



**Tshwane University  
of Technology**

*We empower people*

# South Africa's National System of Innovation & Development

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**The BRICS Project: National Systems of Innovation  
and Development**

Ten years of Local Innovative and Productive Systems  
Rio de Janeiro, 27<sup>th</sup> November 2007





# Outline

- Introduction
  - Development Challenges of Post-Apartheid South Africa
- Continued Evolution of the NSI
- Conclusions

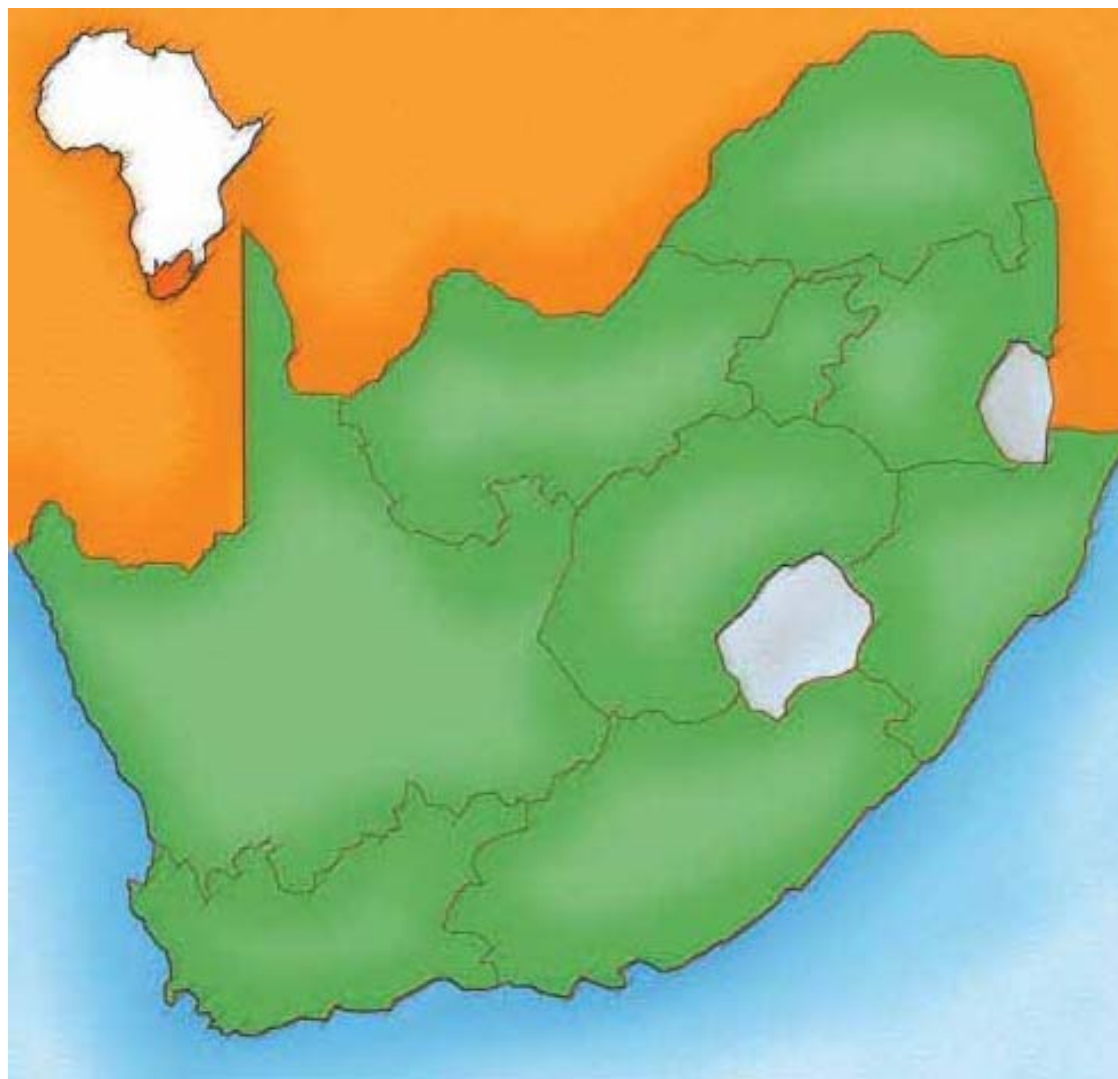


# Introduction

Republic of South Africa  
(1994)

