

# *Going global: working with South Africa's universities*

University of Kwazulu-Natal  
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*Prof. Michael Kahn*

*Centre for Science, Technology and Innovation Indicators  
HSRC*

# *1. Universities in the knowledge economy*

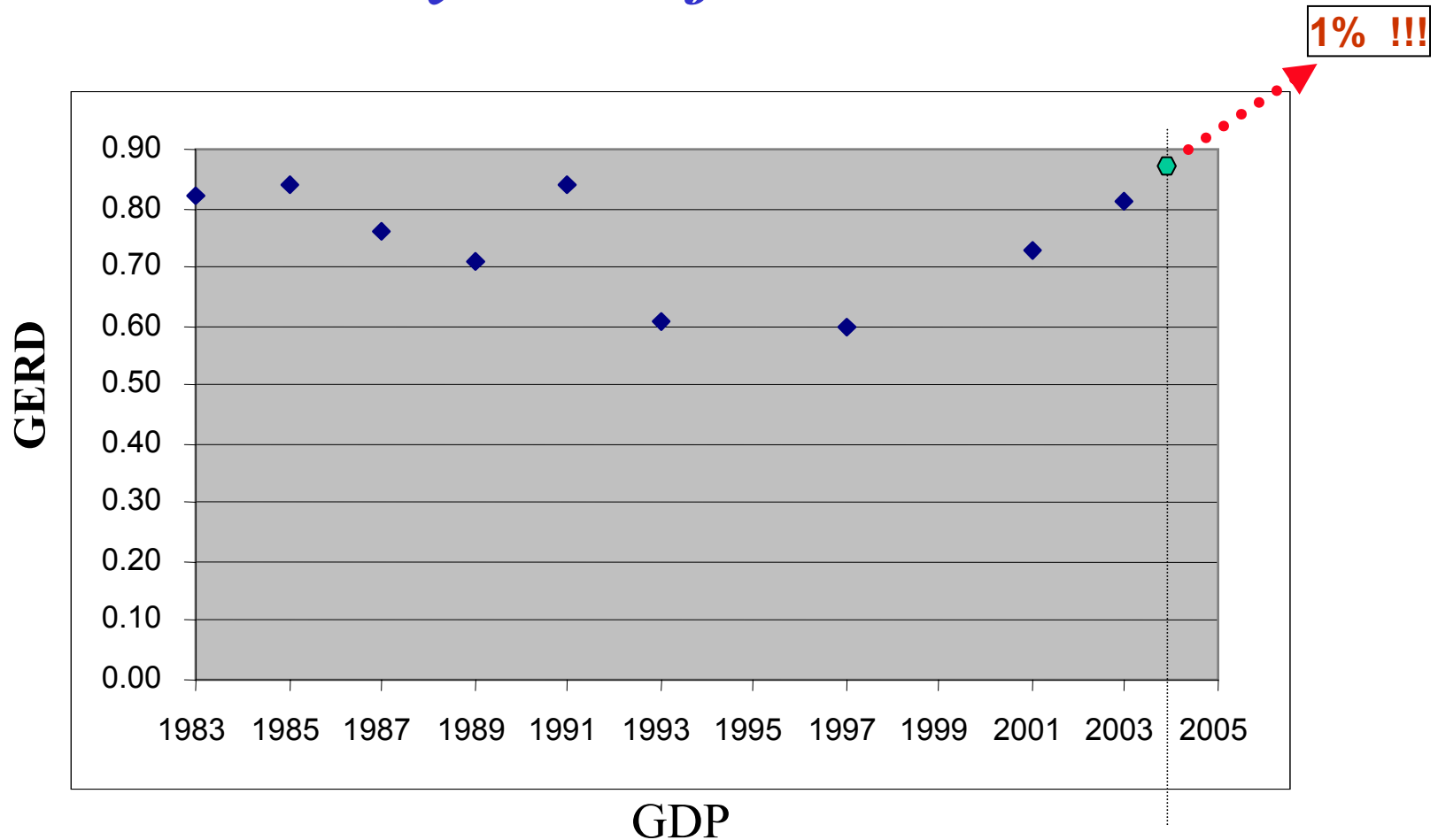
1. Shanghai 250 (UCT #248); THES 200 (no show)
2. Global commercial footprints
3. NRFE 250 (Metro #81); SASOL in top 20 global performers of R&D
4. Becoming 'open' : exports beyond 28% of GDP
5. No longer a resource-based economy: Services = 69% of GDP

