



# DST Strategic Plan 2011-2016

Presentation to the Portfolio  
Committee  
13 April 2011

*Dr Phil Mjwara  
Director General*



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

# Contents

- DST vision and strategic oriented goal outcomes
- Building a National System of Innovation – key priorities and recent outputs
- Current strategic challenges
- Medium-term priorities and initiatives
- Monitoring and Evaluation
- Current status of GERD
- Financial Resources/Budget
- Conclusion



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

# Vision and Mission

- **Vision**

- To create a prosperous society that derives enduring and equitable benefits from science and technology

- **Mission**

- To develop, coordinate and manage an emerging National System of Innovation (NSI) that will bring about maximum human capital, sustainable economic growth and improved quality of life for all

## DST strategic oriented goal outcomes (1)

- To develop the innovation capacity of the NSI that is under construction and thereby contribute to socio-economic development
- To enhance South Africa's knowledge-generation capacity in order to produce world-class research outputs and turn some advanced findings into innovation products and process.



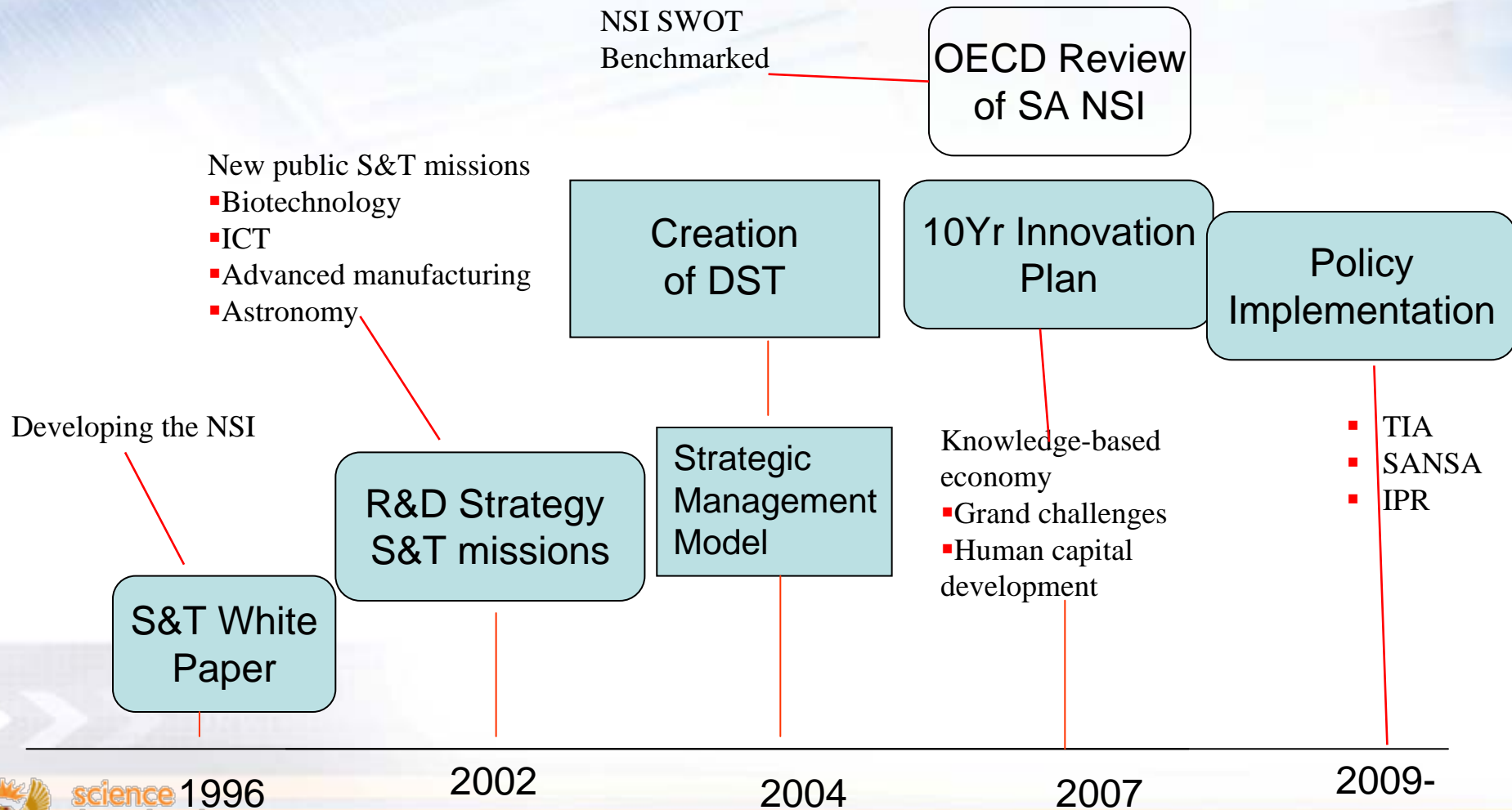
science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

## DST strategic oriented goal outcomes (2)

- To develop appropriate human capital for science, technology and innovation to meet the needs of society.
- To build and train the next generation of researchers and enable technology development and transfer as well as knowledge interchange.
- To position South Africa as a strategic international RDI partner and destination through the exchange of knowledge, capacity and resource between South Africa and its regional and other international partners, thereby strengthening the NSI.

# Strategic Overview and key STI Policy Developments



# National System of Innovation (NSI)

- The overall aim of the DST is to build an NSI as envisioned in the 1996 White Paper on Science and Technology.
- NSI can be thought of as a set of functioning institutions, organisations and policies which interact constructively in the pursuit of a common set of social and economic goals and objectives.
- Whilst a fully fledged NSI is not yet in place, important building blocks have been put in place and needs to be enhanced further

# Some building blocks for the NSI

- Institution-building
- Coordination
  - Institutions
  - Industry
  - Within government



