

# ***Science and Technology Policy in South Africa***

Michael Kahn

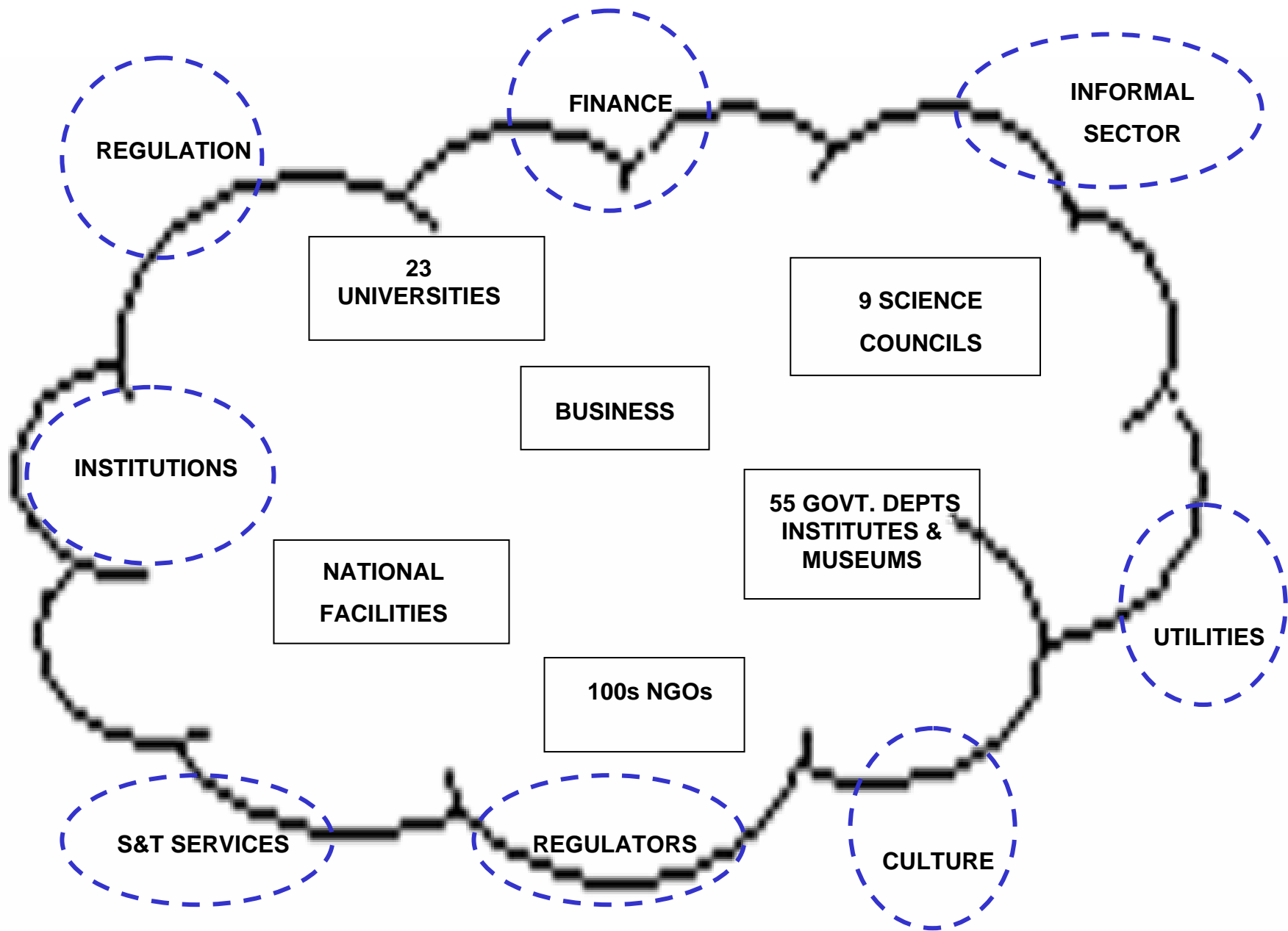
*Centre for Science, Technology and Innovation Indicators*

Workshop on Researching Inequality through S&T

Maputo, 13-14 November, 2006

# *Who are we?*

- Market economy + State sector
- GNP/c PPP \$12, 000
- Services 70% – not ‘resource based’
- Exports ~ 30% GDP
- Commodities=manufactures
- 55% urbanised; growth > 5%
- 16-45 age HIV prevalence +/-20%
- Gini 0,59 ~ inc. social transfers = 0,35



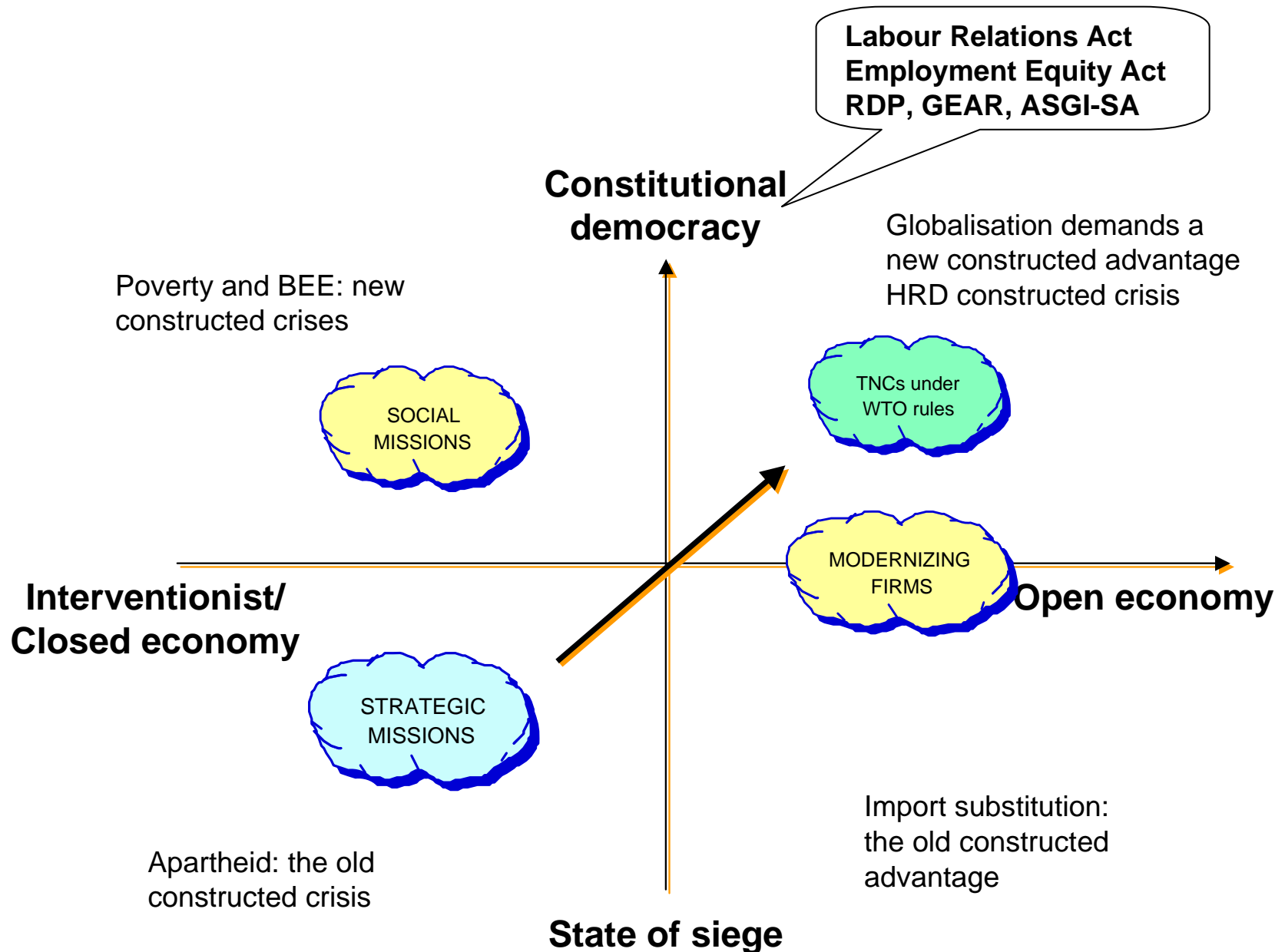
*1st world science; 3<sup>rd</sup>. world social problems e.g. Cholera*