*What sustains and drives this?*

# *Role of R&D*

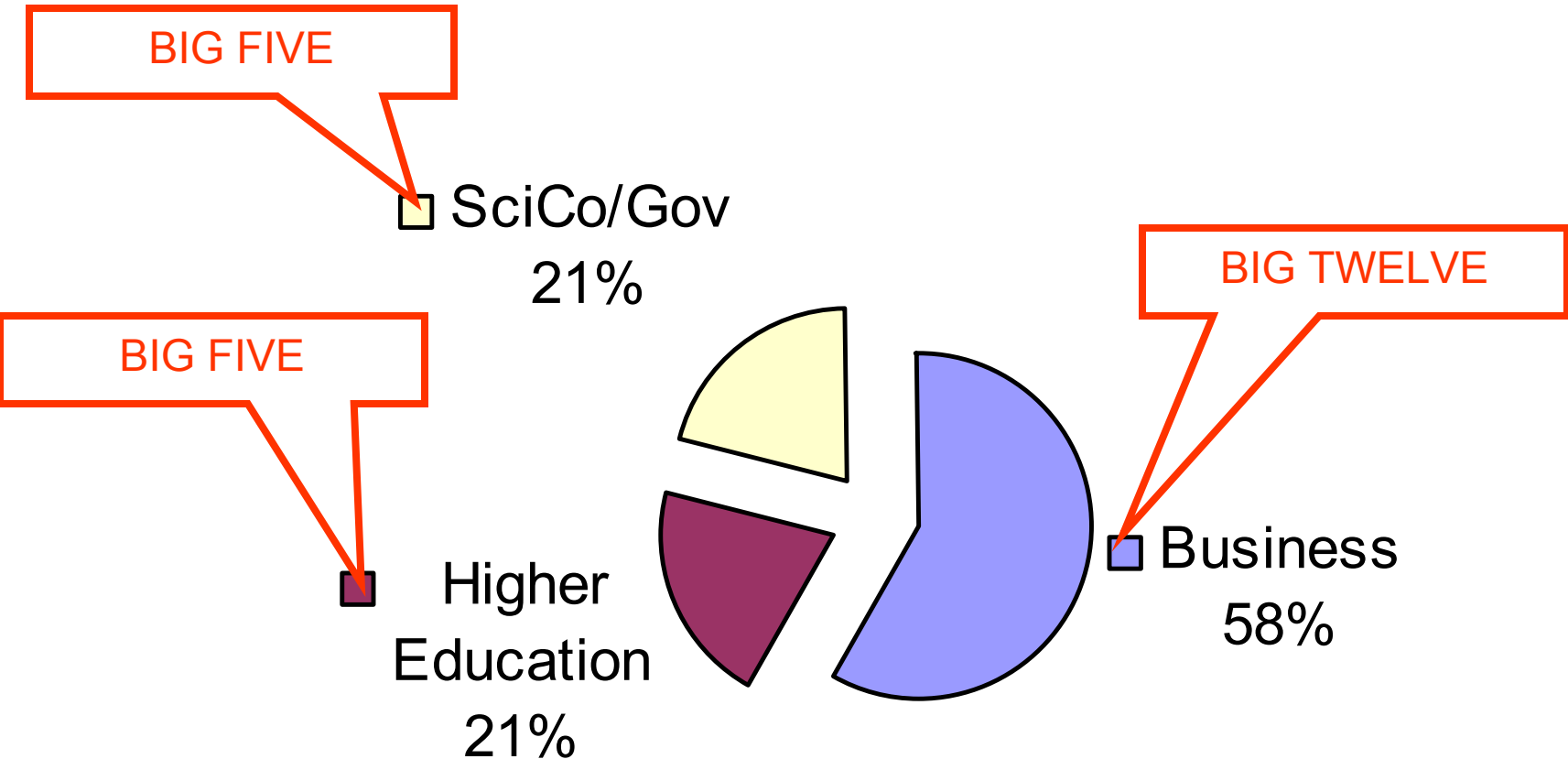
1. 'R&D can be defined as any project to resolve scientific or technological uncertainty aimed at achieving an advance in science or technology. Advances include new or improved products, processes and services.' (UK DTI <http://www.dti.gov.uk/innovation/randd/>)
2. 'The volume of R&D investment reflects the economy's efforts in creating and accumulating new knowledge, which is essential to modern knowledge-based economies. It may also be considered an indirect measure of a society's innovation capacity' (EU, 2003: 45).

