STATISTICAL REPORT

SOUTH AFRICAN NATIONAL SURVEY OF RESEARCH AND EXPERIMENTAL DEVELOPMENT

STATISTICAL REPORT
2012/13

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

HSRC
Human Sciences
Research Council

REPUBLIC OF SOUTH AFRICA
STATISTICIAN-GENERAL
NSS
National Statistics System

NOTIFICATIONS

Produced by the Centre for Science, Technology and Innovation Indicators (CeSTII) on behalf of the Department of Science and Technology (DST).

First published: November 2014

DISSEMINATION

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- http://www.dst.gov.za/index.php/resource-center/rad-reports
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USER FEEDBACK

A User Satisfaction Survey (USS) questionnaire is included as Annexure G of this report. It would be very much appreciated if users could complete the questionnaire and return it by fax to +27 (0)21 461 1255 or by e-mail to RnDSurvey@hsrc.ac.za. The feedback is analysed following each survey cycle to ensure the continued improvement of the R&D survey.

REVISIONS

The Department of Science and Technology (DST), Statistics South Africa (Stats SA) and the Human Sciences Research Council's Centre for Science, Technology and Innovation Indicators (HSRC-CeSTII) jointly reserve the right to revise the data, indicators and analysis contained in this report. Such revisions may result from revisions by Stats SA of socio-economic indicators such as the gross domestic product (GDP), or population or employment numbers, or amendments in response to internal and external data quality and consistency monitoring such as that carried out by the Organisation for Economic Cooperation and Development (OECD), which conducts quality checks through global comparative analysis, time series analyses and other methods. Explanations of any revisions will be made available and accessible on the DST and HSRC websites.

FOREWORD

The Statistics Act (No. 6 of 1999) is the institutional machanism by which the Statistican General (SG) leads and coordinates statistical production and use in the country. Statistics as a global lingua franca and currency through the Act, the Statistician-General leads and coordinates stastistical knowledge bases between South Africa and the world. This provision enables an arrangement whereby, for more than a decade, the Department of Science and Technonlogy (DST) has been coordinating the production of Research and Experimental Development (R&D) survey as a partner within the National Statistics System (NSS). The survey contributes to a body of statistics that on the contribution of R&D to development and change in South Africa as well as in the global context.

The survey is subject to an ongoing quality assessment process in terms of the South African Statistical Quality Assessment Framework (SASQAF) to ensure that the survey remains credible and fit for purpose. Through implementing the quality improvement plan, major strides have been made in improving the quality of the R&D survey processes and its output over time. The response rate of 67.6% achieved in the 2012/13 survey, for instance, is a 10.4 percentage point improvement from the 2011/12 survey. This still needs to be improved further, and can only be achieved with greater cooperation from organisations targeted by the survey in providing responses.

Recent revisions of international guidelines concerning R&D and economic measurement recognise R&D as an activity leading to the creation of intellectual asset, thus contributing to future economic activity. This requires that we change the way we treat R&D data when compiling national Gross Domestic Product (GDP) estimates so that it becomes part of the capital formation and not as an intermediate consumption expenditure, as has been done in the past. Accordingly, work to incorporate this requirement is already underway in South Africa.

Given my assessment of this survey, I endorse the 2012/13 Research and Development Survey results and urge institutions of the state to use it as an integral part of the information arsenal that informs development in South Africa and globally.

Pali J Lehohla

Statistician General, Republic of South Africa

PREFACE

The South African government's Medium Term Strategic Framework (2014-2019) includes a policy target for increasing research and development (R&D) expenditure – to 1,5% of GDP - in order to support growth and development. This is because our country relies on scientific research and technological advancements to maintain its competitive edge.

By giving estimates of the magnitude, supply and flows of resources devoted to R&D, the national R&D survey not only helps us monitor the country's performance against targets, but also helps us understand how the R&D system is changing over time.

The 2012/13 GERD results suggest that the decline in investment in Research and Development from 2009/10, has been arrested. South Africa has recorded increased investment in R&D during the period from 2011/12 to 2012/13. This trend has also been seen in other countries after the economic challenges from 2008. However, even with this increased investment and an improved outlook for the future years, South Africa's Gross Expenditure on Research and Development has remained at 0,76% of GDP over the past three years. Increased investment in Research and Development must be encouraged in order to reap the benefits of our geographic advantages as well as to increase our competitiveness in a challenging global environment. Government's focus on creating a climate for this investment has resulted in enabling policies in Human Capital development, research infrastructure, incentives for increased private sector investment, and international cooperation in Science and technology. Over the next five years we will continue to encourage a significantly increased private and public sector investment in Research and Development.

I extend my appreciation, on behalf of the Department of Science and Technology, to the Centre for Science, Technology and Innovation Indicators for their efforts in conducting this survey each year, and to Statistics South Africa for facilitating the process to assess the quality of the R&D statistics.

A special word of thanks goes to all the survey respondents, in both the private and the public sector, who gave their time so readily to make this survey a success.

Naledi Pandor

GNM Pandor, MP

Minister of Science and Technology

ACKNOWLEDGEMENTS

The South African National Survey of Research and Experimental Development (R&D Survey) is conducted annually by the Human Sciences Research Council's Centre for Science, Technology and Innovation Indicators (HSRC-CeSTII) on behalf of the Department of Science and Technology (DST).

The project team extends its appreciation to Dr Phil Mjwara, Director-General of the DST, Prof. Olive Shisana, Chief Executive Officer of the HSRC, Dr Temba Masilela, Deputy CEO: Research of the HSRC, and Mr Pali Lehohla, Statistician-General, for their support of the R&D survey. The support and contributions of Mr Imraan Patel, Mr Godfrey Mashamba, Ms Tshidi Mamogobo, Ms Rose Msiza, and Ms Kgomotso Matlapeng of the DST are much appreciated.

Technical inputs and advice by the Clearance Committee for Science, Technology and Innovation Statistical reports have helped improve the quality of this publication and are appreciated. The Clearance committee is composed of teams from the National Advisory Council on Innovation (NACI), Statistics South Africa (Stats SA), DST, and CeSTII. We further acknowledge the contributions of HSRC-CeSTII administrative staff, Valda West and Benelton Jumath, and ICT support by Noor Fakier and Siphamandla Bidli.

Interactions with the Organisation for Economic Co-operation and Development's (OECD) Working Party of National Experts on Science and Technology Indicators (NESTI) have provided invaluable assistance in improving the standard of the South African R&D surveys and analysis of the results. We are also most grateful for and acknowledge the co-operation of the respondents to the questionnaire.

The core team of the R&D survey included the following persons in alphabetical order:

Thomson Batidzirai, Isabel Basson, Mario Clayford, Takura Kupamupindi, Demetre Labadarios, Vaughan Leiberum, Natalie le Roux, Zandile Matshaya, Gillian Marcelle, Neo Molotja, Precious Mudavanhu, Nazeem Mustapha, Nolitha Nkobole, Saahier Parker, Julien Rumbelow, Natasha Saunders, Ronel Sewpaul, Moses Sithole and Natalie Vlotman.

ABBREVIATIONS

AIDS	Acquired immune deficiency syndrome
BERD	Business expenditure on R&D
CeSTII	Centre for Science, Technology and Innovation Indicators
DST	Department of Science and Technology
FTE	Full-time equivalent
GDP	Gross domestic product
GERD	Gross domestic expenditure on R&D
GOVERD	Government intramural expenditure on R&D
HEMIS	Higher Education Management Information System
HERD	Expenditure on R&D in the higher education sector
HIV	Human immunodeficiency virus/
HSRC	Human Sciences Research Council
ICT	Information and communication technologies
NESTI	National Experts on Science and Technology Indicators
NPO	Not-for-profit organisation
OECD	Organisation for Economic Cooperation and Development
R&D	Research and experimental development
SA	South Africa
SASQAF	South African Statistical Quality Assessment Framework
SEO	Socio-economic objective
SIC	Standard Industrial Classification
SMRS	Survey Management and Results System
SNA	System of National Accounts
SPII	Support Programme for Industrial Innovation
Stats SA	Statistics South Africa
SVC	Statistical Value Chain
TB	Tuberculosis
VAT	Value added tax

DEFINITIONS AND DESCRIPTIONS

Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.

Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.

Biotechnology is an application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.

Capital expenditures are the annual gross expenditures on fixed assets used in the R&D programmes of statistical units. These are reported in full for the period when they took place and are not registered as an element of depreciation. Capital expenditures on R&D consist of buildings, vehicles, plant machinery and equipment.

Civil gross expenditure on research and development (Civil GERD) is the sum of all expenditure by socio-economic objective (SEO), minus expenditure on defence R&D.

Constant 2005 Rands is the value of goods and services of a given year using the prices of a determined base reference year, which is 2005 in this case. These values were obtained by deflating with the GDP deflator using data published in the Statistics South Africa GDP survey P0441, 3rd Quarter 2013 (Stats SA 2013).

Current expenditure is expenditure on items that generally reoccur after a short period. Current expenditure on R&D activities consists of labour costs and other current expenditures.

Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

Full-time equivalent (FTE) is an estimate of the time spent on R&D activities. It is the proportion of time spent on R&D activities out of all time spent at work.

Gross domestic product (GDP) is the total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports. This statistic is obtained from the Statistics South Africa GDP survey P0441, 3rd Quarter 2013 (Stats SA 2013).

Gross expenditure on research and development (GERD) covers all expenditures for R&D performed on national territory in a given year. It thus includes domestically performed R&D which is financed from abroad but excludes R&D funds paid abroad, notably to international agencies.

Headcounts refers to the number of people directly involved in or supporting R&D (i.e. the total number of R&D personnel within a category).

In-house or intramural R&D refers to R&D performed by the unit or entity itself (i.e. by the personnel of the unit or entity). This is R&D performed within the borders of South Africa, even if funded by foreign sources.

Labour costs comprise annual wages and salaries and all associated costs or fringe benefits, such as bonus payments, holiday pay, contributions to pension funds and other social security payments, payroll taxes, etc. The labour costs of persons providing indirect services which are not included in the personnel data (such as security and maintenance personnel or the staff of central libraries, computer departments or head offices) are excluded and included in other current costs.

New materials pertain to the technology and R&D activities of high-tech companies particularly in the aerospace, construction, electronic, biomedical, renewable energy, environmental remediation, food and packaging, manufacturing and motor car industries. New materials include multi-functional materials, advanced materials, nano-materials, nano-composites and nanotechnology.

Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometres, where unique phenomena enable novel applications.

Open-source software is computer software that is available in source code form under an open-source licence. The source code and certain other rights normally reserved for copyright holders are provided under a software licence that permits anyone to study, change, improve and at times also to distribute the software.

Other current expenditure comprise non-capital purchases of materials, supplies and equipment to support R&D performed by the statistical unit in a given year. These include, but are not limited to running costs, overhead expenses, repairs and maintenance, payments to outside organisations for use of specialised testing facilities, payments to outside organisations for specialised services and on-site consultant expenses in support of R&D projects carried out by the R&D performer.

Outsourced R&D refers to R&D done by another entity on behalf of the reporting unit and paid for by the reporting unit.

R&D intensity estimated by GERD as a proportion of GDP is the total intramural expenditures on R&D performed in the country in a given year relative to GDP.

R&D personnel refers to all persons employed directly on R&D, as well as those providing direct services such as R&D managers, administrators, and clerical staff.

Researchers are R&D personnel engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.

Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

Socio-economic objective (SEO) classification provides an indication of the R&D activities by main purpose. The SEO classification used in this survey is consistent with the Nomenclature for the Analysis and Comparison of Scientific programs and Budgets (NABS) that was published by Eurostat in 2007.

Statistical unit is an entity for which statistical data are collected or derived.

Standard Industrial Classification (SIC) codes are used by Statistics South Africa for describing the economic activities of industries.

State Owned Enterprises (SOEs) are public corporations owned by government units mainly engaged in market production and sale of the kind of goods and services often produced by private enterprises.

Total employment is the total employed labour force in the South African economy. This statistic is obtained from Stats SA Labour Force Survey series P0211 (Stats SA 2014) where employed persons were defined as those aged 15–64 years who, during the reference week, did any work for at least one hour, or had a job or business but were not at work (temporarily absent).

TABLE OF CONTENTS

LIST OF TABLES

KEY FINDINGS

GENERAL SURVEY RESULTS

BUSINESS SECTOR

NOT-FOR-PROFIT SECTOR

GOVERNMENT SECTOR

SCIENCE COUNCILS SECTOR

HIGHER EDUCATION SECTOR

METHODOLOGY

LIST OF FIGURES

A. INTRODUCTION

This Statistical Report presents data tables from the 2012/13 South African National Survey of Research and Experimental Development (R&D survey). The report provides key findings of the survey with commentary, standard summary tables of the overall findings from 2012/13 along with time series from previous instances of the survey. The Statistical Report is published together with the Main Analysis Report which provides selected analysis of the survey data.

The survey covers the sectors that perform R&D in South Africa, namely the business, not-for-profit, government, science councils and higher education sectors. This approach is followed in order to maintain consistency with the institutional sector categorisation recommended by the Organisation for Economic Cooperation and Development (OECD) in *The Measurement of Scientific and Technological Activities: Proposed Standard Practice for Surveys on Research and Experimental Development,* known as the Frascati Manual (OECD 2002).

R&D statistics are presented in tables according to the following categories:

- Gross domestic expenditure on research and development (GERD), and R&D expenditure by R&D-performing sectors,
- Local and international sources of funding for R&D sectors,
- R&D expenditure by field of research and socio-economic objective, and by industrial sector in the business sector,
- R&D expenditure in selected areas of policy interest, namely biotechnology, nanotechnology, environment-related, open-source software, new materials, and tuberculosis (TB), HIV/AIDS and malaria research, and
- R&D personnel.

The description of the survey methodology is contained in section D, and the business sector questionnaire for the 2012/13 survey is reproduced in section F.

B. KEY FINDINGS FOR 2012/13

GERD HAS INCREASED IN BOTH NOMINAL AND REAL TERMS BETWEEN 2011/12 AND 2012/13

- South Africa's gross expenditure on research and experimental development (GERD) amounted to R23.871 billion at current Rand value in 2012/13. This represents a nominal increase of 7.5% from R22.209 billion in 2011/12. This is the second consecutive year that GERD has increased. Prior to 2011/12, GERD had declined in the two preceding periods, 2009/10 and 2010/11.

- At constant 2005 prices[1], GDP GERD amounted to R14.878 billion, which is a real increase of 2.6% from 2011/12. This growth was at almost the same rate as the real GDP growth of 2.5% that South Africa achieved in 2012.

- Nominal R&D expenditure increased in all sectors in 2012/13. The higher education sector was the biggest contributor to the increase in R&D expenditure, spending R724 million more than in the previous period. This was followed by the government and science councils, together accounting for an increase in R&D expenditure of R498 million, and then the non-profit and business sectors together increasing their R&D expenditure by R440 million.

GERD AS A PERCENTAGE OF GDP HAS REMAINED AT 0.76% FOR THREE CONSECUTIVE YEARS

- GERD expressed as a percentage of GDP was 0.76% in 2012/13. This indicator of R&D intensity in the economy has remained unchanged for three consecutive periods since 2010/11.

- The trend over time shows that GERD/GDP increased from 0.81% in 2003/04, peaked at 0.95% in 2006/07, and declined until it reached 0.76%, where it has remained for three consecutive years from 2010/11 to 2012/13.

THERE HAS BEEN AN OVERALL INCREASE IN THE TOTAL R&D PERSONNEL HEADCOUNT, DRIVEN LARGELY BY AN INCREASE IN THE NUMBER OF RESEARCHERS IN THE HIGHER EDUCATION SECTOR

- The headcount of R&D personnel increased by 5 430 (or 9.1%) from 59 487 in 2011/12 to 64 917 in 2012/13. The higher education sector contributed the most (2 048 or 37.7%) to the increase in R&D personnel in 2012/13. The bulk of the increase (1 962) in the higher education sector consisted of researchers (including doctoral students and post-doctoral fellows). The business sector was the second-largest contributor with 1 867 (34.4%) additional R&D personnel. The science councils sector contributed 905 to the increase in R&D personnel headcounts, and the remainder of the increase came from the government and not-for-profit sectors.

- Researchers accounted for 66.0% (42 828) of the total R&D workforce in 2012/13. The higher education sector employed the largest number of researchers, with a headcount of 32 955 in 2012/13. Of the total researchers, 15 514 were post-doctoral fellows and doctoral students. Female researchers constituted 43.7% of the total researcher workforce in 2012/13, with a headcount of 18 724, which was an increase of 1 540 from the previous year.

- The number of FTE researchers per 1 000 in total employment remained at 1.5. This indicator has remained within the range of 1.4 to 1.5 since 2005/06.

[1] The GDP deflator value of 160.4431305, derived from the Stats SA GDP series P0441 published in November 2013 (Stats SA 2013), was used to calculate constant 2005 prices.

TABLE B.1: SUMMARY OF KEY STATISTICS AND INDICATORS (2010/11 TO 2012/13)

KEY INDICATOR	2010/11	2011/12	2012/13
Expenditure on R&D			
Gross domestic expenditure on R&D (GERD) (Rm)	20 254	22 209	23 871
Business enterprise expenditure on R&D (BERD) (Rm)	10 059	10 464	10 571
Not-for-profit (NPO) expenditure on R&D (Rm)	163	171	504
Government expenditure on R&D (GOVERD) (Rm)	1 011	1 236	1 438
Science councils (SCI) expenditure on R&D (Rm)	3 596	3 730	4 026
Expenditure on R&D in the higher education sector (HERD) (Rm)	5 425	6 609	7 333
Gross domestic expenditure on R&D in constant 2005 prices (Rm)	13 945	14 507	14 878
Funding sources			
Government funded* R&D (Rm)	9 019	9 562	10 832
Business funded R&D (Rm)	8 128	8 633	9 152
Foreign funding of R&D (Rm)	2 445	3 331	3 117
R&D personnel			
Total R&D personnel (headcounts)	55 531	59 487	64 917
Total R&D personnel (FTE**)	29 486.4	30 978.4	35 050.3
Total researchers# (headcounts)	37 901	40 653	42 828
Total researchers# (FTE**)	18 719.6	20 115.1	21 382.4
Female researchers# (headcounts)	15 794	17 184	18 724
Indicators computed from the R&D survey			
GERD as a percentage of GDP (%)	0.76	0.76	0.76
Civil GERD as a percentage of GDP (%)	0.71	0.72	0.72
BERD/GERD (%)	49.7	47.1	44.3
Basic research (Rm)	4 848	5 440	6 031
Total R&D personnel (FTE**) per 1 000 in total employment	2.2	2.3	2.4
Total researchers# (FTE**) per 1 000 in total employment	1.4	1.5	1.5
Female researchers# as a percentage of total researchers (headcounts) (%)	41.7	42.3	43.7
Indicators obtained from external data sources			
Gross domestic product level at current prices (Rm)	2 664 269	2 917 539	3 138 980
Real GDP growth (%)	3.1	3.6	2.5
Total employment (thousands)	**13 118**	**13 497**	**14 558**

Note: Financial quantities are in current values, unless otherwise indicated. GDP values are obtained from the Stats SA GDP statistical release P0441 (Stats SA 2013) and the total employment level is taken from the Stats SA Quarterly Labour Force Survey statistical release P0211 (Stats SA 2014).
*Government-funded R&D includes science council and university own funds.
**FTE = Full-time equivalent.

#Researchers include doctoral students and post-doctoral fellows.

COMMENTARY

GOVERNMENT REMAINS THE LARGEST FUNDER OF R&D IN THE COUNTRY, WHILE THE BUSINESS SECTOR REMAINS THE LARGEST PERFORMER OF R&D

- Government funded 45.4% of all R&D undertaken in 2012/13, while the business sector funded 38.3%.

- R&D funding from government increased by 13.3%, from R9.562 billion in 2011/12 to R10.832 billion in 2012/13. Higher education received 49.8% (R5.396 billion) of the total government funding for R&D, while government institutions including science councils received 42.8% (R4.638 billion). The business sector was the second-highest funder of R&D in South Africa, contributing 38.3% (R9.152 billion) towards total R&D funding. Most of the R&D funding (91.8%) from business was spent in the business sector. Foreign funding of R&D decreased to R3.117 billion in current prices in 2012/13 from R3.330 billion in 2011/12. Of the amount of R3.117 billion in foreign funding, R1.190 billion went to the business sector, which was a decrease of R372 million compared with 2011/12.

- The business sector remained the largest performer of R&D in the country, performing 44.3% of GERD in 2012/13. This was followed by the higher education sector with 30.7%. There have been shifts over time in the proportional contribution to GERD by different sectors. The higher education sector has steadily increased its proportional contribution to GERD since 2007, from 19.4% to the current level. This trend can be attributed to increased R&D funding for this sector by government and foreign sources. The proportion of business expenditure of R&D (BERD) declined from 58.6% in 2008/09 to 44.3% in 2012/13.

THE LARGEST PROPORTION OF BUSINESS R&D EXPENDITURE WAS SPENT IN THE FINANCIAL INTERMEDIATION, REAL ESTATE AND BUSINESS SECTOR

- The business sector increased R&D expenditure by R107 million in 2012/13. However, this growth is less than the increase of R405 million that occurred in 2011/12. The decreased growth was accompanied by a decline of R578 million in investments of a capital nature in the business sector.

- In 2012/13, expenditure on R&D in the financial intermediation, real estate and business services sector amounted to R3.915 billion and accounted for the largest proportion of BERD at 37.0%. This was the second consecutive year in which R&D expenditure in this sector was higher than in the manufacturing sector, which was the second-largest contributor to BERD at 32.9% (R3.477 billion). The mining and quarrying sector remained the third-largest contributor to BERD, spending R1.554 billion (or 14.7%).

- R&D expenditure in the financial intermediation, real estate and business services sector has shown a significant growth trend since 2009/10 compared to other sectors, whereas R&D expenditure in the manufacturing sector has been declining since the peak in 2008/09. Notably, the two industries that used to be responsible for the biggest contributions to R&D expenditure in the manufacturing sector, namely the manufacture of refined petroleum, coke, nuclear fuel, chemicals (including pharmaceuticals), rubber and plastic, and the manufacture of transport equipment, indicated the largest declines in R&D spending between 2008/09 and 2012/13.

- R&D expenditure in the electricity, gas and water supply sector has decreased by relatively large amounts since the peak in 2008/09. This sector contributed 18.7% to BERD in 2008/09, compared with its current contribution of only 3.6% (R386 million).

THE LARGEST PERCENTAGE OF GERD WAS SPENT IN THE MEDICAL AND HEALTH SCIENCES, SOCIAL SCIENCES AND ENGINEERING SCIENCES DURING 2012/13

- Applied research accounted for the largest proportion of R&D expenditure, comprising 46.3%, followed by experimental

research at 28.4% and basic research at 25.3%. This underlines a persistent trend towards R&D expenditure on applied research. There have been some shifts over the years in the profile of R&D expenditure by type of research linked to the overall sectoral contributions to GERD. R&D expenditure on basic research, which is performed largely in the higher education sector, has been on an upward trend since 2010/11, while R&D expenditure on experimental research has been declining since 2008/09.

- Between 2011/12 and 2012/13, R&D expenditure devoted to the natural sciences, technology and engineering research fields decreased by 4 percentage points to 81.2% of GERD in 2012/13, while R&D expenditure on the social sciences and humanities research fields increased by 4 percentage points over the same period to 18.8% of GERD. Research activity in the humanities has not increased significantly. The increase in research in the social sciences could be attributed primarily to increased research in finance in the financial services sector. In regards specific research fields, 17.2% of GERD was spent on research in the medical and health sciences, followed by 16.4% in the engineering sciences and 9.4% in applied science and technologies.

SINCE 2005/06, R&D EXPENDITURE HAS INCREASED IN THE FIELDS OF BIOTECHNOLOGY AND NANOTECHNOLOGY, AS WELL AS TUBERCULOSIS, HIV/AIDS AND MALARIA

- The contribution of research on biotechnology increased from 3.2% of GERD in 2005/06 to 4.9% in 2012/13. R&D expenditure on nanotechnology increased from 1.7% to 2.8% over the same period.

- Research expenditure on tuberculosis, HIV/AIDS and malaria increased from 5.2% in 2005/06 to 10.4% in 2012/13. The business sector has been the largest contributor to research in this area, spending R929 million on research on these diseases in 2012/13.

C. TABLES

Notes:

- Totals in the tables may not add up to the sum of their constituent items due to rounding effects.
- The data for 2001/02 may be obtained from previous reports of the R&D survey.

C.1. GENERAL SURVEY RESULTS

C.1.1: EXPENDITURE ON RESEARCH AND EXPERIMENTAL DEVELOPMENT

TABLE C.1: R&D EXPENDITURE BY SECTOR (2003/04 TO 2012/13)

Year	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
2003/04	10 082 559	465 367	1 745 493	2 071 351	5 591 325	209 023
2004/05	12 009 981	515 331	1 996 050	2 533 971	6 766 361	198 268
2005/06	14 149 239	844 640	2 102 094	2 732 215	8 243 776	226 514
2006/07	16 520 584	1 021 355	2 744 718	3 298 808	9 243 165	212 538
2007/08	18 624 013	1 154 399	2 886 094	3 621 862	10 738 456	223 202
2008/09	21 041 046	1 139 676	3 137 343	4 191 366	12 332 012	240 649
2009/10	20 954 677	1 067 302	3 458 074	5 101 224	11 139 237	188 840
2010/11	20 253 805	1 011 340	3 596 023	5 424 602	10 059 010	162 830
2011/12	22 209 192	1 235 669	3 729 680	6 609 216	10 464 022	170 605
2012/13	23 871 219	1 437 509	4 025 998	7 333 153	10 570 726	503 833

TABLE C.2: R&D EXPENDITURE COMPOSITION BY SECTOR (2003/04 TO 2012/13)

Year	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
2003/04	4.6	17.3	20.5	55.5	2.1
2004/05	4.3	16.6	21.1	56.3	1.7
2005/06	6.0	14.9	19.3	58.3	1.6
2006/07	6.2	16.6	20.0	55.9	1.3
2007/08	6.2	15.5	19.4	57.7	1.2
2008/09	5.4	14.9	19.9	58.6	1.1
2009/10	5.1	16.5	24.3	53.2	0.9
2010/11	5.0	17.8	26.8	49.7	0.8
2011/12	5.6	16.8	29.8	47.1	0.8
2012/13	6.0	16.9	30.7	44.3	2.1

TABLE C.3: R&D EXPENDITURE AS A PERCENTAGE OF GDP BY SECTOR (2003/04 TO 2012/13)

Year	GERD/GDP	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%	%
2003/04	0.81	0.04	0.14	0.17	0.45	0.02
2004/05	0.87	0.04	0.14	0.18	0.49	0.01
2005/06	0.92	0.05	0.14	0.18	0.53	0.01
2006/07	0.95	0.06	0.16	0.19	0.53	0.01
2007/08	0.93	0.06	0.14	0.18	0.54	0.01
2008/09	0.92	0.05	0.14	0.18	0.54	0.01
2009/10	0.87	0.04	0.14	0.21	0.46	0.01
2010/11	0.76	0.04	0.13	0.20	0.38	0.01
2011/12	0.76	0.04	0.13	0.23	0.36	0.01
2012/13	0.76	0.05	0.13	0.23	0.34	0.02

TABLE C.4: R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

Year	GERD	BASIC	APPLIED	EXPERIMENTAL DEVELOPMENT
	R'000	R'000	R'000	R'000
2003/04	10 082 559	2 435 363	3 865 436	3 781 760
2004/05	12 009 979	2 237 102	4 651 528	5 121 349
2005/06	14 149 238	2 649 755	5 056 379	6 443 104
2006/07	16 520 728	3 075 263	5 794 785	7 650 671
2007/08	18 624 013	3 830 806	6 373 681	8 419 526
2008/09	21 041 046	4 243 156	7 013 082	9 784 808
2009/10	20 954 676	5 553 399	6 578 902	8 822 375
2010/11	20 253 804	4 848 283	8 058 799	7 346 722
2011/12	22 209 192	5 439 561	9 388 273	7 381 358
2012/13	23 871 219	6 030 827	11 064 247	6 776 146

TABLE C.5: PROPORTIONAL R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

Year	BASIC	APPLIED	EXPERIMENTAL DEVELOPMENT
	%	%	%
2003/04	24.2	38.3	37.5
2004/05	18.6	38.7	42.6
2005/06	18.7	35.7	45.5
2006/07	18.6	35.1	46.3
2007/08	20.6	34.2	45.2
2008/09	20.2	33.3	46.5
2009/10	26.5	31.4	42.1
2010/11	23.9	39.8	36.3
2011/12	24.5	42.3	33.2
2012/13	25.3	46.3	28.4

TABLE C.6: R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

YEAR	GERD	CAPITAL EXPENDITURE ON R&D			CURRENT EXPENDITURE ON R&D			
		LAND, BUILDINGS AND OTHER STRUCTURES	VEHICLES, PLANT MACHINERY, AND EQUIPMENT	SUBTOTAL: CAPITAL EXPENDITURE	LABOUR COSTS	TOTAL COST OF R&D POSTGRADUATE STUDENTS	OTHER CURRENT EXPENDITURE	SUBTOTAL: CURRENT EXPENDITURE
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
2003/04	10 082 559	190 412	944 006	1 134 418	4 608 946	190 892	4 148 303	8 948 141
2004/05	12 009 981	205 970	870 022	1 075 992	5 721 100	308 454	4 904 435	10 933 989
2005/06	14 149 239	347 342	1 619 871	1 967 213	6 178 386	313 645	5 689 995	12 182 026
2006/07	16 520 586	319 868	1 357 234	1 677 102	7 526 757	438 486	6 878 241	14 843 484
2007/08	18 624 013	367 757	1 686 567	2 054 324	8 171 240	495 128	7 903 321	16 569 689
2008/09	21 041 046	326 145	3 091 898	3 418 043	8 661 361	532 883	8 428 759	17 623 003
2009/10	20 954 677	623 089	2 067 728	2 690 817	8 909 301	581 140	8 773 419	18 263 860
2010/11	20 253 805	472 205	1 714 845	2 187 050	8 353 254	756 930	8 956 571	18 066 755
2011/12	22 209 192	454 321	2 215 416	2 669 737	9 534 138	1 074 207	8 931 110	19 539 455
2012/13	23 871 219	495 842	1 747 183	2 243 025	11 922 169	1 186 653	8 519 372	21 628 194

