

# STATISTICAL REPORT 2013/14

SOUTH AFRICAN NATIONAL SURVEY OF  
RESEARCH AND EXPERIMENTAL DEVELOPMENT



**science  
& technology**

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA



**HSRC**  
Human Sciences  
Research Council



# NOTIFICATIONS

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THIS REPORT WAS PRODUCED BY THE CENTRE FOR SCIENCE, TECHNOLOGY AND INNOVATION INDICATORS (CESTII) ON BEHALF OF THE DEPARTMENT OF SCIENCE AND TECHNOLOGY (DST).

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## DISSEMINATION

This report may be downloaded free of charge from the following links.

<http://www.dst.gov.za/index.php/resource-center/rad-reports>

<http://www.hsrc.ac.za/en/departments/cestii/sa-national-survey-of-research-and-experimental-development>

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## USER FEEDBACK

A User Satisfaction Survey (USS) questionnaire is included as section 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 [CeSTIIData@hsrc.ac.za](mailto:CeSTIIData@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.

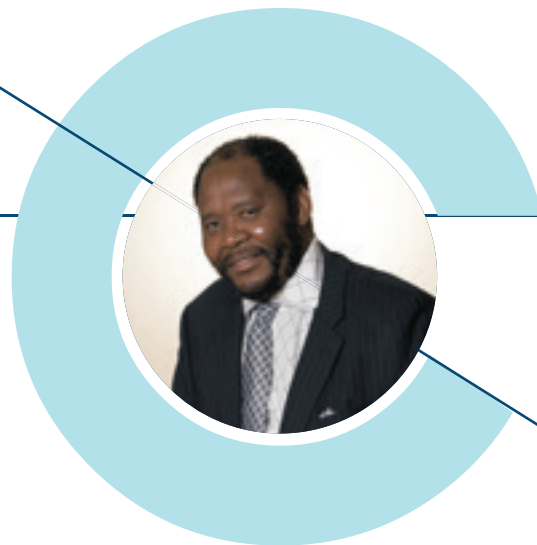
## CESTII PROJECT TEAM

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

Isabel Basson, Mario Clayford, Takura Kupamupindi, Natalie le Roux, Kesewaa Koranteng, Neo Molotja, Precious Mudavanhu, Nazeem Mustapha, Saahier Parker, Natasha Saunders, Ronel Sewpaul, Moses Sithole, Natalie Vlotman and Darryn Whisgary.

# FOREWORD

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The Statistics Act (No. 6 of 1999) empowers the Statistician General to lead and coordinate statistical production and usage in South Africa. This provision enables an arrangement whereby the Department of Science and Technology (DST) has coordinated the production of Research and Experimental Development (R&D) survey as a partner within the South African National Statistics System (SANSS) for more than a decade. The survey contributes to a body of official statistics that helps to report the country's progress in R&D as a critical aspect for development and change, both in South Africa and in the global context.

Two important developments are reflected in the 2013/14 R&D survey. Firstly, the series headline indicator of Gross Expenditure on Research and Development as a percentage of Gross Domestic Product (GERD/GDP) has been revised as a way to incorporate the benchmarking of GDP that was announced in November 2014. This has led to a downward adjustment of the GERD/GDP trend going back in 1993/94.

Secondly, the work has begun in South Africa to treat R&D as part of the capital formation when compiling national Gross Domestic Product (GDP). This requires even stricter coherence of R&D data with other economic statistics. Specific adjustments in classification of certain activities, data reference periods and publication timelines are being considered in order to adhere to this requirement.

The survey is subject to an ongoing quality assessment in terms of the South African Statistical Quality Assessment Framework (SASQAF) to ensure that it remains credible and fit for purpose. The 2013/14 R&D survey achieved an overall response rate of 86.9%. This is an improvement compared to previous rounds of this survey. Important work lies ahead to further expand the universe targeted for the business sector in the survey.

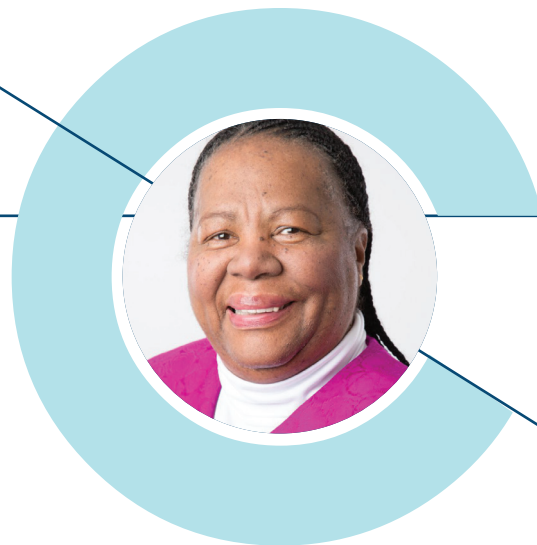
Given my assessment, I endorse the 2013/14 R&D Survey results and encourage its use by stakeholders across all sectors.

A handwritten signature in black ink, appearing to read 'Pali J. Lehohla'.

**Dr Pali J Lehohla**  
Statistician General, Republic of South Africa

# PREFACE

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Since the adoption of a policy target for increasing research and development (R&D) expenditure – to 1,5% of GDP – within the Medium Term Strategic Framework (2014-2019), there has been an increased focus within government on ways to stimulate R&D investment across all sectors.

The annual R&D survey helps this process by providing evidence about the size, growth and composition of R&D expenditure and human capital devoted to R&D. This assists in monitoring the country's performance against set targets and also helps us understand how the R&D system is changing over time.

The 2013/14 R&D survey shows that gross expenditure on research and development (GERD) has increased in nominal terms in South Africa for the third consecutive year after the contraction in the 2009/10 and 2010/11 survey years. This is an indication that the R&D expenditure trend has stabilised. These trends reflect the general pattern of domestic economic growth and track the global trend in R&D expenditure.

While the results show an improving outlook for R&D investment in the country, the magnitude of annual real increases in GERD still appear inadequate. Increases did not keep pace with the real GDP growth over the four years 2010 to 2013, this is why R&D intensity has remained constant at 0.73%. From a policy view, R&D should expand at a faster rate than economic growth if South Africa is to significantly improve its competitiveness.

I extend my appreciation, on behalf of the Department of Science and Technology, to the Centre for Science, Technology and Innovation Indicators (CeSTII) for their efforts in conducting this survey each year, and to Statistics South Africa for facilitating the process of assessing 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.

A handwritten signature in black ink that reads "Naledi Pandor". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

*GNM Pandor, MP*

Minister of Science and Technology

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# ACKNOWLEDGEMENTS

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The South African National Survey of Research and Experimental Development is conducted annually by HSRC-CeSTII on behalf of the DST.

The project team extends its appreciation to Dr Phil Mjwara, Director-General of the DST, Prof. Olive Shisana, CEO of the HSRC, Dr Temba Masilela, Deputy CEO: Research, HSRC, and Mr Pali Lehohla, Statistician-General, for their support of the R&D survey. We further acknowledge the contributions of administrative and ICT support staff Farzanah Frieslaar, Noor Fakier and Siphamandla Bidli.

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 DST and Statistics South Africa teams as well as the Clearance Committee for Science, Technology and Innovation Statistical Reports and input of an independent external expert are appreciated. Interactions with the OECD Working Party of National Experts on Science and Technology Indicators (NESTI) continue to be invaluable in maintaining and improving the quality and standard of the South African R&D surveys and analysis of the results.

*We are most grateful for and acknowledge the cooperation of the respondents to the questionnaire.*

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# LIST OF ABBREVIATIONS

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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 & DESCRIPTIONS

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**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 2010 Rands** is the value of goods and services of a given year using the prices of a determined base reference year, which is 2010 in this case. These values were obtained by deflating with the GDP deflator using data published in the Statistics South Africa GDP survey P0441, 3<sup>rd</sup> Quarter 2013 (Stats SA 2014a).

**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)** refers to the number of hours (person-years of effort) spent on R&D activities.

**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, 3<sup>rd</sup> Quarter 2014 (Stats SA, 2014a).

**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.

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**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** refers to gross expenditure on R&D as a percentage of GDP and represents 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).

**Environmental R&D** refers to research and development expenditures which are targeted to a great extent toward identifying more efficient means of addressing environmental problems.

**Year-on-year changes** are calculated as follows:  $\text{Current year's figure} - \text{previous year's figure} / \text{previous year's figure} \times 100\%$ .



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# [A] INTRODUCTION

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This Statistical Report presents data tables from the 2013/14 South African National Survey of Research and Experimental Development (R&D survey) with commentary, standard summary tables of the overall findings from 2013/14 along with time series from nine 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 satisfy national data needs and, at the same time, 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).

## THE UNIVERSE OF R&D PERFORMERS SECTORS:

- **The business enterprise sector**, comprising large, medium and small enterprises, including state owned enterprises.
- **The government sector**, comprising departments in the three tiers of national, provincial and local government with an R&D component, government research institutions and museums.
- **The higher education sector**, comprising all public higher education institutions and one private higher education institution with an R&D component.
- **The not-for-profit sector**, comprising non-governmental and other organisations formally registered as not-for-profit institutions.
- **The science council sector**, comprising the nine science councils established through Acts of Parliament.

The survey generates key data on human resources and expenditure devoted to R&D. R&D statistics are presented in tables according to the following categories:

- Gross domestic expenditure on research and development (GERD).
- R&D expenditure by R&D-performing sectors.
- Sources and flows of funding for R&D.
- R&D expenditure by field of research and socio-economic objective, and by industrial sector in the business sector.
- R&D expenditure in multidisciplinary and selected areas of policy interest, namely biotechnology, nanotechnology, environment-related, open-source software, new materials, and tuberculosis (TB), HIV/AIDS and malaria research.
- R&D personnel by occupation (researchers, technicians and support staff) and full-time equivalents (FTEs).

The description of the survey methodology is contained in section D, and the business sector questionnaire for the 2013/14 survey in section F.

The current survey has incorporated two important developments in the broader environment of R&D measurement. Firstly, it incorporates the revisions and rebasing of the Gross Domestic Product (GDP) that was announced by Statistics South Africa (Stats SA) in November 2014. In the current report, real GERD values are computed on the basis of 2010 Rand values. The headline indicator of GERD/GDP has been recalculated on the basis of the new GDP series. Headline indicators that have been published in previous series of this survey have therefore been revised. Secondly, the classification of main institutional sectors recommended in the System of National Accounts (EC, IMF, OECD, UN and World Bank, 2009) is indicated in terms of those used in the Frascati Manual (OECD, 2002). This is only used indicatively in this report to assist users of data for R&D capitalisation purposes. Full implementation of this procedure will be done once the changes published in the 7th edition of the Frascati Manual have been finalised.