## 2. System of innovation



*Estimating R&D is like collecting taxes*

***GERD = R 12,07 billions***



*The top five Universities perform 60% of HERD*

# *Performed by Researchers (FTE)*

SciCo/  
Gov

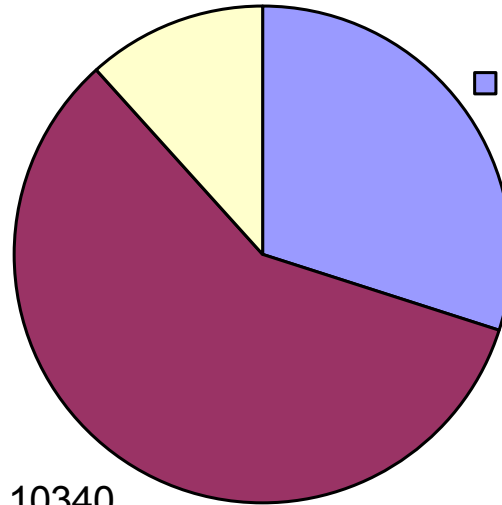
□ 2039

Business

■ 5300

■ 10340

Higher  
Education



### *3. Researching Higher Education*

<b>Year</b>	<b>1991</b>	<b>2003</b>	<b>% Change</b>
<b>Students</b>	430 014	717793	67%
<b>Masters &amp; doctoral students</b>	24 802	52333	111%
<b>Instruction &amp; Research staff</b>	11 831	14 534	23%