TABLE C.7: PROPORTIONAL R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

YEAR	CAPITAL EXPENDITURE ON R&D			CURRENT EXPENDITURE ON R&D			
	LAND, BUILDINGS AND OTHER STRUCTURES	VEHICLES, PLANT, MACHINERY, AND EQUIPMENT	SUBTOTAL: CAPITAL EXPENDITURE	LABOUR COSTS	TOTAL COST OF R&D POSTGRADUATE STUDENTS	OTHER CURRENT EXPENDITURE	SUBTOTAL: CAPITAL EXPENDITURE
	%	%	%	%	%	%	%
2003/04	1.9	9.4	11.3	45.7	1.9	41.1	88.7
2004/05	1.7	7.2	9.0	47.6	2.6	40.8	91.0
2005/06	2.5	11.4	13.9	43.7	2.2	40.2	86.1
2006/07	1.9	8.2	10.2	45.6	2.7	41.6	89.8
2007/08	2.0	9.1	11.0	43.9	2.7	42.4	89.0
2008/09	1.6	14.7	16.2	41.2	2.5	40.1	83.8
2009/10	3.0	9.9	12.8	42.5	2.8	41.9	87.2
2010/11	2.3	8.5	10.8	41.2	3.7	44.2	89.2
2011/12	2.0	10.0	12.0	42.9	4.8	40.2	88.0
2012/13	2.1	7.3	9.4	49.9	5.0	35.7	90.6

TABLE C.8: EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

YEAR	GERD	BIOTECHNOLOGY	NANOTECHNOLOGY
	R'000	R'000	R'000
2005/06	14 149 238	454 332	236 479
2006/07	16 520 584	592 777	310 078
2007/08	18 624 014	648 704	248 521
2008/09	21 041 046	801 640	388 380
2009/10	20 954 677	917 917	423 865
2010/11	20 253 805	1 142 337	414 529
2011/12	22 209 192	1 065 286	596 072
2012/13	23 871 219	1 179 478	662 634

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.9: PROPORTIONAL EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

YEAR	BIOTECHNOLOGY	NANOTECHNOLOGY
	%	%
2005/06	3.2	1.7
2006/07	3.6	1.9
2007/08	3.5	1.3
2008/09	3.8	1.8
2009/10	4.4	2.0
2010/11	5.6	2.0
2011/12	4.8	2.7
2012/13	4.9	2.8

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.10: R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

Year	GERD	ENVIRONMENT / ENVIRONMENT RELATED	OPEN-SOURCE SOFTWARE	NEW MATERIALS	TUBERCULOSIS (TB), HIV/AIDS, MALARIA
	R'000	R'000	R'000	R'000	R'000
2005/06	14 149 239	N/A	101 937	308 800	733 338
2006/07	16 520 584	N/A	192 786	336 970	934 760
2007/08	18 624 013	N/A	254 808	298 746	1 120 028
2008/09	21 041 046	N/A	218 289	514 242	1 616 410
2009/10	20 954 677	N/A	172 712	559 021	1 816 901
2010/11	20 253 805	N/A	157 790	722 167	2 052 521
2011/12	22 209 192	1 215 855	181 320	783 232	2 006 625
2012/13	23 871 219	1 051 035	211 264	1 327 832	2 478 422

Note: Data on these selected areas of interest were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.11: PROPORTIONAL R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

YEAR	ENVIRONMENT / ENVIRONMENT RELATED	OPEN-SOURCE SOFTWARE	NEW MATERIALS	TUBERCULOSIS (TB), HIV/AIDS, MALARIA
	%	%	%	%
2005/06	N/A	0.7	2.2	5.2
2006/07	N/A	1.2	2.0	5.7
2007/08	N/A	1.4	1.6	6.0
2008/09	N/A	1.0	2.4	7.7
2009/10	N/A	0.8	2.7	8.7
2010/11	N/A	0.8	3.6	10.1
2011/12	5.5	0.8	3.5	9.0
2012/13	4.4	0.9	5.6	10.4

Note: Data on these selected areas of interest were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.12: R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural sciences, technology and engineering	**8 892 709**	**10 516 783**	**12 404 829**	**14 568 971**	**16 306 332**	**18 419 289**	**18 236 046**	**17 274 483**	**18 924 485**	**19 384 947**
Mathematical sciences	192 441	205 285	291 122	315 773	341 624	397 512	414 234	530 693	636 153	634 658
Physical sciences	348 905	379 230	551 426	655 378	793 006	952 441	648 657	305 701	338 098	370 616
Chemical sciences	533 070	608 438	591 258	595 579	784 145	1 056 848	860 745	865 345	1 273 588	1 460 180
Earth sciences	254 879	266 185	365 771	426 950	524 133	563 619	402 949	403 848	409 212	499 210
Information, computer and communication technologies	1 060 623	1 534 031	1 866 314	2 314 243	2 598 218	2 763 320	3 272 679	2 808 681	2 852 251	2 000 453
Applied sciences and technologies	1 030 020	973 201	1 541 893	1 812 402	1 832 546	1 905 397	1 740 755	2 151 557	2 114 322	2 252 175
Engineering sciences	2 500 912	2 868 546	2 950 059	3 457 912	4 189 408	5 135 032	4 580 166	3 600 159	3 775 247	3 903 931
Biological sciences	504 349	583 545	705 410	798 835	723 280	744 144	800 435	1 326 076	1 350 716	1 555 035
Agricultural sciences	741 589	865 736	961 166	1 138 873	1 264 628	1 147 706	1 445 847	1 307 191	1 710 860	1 810 114
Medical and health sciences	1 358 092	1 779 259	2 088 399	2 489 242	2 616 439	3 139 245	3 506 472	3 461 304	3 819 180	4 107 641
Environmental sciences	146 423	201 042	194 867	216 710	222 514	248 625	229 186	352 139	439 719	587 113
Material sciences	165 323	191 841	246 125	284 530	365 813	306 828	254 092	109 551	166 411	155 379
Marine sciences	56 083	60 444	51 019	62 544	50 579	58 573	79 830	52 238	38 726	48 442
Division 2: Social sciences and humanities	**1 189 851**	**1 493 200**	**1 744 411**	**1 951 613**	**2 317 681**	**2 621 757**	**2 718 631**	**2 979 322**	**3 284 707**	**4 486 272**
Social sciences	967 790	1 159 115	1 393 471	1 559 043	1 809 308	2 024 801	2 233 521	2 512 714	2 790 339	3 999 853
Humanities	222 061	334 085	350 940	392 570	508 373	596 956	485 110	466 608	494 368	486 420
Total	**10 082 560**	**12 009 983**	**14 149 240**	**16 520 584**	**18 624 013**	**21 041 046**	**20 954 677**	**20 253 805**	**22 209 192**	**23 871 219**

TABLE C.13: PROPORTIONAL R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural sciences, technology and engineering	**88.2**	**87.6**	**87.7**	**88.2**	**87.6**	**87.5**	**87.0**	**85.3**	**85.2**	**81.2**
Mathematical sciences	1.9	1.7	2.1	1.9	1.8	1.9	2.0	2.6	2.9	2.7
Physical sciences	3.5	3.2	3.9	4.0	4.3	4.5	3.1	1.5	1.5	1.6
Chemical sciences	5.3	5.1	4.2	3.6	4.2	5.0	4.1	4.3	5.7	6.1
Earth sciences	2.5	2.2	2.6	2.6	2.8	2.7	1.9	2.0	1.8	2.1
Information, computer and communication technologies	10.5	12.8	13.2	14.0	14.0	13.1	15.6	13.9	12.8	8.4
Applied sciences and technologies	10.2	8.1	10.9	11.0	9.8	9.1	8.3	10.6	9.5	9.4
Engineering sciences	24.8	23.9	20.8	20.9	22.5	24.4	21.9	17.8	17.0	16.4
Biological sciences	5.0	4.9	5.0	4.8	3.9	3.5	3.8	6.5	6.1	6.5
Agricultural sciences	7.4	7.2	6.8	6.9	6.8	5.5	6.9	6.5	7.7	7.6
Medical and health sciences	13.5	14.8	14.8	15.1	14.0	14.9	16.7	17.1	17.2	17.2
Environmental sciences	1.5	1.7	1.4	1.3	1.2	1.2	1.1	1.7	2.0	2.5
Material sciences	1.6	1.6	1.7	1.7	2.0	1.5	1.2	0.5	0.7	0.7
Marine sciences	0.6	0.5	0.4	0.4	0.3	0.3	0.4	0.3	0.2	0.2
Division 2: Social sciences and humanities	**11.8**	**12.4**	**12.3**	**11.8**	**12.4**	**12.5**	**13.0**	**14.7**	**14.8**	**18.8**
Social sciences	9.6	9.7	9.8	9.4	9.7	9.6	10.7	12.4	12.6	16.8
Humanities	2.2	2.8	2.5	2.4	2.7	2.8	2.3	2.3	2.2	2.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.14: R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVES (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVES	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**1 006 013**	**883 101**	**906 174**	**1 091 516**	**1 135 278**	**1 196 200**	**1 276 269**	**1 341 460**	**1 069 289**	**1 351 337**
Defence	1 006 013	883 101	906 174	1 091 516	1 135 278	1 196 200	1 276 269	1 341 460	1 069 289	1 351 337
Division 2: Economic development	**5 765 250**	**6 990 226**	**8 817 223**	**10 017 805**	**11 724 590**	**13 312 043**	**12 341 036**	**11 231 879**	**12 174 897**	**12 223 017**
Economic development unclassified	93 498	102 936	115 029	150 668	171 520	209 400	0	0	0	0
Plant production and plant primary products	468 345	526 775	731 188	792 487	931 733	853 243	1 055 316	1 045 114	1 137 706	1 218 852
Animal production and animal primary products	272 065	299 990	272 077	337 029	279 914	289 909	354 639	293 873	565 729	598 602
Mineral resources (excluding energy)	688 042	979 512	1 164 691	931 909	1 075 821	995 552	1 212 226	1 123 063	1 065 384	1 143 762
Energy resources	312 619	335 717	438 889	574 570	709 891	1 185 455	407 091	274 220	273 390	294 820
Energy supply	317 876	326 122	273 823	347 632	364 876	515 216	540 463	623 953	676 490	509 128
Manufacturing	1 230 223	1 356 014	1 859 779	2 187 583	2 676 911	2 998 301	2 602 319	2 374 657	2 489 799	2 394 239
Construction	442 661	454 608	745 634	937 406	1 150 733	1 461 157	521 289	311 897	392 439	426 960
Transport	418 458	422 968	438 848	515 262	595 065	704 404	924 183	905 571	984 225	992 504
Information and communication services	393 727	667 136	948 734	1 035 459	1 240 972	1 274 761	1 381 989	1 104 273	1 271 591	1 159 823
Commercial services	527 456	766 339	1 145 775	1 380 085	1 457 410	1 499 495	2 045 919	1 849 534	1 866 449	1 895 734
Economic framework	193 052	223 875	304 864	349 517	548 517	604 404	598 312	600 662	611 868	715 759
Natural resources	407 227	528 236	377 891	478 198	521 228	720 746	697 290	725 062	839 825	872 835
Division 3: Society	**1 583 390**	**2 274 312**	**2 316 725**	**2 731 152**	**2 827 775**	**3 225 179**	**3 276 198**	**3 247 428**	**3 861 888**	**4 473 657**
Society unclassified	93 498	102 936	115 029	150 668	171 520	209 400	0	0	0	0
Health	1 044 744	1 504 741	1 522 650	1 725 977	1 790 225	2 013 993	2 247 629	2 089 570	2 301 764	2 942 262
Education and training	200 500	382 553	382 105	418 971	389 138	465 475	458 060	442 181	554 462	672 473
Social development and community services	244 648	284 082	296 942	435 536	476 892	536 312	570 508	715 677	1 005 662	858 922
Division 4: Environment	**555 312**	**575 026**	**604 769**	**711 134**	**854 997**	**1 006 106**	**992 840**	**735 909**	**905 570**	**979 981**
Environment unclassified	31 166	34 312	38 343	50 223	57 173	69 800	0	0	0	0
Environmental knowledge	248 177	257 500	303 892	348 158	375 069	488 204	463 786	310 888	398 977	443 987
Environmental aspects of development	122 517	141 631	118 802	130 144	195 300	176 503	181 907	189 344	216 406	258 144
Environmental and other aspects	153 452	141 583	143 732	182 609	227 455	271 599	347 147	235 677	290 186	277 849
Division 5: Advancement of knowledge	**1 172 594**	**1 287 316**	**1 504 349**	**1 968 977**	**2 081 375**	**2 301 517**	**3 068 334**	**3 697 128**	**4 197 547**	**4 843 227**
Advancement of knowledge unclassified	93 498	102 936	115 029	150 668	171 520	209 400	0	0	0	0
Natural sciences, technologies and engineering	755 448	788 740	925 287	1 372 203	1 456 357	1 604 035	2 036 622	2 672 224	3 025 841	3 497 129
Social sciences and humanities	323 648	395 640	464 032	446 107	453 498	488 082	1 031 712	1 024 904	1 171 706	1 346 098
Total	**10 082 559**	**12 009 981**	**14 149 239**	**16 520 584**	**18 624 015**	**21 041 046**	**20 954 677**	**20 253 805**	**22 209 192**	**23 871 219**

TABLE C.15: PROPORTIONAL R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVES (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVES	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**10.0**	**7.4**	**6.4**	**6.6**	**6.1**	**5.7**	**6.1**	**6.6**	**4.8**	**5.7**
Defence	10.0	7.4	6.4	6.6	6.1	5.7	6.1	6.6	4.8	5.7
Division 2: Economic development	**57.2**	**58.2**	**62.3**	**60.6**	**63.0**	**63.3**	**58.9**	**55.5**	**54.8**	**51.2**
Economic development unclassified	0.9	0.9	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	4.6	4.4	5.2	4.8	5.0	4.1	5.0	5.2	5.1	5.1
Animal production and animal primary products	2.7	2.5	1.9	2.0	1.5	1.4	1.7	1.5	2.5	2.5
Mineral resources (excluding energy)	6.8	8.2	8.2	5.6	5.8	4.7	5.8	5.5	4.8	4.8
Energy resources	3.1	2.8	3.1	3.5	3.8	5.6	1.9	1.4	1.2	1.2
Energy supply	3.2	2.7	1.9	2.1	2.0	2.4	2.6	3.1	3.0	2.1
Manufacturing	12.2	11.3	13.1	13.2	14.4	14.2	12.4	11.7	11.2	10.0
Construction	4.4	3.8	5.3	5.7	6.2	6.9	2.5	1.5	1.8	1.8
Transport	4.2	3.5	3.1	3.1	3.2	3.3	4.4	4.5	4.4	4.2
Information and communication services	3.9	5.6	6.7	6.3	6.7	6.1	6.6	5.5	5.7	4.9
Commercial services	5.2	6.4	8.1	8.4	7.8	7.1	9.8	9.1	8.4	7.9
Economic framework	1.9	1.9	2.2	2.1	2.9	2.9	2.9	3.0	2.8	3.0
Natural resources	4.0	4.4	2.7	2.9	2.8	3.4	3.3	3.6	3.8	3.7
Division 3: Society	**15.7**	**18.9**	**16.4**	**16.5**	**15.2**	**15.3**	**15.6**	**16.0**	**17.4**	**18.7**
Society unclassified	0.9	0.9	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0
Health	10.4	12.5	10.8	10.4	9.6	9.6	10.7	10.3	10.4	12.3
Education and training	2.0	3.2	2.7	2.5	2.1	2.2	2.2	2.2	2.5	2.8
Social development and community services	2.4	2.4	2.1	2.6	2.6	2.5	2.7	3.5	4.5	3.6
Division 4: Environment	**5.5**	**4.8**	**4.3**	**4.3**	**4.6**	**4.8**	**4.7**	**3.6**	**4.1**	**4.1**
Environment unclassified	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0
Environmental knowledge	2.5	2.1	2.1	2.1	2.0	2.3	2.2	1.5	1.8	1.9
Environmental aspects of development	1.2	1.2	0.8	0.8	1.0	0.8	0.9	0.9	1.0	1.1
Environmental and other aspects	1.5	1.2	1.0	1.1	1.2	1.3	1.7	1.2	1.3	1.2
Division 5: Advancement of knowledge	**11.6**	**10.7**	**10.6**	**11.9**	**11.2**	**10.9**	**14.6**	**18.3**	**18.9**	**20.3**
Advancement of knowledge unclassified	0.9	0.9	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	7.5	6.6	6.5	8.3	7.8	7.6	9.7	13.2	13.6	14.6
Social sciences and humanities	3.2	3.3	3.3	2.7	2.4	2.3	4.9	5.1	5.3	5.6
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.16: R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

YEAR	GERD	EASTERN CAPE	FREE STATE	GAUTENG	KWAZULU-NATAL	LIMPOPO	MPUMALANGA	NORTHERN CAPE	NORTH-WEST	WESTERN CAPE
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
2003/04	10 082 559	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2004/05	12 009 982	481 979	723 225	6 552 884	1 229 397	151 112	299 681	100 241	370 310	2 101 162
2005/06	14 149 238	672 008	718 908	7 173 590	1 532 158	197 054	340 773	138 426	323 838	3 052 483
2006/07	16 520 584	752 303	944 829	8 447 470	1 809 013	240 952	369 535	180 923	402 461	3 373 098
2007/08	18 624 014	826 925	1 098 210	9 620 752	2 081 166	263 784	452 950	169 937	453 574	3 656 717
2008/09	21 041 046	889 081	1 562 720	10 981 587	2 210 336	286 157	379 123	174 453	487 376	4 070 214
2009/10	20 954 677	1 121 484	1 370 779	10 377 381	2 167 048	340 379	393 822	217 774	540 951	4 425 059
2010/11	20 253 805	1 048 959	1 332 224	9 772 806	2 290 711	395 042	397 878	250 320	532 456	4 233 409
2011/12	22 209 192	1 278 870	1 718 602	10 391 272	2 515 736	583 857	522 963	341 136	732 363	4 124 394
2012/13	23 871 219	1 463 589	1 714 473	10 602 434	3 013 372	619 437	612 031	400 974	890 364	4 554 545

Note: N/A indicates that data were not collected for that year

TABLE C.17: PROPORTIONAL R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

YEAR	EASTERN CAPE	FREE STATE	GAUTENG	KWAZULU-NATAL	LIMPOPO	MPUMALANGA	NORTHERN CAPE	NORTH-WEST	WESTERN CAPE
	%	%	%	%	%	%	%	%	%
2003/04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2004/05	4.0	6.0	54.6	10.2	1.3	2.5	0.8	3.1	17.5
2005/06	4.7	5.1	50.7	10.8	1.4	2.4	1.0	2.3	21.6
2006/07	4.6	5.7	51.1	11.0	1.5	2.2	1.1	2.4	20.4
2007/08	4.4	5.9	51.7	11.2	1.4	2.4	0.9	2.4	19.6
2008/09	4.2	7.4	52.2	10.5	1.4	1.8	0.8	2.3	19.3
2009/10	5.4	6.5	49.5	10.3	1.6	1.9	1.0	2.6	21.1
2010/11	5.2	6.6	48.3	11.3	2.0	2.0	1.2	2.6	20.9
2011/12	5.8	7.7	46.8	11.3	2.6	2.4	1.5	3.3	18.6
2012/13	6.1	7.2	44.4	12.6	2.6	2.6	1.7	3.7	19.1

Note: N/A indicates that data were not collected for that year

C.1.2. SOURCE OF R&D FUNDS

TABLE C.18: FUNDING FOR R&D BY SOURCE (2003/04 TO 2012/13)

YEAR	TOTAL FUNDS	GOVERNMENT*	BUSINESS	OTHER SOUTH AFRICAN FUNDING SOURCES**	FOREIGN SOURCES
	R'000	R'000	R'000	R'000	R'000
2003/04	10 082 571	3 433 088	5 521 405	32 337	1 095 741
2004/05	12 009 980	4 276 313	5 838 774	62 342	1 832 551
2005/06	14 149 239	5 403 955	6 206 837	620 849	1 917 598
2006/07	16 520 570	6 672 138	7 399 660	701 907	1 746 865
2007/08	18 624 059	8 510 101	7 945 949	180 927	1 987 082
2008/09	21 041 046	9 497 510	8 973 490	175 219	2 394 827
2009/10	20 954 676	9 313 028	8 907 527	195 682	2 538 439
2010/11	20 253 805	9 018 874	8 128 246	661 676	2 445 009
2011/12	22 209 192	9 561 917	8 663 105	653 674	3 330 496
2012/13	23 871 219	10 831 893	9 152 042	770 300	3 116 984

*Includes science council and university own funds.
**Includes funds from higher education institutions, not-for-profit organisations and individual donations disbursed to all sectors.

TABLE C.19: PROPORTIONAL FUNDING FOR R&D BY SOURCE (2003/04 TO 2012/13)

YEAR	GOVERNMENT*	BUSINESS	OTHER SOUTH AFRICAN FUNDING SOURCES**	FOREIGN SOURCES
	%	%	%	%
2003/04	34.0	54.8	0.3	10.9
2004/05	35.6	48.6	0.5	15.3
2005/06	38.2	43.9	4.4	13.6
2006/07	40.4	44.8	4.2	10.6
2007/08	45.7	42.7	1.0	10.7
2008/09	45.1	42.6	0.8	11.4
2009/10	44.4	42.5	0.9	12.1
2010/11	44.5	40.1	3.3	12.1
2011/12	43.1	39.0	2.9	15.0
2012/13	45.4	38.3	3.2	13.1

*Includes science council and university own funds.
**Includes funds from higher education institutions, not-for-profit organisations and individual donations disbursed to all sectors.

TABLE C.20: SOURCES OF R&D FUNDING BY SECTOR, AMOUNT AND AS A PERCENTAGE OF TOTAL FUNDS (2012/13)

SOURCE OF FUNDS	TOTAL		GOVERNMENT		SCIENCE COUNCILS		HIGHER EDUCATION		BUSINESS		NOT-FOR-PROFIT	
	R'000	%	R'000	%	R'000	%	R'000	%	R'000	%	R'000	%
Own funds	**13 513 119**	**56.6**	**935 241**	**65.1**	**288 988**	**7.2**	**4 004 016**	**54.6**	**8 214 462**	**77.7**	**70 412**	**14.0**
Internal sources	9 509 103	39.8	935 241	65.1	288 988	7.2	4 004 016	0.0	8 214 462	77.7	70 412	14.0
Government	**5 603 648**	**23.5**	**334 096**	**23.2**	**3 079 567**	**76.5**	**1 391 855**	**19.0**	**683 669**	**6.5**	**114 461**	**22.7**
Grants	2 058 403	8.6	186 131	12.9	1 651 057	41.0	N/A	N/A	174 958	1.7	46 257	9.2
Contracts	2 153 390	9.0	147 965	10.3	1 428 510	35.5	N/A	N/A	508 711	4.8	68 204	13.5
All other	1 391 855	5.8	N/A	N/A	N/A	N/A	1 391 855	19.0	N/A	N/A	N/A	N/A
Business	**937 580**	**3.9**	**11 552**	**0.8**	**135 729**	**3.4**	**577 527**	**7.9**	**187 878**	**1.8**	**24 894**	**4.9**
Local business	937 580	3.9	11 552	0.8	135 729	3.4	577 527	7.9	187 878	1.8	24 894	4.9
Other South African funding sources	**699 888**	**2.9**	**12 626**	**0.9**	**10 868**	**0.3**	**349 511**	**4.8**	**294 852**	**2.8**	**32 031**	**6.4**
Higher education	184 111	0.8	620	0.0	4 812	0.1	172 533	2.4	634	0.0	5 512	1.1
Not-for-profit	340 319	1.4	11 966	0.8	6 049	0.2	20 021	0.3	291 909	2.8	10 374	2.1
Individual donations	175 458	0.7	40	0.0	7	0.0	156 957	2.1	2 309	0.0	16 145	3.2
Foreign	**3 116 984**	**13.1**	**143 994**	**10.0**	**510 846**	**12.7**	**1 010 244**	**13.8**	**1 189 865**	**11.3**	**262 035**	**52.0**
All sources	3 116 984	13.1	143 994	10.0	510 846	12.7	1 010 244	13.8	1 189 865	11.3	262 035	52.0
Total	**23 871 219**	**100**	**1 437 509**	**100**	**4 025 998**	**100**	**7 333 153**	**100**	**10 570 726**	**100**	**503 833**	**100**

Note: N/A indicates that data were not collected.

TABLE C.21: GOVERNMENT-FUNDED R&D BY SECTOR (2003/04 TO 2012/13)

YEAR	TOTAL	GOVERNMENT*	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
		R'000	R'000	R'000	R'000	R'000
2003/04	**3 162 951**	404 216	1 183 728	1 194 686	345 504	34 817
2004/05	**3 523 233**	438 172	1 287 339	1 278 311	481 519	37 892
2005/06	**5 800 628**	755 656	1 591 534	2 093 228	1 331 740	28 470
2006/07	**7 193 363**	937 005	2 134 960	2 327 134	1 764 448	29 816
2007/08	**8 510 055**	1 091 049	2 297 322	2 761 557	2 326 728	33 399
2008/09	**9 497 510**	1 068 527	2 602 458	3 226 674	2 567 140	32 711
2009/10	**9 313 028**	1 008 475	2 917 683	3 918 620	1 429 766	38 484
2010/11	**9 018 874**	990 290	2 932 489	4 222 092	832 173	41 830
2011/12	**9 561 917**	1 112 307	3 310 894	4 598 426	499 298	40 992
2012/13	**10 831 893**	1 269 337	3 368 555	5 395 871	683 669	114 461

Note: *Include science council and university own funds

TABLE C.22: PROPORTIONAL GOVERNMENT-FUNDED R&D BY SECTOR (2003/04 TO 2012/13)

YEAR	GOVERNMENT*	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
2003/04	12.8	37.4	37.8	10.9	1.1
2004/05	12.4	36.5	36.3	13.7	1.1
2005/06	13.0	27.4	36.1	23.0	0.5
2006/07	13.0	29.7	32.4	24.5	0.4
2007/08	12.8	27.0	32.5	27.3	0.4
2008/09	11.3	27.4	34.0	27.0	0.3
2009/10	10.8	31.3	42.1	15.4	0.4
2010/11	11.0	32.5	46.8	9.2	0.5
2011/12	11.6	34.6	48.1	5.2	0.4
2012/13	11.7	31.1	49.8	6.3	1.1

Note: *Includes science council and university own funds.

TABLE C.23: BUSINESS-FUNDED R&D BY SECTOR (2003/04 TO 2012/13)

YEAR	TOTAL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
2003/04	**5 256 363**	3 758	254 668	478 734	4 499 656	19 547
2004/05	**5 344 512**	2 666	293 030	364 041	4 666 364	18 411
2005/06	**6 206 837**	11 000	220 698	316 740	5 630 983	27 416
2006/07	**7 399 659**	13 067	265 441	682 493	6 414 319	24 339
2007/08	**7 945 949**	5 343	263 098	519 804	7 133 913	23 791
2008/09	**8 973 490**	15 980	137 356	454 184	8 339 379	26 591
2009/10	**8 907 527**	2 326	120 528	609 250	8 142 996	32 427
2010/11	**8 128 246**	2 406	198 206	367 340	7 528 667	31 627
2011/12	**8 663 105**	1 355	67 614	505 510	8 056 545	32 081
2012/13	**9 152 042**	11 552	135 729	577 527	8 402 340	24 894

TABLE C.24: PROPORTIONAL BUSINESS-FUNDED R&D BY SECTOR (2003/04 TO 2012/13)

YEAR	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
2003/04	0.1	4.8	9.1	85.6	0.4
2004/05	0.0	5.5	6.8	87.3	0.3
2005/06	0.2	3.6	5.1	90.7	0.4
2006/07	0.2	3.6	9.2	86.7	0.3
2007/08	0.1	3.3	6.5	89.8	0.3
2008/09	0.2	1.5	5.1	92.9	0.3
2009/10	0.0	1.4	6.8	91.4	0.4
2010/11	0.0	2.4	4.5	92.6	0.4
2011/12	0.0	0.8	5.8	93.0	0.4
2012/13	0.1	1.5	6.3	91.8	0.3

TABLE C.25: FOREIGN-FUNDED R&D BY SECTOR (2003/04 TO 2012/13)

YEAR	TOTAL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
2003/04	**1 095 741**	45 065	171 076	224 031	534 636	120 933
2004/05	**1 894 645**	57 765	254 287	303 002	1 208 310	71 281
2005/06	**1 917 598**	58 714	254 183	305 590	1 196 771	102 340
2006/07	**1 746 996**	51 660	320 868	278 708	977 087	118 673
2007/08	**1 987 082**	56 172	298 906	320 286	1 180 193	131 525
2008/09	**2 394 827**	53 348	392 008	410 038	1 396 033	143 400
2009/10	**2 538 439**	54 129	416 571	443 109	1 538 917	85 713
2010/11	**2 445 009**	16 236	460 580	473 145	1 442 334	52 714
2011/12	**3 330 496**	118 127	321 257	1 272 173	1 562 277	56 662
2012/13	**3 116 984**	143 994	510 846	1 010 244	1 189 865	262 035

TABLE C.26: PROPORTIONAL FOREIGN-FUNDED R&D BY SECTOR (2003/04 TO 2012/13)

YEAR	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
2003/04	4.1	15.6	20.4	48.8	11.0
2004/05	3.0	13.4	16.0	63.8	3.8
2005/06	3.1	13.3	15.9	62.4	5.3
2006/07	3.0	18.4	16.0	55.9	6.8
2007/08	2.8	15.0	16.1	59.4	6.6
2008/09	2.2	16.4	17.1	58.3	6.0
2009/10	2.1	16.4	17.5	60.6	3.4
2010/11	0.7	18.8	19.4	59.0	2.2
2011/12	3.5	9.6	38.2	46.9	1.7
2012/13	4.6	16.4	32.4	38.2	8.4

C.1.3. R&D PERSONNEL

TABLE C.27: R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION (2003/04 TO 2012/13)

YEAR	R&D PERSONNEL		R&D PERSONNEL (FTEs) PER 1000 IN TOTAL EMPLOYMENT	RESEARCHERS		RESEARCHERS (FTEs) PER 1 000 IN TOTAL EMPLOYMENT	TECHNICIANS		OTHER R&D PERSONNEL	
	HEADCOUNTS	FTEs		HEADCOUNTS	FTEs		HEADCOUNTS	FTEs	HEADCOUNTS	FTEs
2003/04	**40 605**	**25 190.0**	**3.3**	22 760	14 130.9	1.6	8 193	5 142.7	9 651	5 916.8
2004/05	**56 453**	**29 696.5**	**2.6**	37 001	17 915.0	1.6	8 641	5 175.7	10 811	6 606.3
2005/06	**57 275**	**28 798.2**	**2.4**	39 266	17 303.0	1.5	8 325	5 248.2	9 684	6 246.9
2006/07	**58 706**	**30 984.4**	**1.5**	39 591	18 573.5	1.5	9 761	6 331.8	9 354	6 080.0
2007/08	**59 334**	**31 354.4**	**2.4**	40 084	19 320.3	1.5	9 476	6 060.5	9 784	5 973.7
2008/09	**58 895**	**30 801.6**	**2.2**	39 955	19 384.3	1.4	9 761	6 022.4	9 179	5 394.8
2009/10	**59 494**	**30 891.3**	**2.3**	40 797	19 793.1	1.5	9 443	5 792.2	9 254	5 306.0
2010/11	**55 531**	**29 486.4**	**2.2**	37 901	18 719.6	1.4	8 559	5 409.6	9 071	5 357.3
2011/12	**59 487**	**30 978.4**	**2.3**	40 653	20 115.1	1.5	9 260	5 566.9	9 574	5 296.5
2012/13	**64 917**	**35 050.3**	**2.4**	42 828	21 382.4	1.5	10 790	6 582.3	11 299	7 085.5

TABLE C.28: R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION AND GENDER (2012/13)

OCCUPATION	HEADCOUNTS			FTEs		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
Researchers*	24 104	18 724	42 828	12 097.9	9 284.5	21 382.4
Technicians	6 902	3 888	10 790	4 181.9	2 400.4	6 582.3
Other personnel directly supporting R&D	5 562	5 737	11 299	3 688.8	3 396.7	7 085.5
Total	**36 568**	**28 349**	**64 917**	**19 968.6**	**15 081.6**	**35 050.3**

*Including doctoral and post-doctoral students.