## Some selected examples of performance of the emerging NSI

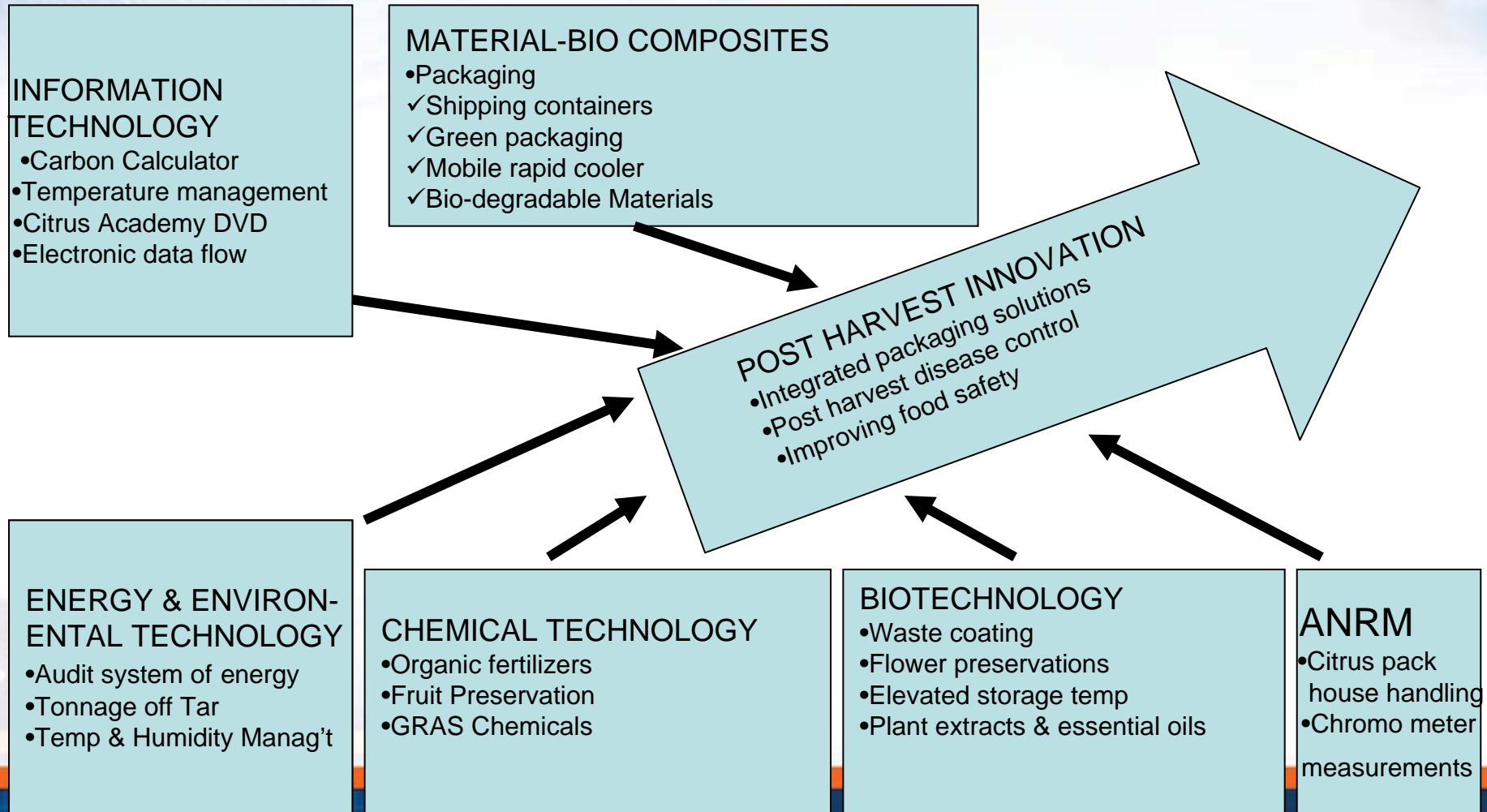
- Selected theme-based RDI (NRDS AND TYIP)
- Research Capacity Enhancement
- Human Capital Development

# Institution Building and instruments to facilitate innovation

## Recent outputs and achievements

- Technology Innovation Agency (TIA) established
- Intellectual Property Rights from Publicly Financed Research Act (IPR Act)-protection of scientific research results through the National Intellectual Property Management Office (NIPMO) in the process of being established
- Centres of Competence (CoCs)
- Research Development & Innovation to support sector competitiveness and dynamism
- Provincial innovation systems

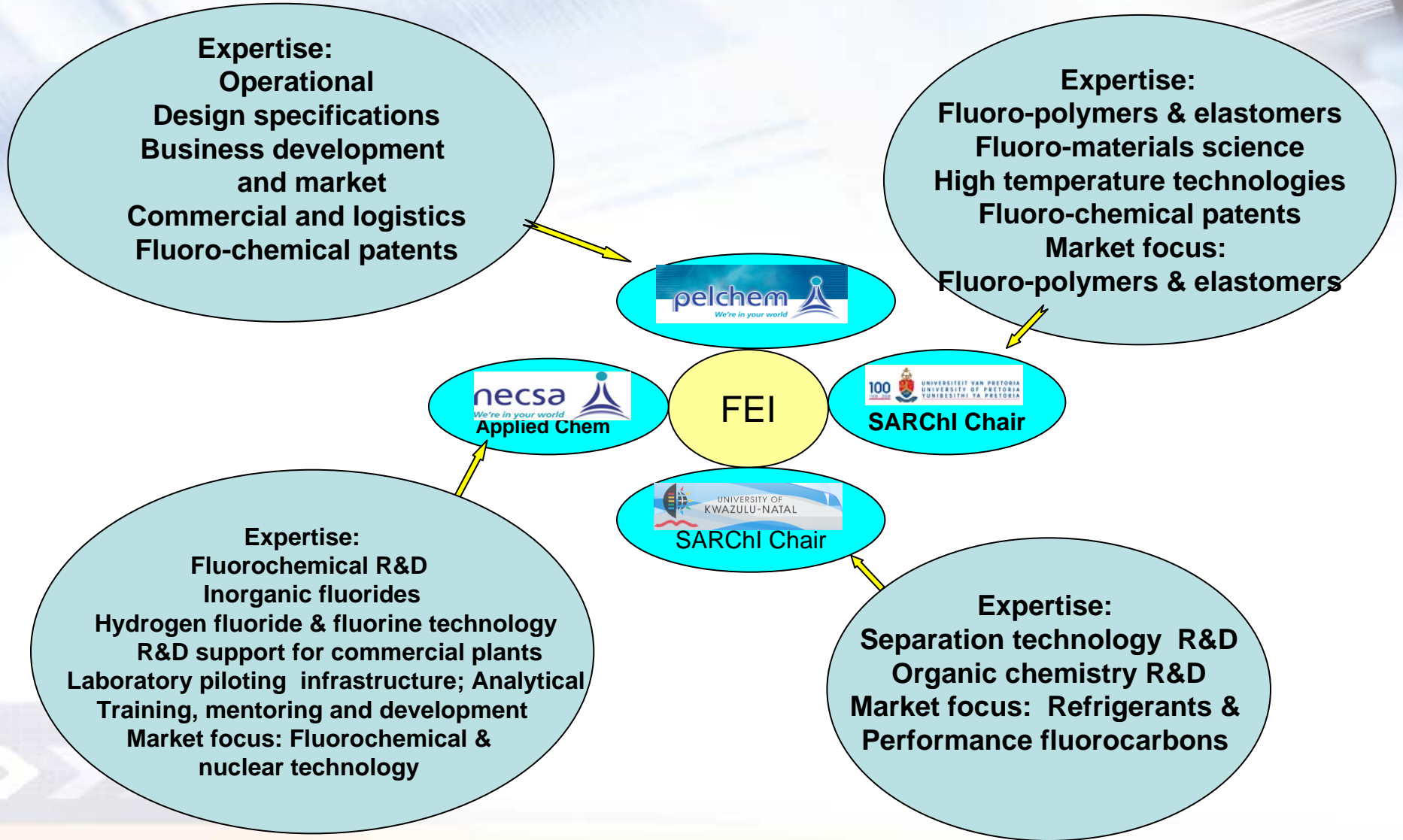
# Sector Innovation approach in South Africa – Post Harvest Beneficiation



## Examples of CoCs and Partnerships

- Fluoro-chemicals (**NECSA, Pelchem, UP, UKZN**)
- Titanium metal powder industry development \_ (**UP, UCT, UKZN, CSIR, NMU, NLC**)
- Unmanned Aerial Systems \_UAS (**CSIR, Denel, ATE, Universities**)
- Nanotechnology in Minerals beneficiation and Advanced materials (**CSIR, Mintek, SASOL**)
- HySA (**CSIR, NWU, Mintek, UCT, UWC**)