South Africans

Petra Röhr-Roëndaal

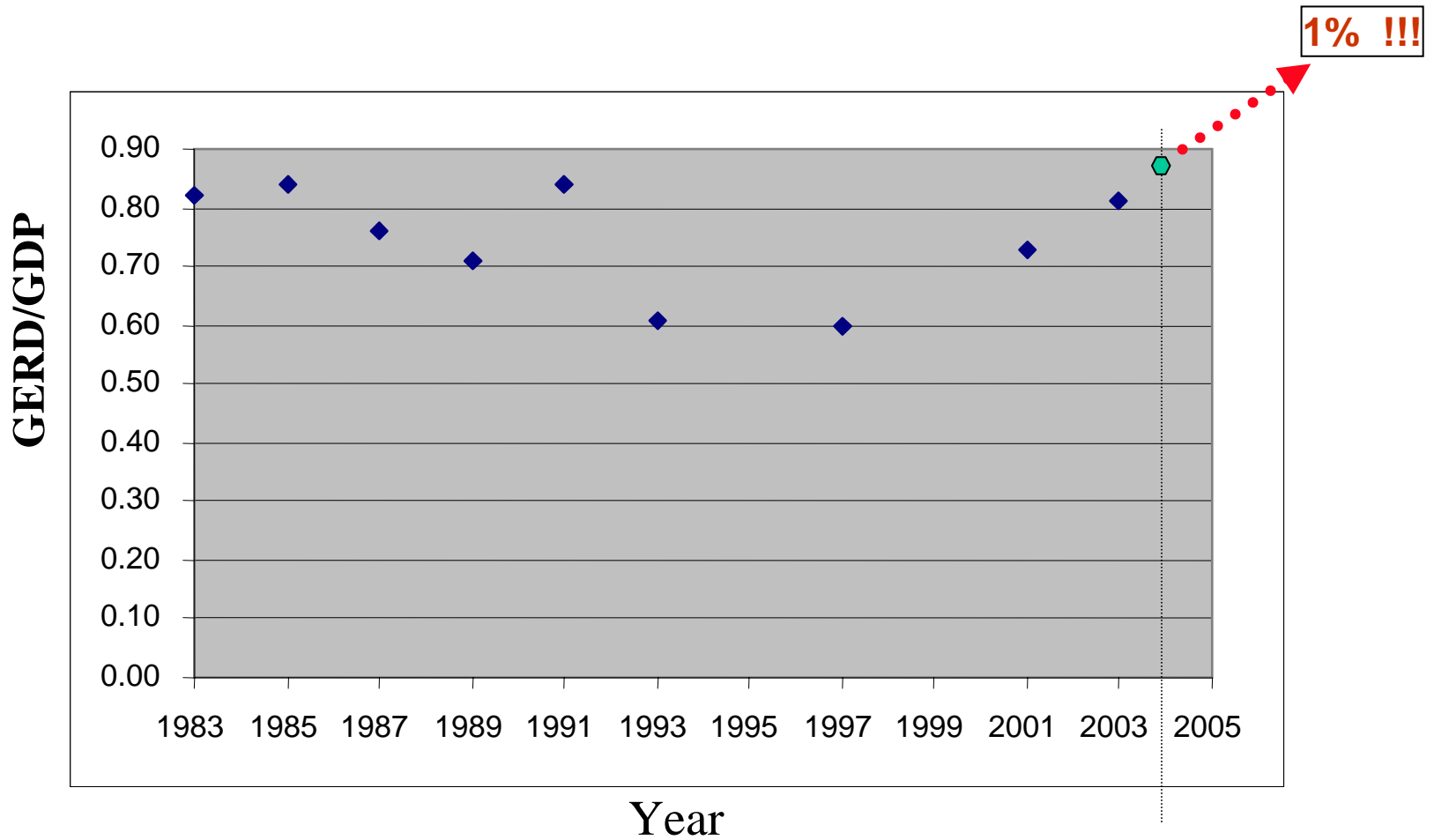
# Where are we going?