TABLE C.29: R&D PERSONNEL IN HEADCOUNTS BY SECTOR (2003/04 TO 2012/13)

YEAR	TOTAL R&D PERSONNEL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION*	BUSINESS	NOT-FOR-PROFIT
	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS
2003/04	**40 605**	2 283	6 522	19 377	11 608	815
2004/05	**56 453**	2 311	6 170	33 126	14 337	509
2005/06	**57 275**	2 001	5 679	32 789	16 321	485
2006/07	**58 706**	2 924	5 798	32 033	17 467	484
2007/08	**59 334**	2 794	5 988	32 109	17 951	502
2008/09	**58 895**	2 963	5 609	31 226	18 595	502
2009/10	**59 494**	2 580	5 926	32 392	18 216	380
2010/11	**55 531**	2 704	4 923	32 571	14 933	400
2011/12	**59 487**	3 143	4 494	36 157	15 288	405
2012/13	**64 917**	3 252	5 399	38 205	17 155	906

Note: *Includes doctoral students and post-doctoral fellows at higher education institutes.

TABLE C.30: RESEARCHERS IN HEADCOUNTS BY SECTOR (2003/04 TO 2012/13)

YEAR	TOTAL RESEARCHERS	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION*	BUSINESS	NOT-FOR-PROFIT
	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS
2003/04	**22 760**	929	2 414	14 054	5 058	305
2004/05	**37 001**	692	1 846	27 603	6 575	285
2005/06	**39 266**	874	1 790	28 879	7 480	243
2006/07	**39 591**	1 111	2 255	27 746	8 227	252
2007/08	**40 084**	1 138	2 594	27 752	8 336	264
2008/09	**39 955**	1 169	2 648	27 316	8 560	262
2009/10	**40 797**	986	2 669	28 552	8 366	224
2010/11	**37 901**	1 184	1 941	28 154	6 372	250
2011/12	**40 653**	1 411	1 803	30 993	6 192	254
2012/13	**42 828**	1 409	1 879	32 955	6 191	394

Note: *Includes doctoral students and post-doctoral fellows at higher education institutes.

TABLE C.31: R&D PERSONNEL IN FULL-TIME EQUIVALENTS BY SECTOR (2003/04 TO 2012/13)

YEAR	TOTAL R&D PERSONNEL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	FTEs	FTEs	FTEs	FTEs	FTEs	FTEs
2003/04	**21 186.7**	1 428.2	5 389.4	4 554.0	9 131.7	683.5
2004/05	**29 696.5**	1 667.3	4 989.6	11 380.9	11 296.0	362.7
2005/06	**28 798.2**	1 483.0	4 103.1	10 611.2	12 235.9	365.0
2006/07	**30 984.4**	2 068.3	4 956.1	11 002.0	12 595.3	362.7
2007/08	**31 354.4**	1 950.0	5 058.8	11 505.3	12 461.3	379.1
2008/09	**30 801.6**	2 073.9	4 699.9	11 169.0	12 492.5	366.4
2009/10	**30 891.3**	1 903.9	4 782.7	11 870.4	12 024.6	309.7
2010/11	**29 486.4**	2 178.6	4 312.4	12 477.3	10 205.1	313.1
2011/12	**30 978.4**	2 404.5	3 803.5	14 563.4	9 894.9	312.1
2012/13	**35 050.3**	2 597.0	4 748.5	15 614.4	11 322.3	768.0

Note: Includes doctoral students and post-doctoral fellows at higher education institutes.

TABLE C.32: R&D PERSONNEL IN HEADCOUNTS BY OCCUPATION, QUALIFICATION, POPULATION GROUP AND GENDER (2012/13)

OCCUPATION AND QUALIFICATION	TOTAL R&D PERSONNEL	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers*											
Doctoral degree or equivalent	18 735	10 371	8 364	3 284	1 959	626	595	717	821	5 744	4 989
Masters, honours, bachelor or equivalent	15 071	8 320	6 751	2 637	2 000	451	521	741	710	4 491	3 520
Diplomas	3 841	1 826	2 015	693	1 015	81	117	190	223	862	660
Subtotal	**37 647**	**20 517**	**17 130**	**6 614**	**4 974**	**1 158**	**1 233**	**1 648**	**1 754**	**11 097**	**9 169**
Technicians directly supporting R&D											
Doctoral degree or equivalent	227	132	95	22	15	5	3	7	6	98	72
Masters, honours, bachelor or equivalent	4 347	2 486	1 861	665	652	145	140	288	204	1 388	865
Diplomas	6 216	4 284	1 932	1 474	908	510	171	280	182	2 021	671
Subtotal	**10 790**	**6 902**	**3 888**	**2 160**	**1 575**	**660**	**314**	**575**	**391**	**3 507**	**1 608**
Other personnel directly supporting R&D											
Doctoral degree or equivalent	428	237	191	81	46	7	15	16	19	133	110
Masters, honours, bachelor or equivalent	2 757	1 125	1 632	436	564	57	145	94	141	537	781
Diplomas	8 114	4 200	3 914	2 110	1 700	545	597	662	281	884	1 337
Subtotal	**11 299**	**5 562**	**5 737**	**2 627**	**2 310**	**609**	**758**	**772**	**441**	**1 554**	**2 228**
Total	**59 736**	**32 981**	**26 755**	**11 402**	**8 858**	**2 427**	**2 305**	**2 995**	**2 586**	**16 157**	**13 006**

Note: Non-SA student data are not collected by population group.
*Doctoral degree or equivalent includes South African doctoral students and post-doctoral fellows.

C.2. SECTOR TABLES

C.2.1. BUSINESS SECTOR

TABLE C.33: BUSINESS SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

Type of research	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	759 345	642 302	721 255	800 085	929 134	1 073 117	1 267 759	1 025 389	922 888	802 753
Applied research	1 883 082	2 223 955	2 409 266	2 550 483	3 077 341	3 426 651	3 301 773	3 949 410	4 461 770	5 569 024
Experimental research	2 948 898	3 900 103	5 113 256	5 892 597	6 731 981	7 832 244	6 569 705	5 084 210	5 079 364	4 198 949
Total	**5 591 325**	**6 766 361**	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**

TABLE C.34: PROPORTIONAL BUSINESS SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

Type of research	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Basic research	13.6	9.5	8.7	8.7	8.7	8.7	11.4	10.2	8.8	7.6
Applied research	33.7	32.9	29.2	27.6	28.7	27.8	29.6	39.3	42.6	52.7
Experimental research	52.7	57.6	62.0	63.8	62.7	63.5	59.0	50.5	48.5	39.7
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.35: BUSINESS SECTOR R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Capital expenditure	**775 849**	**642 863**	**1 446 650**	**1 120 589**	**1 445 305**	**2 658 738**	**1 638 994**	**1 306 444**	**1 650 541**	**1 072 556**
Land, buildings and other structures	136 892	97 982	199 088	154 129	262 994	207 473	285 285	202 835	217 126	140 053
Vehicles, plant, machinery, equipment	638 957	544 881	1 247 562	966 460	1 182 311	2 451 265	1 353 709	1 103 609	1 433 415	932 503
Current expenditure	**4 815 476**	**6 123 498**	**6 797 126**	**8 122 576**	**9 293 151**	**9 673 274**	**9 500 243**	**8 752 566**	**8 813 481**	**9 498 170**
Labour costs	2 488 458	3 341 011	3 703 277	4 461 218	4 881 074	5 279 507	5 207 695	4 467 214	4 723 488	5 821 884
Other current expenditure	2 327 018	2 782 487	3 093 849	3 661 358	4 412 077	4 393 767	4 292 548	4 285 352	4 089 993	3 676 286
Total	**5 591 325**	**6 766 361**	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**

TABLE C.36: PROPORTIONAL BUSINESS SECTOR R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	**13.9**	**9.5**	**17.5**	**12.1**	**13.5**	**21.6**	**14.7**	**13.0**	**15.8**	**10.1**
Vehicles, plant, machinery, equipment	2.4	1.4	2.4	1.7	2.4	1.7	2.6	2.0	2.1	1.3
Land, buildings and other structures	11.4	8.1	15.1	10.5	11.0	19.9	12.2	11.0	13.7	8.8
Current expenditure	**86.1**	**90.5**	**82.5**	**87.9**	**86.5**	**78.4**	**85.3**	**87.0**	**84.2**	**89.9**
Labour costs	44.5	49.4	44.9	48.3	45.5	42.8	46.8	44.4	45.1	55.1
Other current expenditure	41.6	41.1	37.5	39.6	41.1	35.6	38.5	42.6	39.1	34.8
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.37: BUSINESS SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	**138 407**	**132 641**	**169 410**	**268 923**	**330 232**	**341 695**	**422 121**	**499 589**
Nanotechnology	140 187	155 049	30 314	56 881	150 474	102 670	171 808	225 557
Total	**278 595**	**287 690**	**199 724**	**325 804**	**480 706**	**444 366**	**593 929**	**725 145**
Business expenditure on R&D	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.38: PROPORTIONAL BUSINESS SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Biotechnology	**1.7**	**1.4**	**1.6**	**2.2**	**3.0**	**3.4**	**4.0**	**4.7**
Nanotechnology	1.7	1.7	0.3	0.5	1.4	1.0	1.6	2.1
Total	**3.4**	**3.1**	**1.9**	**2.6**	**4.3**	**4.4**	**5.7**	**6.9**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.39: BUSINESS SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	31 349	183 921
Open-source software	60 476	118 858	114 195	96 266	91 818	68 105	85 787	87 200
New materials	160 859	115 339	72 992	154 140	173 308	227 682	277 152	225 897
Tuberculosis (TB), HIV/AIDS, malaria	274 236	294 689	302 122	466 161	460 233	631 996	812 580	929 121
Total	**495 571**	**528 886**	**489 309**	**716 567**	**725 359**	**927 783**	**1 206 869**	**1 426 139**
Business expenditure on R&D	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.40: PROPORTIONAL BUSINESS SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	0.3	1.7
Open-source software	0.7	1.3	1.1	0.8	0.8	0.7	0.8	0.8
New materials	2.0	1.2	0.7	1.2	1.6	2.3	2.6	2.1
Tuberculosis (TB), HIV/AIDS, malaria	3.3	3.2	2.8	3.8	4.1	6.3	7.8	8.8
Total	**6.0**	**5.7**	**4.6**	**5.8**	**6.5**	**9.2**	**11.5**	**13.5**

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.41: BUSINESS SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**5 456 725**	**6 536 764**	**7 919 744**	**8 881 904**	**10 357 433**	**11 902 551**	**10 743 523**	**9 612 221**	**9 992 916**	**9 127 446**
Mathematical sciences	43 823	92 844	169 355	159 496	176 077	183 255	183 426	110 543	204 594	149 220
Physical sciences	208 386	211 921	312 246	382 551	507 646	655 898	190 292	32 669	28 489	47 672
Chemical sciences	410 939	469 211	441 138	438 969	580 146	859 041	627 729	687 843	934 005	980 021
Earth sciences	36 788	34 269	52 781	66 244	93 014	95 034	90 098	106 759	92 439	102 892
Information, computer and communication technologies	944 070	1 279 325	1 635 321	1 980 630	2 182 253	2 412 430	2 855 355	2 502 454	2 481 028	1 576 163
Applied sciences and technologies	857 404	856 021	1 384 945	1 551 885	1 581 438	1 671 375	1 271 414	1 132 538	902 425	872 014
Engineering sciences	1 980 965	2 101 662	2 219 530	2 439 092	3 237 265	3 908 347	3 311 902	2 768 035	2 751 145	2 827 677
Biological sciences	52 867	127 322	163 796	160 584	161 058	162 776	194 671	207 456	212 632	210 627
Agricultural sciences	200 856	187 344	257 447	277 889	311 287	293 357	323 603	371 310	471 529	444 593
Medical and health sciences	571 171	997 182	1 073 854	1 225 114	1 268 551	1 509 109	1 567 493	1 622 215	1 843 005	1 812 411
Environmental sciences	56 473	73 775	52 492	42 315	62 355	57 764	47 692	5 818	2 206	44 563
Material sciences	86 627	96 525	146 886	146 588	184 625	82 192	70 949	59 723	65 092	53 855
Marine sciences	6 355	9 366	9 951	10 547	11 719	11 975	8 899	4 859	4 324	5 738
Division 2: Social Sciences and Humanities	**134 600**	**229 597**	**324 032**	**361 261**	**381 023**	**429 461**	**395 714**	**446 789**	**471 106**	**1 443 280**
Social sciences	134 600	229 522	323 673	360 856	380 554	428 969	395 115	446 789	471 106	1 443 280
Humanities	0	75	359	405	469	491	599	0	0	0
Total	**5 591 325**	**6 766 361**	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**

TABLE C.42: PROPORTIONAL BUSINESS SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**97.6**	**96.6**	**96.1**	**96.1**	**96.5**	**96.5**	**96.4**	**95.6**	**95.5**	**86.3**
Mathematical sciences	0.8	1.4	2.1	1.7	1.6	1.5	1.6	1.1	2.0	1.4
Physical sciences	3.7	3.1	3.8	4.1	4.7	5.3	1.7	0.3	0.3	0.5
Chemical sciences	7.3	6.9	5.4	4.7	5.4	7.0	5.6	6.8	8.9	9.3
Earth sciences	0.7	0.5	0.6	0.7	0.9	0.8	0.8	1.1	0.9	1.0
Information, computer and communication technologies	16.9	18.9	19.8	21.4	20.3	19.6	25.6	24.9	23.7	14.9
Applied sciences and technologies	15.3	12.7	16.8	16.8	14.7	13.6	11.4	11.3	8.6	8.2
Engineering sciences	35.4	31.1	26.9	26.4	30.1	31.7	29.7	27.5	26.3	26.8
Biological sciences	0.9	1.9	2.0	1.7	1.5	1.3	1.7	2.1	2.0	2.0
Agricultural sciences	3.6	2.8	3.1	3.0	2.9	2.4	2.9	3.7	4.5	4.2
Medical and health sciences	10.2	14.7	13.0	13.3	11.8	12.2	14.1	16.1	17.6	17.1
Environmental sciences	1.0	1.1	0.6	0.5	0.6	0.5	0.4	0.1	0.0	0.4
Material sciences	1.5	1.4	1.8	1.6	1.7	0.7	0.6	0.6	0.6	0.5
Marine sciences	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1
Division 2: Social Sciences and Humanities	**2.4**	**3.4**	**3.9**	**3.9**	**3.5**	**3.5**	**3.6**	**4.4**	**4.5**	**13.7**
Social sciences	2.4	3.4	3.9	3.9	3.5	3.5	3.5	4.4	4.5	13.7
Humanities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.43: BUSINESS SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**849 574**	**718 491**	**747 523**	**777 139**	**900 909**	**908 781**	**959 761**	**1 103 510**	**813 259**	**1 040 025**
Defence	849 574	718 491	747 523	777 139	900 909	908 781	959 761	1 103 510	813 259	1 040 025
Division 2: Economic Development	**3 935 136**	**4 895 638**	**6 384 780**	**7 233 003**	**8 399 187**	**9 737 338**	**8 258 491**	**7 012 272**	**7 381 289**	**7 234 533**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant Production And Plant Primary Products	153 202	209 583	273 503	279 937	279 437	266 259	309 370	288 323	315 806	374 327
Animal Production and Animal Primary Products	21 967	38 024	61 266	67 619	78 657	74 302	110 295	46 709	46 316	38 484
Mineral Resources (Excluding Energy)	469 983	711 661	829 414	779 765	937 628	839 558	741 401	728 130	733 280	853 544
Energy Resources	277 337	301 603	385 851	470 735	585 453	732 188	290 662	93 532	90 377	90 975
Energy Supply	279 093	292 545	205 657	239 018	252 064	393 798	426 407	470 030	490 490	321 456
Manufacturing	1 023 487	1 115 221	1 603 753	1 846 199	2 117 823	2 562 745	2 037 129	1 747 369	1 863 289	1 639 077
Construction	385 179	365 271	631 698	756 166	1 017 969	1 295 717	367 510	16 284	46 158	96 071
Transport	351 443	363 545	391 173	446 162	523 022	621 479	843 301	872 149	920 081	951 435
Information and Communication Services	355 231	588 233	818 485	895 714	1 087 198	1 151 637	1 189 650	851 392	978 187	908 640
Commercial Services	486 682	718 856	1 091 434	1 329 972	1 347 470	1 422 123	1 747 450	1 773 253	1 739 933	1 755 506
Economic Framework	14 803	11 280	13 515	16 243	41 756	160 562	106 693	70 795	57 474	103 240
Natural Resources	116 730	179 816	79 032	105 475	130 711	216 971	88 624	54 306	99 898	101 778
Division 3: Society	**502 865**	**911 606**	**798 247**	**839 908**	**915 567**	**1 019 848**	**1 224 481**	**1 041 616**	**1 232 867**	**1 242 066**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	475 478	873 468	761 222	799 201	857 364	930 645	1 103 816	880 549	1 054 182	1 045 048
Education and Training	16 672	20 087	11 199	12 913	12 204	27 232	26 444	32 486	32 767	29 566
Social Development and Community Services	10 715	18 050	25 827	27 794	45 999	61 971	94 220	128 581	145 918	167 452
Division 4: Environment	**151 043**	**145 034**	**109 803**	**113 821**	**164 552**	**221 747**	**211 208**	**211 025**	**220 698**	**173 535**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental Knowledge	43 489	32 776	33 395	39 233	62 551	91 953	53 022	51 845	58 565	46 213
Environmental Aspects of Development	56 246	70 069	28 781	28 327	33 901	31 493	22 456	55 577	42 226	17 957
Environmental and Other Aspects	51 307	42 188	47 626	46 261	68 100	98 301	135 730	103 602	119 907	109 365
Division 5: Advancement of Knowledge	**152 708**	**95 593**	**203 423**	**279 295**	**358 242**	**444 298**	**485 296**	**690 587**	**815 909**	**880 567**
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural Sciences, Technologies and Engineering	147 486	92 497	200 018	275 446	353 694	439 330	479 999	682 401	813 150	877 557
Social Sciences and Humanities	5 222	3 096	3 406	3 848	4 548	4 968	5 298	8 186	2 758	3 010
Total	**5 591 325**	**6 766 361**	**8 243 776**	**9 243 165**	**10 738 457**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**

TABLE C.44: PROPORTIONAL BUSINESS SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**15.2**	**10.6**	**9.1**	**8.4**	**8.4**	**7.4**	**8.6**	**11.0**	**7.8**	**9.8**
Defence	15.2	10.6	9.1	8.4	8.4	7.4	8.6	11.0	7.8	9.8
Division 2: Economic Development	**70.4**	**72.4**	**77.4**	**78.3**	**78.2**	**79.0**	**74.1**	**69.7**	**70.5**	**68.4**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant Production And Plant Primary Products	2.7	3.1	3.3	3.0	2.6	2.2	2.8	2.9	3.0	3.5
Animal Production and Animal Primary Products	0.4	0.6	0.7	0.7	0.7	0.6	1.0	0.5	0.4	0.4
Mineral Resources (Excluding Energy)	8.4	10.5	10.1	8.4	8.7	6.8	6.7	7.2	7.0	8.1
Energy Resources	5.0	4.5	4.7	5.1	5.5	5.9	2.6	0.9	0.9	0.9
Energy Supply	5.0	4.3	2.5	2.6	2.3	3.2	3.8	4.7	4.7	3.0
Manufacturing	18.3	16.5	19.5	20.0	19.7	20.8	18.3	17.4	17.8	15.5
Construction	6.9	5.4	7.7	8.2	9.5	10.5	3.3	0.2	0.4	0.9
Transport	6.3	5.4	4.7	4.8	4.9	5.0	7.6	8.7	8.8	9.0
Information and Communication Services	6.4	8.7	9.9	9.7	10.1	9.3	10.7	8.5	9.3	8.6
Commercial Services	8.7	10.6	13.2	14.4	12.5	11.5	15.7	17.6	16.6	16.6
Economic Framework	0.3	0.2	0.2	0.2	0.4	1.3	1.0	0.7	0.5	1.0
Natural Resources	2.1	2.7	1.0	1.1	1.2	1.8	0.8	0.5	1.0	1.0
Division 3: Society	**9.0**	**13.5**	**9.7**	**9.1**	**8.5**	**8.3**	**11.0**	**10.4**	**11.8**	**11.8**
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	8.5	12.9	9.2	8.6	8.0	7.5	9.9	8.8	10.1	9.9
Education and Training	0.3	0.3	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3
Social Development and Community Services	0.2	0.3	0.3	0.3	0.4	0.5	0.8	1.3	1.4	1.6
Division 4: Environment	**2.7**	**2.1**	**1.3**	**1.2**	**1.5**	**1.8**	**1.9**	**2.1**	**2.1**	**1.6**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	0.8	0.5	0.4	0.4	0.6	0.7	0.5	0.5	0.6	0.4
Environmental Aspects of Development	1.0	1.0	0.3	0.3	0.3	0.3	0.2	0.6	0.4	0.2
Environmental and Other Aspects	0.9	0.6	0.6	0.5	0.6	0.8	1.2	1.0	1.1	1.0
Division 5: Advancement of Knowledge	**2.7**	**1.4**	**2.5**	**3.0**	**3.3**	**3.6**	**4.4**	**6.9**	**7.8**	**8.3**
Advancement of Knowledge unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Sciences, Technologies and Engineering	2.6	1.4	2.4	3.0	3.3	3.6	4.3	6.8	7.8	8.3
Social Sciences and Humanities	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0

TABLE C.45: BUSINESS SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

Province	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	N/A	136 027	242 692	247 295	283 488	316 089	320 955	217 880	354 553	468 197
Free State	N/A	520 740	476 346	665 443	786 225	1 213 808	999 554	943 508	1 308 833	1 265 285
Gauteng	N/A	4 121 777	4 643 864	5 263 546	6 142 233	7 131 411	6 120 062	5 439 718	5 558 409	5 356 550
KwaZulu-Natal	N/A	615 437	843 499	962 308	1 302 260	1 255 509	1 183 636	1 280 014	1 160 507	1 237 563
Limpopo	N/A	49 948	84 187	72 813	71 687	75 675	49 375	41 850	62 728	127 451
Mpumalanga	N/A	178 452	187 934	172 948	196 368	201 550	161 154	139 771	157 158	222 974
North-West	N/A	184 691	180 227	197 383	193 339	222 630	267 528	256 428	302 164	380 144
Northern Cape	N/A	11 665	14 691	15 834	7 450	7 319	7 988	17 017	45 267	78 471
Western Cape	N/A	947 623	1 570 336	1 645 595	1 755 404	1 908 020	2 028 984	1 722 823	1 514 404	1 434 090
Total	**N/A**	**6 766 361**	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**

Note: N/A indicates that data were not collected.

TABLE C.46: PROPORTIONAL BUSINESS SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

Province	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	N/A	2.0	2.9	2.7	2.6	2.6	2.9	2.2	3.4	4.4
Free State	N/A	7.7	5.8	7.2	7.3	9.8	9.0	9.4	12.5	12.0
Gauteng	N/A	60.9	56.3	56.9	57.2	57.8	54.9	54.1	53.1	50.7
KwaZulu-Natal	N/A	9.1	10.2	10.4	12.1	10.2	10.6	12.7	11.1	11.7
Limpopo	N/A	0.7	1.0	0.8	0.7	0.6	0.4	0.4	0.6	1.2
Mpumalanga	N/A	2.6	2.3	1.9	1.8	1.6	1.4	1.4	1.5	2.1
North-West	N/A	2.7	2.2	2.1	1.8	1.8	2.4	2.5	2.9	3.6
Northern Cape	N/A	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.4	0.7
Western Cape	N/A	14.0	19.0	17.8	16.3	15.5	18.2	17.1	14.5	13.6
Total	**N/A**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: N/A indicates that data were not collected.

