



UNIVERSITY OF CAPE TOWN
Groote Schuur and Red Cross Children's Hospital

**CLINICAL SCHOLARS PROGRAMME WORKSHOP: Increasing the Quality and Quantity
of PhDs in the Clinical Sciences at South African and African medical schools**

15TH July 2011: 08h45-16h00

Twelve Apostles Hotel, Oudekraal, Camps Bay

Implications of a bibliometric analysis of South Africa's outputs in clinical science

Michael Kahn

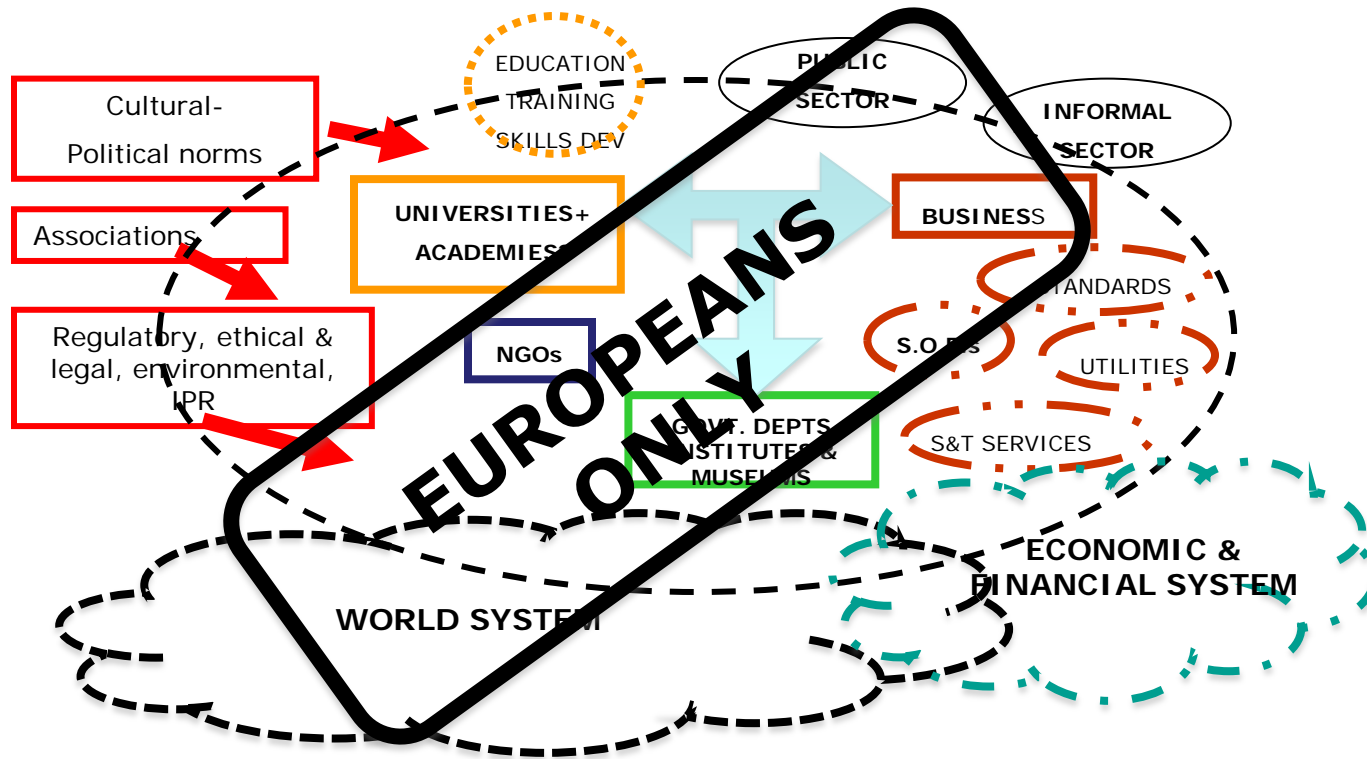
Centre for Research Evaluation of Science and Technology,
University of Stellenbosch, South Africa

Roundtable Meeting for the preparation of the
Science,

mikejkahn@gmail.com

The political economy of South Africa

- Developmental state I (1920 -1980) *Apartheid Constructed Crisis*; minerals-energy complex + inward industrialization.
- Lean state (1980 – 2010) adopted under pressure