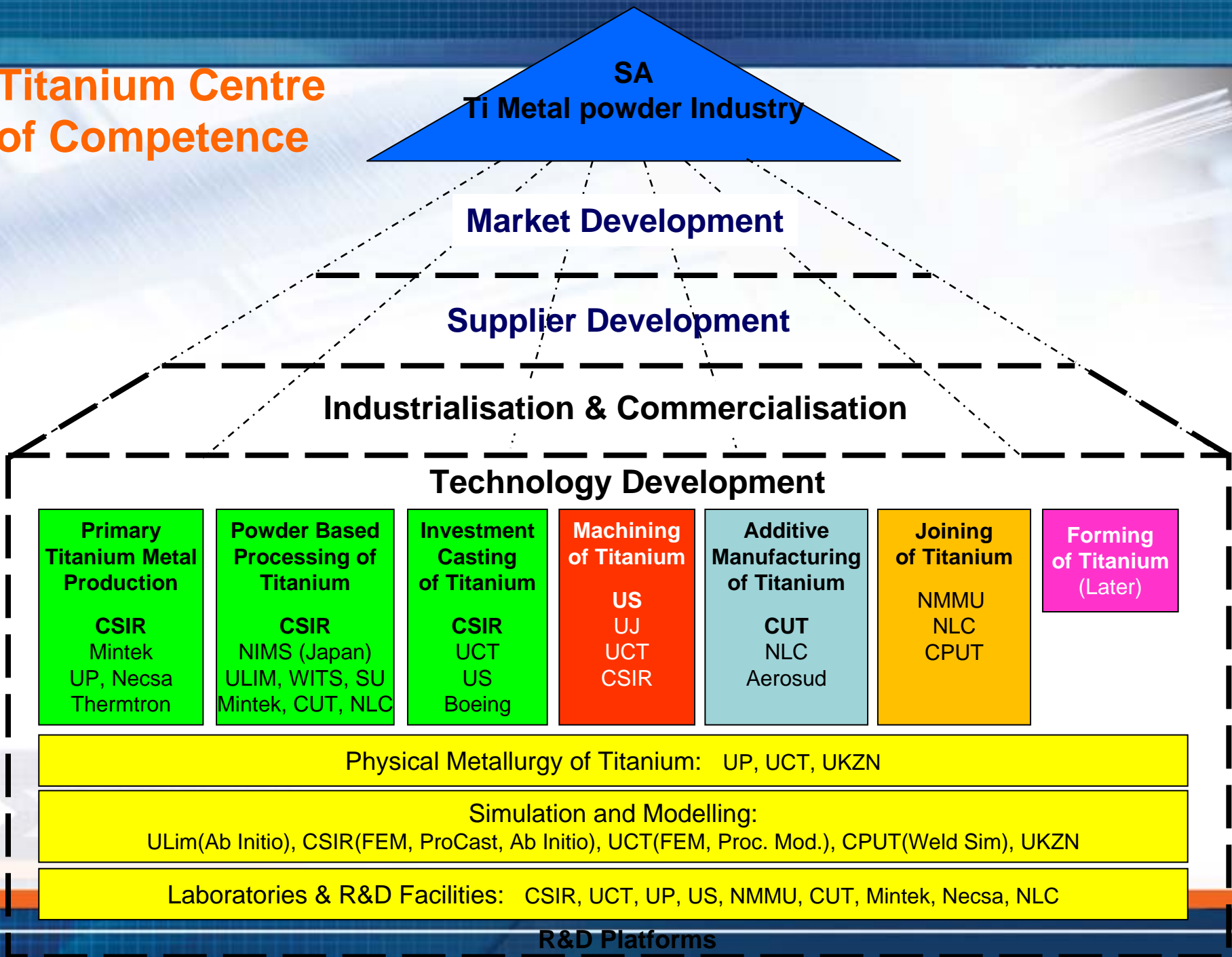
# Fluoro-chemical Expansion Initiative (FEI)



# Fluoro-chemical Expansion Initiative (FEI) (cont.)

- Market share: objective is to increase beneficiation from 5% to 25% of flurospar
- This will further create 1000 direct jobs
- There is also envisaged R1billion increase in value of exports
- To date:
  - 103 students have been supported
  - Published and conference papers: 133
  - Patents: 7

# Titanium Centre of Competence



**SA**  
**Ti Metal powder Industry**

**Market Development**

**Supplier Development**

**Industrialisation & Commercialisation**

**Technology Development**

<p><b>Primary Titanium Metal Production</b></p> <p><b>CSIR</b> Mintek UP, Necs Thermtron</p>	<p><b>Powder Based Processing of Titanium</b></p> <p><b>CSIR</b> NIMS (Japan) ULIM, WITS, SU Mintek, CUT, NLC</p>	<p><b>Investment Casting of Titanium</b></p> <p><b>CSIR</b> UCT US Boeing</p>	<p><b>Machining of Titanium</b></p> <p><b>US</b> UJ UCT CSIR</p>	<p><b>Additive Manufacturing of Titanium</b></p> <p><b>CUT</b> NLC Aerosud</p>	<p><b>Joining of Titanium</b></p> <p>NMMU NLC CPUT</p>	<p><b>Forming of Titanium (Later)</b></p>
--	---	---	--	--	--	---

**Physical Metallurgy of Titanium:** UP, UCT, UKZN

**Simulation and Modelling:**  
ULim(Ab Initio), CSIR(FEM, ProCast, Ab Initio), UCT(FEM, Proc. Mod.), CPUT(Weld Sim), UKZN

**Laboratories & R&D Facilities:** CSIR, UCT, UP, US, NMMU, CUT, Mintek, Necs, NLC

**R&D Platforms**

# Titanium CoC (cont.)

- The initiative is intended to achieve 10% of the global market
- So far:
  - 61 students supported
  - 5 patents filed
  - 56 publications produced



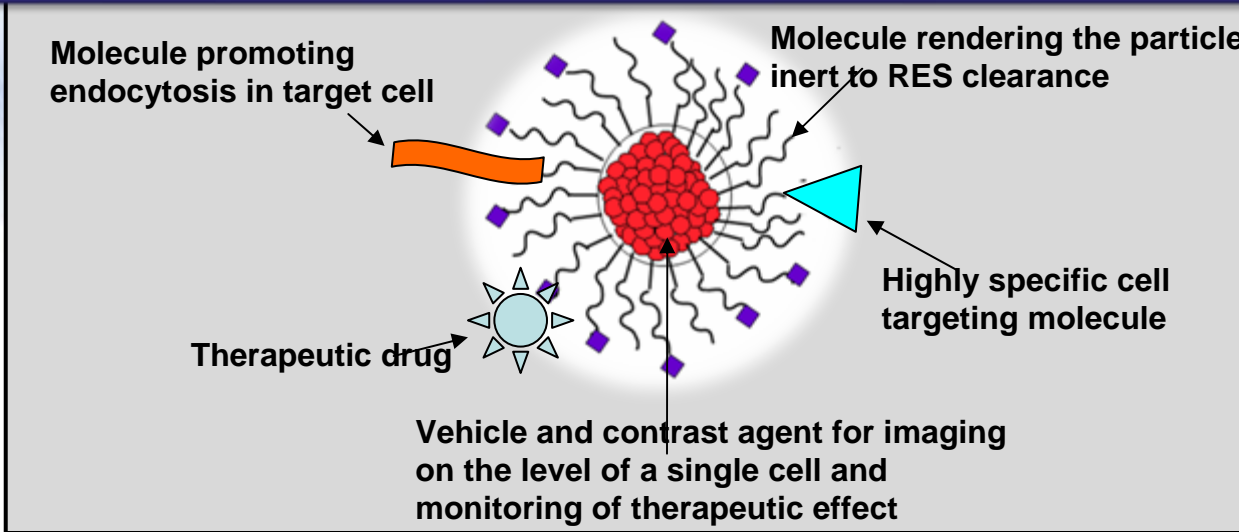
# Unmanned Aerial Systems (UAS)