TABLE C.47: BUSINESS SECTOR R&D EXPENDITURE BY STANDARD INDUSTRIAL CLASSIFICATION CODE (SIC) (2003/04 TO 2012/13)

STANDARD INDUSTRIAL CLASSIFICATION	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Agriculture, Hunting, Forestry and Fishing	98 659	180 008	206 449	199 959	213 808	220 757	208 447	157 916	211 132	286 832
Mining and Quarrying	721 503	425 917	428 066	518 262	559 332	578 825	499 286	1 055 963	1 352 877	1 554 284
Manufacturing	2 478 200	2 981 267	3 367 640	3 537 433	4 222 127	4 787 581	4 321 327	3 592 204	3 551 234	3 476 647
Manufacture of Food Products, Beverages and Tobacco Products	128 017	145 848	194 900	183 391	196 238	215 876	162 851	221 370	283 262	319 143
Manufacture of Textiles, Clothing and Leather Goods	3 376	14 843	23 047	21 899	17 888	13 755	16 946	2 437	0	2 073
Manufacture of Wood and Products of Wood and Cork, except furniture; Manufacture of Articles of Straw and Plaiting Materials; Manufacture of Paper and Paper Products; Manufacture of Publishing, Printing and Reproduction of Recorded Material	91 107	86 214	102 715	110 631	118 535	118 016	111 255	106 448	80 255	50 531
Manufacture of Refined Petroleum, Coke and Nuclear Fuel; Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals); Manufacture of Rubber and Plastic Products	921 065	1 120 622	1 057 218	1 301 947	1 579 382	2 267 063	1 758 353	1 197 179	1 381 001	1 139 617
Manufacture of Non-Metallic Mineral Products	108 379	115 461	108 310	127 714	183 758	134 638	120 508	87 037	72 039	49 974
Manufacture of Basic Metals, Fabricated Metal Products, Machinery & Equipment; Manufacture of Office, Accounting and Computing Machinery	342 799	428 409	600 305	386 605	500 715	315 295	330 137	240 408	392 800	585 635
Manufacture of Electrical Machinery and Apparatus	65 838	83 582	157 388	189 554	187 612	166 498	146 169	207 954	310 599	312 102
Manufacture of Radio, Television and Communication Equipment & Apparatus; Manufacture of Medical, Precision and Optical Instruments, Watches & Clocks	348 015	284 803	378 170	425 585	506 497	511 356	591 774	590 174	639 217	656 639
Manufacture of Transport Equipment	463 272	697 268	726 605	784 209	924 053	984 235	1 022 589	881 958	310 145	267 788
Manufacture of Furniture; Recycling; Manufacturing not elsewhere classified	6 333	4 218	18 983	5 898	7 449	60 849	60 743	57 240	81 914	93 145
Electricity, Gas and Water Supply	227 956	270 538	1 067 428	1 292 925	1 737 511	2 306 297	955 690	536 050	494 745	385 770
Construction	537 300	483 519	8 815	4 559	6 043	6 105	3 490	3 213	6 495	9 051
Wholesale and Retail	6 458	23 469	274 743	324 666	317 780	334 131	434 522	620 541	547 194	179 383
Transport, Storage and Communication	289 070	325 707	438 003	453 715	490 138	425 235	415 243	354 311	484 222	467 411
Financial Intermediation, Real Estate and Business Services	1 095 482	1 912 951	2 080 840	2 477 423	2 759 550	3 377 896	3 777 124	3 326 985	3 645 625	3 914 543
Community, Social and Personal Services	136 697	162 986	371 792	434 223	432 167	295 185	524 108	411 826	170 499	296 805
Total	**5 591 325**	**6 766 361**	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**

TABLE C.48: PROPORTIONAL BUSINESS SECTOR R&D EXPENDITURE BY STANDARD INDUSTRIAL CLASSIFICATION CODE (SIC) (2003/04 TO 2012/13)

STANDARD INDUSTRIAL CLASSIFICATION	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Agriculture, Hunting, Forestry and Fishing	1.8	2.7	2.5	2.2	2.0	1.8	1.9	1.6	2.0	2.7
Mining and Quarrying	12.9	6.3	5.2	5.6	5.2	4.7	4.5	10.5	12.9	14.7
Manufacturing	44.3	44.1	40.9	38.3	39.3	38.8	38.8	35.7	33.9	32.9
Manufacture of Food Products, Beverages and Tobacco Products	2.3	2.2	2.4	2.0	1.8	1.8	1.5	2.2	2.7	3.0
Manufacture of Textiles, Clothing and Leather Goods	0.1	0.2	0.3	0.2	0.2	0.1	0.2	0.0	0.0	0.0
Manufacture of Wood and Products of Wood and Cork, except furniture; Manufacture of Articles of Straw and Plaiting Materials; Manufacture of Paper and Paper Products; Manufacture of Publishing, Printing and Reproduction of Recorded Material	1.6	1.3	1.2	1.2	1.1	1.0	1.0	1.1	0.8	0.5
Manufacture of Refined Petroleum, Coke and Nuclear Fuel; Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals); Manufacture of Rubber and Plastic Products	16.5	16.6	12.8	14.1	14.7	18.4	15.8	11.9	13.2	10.8
Manufacture of Non-Metallic Mineral Products	1.9	1.7	1.3	1.4	1.7	1.1	1.1	0.9	0.7	0.5
Manufacture of Basic Metals, Fabricated Metal Products, Machinery & Equipment; Manufacture of Office, Accounting and Computing Machinery	6.1	6.3	7.3	4.2	4.7	2.6	3.0	2.4	3.8	5.5
Manufacture of Electrical Machinery and Apparatus	1.2	1.2	1.9	2.1	1.7	1.4	1.3	2.1	3.0	3.0
Manufacture of Radio, Television and Communication Equipment &Apparatus; Manufacture of Medical, Precision and Optical Instruments, Watches & Clocks	6.2	4.2	4.6	4.6	4.7	4.1	5.3	5.9	6.1	6.2
Manufacture of Transport Equipment	8.3	10.3	8.8	8.5	8.6	8.0	9.2	8.8	3.0	2.5
Manufacture of Furniture; Recycling; Manufacturing not elsewhere classified	0.1	0.1	0.2	0.1	0.1	0.5	0.5	0.6	0.8	0.9
Electricity, Gas and Water Supply	4.1	4.0	12.9	14.0	16.2	18.7	8.6	5.3	4.7	3.6
Construction	9.6	7.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1
Wholesale and Retail	0.1	0.3	3.3	3.5	3.0	2.7	3.9	6.2	5.2	1.7
Transport, Storage and Communication	5.2	4.8	5.3	4.9	4.6	3.4	3.7	3.5	4.6	4.4
Financial Intermediation, Real Estate and Business Services	19.6	28.3	25.2	26.8	25.7	27.4	33.9	33.1	34.8	37.0
Community, Social and Personal Services	2.4	2.4	4.5	4.7	4.0	2.4	4.7	4.1	1.6	2.8
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.49: BUSINESS SECTOR R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION (2003/04 TO 2012/13)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2003/04	**11 608**	5 058	3 430	3 120	9 132.0	4 153.0	2 605.0	2 374.0
2004/05	**14 337**	6 575	3 724	4 038	11 296.0	5 300.7	2 856.5	3 138.8
2005/06	**16 321**	7 480	4 143	4 698	12 235.9	5 895.7	3 050.0	3 290.1
2006/07	**17 467**	8 227	5 113	4 127	12 595.3	6 110.9	3 735.0	2 749.4
2007/08	**17 951**	8 336	5 303	4 312	12 461.3	6 047.5	3 796.4	2 617.4
2008/09	**18 595**	8 560	5 584	4 451	12 492.5	6 172.0	3 809.9	2 510.6
2009/10	**18 216**	8 366	5 362	4 488	12 024.6	6 059.5	3 612.6	2 352.6
2010/11	**14 933**	6 372	4 630	3 931	10 205.1	4 804.0	3 318.7	2 082.3
2011/12	**15 288**	6 192	5 095	4 001	9 894.9	4 451.9	3 343.5	2 099.5
2012/13	**17 155**	6 191	6 394	4 570	11 322.3	4 555.9	4 065.5	2 700.9

TABLE C.50: BUSINESS SECTOR R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION AND GENDER (2010/11, 2011/12 AND 2012/13)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTEs AS % OF HEADCOUNTS
2010/11	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
Researchers	**6 372**	4 370	2 002	4 804.0	3249.7	1554.3	75.4
Technicians directly supporting R&D	**4 630**	3 235	1 395	3 318.7	2304.1	1014.7	71.7
Other personnel directly supporting R&D	**3 931**	2 320	1 611	2 082.3	1177.7	904.6	53.0
Total	**14 933**	**9 925**	**5 008**	**10 205.1**	**6731.4**	**3473.7**	**68.3**
2011/12	**TOTAL**	MALE	FEMALE	TOTAL			
Researchers	**6 192**	4 288	1 904	4 451.9	3032.0	1420.0	71.9
Technicians directly supporting R&D	**5 095**	3 648	1 447	3 343.5	2368.3	975.2	65.6
Other personnel directly supporting R&D	**4 001**	2 393	1 608	2 099.9	1186.1	913.4	52.5
Total	15 288	**10 329**	**4 959**	**9 894.9**	**6586.4**	**3308.5**	**64.7**
2012/13	**TOTAL**	MALE	FEMALE	TOTAL			
Researchers	**6 191**	4 013	2 178	4 555.9	2843.5	1712.5	73.6
Technicians directly supporting R&D	**6 394**	4 370	2 024	4 065.5	2737.9	1327.6	63.6
Other personnel directly supporting R&D	**4 570**	2 556	2 014	2 700.9	1577.7	1123.3	59.1
Total	17 155	**10 939**	**6 216**	**11 322.3**	**7159.1**	**4163.3**	**66.0**

TABLE C.51: BUSINESS SECTOR R&D PERSONNEL IN HEADCOUNTS BY OCCUPATION, QUALIFICATION, POPULATION GROUP AND GENDER (2012/13)

OCCUPATION AND QUALIFICATION	Total	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers											
Doctoral degree or equivalent	673	466	208	76	36	9	15	16	22	365	135
Masters, honours, bachelor or equivalent	4 032	2 857	1 175	421	311	94	55	294	137	2 048	671
Diplomas	1 486	690	795	157	504	37	35	58	69	439	187
Subtotal	**6 191**	**4 013**	**2 178**	**654**	**852**	**140**	**105**	**367**	**228**	**2 852**	**993**
Technicians directly supporting R&D											
Doctoral degree or equivalent	55	22	33	4	11	0	1	0	3	18	19
Masters, honours, bachelor or equivalent	2 541	1 546	995	328	324	76	64	221	128	921	479
Diplomas	3 798	2 802	996	855	499	241	92	188	87	1 519	318
Subtotal	**6 394**	**4 370**	**2 024**	**1 186**	**834**	**317**	**157**	**409**	**217**	**2 458**	**816**
Other personnel directly supporting R&D											
Doctoral degree or equivalent	74	25	49	10	15	0	3	1	2	14	28
Masters, honours, bachelor or equivalent	838	368	470	78	119	3	24	40	44	246	282
Diplomas	3 658	2 163	1 495	821	723	135	140	611	188	597	445
Subtotal	4 570	2 556	2 014	909	857	138	168	652	234	857	755
Total	**17 155**	**10 939**	**6 216**	**2 749**	**2 542**	**595**	**430**	**1 429**	**679**	**6 166**	**2 565**

TABLE C.52: NUMBER OF FOREIGN AND LOCAL BUSINESS SECTOR PARTNERS ENGAGED IN COLLABORATIVE R&D, AND TOTAL R&D COLLABORATION EXPENDITURE (2011/12 AND 2012/13)

COLLABORATION PARTNERS	2011/12		2012/13	
	WITHIN SOUTH AFRICA	OUTSIDE SOUTH AFRICA	WITHIN SOUTH AFRICA	OUTSIDE SOUTH AFRICA
Government research institutes	16	5	19	10
Higher education institutions	49	15	63	19
Members of own company	15	6	27	8
Not-for-profit organisations	2	0	5	4
Other companies	31	22	55	34
Science councils	29	3	42	7
Total number of R&D collaborations	142	51	211	82
No collaboration	.	.	45	44
R&D EXPENDITURE	**R'000**	**R'000**	**R'000**	**R'000**
Total in-house plus outsourced R&D collaboration expenditure (excl. VAT)	**924 310**	**263 146**	**2 688 798**	**288 917**

Note: Collaborative R&D entails partnerships, alliances and collaborations.
Note: The data in this table are not comparable to similar data on R&D collaborations in previous R&D surveys because the data stems from a question introduced in the 2011/12 survey

C.2.2. NOT-FOR-PROFIT SECTOR

TABLE C.53: NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

TYPE OF RESEARCH	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	65 277	58 514	57 877	54 915	65 337	70 725	111 377	59 302	62 134	114 755
Applied research	118 698	100 137	123 609	110 698	119 982	131 259	53 530	87 435	79 105	346 179
Experimental research	25 048	39 617	45 026	46 925	37 883	38 665	23 933	16 092	29 366	42 898
Total	**209 023**	**198 268**	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**

TABLE C.54: PROPORTIONAL NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

TYPE OF RESEARCH	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Basic research	31.2	29.5	25.5	25.8	29.3	29.4	59.0	36.4	36.4	22.8
Applied research	56.8	50.5	54.6	52.1	53.8	54.5	28.3	53.7	46.4	68.7
Experimental research	12.0	20.0	19.9	22.1	17.0	16.1	12.7	9.9	17.2	8.5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.55: NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'001
Capital expenditure	**12 308**	**13 069**	**10 092**	**6 974**	**7 025**	**7 249**	**8 564**	**8 820**	**18 702**	**37 564**
Land, buildings and other structures	5 173	4 593	2 336	2 624	2 959	3 137	3 486	4 447	6 905	11 152
Vehicles, plant, machinery, equipment	7 135	8 476	7 756	4 350	4 066	4 112	5 078	4 373	11 797	26 412
Current expenditure	**196 715**	**185 199**	**216 422**	**205 564**	**216 177**	**233 400**	**180 276**	**154 010**	**151 903**	**466 269**
Labour costs	106 521	77 502	85 511	98 631	109 147	114 292	94 673	92 098	100 176	243 871
Other current expenditure	90 194	107 697	130 911	106 933	107 030	119 108	85 603	61 912	51 727	222 398
Total	**209 023**	**198 268**	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**

TABLE C.56: PROPORTIONAL NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	**5.9**	**6.6**	**4.5**	**3.3**	**3.1**	**3.0**	**4.5**	**5.4**	**11.0**	**7.5**
Land, buildings and other structures	2.5	2.3	1.0	1.2	1.3	1.3	1.8	2.7	4.0	2.2
Vehicles, plant, machinery, equipment	3.4	4.3	3.4	2.0	1.8	1.7	2.7	2.7	6.9	5.2
Current expenditure	**94.1**	**93.4**	**95.5**	**96.7**	**96.9**	**97.0**	**95.5**	**94.6**	**89.0**	**92.5**
Labour costs	51.0	39.1	37.8	46.4	48.9	47.5	50.1	56.6	58.7	48.4
Other current expenditure	43.2	54.3	57.8	50.3	48.0	49.5	45.3	38.0	30.3	44.1
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.57: NOT-FOR-PROFIT SECTOR (NPO) EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	**206**	**429**	**491**	**255**	**4 446**	**5 666**	**8 667**	**29 062**
Nanotechnology	0	0	0	0	0	1 475	0	10 187
Total	**206**	**429**	**491**	**255**	**4 446**	**7 141**	**8 667**	**39 249**
NPO expenditure on R&D	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.58: PROPORTIONAL NOT-FOR-PROFIT SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Biotechnology	**0.1**	**0.2**	**0.2**	**0.1**	**2.4**	**3.5**	**5.1**	**5.8**
Nanotechnology	0	0	0	0	0	0.9	0	2.0
Total	**0.1**	**0.2**	**0.2**	**0.1**	**2.4**	**4.4**	**5.1**	**7.8**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.59: NOT-FOR-PROFIT SECTOR (NPO) R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	15 133	18 022
Open-source software	7 700	4 973	0	0	0	0	20	419
New materials	0	1 783	0	0	542	830	395	178
Tuberculosis (TB), HIV/AIDS, malaria	3 736	4 215	0	8 763	7 419	13 979	5 034	246 760
Total	**11 436**	**10 971**	**0**	**8 763**	**7 962**	**14 809**	**20 581**	**265 379**
NPO expenditure on R&D	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.60: PROPORTIONAL NOT-FOR-PROFIT SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	8.9	3.6
Open-source software	3.4	2.3	0.0	0.0	0.0	0.0	0.0	0.1
New materials	0.0	0.8	0.0	0.0	0.3	0.5	0.2	0.0
Tuberculosis (TB), HIV/AIDS, malaria	1.6	2.0	0.0	3.6	3.9	8.6	3.0	49.0
Total	**5.0**	**5.2**	**0.0**	**3.6**	**4.2**	**9.1**	**12.1**	**52.7**

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.61: NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

Socio-economic objective	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**100 388**	**53 198**	**54 740**	**53 937**	**61 494**	**72 018**	**53 112**	**54 776**	**64 042**	**346 961**
Mathematical sciences	0	0	0	0	0	1 041	0	0	0	8 223
Physical sciences	0	0	0	0	0	0	6 422	0	0	765
Chemical sciences	0	0	0	0	0	0	0	0	0	0
Earth sciences	0	1 386	158	185	459	1 012	452	2 585	2 407	2 598
Information, computer and communication technologies	0	924	789	925	1 446	1 555	2 207	0	595	2 919
Applied sciences and technologies	0	5 250	5 775	1 407	0	0	0	0	1 487	4 317
Engineering sciences	0	0	0	0	0	0	0	0	0	4 075
Biological sciences	907	766	1 630	1 874	2 005	2 126	904	1 473	7 978	15 475
Agricultural sciences	13 646	12 705	16 507	17 234	18 324	19 426	20 404	25 679	25 819	33 105
Medical and health sciences	79 775	20 096	23 748	25 237	29 603	36 032	13 999	15 920	17 423	265 031
Environmental sciences	4 940	6 067	3 531	3 097	7 363	8 396	6 014	3 433	7 553	10 122
Material sciences	0	0	0	0	0	0	0	0	0	0
Marine sciences	1 120	6 005	2 602	3 978	2 294	2 431	2 711	5 687	781	331
Division 2: Social Sciences and Humanities	**108 635**	**145 070**	**171 774**	**158 601**	**161 708**	**168 631**	**135 728**	**108 054**	**106 563**	**156 872**
Social sciences	108 155	143 351	170 126	156 574	159 155	165 924	133 340	104 306	104 842	142 525
Humanities	480	1 719	1 648	2 027	2 553	2 707	2 388	3 749	1 720	14 348
Total	**209 023**	**198 268**	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**

TABLE C.62: PROPORTIONAL NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**48.0**	**26.8**	**24.2**	**25.4**	**27.6**	**29.9**	**28.1**	**33.6**	**37.5**	**68.9**
Mathematical sciences	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.6
Physical sciences	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.2
Chemical sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Earth sciences	0.0	0.7	0.1	0.1	0.2	0.4	0.2	1.6	1.4	0.5
Information, computer and communication technologies	0.0	0.5	0.3	0.4	0.6	0.6	1.2	0.0	0.3	0.6
Applied sciences and technologies	0.0	2.6	2.5	0.7	0.0	0.0	0.0	0.0	0.9	0.9
Engineering sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Biological sciences	0.4	0.4	0.7	0.9	0.9	0.9	0.5	0.9	4.7	3.1
Agricultural sciences	6.5	6.4	7.3	8.1	8.2	8.1	10.8	15.8	15.1	6.6
Medical and health sciences	38.2	10.1	10.5	11.9	13.3	15.0	7.4	9.8	10.2	52.6
Environmental sciences	2.4	3.1	1.6	1.5	3.3	3.5	3.2	2.1	4.4	2.0
Material sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marine sciences	0.5	3.0	1.1	1.9	1.0	1.0	1.4	3.5	0.5	0.1
Division 2: Social Sciences and Humanities	**52.0**	**73.2**	**75.8**	**74.6**	**72.4**	**70.1**	**71.9**	**66.4**	**62.5**	**31.1**
Social sciences	51.7	72.3	75.1	73.7	71.3	68.9	70.6	64.1	61.5	28.3
Humanities	0.2	0.9	0.7	1.0	1.1	1.1	1.3	2.3	1.0	2.8
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.63: NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**1 564**	**1 441**	**1 161**	**1 312**	**1 438**	**2 050**	**1 600**	**0**	**0**	**0**
Defence	1 564	1 441	1 161	1 312	1 438	2 050	1 600	0	0	0
Division 2: Economic Development	**47 946**	**56 356**	**58 983**	**61 743**	**63 450**	**69 810**	**71 939**	**65 777**	**60 758**	**110 866**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant Production And Plant Primary Products	13 023	942	13 747	13 996	16 030	17 520	18 873	25 441	24 850	36 127
Animal Production and Animal Primary Products	1 376	13 647	1 577	1 850	918	972	1 632	1 389	828	2 538
Mineral Resources (Excluding Energy)	0	0	0	0	0	0	0	763	0	8 150
Energy Resources	920	490	581	656	1 000	1 760	2 604	1 653	969	2 538
Energy Supply	718	1 164	1 161	1 312	1 438	2 575	3 774	3 307	3 430	4 363
Manufacturing	0	0	0	0	0	0	0	0	2 197	3 896
Construction	0	0	0	0	0	0	0	0	0	
Transport	0	0	0	0	70	74	208	0	137	465
Information and Communication Services	0	0	1 183	1 388	0	0	0	0	1 480	2 031
Commercial Services	3 729	2 994	2 396	622	782	827	970	0	0	
Economic Framework	22 604	33 695	34 253	37 516	36 588	39 059	39 463	27 068	22 228	45 252
Natural Resources	5 577	3 425	4 086	4 403	6 624	7 022	4 414	6 157	4 640	5 507
Division 3: Society	**144 673**	**125 674**	**147 288**	**127 170**	**129 159**	**141 189**	**93 947**	**82 481**	**75 597**	**360 333**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	76 295	23 471	26 824	28 057	33 549	37 461	16 554	15 050	13 496	260 712
Education and Training	30 217	66 400	72 160	38 907	32 161	32 308	19 986	22 303	23 762	58 894
Social Development and Community Services	38 162	35 803	48 304	60 206	63 449	71 420	57 407	45 128	38 339	40 726
Division 4: Environment	**6 418**	**10 632**	**3 870**	**4 493**	**5 885**	**6 937**	**7 052**	**10 051**	**13 356**	**12 841**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental Knowledge	3 883	4 641	949	1 090	2 553	3 406	3 577	6 139	7 233	4 716
Environmental Aspects of Development	1 395	5 704	185	209	559	593	683	504	3 746	5 771
Environmental and Other Aspects	1 140	286	2 736	3 194	2 773	2 938	2 792	3 408	2 377	2 355
Division 5: Advancement of Knowledge	**8 423**	**4 165**	**15 211**	**17 819**	**23 271**	**20 663**	**14 303**	**4 521**	**20 895**	**19 793**
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural Sciences, Technologies and Engineering	5 514	0	789	925	459	486	452	632	13 166	7 754
Social Sciences and Humanities	2 909	4 165	14 422	16 894	22 812	20 177	13 851	3 889	7 729	12 039
Total	**209 023**	**198 268**	**226 514**	**212 537**	**223 203**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**

TABLE C.64: PROPORTIONAL NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**0.7**	**0.7**	**0.5**	**0.6**	**0.6**	**0.9**	**0.8**	**0.0**	**0.0**	**0.0**
Defence	0.7	0.7	0.5	0.6	0.6	0.9	0.8	0.0	0.0	0.0
Division 2: Economic Development	**22.9**	**28.4**	**26.0**	**29.1**	**28.4**	**29.0**	**38.1**	**40.4**	**35.6**	**22.0**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant Production And Plant Primary Products	6.2	0.5	6.1	6.6	7.2	7.3	10.0	15.6	14.6	7.2
Animal Production and Animal Primary Products	0.7	6.9	0.7	0.9	0.4	0.4	0.9	0.9	0.5	0.5
Mineral Resources (Excluding Energy)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.6
Energy Resources	0.4	0.2	0.3	0.3	0.4	0.7	1.4	1.0	0.6	0.5
Energy Supply	0.3	0.6	0.5	0.6	0.6	1.1	2.0	2.0	2.0	0.9
Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.8
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1
Information and Communication Services	0.0	0.0	0.5	0.7	0.0	0.0	0.0	0.0	0.9	0.4
Commercial Services	1.8	1.5	1.1	0.3	0.4	0.3	0.5	0.0	0.0	0.0
Economic Framework	10.8	17.0	15.1	17.7	16.4	16.2	20.9	16.6	13.0	9.0
Natural Resources	2.7	1.7	1.8	2.1	3.0	2.9	2.3	3.8	2.7	1.1
Division 3: Society	**69.2**	**63.4**	**65.0**	**59.8**	**57.9**	**58.7**	**49.7**	**50.7**	**44.3**	**71.5**
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	36.5	11.8	11.8	13.2	15.0	15.6	8.8	9.2	7.9	51.7
Education and Training	14.5	33.5	31.9	18.3	14.4	13.4	10.6	13.7	13.9	11.7
Social Development and Community Services	18.3	18.1	21.3	28.3	28.4	29.7	30.4	27.7	22.5	8.1
Division 4: Environment	**3.1**	**5.4**	**1.7**	**2.1**	**2.6**	**2.9**	**3.7**	**6.2**	**7.8**	**2.5**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	1.9	2.3	0.4	0.5	1.1	1.4	1.9	3.8	4.2	0.9
Environmental Aspects of Development	0.7	2.9	0.1	0.1	0.3	0.2	0.4	0.3	2.2	1.1
Environmental and Other Aspects	0.5	0.1	1.2	1.5	1.2	1.2	1.5	2.1	1.4	0.5
Division 5: Advancement of Knowledge	**4.0**	**2.1**	**6.7**	**8.4**	**10.4**	**8.6**	**7.6**	**2.8**	**12.2**	**3.9**
Advancement of Knowledge undassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Sciences, Technologies and Engineering	2.6	0.0	0.3	0.4	0.2	0.2	0.2	0.4	7.7	1.5
Social Sciences and Humanities	1.4	2.1	6.4	7.9	10.2	8.4	7.3	2.4	4.5	2.4
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.65: NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

PROVINCE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	N/A	8 151	6 589	4 850	6 164	6 790	8 136	9 790	9 493	25 610
Free State	N/A	4 301	3 687	1 974	1 255	4 763	4 418	6 385	5 096	15 297
Gauteng	N/A	82 581	104 002	102 141	115 499	126 136	104 420	61 496	69 321	162 866
KwaZulu-Natal	N/A	37 729	35 036	42 902	42 141	40 492	30 548	35 765	33 740	163 221
Limpopo	N/A	4 201	5 329	3 979	4 602	5 138	4 524	4 541	7 449	11 779
Mpumalanga	N/A	9 029	10 238	9 131	9 930	10 332	8 311	13 206	16 027	23 195
North-West	N/A	4 810	3 547	1 974	2 207	2 339	2 382	5 612	6 353	42 960
Northern Cape	N/A	1 298	1 650	1 736	2 038	2 159	4 493	2 030	1 889	3 867
Western Cape	N/A	46 169	56 436	43 852	39 367	42 500	21 609	24 003	21 236	55 038
Total	**N/A**	**198 268**	**226 514**	**212 538**	**223 203**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**

Note: N/A indicates that data were not collected.

TABLE C.66: PROPORTIONAL NOT-FOR-PROFIT SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

PROVINCE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	N/A	4.1	2.9	2.3	2.8	2.8	4.3	6.0	5.6	5.1
Free State	N/A	2.2	1.6	0.9	0.6	2.0	2.3	3.9	3.0	3.0
Gauteng	N/A	41.7	45.9	48.1	51.7	52.4	55.3	37.8	40.6	32.3
KwaZulu-Natal	N/A	19.0	15.5	20.2	18.9	16.8	16.2	22.0	19.8	32.4
Limpopo	N/A	2.1	2.4	1.9	2.1	2.1	2.4	2.8	4.4	2.3
Mpumalanga	N/A	4.6	4.5	4.3	4.4	4.3	4.4	8.1	9.4	4.6
North-West	N/A	2.4	1.6	0.8	1.0	0.9	2.4	3.4	1.1	8.5
Northern Cape	N/A	0.7	0.7	0.9	0.9	1.0	1.3	1.2	3.7	0.8
Western Cape	N/A	23.3	24.9	20.6	17.6	17.7	11.4	14.7	12.4	10.9
Total	**N/A**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: N/A indicates that data were not collected.

TABLE C.67: NOT-FOR-PROFIT SECTOR R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION (2003/04 TO 2012/13)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	**TOTAL**	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2003/04	**815**	305	235	275	**683.5**	258.0	226.1	199.5
2004/05	**509**	285	40	184	**362.7**	234.2	30.7	97.8
2005/06	**485**	243	84	158	**364.9**	198.6	59.0	107.3
2006/07	**484**	252	77	155	**362.7**	203.6	55.3	103.9
2007/08	**502**	264	77	161	**379.1**	215.6	56.5	107.0
2008/09	**502**	262	77	163	**366.4**	207.6	56.5	102.3
2009/10	**380**	224	76	80	**309.7**	187.5	63.7	58.6
2010/11	**400**	250	49	101	**313.1**	196.2	47.6	69.3
2011/12	**405**	254	56	95	**312.1**	190.8	47.2	74.1
2012/13	**906**	394	132	380	**768.0**	294.5	114.2	359.4

TABLE C.68: NOT-FOR-PROFIT SECTOR R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION AND GENDER (2010/11, 2011/12 AND 2012/13)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTEs AS % OF HEADCOUNTS
2010/11	TOTAL	MALE	FEMALE	**TOTAL**	MALE	FEMALE	%
Researchers	**250**	103	147	**196.2**	78.9	117.4	78.5
Technicians directly supporting R&D	**49**	39	10	**47.6**	38.1	9.5	97.0
Other personnel directly supporting R&D	**101**	22	79	**69.3**	16.5	52.8	68.6
Total	**400**	**164**	**236**	**313.1**	**133.4**	**179.7**	**78.3**
2011/12	**TOTAL**	MALE	FEMALE	**TOTAL**	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	**254**	115	139	**190.8**	84.3	106.6	75.1
Technicians directly supporting R&D	**56**	36	20	**47.2**	34.1	13.1	84.3
Other personnel directly supporting R&D	**95**	23	72	**74.1**	16.2	57.9	78.0
Total	**405**	**174**	**231**	**312.1**	**134.6**	**177.6**	**77.1**
2012/13	**TOTAL**	MALE	FEMALE	**TOTAL**	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	**394**	184	210	**294.5**	137.3	157.2	74.7
Technicians directly supporting R&D	**132**	62	70	**114.2**	55.9	58.3	86.5
Other personnel directly supporting R&D	**380**	73	307	**359.4**	71.2	288.3	94.6
Total	**906**	**319**	**587**	**768.0**	**264.3**	**503.7**	**84.8**

TABLE C.69: NOT-FOR-PROFIT SECTOR R&D PERSONNEL IN HEADCOUNTS BY OCCUPATION, QUALIFICATION, POPULATION GROUP AND GENDER (2012/13)

OCCUPATION AND QUALIFICATION	Total	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers											
Doctoral degree or equivalent	101	58	43	15	8	2	5	5	11	36	19
Masters, honours, bachelor or equivalent	268	118	150	42	47	13	13	11	13	52	77
Diplomas	25	8	17	4	7	2	5	0	2	2	3
Subtotal	**394**	**184**	**210**	**61**	**62**	**17**	**23**	**16**	**26**	**90**	**99**
Technicians directly supporting R&D											
Doctoral degree or equivalent	0	0	0	0	0	0	0	0	0	0	0
Masters, honours, bachelor or equivalent	59	24	35	12	18	1	6	4	6	7	5
Diplomas	73	38	35	26	19	2	5	2	7	8	4
Subtotal	**132**	**62**	**70**	**38**	**37**	**3**	**11**	**6**	**13**	**15**	**9**
Other personnel directly supporting R&D											
Doctoral degree or equivalent	9	0	9	0	0	0	0	0	6	0	3
Masters, honours, bachelor or equivalent	129	27	102	18	48	1	10	2	26	6	18
Diplomas	242	46	196	37	147	1	12	6	19	2	18
Subtotal	**380**	**73**	**307**	**55**	**195**	**2**	**22**	**8**	**51**	**8**	**39**
Total	**906**	**319**	**587**	**154**	**294**	**22**	**56**	**30**	**90**	**113**	**147**

C.2.3. GOVERNMENT SECTOR

TABLE C.70: GOVERNMENT SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

TYPE OF RESEARCH	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	119 153	107 912	213 351	224 774	322 270	357 786	257 806	257 235	263 380	331 587
Applied research	283 958	319 040	459 042	521 845	599 162	601 688	621 762	600 205	812 067	873 469
Experimental research	62 256	88 379	172 247	274 736	232 967	180 202	187 734	153 900	160 223	232 453
Total	**465 367**	**515 331**	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**

TABLE C.71: PROPORTIONAL GOVERNMENT SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