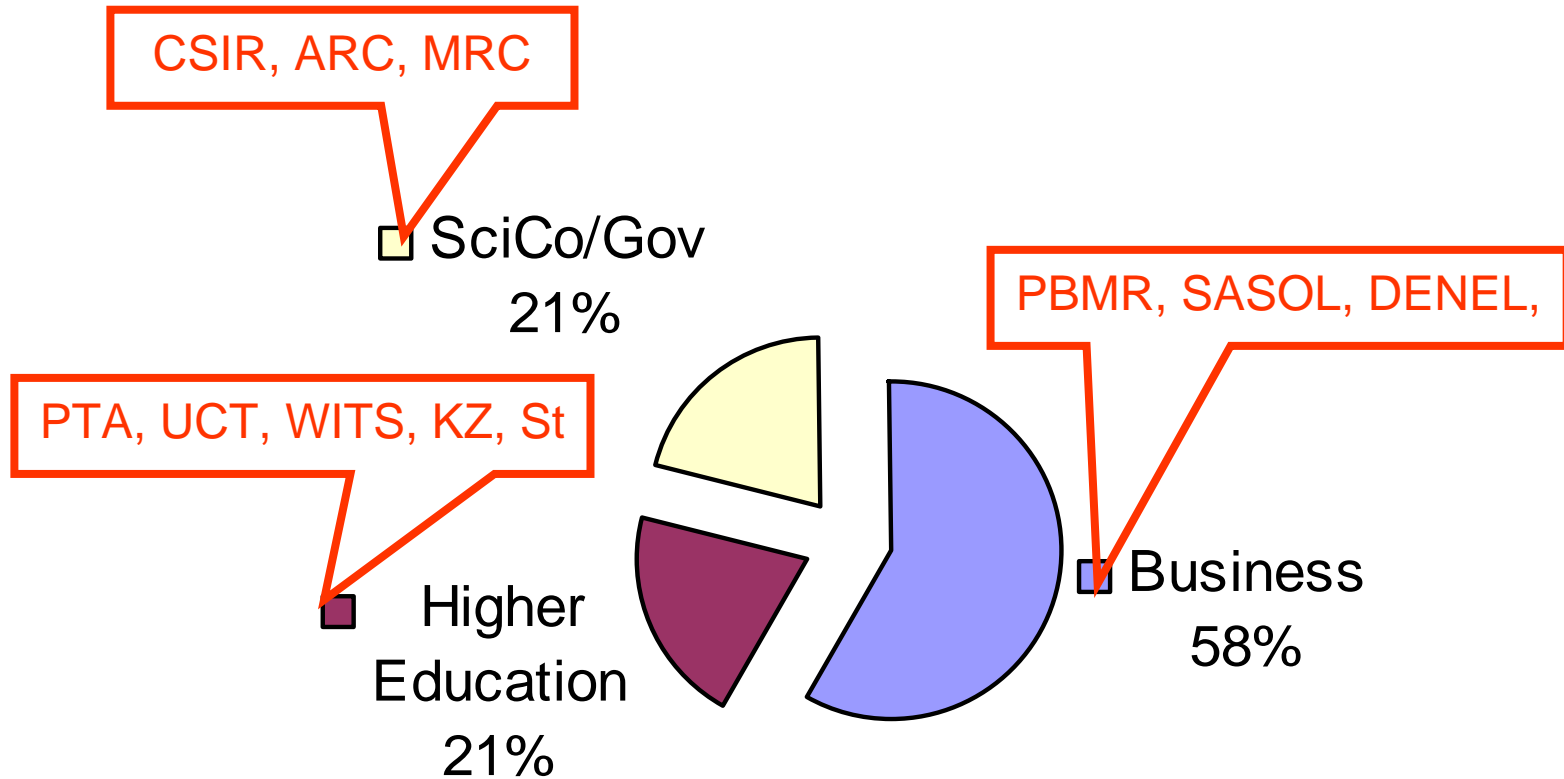
# *How is S&T Policy formulated?*

1. Incremental vs. Radical change
2. Fiscal discipline vs. Blank check
3. Techno-nationalism vs. solidarity
4. Myth vs. Evidence
  - Role of business
5. Technocratic dirigisme vs. Lobbies & broad participation
  - White Paper on S&T (1996)
  - R&D Strategy 2002
6. Old boy networks vs. inclusiveness
  - Foresight
  - Confidence and consensus building