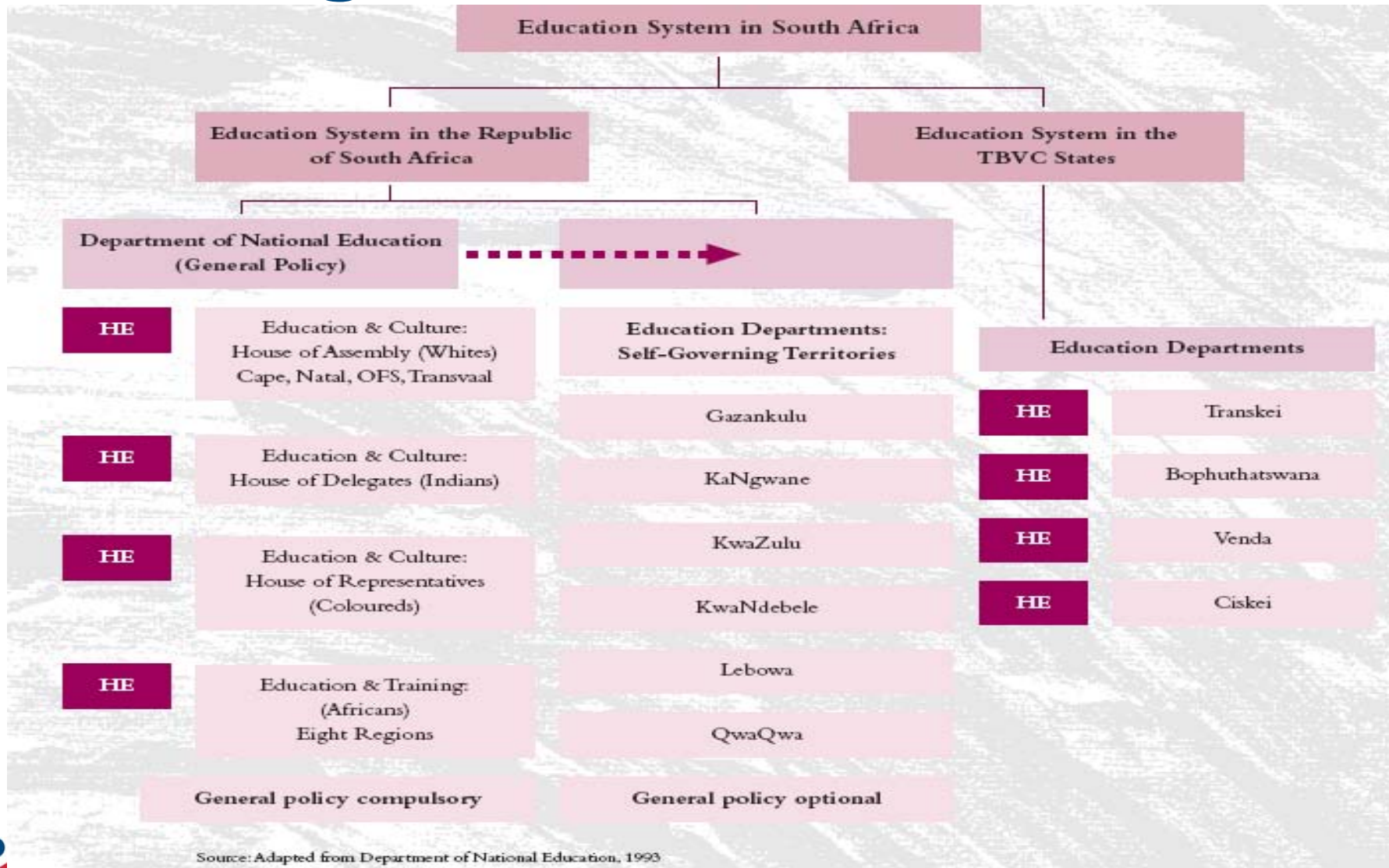
Population: 46.5 million

GDP Growth Rate: 5%





# Background

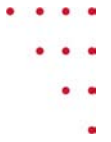




# Policy Definitions

- Narrow STI:
  - Innovations in products, services, processes, & institutional strategies
- Systems of Innovation:
  - Totality of know-how in a firm, industry, sector, cluster, region or nation
  - Functional & dysfunctional arrangements
  - Coordination challenge





# Explicit STI

- ANC Discussion Document on Science & Technology for a Democratic South Africa
- Eminent Persons Review (IDRC, Commonwealth & OECD)
- Science & Technology Initiative
  - National Science & Technology Forum
  - Mass Democratic Movement + Statutory Forces
- Green Paper on Science & Technology
  - Audit of Science, Engineering & Technology in the Public Sector
  - Foresight: Preparing for the 21<sup>st</sup> Century
  - Review of Science Budget Vote
- White Paper on Science and Technology
  - Review of Science, Engineering & Technology Institutions
  - National Advisory Council on Innovation
  - National Research Foundation
- National Research and Development Strategy





# Implicit STI

- Fiscal
  - Growth, Employment & Redistribution
- Monetary
  - Inflation Targeting
- Competition
  - Commission & Tribunal
- Industrial
  - National Industrial Policy Framework
- Geo-spatial Planning
  - Priority Nodes & Spatial Development Corridors
- Sustainability & Environment
  - Biodiversity Protection (including IKS)
  - Strategic Environmental Impact Assessments
  - National Sustainable Development Strategy