- The programme aims to stimulate R&D and innovation-led high-tech industry development in South Africa by integrating and leveraging on existing and emerging aerospace and ICT capabilities
- Involves a range of players from science councils, research institutes, higher education institutions, industry and government
- Aims to capitalize on the emerging Civil/Commercial UAS global markets to contribute to South Africa's economic development
- Targeted civil application areas include
  - Border patrol
  - Disaster management
  - Critical infrastructure monitoring



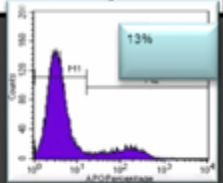
# Mineral Beneficiation: Mintek NIC

## Intelligent Nanoparticle (Precious Metal Based) System

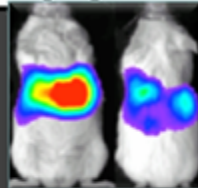


### Therapeutics

#### Toxicity



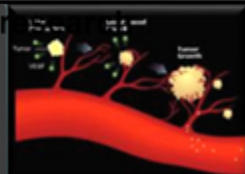
#### Imaging



#### Obesity research



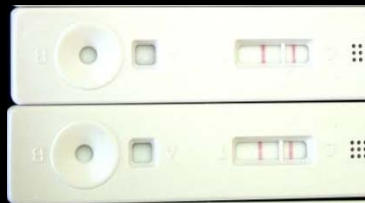
#### Cancer



### Diagnostics



Sensors



LFD

### Water Treatment

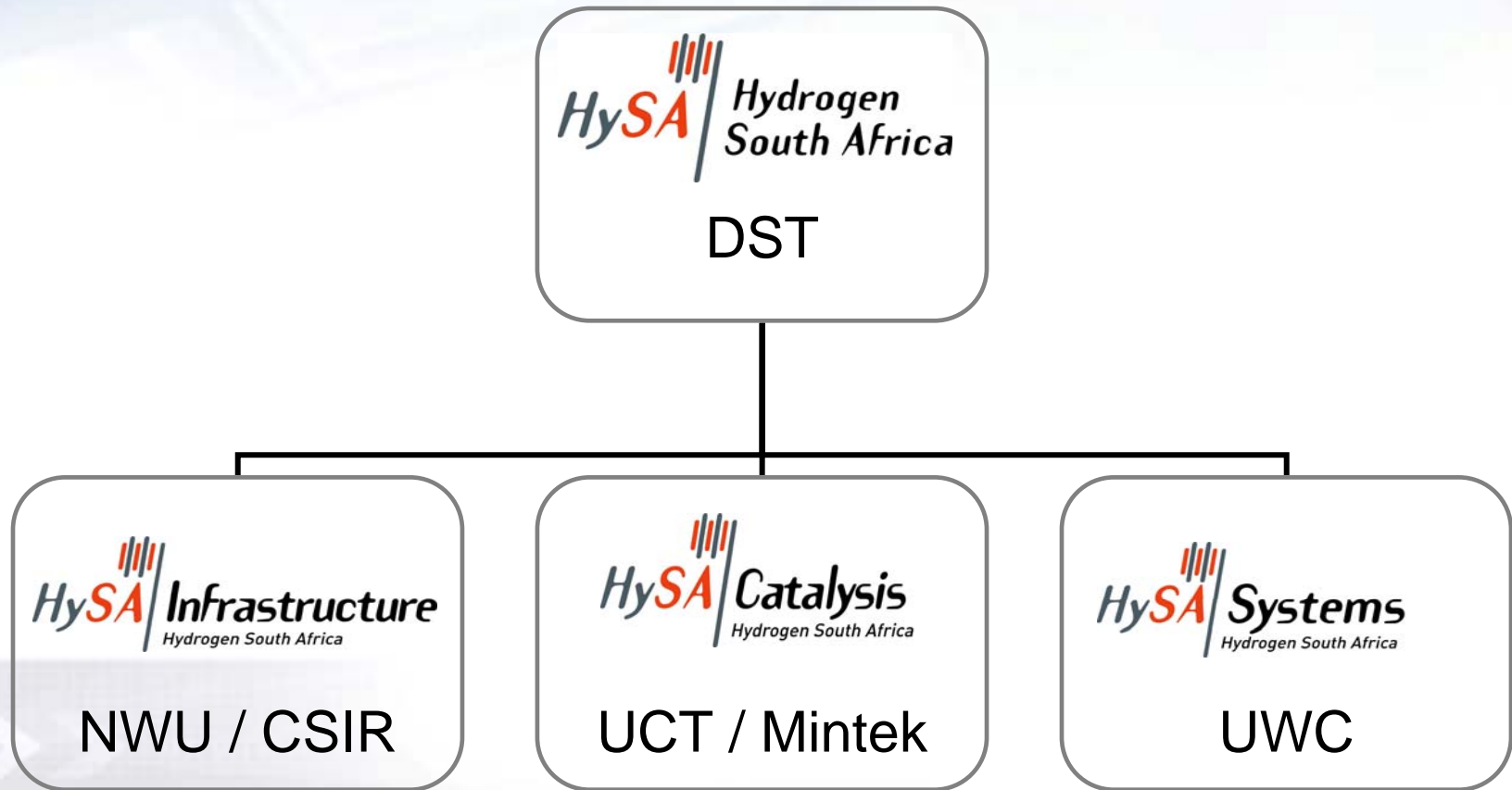
#### Membrane based



# Intelligent Nano particles System (cont.)

- The Mintek has produced home-based diagnostic prototype for diseases such as TB and Malaria; and
  - 125 journal publications
  - 93 postgraduate students
- The CSIR nano-structured materials (NIC) has produced:
  - 43 journal publications
  - 18 postgraduate students and 9 postdoctoral fellows

# HySA Centres.....



# Alternative Energy

- ❖ HySA Ultimate goal is to capture 25% of global PGM catalyst demand by 2020
- ❖ All three HySA CoCs are full functional and Competence Centre Directors have been appointed.
- ❖ A new Key Programme on advanced batteries has been established, which will be upgraded to its own Programme, once the Energy Grand Challenge has been approved
  - ❖ Establishment of Clean Energy Investments
  - ❖ Received 4 million Rand co funding from Impala Platinum

# Co-funding from Industry

- ❖ German fuel membrane producer has signed a technology transfer agreement and invested R300 thousand into HySA ;concluding a commercialisation collaboration in March 2011 with this German Company for the local manufacture of MEA, using IP from both parties
- ❖ Progress to date
  - ❖ 1 prototype on hydrogen storage technology
  - ❖ 2 patents
  - ❖ 6 publications, 1 book chapter, 77 post graduate students

