



**THE DESIGN AND DEVELOPMENT OF A MONITORING AND EVALUATION
FRAMEWORK TO BENCHMARK THE PERFORMANCE OF WOMEN IN THE
SOUTH AFRICAN NSI**

A progress Report

The Centre for Research on Science and Technology

University of Stellenbosch

14 June 2005



Centre for Research on
Science and Technology



A. PROJECT CONCEPTUALISATION AND DESIGN

The overall project has been conceptualised in terms of three phases in the development of a monitoring and evaluation framework of gender impact on the NSI. The descriptions below include the main activities and outputs of each phase.

Phase 1: Identifying indicators, mechanisms and approaches for monitoring and measuring gender impact on the NSI

This phase includes the following activities:

- Review of literature and other monitoring and evaluation systems that measure gender impact
- Elaborate on the 'scoreboard' proposed in *Facing the Facts: Women's Participation in Science, Engineering and Technology* (NACI/SET4W, 2004)

The main deliverable will be a short report on the literature reviewed as well as a list of the indicators to be included in the (draft) M&E Framework.

Phase 2: Designing a M&E Framework for monitoring and measuring gender impact on the NSI

This phase will include the following activities:

- Design and develop a (first version of the) framework that draws on the literature and inputs from Phase 1
- Populate the framework with existing data
- Circulate the populated framework to a range of stakeholders

The main output will be a M&E Framework of Gender Impact on the NSI. The framework will include a philosophical/theoretical rationale for its structure and contents, and an assessment of its feasibility in the context of existing data sources within the National Science System, as well as, guidelines for how to implement and use the framework to monitor, evaluate and report on the participation and performance of women in the NSI.

Phase 3: Making inputs into a Good Practice Guide for implementing the M &E framework

This phase will comprise of the activities:

- Establishing three regional M&E consultative groups (using the SET4W Consultative Forum meetings for this purpose)
- Engaging with participants in these consultative groups to comment on the development of the M&E framework, as well as make inputs into a good practice guide for implementing the framework.

B. PROGRESS THUS FAR

The CREST team working on this project consists of:

- Jaamiah Galant and Johann Mouton (Project leaders)
- Nelius Boshoff
- Jennifer de Beer
- Simone Esau
- Heidi Prozesky
- Lynn Lorenzen

Our activities thus far can be categorized in terms of five areas that coincide with the tasks outlined in Phase One above:

- Attendance of consultative conferences in Cape Town, Durban and Johannesburg (Galant, Esau and Prozesky)
- Review of international sources on women and science indicators (Lorenzen)
- Analysis of the contents of the KPI reports of science councils (Esau)
- Data mining of other South African sources (Boshoff)
- Development of a first version of the indicators' framework (Galant and Mouton)

B1 Attendance of consultative conferences in Cape Town, Durban and Johannesburg

CREST was invited to make brief inputs at the three consultative conferences organized by Da Vinci and which were held in Cape Town (30 May), Durban (31 May) and Midrand (2 June). The aim of these inputs was twofold: first, to inform delegates of the aims of the Monitoring project, and second, to invite participants to register their interest in being involved in the later stages of the Monitoring project. Some of the issues that were raised during the discussions at these conferences are listed below:

The following issues were raised at the Durban meeting as aspects of women's participation in SET that should be monitored:

- The proportion of female learners who choose science and mathematics (especially on higher grade) as secondary school subjects
- The proportion of girls with matric higher grade science and mathematics who actually attain a tertiary qualification in SET (measuring the so-called 'leaky science pipeline'¹)
- Proportion of qualified women scientists (operationalised as those with a PhD) who are actually employed in SET positions for which they were trained
- Rate of 'ejection' of women from industry back into academia (because of inadequate training on a tertiary level for industry work)
- Trends in terms of women's employment in industry, as provided by R&D departments in that sector
- Number of women principal investigators

¹ "...many drop out but a few drop in, especially after high school. The 'drop-outs' from the science pipeline at various stages are disproportionately female" (Sonnert 1998).