TYPE OF RESEARCH	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Basic research	25.6	20.9	25.3	22.0	27.9	31.4	24.2	25.4	21.3	23.1
Applied research	61.0	61.9	54.3	51.1	51.9	52.8	58.3	59.3	65.7	60.8
Experimental research	13.4	17.1	20.4	26.9	20.2	15.8	17.6	15.2	13.0	16.2
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.72: GOVERNMENT SECTOR R&D EXPENDITURE BY SPHERES AND INSTITUTES OF GOVERNMENT AND ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Municipalities	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**14 959**	**65 541**
Capital expenditure	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**144**	**18 605**
Land, buildings and other structures	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5 400
Vehicles, plant, machinery, equipment	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	144	13 205
Current expenditure	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**14 815**	**46 936**
Labour costs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12 715	30 131
Other current expenditure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2 100	16 805
Provincial departments	87 015	131 230	167 328	174 860	253 418	232 062	245 031	284 539	335 607	372 231
Capital expenditure	**33 190**	**35 508**	**21 912**	**12 706**	**37 336**	**24 249**	**39 748**	**30 475**	**42 895**	**45 895**
Land, buildings and other structures	10 296	13 779	9 196	4 495	8 681	2 515	11 238	13 022	10 674	7 255
Vehicles, plant, machinery, equipment	22 894	21 729	12 716	8 211	28 655	21 734	28 510	17 453	32 221	38 640
Current expenditure	**53 825**	**95 722**	**145 416**	**162 154**	**216 082**	**207 813**	**205 283**	**254 064**	**292 712**	**326 336**
Labour costs	37 335	78 489	76 598	100 676	135 695	129 187	138 397	182 175	206 583	236 367
Other current expenditure	16 490	17 233	68 818	61 478	80 387	78 626	66 886	71 889	86 129	89 969
National departments	**189 738**	**268 843**	**304 709**	**489 971**	**499 085**	**287 333**	**240 412**	**211 176**	**280 005**	**321 632**
Capital expenditure	**7 092**	**44 144**	**55 321**	**48 920**	**22 507**	**9 340**	**2 022**	**38 629**	**31 879**	**32 669**
Land, buildings and other structures	0	30 000	67	3 701	0	1 107	500	3 657	11 820	12 783
Vehicles, plant, machinery, equipment	7 092	14 144	55 254	45 219	22 507	8 233	1 522	34 972	20 059	19 886
Current expenditure	**182 646**	**224 699**	**249 388**	**441 051**	**476 578**	**277 993**	**238 390**	**172 547**	**248 126**	**288 963**
Labour costs	44 053	91 508	51 747	158 890	120 257	98 791	81 619	144 779	140 146	158 808
Other current expenditure	138 593	133 191	197 641	282 161	356 321	179 202	156 771	27 768	107 980	130 155
Government research institutes	**155 026**	**91 607**	**342 433**	**327 065**	**365 468**	**579 395**	**553 651**	**483 999**	**573 698**	**644 360**
Capital expenditure	**18 631**	**18 196**	**71 564**	**57 343**	**38 837**	**49 345**	**168 544**	**113 395**	**35 071**	**157 221**
Land, buildings and other structures	13 074	13 603	38 414	31 602	10 225	9 955	115 101	43 360	2 487	58 280
Vehicles, plant, machinery, equipment	5 557	4 593	33 150	25 741	28 612	39 390	53 443	70 035	32 584	98 941
Current expenditure	**136 395**	**73 411**	**270 869**	**269 722**	**326 631**	**530 050**	**385 107**	**370 604**	**538 627**	**487 139**
Labour costs	86 932	47 749	160 554	148 117	183 167	224 691	245 767	269 965	316 835	355 503
Other current expenditure	49 463	25 662	110 315	121 605	143 464	305 359	139 340	100 639	221 792	131 636
Museums	**33 588**	**23 651**	**30 170**	**29 459**	**36 428**	**40 886**	**28 208**	**31 626**	**31 400**	**33 745**
Capital expenditure	**7 529**	**1 211**	**2 437**	**1 908**	**1 644**	**4 002**	**4 087**	**3 699**	**3 256**	**649**
Land, buildings and other structures	2 960	21	91	481	460	2 331	2 491	2 141	2 337	30
Vehicles, plant, machinery, equipment	4 569	1 190	2 346	1 427	1 184	1 671	1 596	1 558	919	619
Current expenditure	**26 059**	**22 440**	**27 733**	**27 551**	**34 784**	**36 884**	**24 121**	**27 927**	**28 144**	**33 096**
Labour costs	19 995	18 743	23 060	20 197	25 041	27 141	17 839	20 814	21 413	25 471
Other current expenditure	6 064	3 697	4 673	7 354	9 743	9 743	6 282	7 113	6 731	7 625
Total government sector	**465 367**	**515 331**	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**
Capital expenditure	**66 442**	**99 059**	**151 234**	**120 877**	**100 324**	**86 936**	**214 401**	**186 198**	**113 245**	**255 039**
Land, buildings and other structures	26 330	57 403	47 768	40 279	19 366	15 908	129 330	62 180	27 318	83 748
Vehicles, plant, machinery, equipment	40 112	41 656	103 466	80 598	80 958	71 028	85 071	124 018	85 927	171 291
Current expenditure	**398 925**	**416 272**	**693 406**	**900 478**	**1 054 075**	**1 052 740**	**852 901**	**825 142**	**1 122 424**	**1 182 470**
Labour costs	188 315	236 489	311 959	427 880	464 160	479 810	483 622	617 733	697 692	806 280
Other current expenditure	210 610	179 783	381 447	472 598	589 915	572 930	369 279	207 409	424 732	376 190

TABLE C.73: PROPORTIONAL GOVERNMENT SECTOR R&D EXPENDITURE BY SPHERES AND INSTITUTES OF GOVERNMENT AND ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Municipalities										
Capital expenditure	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**1.0**	**28.4**
Land, buildings and other structures	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0	8.2
Vehicles, plant, machinery, equipment	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.0	20.1
Current expenditure	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**99.0**	**71.6**
Labour costs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	85.0	46.0
Other current expenditure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14.0	25.6
Provincial departments										
Capital expenditure	**38.1**	**27.1**	**13.1**	**7.3**	**14.7**	**10.4**	**16.2**	**10.7**	**12.8**	**12.3**
Land, buildings and other structures	11.8	10.5	5.5	2.6	3.4	1.1	4.6	4.6	3.2	1.9
Vehicles, plant, machinery, equipment	26.3	16.6	7.6	4.7	11.3	9.4	11.6	6.1	9.6	10.4
Current expenditure	**61.9**	**72.9**	**86.9**	**92.7**	**85.3**	**89.6**	**83.8**	**89.3**	**87.2**	**87.7**
Labour costs	42.9	59.8	45.8	57.6	53.5	55.7	56.5	64.0	61.6	63.5
Other current expenditure	19.0	13.1	41.1	35.2	31.7	33.9	27.3	25.3	25.7	24.2
National departments										
Capital expenditure	**3.7**	**16.4**	**18.2**	**10.0**	**4.5**	**3.3**	**0.8**	**18.3**	**11.4**	**10.2**
Land, buildings and other structures	0.0	11.2	0.0	0.8	0.0	0.4	0.2	1.7	4.2	4.0
Vehicles, plant, machinery, equipment	3.7	5.3	18.1	9.2	4.5	2.9	0.6	16.6	7.2	6.2
Current expenditure	**96.3**	**83.6**	**81.8**	**90.0**	**95.5**	**96.7**	**99.2**	**81.7**	**88.6**	**89.8**
Labour costs	23.2	34.0	17.0	32.4	24.1	34.4	33.9	68.6	50.1	49.4
Other current expenditure	73.0	49.5	64.9	57.6	71.4	62.4	65.2	13.1	38.6	40.5
Government research institutes										
Capital expenditure	**12.0**	**19.9**	**20.9**	**17.5**	**10.6**	**8.5**	**30.4**	**23.4**	**6.1**	**24.4**
Land, buildings and other structures	8.4	14.8	11.2	9.7	2.8	1.7	20.8	9.0	0.4	9.0
Vehicles, plant, machinery, equipment	3.6	5.0	9.7	7.9	7.8	6.8	9.7	14.5	5.7	15.4
Current expenditure	**88.0**	**80.1**	**79.1**	**82.5**	**89.4**	**91.5**	**69.6**	**76.6**	**93.9**	**75.6**
Labour costs	56.1	52.1	46.9	45.3	50.1	38.8	44.4	55.8	55.2	55.2
Other current expenditure	31.9	28.0	32.2	37.2	39.3	52.7	25.2	20.8	38.7	20.4
Museums										
Capital expenditure	**22.4**	**5.1**	**8.1**	**6.5**	**4.5**	**9.8**	**14.5**	**11.7**	**10.4**	**1.9**
Land, buildings and other structures	8.8	0.1	0.3	1.6	1.3	5.7	8.8	6.8	7.4	0.1
Vehicles, plant, machinery, equipment	13.6	5.0	7.8	4.8	3.3	4.1	5.7	4.9	2.9	1.8
Current expenditure	**77.6**	**94.9**	**91.9**	**93.5**	**95.5**	**90.2**	**85.5**	**88.3**	**89.6**	**98.1**
Labour costs	59.5	79.2	76.4	68.6	68.7	66.4	63.2	65.8	68.2	75.5
Other current expenditure	18.1	15.6	15.5	25.0	26.7	23.8	22.3	22.5	21.4	22.6
Total government sector										
Capital expenditure	**14.3**	**19.2**	**17.9**	**11.8**	**8.7**	**7.6**	**20.1**	**18.4**	**9.2**	**17.7**
Land, buildings and other structures	5.7	11.1	5.7	3.9	1.7	1.4	12.1	6.1	2.2	5.8
Vehicles, plant, machinery, equipment	8.6	8.1	12.2	7.9	7.0	6.2	8.0	12.3	7.0	11.9
Current expenditure	**85.7**	**80.8**	**82.1**	**88.2**	**91.3**	**92.4**	**79.9**	**81.6**	**90.8**	**82.3**
Labour costs	40.5	45.9	36.9	41.9	40.2	42.1	45.3	61.1	56.5	56.1
Other current expenditure	45.3	34.9	45.2	46.3	51.1	50.3	34.6	20.5	34.4	26.2

TABLE C.74: GOVERNMENT SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	9 624	21 911	8 639	21 729	32 496	213 817	81 993	124 429
Nanotechnology	0	0	0	4 652	0	4 196	4 609	15 035
Total	**9 624**	**21 911**	**8 639**	**26 381**	**32 496**	**218 013**	**86 602**	**139 464**
Government expenditure on R&D	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.75: PROPORTIONAL GOVERNMENT SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Biotechnology	1.1	2.1	0.7	1.9	3.0	21.1	6.6	8.7
Nanotechnology	0.0	0.0	0.0	0.4	0.0	0.4	0.4	1.0
Total	**1.1**	**2.1**	**0.7**	**2.3**	**3.0**	**21.6**	**7.0**	**9.7**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.76: GOVERNMENT SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	109 774	170 304
Open-source software	3	4	21 494	4 658	7 238	7 261	1 345	1 501
New materials	686	1 054	630	726	7 156	26 166	4 107	28 708
Tuberculosis (TB), HIV/AIDS, malaria	8 775	64 750	263	240	199 977	174 382	167 522	132 264
Total	**9 464**	**65 808**	**22 387**	**5 624**	**214 371**	**207 809**	**282 748**	**332 777**
Government expenditure on R&D	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.77: PROPORTIONAL GOVERNMENT SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	8.9	11.8
Open-source software	0.0	0.0	1.9	0.4	0.7	0.7	0.1	0.1
New materials	0.1	0.1	0.1	0.1	0.7	2.6	0.3	2.0
Tuberculosis (TB), HIV/AIDS, malaria	1.0	6.3	0.0	0.0	18.7	17.2	13.6	9.2
Total	**1.1**	**6.4**	**1.9**	**0.5**	**20.1**	**20.5**	**22.9**	**23.1**
Government expenditure on R&D	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.78: GOVERNMENT SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**372 373**	**450 456**	**661 594**	**808 404**	**874 425**	**824 394**	**806 995**	**634 237**	**863 949**	**1 045 006**
Mathematical sciences	5 782	17 562	21 496	24 823	20 643	20 704	24 441	22 811	2 349	1 076
Physical sciences	0	8 256	27 205	24 726	45 052	45 804	12 093	0	0	5 064
Chemical sciences	493	8 709	10 711	16 622	22 672	17 009	21 698	10 653	1 223	21 823
Earth sciences	38 378	32 795	100 743	109 959	161 815	163 156	47 624	42 081	39 303	90 571
Information, computer and communication technologies	3 494	14 180	42 093	56 323	82 123	22 191	28 176	31 960	15 642	7 760
Applied sciences and technologies	16 758	4 581	17 328	31 603	15 286	15 852	9 315	4 154	10 183	32 467
Engineering sciences	116	9 663	10 355	26 008	14 164	11 487	14 996	4 165	4 515	10 430
Biological sciences	64 611	53 988	79 402	99 841	113 409	125 152	54 893	85 990	94 662	111 871
Agricultural sciences	141 460	174 756	156 538	170 347	208 662	200 598	274 781	225 441	362 241	460 921
Medical and health sciences	66 893	84 629	137 909	187 741	173 929	180 260	288 488	168 400	270 312	211 840
Environmental sciences	13 037	19 790	39 867	40 851	8 589	11 675	10 722	9 147	34 231	54 394
Material sciences	0	0	150	158	637	640	0	0	4 107	9 771
Marine sciences	21 352	21 547	17 797	19 402	7 445	9 866	19 768	29 434	25 182	27 019
Division 2: Social Sciences and Humanities	**92 994**	**64 875**	**183 047**	**212 951**	**279 974**	**315 282**	**260 308**	**377 103**	**371 720**	**392 503**
Social sciences	81 866	59 831	139 536	189 155	235 299	268 058	249 155	363 055	358 892	383 172
Humanities	11 128	5 044	43 511	23 796	44 676	47 225	11 152	14 048	12 828	9 331
Total	**465 367**	**515 331**	**844 641**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**

TABLE C.79: PROPORTIONAL GOVERNMENT SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**80.0**	**87.4**	**78.3**	**79.2**	**75.7**	**72.3**	**75.6**	**62.7**	**69.9**	**72.7**
Mathematical sciences	1.2	3.4	2.5	2.4	1.8	1.8	2.3	2.3	0.2	0.1
Physical sciences	0.0	1.6	3.2	2.4	3.9	4.0	1.1	0.0	0.0	0.4
Chemical sciences	0.1	1.7	1.3	1.6	2.0	1.5	2.0	1.1	0.1	1.5
Earth sciences	8.2	6.4	11.9	10.8	14.0	14.3	4.5	4.2	3.2	6.3
Information, computer and communication technologies	0.8	2.8	5.0	5.5	7.1	1.9	2.6	3.2	1.3	0.5
Applied sciences and technologies	3.6	0.9	2.1	3.1	1.3	1.4	0.9	0.4	0.8	2.3
Engineering sciences	0.0	1.9	1.2	2.5	1.2	1.0	1.4	0.4	0.4	0.7
Biological sciences	13.9	10.5	9.4	9.8	9.8	11.0	5.1	8.5	7.7	7.8
Agricultural sciences	30.4	33.9	18.5	16.7	18.1	17.6	25.7	22.3	29.3	32.1
Medical and health sciences	14.4	16.4	16.3	18.4	15.1	15.8	27.0	16.7	21.9	14.7
Environmental sciences	2.8	3.8	4.7	4.0	0.7	1.0	1.0	0.9	2.8	3.8
Material sciences	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.7
Marine sciences	4.6	4.2	2.1	1.9	0.6	0.9	1.9	2.9	2.0	1.9
Division 2: Social Sciences and Humanities	**20.0**	**12.6**	**21.7**	**20.8**	**24.3**	**27.7**	**24.4**	**37.3**	**30.1**	**27.3**
Social sciences	17.6	11.6	16.5	18.5	20.4	23.5	23.3	35.9	29.0	26.7
Humanities	2.4	1.0	5.2	2.3	3.9	4.1	1.0	1.4	1.0	0.6
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.80: GOVERNMENT SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**0**	**237**	**0**	**50 000**	**0**	**0**	**0**	**2 303**	**2 736**	**19 314**
Defence	0	237	0	50 000	0	0	0	2 303	2 736	19 314
Division 2: Economic Development	**274 374**	**245 493**	**322 819**	**350 497**	**429 646**	**373 251**	**438 114**	**500 343**	**469 129**	**480 373**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant Production And Plant Primary Products	44 609	57 072	54 523	45 951	79 290	66 503	63 570	64 400	70 754	100 956
Animal Production and Animal Primary Products	48 052	57 955	61 778	66 655	79 997	78 619	84 842	91 877	86 710	93 504
Mineral Resources (Excluding Energy)	0	0	0	0	0	0	0	0	0	0
Energy Resources	0	0	0	0	0	0	0	37	0	0
Energy Supply	4 755	0	8 095	8 905	14 290	12 387	2 522	6 154	10 552	7 193
Manufacturing	0	0	75	79	318	320	5 444	15 870	1 005	1 557
Construction	1 501	620	3 386	3 911	3 219	2 484	0	148	9 545	543
Transport	0	3 140	12 833	21 710	15 386	12 073	4 369	9 377	10 964	8 774
Information and Communication Services	5 195	6 068	39 357	32 858	69 318	11 965	13 244	44 257	20 590	5 678
Commercial Services	1 942	815	4 686	4 908	6 897	2 405	9 957	7 471	4 708	3 587
Economic Framework	54 990	35 748	74 563	76 965	98 537	105 080	161 326	187 931	157 364	161 541
Natural Resources	113 331	84 076	63 524	88 558	62 394	81 415	92 838	72 820	96 938	97 042
Division 3: Society	**96 430**	**189 241**	**261 335**	**341 911**	**265 948**	**285 961**	**326 691**	**341 387**	**538 749**	**592 285**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	66 844	76 373	92 858	150 704	69 493	74 784	77 845	106 522	221 435	171 741
Education and Training	11 853	94 694	97 773	112 042	111 407	127 907	158 579	42 234	69 185	116 788
Social Development and Community Services	17 732	18 174	70 705	79 165	85 048	83 270	90 268	192 630	248 129	303 756
Division 4: Environment	**62 698**	**48 560**	**99 112**	**105 792**	**103 372**	**99 985**	**72 614**	**85 347**	**130 742**	**199 677**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental Knowledge	49 295	37 663	67 106	74 710	71 734	83 429	45 360	40 610	83 089	137 679
Environmental Aspects of Development	4 679	5 252	8 995	8 112	20 797	12 424	18 153	27 635	38 467	51 795
Environmental and Other Aspects	8 724	5 645	23 011	22 970	10 841	4 132	9 101	17 102	9 186	10 204
Division 5: Advancement of Knowledge	**31 865**	**31 800**	**161 373**	**173 155**	**355 434**	**380 480**	**229 883**	**81 960**	**94 314**	**145 860**
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural Sciences, Technologies and Engineering	16 619	22 797	120 247	149 847	324 409	333 561	205 995	50 968	61 357	120 173
Social Sciences and Humanities	15 245	9 002	41 127	23 309	31 025	46 919	23 888	30 992	32 956	25 687
Total	**465 367**	**515 331**	**844 640**	**1 021 355**	**1 154 400**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**

TABLE C.81: PROPORTIONAL GOVERNMENT SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**0.0**	**0.0**	**0.0**	**4.9**	**0.0**	**0.0**	**0.0**	**0.2**	**0.2**	**1.3**
Defence	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.2	0.2	1.3
Division 2: Economic Development	**59.0**	**47.6**	**38.2**	**34.3**	**37.2**	**32.8**	**41.0**	**49.5**	**38.0**	**33.4**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant Production And Plant Primary Products	9.6	11.1	6.5	4.5	6.9	5.8	6.0	6.4	5.7	7.0
Animal Production and Animal Primary Products	10.3	11.2	7.3	6.5	6.9	6.9	7.9	9.1	7.0	6.5
Mineral Resources (Excluding Energy)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy Resources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy Supply	1.0	0.0	1.0	0.9	1.2	1.1	0.2	0.6	0.9	0.5
Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.6	0.1	0.1
Construction	0.3	0.1	0.4	0.4	0.3	0.2	0.0	0.0	0.8	0.0
Transport	0.0	0.6	1.5	2.1	1.3	1.1	0.4	0.9	0.9	0.6
Information and Communication Services	1.1	1.2	4.7	3.2	6.0	1.0	1.2	4.4	1.7	0.4
Commercial Services	0.4	0.2	0.6	0.5	0.6	0.2	0.9	0.7	0.4	0.2
Economic Framework	11.8	6.9	8.8	7.5	8.5	9.2	15.1	18.6	12.7	11.2
Natural Resources	24.4	16.3	7.5	8.7	5.4	7.1	8.7	7.2	7.8	6.8
Division 3: Society	**20.7**	**36.7**	**30.9**	**33.5**	**23.0**	**25.1**	**30.6**	**33.8**	**43.6**	**41.2**
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	14.4	14.8	11.0	14.8	6.0	6.6	7.3	10.5	17.9	11.9
Education and Training	2.5	18.4	11.6	11.0	9.7	11.2	14.9	4.2	5.6	8.1
Social Development and Community Services	3.8	3.5	8.4	7.8	7.4	7.3	8.5	19.0	20.1	21.1
Division 4: Environment	**13.5**	**9.4**	**11.7**	**10.4**	**9.0**	**8.8**	**6.8**	**8.4**	**10.6**	**13.9**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	10.6	7.3	7.9	7.3	6.2	7.3	4.2	4.0	6.7	9.6
Environmental Aspects of Development	1.0	1.0	1.1	0.8	1.8	1.1	1.7	2.7	3.1	3.6
Environmental and Other Aspects	1.9	1.1	2.7	2.2	0.9	0.4	0.9	1.7	0.7	0.7
Division 5: Advancement of Knowledge	**6.8**	**6.2**	**19.1**	**17.0**	**30.8**	**33.4**	**21.5**	**8.1**	**7.6**	**10.1**
Advancement of Knowledge unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Sciences, Technologies and Engineering	3.6	4.4	14.2	14.7	28.1	29.3	19.3	5.0	5.0	8.4
Social Sciences and Humanities	3.3	1.7	4.9	2.3	2.7	4.1	2.2	3.1	2.7	1.8
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.82: GOVERNMENT SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

PROVINCE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
		R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	N/A	77 762	84 071	109 779	122 191	107 929	100 100	114 127	127 415	194 258
Free State	N/A	24 962	41 856	69 314	62 116	58 697	46 155	39 998	44 200	38 659
Gauteng	N/A	151 197	291 639	321 176	292 757	264 273	396 124	343 096	447 635	427 173
KwaZulu-Natal	N/A	31 213	72 131	84 192	76 458	115 302	54 914	48 056	126 857	168 029
Limpopo	N/A	9 568	15 917	31 118	40 217	55 252	60 421	57 797	65 017	74 621
Mpumalanga	N/A	29 240	36 001	50 568	74 690	39 103	68 796	69 980	78 335	80 201
North-West	N/A	13 401	20 857	32 889	42 500	70 741	29 176	43 048	44 618	45 573
Northern Cape	N/A	46 075	42 539	64 733	66 921	52 907	77 978	58 918	63 556	75 440
Western Cape	N/A	131 912	239 630	257 586	376 550	375 473	233 639	236 320	238 035	333 555
Total	**N/A**	**515 331**	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**

Note: N/A indicates that data were not collected.

TABLE C.83: PROPORTIONAL GOVERNMENT SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

PROVINCE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	N/A	15.1	10.0	10.7	10.6	9.5	9.4	11.3	10.3	13.5
Free State	N/A	4.8	5.0	6.8	5.4	5.2	4.3	4.0	3.6	2.7
Gauteng	N/A	29.3	34.5	31.4	25.4	23.2	37.1	33.9	36.2	29.7
KwaZulu-Natal	N/A	6.1	8.5	8.2	6.6	10.1	5.1	4.8	10.3	11.7
Limpopo	N/A	1.9	1.9	3.0	3.5	4.8	5.7	5.7	5.3	5.2
Mpumalanga	N/A	5.7	4.3	5.0	6.5	3.4	6.4	6.9	6.3	5.6
North-West	N/A	2.6	2.5	3.2	3.7	6.2	2.7	4.3	3.6	3.2
Northern Cape	N/A	8.9	5.0	6.3	5.8	4.6	7.3	5.8	5.1	5.2
Western Cape	N/A	25.6	28.4	25.2	32.6	32.9	21.9	23.4	19.3	23.2
Total	**N/A**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: N/A indicates that data were not collected.

TABLE C.84: GOVERNMENT SECTOR R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION (2003/04 TO 2012/13)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2003/04	**2283**	929	322	1032	**1 428.2**	443.3	244.6	740.2
2004/05	**2311**	692	494	1125	**1 667.3**	491.1	376.3	800.0
2005/06	**2001**	874	495	632	**1 483.0**	650.6	353.3	479.1
2006/07	**2924**	1111	831	982	**2 068.3**	784.6	555.7	728.0
2007/08	**2794**	1138	739	917	**1 950.0**	757.6	495.6	696.9
2008/09	**2963**	1169	744	1050	**2 073.9**	805.0	495.2	773.7
2009/10	**2580**	986	509	1085	**1 903.9**	680.4	356.8	866.7
2010/11	**2704**	1184	421	1099	**2 178.6**	874.2	352.9	951.6
2011/12	**3143**	1411	432	1300	**2 404.5**	1 009.8	330.4	1 064.3
2012/13	**3252**	1409	517	1326	**2 597.0**	1 091.4	385.8	1 119.9

TABLE C.85: GOVERNMENT SECTOR R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION AND GENDER (2010/11, 2011/12 AND 2012/13)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTEs AS % OF HEADCOUNTS
2010/11	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
Researchers	**1 184**	610	574	**874.2**	463.0	411.2	73.8
Technicians directly supporting R&D	**421**	221	200	**352.9**	182.9	170.0	83.8
Other personnel directly supporting R&D	**1 099**	782	317	**951.6**	706.5	245.1	86.6
Total	**2 704**	**1 613**	**1 091**	**2 178.6**	**1 352.3**	**826.3**	**80.6**
2011/12	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	**1 411**	700	711	**1 009.8**	517.5	492.3	71.6
Technicians directly supporting R&D	**432**	250	182	**330.4**	195.3	135.1	76.5
Other personnel directly supporting R&D	**1 300**	912	388	**1 064.3**	782.1	282.2	81.9
Total	**3 143**	**1 862**	**1 281**	**2 404.5**	**1 494.9**	**909.6**	**76.5**
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	**1 409**	696	713	**1 091.4**	600.0	491.4	77.5
Technicians directly supporting R&D	**517**	294	223	**385.8**	224.7	161.1	74.6
Other personnel directly supporting R&D	**1 326**	940	386	**1 119.9**	823.7	296.2	84.5
Total	**3 252**	**1 930**	**1 322**	**2 597.0**	**1 648.4**	**948.6**	**79.9**

TABLE C.86: GOVERNMENT SECTOR R&D PERSONNEL IN HEADCOUNTS BY OCCUPATION, QUALIFICATION, POPULATION GROUP AND GENDER (2012/13)

OCCUPATION AND QUALIFICATION	Total	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers											
Doctoral degree or equivalent	331	187	144	36	21	11	8	13	16	127	99
Masters, honours, bachelor or equivalent	1 034	490	544	258	258	39	53	26	52	167	181
Diplomas	44	19	25	14	15	1	5	1	0	3	5
Subtotal	**1 409**	**696**	**713**	**308**	**294**	**51**	**66**	**40**	**68**	**297**	**285**
Technicians directly supporting R&D											
Doctoral degree or equivalent	23	14	9	5	1	2	1	1	3	6	4
Masters, honours, bachelor or equivalent	235	124	111	71	76	13	7	7	7	33	21
Diplomas	259	156	103	75	43	27	11	1	2	53	47
Subtotal	**517**	**294**	**223**	**151**	**120**	**42**	**19**	**9**	**12**	**92**	**72**
Other personnel directly supporting R&D											
Doctoral degree or equivalent	2	1	1	0	1	0	0	1	0	0	0
Masters, honours, bachelor or equivalent	102	47	55	29	37	3	1	4	5	11	12
Diplomas	1 222	892	330	605	219	252	42	2	4	33	65
Subtotal	**1 326**	**940**	**386**	**634**	**257**	**255**	**43**	**7**	**9**	**44**	**77**
Total	**3 252**	**1 930**	**1 322**	**1 093**	**671**	**348**	**128**	**56**	**89**	**433**	**434**

C.2.4. SCIENCE COUNCILS SECTOR

TABLE C.87: SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

TYPE OF RESEARCH	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	575 616	379 044	522 861	647 191	804 731	776 406	776 505	871 635	900 830	937 826
Applied research	752 489	1 028 770	1 018 979	1 328 996	1 314 770	1 384 860	1 552 560	1 531 563	1 756 157	1 885 484
Experimental research	417 388	588 236	560 254	768 531	766 593	976 077	1 129 009	1 192 825	1 072 693	1 202 689
Total	**1 745 493**	**1 996 050**	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**

TABLE C.88: PROPORTIONAL SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

TYPE OF RESEARCH	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Basic research	33.0	19.0	24.9	23.6	27.9	24.7	22.5	24.2	24.2	23.3
Applied research	43.1	51.5	48.5	48.4	45.6	44.1	44.9	42.6	47.1	46.8
Experimental research	23.9	29.5	26.7	28.0	26.6	31.1	32.6	33.2	28.8	29.9
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.89: SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	**117 439**	**127 465**	**209 013**	**212 625**	**205 857**	**383 927**	**452 801**	**291 830**	**323 070**	**275 750**
Land, buildings and other structures	104 247	29 299	132 485	53 713	30 704	61 063	107 455	56 141.0	65 442.0	68 565.0
Vehicles, plant, machinery, equipment	13 192	98 166	76528	158 912	175 153	322 864	345 346.0	235689	257 628.0	207 185.0
Current expenditure	**1 628 054**	**1 868 585**	**1 893 081**	**2 532 093**	**2 680 237**	**2 753 416**	**3 005 273**	**3 304 193**	**3 406 610**	**3 750 248**
Labour costs	900 397	968 610	875 467	1 162 633	1 250 480	1 283 210	1 413 128	1 293 033.0	1 531 460.0	2 053 204.0
Other current expenditure	727 657	899 975	1 017 614	1 369 460	1 429 757	1 470 206	1 592 145	2 011 160.0	1 875 150.0	1 697 044.0
Total	**1 745 493**	**1 996 050**	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**

TABLE C.90: PROPORTIONAL SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	**6.7**	**6.4**	**9.9**	**7.7**	**7.1**	**12.2**	**13.1**	**8.1**	**8.7**	**6.8**
Vehicles, plant, machinery, equipment	6.0	1.5	6.3	2.0	1.1	1.9	3.1	1.6	1.8	1.7
Land, buildings and other structures	0.8	4.9	3.6	5.8	6.1	10.3	10.0	6.6	6.9	5.1
Current expenditure	**93.3**	**93.6**	**90.1**	**92.3**	**92.9**	**87.8**	**86.9**	**91.9**	**91.3**	**93.2**
Labour costs	51.6	48.5	41.6	42.4	43.3	40.9	40.9	36.0	41.1	51.0
Other current expenditure	41.7	45.1	48.4	49.9	49.5	46.9	46.0	55.9	50.3	42.2
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.91: SCIENCE COUNCILS SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	129 276	222 190	216 292	207 250	183 844	199 934	208 466	145 671
Nanotechnology	11 130	14 031	47 802	173 834	117 215	101 386	102 007	118 555
Total	**140 406**	**236 221**	**264 094**	**381 084**	**301 058**	**301 320**	**310 473**	**264 226**
Science councils expenditure on R&D	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.92: PROPORTIONAL SCIENCE COUNCILS SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Biotechnology	6.1	8.1	7.5	6.6	5.3	5.6	5.6	3.6
Nanotechnology	0.5	0.5	1.7	5.5	3.4	2.8	2.7	2.9
Total	**6.7**	**8.6**	**9.2**	**12.1**	**8.7**	**8.4**	**8.3**	**6.6**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.93: SCIENCE COUNCILS SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	770 339	378 782
Open-source software	6 035	27 510	77 885	67 833	15 013	7 228	15 982	36 636
New materials	40 343	82 990	64 131	157 134	94 304	201 071	197 430	751 305
Tuberculosis (TB), HIV/AIDS, malaria	170 000	180 104	233 917	490 982	333 841	386 948	399 070	455 311
Total	**216 378**	**290 604**	**375 933**	**715 949**	**443 158**	**595 247**	**1 382 821**	**1 622 034**
Science councils expenditure on R&D	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.94: PROPORTIONAL SCIENCE COUNCILS SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	20.7	9.4
Open-source software	0.3	1.0	2.7	2.2	0.4	0.2	0.4	0.9
New materials	1.9	3.0	2.2	5.0	2.7	5.6	5.3	18.7
Tuberculosis (TB), HIV/AIDS, malaria	8.1	6.6	8.1	15.6	9.7	10.8	10.7	11.3
Total	**10.3**	**10.6**	**13.0**	**22.8**	**12.8**	**16.6**	**37.1**	**40.3**