# Government Partnerships

- Department of Environment Affairs
  - Climate change science and innovation
  - Innovation programme to support a Green Economy
- Department of Agriculture, Fisheries and Forestry
  - Agricultural research and development plan
- Department of Health
  - Audit of technological capacity of the National Health Laboratory Services
- Department of Water
  - Enhancing water research in South Africa
- Department of Communication
  - Technological capability to support policy requirements for information security

# Human Capital development- Recent outputs and achievements

<b>Human Capital Development: NRF supported students</b>			
<b>Level</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Undergrads	214	286	300
Hons/BTech	1620	1663	1700
Masters	2537	2203	2300
Doctoral	1415	1265	1300
Post Doctoral	229	255	250
<b>Total</b>	<b>6,015</b>	<b>5,672</b>	<b>5,850</b>



## Human Capital Development Recent outputs and achievements (cont.)

- NRF internship programme support increased from 216 in 2008 to 365 in 2010.
- South African Research Chairs increased to 92 by 2010.
- 8 Centers of Excellence already in place
- Publications and students (need some numbers for this)

# Human Capital Development Challenges

- Percentages of students supported (expressed as a percentage of total possible students to be funded) through existing instruments are still low
  - Honours: 3%
  - Masters: 5%
  - PhDs: 12%
  - Post-doctoral fellows: 36,9%
- The existing instruments are not yet providing sufficient numbers of emerging and young researchers

## Theme based areas

- **Science missions (NRDS):** astronomy and earth observation, indigenous knowledge, biosciences, paleo-world, Antarctic research
- **Technology missions (NRDS):** poverty reduction, advanced manufacturing, resource based industries, ICT, biotechnology
- **Grand challenges (TYIP):** bio-economy, space, energy, global change, human and social dynamics

## Recent outputs and achievements (1):

- Tenofovir microbicide gel-reduces HIV infections in women by 39% (through TIA).
- Hydrogen fuelled tricycle launched in August 2010.
- Discovery of the Australopithecus sediba.
- SARChI peer reviewed publications. increased from 162 in 2008/09 to 477 in 2009/10.



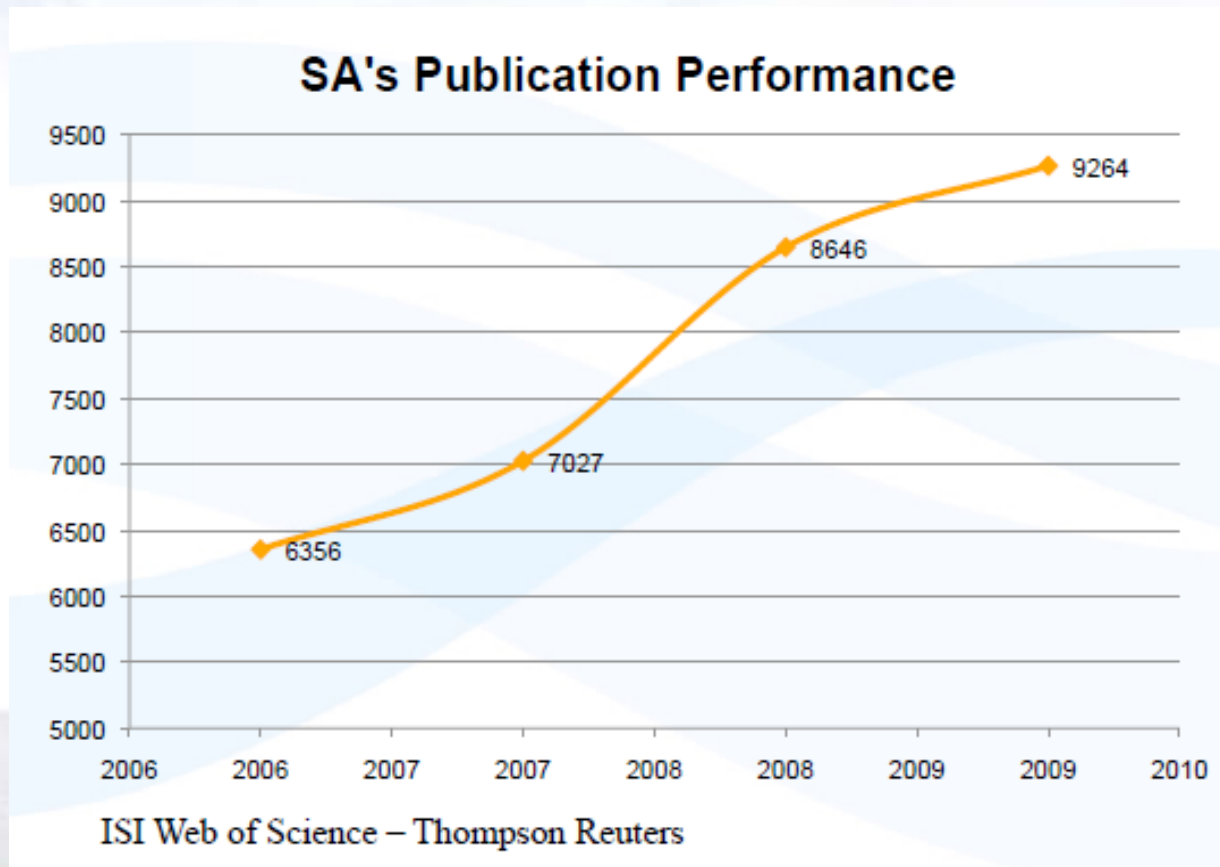
## Recent outputs and achievements (2):

- SKA update
  - Experimental development models were completed in 2007/08
  - The Karoo Array prototype KAT-7 was completed in 2008/09
  - Preparation of KAT-7 infrastructure and construction facilities was completed in 2009/10
  - Engineering commissioning of KAT-7 Dec 2011
  - 1 cooled receiver installed and 3 more being installed now
  - The SKA linked 600 expanded public works jobs.

## Recent outputs SKA update (cont.)

- Preliminary Int'l MeerKAT design review completed in July 2011
- SKA Founding Board set up – 9 countries signed (RSA, Australia, NZ, UK, France, Germany, Italy, China, the Netherlands) – 4 more considering (Canada, S Korea, India, Japan)
- To set up pre-construction Int'l SKA Inc mid-2011
- Formal site selection request for information and final roadmap & weighting and final criteria were approved by SSEC and sent to Australia & RSA

# ISI Publication Performance from 2006-2009



# S&T for social and economic development

## Recent outputs and achievements

- Developed (through CSIR) a new design for low-income houses. Pilot project of 412 houses is underway in Kleinmond.
- A cellphone-based application was developed (through Council for Scientific and Industrial Research) to support the delivery of educational information to resource-constrained communities.
- Roll-out of rural broadband connectivity using wireless mesh network benefited 150 schools in Nkangala District Municipality in Limpopo as well as the development of 19 village operators.