- The size of research groups headed by women principal investigators
- Number of female-owned and/or female-headed companies involved in SET
- Career mobility of women in SET, measured as the duration, in number of years, from one rung in an SET career ladder to the next
- Average gross income of women in SET relative to other players in the sector, but in particular that of men
- Extent to which the girl child is exposed to female science role models at school, measured as the proportion of women science schoolteachers
- Proportion of supervisors of postgraduate students in SET who are women
- Number of postgraduate students in SET produced by women supervisors
- Trends in terms of women's achievements (e.g. SET breakthroughs) in industry, as provided by R&D departments in that sector
- Extent to which the press provides coverage of 'success stories' of women in SET
- Extent to which indicators that measure success in SET are gender-sensitive and/or masculine in nature
- Extent to which the same issues as those raised today, are raised again if a similar workshop on women in SET were to be held ten years from now

A number of other issues were raised in the Cape Town and Johannesburg meetings that perhaps need to be monitored or evaluated through the collection of sustained qualitative data or specific research projects. These include:

- Exit trends of women compared to men in SET – how many leave, after how many years, from which positions held, for what reasons, for how long (i.e. do they return to former positions) and where do they go when they leave? Who replaces females when they leave – males or females?
- Development strategies in the SET workplace – if they exist, what impact have these had on the advancement of women compared to men?
- Success rates of job applications – how many women apply for SET jobs, what are the range of jobs they apply for, and what are their rates of success compared to men?
- Representation in the media – to what extent are 'success stories' of women in SET covered in the media; what profile are women in SET given in the media compared to men in SET?
- Supplementing incomes – how many women compared to men in SET take on additional work to supplement their incomes?
- Networking/socialising – what kinds of networking and socialising patterns do men and women from the same workplace engage in, and what impact does this have on their respective advancement within the workplace?
- Funding criteria – to what extent does research funding criteria (e.g. age, employment status) restrict the participation and/or advancement of women in SET?
- Teaching loads – how do teaching loads for men and women staff in HEI's compare, and what impact does this have on their research outputs?
- Qualification levels – how do men and women's formal qualifications compare within the same job categories?

- Participation in research projects – what proportion of fieldworkers on research projects are female and what proportion of females obtain publications (single or co-authored) from these projects?
- Job satisfaction – will women feel more comfortable in their SET work environments 10 years from now?
- Rural vs urban women – what is the employment rate of female SET graduates in rural and urban areas?
- Indigenous Knowledge Systems – compare female participation in mainstream SET fields with those in IKS fields
- Co-authorship patterns – do females co-author more frequently with other women or men and how does this affect what journals they publish in?

These two lists are currently being scrutinised to see how and whether we can incorporate them in the next draft of the Indicator Framework.

B2 Review of international sources on women and science indicators

A large number of websites of S&T bodies, research centres and national funding agencies have been searched in order to identify where there are currently projects or initiatives that are similar to ours. We have begun, not only to list and review the most relevant sources, but also to cluster them by region/country. This decision was taken given the importance of the socio-historical importance of regional and national development trajectories in understanding different indicators frameworks and scoreboards. We have currently identified four such clusters of activities:

- The various European Commission initiatives and reports on Women in Science and Industry
- The long-standing and pioneering work of the National Science Foundation on science and engineering indicators
- The more recent work in Canada and in Montreal (Godin) on statistical indicators
- Various initiatives in developing countries (Latin America, Africa and Asia) on developing more appropriate indicators

European Commission Women and Science Indicator studies and reports

European Commission (2003a) *Third European Report on Science & Technology Indicators*, Brussels: European Commission

European Commission (2003b) *She Figures 2003: Women and science statistics and indicators*. Brussels: European Commission

European Commission (2003c) *Waste of talents: Turning private struggles into a public issue. Women and Science in the Enwise countries*. Brussels: European Commission

European Commission (2001) *Gender in research. Gender Impact Assessment of the specific programmes of the Fifth Framework Programme*. Brussels: European Commission.

European Commission (2000) *Science policies in the European Union. Promoting excellence through mainstreaming gender equality*. Brussels: European Commission.

National Science Foundation and other USA Women and Science Indicators studies and reports

American Women in Science (2003) *Women in science statistics*.
<http://www.awis.org/statistics>

Kohlstedt, S.G. (2004) *Sustaining gains: Reflections on women in science and technology in 20th-century USA*. NWSA Journal, 16(1): 1 – 26.

Link AN & Link JR (1999) 'Women in science: An exploratory analysis of trends in the United States.' *Science and Public Policy*, 26(6):437-442

Long, J. Scott (2001) *From scarcity to visibility: Gender differences in the careers of doctoral scientists and engineers*. Washington: National Academy of Sciences.

National Science Foundation. (2002) Science and engineering indicators 2002. <http://www.nsf.gov/sbe/srs/scind02/start.htm>

National Science Foundation (2000) Women, minorities and persons with disabilities in science, 2000. <http://www.nsf.gov/sbe/srs/nsf00327/pdfstart.htm>

Canadian Women and Science Indicator Studies and Reports

Godin, B. (2004) *Canadian scoreboards on S&T and its further developments*. Quebec: INRS/CSIIC

Women and Science Indicator studies and reports in developing countries

Makhubu LP (1999) 'Women in science: Third World perspectives.' *Nature debates*, http://www.nature.com/nature/debates/women/women_5.html

RICYT. <http://www.science.oas.org/ricyt/interior/interior.asp>

General resources

Grupp, H. & Moguee, M.E. (2004) Indicators for national science and technology policy: How robust are composite indicators. *Research Policy*, 33: 1373 – 1384.