*Sustained by contract staff?*

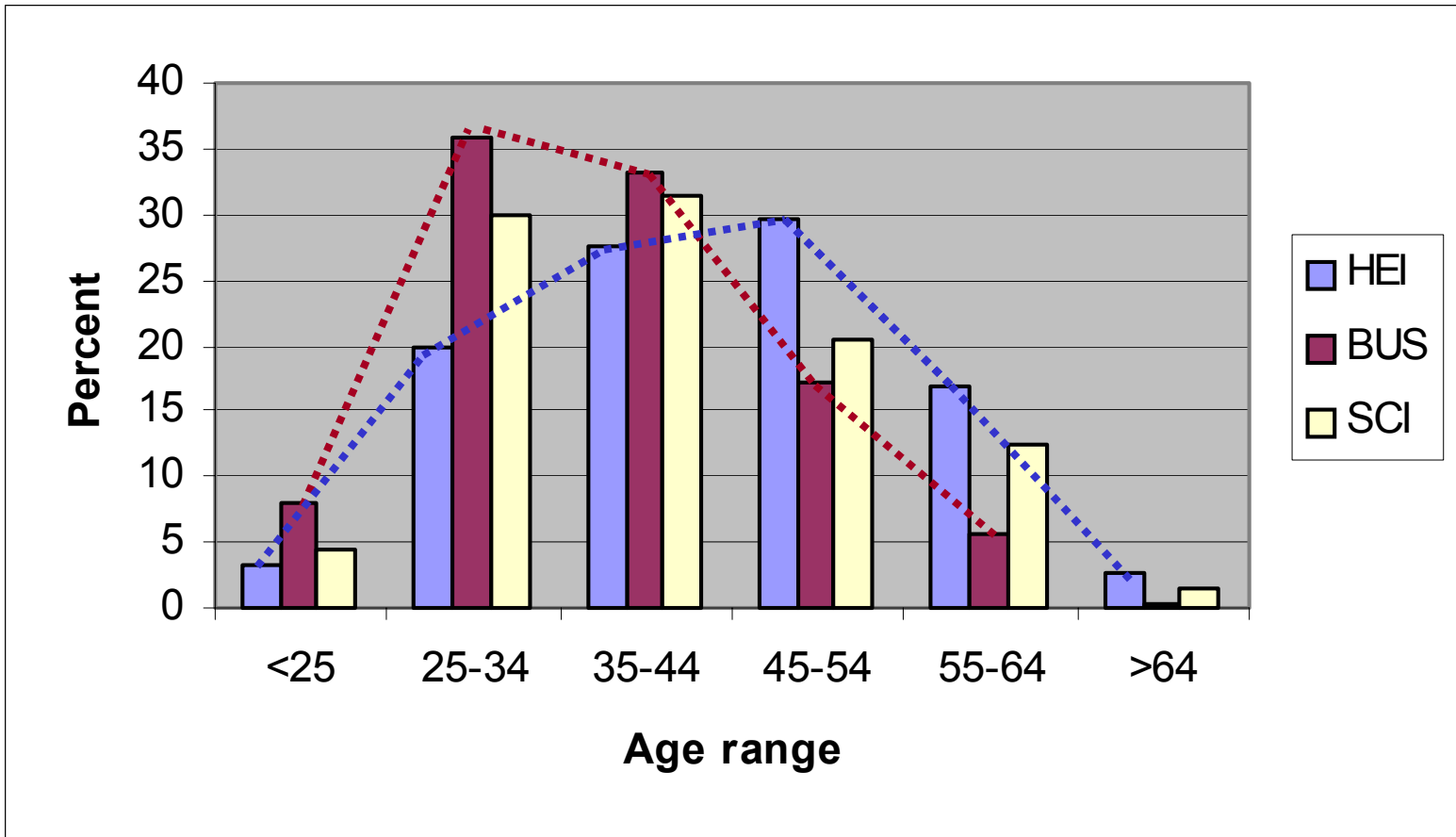
## *Whither academia?*

<b>Sector</b>	<b>1992</b>	<b>2005</b>
Business	3395	5300
Government	2428	2039
Higher Education	3631	3506
<b>TOTAL</b>	<b>9454</b>	<b>10845</b>

Source: DNE, 1993; DST, 2006



# Who is greying?



# *Research Fields*

		<b>Business</b>		<b>Higher Education</b>		<b>Science Councils</b>	
		000s	%	000s	%	000s	%
<b>Basic Sciences</b>		906,156	<b>13</b>	415,000	<b>16.4</b>	329,825	<b>13.1</b>
<b>ICT</b>		1,280,249	<b>18.4</b>	98,240	<b>3.9</b>	155,543	<b>6.2</b>
<b>Appl Science</b>		861,271	<b>12.4</b>	43,653	<b>1.7</b>	68,277	<b>2.7</b>
<b>Engineering Sci</b>		2,101,662	<b>30.2</b>	307,141	<b>12.1</b>	459,742	<b>18.3</b>
<b>Medical Sciences</b>		1,017,278	<b>14.6</b>	440,249	<b>17.4</b>	321,732	<b>12.8</b>
<b>Life Sciences</b>		423,350	<b>6.1</b>	342,448	<b>13.5</b>	944,969	<b>37.6</b>
<b>Soc Sciences</b>		374,667	<b>5.4</b>	887,240	<b>35</b>	231,293	<b>9.2</b>
<b>TOTAL</b>		<b>6,964,633</b>	<b>100</b>	<b>2,533,971</b>	<b>100</b>	<b>2,511,381</b>	<b>100</b>