# NR&DS Intro

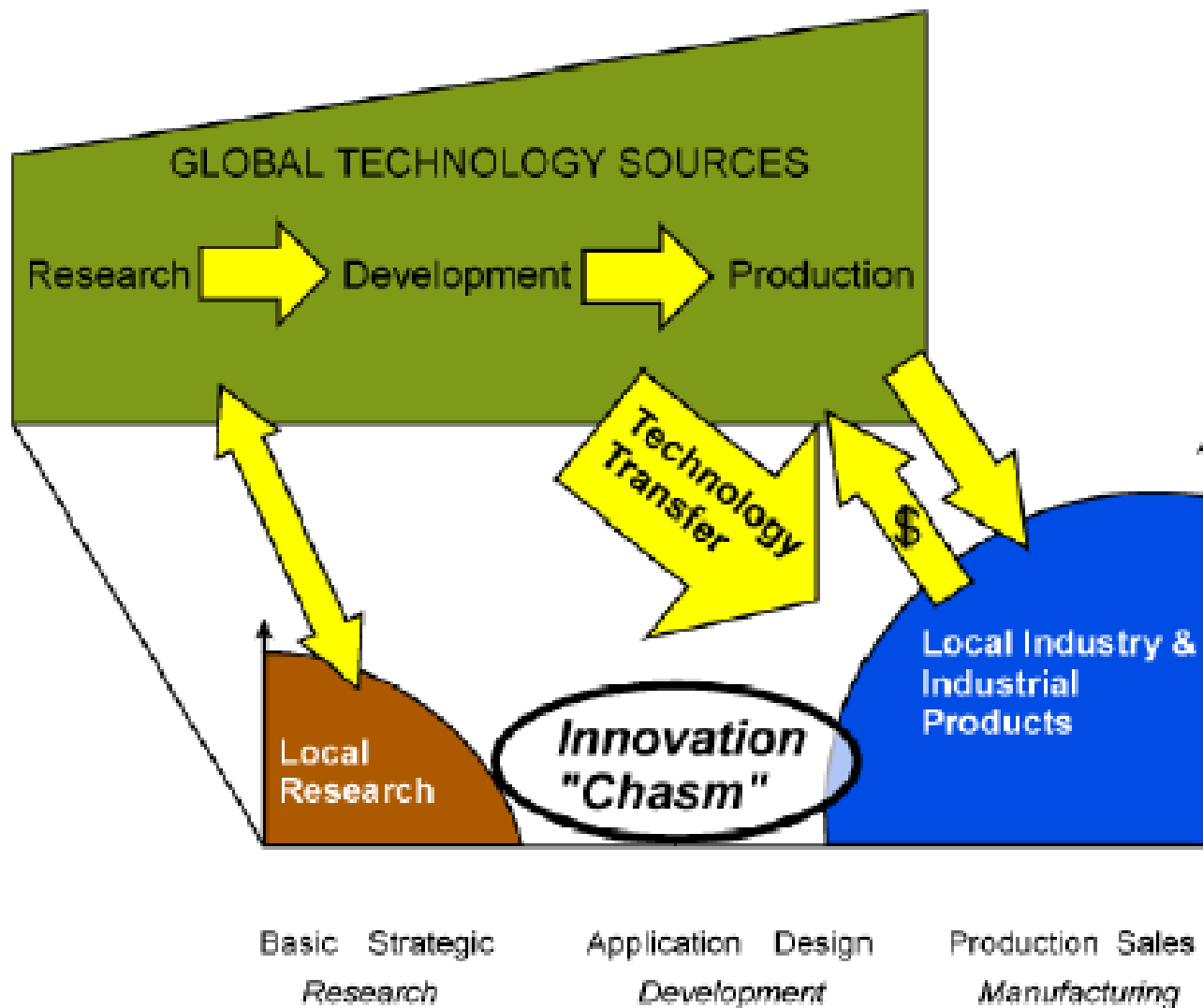
- The termination of key technology missions
  - *“military dominance in the subcontinent and energy self-sufficiency”*
- Strategic security considerations: human, economic & defence
- Human Resources: *“frozen demographics”*
- Globalisation: investment and performance reductions of private sector
- Inadequate intellectual property legislation and infrastructure
- Fragmented governance structures