B3 Analysis of the contents of the KPI reports of science councils

1. Indicators currently included in KPI Reports 2000/1

Mintek	Percentage of core funding allocated to supporting SMME's	Percentage of core funding allocated to training and development. No. gender/racial breakdown	Number of publications (all forms) per R million of core funding No. gender/racial breakdown	Narrative accounts of activities supporting government departmental goals	Percentage of budget allocated to joint ventures and collaborative projects	Percentage of "designated group" staff in major job categories No. gender/racial breakdown	Average salary of "designated group" staff as a percentage of overall average in major job categories	Ratio of percentage of "designated group" staff receiving promotions to the overall percentage of staff promoted.	Number of individuals obtaining in-service training from Mintek No. gender/racial breakdown
ARC	Appointment patterns per occupational grouping- per institute	Training/ development: designated groups (%'s are given- people of colour and women).	Representativity per occupational grouping (researchers, technicians, middle & senior management). Gender and racial breakdown given	Staff turnover and measures to ensure sustainability No. gender/racial breakdown	Percentage productive hours and total income realised per researcher No. gender/racial breakdown	Indicators of marketing liaison success	Percentage of budget spent on training No. gender/racial breakdown		
CGS	Gender composition of the council's staff	Racial composition of the council's staff	Personnel structure of the council No. gender/ racial break down	Qualifications of the council's staff No. gender/Racial break down	Employee profile is indicated (race and gender)	Funding allocated to training and development			
HSRC	Percentage of permanent staff receiving study bursaries	Representativity by race and gender			Gender representivity by employment level	Race representivity by employment level (need to look at the graphs)			
CSIR	Black professional and female demographics (total, % of total, %growth)	Graph of professional staff (excluding white males)	Graph of professional staff (white males only)	Disabling frequency rate No. gender breakdown	Top 5 injuries for 1999-2000 No. gender breakdown	Injury on duty statistics for 1999-2000 No. gender breakdown	Bursary scheme and Student support programme Gender and racial break down given	Intern and in-service trainees Gender and racial breakdown given	Staff qualifications No. gender/ racial break down
SABS	Employment equity (the performance results are stated- no graphs or actual figures)			Transformation- staff profile (the performance results are stated- no graphs or actual figures)			Training programmes in standards writing and management development (the performance results are stated- no graphs or actual figures)		
MRC	Employment equity Gender and racial breakdown given	Black professional and female demographics (total, % of total, %growth)		Scientific output: MRC publication out in peer reviewed journals No. gender/racial breakdown		Contract appointment graphs No. gender/ racial break down		Capacity development through the study support programme Gender and racial breakdown given	

NRF	Number of rated scientists in the different categories for the past five years (1995-2000) No gender/ racial breakdown					Grant holders supported in all programmes for the NLEsS (THRIP excluded) Gender and racial breakdown given		Total number of bursaries granted in the NLEsS programmes and breakdown in terms of race and gender as well as types of bursaries		Total number of students (full-time & part-time) including non-citizens not receiving NRF bursaries, but benefiting from grant-holders running expenses-excluding IRDP and technikons Gender and racial breakdown given		Performance information for various programme themes in the NLEsS Mobility and training grants in the National and Regional equipment programme No indication of the racial/gender profile of the individuals who receive the grants		Types, values and number of grants in the NLEsS provided/administered by the Science Liaison Centre of the NRF. No indication of the racial/gender profile of the individuals who receive the grants								
THRIP	Projects addressing THRIP priorities: <i>student composition, multi-company projects, SMME's</i>														Students participating in THRIP projects: black, women		Number of projects supported & level of support for HBU's & technikons: HBU's, Technikons					
Funds allocated in the different grant categories of the Social Sciences and Humanities:	number of applications, number of awards and funds allocated in rands.					Number of scholarships granted by the Social Sciences and Humanities division Indication of the racial & gender profile of the individuals who receive the grants					Number of scholarships in the technikon capacity development programme Racial & gender profile of the individuals who receive grants					Students supported through the IKS focus area Racial & gender profile of the individuals who receive grants						
National Accelerator Centre	Research papers No indication of the racial/gender profile		Presentations at international conferences No indication of the racial/gender profile		Presentations at local conferences No indication of the racial/gender profile		Number of post-doctorals No indication of the racial/gender profile		Total number of post-graduate students No indication of the racial/gender profile		Number of MSc and PhD degrees obtained No indication of the racial/gender profile		Number of trainees No indication of the racial/gender profile		Enhancing the quality of life: % black patients treated No indication of the gender of these patients		Number of management/staff from previously disadvantaged communities No indication of the racial/gender profile		% Black SA users or collaborators No indication of the gender profile		% Black post-graduate students No indication of the gender profile	
SAAO	Number of research papers No indication of the racial/gender profile						South African researchers & students using the facility No indication of the racial/gender profile						Post-graduate/technikon students trained No indication of the racial/gender profile									