*Balanced? Skewed?*

# Publications

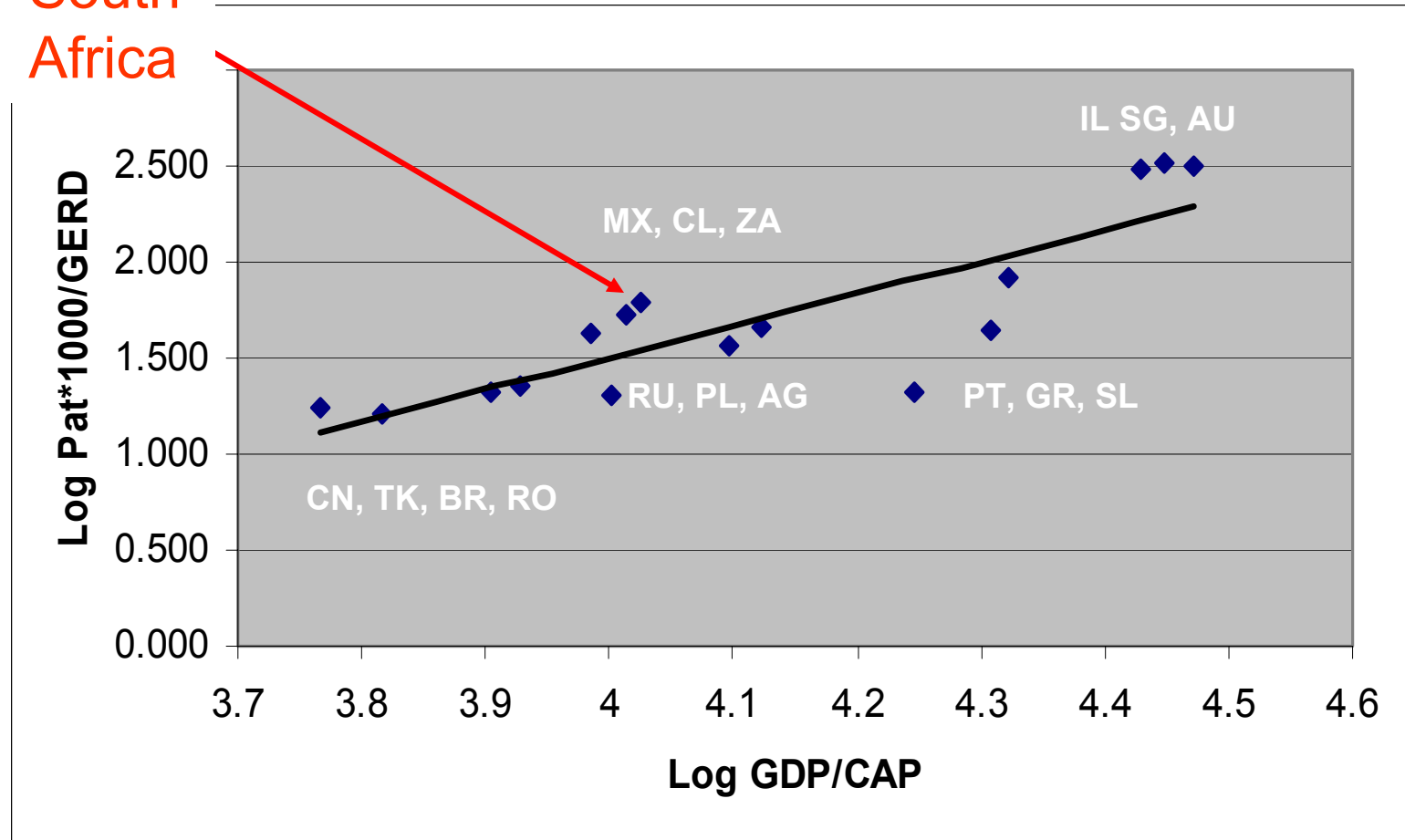
1991			2001	
Discipline	SRCA		Discipline	SRCA
Geol/Petrol/Mining Engn	8.976	→	Geol/Petrol/Mining Engn	8.732
Multidisciplinary	4.211		Animal Sciences	4.338
Animal Sciences	3.897	→	Entomology/Pest Control	4.014
General & Internal Medicine	3.637		Philosophy	3.174
Aquatic Sciences	3.225		Veterinary Med/Animal 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*

