&D) spending, emphasising opportunities linked to existing industries' .



NDP and the role of STI cont. (2)

- **Second phase (2018-2023)**, where the country should lay the foundations for more intensive improvements in productivity' where 'innovation across state, business and social sectors should start to become pervasive'; and
- **Third phase (2023-2030)**, the emphasis should be on consolidating the gains of the second phase, with greater emphasis on innovation, improved productivity, more intensive pursuit of a knowledge economy and better exploitation of comparative and competitive advantages in an integrated continent'



NDP and the role of STI (3)

- In translating these NDP intentions into STI implementable actions, the following is proposed:



South Africa's STI: Where to Go?

Phase One (2012- 2017)

- **Use of knowledge for efficiency gains in the economy-** Drawing on progress achieved thus far, the NSI will expand research capacity (human capital development) and institution building, build on what it has learnt about commercialising ideas from research, and continue to support existing economic sectors (such as agriculture, forestry, agroprocessing, aquaculture, manufacturing and mining) and emerging sectors (such as minerals beneficiation, greener energy (hydrogen and fuel cells), and active pharmaceutical ingredient manufacturing) through technological innovation.





South Africa's STI: Where to Go?

Phase Two (2018- 2023)

- **Industrialisation enhanced by knowledge**-the NSI will continue to accelerate the transformation of the STI sector (i.e. demographic representivity) and enhance efficiency in the economy through knowledge. The government will continue to increase R&D investment and commercialisation, and optimise the utilisation of inbound technology



South Africa's STI: Where to Go?

Phase Three (2023-2030)

- **knowledge-based economy**-The number of knowledge workers and high-technology industries will have increased and boosted exports and increased the capacity to commercialise indigenous or local technologies. Efforts will be directed at sustaining and expanding this progress.

STI Contribution	Inequality	Poverty	Unemployment
<p>Direct</p>	<p><i>Transformation of scientific workforces in terms of race and gender</i></p> <p><i>Innovations to enhance standards of living: In partnership with the Department of Basic Education, leverage innovative technologies to improve access to basic education for children with special needs, prioritising the visually and hearing impaired</i></p> <p><i>In partnership with the Eastern Cape Department of Education, the Department of Water and Sanitation, and the Bill & Melinda Gates Foundation, provide innovative and appropriate off-grid technologies as well we sanitation technologies for rural and peri-urban areas</i></p>	<p><i>Innovation-enabled local economic development: Pilot three community-based agro-processing plants (traditional medicines, cosmeceuticals and nutraceuticals) by 2016</i></p> <p><i>Ensure that STI poverty alleviation initiatives are demand driven and informed by local economic development priorities in at least three provinces</i></p> <p><i>Mainstream applied indigenous knowledge-based R&D (traditional medicines, cosmeceuticals and nutraceuticals), including innovation and local manufacturing to support commercialisation models for sustainable livelihoods</i></p>	<p><i>Internships</i></p> <p><i>Researchers</i></p> <p><i>Postdoctoral support</i></p> <p><i>Economic growth:</i></p> <ul style="list-style-type: none"> <i>•Help grow companies' turnover</i> <i>•Reduce technology balance of payments contribution to current account deficit</i> <p><i>Support SMEs through technology localisation and station programmes</i></p> <ul style="list-style-type: none"> <i>•Grow local industries through the Emerging Industries Action Plan</i> <p><i>Initiatives to improve the technology-based competitiveness of the established primary economic sectors</i></p> <p><i>New R&D led industry development initiatives such as Hydrogen South Africa, the Fluorochemicals Expansion Initiative, the Titanium Beneficiation Initiative and the Advanced</i></p>

STI Contribution	Inequality	Poverty	Unemployment
<p>Indirect</p>	<p><i>Targeted postgraduate bursaries (for black people and women) and funding to support young and emerging researchers.</i></p> <p><i>Use of technology to improve service delivery or demonstrate better living standards, such as through the use of wireless mesh networks to bridge the digital divide.</i></p>	<p><i>Targeted postgraduate bursaries (for black people and women) and funding to support young and emerging researchers.</i></p> <p><i>South African Research Chairs Initiative (SARChI), centres of excellence (CoEs) such as CoE on Food Security.</i></p> <p><i>Providing and packaging information to enhance policy decision making (from COE's, SARChI).</i></p>	<p><i>Postgraduate bursaries, SARChI, CoE's (agreement +/- 20% uptake of PhD graduates with institutions)</i></p> <p><i>Research and development infrastructure-such as MeerKAT/Square Kilometre Array (SKA) radio astronomy telescope.</i></p>



Situational analysis



STI and socio-economic development

- The role of STI in socio-economic development is recognised internationally.
- STI are seen as:
 - a source of new and sustainable growth and competitiveness and engine for addressing social challenges;
 - Holding the key to job creation and enhanced productivity.



STI and socio-economic development (2)

- Organisation for Economic Cooperation and Development (OECD) sees innovation as central in lifting economies out of the global economic crisis.
- Both developed and developing countries prioritised innovation in response to the 2008 global economic downturn.
 - Put stimulus packages for investment in infrastructure and extended support for research, development and innovation, human capital development, green technology and the fostering of entrepreneurship.
- The NDP's vision for 2030 takes similar approach



High-level critical review - Knowledge Generation

- Publications and students up as a result of Research Chairs, bursary values and COE's.
- Productive and efficient researcher community.
- Lack the required critical mass for social and economic transformation → we need large-scale focused interventions.



Way forward - Knowledge Generation

- Deepen and scale-up implementation of successful programmes (Chairs, COE's).
- Mobilise resources for infrastructure (equipment and cyber) – includes access to international infrastructure.
- Strengthen efforts to grow the next generation of researchers-especially black and women.
- Implement revised strategies to build the pipeline for research and innovation.
- New arrangements for scaled-up research efforts (building focused large-scale initiatives).



4 dimensions of knowledge exploitation

Build New Industries

Strengthen the competitiveness of existing industries (like mining and agriculture)

Support localisation opportunities

Support priority social outcomes (education, health, rural development)

Strategic use of local procurement opportunities



High-level critical review - Knowledge Exploitation

- Substantially strengthened the KE architecture (IPR Act, TIA, NIPMO).
- Important large-scales pilot/ demonstrator initiatives that can support new industry development (FEI, Titanium, HySA, Bioeconomy).
- Build a reputation as a strategic and credible economic partner – industry, IDC, dti.



High-level critical review - Knowledge Exploitation

- Generated significant learning on R&D-led industrial development and S&T for social impact.
- Have not always packaged our work effectively.



Way forward - Knowledge Exploitation

- Build and learn from experience on how to commercialise ideas from R&D
- Introduction of an Emerging Industries Action Plan (to consolidate efforts to build R&D led new industries)
- Stronger partnership with industry and other government departments, especially existing industrial areas such as agriculture, mining, forestry, etc.
- Targeted innovation support for key social impact outcomes (education, health, etc.) → Innovation for Inclusive development initiatives.



International partnerships

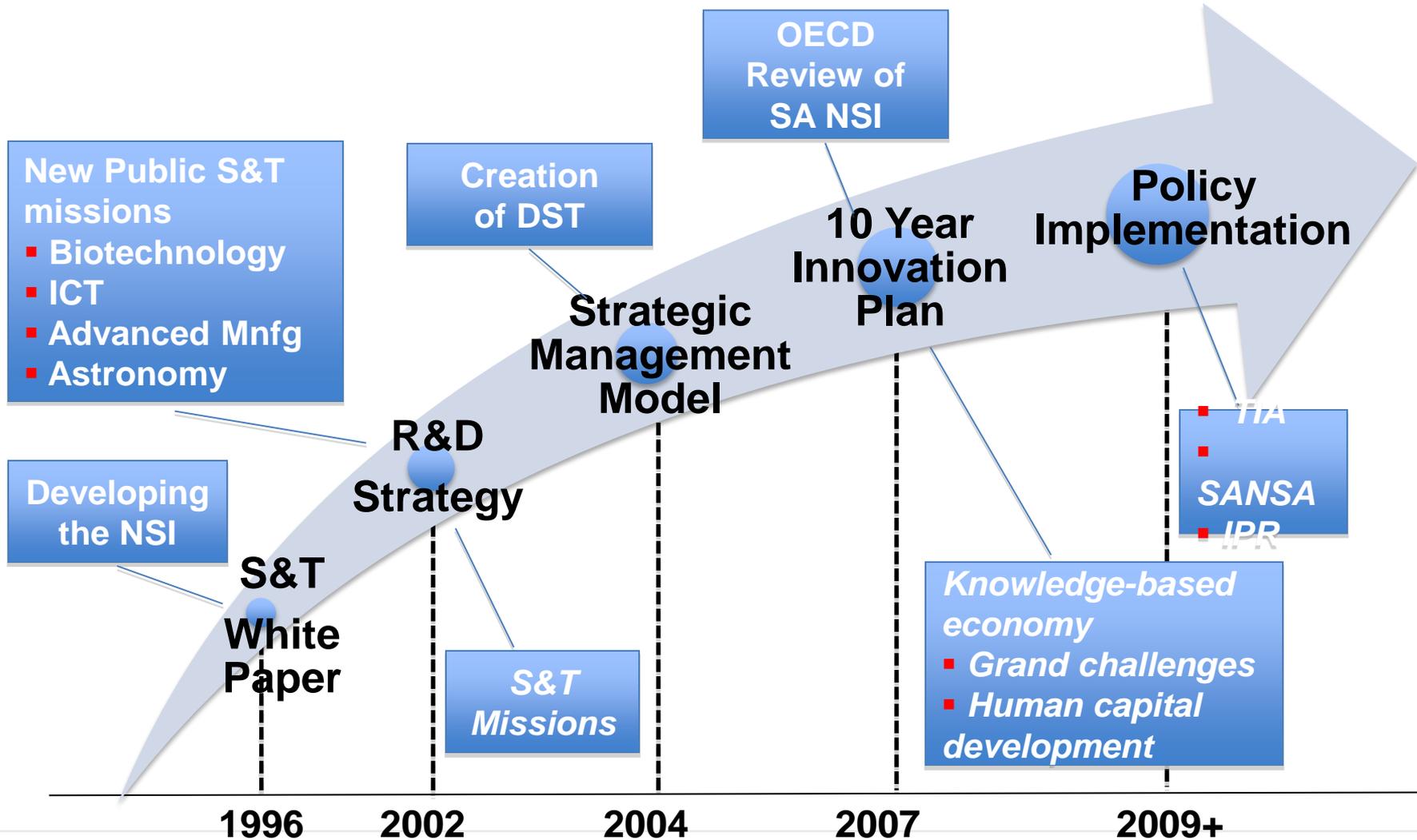
- Continue to secure international and national STI funds in support of the NSI;
- To increase SA's international exposure to knowledge and STI networks;
- To use science diplomacy to represent SA's interests
- To support STI capacity in the rest of the African continent;
- To increase SA's participation in international human capital development opportunities.