# Example: Demonstration Agronomy Science

- The DST has initiated a number of “proof-of-concept” demonstrations for scientifically-proven medicinal plants utilizing land owned by the Agricultural Research Council (ARC) and research farms in Rural Based Universities
- Finalising incubation of Essential Oils SMMEs
- Establishing Abalone Hatcheries to benefit from IP from Innovation Fund
  - 306 Job opportunities sustained, and additional 300 new jobs established.



science  
& technology

Department  
SCIENCE & TECHNOLOGY  
REPUBLIC OF SOUTH AFRICA

# International and continental linkages

## Recent outputs and achievements

- Won the bid to host the new regional NEPAD water initiative.
- DST leveraged R868 million through official donor assistance.
- South Africa was awarded the hosting of 2015 World Social Science Forum (WSSF) (HSRC) for the first time in Africa.
- International Social Science Council elected HSRC CEO, Dr Shisana as its new President.

# Science for policy and decision-making

## Recent outputs and achievements

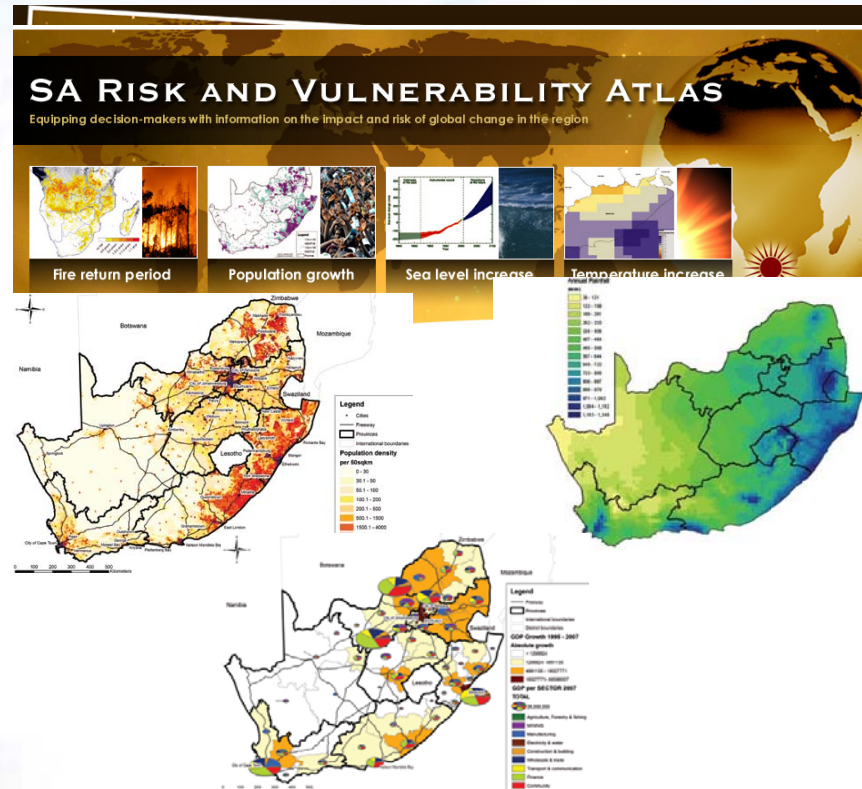
- Global change research plan finalised.
- Risk and Vulnerability Atlas support planning and decision making for global change (CSIR).
- Developed a manual for road maintenance and pothole repair (CSIR).
- Provided scientific support to the Working for Water Programme (CSIR).
- Integrated planning, development and modeling project (IPDM).

# SA Risk & Vulnerability Atlas

- A science-policy interface initiative
- One-stop shop for relevant environmental risks and related information
- Comprises electronic spatial database system and repository of local based spatial-based risk and vulnerability information

A decision-support tool for local decision-makers

Linked to other electronic databases & systems – climate, ecological, demographics etc



Focus broadly on environmental risks and disasters

Support development of human capital in risks and vulnerability assessments

## Users/beneficiaries:

- Municipalities
- Universities & research entities
- Organized local groups – farmers, industry etc
- Individuals

# Current Strategic Challenges

- R&D investments
  - *Achieving and going beyond the 1% GERD as a % of GDP*
- SET Human Capital Development
  - *Quantity (numbers) and Quality (productivity)*
  - *Inequalities (race, gender, regional / institutional distribution)*
- Innovation capacity
  - *Addressing the innovation chasm*
- Increasing knowledge generation (research) capacity
- Governance and coordination of system

## Medium-term priorities

- Development of the bio-economy, nanotechnology, the hydrogen economy, space science, ICT and advanced manufacturing.
- Upscale with appropriate partners some pilot projects on a range of technologies to address poverty and improve the quality of life of South Africans.
- Development of an innovative and diverse flux of young people seeking and finding careers in science and engineering.
- Accomplishment of notable successes in turning trends in global science to the national advantage, e.g., in astronomy and space science.



## Medium Term Initiatives (1)

- Finalisation of human capital development strategy for research, development and innovation.
- Strengthening of structural interventions (such as SARChI) and establishment of focused, high-level, cutting edge research and development platforms e.g. CoE's and post doctoral fellowships
- Continuing implementation of the Youth into Science Strategy.



## Medium Term Initiatives (2)

- Consolidation of new institutions-TIA, NIPMO and SANSA.
- The development of a sustainability model for ongoing development and roll-out of cyber-infrastructure.
- An investment and growth strategy for the provision of scientific equipment to support research and innovation within the National System of Innovation.
- Development and strengthening of international linkages (including the rest of the African continent) in support of HCD, research and development and infrastructure.



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA



## Medium Term Initiatives (3)

- Establish and enhance partnership with private sector-to increase GERD.
- Review the Strategic Management Model and strengthen coordination and governance.
- Enhance macro policy planning, monitoring and evaluation capacity.



# Monitoring and Evaluation

- The DST has an M&E System through which performance information from the DST programmes and public entities is reported
- Reports are compiled on a quarterly and annual basis
- Work underway to develop impact assessment capacity to assess the outcomes and impact of S&T interventions
- A process is also in place to align the DST M&E to the Presidency's M&E