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.95: SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**1 538 663**	**1 829 632**	**1 922 728**	**2 530 246**	**2 623 455**	**2 916 350**	**3 258 392**	**3 414 985**	**3 517 520**	**3 819 642**
Mathematical sciences	15 492	13 629	20 564	27 129	35 551	40 632	37 678	113 396	117 637	134 046
Physical sciences	87 967	58 292	114 723	126 542	93 583	115 737	87 221	97 922	120 267	123 267
Chemical sciences	50 159	28 710	21 494	33 774	37 430	44 271	49 462	8 074	20 972	14 078
Earth sciences	84 880	96 474	96 410	130 879	147 427	167 463	179 999	94 642	100 921	112 406
Information, computer and communication technologies	55 045	141 363	82 238	133 328	212 796	201 731	265 191	161 282	168 115	181 521
Applied sciences and technologies	101 620	63 696	78 065	126 107	138 849	139 267	153 830	924 104	954 616	1 092 098
Engineering sciences	321 668	450 079	451 924	642 923	643 349	863 084	947 315	365 980	278 125	292 940
Biological sciences	226 256	208 812	265 202	306 056	175 592	171 810	200 625	437 938	425 036	485 673
Agricultural sciences	287 632	393 682	387 569	521 454	566 561	442 060	647 750	479 449	582 438	594 638
Medical and health sciences	206 749	237 103	270 090	340 764	358 726	447 479	440 895	428 642	443 156	426 520
Environmental sciences	34 615	61 022	56 259	72 191	85 414	101 920	112 327	273 283	284 116	330 667
Material sciences	47 011	65 398	69 742	51 020	108 068	155 529	106 411	23 199	15 462	22 905
Marine sciences	19 570	11 372	8 448	18 078	20 108	25 368	29 689	7 073	6 656	8 885
Division 2: Social Sciences and Humanities	**206 830**	**166 418**	**179 366**	**214 472**	**262 639**	**220 993**	**199 682**	**181 038**	**212 160**	**206 356**
Social sciences	198 138	148 758	165 557	194 040	238 019	194 646	182 431	164 954	190 845	186 132
Humanities	8 692	17 660	13 809	20 432	24 620	26 347	17 250	16 084	21 315	20 224
Total	**1 745 493**	**1 996 050**	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**

TABLE C.96: PROPORTIONAL SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**88.2**	**91.7**	**91.5**	**92.2**	**90.9**	**93.0**	**94.2**	**95.0**	**94.3**	**94.9**
Mathematical sciences	0.9	0.7	1.0	1.0	1.2	1.3	1.1	3.2	3.2	3.3
Physical sciences	5.0	2.9	5.5	4.6	3.2	3.7	2.5	2.7	3.2	3.1
Chemical sciences	2.9	1.4	1.0	1.2	1.3	1.4	1.4	0.2	0.6	0.3
Earth sciences	4.9	4.8	4.6	4.8	5.1	5.3	5.2	2.6	2.7	2.8
Information, computer and communication technologies	3.2	7.1	3.9	4.9	7.4	6.4	7.7	4.5	4.5	4.5
Applied sciences and technologies	5.8	3.2	3.7	4.6	4.8	4.4	4.4	25.7	25.6	27.1
Engineering sciences	18.4	22.5	21.5	23.4	22.3	27.5	27.4	10.2	7.5	7.3
Biological sciences	13.0	10.5	12.6	11.2	6.1	5.5	5.8	12.2	11.4	12.1
Agricultural sciences	16.5	19.7	18.4	19.0	19.6	14.1	18.7	13.3	15.6	14.8
Medical and health sciences	11.8	11.9	12.8	12.4	12.4	14.3	12.7	11.9	11.9	10.6
Environmental sciences	2.0	3.1	2.7	2.6	3.0	3.2	3.2	7.6	7.6	8.2
Material sciences	2.7	3.3	3.3	1.9	3.7	5.0	3.1	0.6	0.4	0.6
Marine sciences	1.1	0.6	0.4	0.7	0.7	0.8	0.9	0.2	0.2	0.2
Division 2: Social Sciences and Humanities	**11.8**	**8.3**	**8.5**	**7.8**	**9.1**	**7.0**	**5.8**	**5.0**	**5.7**	**5.1**
Social sciences	11.4	7.5	7.9	7.1	8.2	6.2	5.3	4.6	5.1	4.6
Humanities	0.5	0.9	0.7	0.7	0.9	0.8	0.5	0.4	0.6	0.5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.97: SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**153 196**	**160 864**	**155 066**	**260 354**	**228 603**	**280 219**	**311 288**	**228 376**	**243 083**	**279 989**
Defence	153 196	160 864	155 066	260 354	228 603	280 219	311 288	228 376	243 083	279 989
Division 2: Economic Development	**879 229**	**1 057 410**	**1 126 651**	**1 172 607**	**1 560 688**	**1 592 110**	**1 834 253**	**2 111 033**	**2 191 098**	**2 400 747**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant Production And Plant Primary Products	188 451	198 256	297 626	332 655	433 850	349 907	485 470	478 437	448 531	473 133
Animal Production and Animal Primary Products	141 996	118 171	72 380	115 649	25 124	18 760	27 043	25 193	280 542	287 431
Mineral Resources (Excluding Energy)	150 228	251 953	286 363	62 585	63 469	67 418	387 531	294 203	202 919	213 007
Energy Resources	16 961	16 916	30 997	51 257	38 979	379 859	32 136	90 342	94 385	108 360
Energy Supply	3 125	542	595	8 033	874	0	0	0	14 715	13 237
Manufacturing	128 057	138 792	110 467	130 396	385 822	225 227	262 443	366 380	351 021	400 864
Construction	36 433	61 761	90 143	149 809	101 232	116 781	129 922	222 124	220 595	256 024
Transport	54 906	41 935	18 401	30 943	33 817	41 260	45 848	0	0	
Information and Communication Services	7 176	22 090	18 271	25 177	17 429	24 146	68 506	115 342	127 021	141 495
Commercial Services	7 234	2 086	0	3 546	8 975	19 536	5 465	14 152	15 522	25 053
Economic Framework	35 116	50 045	66 540	85 194	206 878	106 105	84 205	97 367	72 109	70 509
Natural Resources	109 546	154 861	134 867	177 363	244 239	243 111	305 685	407 492	363 738	411 634
Division 3: Society	**205 207**	**324 973**	**278 222**	**359 982**	**368 010**	**418 385**	**453 428**	**388 244**	**430 876**	**413 060**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	134 099	203 178	218 941	240 248	272 905	326 340	348 407	310 760	326 500	314 412
Education and Training	31 227	68 755	51 704	56 054	37 449	50 525	65 761	50 676	68 852	64 941
Social Development and Community Services	39 881	53 040	7 577	63 680	57 656	41 520	39 260	26 807	35 525	33 707
Division 4: Environment	**137 520**	**144 737**	**168 682**	**225 563**	**263 325**	**338 290**	**355 484**	**52 334**	**31 241**	**39 169**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental Knowledge	83 067	87 752	94 519	120 806	130 041	173 945	190 926	24 043	19 956	22 939
Environmental Aspects of Development	17 175	20 436	43 835	50 877	46 190	59 943	48 262	19 333	8 623	13 665
Environmental and Other Aspects	37 279	36 549	30 328	53 880	87 094	104 402	116 296	8 958	2 662	2 565
Division 5: Advancement of Knowledge	370 340	308 067	373 473	726 212	465 468	508 339	503 621	816 035	833 382	893 033
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural Sciences, Technologies and Engineering	274 691	246 359	306 398	616 487	361 714	407 189	381 098	674 421	694 254	760 107
Social Sciences and Humanities	95 649	61 708	67 076	109 725	103 754	101 150	122 523	141 614	139 127	132 926
Total	**1 745 493**	**1 996 050**	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**

TABLE C.98: PROPORTIONAL SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**8.8**	**8.1**	**7.4**	**9.5**	**7.9**	**8.9**	**9.0**	**6.4**	**6.5**	**7.0**
Defence	8.8	8.1	7.4	9.5	7.9	8.9	9.0	6.4	6.5	7.0
Division 2: Economic Development	**50.4**	**53.0**	**53.6**	**42.7**	**54.1**	**50.7**	**53.0**	**58.7**	**58.7**	**59.6**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant Production And Plant Primary Products	10.8	9.9	14.2	12.1	15.0	11.2	14.0	13.3	12.0	11.8
Animal Production and Animal Primary Products	8.1	5.9	3.4	4.2	0.9	0.6	0.8	0.7	7.5	7.1
Mineral Resources (Excluding Energy)	8.6	12.6	13.6	2.3	2.2	2.1	11.2	8.2	5.4	5.3
Energy Resources	1.0	0.8	1.5	1.9	1.4	12.1	0.9	2.5	2.5	2.7
Energy Supply	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.4	0.3
Manufacturing	7.3	7.0	5.3	4.8	13.4	7.2	7.6	10.2	9.4	10.0
Construction	2.1	3.1	4.3	5.5	3.5	3.7	3.8	6.2	5.9	6.4
Transport	3.1	2.1	0.9	1.1	1.2	1.3	1.3	0.0	0.0	0.0
Information and Communication Services	0.4	1.1	0.9	0.9	0.6	0.8	2.0	3.2	3.4	3.5
Commercial Services	0.4	0.1	0.0	0.1	0.3	0.6	0.2	0.4	0.4	0.6
Economic Framework	2.0	2.5	3.2	3.1	7.2	3.4	2.4	2.7	1.9	1.8
Natural Resources	6.3	7.8	6.4	6.5	8.5	7.7	8.8	11.3	9.8	10.2
Division 3: Society	11.8	16.3	13.2	13.1	12.8	13.3	13.1	10.8	11.6	10.3
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	7.7	10.2	10.4	8.8	9.5	10.4	10.1	8.6	8.8	7.8
Education and Training	1.8	3.4	2.5	2.0	1.3	1.6	1.9	1.4	1.8	1.6
Social Development and Community Services	2.3	2.7	0.4	2.3	2.0	1.3	1.1	0.7	1.0	0.8
Division 4: Environment	**7.9**	**7.3**	**8.0**	**8.2**	**9.1**	**10.8**	**10.3**	**1.5**	**0.8**	**1.0**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	4.8	4.4	4.5	4.4	4.5	5.5	5.5	0.7	0.5	0.6
Environmental Aspects of Development	1.0	1.0	2.1	1.9	1.6	1.9	1.4	0.5	0.2	0.3
Environmental and Other Aspects	2.1	1.8	1.4	2.0	3.0	3.3	3.4	0.2	0.1	0.1
Division 5: Advancement of Knowledge	**21.2**	**15.4**	**17.8**	**26.5**	**16.1**	**16.2**	**14.6**	**22.7**	**22.3**	**22.2**
Advancement of Knowledge unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Sciences, Technologies and Engineering	15.7	12.3	14.6	22.5	12.5	13.0	11.0	18.8	18.6	18.9
Social Sciences and Humanities	5.5	3.1	3.2	4.0	3.6	3.2	3.5	3.9	3.7	3.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.99: SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

PROVINCE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	N/A	75 170	123 956	131 126	138 342	171 669	155 501	150 665	178 594	182 664
Free State	N/A	33 725	50 197	52 773	67 901	58 561	74 355	60 443	37 138	39 054
Gauteng	N/A	1 312 041	1 103 284	1 546 032	1 809 272	1 991 853	2 219 609	2 327 712	2 287 762	2 537 028
KwaZulu-Natal	N/A	171 424	201 811	267 620	201 009	231 033	235 432	249 137	292 246	307 302
Limpopo	N/A	23 887	48 058	69 808	67 562	63 455	78 662	66 250	99 104	105 150
Mpumalanga	N/A	35 580	48 051	69 859	66 333	55 547	66 881	55 690	100 476	103 468
North-West	N/A	43 581	45 751	72 968	49 390	41 541	51 295	42 854	104 139	110 361
Northern Cape	N/A	20 051	64 284	55 676	45 250	43 624	35 253	64 774	81 998	78 714
Western Cape	N/A	280 591	416 702	478 856	441 036	480 059	541 086	578 497	548 223	562 256
Total	**N/A**	**1 996 050**	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**

Note: N/A indicates that data were not collected.

TABLE C.100: PROPORTIONAL SCIENCE COUNCILS SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

PROVINCE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	N/A	3.8	5.9	4.8	4.8	5.5	4.5	4.2	4.8	4.5
Free State	N/A	1.7	2.4	1.9	2.4	1.9	2.2	1.7	1.0	1.0
Gauteng	N/A	65.7	52.5	56.3	62.7	63.5	64.2	64.7	61.3	63.0
KwaZulu-Natal	N/A	8.6	9.6	9.8	7.0	7.4	6.8	6.9	7.8	7.6
Limpopo	N/A	1.2	2.3	2.5	2.3	2.0	2.3	1.8	2.7	2.6
Mpumalanga	N/A	1.8	2.3	2.5	2.3	1.8	1.9	1.5	2.7	2.6
North-West	N/A	2.2	2.2	2.7	1.7	1.3	1.5	1.2	2.8	2.7
Northern Cape	N/A	1.0	3.1	2.0	1.6	1.4	1.0	1.8	2.2	2.0
Western Cape	N/A	14.1	19.8	17.4	15.3	15.3	15.6	16.1	14.7	14.0
Total	**N/A**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: N/A indicates that data were not collected.

TABLE C.101: SCIENCE COUNCILS SECTOR R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION (2003/04 TO 2012/13)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2003/04	**6 522**	2 414	1 612	2 496	**5 389.4**	1 899.5	1 303.7	2 186.2
2004/05	**6 170**	1 846	1 582	2 742	**4 989.6**	1 548.8	1 344.1	2 096.6
2005/06	**5 679**	1 790	1 678	2 211	**4 103.1**	1 323.3	1 250.9	1 529.0
2006/07	**5 798**	2 255	1 570	1 973	**4 956.1**	1 982.7	1 342.1	1 631.3
2007/08	**5 988**	2 594	1 351	2 043	**5 058.8**	2 300.2	1 099.2	1 659.4
2008/09	**5 609**	2 648	1 302	1 659	**4 699.9**	2 246.7	1 119.1	1 334.0
2009/10	**5 926**	2 669	1 381	1 876	**4 782.7**	2 251.5	1 179.4	1 351.8
2010/11	**4 923**	1 941	1 336	1 646	**4 312.4**	1 777.3	1 155.5	1 379.6
2011/12	**4 494**	1 803	1 333	1 358	**3 803.5**	1 634.9	1 172.4	996.1
2012/13	**5 399**	1 879	1 403	2 117	**4 748.5**	1 697.1	1 279.6	1 771.8

TABLE C.102: SCIENCE COUNCILS SECTOR R&D PERSONNEL IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION AND GENDER (2010/11, 2011/12 AND 2012/13)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTEs AS % OF HEADCOUNTS
2010/11	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
Researchers	**1 941**	1 110	831	1 777.3	998.1	779.2	91.6
Technicians directly supporting R&D	**1 336**	691	645	1 155.5	555.0	600.5	86.5
Other personnel directly supporting R&D	**1 646**	836	810	1 379.6	657.2	722.4	83.8
Total	**4 923**	**2 637**	**2 286**	**4 312.4**	**2 210.3**	**2 102.1**	**87.6**
2011/12	**TOTAL**	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	**1 803**	1 023	780	1 634.9	911.3	723.6	90.7
Technicians directly supporting R&D	**1 333**	774	559	1 172.4	644.7	527.8	88.0
Other personnel directly supporting R&D	**1 358**	778	580	996.1	552.3	443.8	73.4
Total	**4 494**	**2 575**	**1 919**	**3 803.5**	**2 108.3**	**1 695.2**	**84.6**
2012/13	**TOTAL**	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	**1 879**	1 018	861	1 697.1	904.5	792.6	90.3
Technicians directly supporting R&D	**1 403**	830	573	1 279.6	734.7	544.9	91.2
Other personnel directly supporting R&D	**2 117**	1 094	1 023	1 771.8	866.9	904.9	83.7
Total	**5 399**	**2 942**	**2 457**	**4 748.5**	**2 506.1**	**2 242.4**	**88.0**

TABLE C.103: SCIENCE COUNCILS SECTOR R&D PERSONNEL IN HEADCOUNTS BY OCCUPATION, QUALIFICATION, POPULATION GROUP AND GENDER (2012/13)

OCCUPATION AND QUALIFICATION	Total	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers											
Doctoral degree or equivalent	**706**	438	268	167	72	12	20	26	32	233	144
Masters, honours, bachelor or equivalent	**1 129**	564	565	257	251	35	44	31	77	241	193
Diplomas	**44**	16	28	4	17	0	4	2	2	10	5
Subtotal	**1 879**	**1 018**	**861**	**428**	**340**	**47**	**68**	**59**	**111**	**484**	**342**
Technicians directly supporting R&D											
Doctoral degree or equivalent	**20**	14	6					2	0	12	6
Masters, honours, bachelor or equivalent	**691**	396	295	134	145	14	13	32	45	216	92
Diplomas	**692**	420	272	213	170	53	18	13	19	141	65
Subtotal	**1 403**	**830**	**573**	**347**	**315**	**67**	**31**	**47**	**64**	**369**	**163**
Other personnel directly supporting R&D											
Doctoral degree or equivalent	**112**	81	31	39	8	4	1	4	5	34	17
Masters, honours, bachelor or equivalent	**843**	413	430	210	229	24	20	34	37	145	144
Diplomas	**1 162**	600	562	443	321	53	98	25	22	79	121
Subtotal	**2 117**	**1 094**	**1 023**	**692**	**558**	**81**	**119**	**63**	**64**	**258**	**282**
Total	**5 399**	**2 942**	**2 457**	**1 467**	**1 213**	**195**	**218**	**169**	**239**	**1 111**	**787**

TABLE C.104: SCIENCE COUNCILS SECTOR OVERVIEW (2011/12 AND 2012/13)

SCIENCE COUNCILS	2011/12				2012/13			
	R&D EXPENDITURE	RESEARCHERS	BASIC RESEARCH	CAPITAL EXPENDITURE	R&D EXPENDITURE	RESEARCHERS	BASIC RESEARCH	CAPITAL EXPENDITURE
	R'000	FTEs	R'000	R'000	R'000	FTEs	R'000	R'000
African Institute of South Africa	34 537	20.0	34 537	274	37 821	18.0	37 821	234
Agricultural Research Council	677 842	317.0	88 119	72 044	691 498	482.0	89 895	76 941
Council for Scientific and Industrial Research	1 816 735	584.0	181 674	153 893	2 095 576	508.0	209 558	112 234
Council for Geoscience	86 232	100.0	67 261	7 949	113 879	100.0	88 826	20 564
Human Sciences Research Council	236 830	79.2	59 208	6 651	224 713	124.5	56 178	354
Medical Research Council	411 441	293.0	246 865	15 269	394 975	260.0	236 985	5 924
Mintek	233 656	142.8	58 414	20 828	239 878	93.2	59 970	25 824
National Research Foundation	232 407	98.9	164 753	46 162	227 658	111.4	158 594	33 675
Total	**3 729 680**	**1 634.9**	**900 830**	**323 070**	**4 025 998**	**1 697.1**	**937 826**	**275 750**

C.2.5. HIGHER EDUCATION SECTOR

TABLE C.105: HIGHER EDUCATION SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

TYPE OF RESEARCH	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	915 972	1 049 330	1 134 411	1 348 299	1 709 334	1 965 121	2 459 733	2 634 722	3 290 328	3 843 906
Applied research	827 209	979 626	1 045 483	1 282 627	1 262 425	1 468 624	1 729 496	1 890 185	2 279 175	2 390 090
Experimental research	328 170	505 014	552 321	667 882	650 102	757 621	911 994	899 695	1 039 712	1 099 157
Total	**2 071 351**	**2 533 971**	**2 732 215**	**3 298 808**	**3 621 861**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**

TABLE C.106: PROPORTIONAL HIGHER EDUCATION SECTOR R&D EXPENDITURE BY TYPE OF RESEARCH (2003/04 TO 2012/13)

TYPE OF RESEARCH	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Basic research	44.2	41.4	41.5	40.9	47.2	46.9	48.2	48.6	49.8	52.4
Applied research	39.9	38.7	38.3	38.9	34.9	35.0	33.9	34.8	34.5	32.6
Experimental research	15.8	19.9	20.2	20.2	17.9	18.1	17.9	16.6	15.7	15.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.107: HIGHER EDUCATION SECTOR R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Capital expenditure on R&D	**162 380**	**193 536**	**150 224**	**216 037**	**295 813**	**281 193**	**376 057**	**393 758**	**564 179**	**602 116**
Land, buildings and other structures	8 825	16 693	21 622	69 123	51 734	38 564	97 533	146 602.0	137 530.0	192 324.0
Vehicles, plant, machinery, equipment	153 555	176 843	128602	146 914	244 079	242 629	278 524.0	247156	426 649.0	409 792.0
Current expenditure	**1 908 971**	**2 340 435**	**2 581 991**	**3 082 771**	**3 326 049**	**3 910 173**	**4 725 167**	**5 030 844**	**6 045 037**	**6 731 037**
Labour costs	925 255	1 097 488	1 202 172	1 376 395	1 466 379	1 504 542	1 710 183	1 883 176.0	2 481 322.0	2 996 929.0
Total cost of R&D postgraduate students	190 892	308 454	313 645	438 486	495 128	532 883	581 140	756 930.0	1 074 207.0	1 186 653.0
Other current expenditure	**792 824**	**934 493**	**1 066 174**	**1 267 890**	**1 364 542**	**1 872 748**	**2 433 844**	**2 390 738**	**2 489 508**	**2 547 455**
Total	**2 071 351**	**2 533 971**	**2 732 215**	**3 298 808**	**3 621 862**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**

TABLE C.108: PROPORTIONAL HIGHER EDUCATION SECTOR R&D EXPENDITURE BY ACCOUNTING CATEGORY (2003/04 TO 2012/13)

TYPE OF EXPENDITURE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Capital expenditure on R&D	**7.8**	**7.6**	**5.5**	**6.5**	**8.2**	**6.7**	**7.4**	**7.3**	**8.5**	**8.2**
Land, buildings and other structures	0.4	0.7	0.8	2.1	1.4	0.9	1.9	2.7	2.1	2.6
Vehicles, plant, machinery, equipment	7.4	7.0	4.7	4.5	6.7	5.8	5.5	4.6	6.5	5.6
Current expenditure	**92.2**	**92.4**	**94.5**	**93.5**	**91.8**	**93.3**	**92.6**	**92.7**	**91.5**	**91.8**
Labour costs	44.7	43.3	44.0	41.7	40.5	35.9	33.5	34.7	37.5	40.9
Total cost of R&D postgraduate students	9.2	12.2	11.5	13.3	13.7	12.7	11.4	14.0	16.3	16.2
Other current expenditure	**38.3**	**36.9**	**39.0**	**38.4**	**37.7**	**44.7**	**47.7**	**44.1**	**37.7**	**34.7**
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.109: HIGHER EDUCATION SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	176 818	215 606	253 872	303 483	366 900	381 225	344 039	380 727
Nanotechnology	85 162	140 998	170 405	153 013	156 176	204 802	317 649	293 300
Total	261 980	356 604	424 277	456 496	523 076	586 027	661 688	674 028
Higher Education expenditure on R&D	2 732 215	3 298 808	3 621 862	4 191 366	5 101 224	5 424 602	6 609 216	7 333 153

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.110: PROPORTIONAL HIGHER EDUCATION SECTOR EXPENDITURE ON MULTIDISCIPLINARY AREAS OF R&D (2005/06 TO 2012/13)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Biotechnology	6.5	6.5	7.0	7.2	7.2	7.0	5.2	5.2
Nanotechnology	3.1	4.3	4.7	3.7	3.1	3.8	4.8	4.0
Total	9.6	10.8	11.7	10.9	10.3	10.8	10.0	9.2

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

TABLE C.111: HIGHER EDUCATION SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	770 339	300 006
Open-source software	27 723	41 441	41 234	49 532	58 643	75 195	15 982	85 508
New materials	106 912	135 803	160 993	202 242	283 711	266 419	197 430	321 744
Tuberculosis (TB), HIV/AIDS, malaria	276 591	391 002	583 726	650 502	815 431	845 216	399 070	714 966
Total	411 226	568 246	785 953	902 276	1 157 785	1 186 830	1 382 821	1 422 224
Higher Education expenditure on R&D	2 732 215	3 298 808	3 621 862	4 191 366	5 101 224	5 424 602	6 609 216	7 333 153

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.112: PROPORTIONAL HIGHER EDUCATION SECTOR R&D EXPENDITURE ON SELECTED AREAS OF INTEREST (2005/06 TO 2012/13)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	11.7	4.1
Open-source software	1.0	1.3	1.1	1.2	1.1	1.4	0.2	1.2
New materials	3.9	4.1	4.4	4.8	5.6	4.9	3.0	4.4
Tuberculosis (TB), HIV/AIDS, malaria	10.1	11.9	16.1	15.5	16.0	15.6	6.0	9.7
Total	15.1	17.2	21.7	21.5	22.7	21.9	20.9	19.4

Note: Data on these selected areas of R&D were collected for the first time in the 2005/06 R&D survey.
N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

TABLE C.113: HIGHER EDUCATION SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**1 424 560**	**1 646 731**	**1 846 022**	**2 294 479**	**2 389 525**	**2 703 975**	**3 374 024**	**3 558 265**	**4 486 057**	**5 045 892**
Mathematical sciences	127 344	81 251	79 707	104 323	109 354	151 880	168 689	283 942	311 572	342 093
Physical sciences	52 552	100 761	97 252	121 559	146 726	135 002	352 628	175 110	189 341	193 849
Chemical sciences	71 479	101 808	117 914	106 214	143 897	136 528	161 856	158 775	317 389	444 258
Earth sciences	94 833	101 262	115 680	119 682	121 419	136 955	84 777	157 781	174 141	190 744
Information, computer and communication technologies	58 014	98 240	105 873	143 037	119 600	125 413	121 750	112 985	186 870	232 090
Applied sciences and technologies	54 238	43 653	55 779	101 400	96 972	78 904	306 195	90 761	245 611	251 278
Engineering sciences	198 163	307 141	268 250	349 889	294 630	352 114	305 953	461 980	741 462	768 810
Biological sciences	159 708	192 658	195 380	230 480	271 216	282 280	349 343	593 219	610 408	731 389
Agricultural sciences	97 996	97 248	143 104	151 950	159 793	192 265	179 309	205 311	268 834	276 857
Medical and health sciences	433 504	440 249	582 798	710 386	785 630	966 365	1 195 597	1 226 127	1 245 284	1 391 838
Environmental sciences	37 358	40 388	42 719	58 256	58 793	68 869	52 431	60 458	111 612	147 367
Material sciences	31 685	29 918	29 348	86 764	72 484	68 467	76 732	26 629	81 749	68 849
Marine sciences	7 685	12 154	12 220	10 539	9 013	8 933	18 764	5 186	1 783	6 469
Division 2: Social Sciences and Humanities	**646 791**	**887 240**	**886 193**	**1 004 329**	**1 232 337**	**1 487 391**	**1 727 200**	**1 866 337**	**2 123 159**	**2 287 261**
Social sciences	445 031	577 653	594 579	658 419	796 281	967 204	1 273 479	1 433 610	1 664 653	1 844 744
Humanities	201 761	309 587	291 615	345 910	436 056	520 187	453 721	432 727	458 505	442 517
Total	**2 071 351**	**2 533 971**	**2 732 215**	**3 298 808**	**3 621 862**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**