2. Indicators currently included in KPI Reports 2001/2

Mintek	Percentage of core funding allocated to supporting SMME's	Percentage of core funding allocated to training and development. No gender/racial breakdown	Number of publications (all forms) per R million of core funding No gender/racial breakdown	Narrative accounts of activities supporting governmental goals	Percentage of budget allocated to joint ventures and collaborative projects No gender/racial breakdown	Management Development programme. Gender & racial breakdown given	Number of mentees in the mentoring programme. Gender & racial breakdown given	Percentage of "designated group" staff in major job categories. Gender breakdown given. No racial breakdown	Average salary of "designated group" staff as a percentage of overall average in major job categories. Female proportions given	Bursaries and in-service training investment No gender/racial breakdown
ARC	Involvement of employees in non-ARC decision-making forums No gender/racial breakdown	Distribution of staff and vacant posts research component throughout the ARC No gender/racial breakdown	Distribution of qualifications of the research component throughout the ARC No gender/racial breakdown	Total years and average of experience lost and replacement over the last three years. No gender/racial breakdown	Information dissemination during 2001-2002No gender/racial breakdown	Distribution of blacks in core business at the end of financial year 2001-2002No gender breakdown	Trends in professional development programme funding and training No gender/racial breakdown	Availability of students from the professional development programme No gender/racial breakdown	Overall employment equity per occupational grouping Gender and racial profile indicated	Attrition patterns and turnover rates No gender/racial breakdown
CGS	Number of bursaries awarded No gender/racial breakdown	Expenditure on training and skills development No gender/racial breakdown			Employment equity targets: professional, technical & administrative staff. No gender/racial breakdown		Number of attachments of young staff members to large projects No gender/racial breakdown		Number of short term overseas placements of young scientists No gender/racial breakdown	
CSIR	Black professional and female demographics (total, % of total, %growth)	Graph of professional staff (excluding white males)	Graph of professional I staff (white males only)	Disabling frequency rate No gender breakdown	Top 5 injuries for 1999-2000No gender breakdown	Injury on duty statistics for 1999-2000No gender breakdown	Bursary scheme and Student support programme Gender and racial break down given	Intern and in-service trainees Gender and racial breakdown given	Staff qualifications No gender/ racial break down	
SABS	Black professional staff as a % of the total staff	Professional and managerial staff as a % of total staff	Management development of black staff	Percentage of transformation- % of staff from PDI	Staff development to enhance rapid skills and competence- no illiterate workers	Number of employees – black and white. No gender breakdown				
MRC	Contract appointment graphs No gender/ racial break down	Scientific output: MRC publication out in peer reviewed journals No gender/racial breakdown	Profile of partnerships/joint ventures and co-operation agreements No indication of the gender/racial profiles of the researchers involved	Number of patents No indication of the gender/racial profiles of the researchers involved	Allocation of study support Gender and racial break down given	Skills development of staff- % of courses attended Gender and racial break down given	Employment equity- % of black employees in job levels compared to the equity plan	Employment equity- % of female employees in job levels compared to the equity plan		