# Gross Expenditure on R&D (GERD)

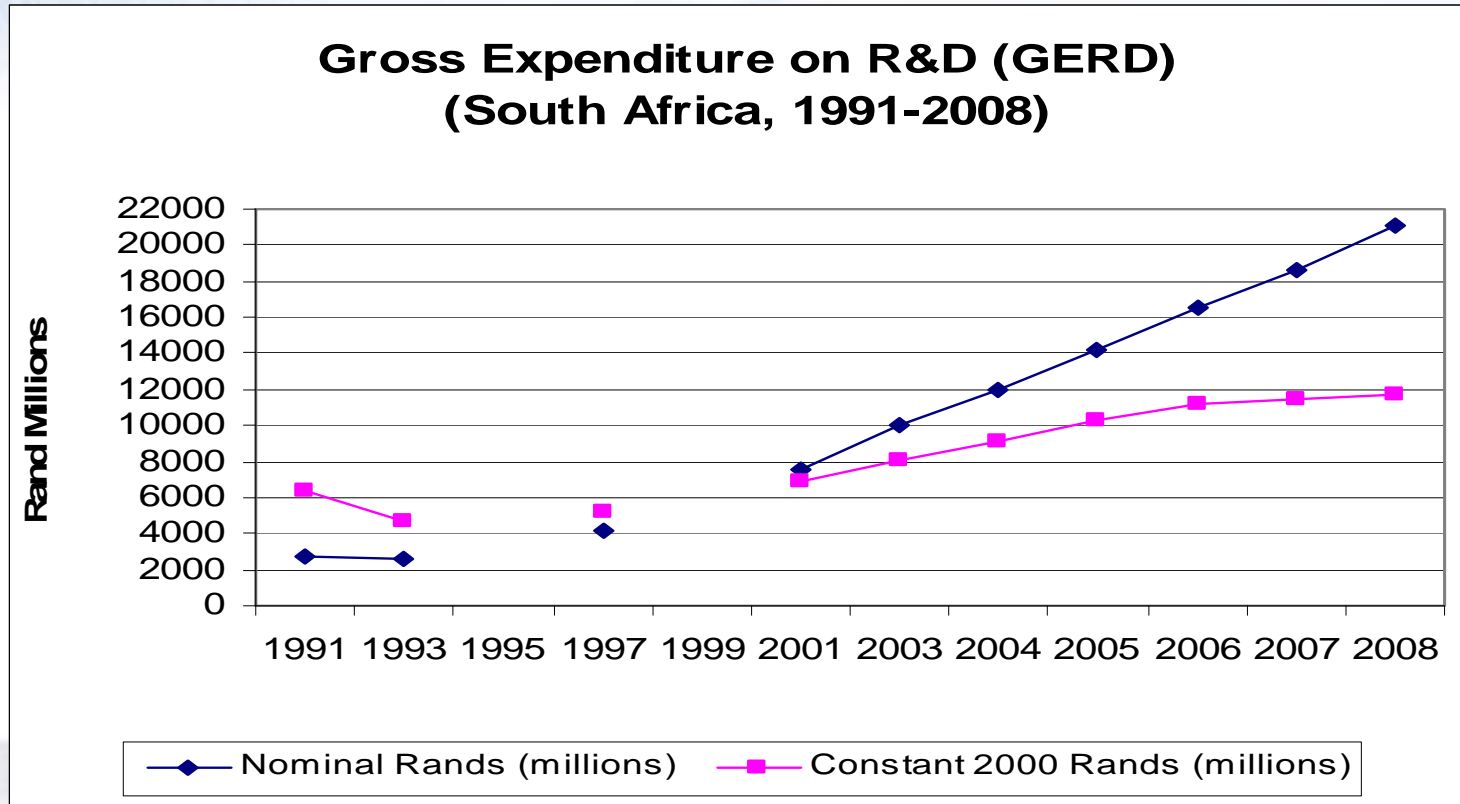
- National Spending on R&D
  - 2008/09 R&D survey shows spending on R&D amounted to R21 billion i.e. 0,92 per cent of GDP.
  - Proportion of spending decreased from 0,93% (2007/08 survey) to 0,92% (2008/09 survey)
  - Private sector spending on R&D 58.6%



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

# Gross Expenditure on R&D



# Financial Resources

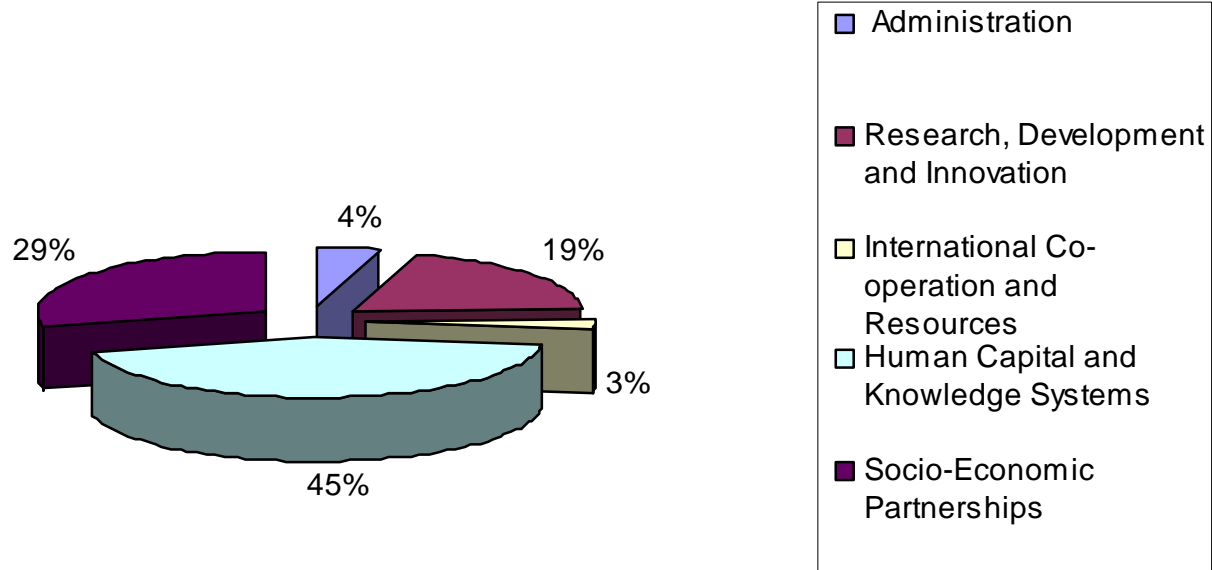
Programmes	Medium-term expenditure estimates		
	2011/12	2012/13	2013/14
	R million	R million	R million
Administration	192.1	202.0	220.6
Research, Development and Innovation	854.6	1 112.4	1 272.8
International Co-operation and Resources	137.2	145.9	157.2
Human Capital and Knowledge Systems	1 950.4	2 045.5	2 406.3
Socio-Economic Partnerships	1 270.3	1 381.6	1 453.2
<b>Total</b>	<b>4 404.6</b>	<b>4 887.4</b>	<b>5 510.1</b>