- Toward Developmental state II

Publication counts, Web of Science

2004-2008 total count 33 671		Ratio	1990-1994 total count 20 892	
Subject area	33		Subject area	20
	671	1.6		892
Plant sciences	1 990		Medicine, general & internal	2 280
Medicine, general & internal	1 556		Plant sciences	1 132
Ecology	1 269		Multidisciplinary sciences	912
Infectious diseases (67)	1 099	8.3	Zoology	752
Public, environmental & occupational health (22)	1 016	3.5	Surgery	721
Immunology (48)	930	5.4	Biochemistry & molecular biology	612
Multidisciplinary sciences	906		Ecology	606
Zoology	903		Veterinary sciences	603
Environmental sciences	891		Marine & freshwater biology	552
Biochemistry & molecular biology	873		History	532
Pharmacology & pharmacy	862		Astronomy & astrophysics	407
Biotechnology & applied microbiology (29)	696	2.7	Pharmacology & pharmacy	397
Veterinary sciences	679		Environmental sciences	382
Astronomy & astrophysics	662		Area studies	378
Microbiology (25)	629	2.3	Water resources	354
Marine & freshwater biology	626		Chemistry, multidisciplinary	350
Geosciences, multidisciplinary	621		Chemistry, inorganic & nuclear	346
Water resources	607		Geosciences, multidisciplinary	340
Psychology, multidisciplinary (41)	578	2.8	Mining & mineral processing	329
Virology (96)	564	6.6	Chemistry, physical	327
Psychiatry (120)	562	9.4	Entomology	296
Surgery (5)	542	0.8	Public, environmental & occupational health	291
Engineering, chemical (39)	536	2.4	Chemistry, organic	281
Education & educational research (100)	509	6.4	Metallurgy & metallurgical engineering	281
Entomology	494		Microbiology	274

	1990-1994	20892		2004-2008	33671
	Institution Name	N		Institution Name	N
1	UNIVERSITY OF CAPE TOWN	4105	1	UNIVERSITY OF CAPE TOWN	6556
2	UNIVERSITY WITWATERSRAND	3607	2	UNIVERSITY OF THE WITWATERSRAND	4594
3	UNIVERSITY OF NATAL	2185	3	UNIVERSITY OF PRETORIA	4507
4	UNIVERSITY OF PRETORIA	2030	4	STELLENBOSCH UNIVERSITY	4141
5	STELLENBOSCH UNIVERSITY	1382	5	UNIVERSITY OF KWAZULU NATAL	3563
6	UNIVERSITY OF ORANGE FREE STATE	883	6	RHODES UNIVERSITY	1250
7	RHODES UNIVERSITY	656	7	UNIVERSITY OF THE ORANGE FREE STATE	1127
8	MRC	644	8	NORTH-WEST UNIVERSITY	929
9	ARC	612	9	UNIVERSITY OF THE WESTERN CAPE	920
10	RAND AFRIKAANS UNIVERSITY	598	10	UNIVERSITY OF JOHANNESBURG	882
11	GROOTE SCHUUR HOSPITAL	587	11	MRC	871
12	UNIVERSITY OF SOUTH AFRICA	501	12	UNIVERSITY OF SOUTH AFRICA	619
13	CSIR	460	13	ARC	508
14	SAIMR	387	14	NELSON MANDELA METROPOLITAN UNIVERSITY	503
15	UNIVERSITY OF THE NORTH	358	15	CSIR	429
16	POTCHEFSTROOM UNIVERSITY CHE	354	16	GROOTE SCHUUR HOSPITAL	419
17	UNIVERSITY OF PORT ELIZABETH	343	17	UNIVERSITY OF LIMPOPO	344
18	UNIVERSITY OF THE WESTERN CAPE	276	18	OXFORD UNIVERSITY	339
19	TYGERBERG HOSPITAL	262	19	TSHWANE UNIVERSITY OF TECHNOL	330
20	BARAGWANATH HOSPITAL	230	20	NATIONAL HEALTH LABORATORY SERV	295
21	SEA FISHERIES RES INST	187	21	NATIONAL INSTITUTE OF COMMUNICABLE DISEASE	260
22	NATIONAL BOTANICAL INSTITUTE	176	22	S A NATIONAL BIODIVERSITY INSTITUTE	258
23	JOHANNESBURG HOSPITAL	166	23	S A ASTRONOMICAL OBSERVATORY	244
24	S AFRICAN ASTRON OBSERV	158	24	FORT HARE UNIVERSITY	232
25	RED CROSS WAR MEM CHILDRENS HOSPITAL	150	25	LONDON SCH HYG & TROP MED	217
26	MINTEK	149	26	HUMAN SCIENCES RESEARCH COUNCIL	203
27	NATIONAL ACCELERATOR CTR	116	27	HARVARD UNIVERSITY	198
28	KING EDWARD VIII HOSPITAL	96	28	UNIVERSITY OF CAMBRIDGE	196
29	ATOMIC ENERGY CORP	81	29	COLUMBIA UNIVERSITY	185
30	TRANSVAAL MUSEUM	80	30	UNIVERSITY OF ZULULAND	171
31	UNIVERSITY OF TRANSKEI	69	31	CNRS	163