# Measurement is critical



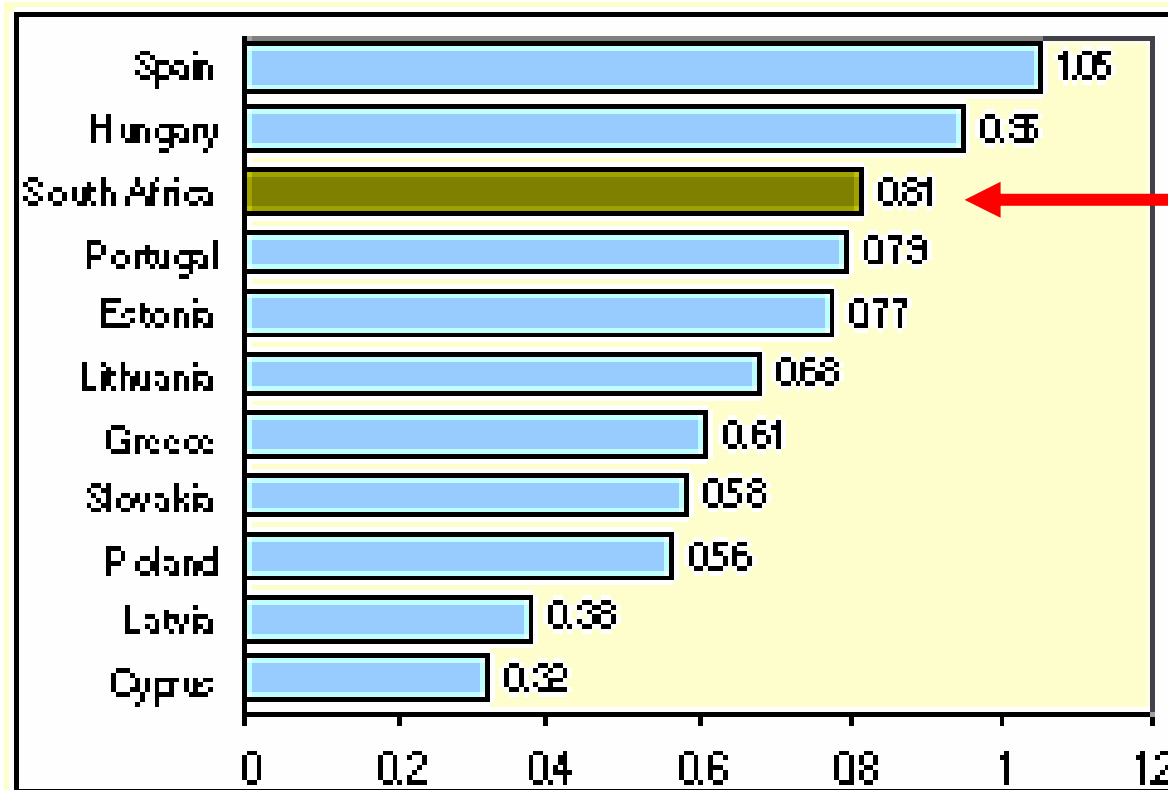
# GERD = R 12,07 billion



*Institutional diversity - disparities*



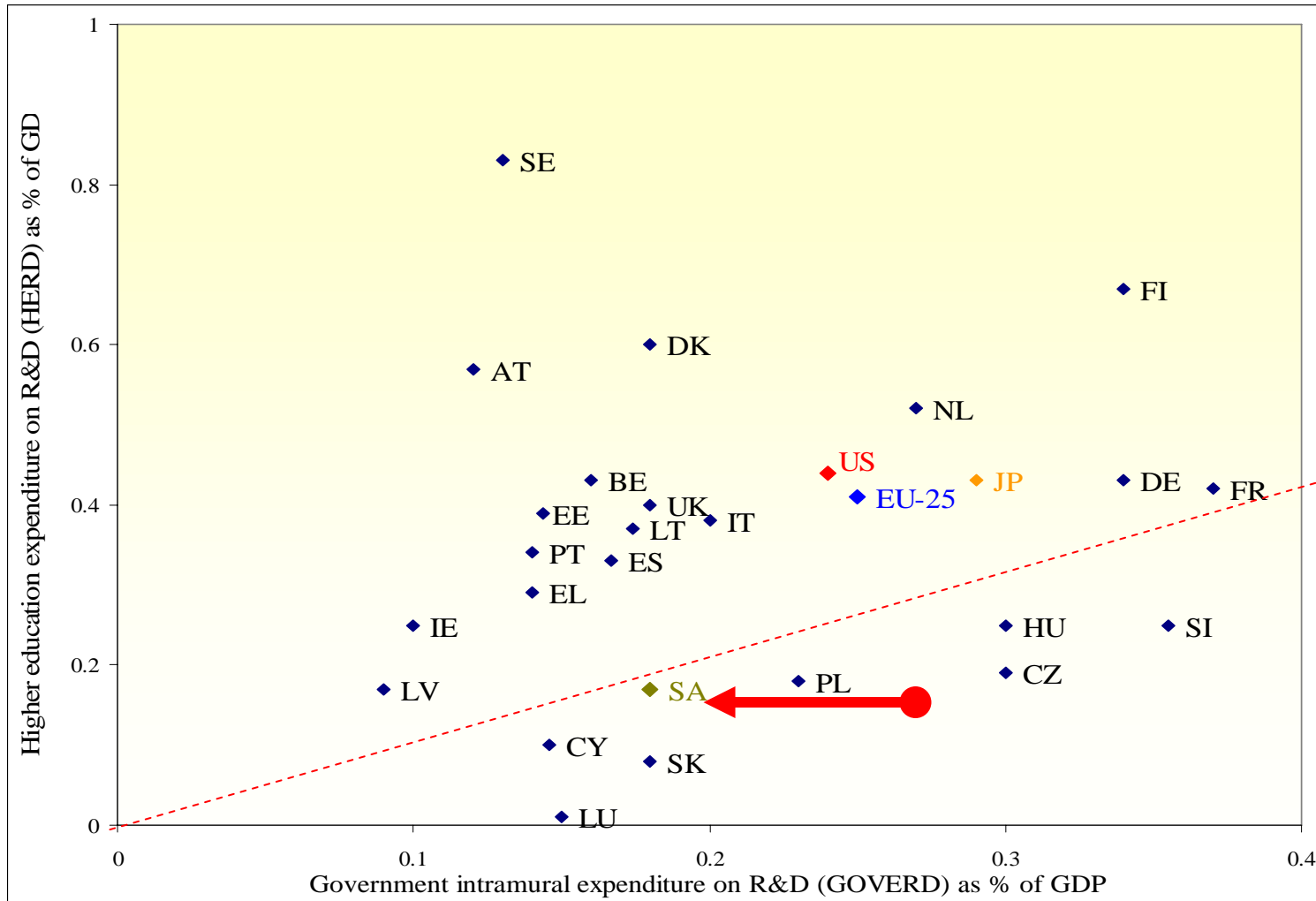
# GDP/GDP EU comparison



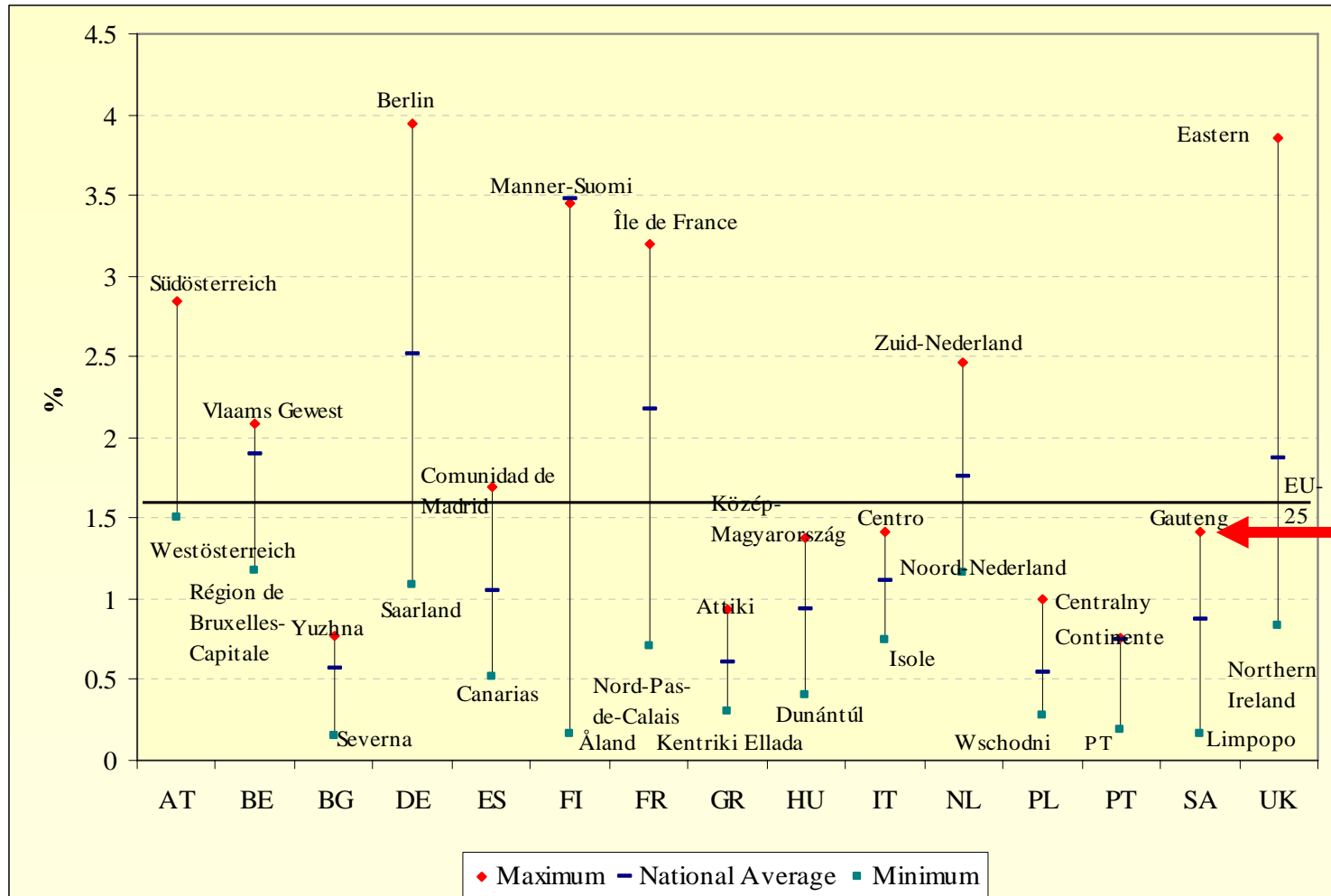
*Country diversity*

Source: CeSTII EU-25 Benchmarking study (2006)