# [B] KEY FINDINGS FOR 2013/14

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## GERD INCREASED BY 1.4% IN REAL TERMS BETWEEN 2012/13 AND 2013/14

- South Africa's gross expenditure on research and experimental development (GERD) amounted to R25.661 billion at current Rand value in 2013/14, a nominal increase of 7.5% from R23.871 billion recorded in 2012/13. This is the third consecutive year that GERD has increased in nominal terms after the downswing in 2009/10 and 2010/11.
- At constant 2010 Rand values, GERD amounted to R21.515 billion, which is an increase of 1.4% from the R21.213 billion recorded in 2012/13.<sup>1</sup>

## GERD AS A PERCENTAGE OF GDP REMAINED UNCHANGED AT 0.73%

- After incorporating the revision of GDP by Statistics South Africa (Stats SA, 2014a), GERD as a percentage of GDP remained unchanged at 0.73% from its revised value in 2012/13, despite the nominal increase in GERD.<sup>2</sup>
- The upward revision of the GDP series resulted in generally lower values of GERD/GDP calculated all the way back to 1993/94.

## GERD INCREASED FOR ALL THE SECTORS EXCEPT HIGHER EDUCATION

- The business sector was the largest performer of R&D in 2013/14, with expenditure amounting to 45.9% of GERD, which represented an increase of 5.2% between 2012/13 and 2013/14. This is the first year since 2008/09 that the business sector has shown a positive year-on-year change in R&D expenditure since 2008/09, albeit off a low base that may be compared with the level of business expenditure on R&D last recorded in 2003/04. The largest increase in business-funded R&D since before 2009/10 also occurred in 2013/14.
- The higher education sector accounted for 28.4% of GERD, although this represented a decrease of 0.5% (about R40 million) from the expenditure in this sector in 2012/13. This is significant because the HEI sector accounts for the second highest R&D expenditure. Expenditure on R&D by science councils accounted for 16.8% of GERD, followed by government at 6.6%, while the R&D expenditure recorded for not-for-profit organisations increased by 12.9%.

1. The GDP deflator values of 119.2663535 for 2013 and 112.5306674 for 2012, derived from the rebased GDP values provided by Stats SA published in November 2014 (Stats SA, 2014a) were used to calculate constant 2010 prices and year-on-year changes.

2. The methodological notes in section D describe the effect of GDP revisions on R&D indicators.



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## THE BUSINESS SECTOR (WHICH INCLUDED STATE OWNED ENTERPRISES) HAS INCREASED ITS FUNDING FOR R&D ALMOST TO THE LEVEL OF GOVERNMENT'S CONTRIBUTION

- The government and business sectors were the largest funders of R&D in South Africa in 2013/14, funding 42.9% and 41.4% respectively. There are shifts in these funding patterns compared to 2012/13 due to a relatively larger increase in R&D funding by the business sector. R&D activities funded by the business sector increased nominally from R9.152 billion to R10.616 billion, which represented an increase in constant 2010 Rand values of 9.4% from 2012/13 to 2013/14. On the other hand, government-funded R&D, in constant 2010 Rand values, decreased by 4.1% from 2012/13 to 2013/14.
- Higher education continued to receive the largest share of government-funded R&D at 48.8% (R5.369 billion), followed by government institutions including science councils, which received 44.1% (R4.849 billion). Government funding of R&D in the business and not-for-profit sectors was at 6.2% (R686 million) and 0.9% (R103 million) respectively.
- The business sector (which included state owned enterprises) funded 80.5% of its own R&D activities.

## HEADCOUNT R&D PERSONNEL INCREASED BY 6.0%

- R&D personnel increased by 3 921 headcounts (or 6.0%) from 64 917 in 2012/13 to 68 838 in 2013/14. This was driven mainly by an increase in headcounts of 3 259 in the higher education sector, of which 73.9% were doctoral students and post-doctoral fellows. The science council sector also contributed<sup>3</sup> to this increase in headcounts with 485 additional R&D personnel followed by the business sector with 444 additional R&D personnel and the not-for-profit sector with 111 additional R&D personnel. In the government sector, R&D personnel decreased by 378.
- Researchers, who are employed mainly in the higher education sector, accounted for 66.7% (45 935) of the total R&D workforce in 2013/14. Female researchers constituted 44.0% of the total researcher workforce, which was an increase of 8.0% from 2012/13.
- The number of full-time equivalent (FTE) researchers per 1 000 in total employment increased from 1.5 in 2012/13 to 1.6 in 2013/14. This was due to a relatively larger increase in FTE researchers of 9.2% compared to previous years, combined with a relatively small increase in total employment in South Africa of 3.4%.

3. Two science councils provided personnel data that may be overestimates.



# [TABLE B.1]

## SUMMARY OF KEY STATISTICS AND INDICATORS (2011/12 TO 2013/14)

KEY INDICATOR	2011/12	2012/13	2013/14
<b>Expenditure on R&amp;D</b>			
Gross domestic expenditure on R&D (GERD) (Rm)	22 209	23 871	25 661
Business enterprise expenditure on R&D (BERD) (Rm)	10 464	10 571	11 783
Not-for-profit (NPO) expenditure on R&D (Rm)	171	504	583
Government expenditure on R&D (GOVERD) (Rm)	1 236	1 438	1 697
Science councils (SCI) expenditure on R&D (Rm)	3 730	4 026	4 305
Expenditure on R&D in the higher education sector (HERD) (Rm)	6 609	7 333	7 293
Gross domestic expenditure on R&D in constant 2010 prices (Rm)	20 824	21 213	21 515
<b>Funding sources</b>			
Government funded* R&D (Rm)	9 562	10 832	11 007
Business funded R&D (Rm)	8 633	9 152	10 616
Foreign funding of R&D (Rm)	3 331	3 117	3 315
<b>R&amp;D personnel</b>			
Total R&D personnel (headcounts)	59 487	64 917	68 838
Total R&D personnel (FTE**)	30 978.4	35 050.3	37 956.5
Total researchers# (headcounts)	40 653	42 828	45 935
Total researchers# (FTE**)	20 115.1	21 382.4	23 346.0
Female researchers# (headcounts)	17 184	18 724	20 231
<b>Indicators computed from the R&amp;D survey</b>			
GERD as a percentage of GDP (%)	0.73	0.73	0.73
Civil GERD as a percentage of GDP (%)	0.70	0.69	0.69
Basic research (R millions)	5 440	6 031	6 102
Total R&D personnel (FTE**) per 1 000 in total employment	2.3	2.4	2.5
Total researchers# (FTE**) per 1 000 in total employment	1.5	1.5	1.6
Female researchers# as a percentage of total researchers (headcounts) (%)	42.3	43.7	44.0
<b>Indicators obtained from external data sources</b>			
Gross domestic product level at current prices (Rm)	3 024 950	3 262 542	3 534 326
GDP (%)	3.2	2.2	2.2
SA employment ('000)	13 497	14 558	15 055

Note: Financial quantities are in current values, unless otherwise indicated. GDP was revised and rebased to 2010 values by Stats SA in 2014. The revised GDP values were obtained from the GDP statistical release P0441 (Stats SA, 2014), and the total employment level was 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 includes doctoral students and post-doctoral fellows.

## R&D personnel include doctoral students and post-doctoral fellows.

# COMMENTARY

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## NOTABLE DEVELOPMENTS IMPACTING ON KEY INDICATORS

- The 2013/14 R&D survey has incorporated the revisions and rebasing of the GDP that was announced by Statistics South Africa (Stats SA) in November 2014. In this report, real GERD values are computed on the basis of 2010 Rand values. The headline indicator of GERD/GDP has been recalculated on the basis of the new GDP series.
- GERD as a percentage of GDP remained unchanged because the real growth in GERD of 1.4% in 2013/14 did not keep pace with GDP growth of 2.2% in 2013.
- The increase in BERD comes a year after the correspondingly large increase in R&D personnel between 2011/12 and 2012/13.
- As in 2012/13, the largest R&D expenditure within the business sector in 2013/14 – amounting to R4.724 billion – was recorded in the financial intermediation, real estate and business services sector. The next-largest sectors in terms of R&D expenditure were the manufacturing sector at R3.793 billion, and the mining and quarrying sector at R1.675 billion. Before 2011/12, the manufacturing sector was the largest contributor to business R&D expenditure, but its contribution has been declining since 2007/08.
- The increase of 0.1 in both FTE researchers and total R&D personnel per 1000 in total employment was due to a relatively large increase in FTE researchers of 9.2%, combined with a relatively small increase in SA employment of 3.4%.
- Foreign funding of R&D increased nominally from R3.117 billion to R3.315 billion (or 12.9% of total funding of R&D) between 2012/13 and 2013/14, which was an increase of 0.4% in constant 2010 Rand values. The business sector received 37.0% of this foreign funding, and higher education institutions received 31.4%.
- Applied research, driven largely by the business sector and science councils, has been increasing relative to experimental and basic research since 2009/10.

# [C] TABLES

## NOTES:

- Following the revision and rebasing of GDP to 2010 values by Statistics South Africa (Stats SA, 2014a), revised GDP values were used to calculate R&D expenditures as a percentage of GDP. Implications of the GDP revisions and rebasing are explained under section D: Methodological Notes (Revision of indicators of R&D expenditure).
- Estimates of R&D expenditure, headcounts and full-time equivalent personnel in the science council sector are higher than expected in 2013/14 due to two institutions overestimating headcount and full-time equivalent personnel counts.
- Totals in the tables may not add up to the sum of their constituent items due to rounding effects.
- Data from 2001/02 onwards may be downloaded from

<http://www.dst.gov.za/index.php/resource-center/rad-reports> and

<http://www.hsrc.ac.za/en/departments/cestii/sa-national-survey-of-research-and-experimental-development>.

## C.1. GENERAL SURVEY RESULTS

### C.1.1. EXPENDITURE ON RESEARCH AND EXPERIMENTAL DEVELOPMENT

**Table C.1: R&D expenditure by sector (2004/05 to 2013/14)**

Year	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
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
2013/14	25 660 573	1 697 151	4 304 556	7 292 853	11 782 848	583 165

*Note: The NPO sector in 2012/13 experienced greatly improved coverage contributing an additional 1.2% of GERD.*

**Table C.2: R&D expenditure in constant 2010 rand values by sector (2004/05 to 2013/14)**

Year	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
2004/05	18 228 945	782 178	3 029 637	3 846 103	10 270 093	300 934
2005/06	20 366 188	1 215 761	3 025 720	3 932 707	11 865 959	326 041
2006/07	22 375 580	1 383 329	3 717 463	4 467 926	12 518 999	287 863
2007/08	23 173 761	1 436 413	3 591 152	4 506 664	13 361 804	277 729
2008/09	24 056 683	1 303 016	3 586 992	4 792 079	14 099 456	275 139
2009/10	22 285 512	1 135 087	3 677 697	5 425 204	11 846 692	200 833
2010/11	20 253 805	1 011 340	3 596 023	5 424 602	10 059 010	162 830
2011/12	20 824 028	1 158 602	3 497 064	6 197 006	9 811 392	159 965
2012/13	21 213 079	1 277 438	3 577 690	6 516 582	9 393 640	447 730
2013/14	21 515 350	1 422 992	3 609 196	6 114 761	9 879 440	488 960

Note: The GDP series that was revised and rebased to 2010 values by Statistics South Africa in 2014 (Stats SA, 2014a) was used to calculate real R&D expenditure.