# *US Patents filed vs. Wealth*

South  
Africa

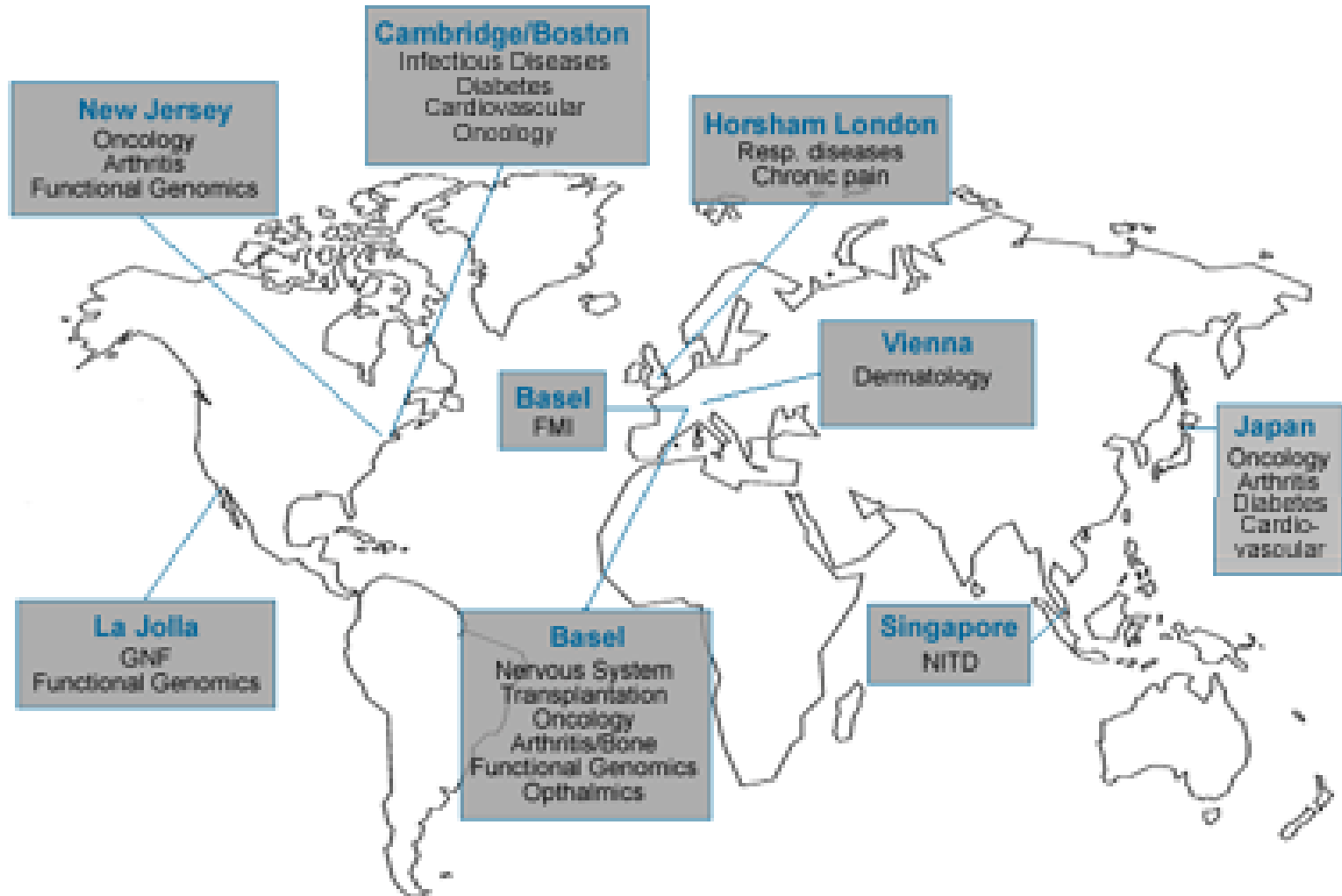


Source: OECD 2003, 