STI Policy Package, strategic outcome-oriented goals and selected initiatives

Policy Overview



□ To build on previous gains in building a responsive, coordinated and efficient NSI;

- **Proxy Indicator 1:** Cabinet approval secured for the first comprehensive decadal plan for STI aligned to the NDP by 2019.
- **Proxy Indicator 2:** Budget coordination and legislative instrument for coordination finalised by 2019.
- **Proxy Indicator 3:** Improved systems in place by 2019 for a more rational and strategic deployment of public funding for STI activities.
- **Proxy Indicator 4:** By 2019, a 300% increase in the rand value of investment by government and the private sector in R&D partnerships as compared to 2013 achieved (MTSF Outcome 4, sub-outcome 10).

- ❑ **To maintain and increase the relative contribution of South African researchers to global scientific output;**
 - **Proxy Indicator 1:** 22 032 researchers supported by 2019.
 - **Proxy Indicator 2:** Publication of at least 33 700 ISI-accredited research articles supported by 2019.
 - **Proxy Indicator 3:** Number of articles co-published with researchers on the African continent doubled.

To increase the number of high-level graduates and improve their representivity;

- **Proxy Indicator 1:** 70 960 postgraduate students supported by 2019.
- **Proxy Indicator 2:** 4 200 graduates and students placed in science, engineering, technology and innovation (SETI) institutions by March 2019.
- **Proxy Indicator 3:** 5 521 160 people reached through science engagement activities by 2019.
- **Proxy Indicator 4:** Three times the number of master's and PhDs in areas of priority identified in the NRDS and TYIP by 2019 (measured on a 2012 baseline).

□ To derive a greater share of economic growth from R&D-based opportunities and partnerships;

- **Proxy Indicator 1:** By 2019, new commercial and industrial financing of R2bn secured for a portfolio of R&D-led industrial development initiatives funded by the DST.
- **Proxy Indicator 2:** By 2019, additional revenue of R500m generated from firms and companies that are or have received support from DST-funded instruments since 2010.
- **Proxy Indicator 3:** By 2019, performance of 10 000 SMEs improved through technology interventions.

□ To accelerate inclusive development through scientific knowledge, evidence and appropriate technology.

- **Proxy Indicator 1:** By 2019, decision-support provided that strengthens or improves the delivery of at least 10 government services or functions.
- **Proxy Indicator 2:** Between 2014 and 2019, contribution of technology-based opportunities for local economic development introduced or strengthened in at least five distressed municipalities.
- **Proxy Indicator 3:** By 2019, opportunities for improving the standard of living of at least 500 000 people in South Africa and/or 12 communities unlocked through S&T interventions funded by the DST.

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Strategic outcome-oriented goal (3) proposed interventions

To increase the number of high-level graduates and improve their representivity;

- The Department will design and implement a system to track graduates;
- Internship programme will be expanded;
- More funding for researchers and students will be mobilised;
- To ensure equity and transformation of HCD-bursary beneficiaries will consist of 80% black, 55% women and 4% disabled.
- Science engagement strategy to be implemented.

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4 dimensions of knowledge exploitation

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Strategic use of local procurement opportunities

Economic Impact
GDP; Current Account Deficit; Economic competitiveness

Impact

Revenues from licensed technologies commercialised

No. of spin out companies from commercialised ideas

TBP

Increase companies turnover

Improved productivity in SMEs

Outcomes

No. and impact of ideas commercialised from research

Industrial finance secured for DST funded initiatives (TIA, CSIR)

Private equity funds

Programmes to be upscaled and rolled out

Proxy output-orientated indicators

AMTS
AMI
Biocomposites, RBI; ICT
Roadmap

EIAP

SIF (ECSP)

TSP
TLP

NSI initiatives

FEI
HYSA

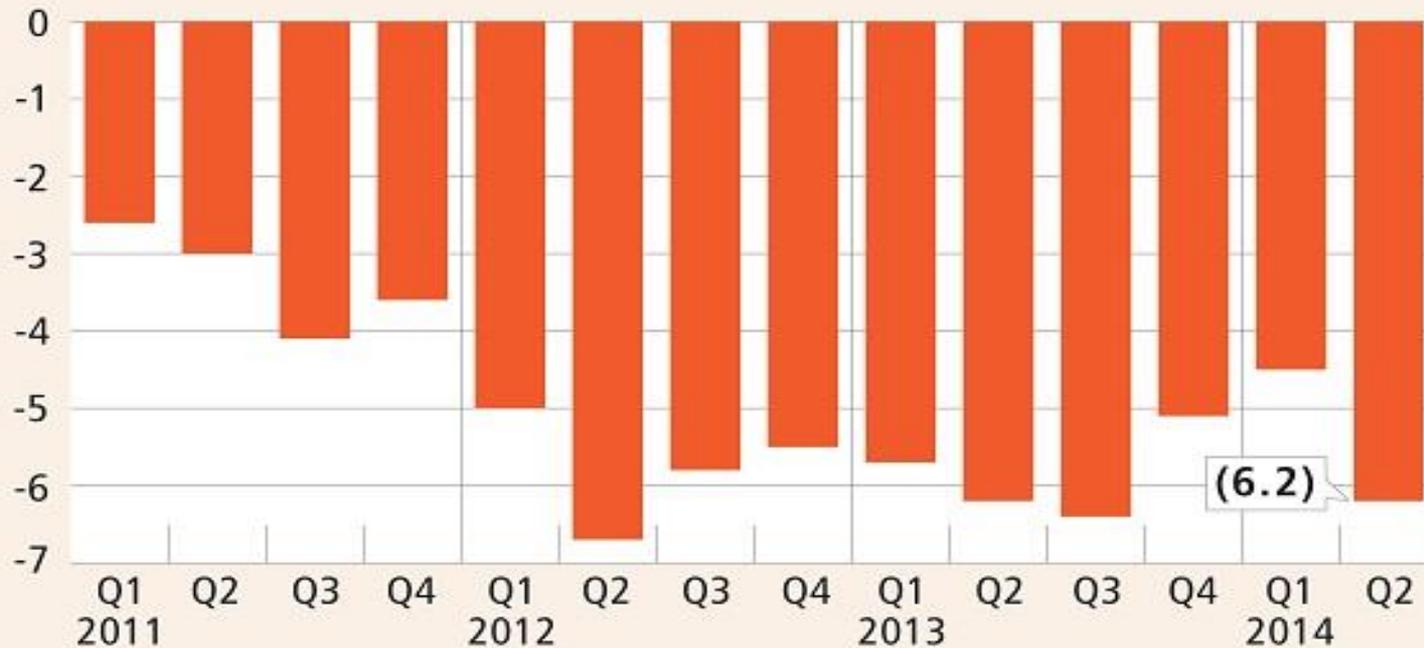
Sectoral interventions (Mining; manufacturing; forestry; etc.)