**Table C.3: R&D expenditure composition by sector (2004/05 to 2013/14)**

Year	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
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
2013/14	6.6	16.8	28.4	45.9	2.3

**Table C.4: R&D expenditure as a percentage of GDP by sector (2004/05 to 2013/14)**

Year	GERD/GDP	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%	%
2004/05	0.81	0.03	0.14	0.17	0.46	0.01
2005/06	0.86	0.05	0.13	0.17	0.50	0.01
2006/07	0.90	0.06	0.15	0.18	0.50	0.01
2007/08	0.88	0.05	0.14	0.17	0.51	0.01
2008/09	0.89	0.05	0.13	0.18	0.52	0.01
2009/10	0.84	0.04	0.14	0.20	0.44	0.01
2010/11	0.74	0.04	0.13	0.20	0.37	0.01
2011/12	0.73	0.04	0.12	0.22	0.35	0.01
2012/13	0.73	0.04	0.12	0.22	0.32	0.02
2013/14	0.73	0.05	0.12	0.21	0.33	0.02

**Table C.5: R&D expenditure by type of research (2004/05 to 2013/14)**

Year	GERD	BASIC	APPLIED	EXPERIMENTAL DEVELOPMENT
	R'000	R'000	R'000	R'000
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
2013/14	25 660 573	6 102 085	12 132 211	7 426 277

**Table C.6: Proportional R&D expenditure by type of research (2004/05 to 2013/14)**

Year	BASIC	APPLIED	EXPERIMENTAL DEVELOPMENT
	%	%	%
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
2013/14	23.8	47.3	28.9

**Table C.7: R&D expenditure as a percentage of GDP by sector (2004/05 to 2013/14)**

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 POST-GRADUATE STUDENTS	OTHER CURRENT EXPENDITURE	SUBTOTAL: CURRENT EXPENDITURE
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
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
2013/14	25 660 573	529 575	1 857 913	2 387 488	13 304 413	1 224 611	8 744 061	23 273 085

**Table C.8: Proportional R&D expenditure by accounting category (2004/5 to 2013/14)**

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 POST-GRADUATE STUDENTS	OTHER CURRENT EXPENDITURE	SUBTOTAL: CAPITAL EXPENDITURE
	%	%	%	%	%	%	%
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
2013/14	2.1	7.2	9.3	51.8	4.8	34.1	90.7

**Table C.9: Expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

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
2013/14	25 660 573	1 266 325	664 139

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: Proportional expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

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
2013/14	4.9	2.6

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

**Table C.11: R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

Year	GERD	OPEN SOURCE SOFTWARE	TUBERCULOSIS (TB), HIV/AIDS, MALARIA	ENVIRONMENT / ENVIRONMENT RELATED	NEW MATERIALS
	R'000	R'000	R'000	R'000	R'000
2005/06	14 149 239	101 937	733 338	N/A	308 800
2006/07	16 520 584	192 786	934 760	N/A	336 970
2007/08	18 624 013	254 808	1 120 028	N/A	298 746
2008/09	21 041 046	218 289	1 616 410	N/A	514 242
2009/10	20 954 677	172 712	1 816 901	N/A	559 021
2010/11	20 253 805	157 790	2 052 521	N/A	722 167
2011/12	22 209 192	181 320	2 006 625	1 215 855	783 232
2012/13	23 871 219	211 264	2 478 422	1 051 035	1 327 832
2013/14	25 660 573	339 065	2 867 954	1 088 094	794 016

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: Proportional R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

YEAR	OPEN-SOURCE SOFTWARE	TUBERCULOSIS (TB), HIV/AIDS, MALARIA	ENVIRONMENT / ENVIRONMENT RELATED	NEW MATERIALS
	%	%	%	%
2005/06	0.7	5.2	N/A	2.2
2006/07	1.2	5.7	N/A	2.0
2007/08	1.4	6.0	N/A	1.6
2008/09	1.0	7.7	N/A	2.4
2009/10	0.8	8.7	N/A	2.7
2010/11	0.8	10.1	N/A	3.6
2011/12	0.8	9.0	5.5	3.5
2012/13	0.9	10.4	4.4	5.6
2013/14	1.3	11.2	4.2	3.1

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.13: R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	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	20 587 093
Mathematical sciences	205 285	291 122	315 773	341 624	397 512	414 234	530 693	636 153	634 658	627 017
Physical sciences	379 230	551 426	655 378	793 006	952 441	648 657	305 701	338 098	370 616	379 813
Chemical sciences	608 438	591 258	595 579	784 145	1 056 848	860 745	865 345	1 273 588	1 460 180	1 305 139
Earth sciences	266 185	365 771	426 950	524 133	563 619	402 949	403 848	409 212	499 210	498 427
Information, computer and communication technologies	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	1 994 502
Applied sciences and technologies	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	2 164 025
Engineering sciences	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	4 315 051
Biological sciences	583 545	705 410	798 835	723 280	744 144	800 435	1 326 076	1 350 716	1 555 035	1 578 516
Agricultural sciences	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	2 196 122
Medical and health sciences	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	4 668 417
Environmental sciences	201 042	194 867	216 710	222 514	248 625	229 186	352 139	439 719	587 113	611 007
Material sciences	191 841	246 125	284 530	365 813	306 828	254 092	109 551	166 411	155 379	192 199
Marine sciences	60 444	51 019	62 544	50 579	58 573	79 830	52 238	38 726	48 442	58 857
Division 2: Social sciences and humanities	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	5 073 480
Social sciences	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	4 489 054
Humanities	334 085	350 940	392 570	508 373	596 956	485 110	466 608	494 368	486 420	584 426
Total	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	25 660 573

**Table C.14: Proportional R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural sciences, technology and engineering	87.6	87.7	88.2	87.6	87.5	87.0	85.3	85.2	81.2	80.2
Mathematical sciences	1.7	2.1	1.9	1.8	1.9	2.0	2.6	2.9	2.7	2.4
Physical sciences	3.2	3.9	4.0	4.3	4.5	3.1	1.5	1.5	1.6	1.5
Chemical sciences	5.1	4.2	3.6	4.2	5.0	4.1	4.3	5.7	6.1	5.1
Earth sciences	2.2	2.6	2.6	2.8	2.7	1.9	2.0	1.8	2.1	1.9
Information, computer and communication technologies	12.8	13.2	14.0	14.0	13.1	15.6	13.9	12.8	8.4	7.8
Applied sciences and technologies	8.1	10.9	11.0	9.8	9.1	8.3	10.6	9.5	9.4	8.4
Engineering sciences	23.9	20.8	20.9	22.5	24.4	21.9	17.8	17.0	16.4	16.8
Biological sciences	4.9	5.0	4.8	3.9	3.5	3.8	6.5	6.1	6.5	6.2
Agricultural sciences	7.2	6.8	6.9	6.8	5.5	6.9	6.5	7.7	7.6	8.6
Medical and health sciences	14.8	14.8	15.1	14.0	14.9	16.7	17.1	17.2	17.2	18.2
Environmental sciences	1.7	1.4	1.3	1.2	1.2	1.1	1.7	2.0	2.5	2.4
Material sciences	1.6	1.7	1.7	2.0	1.5	1.2	0.5	0.7	0.7	0.7
Marine sciences	0.5	0.4	0.4	0.3	0.3	0.4	0.3	0.2	0.2	0.2
Division 2: Social sciences and humanities	12.4	12.3	11.8	12.4	12.5	13.0	14.7	14.8	18.8	19.8
Social sciences	9.7	9.8	9.4	9.7	9.6	10.7	12.4	12.6	16.8	17.5
Humanities	2.8	2.5	2.4	2.7	2.8	2.3	2.3	2.2	2.0	2.3
Total	100	100	100	100	100	100	100	100	100	100

**Table C.15: R&D expenditure by socio-economic objectives (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVES	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	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	1 386 428
Defence	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	1 386 248
Division 2: Economic development	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	14 166 615
Economic development unclassified	102 936	115 029	150 668	171 520	209 400	0	0	0	0	0
Plant production and plant primary products	526 775	731 188	792 487	931 733	853 243	1 055 316	1 045 114	1 137 706	1 218 852	1 739 038
Animal production and animal primary products	299 990	272 077	337 029	279 914	289 909	354 639	293 873	565 729	598 602	803 403
Mineral resources (excluding energy)	979 512	1 164 691	931 909	1 075 821	995 552	1 212 226	1 123 063	1 065 384	1 143 762	1 351 239
Energy resources	335 717	438 889	574 570	709 891	1 185 455	407 091	274 220	273 390	294 820	288 214
Energy supply	326 122	273 823	347 632	364 876	515 216	540 463	623 953	676 490	509 128	590 980
Manufacturing	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	2 608 207
Construction	454 608	745 634	937 406	1 150 733	1 461 157	521 289	311 897	392 439	426 960	450 907
Transport	422 968	438 848	515 262	595 065	704 404	924 183	905 571	984 225	992 504	1 115 027
Information and communication services	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	1 124 614
Commercial services	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	2 443 529
Economic framework	223 875	304 864	349 517	548 517	604 404	598 312	600 662	611 868	715 759	689 386
Natural resources	528 236	377 891	478 198	521 228	720 746	697 290	725 062	839 825	872 835	961 971
Division 3: Society	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	4 585 825
Society unclassified	102 936	115 029	150 668	171 520	209 400	0	0	0	0	0
Health	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	2 859 623
Education and training	382 553	382 105	418 971	389 138	465 475	458 060	442 181	554 462	672 473	882 976
Social development and community services	284 082	296 942	435 536	476 892	536 312	570 508	715 677	1 005 662	858 922	843 226
Division 4: Environment	575 026	604 769	711 134	854 997	1 006 106	992 840	735 909	905 570	979 981	861 976
Environment unclassified	34 312	38 343	50 223	57 173	69 800	0	0	0	0	0
Environmental knowledge	257 500	303 892	348 158	375 069	488 204	463 786	310 888	398 977	443 987	388 688
Environmental aspects of development	141 631	118 802	130 144	195 300	176 503	181 907	189 344	216 406	258 144	226 299
Environmental and other aspects	141 583	143 732	182 609	227 455	271 599	347 147	235 677	290 186	277 849	246 989
Division 5: Advancement of knowledge	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	4 659 729
Advancement of knowledge unclassified	102 936	115 029	150 668	171 520	209 400	0	0	0	0	0
Natural sciences, technologies and engineering	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	3 407 325
Social sciences and humanities	395 640	464 032	446 107	453 498	488 082	1 031 712	1 024 904	1 171 706	1 346 098	1 252 404
Total	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	25 660 573