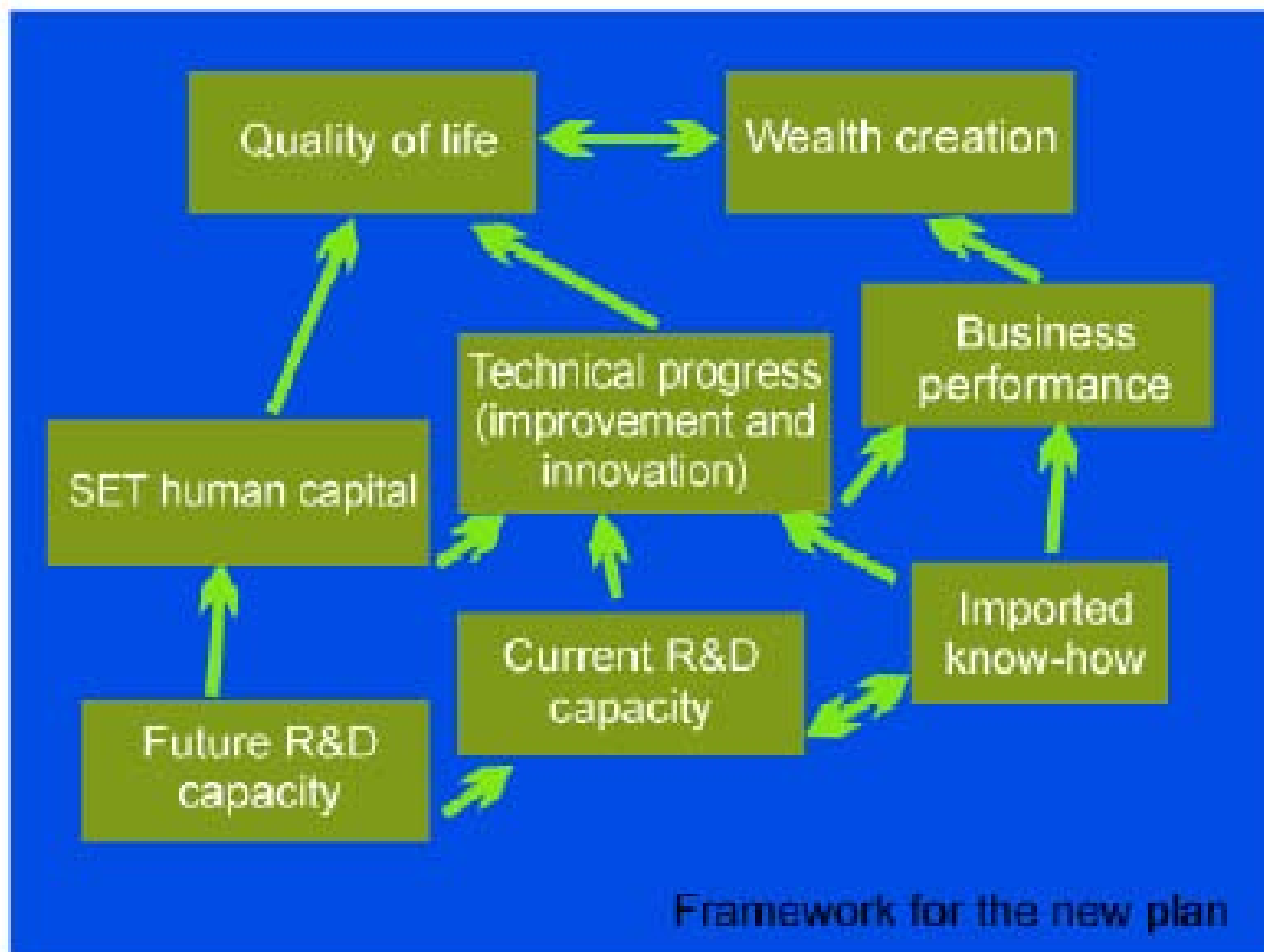


# Innovation Chasm





# NR&DS Framework





# NR&DS Indicators

## Quality of life

- Technology Achievement Index

## Wealth Creation

- Technology-based growth

## Science, engineering and technology human capital

- Researchers per thousand of workforce
- SET demography

## Technical progress (improvement and innovation)

- Patents
- High-tech start-ups
- Business innovation investment
- Key technology missions

## Business performance and key industrial sectors

- Technology / trade mix
- Proportion of high-tech firms
- Sectoral performance

## Future R&D capacity

- University enrolments (SET proportion)
- S&T post-graduate degrees
- Matriculants with Maths and Science

## Current R&D capacity

- Publications
- Global share of publications
- R&D intensity (investment)