Projects funded at OTTs

Current Account Deficit

BALANCE ON CURRENT ACCOUNT

As a percentage of GDP



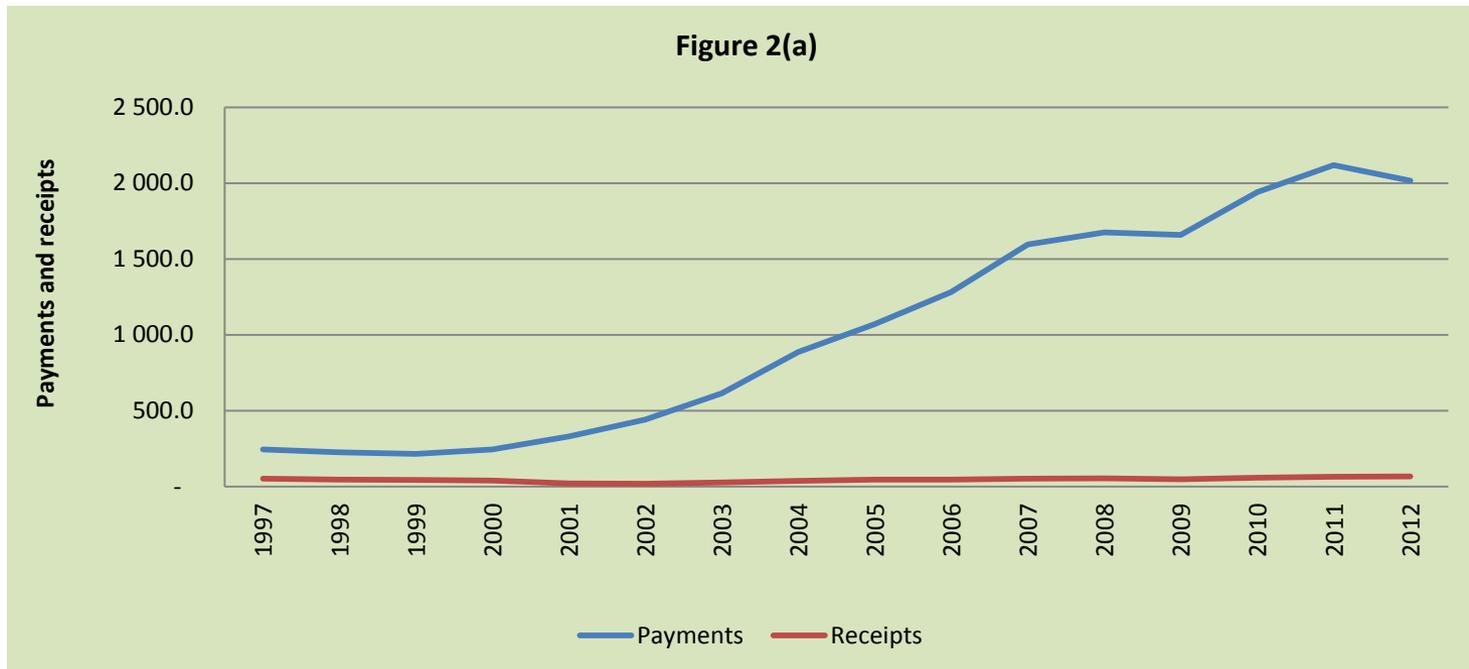
Source: RESERVE BANK



Disembodied and Embodied Technologies

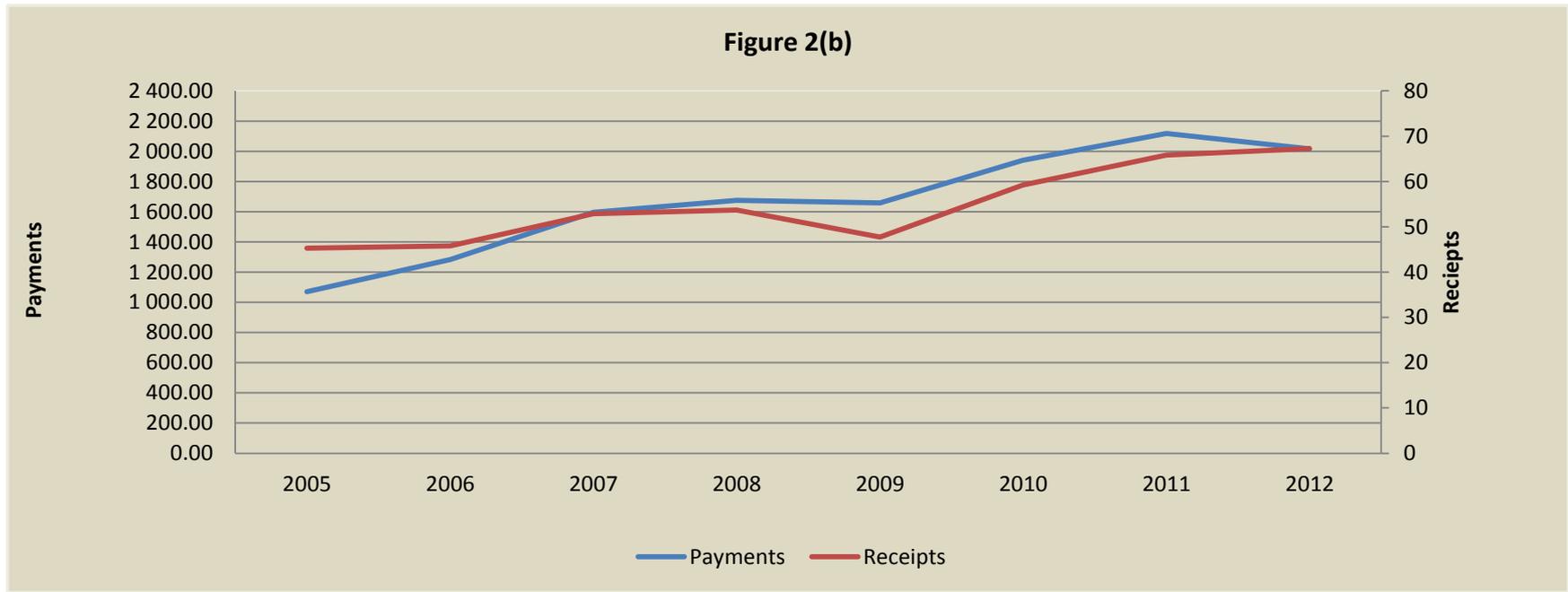
- **Disembodied technologies** : TBP (royalties and licensee fees):
 - TBP balance as % of total current account balance stood at 9.7% (2012);
 - As % of GDP moved from 0.3 % in 2003 to 0.5% in 2012.
- **Embodied technologies**:
 - High-technology manufacturing imports and exports
 - Stood at 3.4 % of GDP in 2011.

SA Technology Balance of Payments



- SA is a net importer of technology;
- The gap between imports and exports has been increasing;
- Points to increasing local demand for technology.

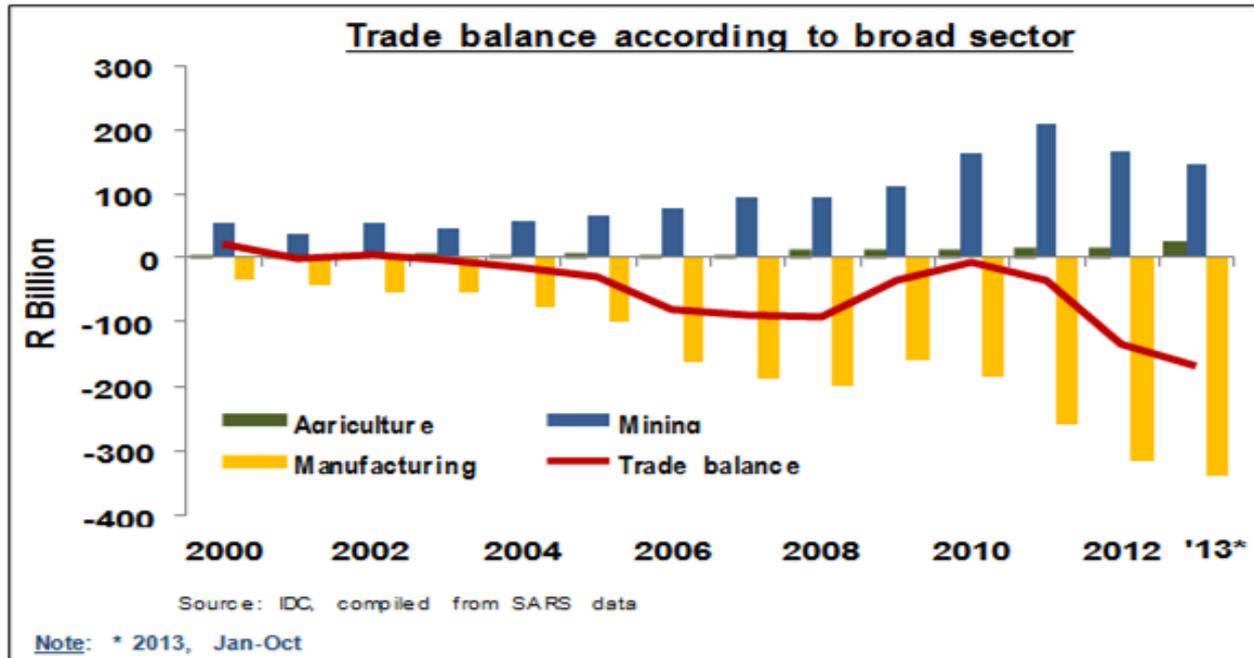
Rising SA technology exports



- SA technology exports have been increasing;
- Points to growing capacity in the knowledge sectors of the SA economy;
- Hence there is potential to boost SA exports and support local industry with locally grown technologies.

Manufacturing Trade Deficit

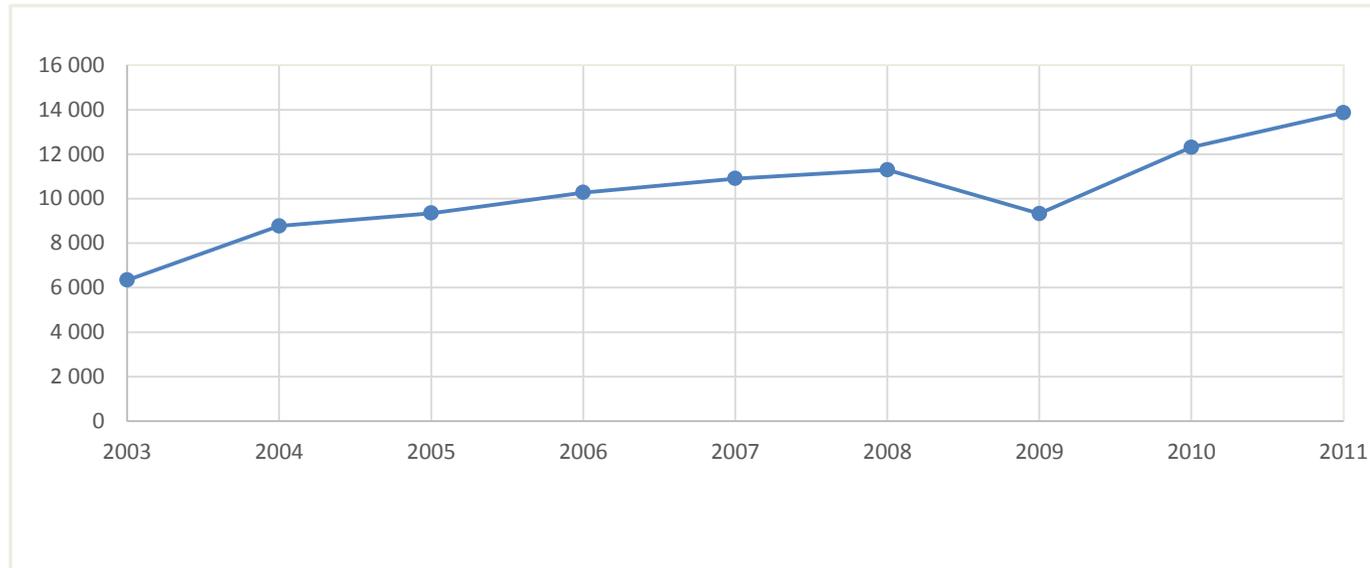
Figure 14: Trade balance by sector



Source: IDC compiled from SARS data

- SA's growing trade deficit in the manufacturing sector is a structural concern for the economy.

SA High-Technology Manufacturing Trade Deficit Trend (Million Current USD)



Rate of trade deficit growth differs depending on the industry:

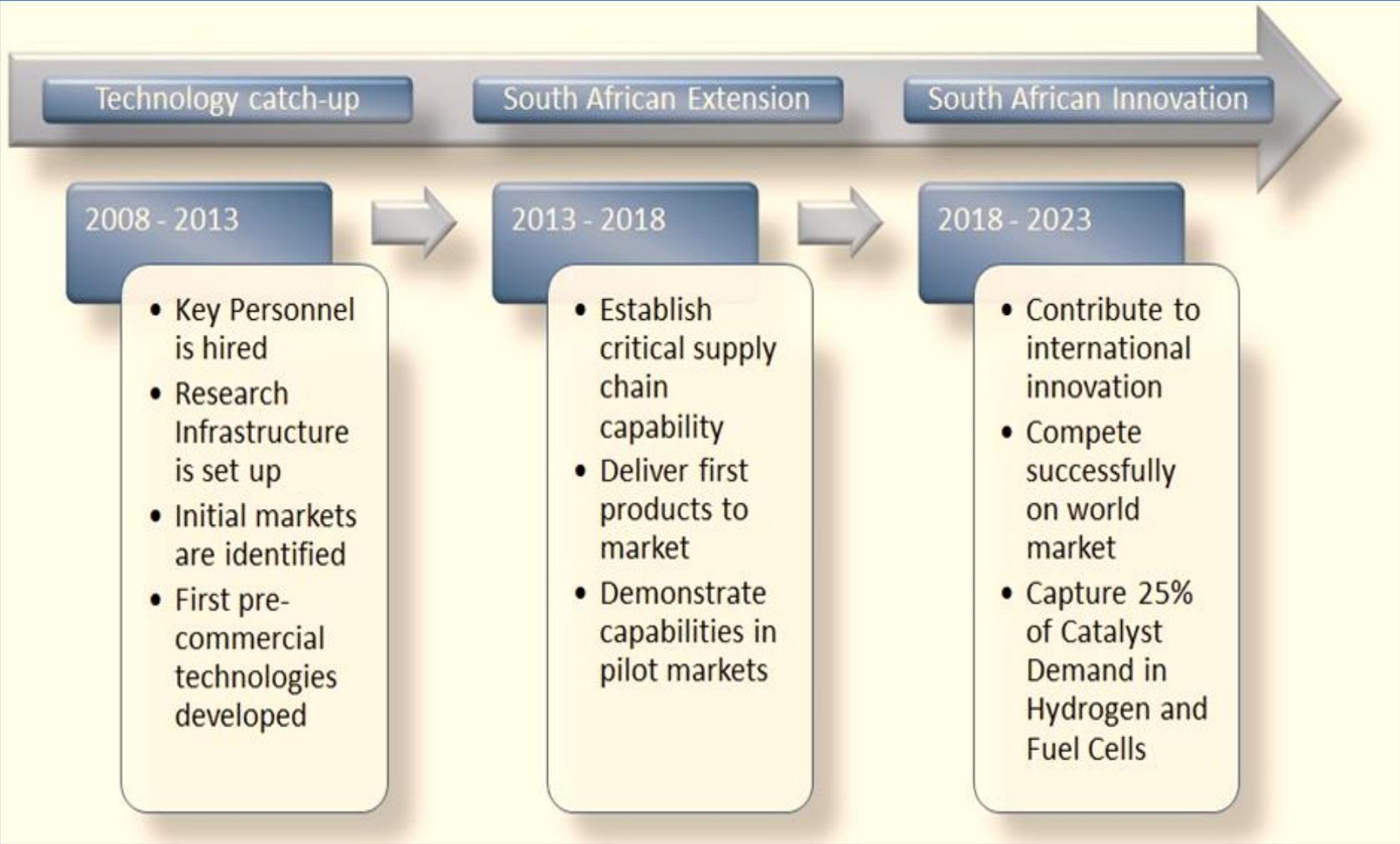
- Electronics sector 14.5% per year
- Pharmaceuticals 12.7% per year
- Scientific instruments 11.0% per year
- Office, accounting and computing machinery 10.7% per year
- Aerospace 3.5% per year