**Table C.16: Proportional R&D expenditure by socio-economic objectives (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVES	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	7.4	6.4	6.6	6.1	5.7	6.1	6.6	4.8	5.7	5.4
Defence	7.4	6.4	6.6	6.1	5.7	6.1	6.6	4.8	5.7	5.4
Division 2: Economic development	58.2	62.3	60.6	63.0	63.3	58.9	55.5	54.8	51.2	55.2
Economic development unclassified	0.9	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	4.4	5.2	4.8	5.0	4.1	5.0	5.2	5.1	5.1	6.8
Animal production and animal primary products	2.5	1.9	2.0	1.5	1.4	1.7	1.5	2.5	2.5	3.1
Mineral resources (excluding energy)	8.2	8.2	5.6	5.8	4.7	5.8	5.5	4.8	4.8	5.3
Energy resources	2.8	3.1	3.5	3.8	5.6	1.9	1.4	1.2	1.2	1.1
Energy supply	2.7	1.9	2.1	2.0	2.4	2.6	3.1	3.0	2.1	2.3
Manufacturing	11.3	13.1	13.2	14.4	14.2	12.4	11.7	11.2	10.0	10.2
Construction	3.8	5.3	5.7	6.2	6.9	2.5	1.5	1.8	1.8	1.8
Transport	3.5	3.1	3.1	3.2	3.3	4.4	4.5	4.4	4.2	4.3
Information and communication services	5.6	6.7	6.3	6.7	6.1	6.6	5.5	5.7	4.9	4.4
Commercial services	6.4	8.1	8.4	7.8	7.1	9.8	9.1	8.4	7.9	9.5
Economic framework	1.9	2.2	2.1	2.9	2.9	2.9	3.0	2.8	3.0	2.7
Natural resources	4.4	2.7	2.9	2.8	3.4	3.3	3.6	3.8	3.7	3.7
Division 3: Society	18.9	16.4	16.5	15.2	15.3	15.6	16.0	17.4	18.7	17.9
Society unclassified	0.9	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0	0.0
Health	12.5	10.8	10.4	9.6	9.6	10.7	10.3	10.4	12.3	11.1
Education and training	3.2	2.7	2.5	2.1	2.2	2.2	2.2	2.5	2.8	3.4
Social development and community services	2.4	2.1	2.6	2.6	2.5	2.7	3.5	4.5	3.6	3.3
Division 4: Environment	4.8	4.3	4.3	4.6	4.8	4.7	3.6	4.1	4.1	3.4
Environment unclassified	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0
Environmental knowledge	2.1	2.1	2.1	2.0	2.3	2.2	1.5	1.8	1.9	1.5
Environmental aspects of development	1.2	0.8	0.8	1.0	0.8	0.9	0.9	1.0	1.1	0.9
Environmental and other aspects	1.2	1.0	1.1	1.2	1.3	1.7	1.2	1.3	1.2	1.0
Division 5: Advancement of knowledge	10.7	10.6	11.9	11.2	10.9	14.6	18.3	18.9	20.3	18.2
Advancement of knowledge unclassified	0.9	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	6.6	6.5	8.3	7.8	7.6	9.7	13.2	13.6	14.6	13.3
Social sciences and humanities	3.3	3.3	2.7	2.4	2.3	4.9	5.1	5.3	5.6	4.9
Total	100	100	100	100	100	100	100	100	100	100

**Table C.17: R&D expenditure by province (2004/05 to 2013/14)**

YEAR	GERD	EASTERN CAPE	FREE STATE	GAUTENG	KWAZULU-NATAL	LIMPOPO	MPUMA-LANGA	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
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
2013/14	25 660 573	1 478 850	1 943 131	11 975 916	2 752 543	444 015	615 773	473 722	1 027 448	4 949 174

**Table C.18: Proportional R&D expenditure by province (2004/05 to 2013/14)**

YEAR	EASTERN CAPE	FREE STATE	GAUTENG	KWAZULU-NATAL	LIMPOPO	MPUMA-LANGA	NORTHERN CAPE	NORTH-WEST	WESTERN CAPE
	%	%	%	%	%	%	%	%	%
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
2013/14	5.8	7.6	46.7	10.7	1.7	2.4	1.8	4.0	19.3

# [TABLE C.1.2]

## SOURCE OF R&D FUNDS

**Table C.19: Funding for R&D by source (2004/05 to 2013/14)**

YEAR	TOTAL FUNDS	GOVERNMENT*	BUSINESS	OTHER SOUTH AFRICAN FUNDING SOURCES**	FOREIGN SOURCES
	R'000	R'000	R'000	R'000	R'000
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
2013/14	25 660 573	11 007 083	10 615 902	722 361	3 315 227

\*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: Proportional funding for R&D by source (2004/05 to 2013/14)**

YEAR	GOVERNMENT*	BUSINESS	SOURCES**	FOREIGN SOURCES
	%	%	%	%
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
2013/14	42.9	41.4	2.2	12.9

\*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.21: Sources of R&D funding by sector, amount and as a percentage of total funds (2013/14)**

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	14 508 269	56.5	870 398	51.3	154 509	3.6	3 939 264	54.0	9 485 212	80.5	58 886	10.1
Internal sources	14 508 269	56.5	870 398	51.3	154 509	3.6	3 939 264	54.0	9 485 212	80.5	58 886	10.1
Government	6 042 912	23.5	565 743	33.3	3 258 281	75.7	1 430 070	19.6	685 670	5.8	103 148	17.7
Grants	2 767 774	10.8	549 318	32.4	1 982 375	46.1	N/A	N/A	183 385	1.6	52 696	9.0
Contracts	1 845 068	7.2	16 425	1.0	1 275 906	29.6	N/A	N/A	502 285	4.3	50 452	8.7
All other	1 430 070	5.6	N/A	N/A	N/A	N/A	1 430 070	19.6	N/A	N/A	N/A	N/A
Business	1 130 690	4.4	1 759	0.1	419 469	9.7	588 598	8.1	67 505	0.6	53 359	9.1
Local business	1 130 690	4.4	1 759	0.1	419 469	9.7	588 598	8.1	67 505	0.6	53 359	9.1
Other South African funding sources	663 475	2.6	720	0.0	17 770	0.4	292 294	4.0	317 495	2.7	35 196	6.0
Higher education	181 869	0.7	531	0.0	8 945	0.2	169 024	2.3	752	0.0	2 617	0.4
Not-for-profit	351 475	1.4	189	0.0	8 819	0.2	17 339	0.2	314 262	2.7	10 866	1.9
Individual donations	130 131	0.5	0	0.0	6	0.0	105 931	1.5	2 481	0.0	21 713	3.7
Foreign	3 315 227	12.9	258 531	12.9	258 531	15.2	454 527	10.6	1 042 627	14.3	1 226 966	57.0
All sources	3 315 227	12.9	258 531	12.9	258 531	15.2	454 527	10.6	1 042 627	14.3	1 226 966	57.0
Total	25 660 573	100	1 697 151	100	4 304 556	100	7 292 853	100	11 782 848	100	583 165	100

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

**Table C.22: Government-funded R&D by sector (2004/05 to 2013/14)**

YEAR	TOTAL	GOVERNMENT*	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
		R'000	R'000	R'000	R'000	R'000
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
2013/14	11 007 083	1 436 141	3 412 790	5 369 334	685 670	103 148

Note: Government-funded R&D includes science council and university own funds.

**Table C.23: Proportional government-funded R&D by sector (2004/05 to 2013/14)**

YEAR	GOVERNMENT*	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
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
2013/14	13.0	31.0	48.8	6.2	0.9

Note: Government-funded R&D includes science council and university own funds.

**Table C.24: Business-funded R&D by sector (2004/05 to 2013/14)**

YEAR	TOTAL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
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
2013/14	10 615 902	1 759	419 469	588 598	9 552 717	53 359



**Table C.25: Proportional business-funded R&D by sector (2004/05 to 2013/14)**

YEAR	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
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
2013/14	0.0	4.0	5.5	90.0	0.5

**Table C.26: Foreign-funded R&D by sector (2004/05 to 2013/14)**

YEAR	TOTAL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
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
2013/14	3 315 227	258 531	454 527	1 042 627	1 226 966	332 576

**Table C.27: Proportional foreign-funded R&D by sector (2004/05 to 2013/14)**

YEAR	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
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
2013/14	7.8	13.7	31.4	37.0	10.0

# [TABLE C.1.3]

## R&D PERSONNEL

**Table C.28: R&D personnel in headcounts and full-time equivalents by occupation (2004/05 to 2013/14)**

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	
	HEAD-COUNTS	FTEs		HEAD-COUNTS	FTEs		HEAD-COUNTS	FTEs	HEAD-COUNTS	FTEs
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
2013/14	68 838	37 956.5	2.5	45 935	23 346.0	1.6	10 800	6 905.5	12 103	7 705.0

*\*Including doctoral and post-doctoral students*

**Table C.29: R&D personnel in headcounts and full-time equivalents by occupation and gender (2011/12, 2012/13 and 2013/14)**

YEAR	HEADCOUNTS			FTEs AS % OF HEADCO UNITS			
2011/12	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTE'S AS 0% OF HEADCOUNTS
Researchers*	40 653	23 469	17 184	20 115.1	11 735.1	8 380.0	49.5
Technicians directly supporting R&D	9 574	5 013	4 561	5 566.9	3 613.8	1 953.0	58.1
Other personnel directly supporting R&D	9 260	6 035	3 225	5 296.5	2 842.8	2 453.7	57.2
Total	59 487	34 517	24 970	30 978.4	18 191.7	12 786.7	52.1
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTE'S AS 0% OF HEADCOUNTS
Researchers*	42 828	24 104	18 724	21 382.4	12 079.9	9 284.5	49.9
Technicians	10 790	6 902	3 888	6 582.3	4 181.9	2 400.4	61.0
Other personnel	11 299	5 562	5 737	7 085.5	3 688.8	3 396.7	62.7
Total	64 917	36 568	28 349	35 050.3	19 968.6	15 081.6	54.0
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTE'S AS 0% OF HEADCOUNTS
Researchers*	45 935	25 704	20 231	23 346.0	13 180.8	10 165.2	50.8
Technicians directly supporting R&D	10 800	6 900	3 900	6 5905.5	4 340.3	2 565.2	63.9
Other personnel directly supporting R&D	12 103	6 003	6 100	7 705.0	3 947.7	3 757.3	63.7
Total	68 838	38 607	30 231	37 956.5	21 468.7	16 487.8	55.1