Full-time equivalent researchers, 1992 and 2007

Sector	1992	2007
Business	3 395	6 264
Government (inc. Science Councils)	2 428	3 058
Higher Education	3 631	3 672
Total	9 454	12 994

Headcount of researchers: 30 000
(Korea was at this level around
1982)

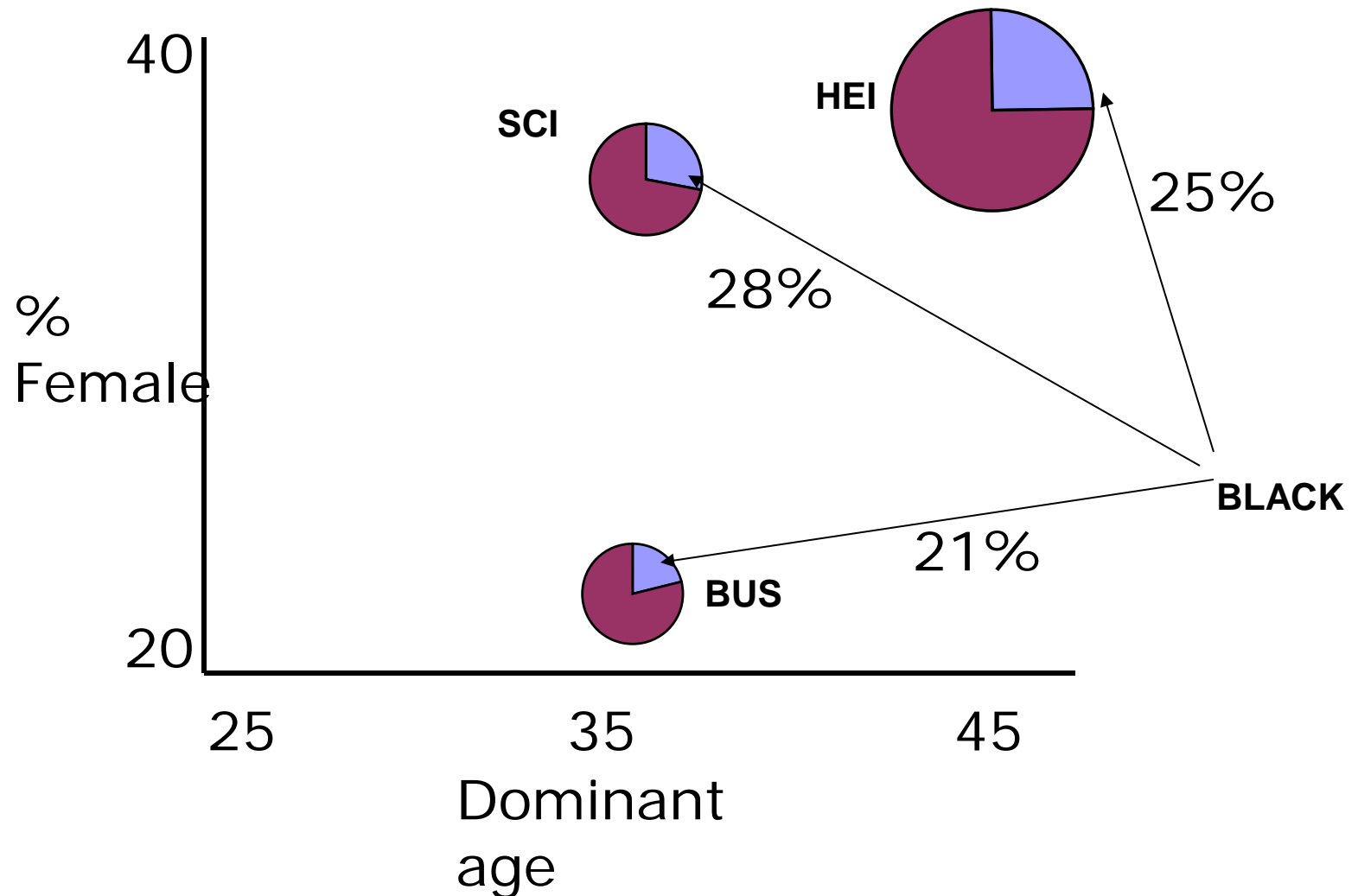
Systems grow iff they are nurtured

Table 1: Graduates by group, Science Councils, 1994

Science Council 1994	African		Coloured		Indian		White		Total
	M	F	M	F	M	F	M	F	
ARC	1						508	313	822
CSIR	17	6	4	4	9	5	732	262	1039
FRD (NRF)	5	1	1		2		100	27	136
Geoscience					2		114	28	144
HSRC	24	22	1	4	6	2	115	172	346
Mintek	3	1		2	9	1	162	53	231
MRC	2	7			4	2	74	61	150
SABS					1		147	107	255
Total	66	65	6	10	33	10	1952	1023	3123

Source: Motata, 1994.

Researchers: No, %F, Group, Sector



Source: DNE (1993), DST (2004)

Table 4: Graduates, CESM Natural Sciences fields, 2006.

Degree Subject area	3 yr	4 yr¹	Hons	Masters (research)	Masters (coursework)	PhD 2006	PhD 1996
Agriculture & Renewable Resources	386	574	181	163	50	54	16
Architecture	559	500	247	100	131	3	13
Computer Science & Dat. Proc.	1503	540	533	127	44	12	7
Engineering & Eng. Tech.		2930	298	412	176	105	53
Health Care & Health Sciences	903	4685	455	429	442	110	70
Life Sciences & Physical Sc.	2090	281	1100	503	109	206	136
Mathematical Sciences	1103	32	434	83	58	28	17
TOTALS	6544	9542	3248	1817	1010	518	312

Source: HEMIS Table 2.13, 2006

- **Ten Year Innovation Plan (2008)**
 - **Space Science** – remote monitoring & telemetry