2004; RICYT, 2004

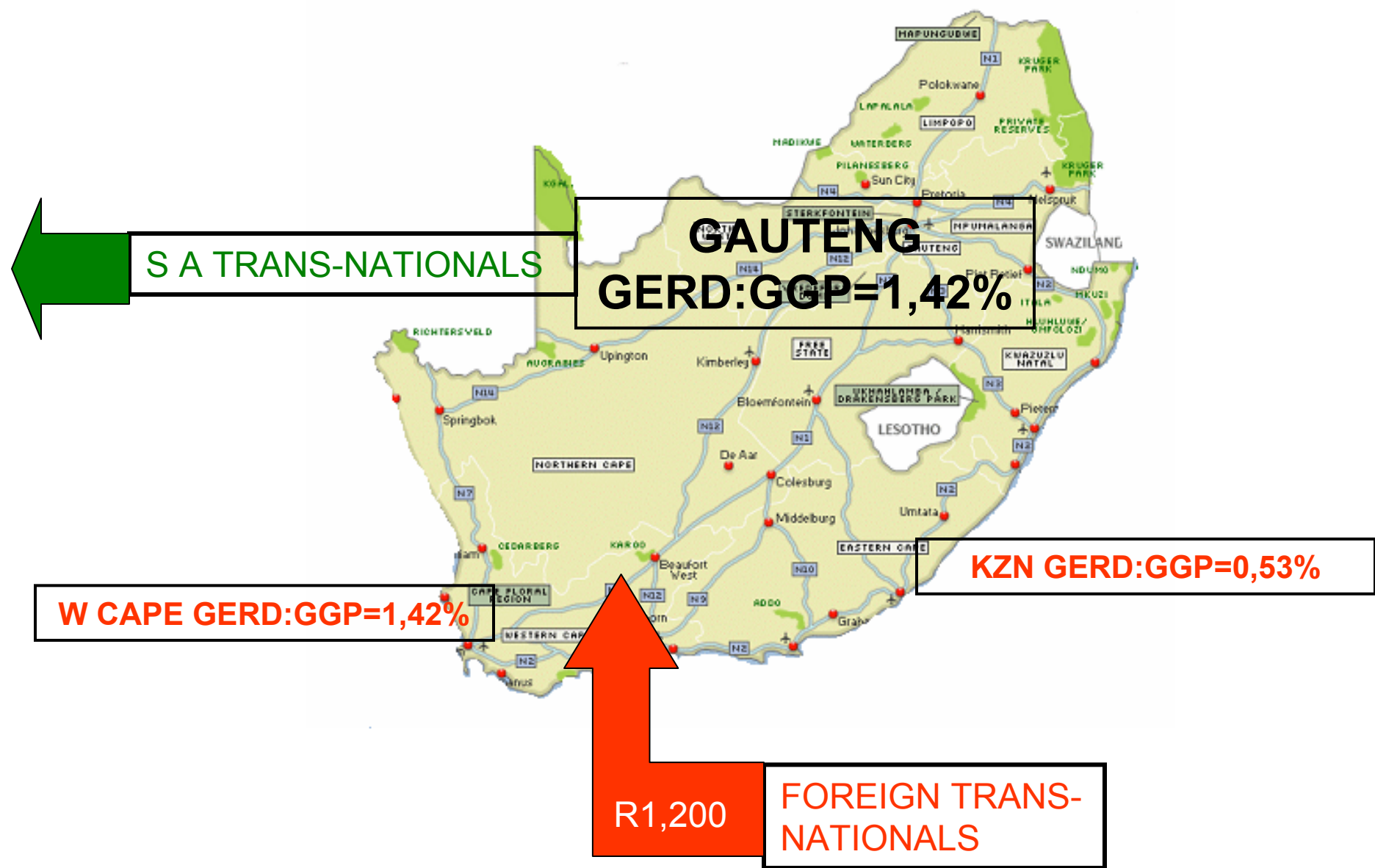
*Falling share, but commensurate with wealth*