\*Including doctoral and post-doctoral students

**Table C.30: Researchers in headcounts by sector (2004/05 to 2013/14)**

YEAR	TOTAL R&D PERSONNEL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION*	BUSINESS	NOT-FOR-PROFIT
	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS
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
2013/14	68 838	2 874	5 884	41 464	17 599	1 017

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

**Table C.31: R&D personnel in full-time equivalents by sector (2004/05 to 2013/14)**

YEAR	TOTAL R&D PERSONNEL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	FTEs	FTEs	FTEs	FTEs	FTEs	FTEs
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
2013/14	37 956.5	2 245.5	5 164.5	17 777.7	11 877.4	891.4

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

**Table C.32: Researchers in headcounts by sector (2004/05 to 2013/14)**

YEAR	TOTAL R&D PERSONNEL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION*	BUSINESS	NOT-FOR-PROFIT
	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS	HEADCOUNTS
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
2013/14	45 935	1 229	1 956	36 133	6 182	435

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

**Table C.33: Researchers\* in headcounts by gender (2004/05 to 2013/14)**

YEAR	TOTAL RESEARCHER HEADCOUNTS	MALE	FEMALE
2004/05	27 668	17 473	10 195
2005/06	29 264	17 786	11 478
2006/07	29 303	17 913	11 390
2007/08	29 327	18 022	11 305
2008/09	28 952	17 694	11 258
2009/10	29 255	17 614	11 641
2010/11	25 300	14 823	10 477
2011/12	25 954	15 065	10 889
2012/13	27 314	15 378	11 936
2013/14	28 014	15 520	12 494

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

**Table C.34: Researchers in headcounts by Population group (2004/05 to 2013/14)**

YEAR	TOTAL RESEARCHER HEADCOUNTS	AFRICAN	COLOURED	INDIAN	WHITE
2004/05	27 670	5 319	993	2 279	19 079
2005/06	29 264	6 087	1 329	2 220	19 628
2006/07	29 303	6 058	1 396	2 402	19 447
2007/08	29 327	6 566	1 398	2 434	18 929
2008/09	28 952	6 595	1 505	2 588	18 265
2009/10	29 255	7 210	1 573	2 448	18 024
2010/11	25 300	6 756	1 316	2 438	14 789
2011/12	25 954	7 201	1 438	2 202	15 113
2012/13	27 314	8 101	1 591	2 514	15 108
2013/14	28 014	8 024	1 685	2 530	15 775

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

**Table C.35: R&D personnel in headcounts by occupation, qualification, population group and gender(2013/14)**

OCCUPATION AND QUALIFICATION	TOTAL R&D PERSONNEL	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	40 407	21 878	18 529	7 741	5 257	1 221	1 332	1 659	1 920	11 257	10 020
Doctoral degree or equivalent*	21 786	12 127	9 659	4 463	2 575	706	661	802	969	6 156	5 454
Masters, honours, bachelor or equivalent	14 972	7 915	7 057	2 646	2 043	431	560	705	765	4 133	3 689
Diplomas	3 649	1 836	1 813	632	639	84	111	152	186	968	877
Technicians directly supporting R&D	10 800	6 900	3 900	2 244	1 511	631	333	626	474	3 399	1 583
Doctoral degree or equivalent*	236	165	71	27	13	12	5	11	6	115	46
Masters, honours, bachelor or equivalent	5 077	2 942	2 134	900	728	159	172	339	264	1 544	970
Diplomas	5 488	3 793	1 695	1 316	769	460	156	276	203	1 740	567
Other personnel directly supporting R&D	12 103	6 004	6 099	2 622	2 348	578	804	1 161	583	1 643	2 363
Doctoral degree or equivalent*	359	218	141	59	35	13	15	14	7	132	84
Masters, honours, bachelor or equivalent	2 810	1 134	1 676	379	579	79	161	126	130	551	806
Diplomas	8 934	4 651	4 283	2 184	1 735	486	628	1 021	446	960	1 473
Total	63 310	34 782	28 528	12 607	9 116	2 430	2 469	3 446	2 977	16 299	13 966

Note: Non-SA student data are not collected by population group.

\*Doctoral degree or equivalent includes South African (that is it excludes non-SA) doctoral students and post-doctoral fellows.

## [C.2. SECTOR TABLES]

### C.2.1 .BUSINESS SECTOR (WHICH INCLUDED STATE OWNED ENTERPRISES)

**Table C.36: Business sector R&D expenditure by type of research (2004/05 to 2013/14)**

Type of research	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	642 302	721 255	800 085	929 134	1 073 117	1 267 759	1 025 389	922 888	802 753	968 504
Applied research	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	6 087 791
Experimental research	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	4 726 553
Total	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	11 782 848

**Table C.37: Proportional business sector R&D expenditure by type of research (2004/05 to 2013/14)**

Type of research	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Basic research	9.5	8.7	8.7	8.7	8.7	11.4	10.2	8.8	7.6	8.2
Applied research	32.9	29.2	27.6	28.7	27.8	29.6	39.3	42.6	52.7	51.7
Experimental research	57.6	62.0	63.8	62.7	63.5	59.0	50.5	48.5	39.7	40.1
Total	100	100	100	100	100	100	100	100	100	100

**Table C.38: Business sector R&D expenditure by accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Capital expenditure	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	1 132 520
Land, buildings and other structures	97 982	199 088	154 129	262 994	207 473	285 285	202 835	217 126	140 053	159 162
Vehicles, plant, machinery, equipment	544 881	1 247 562	966 460	1 182 311	2 451 265	1 353 709	1 103 609	1 433 415	932 503	973 358
Current expenditure	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	10 650 328
Labour costs	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	6 768 527
Other current expenditure	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	3 881 801
Total	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	11 782 848

**Table C.39: Proportional business sector R&D expenditure by accounting category (2004/05 to 2013/14)**

Type of expenditure	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	9.5	17.5	12.1	13.5	21.6	14.7	13.0	15.8	10.1	9.6
Vehicles, plant, machinery, equipment	1.4	2.4	1.7	2.4	1.7	2.6	2.0	2.1	1.3	1.4
Land, buildings and other structures	8.1	15.1	10.5	11.0	19.9	12.2	11.0	13.7	8.8	8.3
Current expenditure	90.5	82.5	87.9	86.5	78.4	85.3	87.0	84.2	89.9	90.4
Labour costs	49.4	44.9	48.3	45.5	42.8	46.8	44.4	45.1	55.1	57.4
Other current expenditure	41.1	37.5	39.6	41.1	35.6	38.5	42.6	39.1	34.8	32.9
Total	100	100	100	100	100	100	100	100	100	100

**Table C.40: Business sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	566 275
Nanotechnology	140 187	155 049	30 314	56 881	150 474	102 670	171 808	225 557	170 479
Total	278 595	287 690	199 724	325 804	480 706	444 366	593 929	725 145	726 754
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	11 782 848

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

**Table C.41: Proportional business sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Biotechnology	1.7	1.4	1.6	2.2	3.0	3.4	4.0	4.7	4.7
Nanotechnology	1.7	1.7	0.3	0.5	1.4	1.0	1.6	2.1	1.4
Total	3.4	3.1	1.9	2.6	4.3	4.4	5.7	6.9	6.2

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



**Table C.42: Business sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	228 905
Open-source software	60 476	118 858	114 195	96 266	91 818	68 105	85 787	87 200	233 576
New materials	160 859	115 339	72 992	154 140	173 308	227 682	277 152	225 897	151 890
Tuberculosis (TB), HIV/AIDS, malaria	274 236	294 689	302 122	466 161	460 233	631 996	812 580	929 121	992 538
Total	495 571	528 886	489 309	716 567	725 359	927 783	1 206 869	1 426 139	1 606 909
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	11 782 848

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.43: Proportional business sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	0.3	1.7	1.9
Open-source software	0.7	1.3	1.1	0.8	0.8	0.7	0.8	0.8	2.0
New materials	2.0	1.2	0.7	1.2	1.6	2.3	2.6	2.1	1.3
Tuberculosis (TB), HIV/AIDS, malaria	3.3	3.2	2.8	3.8	4.1	6.3	7.8	8.8	8.4
Total	6.0	5.7	4.6	5.8	6.5	9.2	11.5	13.5	13.6

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.44: Business sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	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	9 765 859
Mathematical sciences	92 844	169 355	159 496	176 077	183 255	183 426	110 543	204 594	149 220	209 344
Physical sciences	211 921	312 246	382 551	507 646	655 898	190 292	32 669	28 489	47 672	50 708
Chemical sciences	469 211	441 138	438 969	580 146	859 041	627 729	687 843	934 005	980 021	979 760
Earth sciences	34 269	52 781	66 244	93 014	95 034	90 098	106 759	92 439	102 892	100 665
Information, computer and communication technologies	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	1 610 718
Applied sciences and technologies	856 021	1 384 945	1 551 885	1 581 438	1 671 375	1 271 414	1 132 538	902 425	872 014	808 899
Engineering sciences	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	3 093 088
Biological sciences	127 322	163 796	160 584	161 058	162 776	194 671	207 456	212 632	210 627	213 124
Agricultural sciences	187 344	257 447	277 889	311 287	293 357	323 603	371 310	471 529	444 593	593 315
Medical and health sciences	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	1 974 213
Environmental sciences	73 775	52 492	42 315	62 355	57 764	47 692	5 818	2 206	44 563	50 909
Material sciences	96 525	146 886	146 588	184 625	82 192	70 949	59 723	65 092	53 855	64 090
Marine sciences	9 366	9 951	10 547	11 719	11 975	8 899	4 859	4 324	5 738	8 026
Division 2: Social Sciences and Humanities	229 597	324 032	361 261	381 023	429 461	395 714	446 789	471 106	1 443 280	2 016 989
Social sciences	229 522	323 673	360 856	380 554	428 969	395 115	446 789	471 106	1 443 280	2 016 989
Humanities	75	359	405	469	491	599	0	0	0	0
Total	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	11 782 848