3. Indicators currently included in KPI Reports 2002/3

Mintek	Percentage of core funding allocated to supporting SMME's	Percentage of core funding allocated to training and development. No gender/racial breakdown	Number of publications (all forms) per R million of core funding No gender/racial breakdown	possible cumulative value addition and job creation over a ten year period from Mintek commercial projects No gender/racial breakdown	Percentage of budget allocated to joint ventures and collaborative projects No gender/racial breakdown	Percentage of core funding allocated to training and development. No gender/racial breakdown	Bursaries and in-service training investment No gender/racial breakdown	Percentage of "designated group" staff in major job categories Gender breakdown given. No racial breakdown				
ARC	Comparison of quarterly publications for 2001-2002 No gender/racial breakdown	Comparison of presentations at technology diffusion events during 2001-2002	Number of presentations per even type No gender/racial breakdown	Involvement of employees in non-ARC decision-making forums. No gender/racial breakdown	International travel: Number of visits by ARC scientists during 2002-2003. No gender/racial breakdown	Research outputs per ARC goal No gender/racial breakdown	Distribution of qualifications of the research component throughout the ARC No gender/racial breakdown	Distribution of staff and vacant posts research component throughout the ARC No gender/racial breakdown	Achievements of ARC staff during 2002-2003 No gender/racial breakdown	Number of employees per occupational grouping	Employment equity per occupational group for the ARC	Gender distribution of core staff
CGS	Number of bursaries awarded No gender/racial breakdown	Expenditure on training and skills development No gender/racial breakdown			Employment equity targets: professional, technical & administrative staff. No gender profile given. But there is a racial breakdown given		Number of attachments of young staff members to large projects No gender/racial breakdown		Number of short term overseas placements of young scientists No gender/racial breakdown			
CSIR	Disabling frequency rate No gender breakdown	CSIR research outputs in 2002-2003 No gender/racial breakdown	Peer-reviewed publications and their impact. No gender/racial breakdown	CSIR qualification levels: % of total employees in March 2003 No gender/racial breakdown	CSIR demographics vs. job types	Bursary scheme and Student support programme Gender and racial break down given	Intern and in-service trainees Gender and racial breakdown given	Graph of professional staff (white males only)	Graph of professional staff (excluding white males)	CSIR: people with disabilities		
SABS	Training programmes with representation by PDI's (%). No gender breakdown.				Nr of staff members attending higher courses %PDI. No gender breakdown.				Organisational demographics			
AISA	Quality of the scientific outputs No gender/racial breakdown				Quality of scientific capacity: staff qualifications. Gender and racial %'s given				Graph of occupational categories- Gender and racial %'s given			

4. Indicators currently included in KPI Reports 2003/4

Mintek	Quality of the scientific outputs : publication output No gender/racial breakdown	Quality of scientific capacity: staff qualifications. Gender and racial %'s given	New students introduced into the training programme. Gender and racial figures given	Bursaries and in-service training investment. Gender and racial figures given	Publications with external collaborators. No gender/racial breakdown	Mintek's workforce profile. Gender and racial figures given	Percentage of black researchers and managers	Percentage of women researchers and managers	Percentage of disabled staff managers		
ARC	Proportion of researchers and research technicians. No gender/racial breakdown	Quality of scientific output. No gender/racial breakdown	Quality of scientific capacity: staff qualifications. Gender and racial %'s given	The professional development programme. Gender and racial figures given	Human Resource Development. Gender and racial figures given	Diversity of employees per occupational grouping per year- total staff complement. No gender/racial breakdown	Employment equity demographic 2001/2 to 2003/4. Gender and racial figures given	Percentage female/black researchers and managers to total staff- 2002 to 2004. Gender and racial figures given	Appointment pattern. Gender and racial figures given		
CGS	Scientific output: to promote scientific and innovation excellence. No gender/racial breakdown	Quality of scientific capacity: staff qualifications. No gender/racial breakdown	Organisational demographics. Gender and racial figures given	Executive management- gender and racial distribution	Unit management- gender and racial distribution	Professionals- gender and racial distribution	Technicians- gender and racial distribution	Administrative personnel- gender and racial distribution	Recruits- gender and racial distribution		
HSRC	Proportion of researchers to total staff. No gender/racial breakdown	Proportion of women researchers to total staff. No racial distribution given	Proportion of disabled researchers to total staff. No racial distribution given	Proportion of black staff members to total staff.	Proportion of black researchers to total researchers.	Number of publications & publications with female or black authors	Research output- in accordance with DST guidelines	Qualifications of staff - with and without interns. Gender and racial figures given	proportions of researchers (excluding interns) with Masters and Doctorates	HSRC broad representivity trends, 1996-2004	Employment equity demographics
CSIR	Disabling frequency rate No gender breakdown	CSIR research outputs in 2003/2004 No gender/racial breakdown	Quality of scientific capacity: staff qualifications. To promote a skilled workforce. Gender and racial figures given	Bursary scheme and Student support programme Gender and racial break down given	Intern and in-service trainees Gender and racial breakdown given	Organisational demographics: to reflect diversity. Gender and racial figures given	Graph of professional staff (excluding white males)	Graph of professional staff (white males only)	CSIR: people with disabilities		
SABS	Black professional staff as a % of the total staff			Percentage of transformation- % of staff from PDI		Staff development to enhance rapid skills and competence		Employee statistics: racial and gender distribution indicated			
MRC	Scientific output: to promote scientific and innovation excellence. No gender/racial breakdown	Quality of scientific capacity: staff qualifications. To promote a skilled workforce. No gender/racial breakdown	Development of scientific capacity: bursaries, research scholarships, fellowships & career awards. No gender/racial breakdown	Organisational demographics: to reflect and embrace SA diversity. Gender and racial figures given			Black and female employees in employment levels, 2003/4				

B4 Data mining of other South African sources

The following possible databases and information systems have been consulted and analysed:

- Various NRF sources
- CREST's database on scientific production in South Africa (SA Knowledgebase)
- The Department of Education's HEMIS database
- The DST's National R&D Survey (2001/2)

We are currently, in preparation for the next phase of our work, requesting outstanding data from these sources.