Current Account Deficit

Current Account Deficit	Indicators
Agriculture; Current Account deficit	Bioeconomy, GDP ▲ ⁺ , CCA Animal cluster (TIA) ▲ ⁺ GDP
Aerospace	UAS, GDP ▲ ⁺
Manufacturing	Biocomposites ▲ ⁺ GDP AMTS, SIF, Nanotechnology Centers
Electronics sector office equipment, accounting and computing machinery	Bioeconomy (Industry) ▲ ⁺ (CAD), GDP ICT Roadmap;
Pharmaceutical	▲ ⁺ CAD, GDP • SHIP • Bioeconomy (Health)







1. Catalyst Market

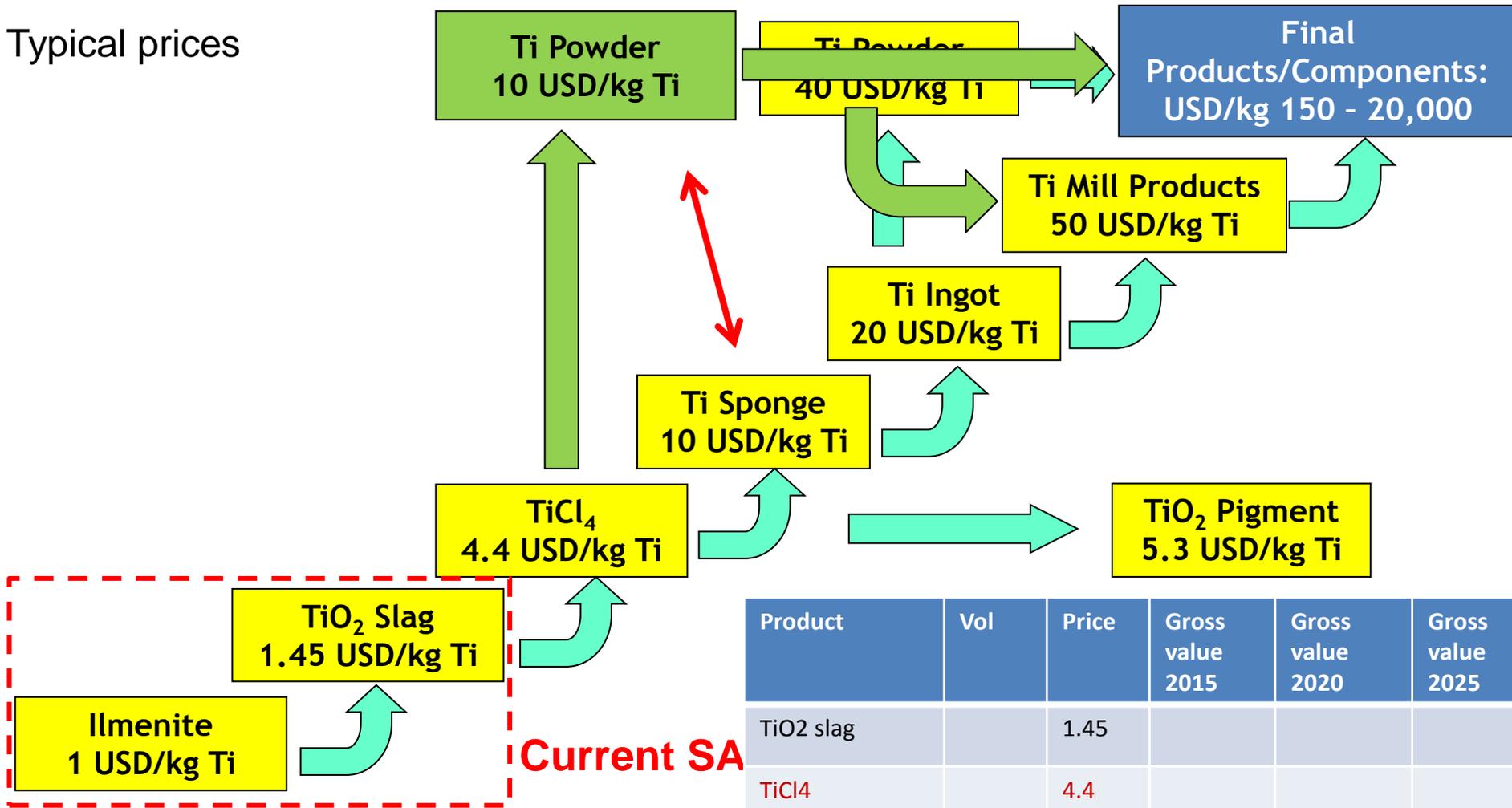
		CAGR	2012	2016	2020
Catalyst & Ink Market*	\$m/yr	28%	77	207	555
DST 25% Target	\$m/yr	28%	19	52	139
DST 25% Target	kg Pt/yr	28%	284	763	2 047
Global PEMFC Market*	\$m/yr	21.6%	468	1 023	2 237

- 2. Membrane Electrode Assembly (MEA):** Current costs are at ZAR1500/MEA
Assuming we produce 1000 000 MEA units per year sold at ZAR1200/MEA would result in Revenue of ZAR1.2 billion/yr.
- 3. Metal Hydride (MH) hydrogen storage material:** Current costs are at ZAR1400/kg
Assuming we produce 1000 kg of MH per year sold at ZAR1 200/kg would result in Revenue of ZAR1.2 mil/yr.
- 4. Combined Heat and Power (CHP) Units:** Current costs are at \$30 000/kW
Assuming we produce 1000 x 1kW units per year sold at \$15 000/kW would result in Revenue of \$15 mil/yr.



Cheaper Titanium Powder – Changing the Industry

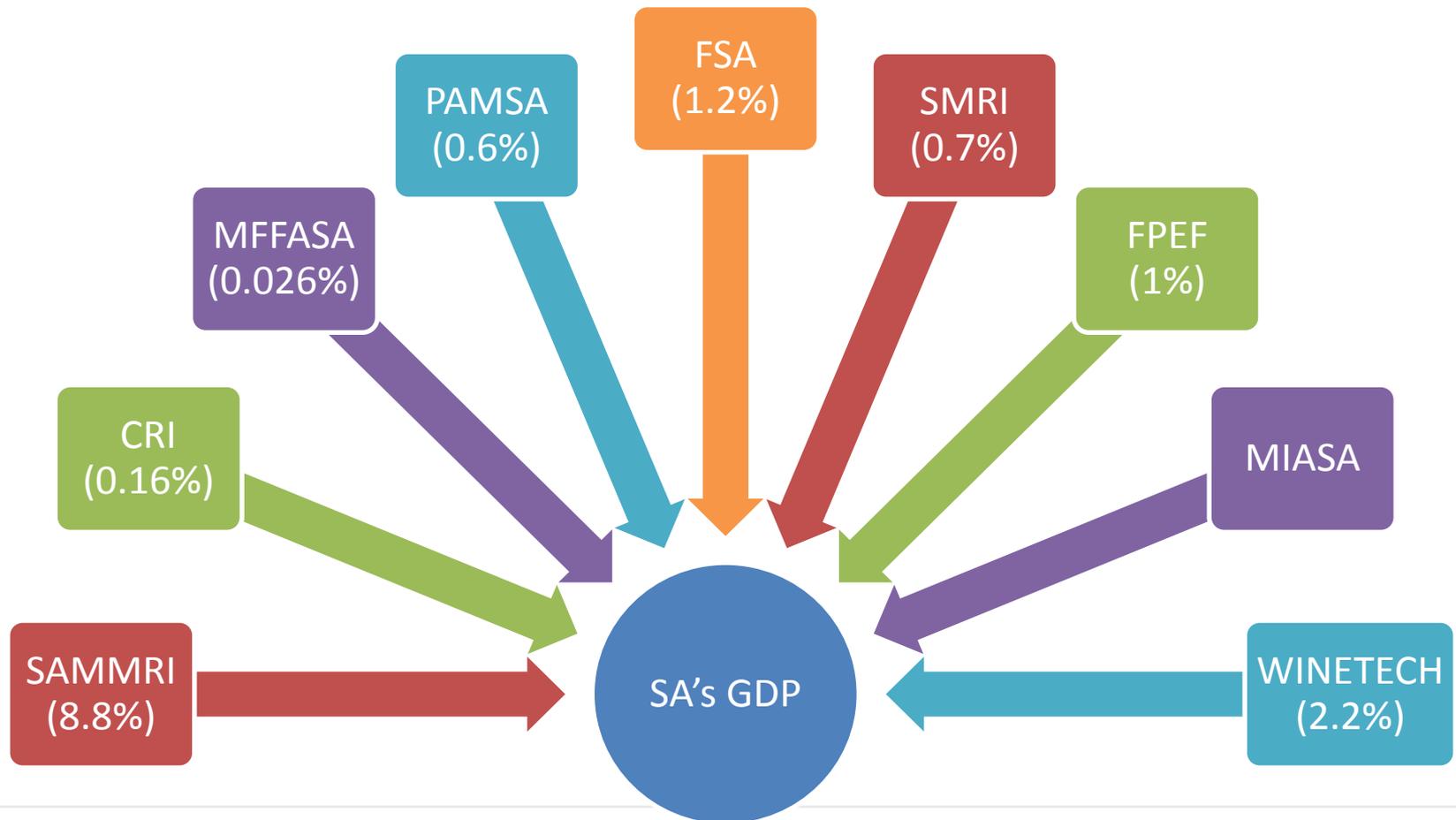
Typical prices



Product	Vol	Price	Gross value 2015	Gross value 2020	Gross value 2025
TiO2 slag		1.45			
TiCl4		4.4			
TiO2 pigment		5.3			
Ti powder		10			

Sector's Contribution To GDP

- 9 SIFs established by end 2014/15





Improvement on GDP Resulting from SIF R&D Intervention

- Sectors supported by SIF constitute $\pm 15\%$ of GDP

Primary Sectors	Secondary Sectors	% GDP
	SAMMRI	8.8
CRI		0.16
MFFASA		0.026
FSA		1.2
	PAMSA	0.6
	SMRI	0.7
	FPEF – PHI	1
	MIASA	-
	WINETECH	2.2
	TOTAL	14.69