# Public R&D in relation to GDP, 2003

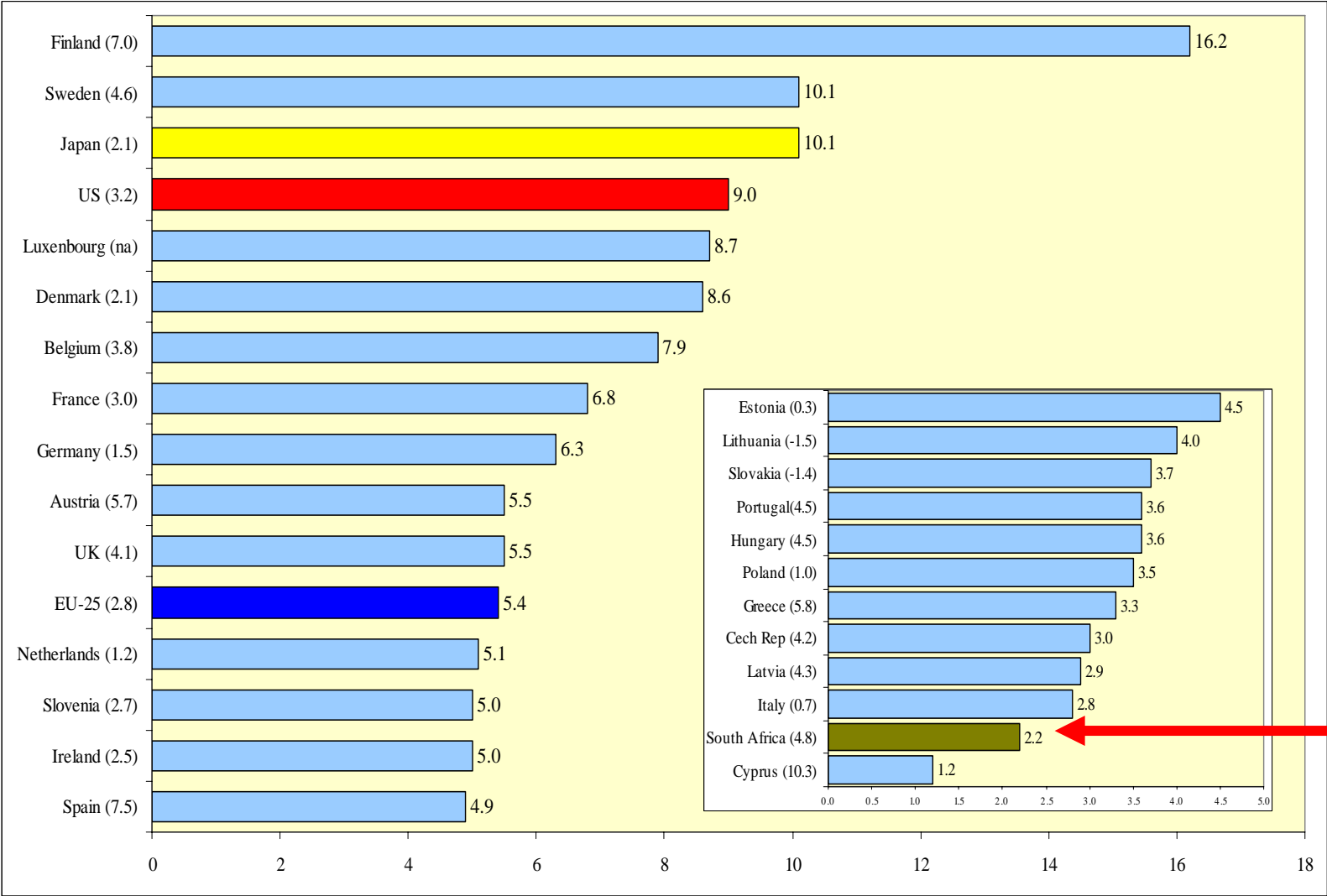


# Regional R&D : GDP NUTS 1

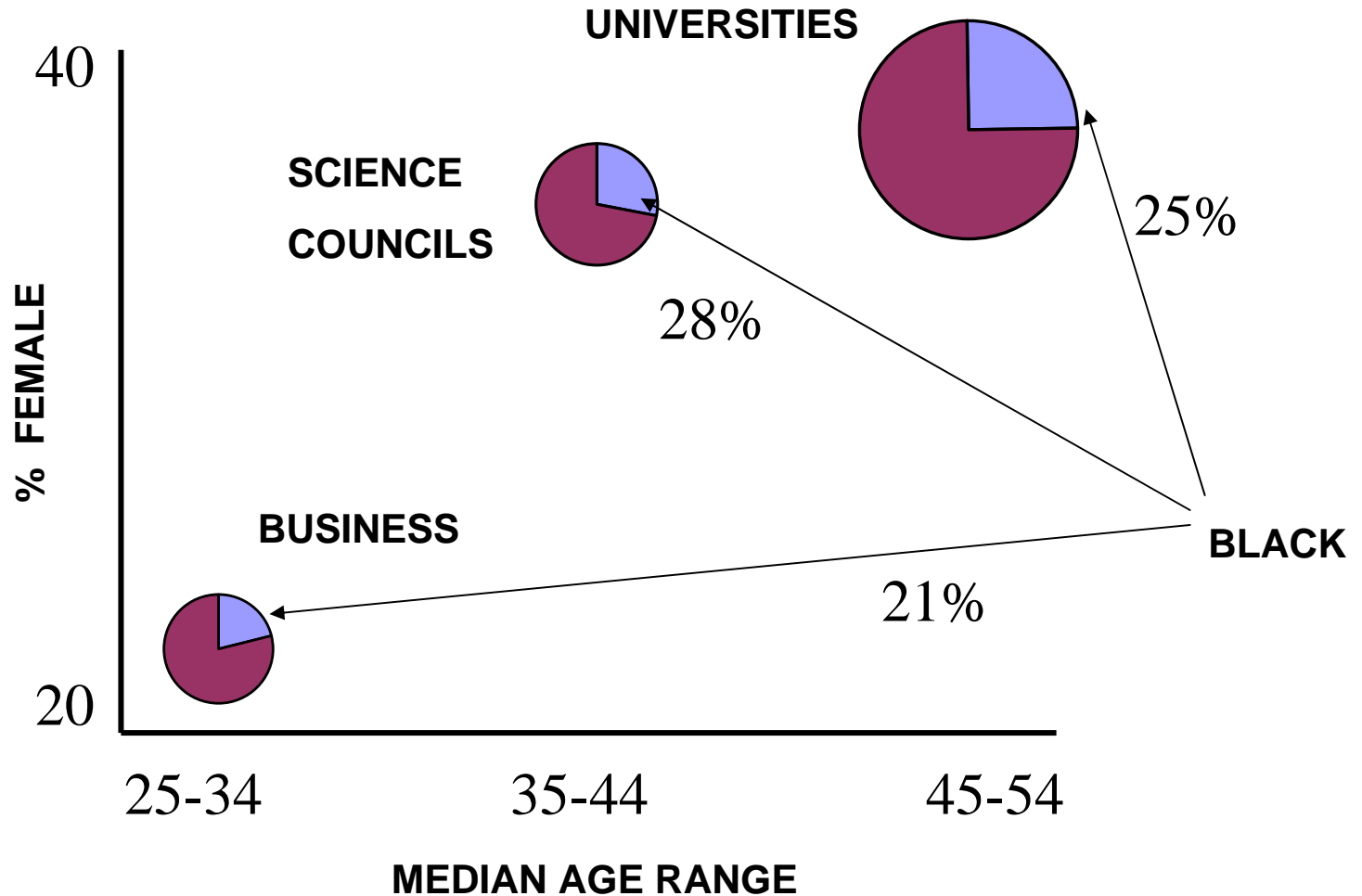


*Regional diversity*

# Researchers (FTE)/1000 labour force (2003/04)



# Researchers: No, % Female, Group, Sector



**DIVERSE R&D ACTIVITY**

Blue Skies

SocSci/  
Humanities  
R1,5bn

Environment  
R0,8bn

Manufacturing  
R0,8bn

R1,3bn

Chemicals  
R0,7bn

Min/ Nat.  
Resources  
R1,5bn

Medical R1,0 bn

Agric R0,8bn

Clinical  
Trials

Defence/  
Aerospace  
R0,9bn

Software/  
ICT

Energy  
R0,7bn

R0,7bn

R1,5bn

# Publications

1991			2001	
Discipline	SRCA		Discipline	SRCA
Geol/Petrol/Mining Engn	8.976	→	Geol/Petrol/Mining Engn	8.732
Multidisciplinary	4.211		Animal Sciences	4.338
Animal Sciences	3.897	→	Entomology/Pest Control	4.014
General & Internal Medicine	3.637		Philosophy	3.174
Aquatic Sciences	3.225		Veterinary Med/Animal Health	2.919