NRF – RATING INFORMATION

Rated researchers (headcounts)

		Women		Men		Women and men combined	
		By rating category (A-Y)	Total	By rating category (A-Y)	Total	By rating category (A-Y)	Total
Institution	Applications						
	Rated					85-03	85-04
Race	Applications						
	Rated						96-03
Age	Applications						
	Rated					03	03
Discipline	Applications						
	Rated					01-03	01-03
Overall	Applications						94-03
	Rated		96-03		96-03		96-03

Local reviewers (headcounts)

	Women	Men	Total
Institution			03-04

Source:

NRF, 18 Feb 2005, "Evaluation and rating: facts & figures", Version 1.

NRF – STUDENT & GRANTHOLDER SUPPORT

	Possible as from 1995 onwards
	Gender by:
Student support	Race, institution, subject, programme type, amount and student category (all combinations possible)
Grantholder support	Race, institution, subject, programme type and amount (all combinations possible)

NRF – DST INTERNATIONAL COLLABORATIVE RESEARCH PROJECTS DATABASE

This is an on-line database of collaborative projects emanating from intergovernmental agreements conducted by DST. It contains the following information categories: Researcher surname and initials, project title, agreement (e.g. China-SA intergovernmental agreement), year of commencement, project status (current/completed), institution, broad science field. There is no reference to gender in the on-line search criteria. If required, one could find out directly from the NRF whether the info for the South-African project leaders and researchers is available in terms of gender.

NRF – THRIP

The number of students working on THRIP projects, broken down by gender, is available as from 1996 onwards. Cannot detect from the reports what else is available in terms of gender, e.g. the gender of the public sector project leader.

SA KNOWLEDGEbase (CREST)

Year	^{female} “Known” <u>gender</u> as % of total authorships in SA Knowledgebase	^{black} “Known” <u>gender and race</u> as % of total authorships in SA Knowledgebase	^{age} “Known” <u>gender and age</u> as % of total authorships in SA Knowledgebase	“Known” <u>gender and affiliation</u> as % of total authorships in SA Knowledgebase
1990	43%	43%	43%	87%
1991	43%	44%	43%	85%
1992	42%	43%	42%	87%
1993	45%	45%	45%	87%
1994	47%	47%	47%	87%
1995	43%	44%	43%	86%
1996	44%	44%	44%	86%
1997	44%	44%	44%	86%
1998	43%	43%	43%	86%
1999	44%	44%	44%	88%
2000	40%	41%	40%	89%
2001	40%	41%	40%	87%
2002	40%	40%	40%	86%

Source: SA Knowledgebase, CREST, May 2005

DoE – HEMIS

HIGHER EDUCATION STAFF DATA – 2000+	
Gender broken down by:	Note/Explanation
<i>Available</i>	
Institution	Self-explanatory
Race	Self-explanatory
Nationality	Separate codes for African countries. Continent codes for other countries.
Personnel category	Instructional/research professional; Executive/administration/management professional; Specialised/support professional; Technical; Non-professional administration; Crafts/Trades; Service
Rank	Only for research/instructional professionals: Professor; Associate professor; Senior lecturer; Lecturer; Junior lecturer; Below junior lecturer; Other/undesignated
Permanent/Temporary	A permanent staff member is someone who contributes to an approved retirement fund of the institution. All other staff members are classified as temporary.
Full-time/Part-time	The full-time/part-time status of a staff member is determined by the institution in accordance with its contractual requirements for employment
Qualification type	Qualifications reported only for research/instructional professionals
Joint appointment	A joint appointment is one that involves a person being a staff member of the institution and at the same time being a staff member of another entity which is not controlled by the institution.
Staff programme FTE	A full-time equivalent (FTE) staff member is equivalent to a staff member who works at the institution for a full year on a full-time basis. Staff programme types are: Instruction, research, public service, academic support, student services, institutional support, operation and maintenance of plant, auxiliary enterprises, hospital services, independent operations
CESM FTE	CESM categories only for research/instructional professionals
<i>Possible to obtain</i>	
Date of birth	Self-explanatory

HIGHER EDUCATION STUDENT ENROLMENT DATA – 1999+	
Gender broken down by:	Note/Explanation
<i>Available</i>	
Institution	Self-explanatory
Qualification type	Different for universities and technikons
Race	Self-explanatory