Improving Technological Capability of Local Firms

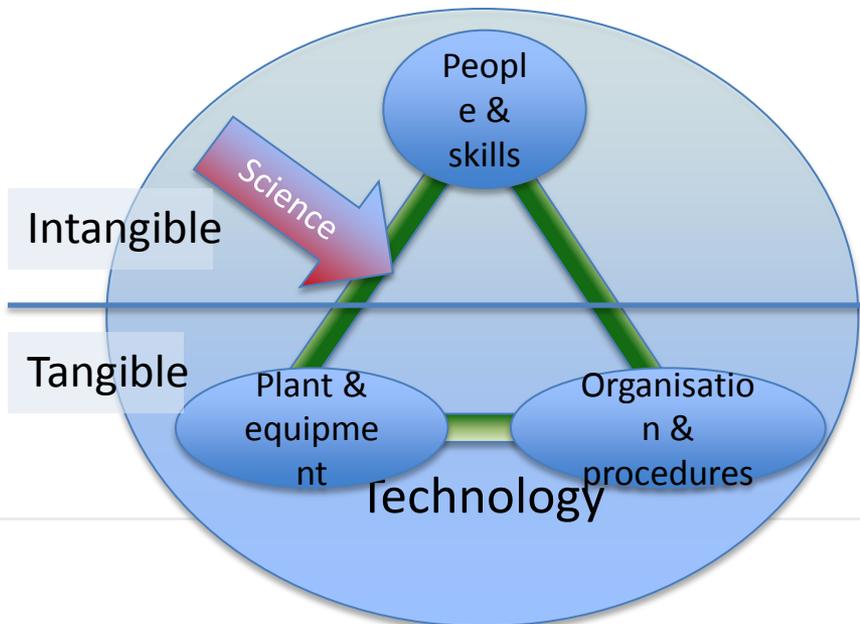
Technology Localisation Programme (TLP) Goal:

- Improve the technological capability of local firms leading to
 - Increased competitiveness (quality, cost, customisation)
 - Expanded capability (new products, services)
 - Expanded market (local and global)

- South African industry is in need of technology renewal

Catch-up – valves, foundries
Retain and improve competitiveness, reclaim & market share

- Continued technology development
Maintain and expand indigenous knowledge base
Create and sustain skills pipeline



TLP Focus Areas

Provincial Footprint

OEM

SECTOR SUB-
SECTOR
INTERVENTIONS

PUBLIC PROCUREMENT /
INFRASTRUCTURE PROGRAMMES

Industrial Transformation and SME development

Benchmarking

Aerospace & Defence

Foundries

Energy

Transport

Designated areas

science /
Strategic
Integrated
Projects

Coal based
Power
Generation

Rolling stock

Solar-Water
Heaters

Meerkat

Port
equipment

Nuclear
Power
Generation

Renewable
Energy

Oil & Gas



Comprehensive Approach to Technology Localisation

Implementation:
Technology Localisation Implementation Unit (TLIU), hosted by the CSIR

Technology Assistance Packages (TAPs)

Technology Development Support Packages

Profiling and Benchmarking database

Firm Level TAP

Industry / sub-sector TAP

Technology Development Grants

Other supplier dev

Human Capital Development - Internships Programme

Technology Stations (Ring fenced funding to TIA)

Highlights of Overall Impact of TAPs

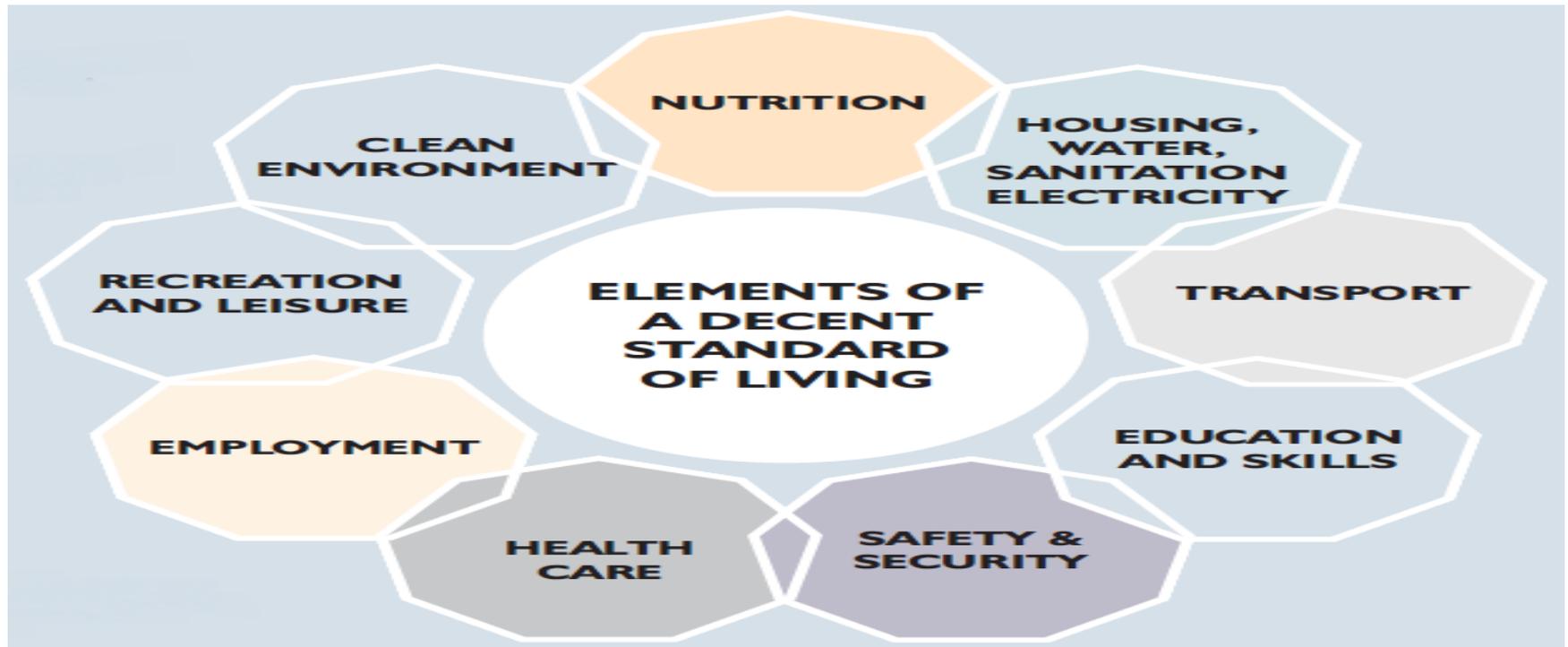
Description	Quantity
Projects where IP was created	6
Jobs created	136
Tier upgrade of supplier	20
Export capability achieved	15
Import substitution achieved	13
Productivity improvement achieved at company	28
Scrap reduction achieved at company	25
Companies where SOC work has been gained	20
Companies where SOC work was retained/strengthened	10



□ To accelerate inclusive development through scientific knowledge, evidence and appropriate technology.

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Elements of Standard of Living





Improvement in development indicators equal or greater than peers

Impact

Standard of living of [xxx] individuals improved through DST-funded S&T interventions

[xxx] communities benefiting from DST-funded S&T interventions

Capacity of [xxxx] agencies improved to effectively use S&T to improve standard of living

Outcome

Increased in evidence-based reports on development

of users of DST-funded decision support systems

of high-impact catalytic innovation projects

Increase in the use of data for policy and practice

Outputs

Increased generation of knowledge on development generation (Research Chairs, Centres of Excellence, HSRC, CSIR, international research)

Demonstration Projects (sanitation, e-education, human settlements, e-agriculture)

Generation of Data and modelling (including longitudinal studies)

Capacity building on technology and innovation management

Development and adaptation of promising technologies

NSI initiatives informed by DST strategies

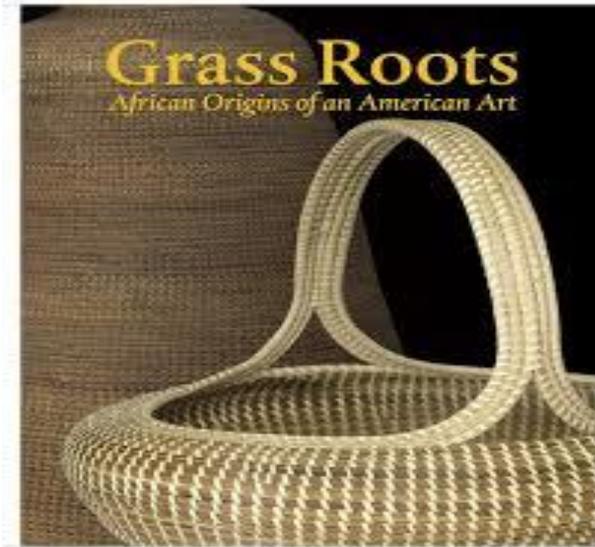


Improved Standard of Living

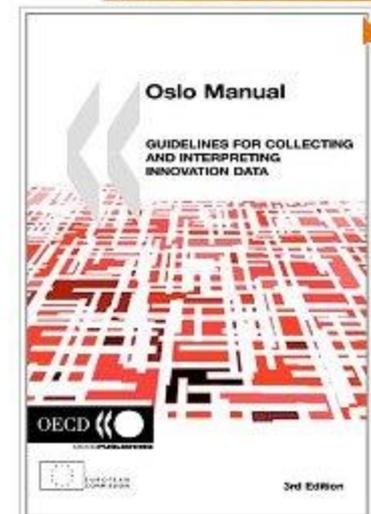


Figure 7
A map of the Alimond Housing Scheme (Western Cape, South Africa). The houses selected for sampling (throughout the study are indicated by black circles. Green circles indicate the houses that were replaced with alternative, new houses and circles that were sampled from the J-Mand 6P sampling sessions.

**“BREAKING
NEW GROUND”**



Click to **LOOK INSIDE!**

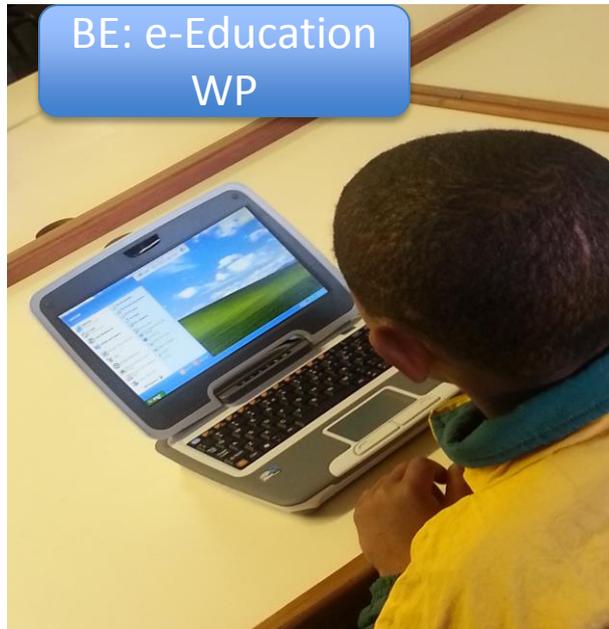


Decision support for improved service delivery: outputs and outcomes

DRDLR, DHS, COGTA:
Spatial planning
policy

stepSA

SPATIAL TEMPORAL EVIDENCE FOR PLANNING SOUTH AFRICA



Anthropometric Measurement

DoH and DBE: school
health policy

Anthropometry refers to the measurements of the child's body.
The next slide illustrates the different body shapes.
Which image resembles the build of the patient/learner?