Entomology/Pest Control	3.193	→	Environ Studies, Geog & Dev	2.787
Archaeology	3.034		Multidisciplinary	2.755
Veterinary Med/Animal Health	2.719		Environment/Ecology	2.654
Plant Sciences	2.622		Plant Sciences	2.643
Inorganic & Nucl Chemistry	2.429		Political Sci & Public Admin	2.603
Classical Studies	2.362		General & Internal Medicine	2.266
Environment/Ecology	2.306		Aquatic Sciences	2.251
History	2.077		Biology	2.139
Philosophy	2.036		Education	2.088

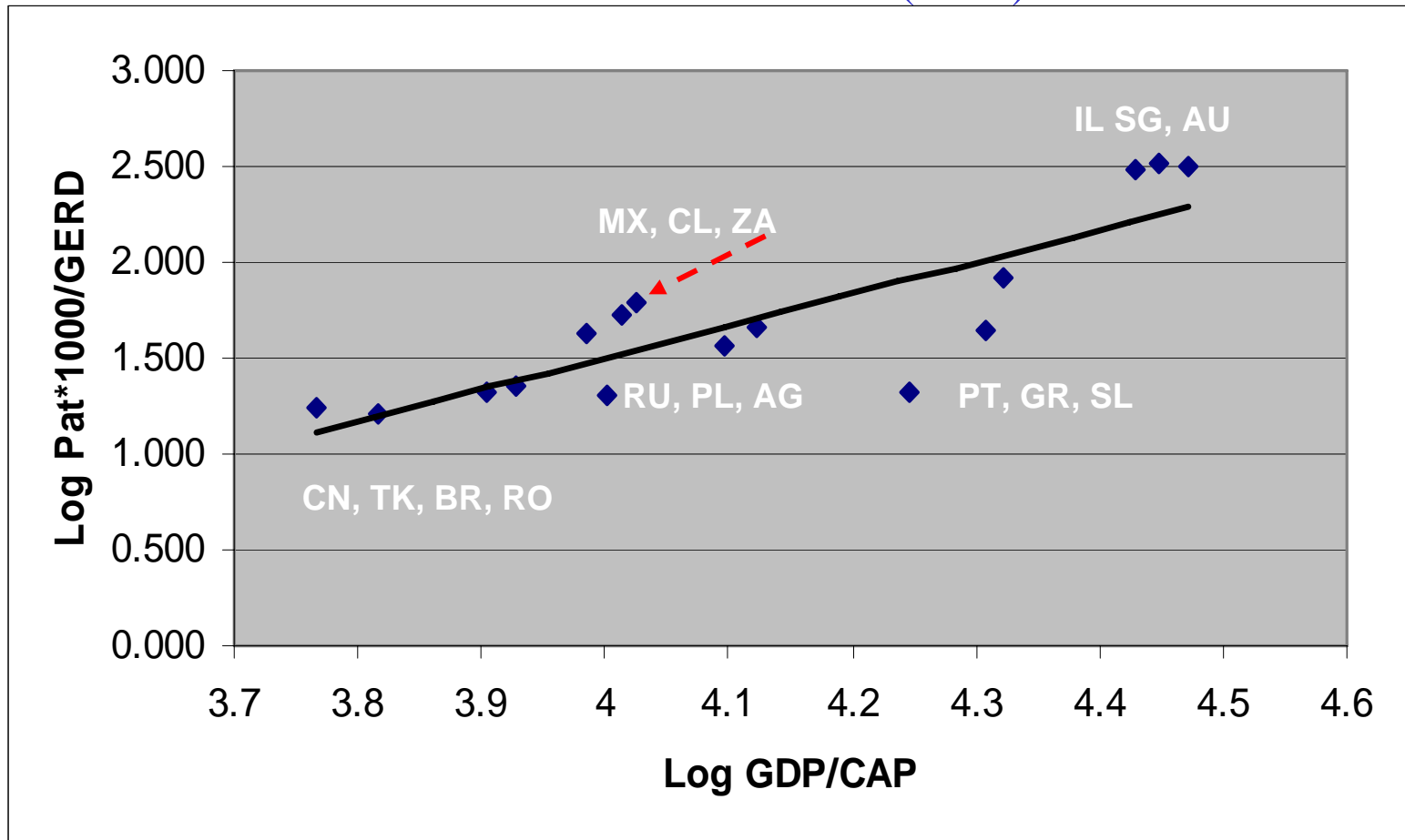
Source: Albuquerque, E. (2003) 'Immature systems of innovation: Introductory notes about a comparison between South Africa, India, Mexico and Brazil'  
CEDEPLAR/FACE/IFMG

*Falling world share, but key strengths*

## USPTO Patents (SA assignees)

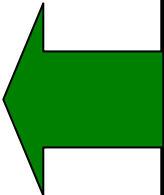
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
No.	89	99	137	112	112	115	110	111	120	113	112