TABLE C.114: PROPORTIONAL HIGHER EDUCATION SECTOR R&D EXPENDITURE BY RESEARCH FIELD (2003/04 TO 2012/13)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**68.8**	**65.0**	**67.6**	**69.6**	**66.0**	**64.5**	**66.1**	**65.6**	**67.9**	**68.8**
Mathematical sciences	6.1	3.2	2.9	3.2	3.0	3.6	3.3	5.2	4.7	4.7
Physical sciences	2.5	4.0	3.6	3.7	4.1	3.2	6.9	3.2	2.9	2.6
Chemical sciences	3.5	4.0	4.3	3.2	4.0	3.3	3.2	2.9	4.8	6.1
Earth sciences	4.6	4.0	4.2	3.6	3.4	3.3	1.7	2.9	2.6	2.6
Information, computer and communication technologies	2.8	3.9	3.9	4.3	3.3	3.0	2.4	2.1	2.8	3.2
Applied sciences and technologies	2.6	1.7	2.0	3.1	2.7	1.9	6.0	1.7	3.7	3.4
Engineering sciences	9.6	12.1	9.8	10.6	8.1	8.4	6.0	8.5	11.2	10.5
Biological sciences	7.7	7.6	7.2	7.0	7.5	6.7	6.8	10.9	9.2	10.0
Agricultural sciences	4.7	3.8	5.2	4.6	4.4	4.6	3.5	3.8	4.1	3.8
Medical and health sciences	20.9	17.4	21.3	21.5	21.7	23.1	23.4	22.6	18.8	19.0
Environmental sciences	1.8	1.6	1.6	1.8	1.6	1.6	1.0	1.1	1.7	2.0
Material sciences	1.5	1.2	1.1	2.6	2.0	1.6	1.5	0.5	1.2	0.9
Marine sciences	0.4	0.5	0.4	0.3	0.2	0.2	0.4	0.1	0.0	0.1
Division 2: Social Sciences and Humanities	**31.2**	**35.0**	**32.4**	**30.4**	**34.0**	**35.5**	**33.9**	**34.4**	**32.1**	**31.2**
Social sciences	21.5	22.8	21.8	20.0	22.0	23.1	25.0	26.4	25.2	25.2
Humanities	9.7	12.2	10.7	10.5	12.0	12.4	8.9	8.0	6.9	6.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.115: HIGHER EDUCATION SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SOCIO-ECONOMIC OBJECTIVE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**1 679**	**2 069**	**2 423**	**2 711**	**4 328**	**5 150**	**3 620**	**7 271**	**10 211**	**12 009**
Defence	1 679	2 069	2 423	2 711	4 328	5 150	3 620	7 271	10 211	12 009
Division 2: Economic development	**628 565**	**735 329**	**923 990**	**1 199 956**	**1 271 620**	**1 539 534**	**1 738 239**	**1 542 453**	**2 072 624**	**1 996 497**
Economic development undassified	93 498	102 936	115 029	150 668	171 520	209 400	0	0	0	0
Plant production and plant primary products	69 061	60 922	91 790	119 949	123 126	153 054	178 033	188 513	277 764	234 309
Animal production & primary products	58 674	72 192	75 076	85 256	95 219	117 255	130 828	128 705	151 334	176 645
Mineral resources (excluding energy)	67 831	15 898	48 914	89 559	74 725	88 576	83 294	99 966	129 185	69 062
Energy resources	17 402	16 709	21 461	51 923	84 459	71 648	81 689	88 657	87 659	92 947
Energy supply	30 186	31 871	58 314	90 365	96 209	106 457	107 759	144 462	157 304	162 879
Manufacturing	78 679	102 001	145 485	210 910	172 947	210 009	297 303	245 037	272 287	348 845
Construction	19 548	26 956	20 407	27 521	28 313	46 175	23 858	73 340	116 141	74 322
Transport	12 109	14 347	16 440	16 447	22 770	29 517	30 456	24 045	53 043	31 830
Information and communication services	26 125	50 745	71 439	80 322	67 026	87 013	110 589	93 281	144 313	101 980
Commercial services	27 868	41 588	47 260	41 037	93 285	54 604	282 078	54 659	106 287	111 587
Economic framework	65 539	93 107	115 993	133 600	164 759	193 599	206 625	217 501	302 693	335 217
Natural resources	62 045	106 057	96 382	102 399	77 260	172 228	205 728	184 287	274 612	256 874
Division 3: Society	**634 216**	**722 819**	**831 632**	**1 062 182**	**1 149 091**	**1 359 797**	**1 177 651**	**1 393 700**	**1 583 800**	**1 865 914**
Society unclassified	93 498	102 936	115 029	150 668	171 520	209 400	0	0	0	0
Health	292 029	328 251	422 804	507 767	556 914	644 763	701 007	776 688	686 152	1 150 349
Education and training	110 531	132 616	149 270	199 056	195 917	227 502	187 291	294 482	359 897	402 285
Social development and community services	138 158	159 016	144 529	204 691	224 740	278 132	289 353	322 530	537 752	313 280
Division 4: Environment	**197 632**	**226 063**	**223 302**	**261 464**	**317 863**	**339 148**	**346 483**	**377 151**	**509 533**	**554 758**
Environment unclassified	31 166	34 312	38 343	50 223	57 173	69 800	0	0	0	0
Environmental knowledge	68 443	94 667	107 922	112 319	108 189	135 472	170 901	188 250	230 135	232 440
Environmental aspects of development	43 021	40 122	37 006	42 619	93 853	72 050	92 353	86 295	123 344	168 956
Environmental and other aspects	55 002	56 963	40 030	56 303	58 648	61 826	83 229	102 606	156 054	153 362
Division 5: Advancement of knowledge	**609 259**	**847 691**	**750 868**	**772 495**	**878 959**	**947 737**	**1 835 231**	**2 104 026**	**2 433 048**	**2 903 975**
Advancement of knowledge unclassified	93 498	102 936	115 029	150 668	171 520	209 400	0	0	0	0
Natural sciences, technologies and engineering	311 137	427 087	297 837	329 497	416 081	423 469	969 079	1 263 802	1 443 913	1 731 540
Social sciences and humanities	204 623	317 668	338 002	292 330	291 359	314 868	866 152	840 223	989 135	1 172 435
Total	**2 071 351**	**2 533 971**	**2 732 215**	**3 298 808**	**3 621 862**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**

TABLE C.116: PROPORTIONAL HIGHER EDUCATION SECTOR R&D EXPENDITURE BY SOCIO-ECONOMIC OBJECTIVE (2003/04 TO 2012/13)

SSOCIO-ECONOMIC OBJECTIVES	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**	**0.2**
Defence	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Division 2: Economic development	**30.3**	**29.0**	**33.8**	**36.4**	**35.1**	**36.7**	**34.1**	**28.4**	**31.4**	**27.2**
Economic development unclassified	4.5	4.1	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	3.3	2.4	3.4	3.6	3.4	3.7	3.5	3.5	4.2	3.2
Animal production & primary products	2.8	2.8	2.7	2.6	2.6	2.8	2.6	2.4	2.3	2.4
Mineral resources (excluding energy)	3.3	0.6	1.8	2.7	2.1	2.1	1.6	1.8	2.0	0.9
Energy resources	0.8	0.7	0.8	1.6	2.3	1.7	1.6	1.6	1.3	1.3
Energy supply	1.5	1.3	2.1	2.7	2.7	2.5	2.1	2.7	2.4	2.2
Manufacturing	3.8	4.0	5.3	6.4	4.8	5.0	5.8	4.5	4.1	4.8
Construction	0.9	1.1	0.7	0.8	0.8	1.1	0.5	1.4	1.8	1.0
Transport	0.6	0.6	0.6	0.5	0.6	0.7	0.6	0.4	0.8	0.4
Information and communication services	1.3	2.0	2.6	2.4	1.9	2.1	2.2	1.7	2.2	1.4
Commercial services	1.3	1.6	1.7	1.2	2.6	1.3	5.5	1.0	1.6	1.5
Economic framework	3.2	3.7	4.2	4.0	4.5	4.6	4.1	4.0	4.6	4.6
Natural resources	3.0	4.2	3.5	3.1	2.1	4.1	4.0	3.4	4.2	3.5
Division 3: Society	**30.6**	**28.5**	**30.4**	**32.2**	**31.7**	**32.4**	**23.1**	**25.7**	**24.0**	**25.4**
Society unclassified	4.5	4.1	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0
Health	14.1	13.0	15.5	15.4	15.4	15.4	13.7	14.3	10.4	15.7
Education and training	5.3	5.2	5.5	6.0	5.4	5.4	3.7	5.4	5.4	5.5
Social development and community services	6.7	6.3	5.3	6.2	6.2	6.6	5.7	5.9	8.1	4.3
Division 4: Environment	**9.5**	**8.9**	**8.2**	**7.9**	**8.8**	**8.1**	**6.8**	**7.0**	**7.7**	**7.6**
Environment unclassified	1.5	1.4	1.4	1.5	1.6	1.7	0.0	0.0	0.0	0.0
Environmental knowledge	3.3	3.7	3.9	3.4	3.0	3.2	3.4	3.5	3.5	3.2
Environmental aspects of development	2.1	1.6	1.4	1.3	2.6	1.7	1.8	1.6	1.9	2.3
Environmental and other aspects	2.7	2.2	1.5	1.7	1.6	1.5	1.6	1.9	2.4	2.1
Division 5: Advancement of knowledge	**29.4**	**33.5**	**27.5**	**23.4**	**24.3**	**22.6**	**36.0**	**38.8**	**36.8**	**39.6**
Advancement of knowledge unclassified	4.5	4.1	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	15.0	16.9	10.9	10.0	11.5	10.1	19.0	23.3	21.8	23.6
Social sciences and humanities	9.9	12.5	12.4	8.9	8.0	7.5	17.0	15.5	15.0	16.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

TABLE C.117: HIGHER EDUCATION SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

PROVINCE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	N/A	184 868	214 701	259 254	276 740	286 605	536 792	556 496	608 815	592 861
Free State	N/A	139 497	146 823	155 326	180 713	226 892	246 298	281 889	323 335	356 177
Gauteng	N/A	885 288	1 030 801	1 214 575	1 260 991	1 467 914	1 537 166	1 600 783	2 028 145	2 118 817
KwaZulu-Natal	N/A	373 595	379 681	451 992	459 299	567 999	662 518	677 740	902 386	1 137 258
Limpopo	N/A	63 508	43 565	63 233	79 716	86 635	147 397	224 603	349 559	300 435
Mpumalanga	N/A	47 379	58 548	67 029	105 629	72 590	88 680	119 231	170 966	182 192
North-West	N/A	123 817	73 456	97 246	166 137	150 125	190 570	184 514	275 088	311 325
Northern Cape	N/A	21 152	15 263	42 944	48 277	68 443	92 062	107 581	148 425	164 483
Western Cape	N/A	694 867	769 377	947 209	1 044 360	1 264 162	1 599 741	1 671 766	1 802 496	2 169 606
Total	**N/A**	**2 533 971**	**2 732 215**	**3 298 808**	**3 621 862**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**

Note: N/A indicates that data were not collected.

TABLE C.118: PROPORTIONAL HIGHER EDUCATION SECTOR R&D EXPENDITURE BY PROVINCE (2003/04 TO 2012/13)

PROVINCE	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	N/A	7.3	7.9	7.9	7.6	6.8	10.5	10.3	9.2	8.1
Free State	N/A	5.5	5.4	4.7	5.0	5.4	4.8	5.2	4.9	4.9
Gauteng	N/A	34.9	37.7	36.8	34.8	35.0	30.1	29.5	30.7	28.9
KwaZulu-Natal	N/A	14.7	13.9	13.7	12.7	13.6	13.0	12.5	13.7	15.5
Limpopo	N/A	2.5	1.6	1.9	2.2	2.1	2.9	4.1	5.3	4.1
Mpumalanga	N/A	1.9	2.1	2.0	2.9	1.7	1.7	2.2	2.6	2.5
North-West	N/A	4.9	2.7	2.9	4.6	3.6	3.7	3.4	4.2	4.2
Northern Cape	N/A	0.8	0.6	1.3	1.3	1.6	1.8	2.0	2.2	2.2
Western Cape	N/A	27.4	28.2	28.7	28.8	30.2	31.4	30.8	27.3	29.6
Total	**N/A**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: N/A indicates that data were not collected.

TABLE C.119: HIGHER EDUCATION SECTOR R&D PERSONNEL* IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION (2003/04 TO 2012/13)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	**TOTAL**	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2003/04	**19 378**	14 055	2 594	2 729	**4 554.0**	3 373.8	763.3	416.9
2004/05	**23 793**	18 270	2 801	2 722	**4 547.6**	3 506.5	568.1	473.0
2005/06	**22 787**	18 877	1 925	1 985	**4 931.6**	3 555.2	535.0	841.4
2006/07	**21 746**	17 459	2 170	2 117	**5 168.9**	3 657.8	643.8	867.3
2007/08	**21 365**	17 008	2 006	2 351	**5 178.1**	3 672.3	612.8	893.0
2008/09	**20 223**	16 313	2 054	1 856	**4 859.3**	3 643.5	541.7	674.2
2009/10	**20 850**	17 010	2 115	1 725	**5 018.0**	3 761.8	579.8	676.4
2010/11	**19 970**	15 553	2 123	2 294	**5 023.0**	3 613.7	534.9	874.5
2011/12	**21 458**	16 294	2 344	2 820	**6 091.2**	4 355.3	673.4	1 062.5
2012/13	**22 691**	17 441	2 344	2 906	**6 571.5**	4 700.6	737.3	1 133.5

*Excludes doctoral and postdoctoral fellows

TABLE C.120: HIGHER EDUCATION SECTOR R&D PERSONNEL (INCLUDING DOCTORAL STUDENTS AND POST-DOCTORAL FELLOWS) IN HEADCOUNTS AND FULL-TIME EQUIVALENTS BY OCCUPATION AND GENDER (2010/11, 2011/12 AND 2012/13)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTEs AS % OF HEADCOUNTS
2010/11	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
Researchers*	**28 154**	15 914	12 240	11 067.9	6 286.2	4 781.7	39.3
Technicians directly supporting R&D	**2 123**	1 233	890	534.9	313.3	221.6	25.2
Other personnel directly supporting R&D	**2 294**	760	1 534	874.5	254.3	620.1	38.1
Total	**32 571**	**17 907**	**14 664**	**12 477.3**	**6 853.8**	**5 623.5**	**38.3**
2011/12	**TOTAL**	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	**30 993**	17 343	13 650	12 827.6	7 190.0	5 637.5	41.4
Technicians directly supporting R&D	**2 344**	1 327	1 017	673.4	371.4	301.9	28.7
Other personnel directly supporting R&D	**2 820**	907	1 913	1 062.5	306.1	756.4	37.7
Total	**36 157**	**19 577**	**16 580**	**14 563.5**	**7 867.5**	**6 695.9**	**40.3**
2012/13	**TOTAL**	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	**32 955**	18 193	14 762	13 743.6	7 612.6	6 131.0	41.7
Technicians	**2 344**	1 346	998	737.3	428.8	308.6	31.5
Other personnel	**2 906**	899	2 007	1 133.5	349.4	784.1	39.0
Total	**38 205**	**20 438**	**17 767**	**15 614.4**	**8 390.8**	**7 223.6**	**40.9**

*Includes doctoral students and post-doctoral fellows.

TABLE C.121: HIGHER EDUCATION SECTOR R&D PERSONNEL IN HEADCOUNTS BY OCCUPATION AND GENDER, AND FULL-TIME EQUIVALENTS BY OCCUPATION (2010/11, 2011/12 AND 2012/13)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS	
2010/11	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Researchers*	**15 553**	8 630	6 923	3 613.7	23.2
Technicians directly supporting R&D	**2 123**	1 233	890	534.9	25.2
Other personnel directly supporting R&D	**2 294**	760	1 534	874.5	38.1
Total	**19 970**	**10 623**	**9 347**	**5 023.0**	**25.2**
2011/12	**TOTAL**	**MALE**	**FEMALE**	**TOTAL**	**FTEs AS % OF HEADCOUNTS**
Researchers*	**16 294**	8 939	7 355	4 355.3	26.7
Technicians directly supporting R&D	**2 344**	1 327	1 017	673.4	28.7
Other personnel directly supporting R&D	**2 820**	907	1 913	1 062.5	37.7
Total	**21 458**	**11 173**	**10 285**	**6 091.2**	**28.4**
2012/13	**TOTAL**	**MALE**	**FEMALE**	**TOTAL**	**FTEs AS % OF HEADCOUNTS**
Researchers*	17 441	9 466	7 975	4 700.6	27.0
Technicians	2 344	1 346	998	737.3	31.5
Other personnel	2 906	899	2 007	1 133.5	39.0
Total	**22 691**	**11 711**	**10 980**	**6 571.5**	**29.0**

*Excludes doctoral students and post-doctoral fellows.

TABLE C.122: HIGHER EDUCATION SECTOR R&D POSTGRADUATES IN HEADCOUNTS BY QUALIFICATION AND GENDER, AND FULL-TIME EQUIVALENTS BY QUALIFICATION (2010/11, 2011/12 AND 2012/13)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS	
2010/11	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Post-doctoral fellows	**961**	570	391	866.6	90.2
Doctoral students	**11 640**	6 714	4 926	6 587.6	56.6
Masters students	**28 373**	14 165	14 208	12 505.1	44.1
Total	**40 974**	**21 449**	**19 525**	**19 959.3**	**48.7**
2011/12	**TOTAL**	**MALE**	**FEMALE**	**TOTAL**	**FTEs AS % OF HEADCOUNTS**
Post-doctoral fellows	**1 180**	667	513	982.0	83.2
Doctoral students	**13 519**	7 737	5 782	7 490.2	55.4
Masters students	**35 637**	18 354	17 283	14 912.4	41.8
Total	**50 336**	**26 758**	**23 578**	**23 384.7**	**46.5**
2012/13	**TOTAL**	**MALE**	**FEMALE**	**TOTAL**	**FTEs AS % OF HEADCOUNTS**
Post-doctoral fellows	1 384	816	568	1 296.4	93.7
Doctoral students	14 130	7 911	6 219	7 746.6	54.8
Masters students	35 137	17 646	17 491	17 310.3	49.3
Total	**50 651**	**26 373**	**24 278**	**26 353.3**	**52.0**

TABLE C.123: HIGHER EDUCATION SECTOR R&D PERSONNEL IN HEADCOUNTS BY OCCUPATION, QUALIFICATION, POPULATION GROUP AND GENDER (2012/13)

OCCUPATION AND QUALIFICATION	Total	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers											
Doctoral degree or equivalent	6 590	4 083	2 507	933	392	207	132	308	201	2 635	1 782
Masters, honours, bachelor or equivalent	8 609	4 291	4 318	1 659	1 133	270	356	379	431	1 983	2 398
Diplomas	2 242	1 092	1 150	514	472	41	68	129	150	408	460
Subtotal	**17 441**	**9 466**	**7 975**	**3 106**	**1 997**	**518**	**556**	**816**	**782**	**5 026**	**4 640**
Technicians directly supporting R&D											
Doctoral degree or equivalent	129	82	47	13	3	3	1	4	0	62	43
Masters, honours, bachelor or equivalent	821	396	425	120	89	41	50	24	18	211	268
Diplomas	1 394	868	526	305	177	187	45	76	67	300	237
Subtotal	**2 344**	**1 346**	**998**	**438**	**269**	**231**	**96**	**104**	**85**	**573**	**548**
Other personnel directly supporting R&D											
Doctoral degree or equivalent	231	130	101	32	22	3	11	10	6	85	62
Masters, honours, bachelor or equivalent	845	270	575	101	131	26	90	14	29	129	325
Diplomas	1 830	499	1 331	204	290	104	305	18	48	173	688
Subtotal	2 906	899	2 007	337	443	133	406	42	83	387	1 075
Total	**22 691**	**11 711**	**10 980**	**3 881**	**2 709**	**882**	**1 058**	**962**	**950**	**5 986**	**6 263**

*Excludes doctoral students and post-doctoral fellows.

TABLE C.124: HIGHER EDUCATION SECTOR OVERVIEW (2012/13)

HIGHER EDUCATION INSTITUTES	R&D EXPENDITURE	RESEARCHERS	RESEARCHERS	POSTGRADUATES	POSTGRADUATES
	R'000	(HEADCOUNTS)	(FTEs)	(HEADCOUNTS)	(FTEs)
Private Universities	**29 721**	**112**	**39.0**	**1**	**0.9**
Public Universities	**6 846 124**	**14 576**	**4 252.2**	**14 588**	**8 498.5**
Nelson Mandela Metropolitan University	250 233	448	78.3	482	248.8
North West University	438 358	1 226	440.8	1 105	387.0
Rhodes University	159 702	432	146.8	480	480.0
University of Cape Town	1 071 116	1 304	460.0	1 613	1 040.1
University of Fort Hare	33 433	291	58.2	263	157.8
University of Johannesburg	287 450	795	216.4	803	803.0
University of KwaZulu-Natal	912 302	1 877	542.4	1 804	787.7
University of Limpopo	242 620	285	47.7	205	40.6
University of Pretoria	601 428	1 624	342.1	1 977	833.2
University of South Africa	559 380	1 849	924.5	1 269	891.9
University of Stellenbosch	780 417	1 088	336.1	1 486	940.5
University of the Free State	249 040	201	56.4	601	264.3
University of the Western Cape	253 229	944	257.2	699	361.9
University of the Witwatersrand	971 676	1 942	291.3	1 617	1 150.7
University of Zululand	35 740	270	54.0	184	111.2
Public Universities of (Science) and Technology	**457 308**	**2 753**	**409.4**	**925**	**543.6**
Cape Peninsula University of Technology	101 412	412	69.8	211	211.0
Central University of Technology, Free State	27 050	283	41.1	90	51.1
Durban University Technology	58 023	339	44.8	121	79.7
Mangosuthu University of Technology	21 515	182	36.4	0	0
Tshwane University of Technology	138 027	331	53.8	337	106.1
University of Venda for Science and Technology	18 709	325	32.5	118	70.8
Vaal University of Technology	42 242	274	39.6	18	6.9
Walter Sisulu University of Technology and Science	50 330	607	91.4	30	18.0
Total	**7 333 153**	**17 441**	**4 700.6**	**15 514**	**9 043.0**

*Collected personnel data may differ from Higher Education Management Information System (HEMIS) data in some cases due to definitional differences in personnel categories. R&D expenditure data for the University of Fort Hare, University of South Africa, University of Zululand, University of Venda for Science & Technology and Walter Sisulu University of Technology and Science were statistically generated, and personnel data were obtained from HEMIS.

D. METHODOLOGICAL NOTES

D.1. SURVEY DESIGN AND PLANNING

The South African National Survey of Research and Experimental Development (R&D survey) is commissioned by the Department of Science and Technology and forms part of the tools for monitoring and evaluating the performance of the National System of Innovation (NSI).

The R&D survey is conducted annually. It produces statistics on expenditure and human resources devoted to R&D in South Africa. These data are used to compile national and international indicators on R&D for South Africa and to conduct focused analysis. Output tables were agreed in advance of the survey between CeSTII and the DST.

The scope includes all units performing R&D, either continuously or occasionally. This report contains the results for the 2012/13 reference period.

The R&D survey is composed of three survey instruments covering the four main sectors described in the Frascati Manual: business enterprise, government, private not-for-profit and higher education sectors. In South Africa, the science councils are extracted from the government sector and are reported separately, thus comprising a fifth sector.

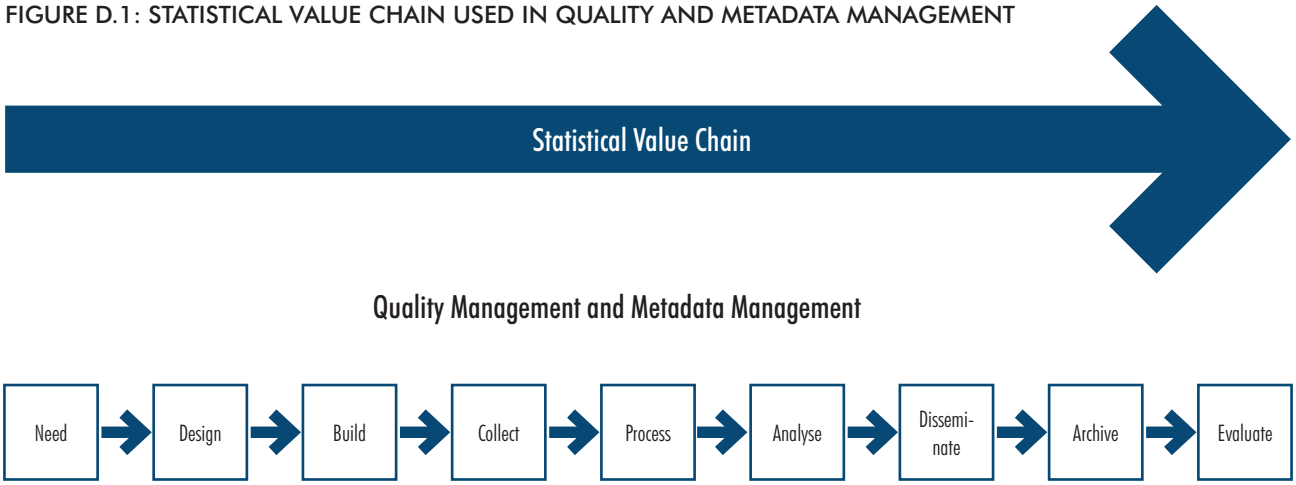
The survey collects data in accordance with the guidelines recommended by the OECD in the Frascati Manual (OECD 2002) to maintain coherence and international comparability. The System of National Accounts (EC, IMF, OECD, UN and World Bank 1993) and the National System of Innovation differ on the identification of target units and definitions. The Frascati Manual (OECD 2002) comments on the main areas of difference that have continued to exist between the two systems, as shown in Table D.1.

TABLE D.1: MAIN INSTITUTIONAL SECTORS IN THE ECONOMY

SYSTEM OF NATIONAL ACCOUNTS SECTOR	NATIONAL SYSTEM OF INNOVATION SECTOR DESCRIPTION
Non-financial corporations Financial corporations	**Business enterprise sector:** "All firms, organisations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price. The private non-profit institutions mainly serving them."
General government	**Government sector:** "All departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community. (Public enterprises are included in the business enterprise sector.) [Non-profit institutions] controlled and mainly financed by government, but not administered by the higher education sector."
Non-profit institutions serving households	**Private non-profit sector:** "Non-market, private non-profit institutions serving households (i.e. the general public). Private individuals or households."
Included in other SNA sectors	**Higher education:** "All universities, colleges of technology and other institutions of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of or administered by or associated with higher education institutions."
Rest of the world	**Abroad**

In the interests of coherence of its data with other South African economic survey data, the South African R&D survey takes care to use standards and methods applied or recommended by Statistics South Africa. Concepts and definitions are aligned as far as possible with those in use by the national statistical institute (Stats SA 2010a). Indicators that use external data are sourced from Stats SA surveys – gross domestic product values are the values for the 2012 annual reference period taken from the quarterly Stats SA GDP statistical release P0441 (Stats SA 2013), and employment level is the value for the first quarter of 2013 obtained from the Stats SA Quarterly Labour Force Survey statistical release P02111 (Stats SA 2014). The survey also uses the Standard Industrial Classification (Stats SA 2004) codes for business sector industrial classifications employed by Stats SA. Overall, HSRC-CeSTII performs quality management in line with practices recommended by Stats SA in the South African Statistical Quality Assessment Framework (SASQAF) (Stats SA 2010b). The survey was conducted according to a project plan aligned with the phases of the Statistical Value Chain (SVC) illustrated in Figure D.1, which is modelled on practice at Statistics SA.

FIGURE D.1: STATISTICAL VALUE CHAIN USED IN QUALITY AND METADATA MANAGEMENT



D.2. QUALITY INDICATORS OF SURVEY COVERAGE

A summary set of quality indicators for the collection and imputation phases of the survey processes in Table D.2 records an overall questionnaire response rate of 69.8%. There were relatively large increases in response rates in the business and not-for-profit sectors. This has been attributed to the improved quality of the sector frames. The comparatively low response rate for the government sector persisted in 2012/13.

The weighted response rate of 91.5% gives an estimate of the size of national R&D expenditure captured from responses alone; that is, excluding the proportion contributed by imputed units. The questionnaire response rate improved by 12.6 percentage points from the 2011/12 survey, resulting in an increase in the weighted response rate of 5%.

A partial reason for the relatively high number of out-of-scopes in the business, not-for-profit and government sectors may be attributed to the nature of the scope of R&D surveys conducted according to Frascati standards, where the units selected for surveying include likely R&D performers in addition to known R&D performers. The nature of R&D is such that there may be a very small number of projects active in the R&D-performing business unit of a firm. These projects typically last for around three years. Upon termination of the project, the R&D expenditure of a firm would thus be nought for a particular reference period, which with the existing CeSTII operational procedures would classify it as an out-of-scope unit, even though it might probably perform R&D again in the future.

Non-response[2] was defined as failure to obtain a measurement on one or more variables for one or more units selected for the survey. These include out-of-scope units.

Out-of-scope units are defined as units that should not be included in the survey frame because they did not belong to the target population in the reference period. Entities that returned a questionnaire stating nil in-house R&D expenditure for the survey reference period were counted as out-of-scope for the 2012/13 R&D survey.

In-scope[3] units were defined as units performing in-house R&D or with likely in-house R&D activity; units that indicated that no R&D had been performed during the 2012/13 period were classified as out-of-scope.

Questionnaire responses were defined as those units that were not classified as non-responses within the set of all questionnaires sent out. The questionnaire response rate was calculated using the following formula:

$$\text{QUESTIONNAIRE RESPONSE RATE} = \frac{\text{Responses}}{(\text{Response} + \text{Non-response}) - (\text{Out-of-scope})}$$

The *weighted response rate*[4] is a measure of the fraction of R&D collected from responses. It was calculated as

$$\text{WEIGHTED RESPONSE RATE} = \frac{\text{R\&D expenditure obtained from responses}}{\text{(R\&D expenditure from responses + unit imputations)}}$$

The *survey unit imputation rate* was defined as the number of eligible non-responding units that had all data imputed as a fraction of eligible units. It was calculated using the following formula:

$$\text{SURVEY UNIT IMPUTATION RATE} = \frac{\text{Unit imputations}}{\text{(Response + Non-response)- (Out-of-scope)}}$$

[2] Adapted from (Särndal, Swensson and Wretman 1992).

[3] This is the HSRC -CeSTII operational definition.

[4] This is also referred to as the GERD response in the Metadata Report.

TABLE D.2: QUALITY INDICATORS OF SURVEY COVERAGE BY SECTOR

Sector	Number of units investigated	Number of units selected	Non-response	Out-of-scope	Responses	Questionnaire response rate	Survey unit imputation rate	Weighted response rate
Business	909	534	143	36	324	75.2%	18.1%	89.3%
Not-for-profit	216	91	45	21	45	65.2%	1.4%	96.9%
Government	222	164	84	19	80	55.2%	3.4%	87.7%
Science councils	13	13	0	0	13	100.0%	0.0%	100.0%
Higher education	36	36	15	2	21	61.8%	14.7%	90.5%
Total	**1 396**	**838**	**288**	**79**	**483**	**69.8%**	**12.9%**	**91.5%**

D.3. FRAME, SAMPLE SELECTION AND FIELDWORK PERIODS

A set of three separate questionnaires was used for the survey. One questionnaire was designed for the business sector, another for the higher education sector, and a third one for government departments, research institutes, museums, science councils and not-for-profit organisations.

R&D performers in sectors were taken to be any units that had R&D expenditure, or were likely to have had R&D expenditure, in 2012/13. Table D.3 describes each of the sectors and provides their respective reference periods.