The online Compendium
Sanitation Systems and

DWS &
Municipalities

Sanitation Technologies

U - User Interface

- Dry Toilet
- Urinal
- Pour Flush Toilet
- Cistern Flush Toilet
- Urine-Diverting Dry Toilet (UDDT)
- Urine-Diverting Flush Toilet (UDFT)

S - Collection and Storage / Treatment

- Urine Storage Tank / Composter
- Single Pit
- Single Ventilated Improved Pit (VIP)
- Double Ventilated Improved Pit (VIP)
- Fossa Alterna
- Twin Pits for Pour Flush
- Dehydration Vaults
- Composting Chamber
- Septic Tank
- Anaerobic Buffered Reactor (ABR)
- Anaerobic Filter
- Biogas Reactor

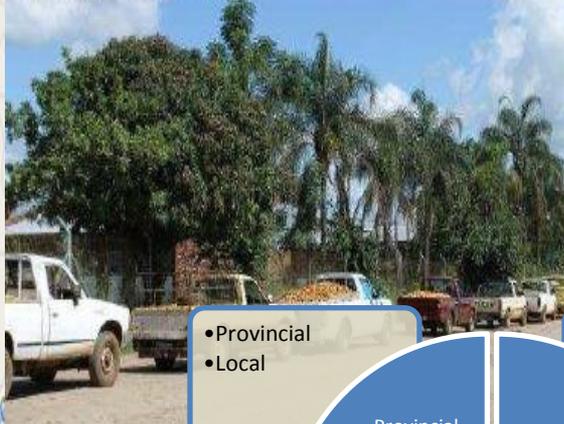
Decision support
intended to improve
planning and
implementation of
services

DAFF: extension
recovery

ILED: next five years (isolated projects to systemic interventions)



2. MANGO SUPPLIERS

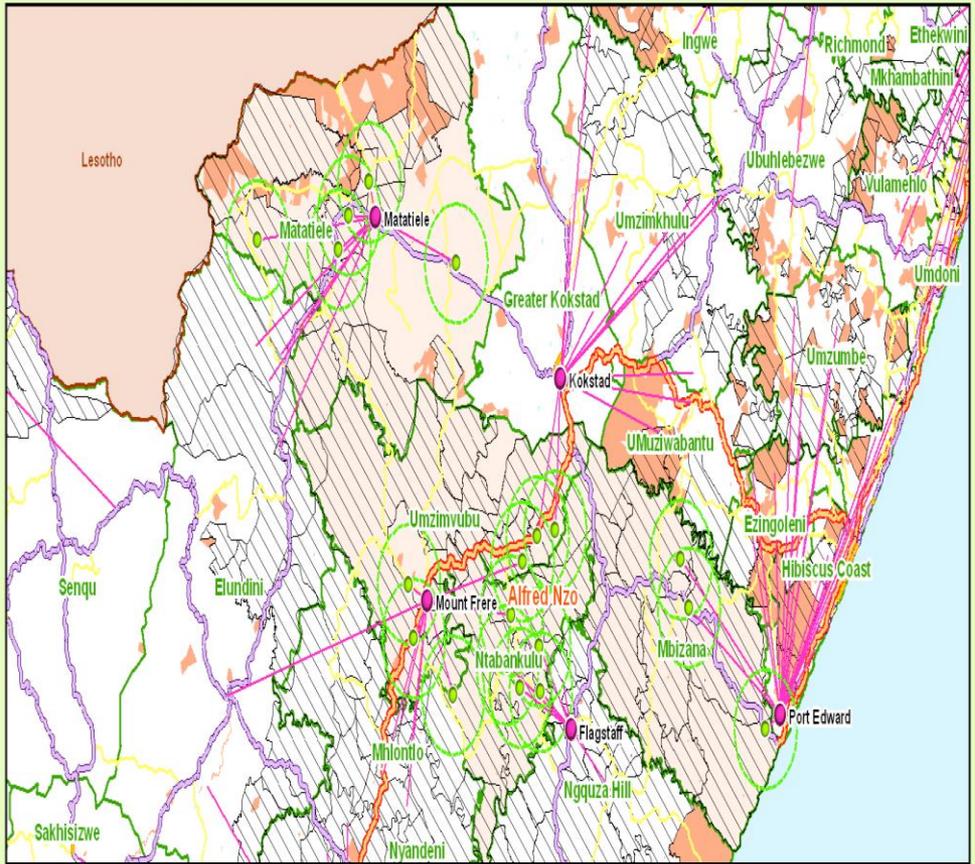


- Provincial
- Local

- Universities
- Research institutions

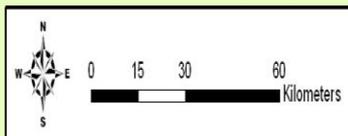


Alfred Nzo District : Rural Economic Transformation Model

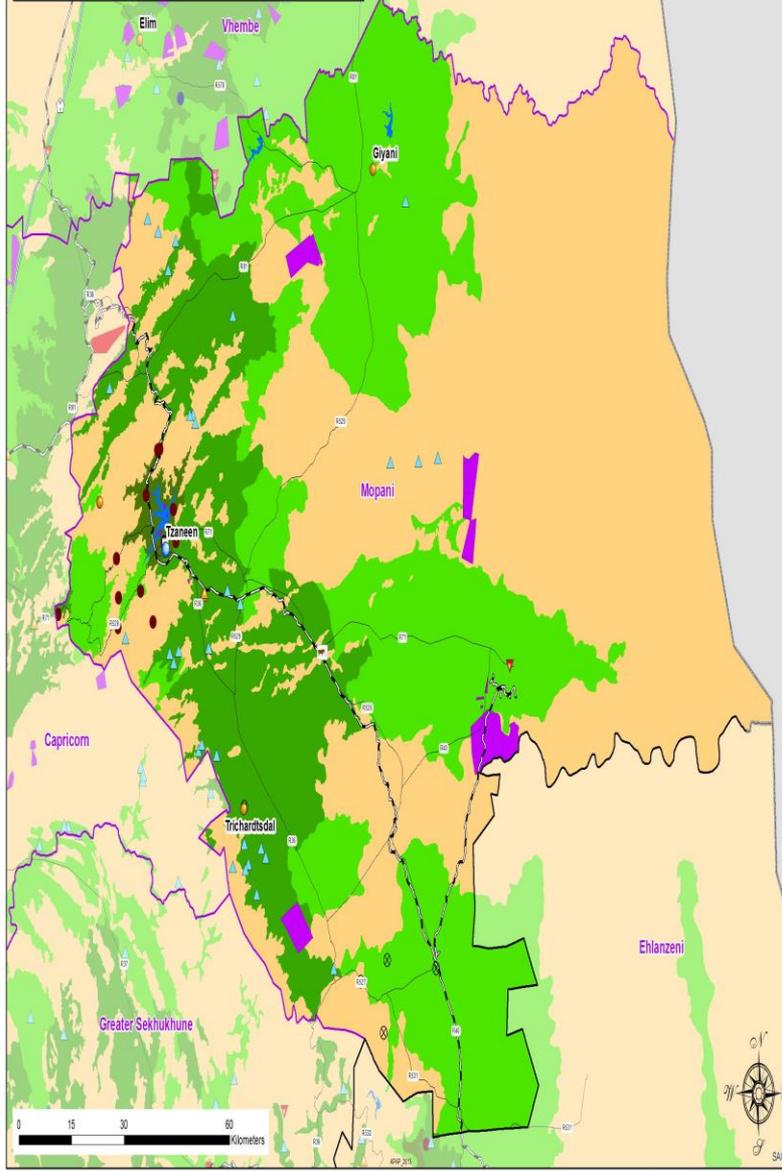


Legend

Agri-Village/Park Locations	Roads	Traditional Authorities
District Agro-Processing Facilities	CATEGORY	Local Municipalities
Regional Gateways	ARTERIAL	State Land
10Km Agri Village/Park Zones	HIGHWAY	28 Priority Districts
District Settlement Connections	MAIN ROADS	
	SECONDARY	



Mopani District Municipality



rural development & land reform
 Department: Rural Development and Land Reform
 REPUBLIC OF SOUTH AFRICA

- AgriParks (Regional)
- AgriParks (District)
- AgriParks (Local)
- Cooperatives
- Feedlots
- SAGIS Agbiz
- SAGIS Processors
- Abattoirs
- Smallholder Irrigation Schemes
- Fresh Produce Markets
- Wine Cellars
- Sawnmills
- Mills
- Ginners
- Silos
- International Boundaries
- Provincial Boundaries
- District Municipalities
- Vacant State Land
- I. High potential arable land
- II. Moderate potential arable land
- III. Marginal potential arable land
- V, VI, VII, VIII. Non-arable
- Water

0 15 30 60 Kilometers

SAGIS

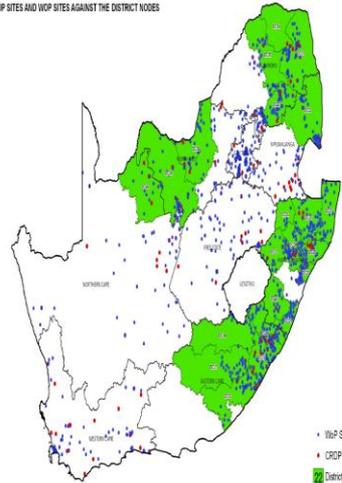
ILED: Aquaculture and Essential Oils



NC - HONDEKLIPBAAI - FACILITIES - LAND CAGES - ANIMALS - ABALONE

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CRDP SITES AND WWP SITES AGAINST THE DISTRICT NODES

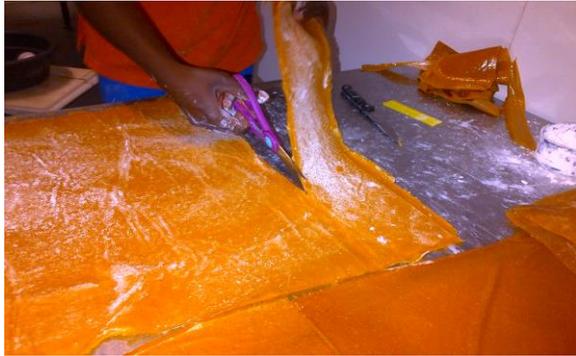


GP - PICO GRO - FACILITIES - NURSERY TUNNEL - PLANTS

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Agroprocessing





The valued derived from Sumbandila Satellite Programme

SumbandilaSat, an Earth observation microsatellite, was launched in 2009, at a cost of about R63 million.