## US Patents filed vs. wealth (2004)



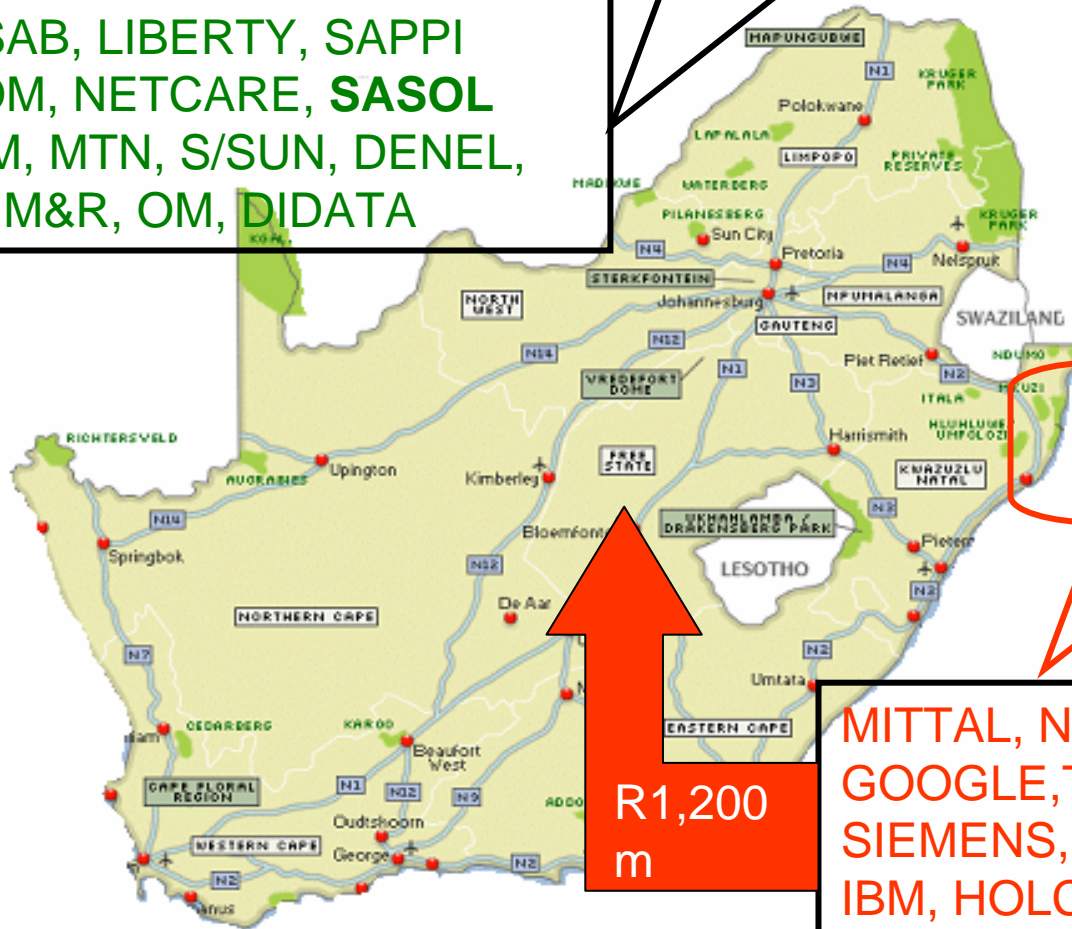


# Business



AAC, SAB, LIBERTY, SAPPI  
TELKOM, NETCARE, **SASOL**  
ESKOM, MTN, S/SUN, DENEL,  
ABSA, M&R, OM, **DIDATA**

Home base  
exploiting?



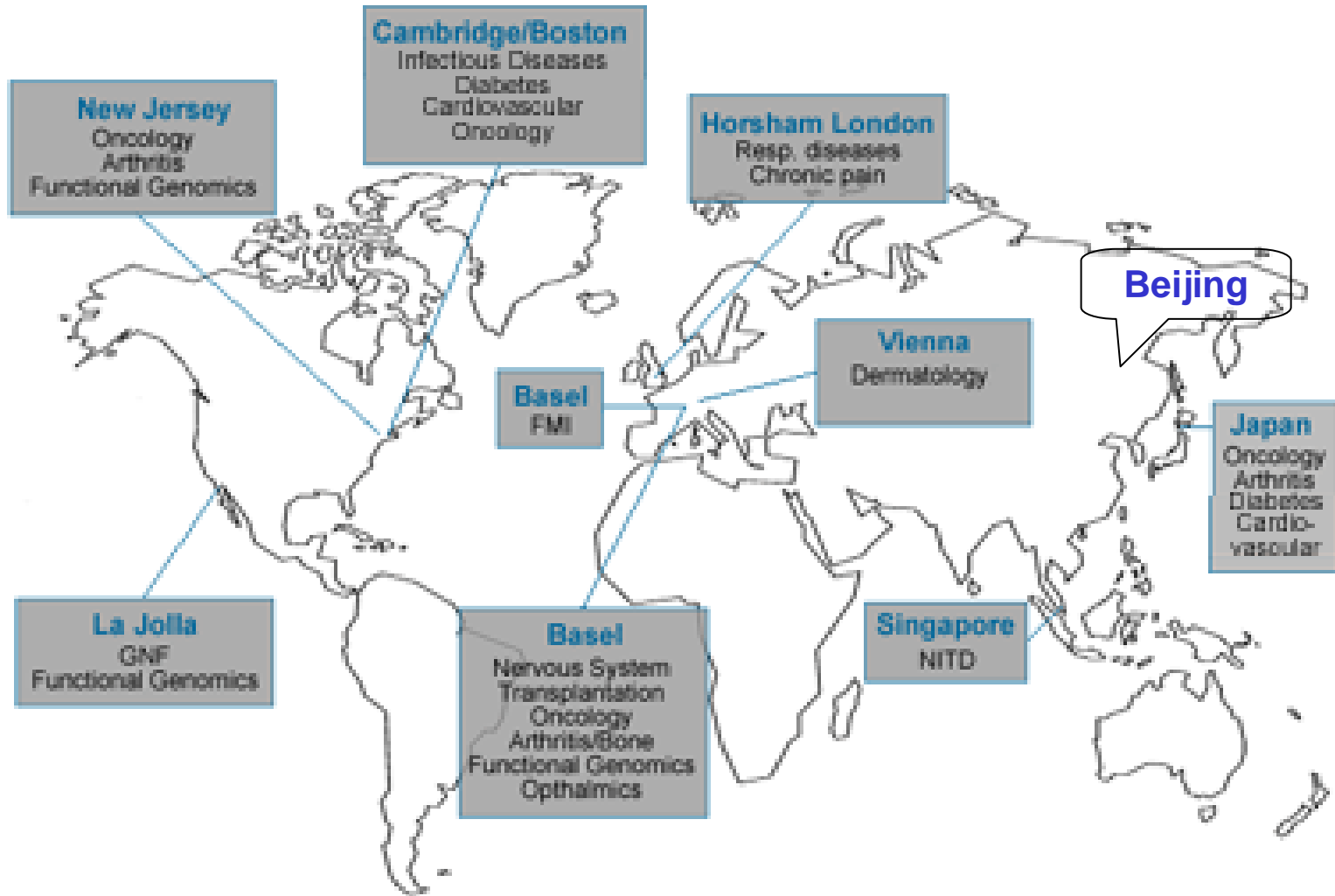
Home base  
exploiting?