Home language	Self-explanatory
Nationality	Separate codes for African countries. Continent codes for other countries.
NSFAS status	A code indicating a student's eligibility for and receipt of an award through the National Student Financial Aid Scheme (NSFAS) [Data very limited]
Matriculation aggregate	Only for first-time entering undergraduate or pre-diploma students. [Captured values don't make sense on the surface]
Previous year's activity	Predominant activity for first-time entering or transfer students
Attendance mode	The attendance mode by which a student is undertaking the qualification (contact/distance/mixture)
CESM	The field of study of a student's first or sole area of specialisation
<i>Possible to obtain</i>	
Date of birth	Self-explanatory

HIGHER EDUCATION STUDENT GRADUATION DATA – 1999+	
Gender broken down by:	Note/Explanation
<i>Available</i>	
Institution	Self-explanatory
Qualification type	Different for universities and technikons
Race	Self-explanatory
Home language	Self-explanatory
Nationality	Separate codes for African countries. Continent codes for other countries.
NSFAS status	A code indicating a student's eligibility for and receipt of an award through the National Student Financial Aid Scheme (NSFAS) [Data very limited]
Matriculation aggregate	Only for first-time entering undergraduate or pre-diploma students. [Captured values don't make sense on the surface]
Previous year's activity	Predominant activity for first-time entering or transfer students
Attendance mode	The attendance mode by which a student is undertaking the qualification (contact/distance/mixture)
CESM	The field of study of a student's first or sole area of specialisation
<i>Possible to obtain</i>	
Date of birth	Self-explanatory

HSRC R&D SURVEY

	2001/02	2003/04
Higher education sector	<ul style="list-style-type: none"> Gender by race, qualification & R&D personnel category (headcount) Gender by R&D personnel category (FTE) Gender by race & M/D student category (headcount) Gender by M/D student category (FTE) 	<ul style="list-style-type: none"> Gender by R&D personnel category (headcount) Gender by M/D/PostDoc student category (headcount)
Science council sector	<ul style="list-style-type: none"> Gender by race, qualification & R&D personnel category (headcount) Gender by R&D personnel category (FTE) 	<ul style="list-style-type: none"> Gender by R&D personnel category (headcount)
Government sector	<ul style="list-style-type: none"> Gender by race, qualification & R&D personnel category (headcount) Gender by R&D personnel category (FTE) 	<ul style="list-style-type: none"> Gender by R&D personnel category (headcount)
Not-for-profit sector	<ul style="list-style-type: none"> Gender by race, qualification & R&D personnel category (headcount) Gender by R&D personnel category (FTE) 	<ul style="list-style-type: none"> Gender by R&D personnel category (headcount)
Business sector	<ul style="list-style-type: none"> Gender by race, qualification & R&D personnel category (headcount) Gender by R&D personnel category (FTE) 	<ul style="list-style-type: none"> Gender by R&D personnel category (headcount)

B5 Development of a first version of the indicators; framework

In the Facts and Figures study (CREST, 2004) a proposed framework for a South African women in SET scoreboard identified a number of categories of indicators for monitoring women in SET. These initial indicators were based on those used in the European Commission's *She Figures* (2003), which represents the most comprehensive set of comparative indicators on women in SET. The value of drawing on these comparative indicators is of course that it makes international benchmarking in selected areas possible. However, a monitoring and evaluation framework for women in SET that should support planning and resourcing of the National System of Innovation, cannot be limited to 'international benchmarking' indicators – it has to include indicators that provide a more comprehensive national profile of women in SET.

The consultative conferences referred to above presented an opportunity to get contributions to a monitoring and evaluation framework for women in SET, from active women scientists across different sectors and scientific domains in the country. In addition, a review of international literature highlighted additional indicators which have been used to measure the

participation and status of women in SET. Where possible we have added the contributions from the consultative workshops, and indicators from the literature, to this proposed framework. At this point we have not included the possible sources for this data.

The indicators have been organised around the following core constructs:

- Potential pool of SET labour force
- Participation in the national system of innovation (Higher Education, Government, Industry/business)
- Representation across scientific fields
- Seniority in academia and R&D
- Gender equity and scientific agenda-setting
- Scientific productivity
- Career mobility in SET
- Remuneration of SET labour force

Construct	Operational definition	Indicators
Potential pool of SET labour force	Share of female students taking maths as a school subject	% of female matriculants passing maths with more than 60% ²
	Share of female students taking science as a school subject	% of female matriculants passing science with more than 60%
	Share of female students taking technology as a school subject	% of female matriculants passing technology with more than 60%
	Share of female undergraduates in SET	% of female undergraduates in SET
Participation in the national system of innovation	Share of female Masters and PhD graduates	% of female Masters and Doctoral graduates
	Share of females in the R&D labour force	% of female researchers
	Share of females in the R&D ³ labour force in higher education	% of female academics/ researchers in higher education (permanent vs temporary)
	Share of females in the R&D labour force in government	% of female researchers in government (permanent vs temporary)
	Share of females in the R&D ⁴ labour force in business/industry	% of female researchers ⁵ in business (permanent vs temporary)

2 Or whatever the entrance requirement for higher education studies in these subjects are.

3 This has to be broken down by occupational levels within each sector. Within HEIs the categories are – lecturer, senior lecturer, ass professor, professor. One could also compare other job categories within HEIs, like Deans, DVCs and VCs, to give an indication of the distribution of women within management in HEIs.