## Imported know-how

- Technology balance of payments
- Imported high-tech equipment
- Imported ICT



# 2005 Main Results

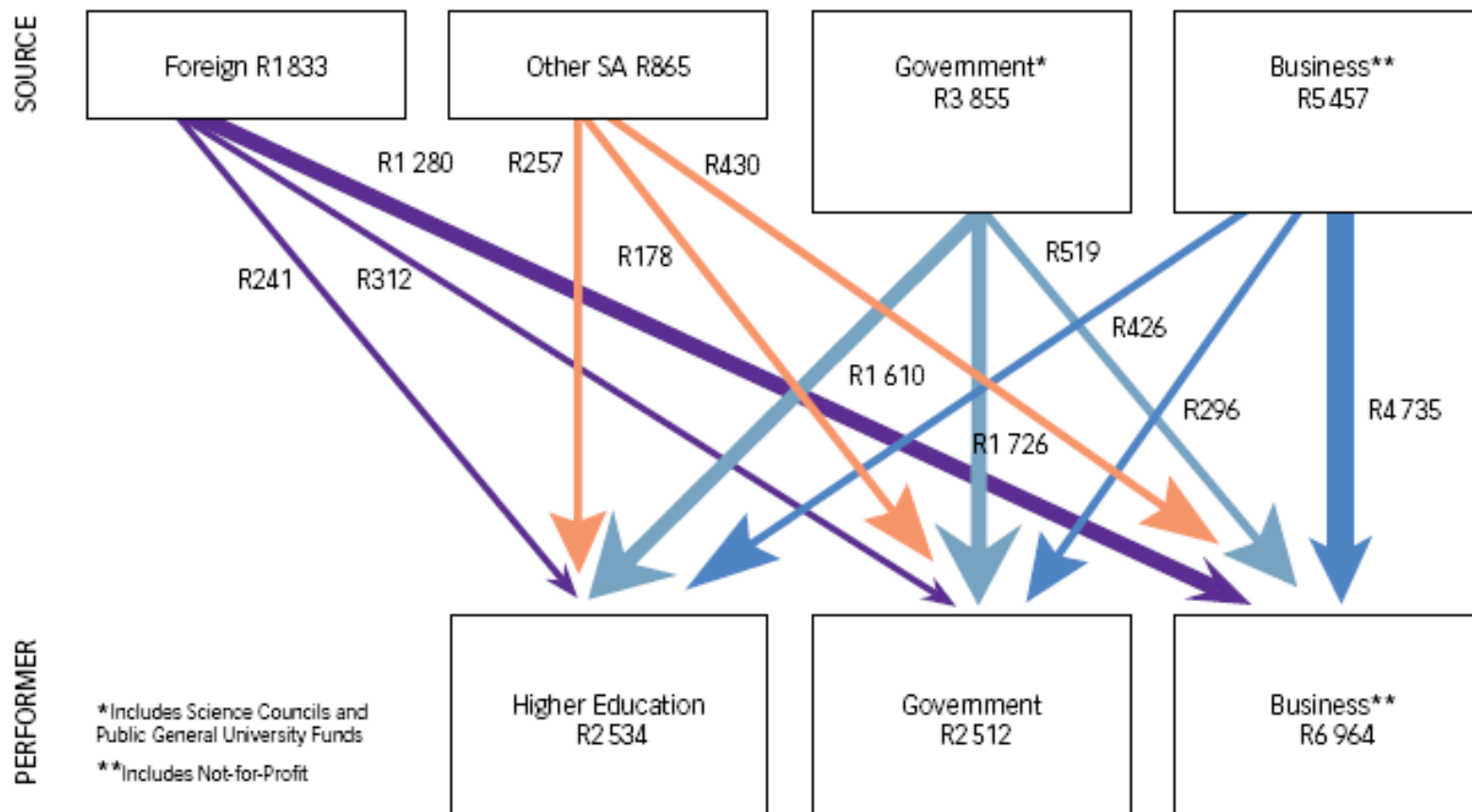
INDICATOR	VALUE	
	2003/04	2004/05
Gross domestic expenditure on R&D – GERD (Rand millions)	10 082.6	12 010.0
GERD as a percentage of GDP	0.81	0.87
Total R&D personnel (FTE) <sup>a</sup>	25 185	29 692
Total researchers <sup>b</sup> (FTE)	14 129	17 910
Total researchers per 1000 total employment <sup>c</sup> (FTE)	1.2	1.6
Total R&D personnel per 1000 total employment (FTE)	2.2	2.6
Civil GERD as a percentage of GDP	0.72	0.80
Total researchers (headcount)	30 703	36 979
Women researchers as a percentage of total researchers	38.0	38.3

<sup>a</sup> FTE = Full Time Equivalent  
<sup>b</sup> Following OECD practice, doctoral students are included as researchers  
<sup>c</sup> Following OECD practice, total employment is now provided by the International Labour Organisation based on the Labour Force Surveys of Statistics South Africa and is not restricted to the formal non-agricultural sectors as previously reported.