R1,200  
m

MITTAL, NOVARTIS,  
GOOGLE, TOYOTA, GM,  
SIEMENS, CISCO, CIPLA,  
IBM, HOLCIM, DAIMLER,  
PARMALAT, SAAB, BAE,  
BHP, PAREXEL

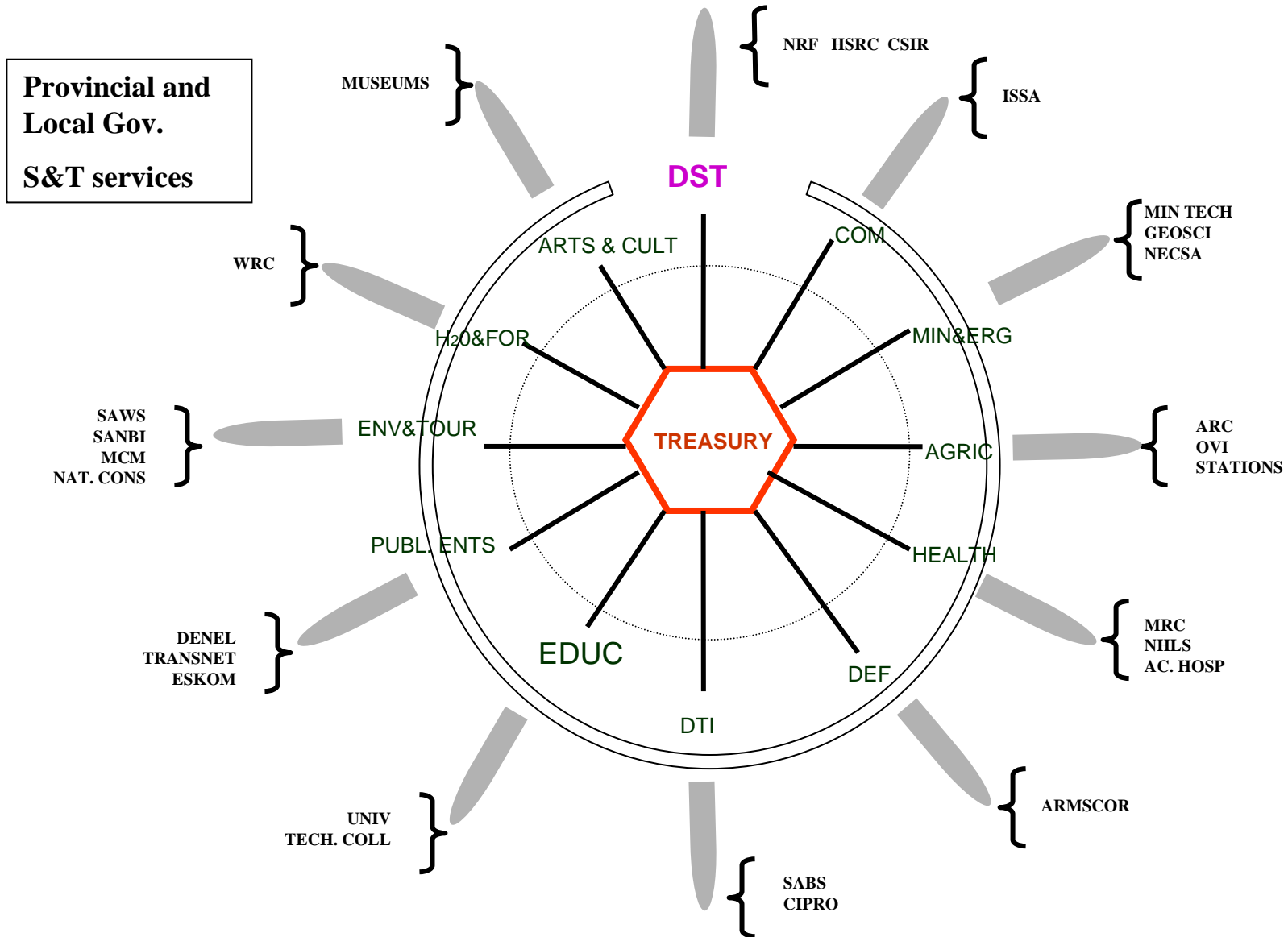
- Local R&D base; 90% funded by business
- R1,2 billions inflows ;27% by foreign companies
- Resources 30%; services 27%
- Mix – 41% high tech; 29.5% low/medium low
- SMMEs 24%
- Collaboration w HE and Research Institutes
- Funds 16% of HERD – substitution role?

## Novartis Pharmaceuticals Research Worldwide Community 2004



*R&D 24/7, 360° ‘... the sun never sets at IBM research’*

# Science policy praxis



*Knowledge Economy Growth = F(People, Ideas, Things)*

# Recognizing

...

- Unique geographic advantages
- Minerals, resources and energy complex
- Diversified economy
- Defence & Aerospace – origins in 1<sup>st</sup> and 2<sup>nd</sup> World Wars
- Arms embargo & nuclear programme (PBMR)
- Legacy of sanctions and import substitution
- Massive structural inequalities

*No poverty of technologies*

# Legislating ...

1. Department of Science & Technology
  - Technology Missions & Platforms inc. 'Technology for Poverty Reduction'
  - Builds on Foresight?
2. Business (autonomous)
  - Direct incentives: grants; competitive funds; awards
  - Indirect incentives through tax break
3. Higher education (publicly-funded)
  - Dual stream + 3rd stream competitive
  - Centres of Excellence
  - Research Chairs Programme
4. Science Councils (arms length) and the market

# People

- Impact of HIV/AIDS pandemic
- Inclusion: 'pockets and layers'
- Insufficient high quality school leavers, increased HE enrolment, slow staff growth
- Waning interest in SET careers
- Disciplinary ageing
- Globalization pressures, mobility & law
  - Losses through emigration
  - Little inward flow (foreign university staff <5%)
  - Potential of foreign postgraduate students (15-20%)

# Ideas

- IP policy inc. forex
- Transfer & spillover enablers
- Invention, open innovation and Informal sector contribution
- Indigenous knowledge systems
- Governance and accountability
- Sustainable development & MDGs
- Outcomes & impact analysis



# Things (Capital)

- Infrastructure degradation
- Utilities pricing
- Angel investors and venture capital
- The role of state parented organisations
  - SASOL
  - PBMR
  - Defence Aerospace
- Autonomous publicly-funded institutions
  - High SSH spend
  - What research areas to grow/curtail?

*(The) ... challenge for policymakers is to ensure that the benefits of global economic integration are sufficiently widely shared .... (and) a consensus for welfare enhancing change can be obtained.'*  
*(Ben Bernanke, 2006)*

*'... the world's more prosperous states ... have to introduce more coherent policies towards the developing world, .... the world's poorer states have ...to create the conditions,... for economic growth. In the absence of such conditions ... many people will feel that they have no other choice but to leave their own country.*  
*(Mamphela Ramphela, 2004)*

An aerial photograph of a city, likely Seattle, showing a dense urban area with various buildings, a large body of water (the Puget Sound) in the middle ground, and a prominent mountain (Mount Rainier) in the background under a clear sky. The text "THANK YOU" is overlaid in the center of the image.

**THANK YOU**