4 The labour market review for example distinguishes between top management; senior management; Professionally qualified and experienced specialists and mid-management; Skilled technical and academically qualified workers, junior management, supervisors, foremen, and superintendents; Semi-skilled and discretionary decision making; Unskilled and defined decision making.

5 Other categories of workers might have to be included here.

Participation in the national system of innovation (cont.)	Share of female maths and science school teachers	% of female maths and science school teachers
	Share of female principal investigators for research projects in HE	% of female principal investigators for research projects in HE
	Share of female project leaders of significant (large) project	% of females who manage large scale research projects
	Share of female post-doc fellows in SET	% of female post-doc fellows in SET
	Share of female M & D supervisors	% of female M & D supervisors
	Average age of females at entry level into post-graduate studies	Average age of female M and PhD graduates
	Average age of females at different ranks of scientific work	Average age of female R&D workers at different levels
Representation across scientific fields	Share of female Masters and PhDs in science	% of female Masters and Doctoral graduates in science
	Share of female Masters and PhDs in Engineering	% of female Masters and Doctoral graduates in Engineering
	Share of female academic staff in Science faculties	% of female academic staff in Science faculties
	Share of female academic staff in Engineering faculties	% of female academic staff in Engineering faculties
	Share of female senior R&D staff in different SET industries	% of female senior R&D staff in different SET industries
Seniority in academia and R&D	Share of female Professors	% of female Professors
	Share of female Professors in science	% of female Professors in science
	Share of female Professors in Engineering	% of female professors in Engineering
	Share of female HODs and Deans of Science and Engineering faculties	% of female HODs and Deans of Science and Engineering faculties
	Share of female VCs and DVCs of HEIs	% of female VCs and DVCs of HEIs
	Share of female-owned and or female-headed companies involved in SET	% of female-owned and or female-headed companies involved in SET
	Share of female senior managers in SET companies	% of female senior managers in SET companies
Gender equity and scientific agenda-setting	Research funding grants	Research funding success rates (NRF and MRC grants) - % of female applicants awarded grants
		% of female researchers receiving NRF and MRC grants and monetary value
	Female representation on scientific boards	% of females on scientific boards
	Female representation on editorial boards of scientific journals	% of females on editorial boards of scientific journals
	Female representation on professional SET bodies	% of females on professional SET bodies
	Female representation on regulatory bodies of SET industries	% of females on regulatory bodies of SET industries

Scientific productivity	The share of female authors of peer-reviewed articles	% of female authors
	The share of peer-reviewed articles authored by women	% of peer-reviewed articles authored by females
		Average citations of women authors in SET
		% of females who publish in high impact journals
		% of female Doctoral students who publish before graduation
		% of female authors who co-author with international academics
Career mobility – awards, promotion, advancement, networks	Share of female rated scientists	% of female rated scientists
	Length of time to promotion of female academics	Average length of time to promotion for female academics from lecturer to senior lecturer, to professor
	Length of time to promotion of females in SET business/industry	Average length of time to promotion for female R&D workers in SET from middle managers to senior managers
	Networking opportunities	% of female researchers who work collaboratively with other research teams
		% of female researchers who go for research sabbaticals overseas
	Performance related bonuses	Frequency and % of women in SET industries who get performance related bonuses
Remuneration of SET labour force	Gross income levels of female academics	Average gross income levels of female academics
	Gross income levels of females in SET business/industry	Average gross income levels of females in SET business/industry

C. THE NEXT STEPS

Our immediate priorities are as follows:

1. To complete our review of international indicator frameworks
2. To complete the secondary analysis of available KPI reports and current database information
3. To develop a first comprehensive draft of the Indicator Framework in an iterative manner working from the findings obtained in (1) and (2) above.
4. To draw up a list of potential stakeholders to consult once the Draft of the Indicator Framework has been finalised.
5. To set up consultative meetings on a regional basis and to engage with stakeholders around the Draft Framework.

We currently aim to complete Steps 1 – 5 by the end of July and to report on a revised Framework at the next reference Group meeting in August.