# Financial Resources (Economic Classification)

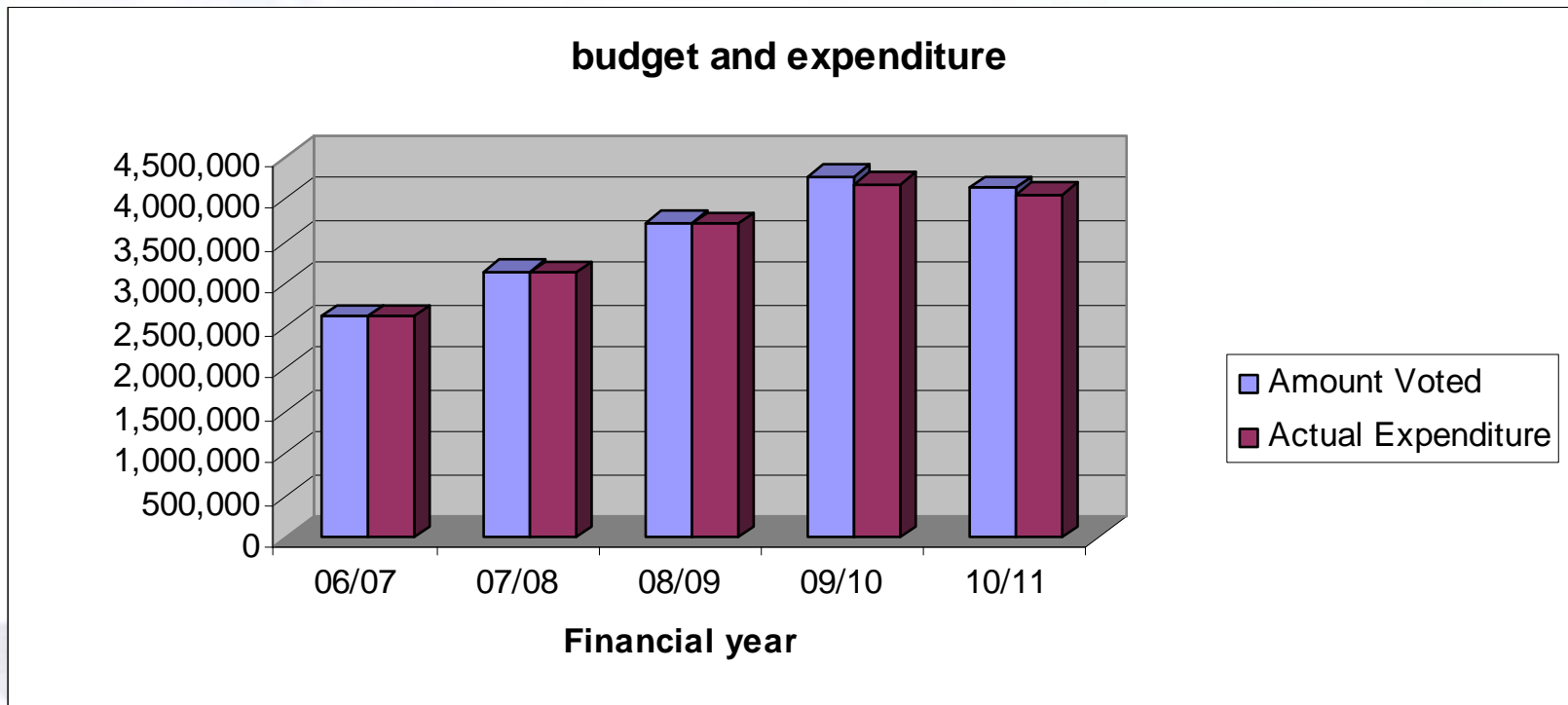
Programmes	Medium-term expenditure estimates		
	2011/12	2012/13	2013/14
	R million	R million	R million
Compensation of employees	225.3	237.6	259.6
Goods and services	144.5	152.1	164.3
Transfer and subsidies	4,031.6	4,494.3	5,082.7
Total payment for capital assets	3.3	3.4	3.6
<b>Total</b>	<b>4 404.6</b>	<b>4 887.4</b>	<b>5 510.1</b>

# Budget per programme (R million)

2011/12 Budget per programme

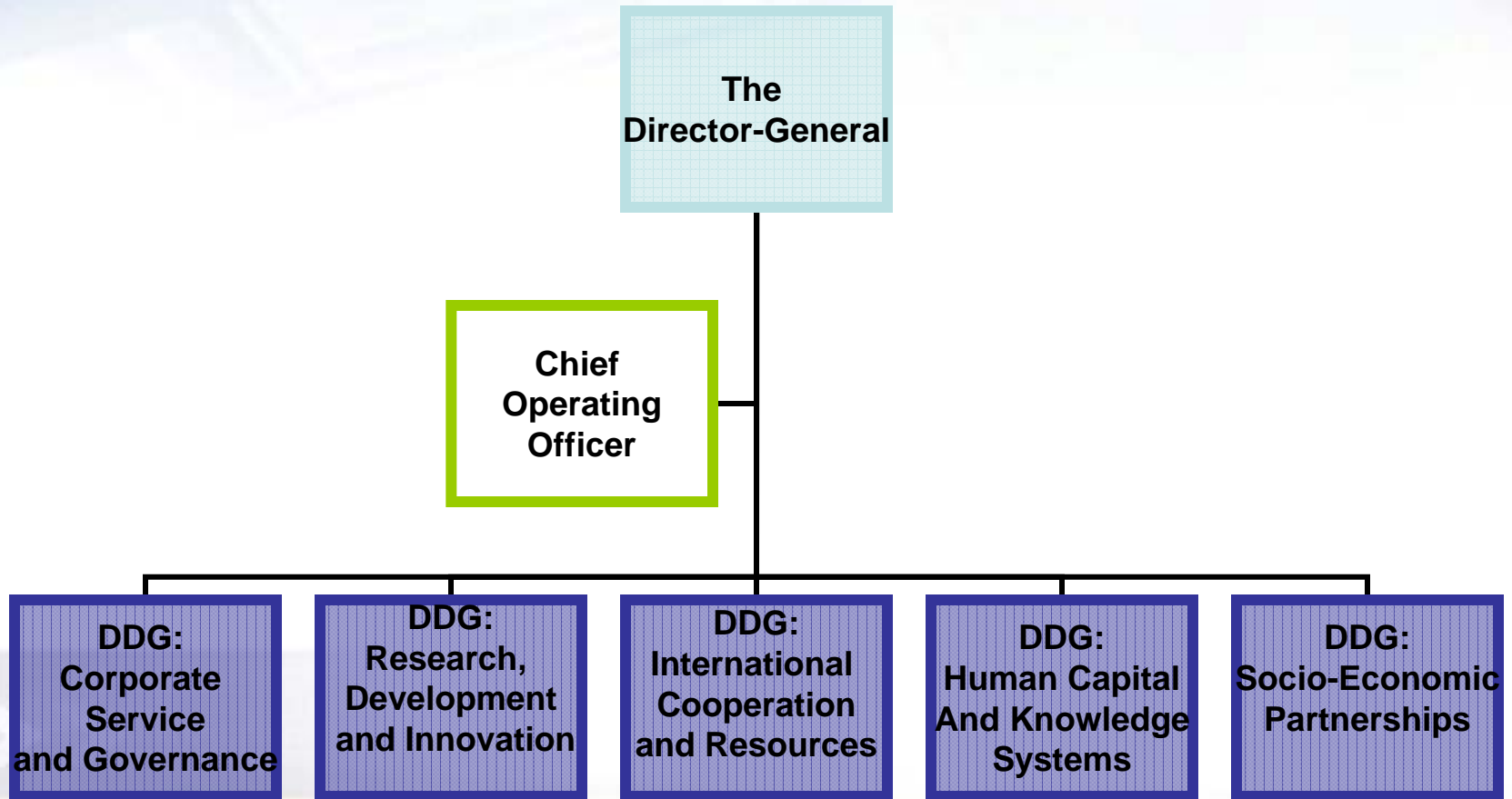


# 5 Year Spending Trends





# Organogram



## DST Public Entities

- Council for Scientific and Industrial Research (CSIR)
- National Research Foundation (NRF)
- Human Sciences Research Council (HSRC)
- Africa institute of South Africa (AISA)
- Technology Innovation Agency (TIA)
- Academy of Science of South Africa (ASSaf)
- South African National Space Agency (SANSA)

## Conclusion

- Medium term outputs driven by MTSF, NRDS and TYIP
- Performance satisfactory
- Steady growth in resources
- Continue with various building blocks for an emerging NSI
- Continued focus on HCD, R&D and infrastructure
- Public entities aligned to implement government priorities
- Robust Monitoring and Evaluation System is being put in place.

## Conclusion

Dankie  
Enkosi  
Ha khensa  
Re a leboga  
Ro livhuwa  
Siyabonga  
Siyathokoza  
Thank you