# 4. Globalisation of R&D

## Novartis Pharmaceuticals Research Worldwide Community 2004



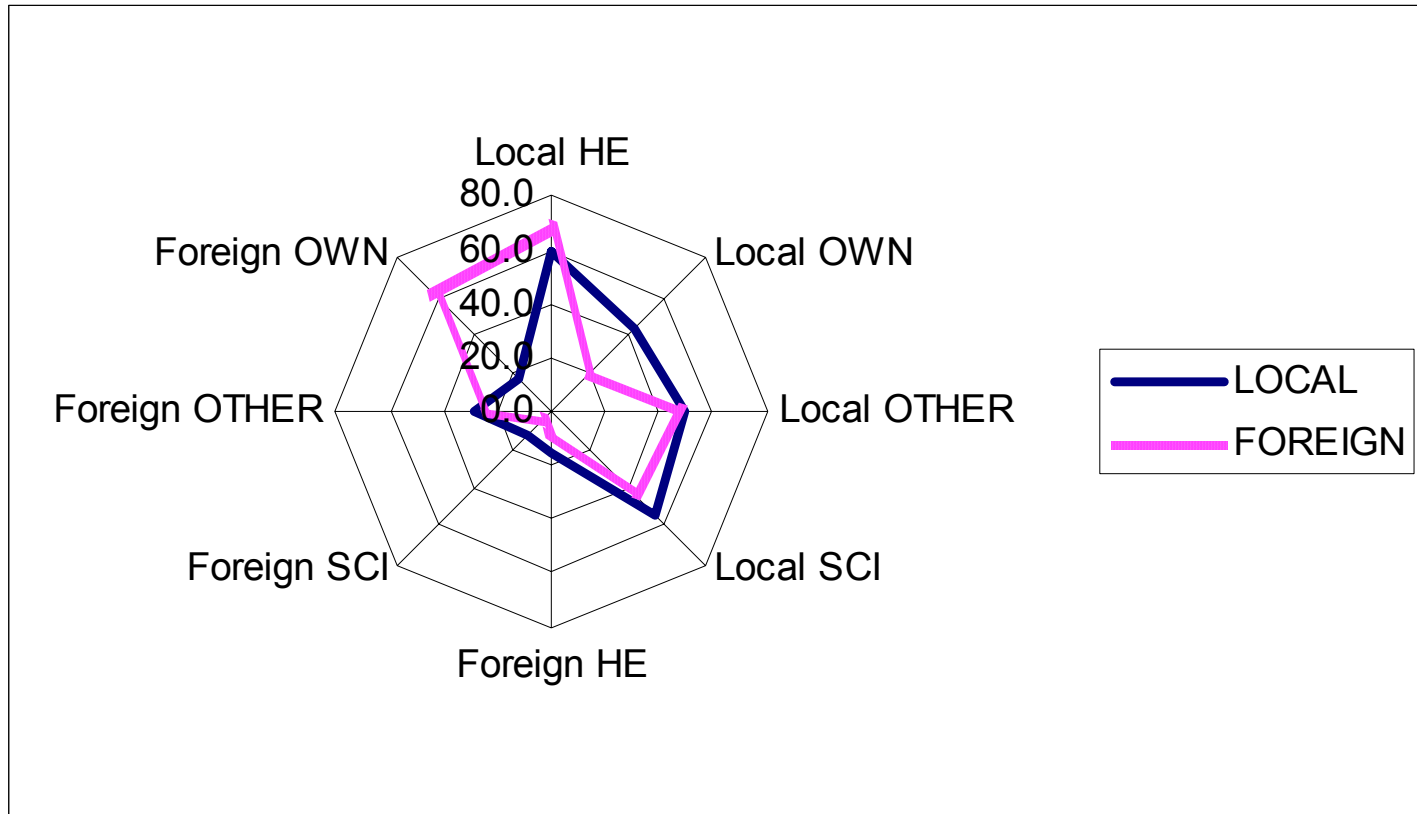
*R&D 24/7, 360° ‘... the sun never sets at IBM research’*<sup>13</sup>



## *5. Measuring openness*

1. Foreign students >8%
2. Foreign staff <5%
3. Co-publication
  - Clinical medicine 27%
  - Plant and animal science 11%
4. Research collaboration
5. Foreign funding 10%

# *Industry + universities + science councils*





## *6. Challenges and opportunities*

1. Quality of life
2. User-friendly immigration, tax incentives and intellectual property law
3. Quality teaching and research staff – stocks and mobility
4. Quality research infrastructure

**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

# *Focus, focus, focus*

1. Play from strengths
2. Identify new opportunities – e.g. clinical trials value chain
3. Retain graduate (especially foreign) students
4. Benefit via Research Chairs programme
5. Seek synergy with private sector I.r.o. tax incentive
6. Reward and celebrate excellence

*The knowledge workers of all lands are on a flight, they have nothing to lose but their brains (apologies to F. Engels)*

*Learn and teach Mandarin*