It represented South Africa's re-entry into an active space programme. It was primarily a technology demonstrator satellite, which carried a number of experimental payloads from the research community.

The direct value or quantifiable portion of the return on investment for the Sumbandila programme indicated financial savings and gains amounting to about R136,4 million through the following:

- developing the satellite locally (saved at least R44,6 million).
- gains through the postgraduate degrees obtained (estimated as being worth R45 million).
- acquiring imagery from SumbandilaSat instead of purchasing images from other countries (R35,6 million).
- job creation and earnings of suppliers (R11,4 million).





Selected APP performance indicators and targets (MTEF)



Selected performance indicators and targets (1)

Performance indicator	MTEF targets
Percentage alignment of DST planning documents (Strategic plan, APP and ENE)	Minimum of 90% alignment across DST planning documents by 31 March 2018
Number of DST public entities' annual reports submitted to Parliament	24 DST public entities' annual reports submitted to Parliament by 31 March 2018



Selected performance indicators and targets (3)

Performance indicator	MTEF targets
Number of disclosures received from publicly-funded institutions	900 disclosures received from publicly-funded institutions by 31 March 2018
Number of policy directives developed and adopted by government	10 policy directives developed and adopted by government by 31 March 2018
Number of knowledge products (patents and publications in space science, energy and bioeconomy) generated	377 knowledge products (patents and publications in space science, energy and bioeconomy) generated by 31 March 2018



Selected performance indicators and targets (4)

Performance indicator	MTEF targets
Number of trainees supported (through bursaries, internships, high-end-skills development initiatives, conferences and workshops) in strategic and emerging research areas	600 trainees supported in strategic and emerging research areas by 31 March 2018
Number of new technology products, processes and/or services commercialised	11 new technology products, processes and/or services commercialised by 31 March 2018



Selected performance indicators and targets (4)

Performance indicator	MTEF targets
Number of trainees supported (through bursaries, internships, high-end-skills development initiatives, conferences and workshops) in strategic and emerging research areas	600 trainees supported in strategic and emerging research areas by 31 March 2018
Number of new technology products, processes and/or services commercialised	11 new technology products, processes and/or services commercialised by 31 March 2018



Selected performance indicators and targets (5)

Performance indicator	MTEF targets
Amount of international funds directly invested in research, innovation and STI HCD programmes in South Africa	R2 billion of international funds directly invested in research, innovation and STI HCD programmes in South Africa by 31 March 2019
Number of leadership positions occupied by South Africa in international STI governance structures	15 leadership positions occupied by South Africa in international STI governance structures by 31 March 2019



Selected performance indicators and targets (6)

Performance indicator	MTEF targets
Number of South African students accepted into international training programmes offering a postgraduate qualification	550 of South African students accepted into international training programmes offering a postgraduate qualification by 31 March 2018
Number of approved AU or SADC STI initiatives endorsed at AU or SADC ministerial level supported (financially or in-kind)	30 approved AU or SADC STI initiatives endorsed at AU or SADC ministerial level supported (financially or in-kind) by 31 March 2018 ₆₇



Selected performance indicators and targets (7)

Performance indicator	MTEF targets
Number of research, innovation and STI HCD cooperation projects co-funded or supported in-kind by DST and other African partners	100 research, innovation and STI HCD cooperation projects co-funded or supported in-kind by DST and other African partners by 31 March 2018
Total number of graduates and students placed in DST-funded work preparation programmes in SETI institutions	2 700 graduates and students placed in DST-funded work preparation programmes in SETI institutions by 31 March 2018



Selected performance indicators and targets (8)

Performance indicator	MTEF targets
Average amount of bandwidth per SANReN site per year	5 000 Mbps average bandwidth capacity available per SANReN site by 31 March 2018
Number of biennial reports on the state of climate change in South Africa approved by Cabinet	First report on the state of climate change in South Africa submitted to Cabinet for approval and process of compiling second biennial report initiated by 31 March 2018



Selected performance indicators and targets (9)

Performance indicator	MTEF targets
Number of research infrastructure grants awarded as per award letters	200 research infrastructure grants awarded as per award letters by 31 March 2018
Number of regulations on Astronomy Advantage Areas (AAAs) gazetted	3 regulations on AAAs (frequency spectrum, electronic magnetic interference and SKA procedural matters and financial compensation) gazetted by 31 March 2018



Selected performance indicators and targets (10)

Performance indicator	MTEF targets
Number of knowledge products on innovation for inclusive development published	14 knowledge products on innovation for inclusive development published by 31 March 2018
Number of reports and policy briefings on the innovation system and innovation policy approved Exco/ published	17 reports and policy briefings on the innovation system and innovation policy approved Exco/ published by 31 March 2018



Selected performance indicators and targets (11)

Performance indicator	MTEF targets
Number of instruments funded in support of increased localisation, competitiveness and R&D-led industry development	11 instruments funded in support of increased localisation, competitiveness and R&D-led industry development by 31 March 2018
Turnaround time in providing pre-approval decisions on applications for the R&D tax incentive	Pre-approval decisions provided within 90 days of date of application for the R&D tax incentive by 31 March 2018

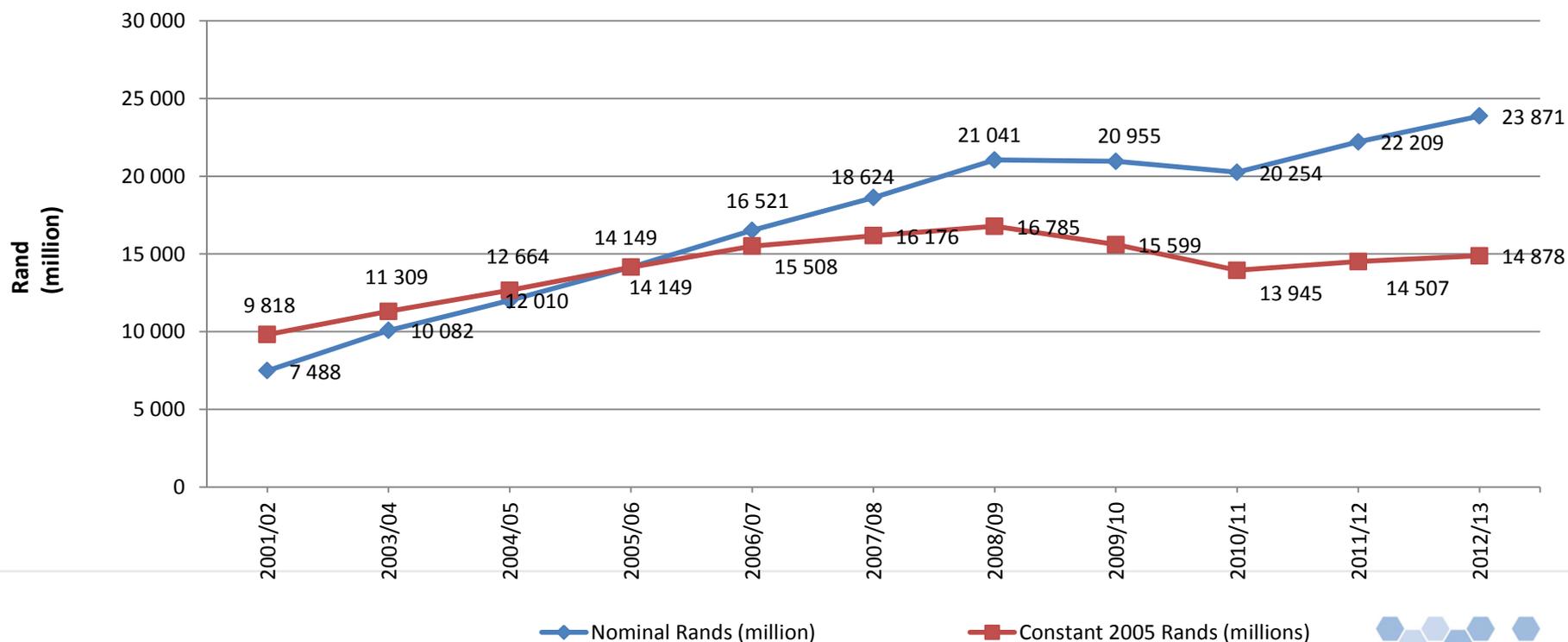


Selected performance indicators and targets (12)

Performance indicator	MTEF targets
Number of high-level research graduates (master's and doctoral) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals ,ICTs and sector innovation funds)	863 high-level research graduates (master's and doctoral) fully funded or co-funded in designated niche areas (advanced manufacturing, aerospace, chemicals, mining, advanced metals ,ICTs and sector innovation funds) by 31 March 2018

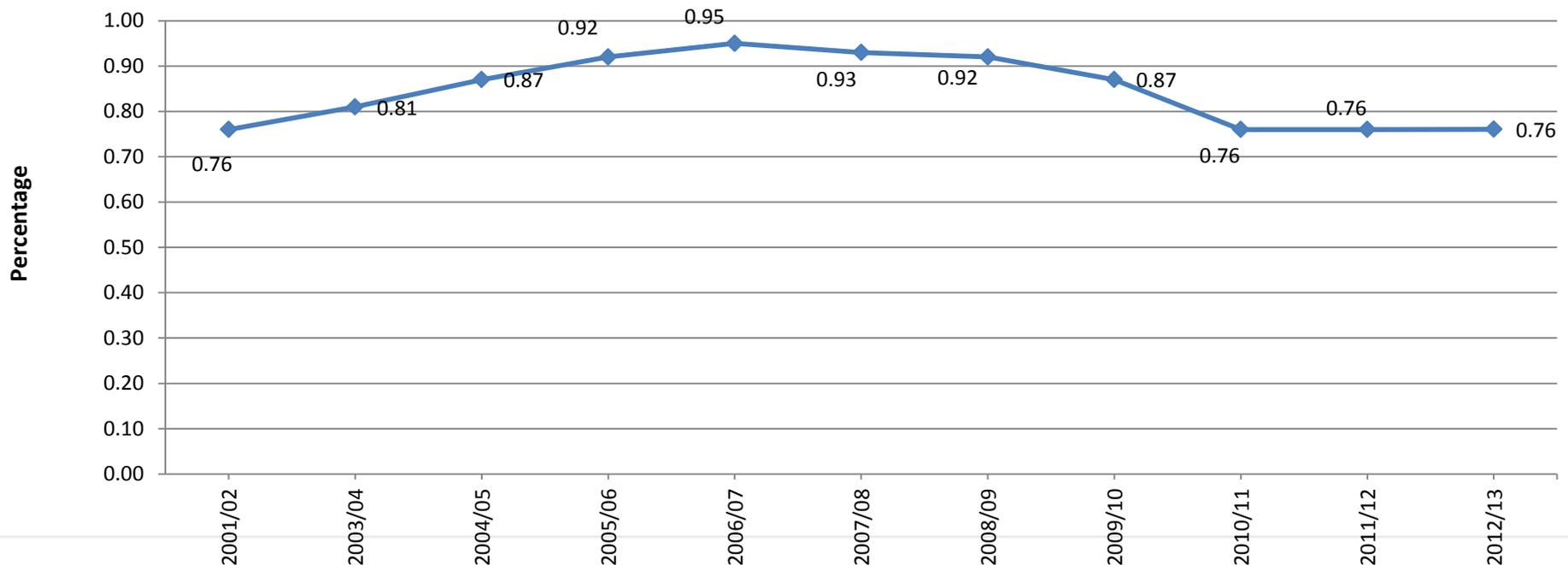
Gross Expenditure on Research and Development (GERD) in current and constant 2005 Rand values

GERD	Comment
R23.871 billion	<ul style="list-style-type: none"> The 2012/13 survey registered an increase of R1.662 billion or 9.7% from R22.209 billion reported in 2011/12. The GERD has increased from 2011/12 to 2012/13 in both nominal and real terms, after the decrease in 2008/09 to 2010/11.