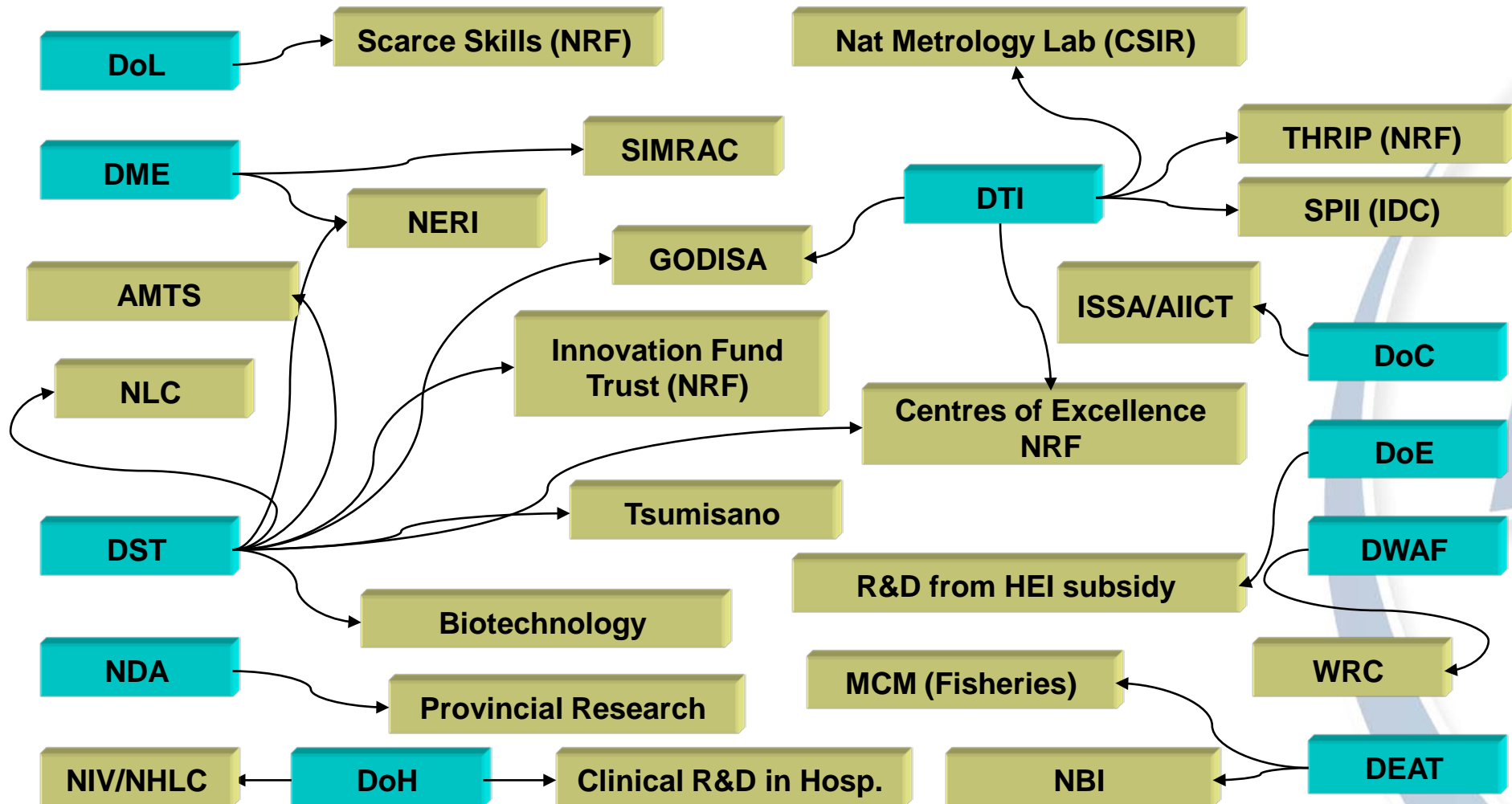


# 2005 Flows





# - Alignment & Steering





# Conclusion

- Globalisation
- Regionalisation
- National Systems
- Provincial Roles
- Local Dynamics





# Thank You

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