TABLE D.3: DESCRIPTION OF SECTORS, RESPECTIVE REFERENCE PERIODS, SAMPLING METHODS AND FIELDWORK PERIODS

Sector	Description	Reference period	Method of surveying	Fieldwork and follow-up period
Business	Business enterprises, including state-owned enterprises.	Financial year ending 28 February 2013 (or the closest complete financial year).	A purposive design was used for the survey of the business sector, and the frame was constructed from the business register developed and maintained by HSRC-CeSTII since 2002. All known and likely R&D performers were targeted.	15 September 2013 to 17 April 2014.
Not-for-profit	Non-governmental and other organisations formally registered as NPOs.	Financial year ending 28 February 2013 (or the closest complete financial year).	Non-governmental and other organisations formally registered as NPOs were surveyed through purposive sampling, similar to the approach adopted for the business sector.	15 September 2013 to 17 April 2014.
Government	National and provincial departments, local government, museums, research institutes and other research councils with an R&D component.	Financial (fiscal) year ending 31 March 2013.	Government departments were surveyed using a census approach. All national government departments, associated research institutions and museums performing R&D at national, provincial and local levels were included in the government sector.	15 September 2013 to 17 April 2014.
Science councils	The science councils established through Acts of Parliament.	Financial (fiscal) year ending 31 March 2013.	Eight statutory science councils were surveyed, using a census approach.	15 September 2013 to 17 April 2014.
Higher education	All public higher education institutions as well as private higher education institutions that performed R&D. Teaching hospitals were also included in this sector.	Calendar year (ending 31 December 2012).	Higher education institutions, namely universities, universities of science and technology, institutes of education and private higher education institutions were included in the higher education sector frame. All public higher education institutions were surveyed, using a census approach.	15 September 2013 to 17 April 2014.

For each sector, a list of R&D-performing units was identified from existing lists and intelligence-gathering operations. These units were verified as R&D performers to determine the units to be surveyed before collection began.

BUSINESS SECTOR

CeSTII developed a register of potential R&D performers in the business sector from several information sources, including the following lists: JSE Limited Top 100 Companies, Technology Top 100, Support Programme for Industrial Innovation (SPII) and Technology and Human Resources for Industry Programme. The 566 business sector units selected for surveying from the R&D business sector register compiled by CeSTII included 480 units that had indicated continued R&D activity in the 2011/12 survey. The difference between the 534 units selected and the actual number of units actually dispatched (467 units) was the result of three factors:

- Some new companies selected for dispatch, were later found to be non-R&D active and the questionnaires were not dispatched;
- Other units were found to be part of a group of companies and to avoid double counting, the questionnaires were not dispatched;
- Questionnaires to other units may not have been dispatched, because the confirmation of dispatch was not fully recorded.

SCIENCE COUNCILS SECTOR

Eight R&D-active science councils responded to the survey questionnaire. One of these eight science councils was surveyed at the level of its constituent units, resulting in a total of 13 reporting units surveyed in the science councils sector.

NOT-FOR-PROFIT SECTOR

There is an ongoing process of substantial improvement in coverage of the not-for-profit sector by investigating a comprehensive list of 17 324 NPOs. A total of 216 units were investigated for the 2012/13 survey, comprising units selected for the 2011/12 survey as well as a sample of units from the list. The NPO frame for the 2012/13 survey comprised a total of 91 units identified as likely R&D performers.

The set of responses contained two units that were new to the NPO frame, but had been surveyed in the business sector and higher education sectors in previous survey instances. These units contributed significantly to the estimates of the contribution of the NPO sector to R&D activity. The contribution of these changes in sector classifications was estimated as follows.

- R281.509 million (or 55.9%) increase of the overall R&D expenditure of the NPO sector expenditure equal to R503.833 million;
- One basis point increase in NPO sector R&D expenditure as a percentage of GDP and overall R&D intensity.

GOVERNMENT SECTOR

The government sector investigated a list of 222 units consisting of national and provincial departments, municipalities, research centres and museums, of which 164 units were selected by excluding the units that either confirmed they were not R&D performers or would not be performing any R&D for the three reference periods following 2012/13. Museums that had no line item for research in their budgets were not selected. One unit was added to the register.

HIGHER EDUCATION SECTOR

In the 2011/12 R&D survey, the survey frame for the higher education sector was increased to 37 by adding 13 private universities to the original frame of 24. The higher education institutions selected for the 2012/13 survey were the 36 units that were not out-of-scope in the 2011/12 survey. The sector consisted of 23 public institutions and 13 private institutions. The majority of the 13 private institutions surveyed did not respond to the survey, and some were identified as out-of-scope because they do not perform R&D.

D.4. FIELDWORK

The R&D data were collected by means of questionnaires that were sent to the units in each sector by surface and/or electronic mail.

A unit was considered as a response if it completed and returned a questionnaire with non-zero in-house R&D expenditure; if the unit's in-house R&D expenditure figure was reported by the respondent without a completed questionnaire; or if data were confirmed by the respondent after being imputed based on secondary data sources. The data sources used for imputation included previous R&D survey responses as well as other private and public data sources such as the Higher Education Management Information System (HEMIS) and Support Programme for Industrial Innovation (SPII).

D.5. IMPUTATION

Imputation is a procedure for entering a value for a specific data item where the response is missing or unusable.

The survey employed varying degrees of imputation, ranging from using a total R&D expenditure figure reported by the respondent (by e-mail or telephone), followed by imputing the remaining data items from available sector R&D profiles, to generating an R&D profile for a unit based on its known historical R&D profile adjusted by the GDP inflation factor, or using publicly available data on a unit's R&D. The imputation models were unchanged from those used in the 2011/12 survey. Details of the imputation methods are available on request. Financial data on R&D were adjusted by a GDP inflation factor of 8.146. Table D.4 presents survey imputation by the age of the data used.

TABLE D.4: NUMBER OF UNITS AND AGE OF DATA USED IN THE IMPUTATION MODELS BY SECTOR

Age of data	Business	NPO	Government	Science councils	Higher education
Imputed (data from current reference period)	0	0	1	0	0
Imputed (data from previous year)	0	0	0	0	0
Imputed (data more than one year old)	0	0	0	0	0
Commuted (data from previous year)	29	1	5	0	1
Commuted (data more than one year old)	49	0	0	0	4
Total	**78**	**1**	**6**	**0**	**5**

Individual fieldwork lists were interrogated, and non-respondents were identified for possible imputation towards the end of the survey period. Only units with evidence of on-going R&D activity qualified for imputation. Where it was not possible to obtain company confirmation, individual fieldworkers were responsible for providing evidence of on-going R&D activity to qualify units for imputation. All unit imputations were sent to companies for review, agreement or adjustment where necessary.

Personnel data for non-responding higher education institutions were imputed from personnel data obtained from HEMIS. R&D expenditure for these units was imputed from a mathematical model.

D.6. DATA PROCESSING AND ANALYSIS

Once the individual responses to the questionnaires, including summation and percentage calculations, had been checked by the relevant fieldworker, the data were manually entered on the Survey Management and Results System (SMRS). Data entries were then checked against the questionnaire/fieldwork notes used in the original capture of data on the SMRS as a second quality-control measure in the data-capturing process. Following data capture, automated discrepancy-checking calculations were applied to the data. Where anomalies were found, the responsible sector leader within the survey corrected the data to the required standard in consultation with the relevant respondent.

Data tables were drawn from the data in the form of outputs agreed upon by HSRC-CeSTII and the DST. These included time-series data that were added from previous surveys for the purpose of multi-year comparison.

Final data quality-control measures required that the formatted tables be analysed by HSRC-CeSTII researchers by cross-checking sectoral data items with corresponding aggregate data items or historic data. Where variability in data across the time series was observed, factors contributing to such variability were identified and checked by examining the unit-level data on the database to ensure that no anomalies had been missed in processing.

D.7. DISSEMINATION OF SURVEY RESULTS

The 2012/13 R&D survey reports will be disseminated to all respondents as well as to other users of the R&D statistics.

This report is available on request from HSRC-CeSTII and the DST. The report can be downloaded from the HSRC-CeSTII website http://www.hsrc.ac.za/en/departments/cestii/sa-national-survey-of-research-and-experimental-development) or the DST website (http://www.dst.gov.za/index.php/resource-center/rad-reports). Care is taken to ensure the confidentiality of respondent information, and the data presented in the report are therefore anonymised as far as possible.

D.8. STORAGE AND ARCHIVING OF SURVEY RESULTS

The data from the R&D survey series have been archived according to established HSRC-CeSTII procedures. Hard copies of the data from the two most recent surveys are kept in safe storage at HSRC-CeSTII, while the data from older surveys are kept in safe storage off site. All data are stored electronically on secure servers, and daily back-ups of databases are generated. In addition, as part of the HSRC's institutional objectives, the HSRC's Data Curation Unit, in consultation with HSRC-CeSTII, has completed the curation of data from the 2001/02 and 2003/04 to 2007/08 R&D surveys. The 2009/10 survey has been selected for curation in 2014.

E. REFERENCES

EC, IMF, OECD, UN and World Bank. 1993. *System of National Accounts 1993*. Brussels/Luxembourg, New York, Paris, Washington: Commission for the European Communities, International Monetary Fund, Organiation for Economic Cooperation and Development, United Nations and World Bank.

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Stats SA (Statistics South Africa). 2004. *Standard Industrial Classification*. [Online] Available at: http://www.statssa.gov.za/additional_services/sic/sic.htm. Accessed: 22 September 2011.

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NOTES

F. R&D SURVEY QUESTIONNAIRE

BUSINESS SECTOR

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

HSRC
Human Sciences
Research Council

Statistics South Africa

NATIONAL SURVEY OF RESEARCH & EXPERIMENTAL DEVELOPMENT (R&D) INPUTS 2012/13 FINANCIAL YEAR

BUSINESS ENTERPRISES

Company	Please modify address label if necessary

AUTHORITY

The Centre for Science, Technology and Innovation Indicators (CeSTII), within the Human Sciences Research Council (HSRC), conducts the National Survey of Inputs into Research and Experimental Development (R&D) for the Department of Science and Technology (DST). The Survey is conducted in terms of the Statistics Act No. 6 of 1999. Organisations are therefore legally required to respond by providing accurate data on R&D performance. All data gathered for this survey are confidential. Only the survey team have access to individual organisation data. The HSRC and DST will not disseminate any information identifiable with an organisation without their consent.

PURPOSE AND SCOPE OF SURVEY

The R&D survey collects data on the inputs into R&D activities performed IN-HOUSE in South Africa by all organisations (including Business, Government, Science Councils, Not-for Profit and Higher Education). The data is used for planning and monitoring purposes and to support decisions about strengthening South Africa's competitiveness. Previous survey results may be viewed at http://www.hsrc.ac.za/en/departments/cestii. This survey covers the Financial Year 1 March 2012 to 28 February 2013 (or your nearest complete financial year).

DUE DATE

Kindly complete and return this questionnaire by _____ to: R&D Survey, Private Bag X2, Vlaeberg 8018

PLEASE KEEP A COPY OF THIS QUESTIONNAIRE FOR YOUR RECORDS

ASSISTANCE

To assist you with queries kindly contact one of the survey manager(s):

Name	Contact Number	E-mail
Mr Saahier Parker	021 466 7814 / 082 928 7473	sparker@hsrc.ac.za
Mr Julien Rumbelow	021 466 7834	jrumbelow@hsrc.ac.za
Ms Nolitha Nkobole	021 466 7837	nnkobole@hsrc.ac.za
Ms Zandile Matshaya	021 466 7811	zmatshaya@hsrc.ac.za
Ms Isabel Basson	021 466 7830	ibasson@hsrc.ac.za

Dr Neo Molotja

Senior Research Specialist
nmolotja@hsrc.ac.za
Tel: 021 466 7818

DETAILS OF PERSON COMPLETING THE QUESTIONNAIRE:

Name (with title)	
Designation	
Date	
Sign	

Tel	
Fax	
Cell	
E-mail	

THE FOLLOWING DEFINITIONS ARE IMPORTANT IN THE COMPLETION OF THE SURVEY QUESTIONNAIRE: WHAT IS R&D?

DEFINITION

This survey follows the approach of the Organisation for Economic Co-operation and Development (OECD), which defines Research and Experimental Development (R&D) as:

- Research is creative work and original investigation undertaken on a systematic basis to gain new knowledge, including knowledge of humanity, culture and society.

- Development is the application of research findings or other scientific knowledge for the creation of new or significantly improved products, services or processes.

The basic criterion for distinguishing R&D from related activities is the presence in R&D of an appreciable element of novelty and the resolution of scientific and/or technological uncertainty, i.e. when the solution to a problem is not readily apparent to someone familiar with the basic stock of commonly used knowledge and techniques in the area concerned.

EXAMPLES:

Investigating electrical conduction in crystals is basic research; application of crystallography to the properties of alloys is applied research.

New chip designs involve development.

Investigating the limiting factors in chip element placement lies at the border between basic and applied research, and increasingly involves nanotechnology.

Much services R&D involves software development where the completion of the project is dependent on a scientific or technological advance and the aim of the project is the systematic resolution of a scientific or technological uncertainty.

SCOPE OF SURVEY

- The survey requests data on R&D performed IN-HOUSE by your organisation on the national territory of South Africa.
- Part five asks some questions on "out-sourced R&D"

R&D INCLUDES – BUT IS NOT LIMITED TO:

Activities of personnel who are obviously engaged in R&D. In addition include:

- The provision of professional, technical, administrative or clerical support and/or assistance to personnel directly engaged in R&D
- Management of personnel who are either directly engaged in R&D or are providing professional, technical or clerical support to those performing R&D
- Software development where the aim of the project is the systematic resolution of a scientific or technological uncertainty
- Research work in the biological, physical and social sciences, and the humanities
- Social science research including economic, cultural, educational, psychological and sociological research
- Research work in engineering and the medical sciences
- R&D projects performed for other parties
- "Feedback R&D" directed at solving problems occurring beyond the original R&D phase, for example technical problems arising during initial production runs.

R&D EXCLUDES:

The following ROUTINE activities are excluded , except where they are an essential part of in-house R&D activity:

- Scientific and technical information services
- Engineering and technical services
- General purpose or routine data collection
- Standardisation and routine testing
- Feasibility studies (except into R&D projects)
- Specialised routine medical care, for example routine pathology services
- The commercial, legal and administrative aspects of patenting, copyrighting or licensing activities
- Routine computer programming, systems work or software maintenance where there are no technological uncertainties to be resolved.

PART 1: GENERAL INFORMATION

1a. Registered name of company

1b. Trading as (if applicable)

2a. If you are reporting R&D for subsidiary companies (e.g. as a head office with several subsidiary companies), please list the companies below (append a page if required).

2b. List the principal activities and/or Standard Industrial Classification (SIC) code (see Appendix A in codes book) from which your company derives its main income.

Activities	SIC	Company Income Obtained (%)
		(%)
		(%)
		(%)
	Must sum to 100%	(%)

3. Parent Company (if applicable) with % ownership (%)

3.a Is this company a state owned enterprise (SOE) YES NO

Definition: SOE are public corporations owned by government units mainly engaged in market production and sale of the kind of goods and services often produced by private enterprises.

4. Approximate foreign/local ownership split
(By ultimate ownership if complex holding structures exist)

South Africa	
Rest of Africa	
Europe	
USA	
China	
Rest of Asia	
Other	

5. Financial year (dd/mm/yyyy) for which you are reporting in this survey

From	To

6. Total number of all employees
(include staff on contract for six months or longer)

7.	Gross Sales Revenue or Turnover (R'000 Excl. VAT)				
8.	Did the company make use of the enhanced tax allowance for R&D in its annual return to SARS?	YES		NO	
	If YES state the date of the Annual Return (mm/yy)				
8b.	Did the company perform any IN-HOUSE R&D in South Africa during the 2012/13 financial year? Please tick as appropriate	YES		NO	

Do you think your organisation will perform in-house R&D in the future?

Please tick	2013-2014	2014-2015	2015-2016
YES			
NO			

8c. Did your company Outsource R&D during the 2012/13 financial year?

YES		**Proceed to Part 5: Question 21 and 22 on Outsourced R&D**

Thank you for providing "General Information" on your company (part 1).

We now proceed with information on your In-House R&D (parts 2, 3 & 4)

If your company does not do any In-House and/or any Outsourced R&D, tick this box and return the questionnaire as a NIL response.

NO		**i.e. No in-house nor out-sourced R&D.**

PART 1: GENERAL INFORMATION

Report for all R&D personnel, permanent and contract (6 months or longer).

RESEARCHERS

Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the planning and management of the projects concerned.

TECHNICIANS DIRECTLY SUPPORTING R&D

Persons doing technical tasks in support of R&D, normally under the direction and supervision of a Researcher.

OTHER PERSONNEL DIRECTLY SUPPORTING R&D

Other supporting staff includes skilled and unskilled crafts persons, secretarial and clerical staff participating in R&D projects or directly associated with such Projects.

NOTE: Do not include personnel indirectly supporting R&D: Typical examples are transportation, storage, cleaning, repair, maintenance and security activities, as well as administration and clerical activities undertaken not exclusively for R&D (such as the activities of central finance and personnel departments).

Allowance for these should be made under overheads in R&D expenditure (current expenditure – Question 11 D) but such persons should not be included as R&D Personnel.

9. HEADCOUNT OF R&D PERSONNEL

PERSONNEL CATEGORIES AND HIGHEST QUALIFICATION	African		Coloured		Indian		White		Subtotal		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
RESEARCHERS (INCL. RESEARCH EXECUTIVES & RESEARCH MANAGERS)												
Doctorates												
Masters/Hons/Bachelors or equivalent												
Diplomas and other qualifications												
RESEARCHER TOTAL												
Technicians /Technologists directly supporting R&D												
Doctorates												
Masters/Hons/Bachelors or equivalent												
Diplomas and other qualifications												
TECHNICIAN TOTAL												
Other personnel directly supporting R&D												
Doctorates												
Masters/Hons/Bachelors or equivalent												
Diplomas and other qualifications												
TECHNICIAN TOTAL												

Carry subtotals over to Q 10

10. HEADCOUNTS, FULL-TIME EQUIVALENTS (FTEs) AND LABOUR COST OF R&D PERSONNEL

Provide an estimate of Person Years of effort on R & D (or Full Time Equivalents), according to the categories below.

CALCULATING 'FULL TIME EQUIVALENT' (FTE) PERSONS

Note: For the purpose of this survey, an employee can work a maximum of 1 FTE in a year.
The following equation can be used to calculate person years of effort on R&D:
(Full time equivalent) x (Portion of the year the person spent on R&D) x (Portion of their job spent on R&D) = Person years of effort on R&D

For example:

-a **full time** employee who devotes **100%** of their time to R&D
1 x 1 x 1 = 1 person years on R&D
-a **full time** employee spending **40%** of his/her time on R&D during half of the survey year:
1 x 0.4 persons x 0.5 years = 0.2 person years of R&D effort
-a **part-time** employee working **40%** of a full time year doing only R&D
0.4 x 1x 1= 0.4 FTE to the R&D effort.
-20 **fulltime** male researchers spending **40%** of their time on R&D during the survey year:
20 x 0.4 x 1 = 8

NOTE: please calculate FTE's for all R&D personnel

R&D Personnel Categories	Headcounts (From Q9)			Total Full Time Equivalents (FTE's)			Average annual labour cost per person R'000 (Excl. VAT) (B)	Calculated labour cost of R&D R'000 (Excl. VAT) (A x B
	M	F	Total	M	F	Total (A)		
Researchers (incl. Research Executives & Research Managers)								
Technicians directly supporting R&D								
Other personnel directly supporting R&D								
TOTAL LABOUR COST OF R&D								

Carry over total calculated labour cost of R&D personnel to Question 11C

PART 3: IN-HOUSE R&D EXPENDITURE

11. ALLOCATE IN-HOUSE R&D EXPENDITURE AS FOLLOWS

CAPITAL EXPENDITURE ON R&D

• The full value of capital expenditure must be reported in the year of purchase (do not depreciate). • If the asset has been/will be used for more than one activity, include an estimate of the portion used for R&D.	
Including - but not limited to: • Expenditure on fixed assets used in the R&D projects of your business. • Acquisition of software for R&D, including fees, expected to be used for more than one year. • Purchase of databases expected to be used for more than one year. • Major repairs & improvements on land & buildings used for R&D.	**Excluding:** • R&D activities where the research project is carried out elsewhere by others on behalf of your business. • Payments for purchases of technical know-how. • Payments for patent searches. • Depreciation provisions.

		R'000 (Excl. VAT)
Other Current Expenditure	D	

		R'000 (Excl. VAT)
TOTAL R&D EXPENDITURE (A + B + C + D = E)	E	

ESTIMATED FUTURE R&D EXPENDITURE:

12. Please estimate future in-house R&D expenditure:

CAPITAL EXPENDITURE ON R&D

In-House R&D (Report in R'000 Excl. VAT)	
2013/14	2014/15

13. SOURCES OF FUNDS OF IN-HOUSE R&D

Provide a breakdown of the total R&D expenditure (as reported in Question 11 according to sources of funds.

Company	R'000 (Excl. VAT)
Own funds	

Government (includes Science Councils e.g. CSIR, Departments and Institutes)

Grants (including SPII, Innovation Fund etc.)	
Contracts to perform R&D	

Other Local Businesses (including Trade Associations)

Contracts to perform R&D	

Other South African Sources

Not for Profit Organizations* (including Foundations)	
Individual Donations	
Higher Education	

Foreign

All sources	

Company	R'000 (Excl. VAT)
TOTAL R&D EXPENDITURE (to equal Question 11)	

*Non-profit organisations primarily serving households. Funding from non-profit organisations primarily serving by Business, Higher Education or Government should be allocated to these sectors.

14. FOREIGN SOURCES OF FUNDS (in R000's) FOR IN-HOUSE R&D

14a. If your organisation received no R&D funding from foreign sources kindly tick N/A here and move to question 15:

N/A	

14b. Kindly categorise Foreign R&D funding (from Question 13) by sector and region.

Foreign funding of R&D		SUB TOTAL (R000's) made up of							
	Category SUB-TOTAL	Africa (outside SA)	Middle East	Europe	USA / Canada	Central & South America	China	Rest of Asia	Other
Category	R								
Business*	R								
Not-for-Profit Organisations** / Individuals	R								
Foundations	R								
Government	R								
Higher Education	R								
TOTAL		TOTAL to correspond with Foreign funds in Q 13 above							

* Including affiliated company, trade associations (Affiliated denotes parent or subsidiary organisation)
** NPO's serving households only. Funding from non-profit organisations primarily serving by Business, Higher Education or Government should be allocated to these sectors.

15. PROVINCIAL EXPENDITURE ON R&D

Please state the location where your company carried out R&D activities and the percentage of the total R&D expenditure.

SPECIFY WHERE R&D IS ACTUALLY PERFORMED, RATHER THAN WHERE IT IS MANAGED/FINANCED FROM.

Eastern Cape	%	Mpumalanga	%
Free State	%	Northern Cape	%
Gauteng	%	North-West	%
KwaZulu-Natal	%	Western Cape	%
Limpopo	%	**TOTAL (must sum to 100%)**	**%**

PART 4: CATEGORIES OF IN-HOUSE R&D EXPENDITURE

16. IN-HOUSE R&D CURRENT EXPENDITURE BY TYPE OF R&D.

Specify the percentage of total IN-HOUSE LABOUR COSTS and OTHER CURRENT R&D expenditure by type of R&D.

Basic Research

• Work undertaken primarily to extend the boundaries of disciplinary knowledge. • The analysis of properties, structures and relationships with a view to formulating and testing hypotheses, theories or laws. • The results of basic research are usually published in peer-reviewed scientific journals.	Percentage	%

Applied Research

• Original investigation to acquire new knowledge with a specific application in view. • Activities that determine the possible uses for the findings of basic research. • The results of applied research are intended primarily to be valid for a single or limited number of products, operations, methods or systems. • Applied research develops ideas into operational form and may be published in peer-reviewed journals or subjected to other forms of intellectual property protection.	Percentage	%

Experimental Development

• Systematic work using existing knowledge for creating new or improved materials, products, processes or services, or improving substantially those already produced or installed.	Percentage	%

TOTAL	%

17. Classify R&D according to Standard Industrial Classification (SIC).
(See Appendix A in the codes book) with associated % expenditure)

SICs indicate the classification that best describes company R&D according to the intended use of the product.

SIC Codes		Percentage %
SIC		%
SIC		%
SIC		%
SIC		%
SIC		%

SIC Codes		Percentage %
SIC		%
SIC		%
SIC		%
SIC		%
SIC		%
	Total	%

18a. RESEARCH FIELD (RF)

Classify R&D according to Research Fields (RF) with associated % expenditure. (See Appendix B in the codes book.)

The RF Codes are based on recognised academic disciplines and emerging areas of study.

RF Codes		Percentage %
SIC		%
SIC		%
SIC		%
SIC		%
SIC		%

RF Codes		Percentage %
SIC		%
SIC		%
SIC		%
SIC		%
SIC		%
	Total	%

18b. MULTI-DISCIPLINARY R&D

Please estimate the percentage of R&D expenditure allocated to the following areas:

- Multi-disciplinary R&D combines several research fields or disciplines. If your organisation performs such R&D, as described below, please provide the applicable % of total R&D Expenditure.
- Note that the percentages will most likely not total 100%.

DEFINITIONS

Biotechnology is application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.

Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering and technology; nanotechnology involves imaging, measuring, modelling, and manipulating matter at this length scale.

Multidisciplinary Area of R&D	% of R&D expenditure
Biotechnology	%
Nanotechnology	%

No R&D in these areas (TICK if no such R&D is done)	

18c SPECIFIC AREAS OF R&D

Please estimate the percentage of R&D expenditure allocated to the following areas:

- National R&D strategies emphasise the importance of certain areas of R&D.
- Some of these areas are listed below. If your organisation performs R&D in these areas, please provide the applicable % of total R&D Expenditure.
- Note that the percentages will most likely not total 100%.

Specific Areas of Interest	% of R&D expenditure
Open-source software	%
New materials	%
Tuberculosis (TB), HIV/AIDS, Malaria	%
Environment / Environment related	%

No R&D in these areas (TICK if no such R&D is done)	

19. Classify R&D according to Socio-economic objectives with associated % expenditure.
(See Appendix C in codes book.)

The SEO classification provides an indication of the main beneficiary of your R&D activities.

SEO Codes		Percentage %
SIC		%
SIC		%
SIC		%
SIC		%
SIC		%

SEO Codes		Percentage %
SIC		%
SIC		%
SIC		%
SIC		%
SIC		%
	Total	%

20. COLLABORATIVE R&D

20a. Does your company collaborate on R&D with persons / organisation outside your own organisation?

YES		**Continue with Question 20.b**

NO		**Go to question 21**

20b. With whom is R&D conducted in partnerships, alliances or collaboration?

Note: In the table below a single collaborative R&D project with several partners may be ticked in several places. Collaborative R&D may be in-house or out-sourced. R&D collaboration can occur without expenditure – please note zero expenditure in such cases.

(Tick as appropriate)	South Africa	Foreign
Higher Education Institutions		
Science Councils		
(e.g. CSIR, Mintek, MRC, ARC etc.)		
Government Research Institutes		
Members of own organisation / Affiliated* organisations		
Other Companies (including specialist consultants, business and trade associations)		
Not-for-profit organisations**		
NO COLLABORATION		
	R 000s Excl VAT	R 000s Excl VAT
TOTAL (in-house & outsourced) R&D Collaboration expenditure		

Foreign consisting of . . . (tick as appropriate)							
Africa (outside SA)	Middle East	Europe	USA / Canada	Central & South America	China	Rest of Asia	Other)

* Affiliated denotes parent or subsidiary organisation

** NPOs serving households only. Funding from non-profit organisations primarily serving by Business, Higher Education or Government should be allocated to these sectors

PART 5: R&D OUTSOURCED / CONTRACTED OUT

Outsourced R&D refers to:
- Outsourced or extramural expenditures being the amounts a reporting unit paid or committed to pay to another organisation for the performance of R&D during a specific period.
- This includes acquisition of R&D performed by and/or grants given to other organisations for performing R&D

21. State value of R&D outsourced inside South Africa.	R'000 (Excl. VAT)

21a. Please indicate the name of the organisation(s) that conducted the outsourced R&D with the associated expenditure inside South Africa.

Outsourced to:	Approximate Value R'000s (excl. VAT)

22. State value of R&D outsourced outside South Africa. R'000 (Excl. VAT)	R'000 (Excl. VAT)

22a. If you have indicated R&D outsourced to outside South Africa in question 22, kindly provide the sector and geographic location of this outsourced R&D expenditure.

		SUB TOTAL (R000's) made up of:							
Category	Category SUB-TOTAL	Africa (outside SA)	Middle East	Europe	USA / Canada	Central & South America	China	Rest of Asia	(Other)
Business	R								
Not-for-Profit Organisations / Individuals	R								
Foundations	R								
Government	R								
Higher Education	R								
TOTAL	R								

THANK YOU FOR YOUR TIME AND EFFORT Respondent feedback: Respondents may use this section to provide general feedback or data notes to the survey team:

G. USER SATISFACTION SURVEY: R&D STATISTICAL REPORT

In order to improve the quality and relevance of the R&D statistics, it would be useful to receive the views of users of this publication. It would therefore be appreciated if you could complete the following questionnaire and return by fax to +27 (0)21 461 1255 or by e-mail to RnDSurvey@hsrc.ac.za.

1. Name and address of respondent:

Name and title	
Designation/occupation	
Name and address of organisation or enterprise.	

2. Which of the following describes yourarea of work? Mark with 'X'.

Government		International organisation	
Private enterprise		Media	
Public enterprise		Not-for-profit organisation	
Academic or research institution		Other, specify	

3. In which country do you work?

4. What is your assessment of the contents of this publication?

Excellent ☐ Good ☐ Average ☐ Satisfactory ☐ Poor ☐

5. How useful is this publication for your work?

Extremely useful ☐ Very useful ☐ Useful ☐ Partly useful ☐ Not at all useful ☐

6. How accurate is the picture of R&D in your sector or research field/s as presented in this publication?

Very accurate ☐ Fairly accurate ☐ Not very accurate ☐ Partly useful ☐ Not at all accurate ☐

7. How easy was it to find specific information that you required in the publication?

Extremely easy ☐ Very easy ☐ Easy ☐ Not very easy ☐ Not at all easy ☐

8. What information (i.e. tables, text or figures) were of most interest to you? Please be as specific as possible e.g. provide table, page or figure numbers.

9. What did you like best about the publication?

10. Provide any comments or recommendations for the improvement of the publication.

THANK YOU FOR COMPLETING THE SURVEY

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