**Table C.45: Proportional business sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	96.6	96.1	96.1	96.5	96.5	96.4	95.6	95.5	86.3	82.9
Mathematical sciences	1.4	2.1	1.7	1.6	1.5	1.6	1.1	2.0	1.4	1.8
Physical sciences	3.1	3.8	4.1	4.7	5.3	1.7	0.3	0.3	0.5	0.4
Chemical sciences	6.9	5.4	4.7	5.4	7.0	5.6	6.8	8.9	9.3	8.3
Earth sciences	0.5	0.6	0.7	0.9	0.8	0.8	1.1	0.9	1.0	0.9
Information, computer and communication technologies	18.9	19.8	21.4	20.3	19.6	25.6	24.9	23.7	14.9	13.7
Applied sciences and technologies	12.7	16.8	16.8	14.7	13.6	11.4	11.3	8.6	8.2	6.9
Engineering sciences	31.1	26.9	26.4	30.1	31.7	29.7	27.5	26.3	26.8	26.3
Biological sciences	1.9	2.0	1.7	1.5	1.3	1.7	2.1	2.0	2.0	1.8
Agricultural sciences	2.8	3.1	3.0	2.9	2.4	2.9	3.7	4.5	4.2	5.0
Medical and health sciences	14.7	13.0	13.3	11.8	12.2	14.1	16.1	17.6	17.1	16.8
Environmental sciences	1.1	0.6	0.5	0.6	0.5	0.4	0.1	0.0	0.4	0.4
Material sciences	1.4	1.8	1.6	1.7	0.7	0.6	0.6	0.6	0.5	0.5
Marine sciences	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1
Division 2: Social Sciences and Humanities	3.4	3.9	3.9	3.5	3.5	3.6	4.4	4.5	13.7	17.1
Social sciences	3.4	3.9	3.9	3.5	3.5	3.5	4.4	4.5	13.7	17.1
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.46: Business sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	718 491	747 523	777 139	900 909	908 781	959 761	1 103 510	813 259	1 040 025	1 096 986
Defence	718 491	747 523	777 139	900 909	908 781	959 761	1 103 510	813 259	1 040 025	1 096 986
Division 2: Economic Development	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	8 308 177
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant Production And Plant Primary Products	209 583	273 503	279 937	279 437	266 259	309 370	288 323	315 806	374 327	454 990
Animal Production and Animal Primary Products	38 024	61 266	67 619	78 657	74 302	110 295	46 709	46 316	38 484	69 916
Mineral Resources (Excluding Energy)	711 661	829 414	779 765	937 628	839 558	741 401	728 130	733 280	853 544	977 365
Energy Resources	301 603	385 851	470 735	585 453	732 188	290 662	93 532	90 377	90 975	95 375
Energy Supply	292 545	205 657	239 018	252 064	393 798	426 407	470 030	490 490	321 456	349 710
Manufacturing	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	1 869 926
Construction	365 271	631 698	756 166	1 017 969	1 295 717	367 510	16 284	46 158	96 071	125 059
Transport	363 545	391 173	446 162	523 022	621 479	843 301	872 149	920 081	951 435	1 080 427
Information and Communication Services	588 233	818 485	895 714	1 087 198	1 151 637	1 189 650	851 392	978 187	908 640	842 341
Commercial Services	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	2 255 642
Economic Framework	11 280	13 515	16 243	41 756	160 562	106 693	70 795	57 474	103 240	91 464
Natural Resources	179 816	79 032	105 475	130 711	216 971	88 624	54 306	99 898	101 778	95 962
Division 3: Society	911 606	798 247	839 908	915 567	1 019 848	1 224 481	1 041 616	1 232 867	1 242 066	1 303 321
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	873 468	761 222	799 201	857 364	930 645	1 103 816	880 549	1 054 182	1 045 048	1 097 446
Education and Training	20 087	11 199	12 913	12 204	27 232	26 444	32 486	32 767	29 566	33 913
Social Development and Community Services	18 050	25 827	27 794	45 999	61 971	94 220	128 581	145 918	167 452	171 962
Division 4: Environment	145 034	109 803	113 821	164 552	221 747	211 208	211 025	220 698	173 535	171 747
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental Knowledge	32 776	33 395	39 233	62 551	91 953	53 022	51 845	58 565	46 213	43 935
Environmental Aspects of Development	70 069	28 781	28 327	33 901	31 493	22 456	55 577	42 226	17 957	14 344
Environmental and Other Aspects	42 188	47 626	46 261	68 100	98 301	135 730	103 602	119 907	109 365	113 468
Division 5: Advancement of Knowledge	95 593	203 423	279 295	358 242	444 298	485 296	690 587	815 909	880 567	902 617
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural Sciences, Technologies and Engineering	92 497	200 018	275 446	353 694	439 330	479 999	682 401	813 150	877 557	899 840
Social Sciences and Humanities	3 096	3 406	3 848	4 548	4 968	5 298	8 186	2 758	3 010	2 776
Total	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	11 782 848

**Table C.47: Proportional business sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/13
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	10.6	9.1	8.4	8.4	7.4	8.6	11.0	7.8	9.8	9.3
Defence	10.6	9.1	8.4	8.4	7.4	8.6	11.0	7.8	9.8	9.3
Division 2: Economic Development	72.4	77.4	78.3	78.2	79.0	74.1	69.7	70.5	68.4	70.5
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	3.1	3.3	3.0	2.6	2.2	2.8	2.9	3.0	3.5	3.9
Animal Production and Animal Primary Products	0.6	0.7	0.7	0.7	0.6	1.0	0.5	0.4	0.4	0.6
Mineral Resources (Excluding Energy)	10.5	10.1	8.4	8.7	6.8	6.7	7.2	7.0	8.1	8.3
Energy Resources	4.5	4.7	5.1	5.5	5.9	2.6	0.9	0.9	0.9	0.8
Energy Supply	4.3	2.5	2.6	2.3	3.2	3.8	4.7	4.7	3.0	3.0
Manufacturing	16.5	19.5	20.0	19.7	20.8	18.3	17.4	17.8	15.5	15.9
Construction	5.4	7.7	8.2	9.5	10.5	3.3	0.2	0.4	0.9	1.1
Transport	5.4	4.7	4.8	4.9	5.0	7.6	8.7	8.8	9.0	9.2
Information and Communication Services	8.7	9.9	9.7	10.1	9.3	10.7	8.5	9.3	8.6	7.1
Commercial Services	10.6	13.2	14.4	12.5	11.5	15.7	17.6	16.6	16.6	19.1
Economic Framework	0.2	0.2	0.2	0.4	1.3	1.0	0.7	0.5	1.0	0.8
Natural Resources	2.7	1.0	1.1	1.2	1.8	0.8	0.5	1.0	1.0	0.8
Division 3: Society	13.5	9.7	9.1	8.5	8.3	11.0	10.4	11.8	11.8	11.1
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	12.9	9.2	8.6	8.0	7.5	9.9	8.8	10.1	9.9	9.3
Education and Training	0.3	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3
Social Development and Community Services	0.3	0.3	0.3	0.4	0.5	0.8	1.3	1.4	1.6	1.5
Division 4: Environment	2.1	1.3	1.2	1.5	1.8	1.9	2.1	2.1	1.6	1.5
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	0.5	0.4	0.4	0.6	0.7	0.5	0.5	0.6	0.4	0.4
Environmental Aspects of Development	1.0	0.3	0.3	0.3	0.3	0.2	0.6	0.4	0.2	0.1
Environmental and Other Aspects	0.6	0.6	0.5	0.6	0.8	1.2	1.0	1.1	1.0	1.0
Division 5: Advancement of Knowledge	1.4	2.5	3.0	3.3	3.6	4.4	6.9	7.8	8.3	7.7
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	1.4	2.4	3.0	3.3	3.6	4.3	6.8	7.8	8.3	7.6
Social Sciences and Humanities	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total	100	100	100	100	100	100	100	100	100	100

**Table C.48: Business sector R&D expenditure by province (2004/05 to 2013/14)**

Province	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	136 027	242 692	247 295	283 488	316 089	320 955	217 880	354 553	468 197	646 497
Free State	520 740	476 346	665 443	786 225	1 213 808	999 554	943 508	1 308 833	1 265 285	1 374 960
Gauteng	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	5 813 673
KwaZulu-Natal	615 437	843 499	962 308	1 302 260	1 255 509	1 183 636	1 280 014	1 160 507	1 237 563	1 434 084
Limpopo	49 948	84 187	72 813	71 687	75 675	49 375	41 850	62 728	127 451	140 026
Mpumalanga	178 452	187 934	172 948	196 368	201 550	161 154	139 771	157 158	222 974	301 831
North-West	184 691	180 227	197 383	193 339	222 630	267 528	256 428	302 164	380 144	435 849
Northern Cape	11 665	14 691	15 834	7 450	7 319	7 988	17 017	45 267	78 471	124 150
Western Cape	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	1 511 778
Total	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	11 782 848

**Table C.49: Proportional business sector R&D expenditure by province (2004/05 to 2013/14)**

Province	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	2.0	2.9	2.7	2.6	2.6	2.9	2.2	3.4	4.4	5.5
Free State	7.7	5.8	7.2	7.3	9.8	9.0	9.4	12.5	12.0	11.7
Gauteng	60.9	56.3	56.9	57.2	57.8	54.9	54.1	53.1	50.7	49.3
KwaZulu-Natal	9.1	10.2	10.4	12.1	10.2	10.6	12.7	11.1	11.7	12.2
Limpopo	0.7	1.0	0.8	0.7	0.6	0.4	0.4	0.6	1.2	1.2
Mpumalanga	2.6	2.3	1.9	1.8	1.6	1.4	1.4	1.5	2.1	2.6
North-West	2.7	2.2	2.1	1.8	1.8	2.4	2.5	2.9	3.6	3.7
Northern Cape	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.4	0.7	1.1
Western Cape	14.0	19.0	17.8	16.3	15.5	18.2	17.1	14.5	13.6	12.8
Total	100	100	100	100	100	100	100	100	100	100

**Table C.50: Business sector R&D expenditure by Standard Industrial Classification Code (SIC)  
(2004/05 to 2013/14)**

STANDARD INDUSTRIAL CLASSIFICATION	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	180 008	206 449	199 959	213 808	220 757	208 447	157 916	211 132	286 832	364 424
Mining and Quarrying	425 917	428 066	518 262	559 332	578 825	499 286	1 055 963	1 352 877	1 554 284	1 675 153
Manufacturing	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	3 793 066
Manufacture of Food Products, Beverages and Tobacco Products	145 848	194 900	183 391	196 238	215 876	162 851	221 370	283 262	319 143	340 427
Manufacture of Textiles, Clothing and Leather Goods	14 843	23 047	21 899	17 888	13 755	16 946	2 437	0	2 073	32 091
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	86 214	102 715	110 631	118 535	118 016	111 255	106 448	80 255	50 531	60 437
Manufacture of Refined Petroleum, Coke and Nuclear Fuel; Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals); Manufacture of Rubber and Plastic Products	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	1 256 313
Manufacture of Non-Metallic Mineral Products	115 461	108 310	127 714	183 758	134 638	120 508	87 037	72 039	49 974	52 263
Manufacture of Basic Metals, Fabricated Metal Products, Machinery & Equipment; Manufacture of Office, Accounting and Computing Machinery	428 409	600 305	386 605	500 715	315 295	330 137	240 408	392 800	585 635	620 923
Manufacture of Electrical Machinery and Apparatus	83 582	157 388	189 554	187 612	166 498	146 169	207 954	310 599	312 102	254 042
Manufacture of Radio, Television and Communication Equipment & Apparatus; Manufacture of Medical, Precision and Optical Instruments, Watches & Clocks	284 803	378 170	425 585	506 497	511 356	591 774	590 174	639 217	656 639	742 033
Manufacture of Transport Equipment	697 268	726 605	784 209	924 053	984 235	1 022 589	881 958	310 145	267 788	334 276
Manufacture of Furniture; Recycling; Manufacturing not elsewhere classified	4 218	18 983	5 898	7 449	60 849	60 743	57 240	81 914	93 145	100 261
Electricity, Gas and Water Supply	270 538	1 067 428	1 292 925	1 737 511	2 306 297	955 690	536 050	494 745	385 770	355 720
Construction	483 519	8 815	4 559	6 043	6 105	3 490	3 213	6 495	9 051	8 037
Wholesale and Retail	23 469	274 743	324 666	317 780	334 131	434 522	620 541	547 194	179 383	100 176
Transport, Storage and Communication	325 707	438 003	453 715	490 138	425 235	415 243	354 311	484 222	467 411	451 336
Financial Intermediation, Real Estate and Business Services	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	4 724 439
Community, Social and Personal Services	162 986	371 792	434 223	432 167	295 185	524 108	411 826	170 499	296 805	310 498
Total	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	11 782 848