 - **Energy**, hydrogen economy & new materials -catalysis
 - **Farmer to Pharma**-biotech, plant & animal science
 - **Global dynamics** – climate change – remote sensing
 - **Human and Social Dynamics** – poverty of technology or poverty of politics?

Innovation towards a knowledge-based economy: the transformation

<i>Indicator</i>	<i>Measure</i>	<i>2018</i>
SA positioned as knowledge-based economy	Economic growth attributable to technical progress (10% in 2002)	30%
	National income derived from knowledge-based industries	>50%
	Proportion of workforce employed in knowledge-based jobs	>50%
	Proportion of firms using technology to innovate	>50%
	GERD/GDP (0.92 in 2005; short-term 2008 target was 1%)	2%
	Global share of research outputs (0.5% in 2002)	1%
	High- and medium-tech exports/services as a percentage of all exports/services (30% in 2002)	55%
	Number of South African-originated US patents (100 in 2002)	250
Research and technology enablers	Matriculants with university exemption in maths and science (5.2% maths and 5.9% science in 2005)	10%
	SET graduates as percentage of all students in public higher education institutions (28% in 2005)	35%
	Number of SET PhD graduates per year (561 in 2005)	3 000
	Number of full-time equivalent researchers (was 11 439 in 2005)	20 000
	FTE researchers per 1 000 workforce employed (1.5 in 2005)	2.6

implications

- Western/ environmental science bias (like Norway)
- Path dependence
- Older universities dominate
- Private sector does not feature
- Run down on the state side