GERD as a % of GDP

GERD/GDP	Comment
0.76 %	<ul style="list-style-type: none">•In the three consecutive years, 2010/11 to 2012/13, GERD/GDP remained constant at 0.76%.•At constant 2005 prices, GERD growth rate was at 2.6% from 2011/12, which is almost the same as GDP at 2.5% in 2012



DST MTEF Budget Estimates

R' thousand	2015/16	2016/17	2017/18
Programmes			
Administration	299 776	304 136	320 816
Technology Innovation	1 008 817	1 011 636	1 044 314
International Cooperation and Resources	121 997	123 874	130 779
Research Development and Support	4 247 066	4 265 269	4 448 474
Socio-Economic Innovation Partnerships	1 804 464	1 857 270	1 664 259
Total	7 482 120	7 562 185	7 608 642



Conclusion

- Need to build, grow and strengthen a National System of Innovation that is efficient, productive and beginning to be responsive to national priorities.
- Need to engage public entities and university to orient them on our approach to intended outcomes.
- Enhance efforts at transformation and the building of a strong academy.
- Institutional plans to accommodate and support young researchers.



Conclusion (2)

- Deepen implementation from lesson's learnt in the past:
 - ✓ Moving pilots to semi pilots and full plants
 - ✓ Support government in areas requiring technology solutions
- Communicate more strategically.
- Develop and enhance planning, analytical and evaluation capability.



Thank you





Appendix: STI Impact Case Studies



4 types of STI contributions/impacts

- Economic growth and competitiveness;
- Improved social development/quality of life/standard of living;
- Cost savings by government departments through the use of STI decision support;
- Enhanced government decision-making informed by STI policy.

Bio-economy

Target: 5% GDP attributed to bio-economy by 2050
(~ R175 billion in today's terms).



- R2 billion invested by BRICs / TIA into biotech innovation (2003-10).
- By 2014, the top 7 biotech companies had a combined annual turnover of nearly R1 billion (from a direct investment of R63million).
- Taxes, jobs, wealth creation, export earnings, improved QoL.



Sterile False Codling Moth

R10 million invested



- Sterile male moth released and dramatically reduces FCM population;
- Approximately 15tonnes/ha additional fruit due to XSIT, equating to R40 000/ha;
- Currently 13 000 hectares under SIT equating to R520 million additional income;
- If expanded to 64 000 ha under citrus, this equates to an additional income of R1.9billion;
- 75% of all export markets have zero tolerance to FCM.



Powertech Transformers

- The TLIU assisted Powertech Transformers (PTT) with the development of a Finite Element Model (FEM).
- The FEM was used to determine the short circuit integrity in transformer windings caused by lightning.
- This project was done in collaboration with the University of Pretoria and a variety of international subject matter experts.



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Powertech Transformers (cont.)

- This project has resulted in the development of local design capability for transformer windings.
- This project has assisted PTT to retain and gain orders with Eskom as well as gain orders into Nigeria.



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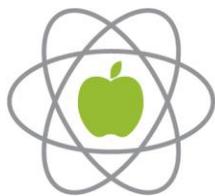
Sector Innovation Funds

- Economic Competitiveness funding enabled DST to broaden the SIF's;
- Initiated an open competitive process in 2013-resulted in nine successful applications (including PHI and SAMMRI). Establishment of the nine SIF's at various stages
- The SIF is co-designed and managed with industry but industry takes the lead in determining priorities and criteria for selecting projects to be funded
- Negotiated a detailed and mutually beneficial performance and delivery framework. A key contractual requirement is increased funding from the private sector into the partnership but also more investment in R&D in general



Sector Innovation Funds

- Build on two successful partnerships:
 - Post-Harvest Innovation programme initiated in 2007. Second 3-year phase ending in March 2015;
 - South African Metals and Minerals Research Initiative (SAMMRI) – initiated in 2009, first DST funding support in 2011.
- Ministerial Review Committee report recommends the establishment of co-operatively managed sector funds.



POST-HARVEST
INNOVATION PROGRAMME

a public-private partnership between



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fpéf
SOUTH AFRICA
Fresh Produce Exporters' Forum

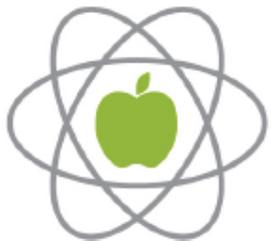


Highlights

POST HARVEST INNOVATION PROGRAMME:

- **2006:** Study commissioned by the Department of Science and Technology into Post-Harvest and Cold Chain Technologies in the SA Fresh Fruit Industry;
- **2007:** The First phase of PHI programme was launched with a Programme Management Unit driving the Programme;

R30m



POST-HARVEST
INNOVATION PROGRAMME

a public-private partnership between



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Fresh Produce Exporters' Forum
SOUTH AFRICA

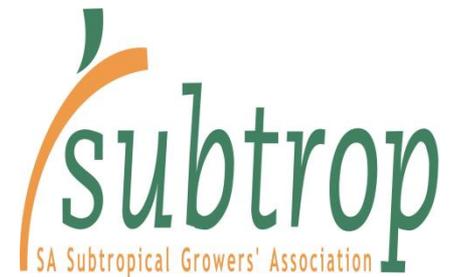




FRUIT SA



HORTGRO SERVICES
DIENSTE
SUPPORTING THE HORTICULTURAL INDUSTRY





Project with Emerging Farmers

Despite numerous challenges, the project achieved the following:

- 1 farmer exported 2 containers of Granny Smith apples directly to UK (not via an export agent.)
- Another farmer exported 2 containers of fruit to the Far East.
- 4 more farmers to access formal local markets, which they now supply directly.

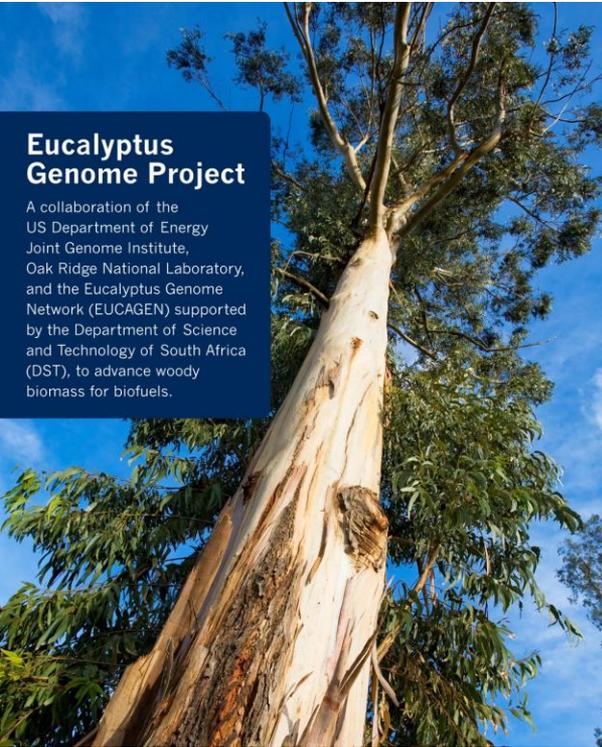


Case studies showing potential STI derived cost savings



Bio-innovation Case Studies

Eucalyptus Genome Programme (UP) R5.5+million invested



Eucalyptus Genome Project

A collaboration of the US Department of Energy Joint Genome Institute, Oak Ridge National Laboratory, and the Eucalyptus Genome Network (EUCAGEN) supported by the Department of Science and Technology of South Africa (DST), to advance woody biomass for biofuels.

- Sequenced the Eucalyptus Genome.
- Identification of genetic markers for desirable traits, which speeds-up, and allows for more accurate, breeding.
- Estimated that the benefits of Marker Assisted Breeding over conventional breeding will save R81million over 15yrs per 30 000 ha.
- Translated to the 1.2million ha total plantation in SA: equates to a potential saving of R3.4billion over 15 yrs.



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SPACE ECONOMIC BENEFITS

Quantitative (Rands and Cents, hard stats/ratios)

Qualitative (Broad, soft, social outcomes)

Economic Returns
Financial gain / Profit

Social Welfare

- GDP
- Poverty alleviation
- Employment

Externalities or extra benefits

- Attracting more/private investment
- Efficiencies

Economic Benefit

Economic Impact

Return on Investment

Cost Benefit Analysis



Space applications (1)

- **AFIS**

- In South Africa, approximately 20% of power supply disruptions are caused by fires that burn under Eskom's transmission lines causing transient faults;
- Approximately 3500 wild fires on average are detected close to ESKOM's annually;
- Electricity disruptions can thus cost the South African economy as much as R15 million an hour, in direct costs, excluding the effects to other industries who rely on the power sector;
- If the assumption is that wild fires contributes R1m of the R15m electric disruptions, and AFIS detecting 3500 fires, the savings due to this system is estimated at R3,5 billion.





Space applications (2)

- **StatsSA Building Count and Census**
 - SPOT 5 imagery has enabled Stats SA to prepare more accurate locality maps and listing maps for surveys and census field work;
 - It is estimated that if Stats SA were to use human resources to collect this data it would cost them about R300 million.





STI support to decision-making and saving of lives

Bio-innovation Case Studies

Health: Currently costing ~8.9% GDP

Generally, govt. health science investments are not likely to result in a financial return, but rather a cost reduction and improved healthcare.



- **Govt's HIV/AIDS ART programme cost R5.4 billion in 2011.**
- **An HIV vaccine, or local manufacturing of ARVs, is surely a worthwhile venture?**



Bio-innovation Case Studies

Umbiflow – Doppler ultrasound device for determining placental competence

R2million+ invested



- **Designed for Primary Health Care in remote and low-resource settings.**
- **Reduces dramatically the need for referrals to 2^o hospitals. In rural setting, a substantial patient benefit.**
- **Cost savings of 14x that at 2^o hospitals.**
- **Improved healthcare at reduced costs.**



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Bio-innovation Case Studies

mTriage – mobile app for assessing urgency of medical treatment.

R1.2+ million invested



- **Triage - currently a paper-based system that is not completed >25% of the time, and incorrectly triages up to 25% of patients.**
- **Tablet-based app that is simpler, quicker and easier to triage.**
- **Cost savings in time and forms completed, potential lives saved.**

Geospatial information for election management