**Table C.51: Business sector R&D expenditure by Standard Industrial Classification Code (SIC)  
(2004/05 to 2013/14)**

STANDARD INDUSTRIAL CLASSIFICATION	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Agriculture, Hunting, Forestry and Fishing	2.7	2.5	2.2	2.0	1.8	1.9	1.6	2.0	2.7	3.1
Mining and Quarrying	6.3	5.2	5.6	5.2	4.7	4.5	10.5	12.9	14.7	14.2
Manufacturing	44.1	40.9	38.3	39.3	38.8	38.8	35.7	33.9	32.9	32.2
Manufacture of Food Products, Beverages and Tobacco Products	2.2	2.4	2.0	1.8	1.8	1.5	2.2	2.7	3.0	2.9
Manufacture of Textiles, Clothing and Leather Goods	0.2	0.3	0.2	0.2	0.1	0.2	0.0	0.0	0.0	0.3
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	1.3	1.2	1.2	1.1	1.0	1.0	1.1	0.8	0.5	0.5
Manufacture of Refined Petroleum, Coke and Nuclear Fuel; Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals); Manufacture of Rubber and Plastic Products	16.6	12.8	14.1	14.7	18.4	15.8	11.9	13.2	10.8	10.7
Manufacture of Non-Metallic Mineral Products	1.3	1.3	1.4	1.7	1.1	1.1	0.9	0.7	0.5	0.4
Manufacture of Basic Metals, Fabricated Metal Products, Machinery & Equipment; Manufacture of Office, Accounting and Computing Machinery	6.3	7.3	4.2	4.7	2.6	3.0	2.4	3.8	5.5	5.3
Manufacture of Electrical Machinery and Apparatus	1.2	1.9	2.1	1.7	1.4	1.3	2.1	3.0	3.0	2.2
Manufacture of Radio, Television and Communication Equipment & Apparatus; Manufacture of Medical, Precision and Optical Instruments, Watches & Clocks	4.2	4.6	4.6	4.7	4.1	5.3	5.9	6.1	6.2	6.3
Manufacture of Transport Equipment	10.3	8.8	8.5	8.6	8.0	9.2	8.8	3.0	2.5	2.8
Manufacture of Furniture; Recycling; Manufacturing not elsewhere classified	0.1	0.2	0.1	0.1	0.5	0.5	0.6	0.8	0.9	0.9
Electricity, Gas and Water Supply	4.0	12.9	14.0	16.2	18.7	8.6	5.3	4.7	3.6	3.0
Construction	7.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1
Wholesale and Retail	0.3	3.3	3.5	3.0	2.7	3.9	6.2	5.2	1.7	0.9
Transport, Storage and Communication	4.8	5.3	4.9	4.6	3.4	3.7	3.5	4.6	4.4	3.8
Financial Intermediation, Real Estate and Business Services	28.3	25.2	26.8	25.7	27.4	33.9	33.1	34.8	37.0	40.1
Community, Social and Personal Services	2.4	4.5	4.7	4.0	2.4	4.7	4.1	1.6	2.8	2.6
Total	100	100	100	100	100	100	100	100	100	100



**Table C.52: Number of foreign and local business sector partners engaged in collaborative R&D, and total R&D collaboration expenditure (2011/12, 2012/13 and 2013/14)**

COLLABORATION PARTNERS	2011/12		2012/13		2013/14	
	WITHIN SOUTH AFRICA	OUTSIDE SOUTH AFRICA	WITHIN SOUTH AFRICA	OUTSIDE SOUTH AFRICA	WITHIN SOUTH AFRICA	OUTSIDE SOUTH AFRICA
Government research institutes	16	5	19	10	22	8
Higher education institutions	49	15	63	19	69	16
Members of own company	15	6	27	8	28	11
Not-for-profit organisations	2	0	5	4	6	0
Other companies	31	22	55	34	48	26
Science councils	29	3	42	7	43	6
Total number of R&D collaborations	142	51	211	82	216	67
No collaboration	N/A	N/A	45	44	N/A	N/A
<b>R&amp;D EXPENDITURE</b>	<b>R'000</b>	<b>R'000</b>	<b>R'000</b>	<b>R'000</b>	<b>R'000</b>	<b>R'000</b>
Total in-house plus outsourced R&D collaboration expenditure (excl.VAT)	924 310	263 146	2 688 798	288 917	3 445 916	670 854

Note: Collaborative R&D entails partnerships, alliances and collaborations.  
N/A: Missing data.

**Table C.53: Business sector R&D personnel in headcounts and full-time equivalents by occupation (2004/05 to 2013/14)**

YEAR	HEADCOUNT				FULL TIME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
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	3 209.1
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
2013/14	17 599	6 182	6 397	5 020	11 877.4	4 530.1	4 253.1	3 094.2

**Table C.54: Business sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2011/12, 2012/13 and 2013/14)**

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTEs AS % OF HEADCOUNTS
2011/12	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
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			FTEs AS % OF HEADCOUNTS
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
2013/14	TOTAL	MALE	FEMALE	TOTAL			FTEs AS % OF HEADCOUNTS
Researchers	6 182	3 895	2 287	4 530.1	2749.4	1780.8	73.3
Technicians directly supporting R&D	6 397	4 418	1 979	4 253.1	2876.3	1376.8	66.5
Other personnel directly supporting R&D	5 020	2 879	2 141	3 094.2	1817.1	1277.1	61.6
Total	17 599	11 192	6 407	11 877.4	7442.8	4434.6	67.5

**Table C.55: Business sector R&D personnel in headcounts by occupation, qualification, population group and gender (2013/14)**

OCCUPATION AND QUALIFICATION	TOTAL	SUB-TOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	6 182	3 895	2 287	580	494	146	133	339	276	2 830	1 384
Doctoral degree or equivalent	775	531	244	88	30	8	11	22	30	413	172
Masters, honours, bachelor or equivalent	4 373	2 731	1 642	392	347	99	86	285	195	1 955	1 014
Diplomas	1 034	633	401	100	116	39	36	32	50	462	199
Technicians directly supporting R&D	6 397	4 418	1 979	1 293	713	292	152	456	274	2 377	841
Doctoral degree or equivalent	49	36	13	4	4	3	0	7	1	22	7
Masters, honours, bachelor or equivalent	3 148	1 955	1 192	504	354	83	78	269	176	1 099	584
Diplomas	3 201	2 427	774	784	354	206	74	180	96	1 256	250
Other personnel directly supporting R&D	5 020	2 879	2 141	767	710	116	122	1 038	398	958	910
Doctoral degree or equivalent	24	14	10	0	0	0	0	0	0	14	10
Masters, honours, bachelor or equivalent	804	402	402	38	85	12	7	64	34	289	276
Diplomas	4 192	2 462	1 730	729	626	104	115	974	364	655	624
Total	17 599	11 192	6 407	2 640	1 918	554	406	1 833	948	6 165	3 135

# [TABLE C.2.2]

## NOT-FOR-PROFIT SECTOR

**Table C.56: Not-for-profit sector R&D expenditure by type of research (2004/05 to 2013/14)**

TYPE OF RESEARCH	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	58 514	57 877	54 915	65 337	70 725	111 377	59 302	62 134	114 755	132 478
Applied research	100 137	123 609	110 698	119 982	131 259	53 530	87 435	79 105	346 179	322 295
Experimental research	39 617	45 026	46 925	37 883	38 665	23 933	16 092	29 366	42 898	128 391
Total	198 268	226 514	212 538	223 202	240 649	188 840	162 830	170 605	503 833	583 165

**Table C.57: Proportional not-for-profit sector R&D expenditure by type of research (2004/05 to 2013/14)**

TYPE OF RESEARCH	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Basic research	29.5	25.5	25.8	29.3	29.4	59.0	36.4	36.4	22.8	22.7
Applied research	50.5	54.6	52.1	53.8	54.5	28.3	53.7	46.4	68.7	55.3
Experimental research	20.0	19.9	22.1	17.0	16.1	12.7	9.9	17.2	8.5	22.0
Total	100	100	100	100	100	100	100	100	100	100

**Table C.58: Not-for-profit sector R&D expenditure by accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'001
Capital expenditure	13 069	10 092	6 974	7 025	7 249	8 564	8 820	18 702	37 564	39 983
Land, buildings and other structures	4 593	2 336	2 624	2 959	3 137	3 486	4 447	6 905	11 152	19 047
Vehicles, plant, machinery, equipment	8 476	7 756	4 350	4 066	4 112	5 078	4 373	11 797	26 412	20 936
Current expenditure	185 199	216 422	205 564	216 177	233 400	180 276	154 010	151 903	466 269	543 182
Labour costs	77 502	85 511	98 631	109 147	114 292	94 673	92 098	100 176	243 871	303 644
Other current expenditure	107 697	130 911	106 933	107 030	119 108	85 603	61 912	51 727	222 398	239 538
Total	198 268	226 514	212 538	223 202	240 649	188 840	162 830	170 605	503 833	583 165

**Table C.59: Proportional not-for-profit sector R&D expenditure by accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	6.6	4.5	3.3	3.1	3.0	4.5	5.4	11.0	7.5	6.9
Land, buildings and other structures	2.3	1.0	1.2	1.3	1.3	1.8	2.7	4.0	2.2	3.3
Vehicles, plant, machinery, equipment	4.3	3.4	2.0	1.8	1.7	2.7	2.7	6.9	5.2	3.6
Current expenditure	93.4	95.5	96.7	96.9	97.0	95.5	94.6	89.0	92.5	93.1
Labour costs	39.1	37.8	46.4	48.9	47.5	50.1	56.6	58.7	48.4	52.1
Other current expenditure	54.3	57.8	50.3	48.0	49.5	45.3	38.0	30.3	44.1	41.1
Total	100	100	100	100	100	100	100	100	100	100

**Table C.60: Not-for-profit sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	62 082
Nanotechnology	0	0	0	0	0	1 475	0	10 187	4 915
Total	206	429	491	255	4 446	7 141	8 667	39 249	66 997
NPO expenditure on R&D	226 514	212 538	223 202	240 649	188 840	162 830	170 605	503 833	583 165

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

**Table C.61: Proportional not-for-profit sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Biotechnology	0.1	0.2	0.2	0.1	2.4	3.5	5.1	5.8	10.6
Nanotechnology	N/A	N/A	N/A	N/A	N/A	0.9	N/A	2.0	0.8
Total	0.1	0.2	0.2	0.1	2.4	4.4	5.1	7.8	11.5

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

**Table C.62: Not-for-profit sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	27 142
Open-source software	7 700	4 973	0	0	0	0	20	419	481
New materials	0	1 783	0	0	542	830	395	178	191
Tuberculosis (TB), HIV/AIDS, malaria	3 736	4 215	0	8 763	7 419	13 979	5 034	246 760	301 086
Total	11 436	10 971	0	8 763	7 962	14 809	20 581	265 379	328 901
NPO expenditure on R&D	226 514	212 538	223 202	240 649	188 840	162 830	170 605	503 833	583 165

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.63: Proportional not-for-profit sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	8.9	3.6	4.7
Open-source software	3.4	2.3	0.0	0.0	0.0	0.0	0.0	0.1	0.1
New materials	0.0	0.8	0.0	0.0	0.3	0.5	0.2	0.0	0.0
Tuberculosis (TB), HIV/AIDS, malaria	1.6	2.0	0.0	3.6	3.9	8.6	3.0	49.0	51.6
Total	5.0	5.2	0.0	3.6	4.2	9.1	12.1	52.7	56.4

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.64: Not-for-profit sector R&D expenditure by research field (2004/05 to 2013/14)**

Socio-economic objective	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	53 198	54 740	53 937	61 494	72 018	53 112	54 776	64 042	346 961	427 237
Mathematical sciences	0	0	0	0	1 041	0	0	0	8 223	9 674
Physical sciences	0	0	0	0	0	6 422	0	0	765	802
Chemical sciences	0	0	0	0	0	0	0	0	0	1 309
Earth sciences	1 386	158	185	459	1 012	452	2 585	2 407	2 598	5 907
Information, computer and communication technologies	924	789	925	1 446	1 555	2 207	0	595	2 919	39
Applied sciences and technologies	5 250	5 775	1 407	0	0	0	0	1 487	4 317	4 666
Engineering sciences	0	0	0	0	0	0	0	0	4 075	4 915
Biological sciences	766	1 630	1 874	2 005	2 126	904	1 473	7 978	15 475	23 435
Agricultural sciences	12 705	16 507	17 234	18 324	19 426	20 404	25 679	25 819	33 105	34 165
Medical and health sciences	20 096	23 748	25 237	29 603	36 032	13 999	15 920	17 423	265 031	329 293
Environmental sciences	6 067	3 531	3 097	7 363	8 396	6 014	3 433	7 553	10 122	12 238
Material sciences	0	0	0	0	0	0	0	0	0	0
Marine sciences	6 005	2 602	3 978	2 294	2 431	2 711	5 687	781	331	794
Division 2: Social Sciences and Humanities	145 070	171 774	158 601	161 708	168 631	135 728	108 054	106 563	156 872	155 928
Social sciences	143 351	170 126	156 574	159 155	165 924	133 340	104 306	104 842	142 525	147 029
Humanities	1 719	1 648	2 027	2 553	2 707	2 388	3 749	1 720	14 348	8 898
Total	198 268	226 514	212 538	223 202	240 649	188 840	162 830	170 605	503 833	583 165

**Table C.65: Proportional not-for-profit sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	26.8	24.2	25.4	27.6	29.9	28.1	33.6	37.5	68.9	73.3
Mathematical sciences	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.6	1.7
Physical sciences	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.2	0.1
Chemical sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Earth sciences	0.7	0.1	0.1	0.2	0.4	0.2	1.6	1.4	0.5	1.0
Information, computer and communication technologies	0.5	0.3	0.4	0.6	0.6	1.2	0.0	0.3	0.6	0.0
Applied sciences and technologies	2.6	2.5	0.7	0.0	0.0	0.0	0.0	0.9	0.9	0.8
Engineering sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8
Biological sciences	0.4	0.7	0.9	0.9	0.9	0.5	0.9	4.7	3.1	4.0
Agricultural sciences	6.4	7.3	8.1	8.2	8.1	10.8	15.8	15.1	6.6	5.9
Medical and health sciences	10.1	10.5	11.9	13.3	15.0	7.4	9.8	10.2	52.6	56.5
Environmental sciences	3.1	1.6	1.5	3.3	3.5	3.2	2.1	4.4	2.0	2.1
Material sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marine sciences	3.0	1.1	1.9	1.0	1.0	1.4	3.5	0.5	0.1	0.1
Division 2: Social Sciences and Humanities	73.2	75.8	74.6	72.4	70.1	71.9	66.4	62.5	31.1	26.7
Social sciences	72.3	75.1	73.7	71.3	68.9	70.6	64.1	61.5	28.3	25.2
Humanities	0.9	0.7	1.0	1.1	1.1	1.3	2.3	1.0	2.8	1.5
Total	100	100	100	100	100	100	100	100	100	100



**Table C.66: Not-for-profit sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	1 441	1 161	1 312	1 438	2 050	1 600	0	0	0	0
Defence	1 441	1 161	1 312	1 438	2 050	1 600	0	0	0	0
Division 2: Economic Development	56 356	58 983	61 743	63 450	69 810	71 939	65 777	60 758	110 866	113 991
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant Production And Plant Primary Products	942	13 747	13 996	16 030	17 520	18 873	25 441	24 850	36 127	35 511
Animal Production and Animal Primary Products	13 647	1 577	1 850	918	972	1 632	1 389	828	2 538	3 083
Mineral Resources (Excluding Energy)	0	0	0	0	0	0	763	0	8 150	9 831
Energy Resources	490	581	656	1 000	1 760	2 604	1 653	969	2 538	3 083
Energy Supply	1 164	1 161	1 312	1 438	2 575	3 774	3 307	3 430	4 363	8 690
Manufacturing	0	0	0	0	0	0	0	2 197	3 896	2 955
Construction	0	0	0	0	0	0	0	0	0	0
Transport	0	0	0	70	74	208	0	137	465	424
Information and Communication Services	0	1 183	1 388	0	0	0	0	1 480	2 031	1 823
Commercial Services	2 994	2 396	622	782	827	970	0	0	0	0
Economic Framework	33 695	34 253	37 516	36 588	39 059	39 463	27 068	22 228	45 252	42 423
Natural Resources	3 425	4 086	4 403	6 624	7 022	4 414	6 157	4 640	5 507	6 167
Division 3: Society	125 674	147 288	127 170	129 159	141 189	93 947	82 481	75 597	360 333	415 093
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	23 471	26 824	28 057	33 549	37 461	16 554	15 050	13 496	260 712	303 535
Education and Training	66 400	72 160	38 907	32 161	32 308	19 986	22 303	23 762	58 894	63 833
Social Development and Community Services	35 803	48 304	60 206	63 449	71 420	57 407	45 128	38 339	40 726	47 725
Division 4: Environment	10 632	3 870	4 493	5 885	6 937	7 052	10 051	13 356	12 841	15 044
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental Knowledge	4 641	949	1 090	2 553	3 406	3 577	6 139	7 233	4 716	7 845
Environmental Aspects of Development	5 704	185	209	559	593	683	504	3 746	5 771	4 545
Environmental and Other Aspects	286	2 736	3 194	2 773	2 938	2 792	3 408	2 377	2 355	2 654
Division 5: Advancement of Knowledge	4 165	15 211	17 819	23 271	20 663	14 303	4 521	20 895	19 793	39 036
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural Sciences, Technologies and Engineering	0	789	925	459	486	452	632	13 166	7 754	31 450
Social Sciences and Humanities	4 165	14 422	16 894	22 812	20 177	13 851	3 889	7 729	12 039	7 586
Total	198 268	226 514	212 537	223 203	240 649	188 840	162 830	170 605	503 833	583 165

**Table C.67: Proportional not-for-profit sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	0.7	0.5	0.6	0.6	0.9	0.8	0.0	0.0	0.0	0.0
Defence	0.7	0.5	0.6	0.6	0.9	0.8	0.0	0.0	0.0	0.0
Division 2: Economic Development	28.4	26.0	29.1	28.4	29.0	38.1	40.4	35.6	22.0	19.5
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	0.5	6.1	6.6	7.2	7.3	10.0	15.6	14.6	7.2	6.1
Animal Production and Animal Primary Products	6.9	0.7	0.9	0.4	0.4	0.9	0.9	0.5	0.5	0.5
Mineral Resources (Excluding Energy)	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.6	1.7
Energy Resources	0.2	0.3	0.3	0.4	0.7	1.4	1.0	0.6	0.5	0.5
Energy Supply	0.6	0.5	0.6	0.6	1.1	2.0	2.0	2.0	0.9	1.5
Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.8	0.5
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	0.1	0.0	0.1	0.1	0.1
Information and Communication Services	0.0	0.5	0.7	0.0	0.0	0.0	0.0	0.9	0.4	0.3
Commercial Services	1.5	1.1	0.3	0.4	0.3	0.5	0.0	0.0	0.0	0.0
Economic Framework	17.0	15.1	17.7	16.4	16.2	20.9	16.6	13.0	9.0	7.3
Natural Resources	1.7	1.8	2.1	3.0	2.9	2.3	3.8	2.7	1.1	1.1
Division 3: Society	63.4	65.0	59.8	57.9	58.7	49.7	50.7	44.3	71.5	71.2
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	11.8	11.8	13.2	15.0	15.6	8.8	9.2	7.9	51.7	52.0
Education and Training	33.5	31.9	18.3	14.4	13.4	10.6	13.7	13.9	11.7	10.9
Social Development and Community Services	18.1	21.3	28.3	28.4	29.7	30.4	27.7	22.5	8.1	8.2
Division 4: Environment	5.4	1.7	2.1	2.6	2.9	3.7	6.2	7.8	2.5	2.6
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	2.3	0.4	0.5	1.1	1.4	1.9	3.8	4.2	0.9	1.3
Environmental Aspects of Development	2.9	0.1	0.1	0.3	0.2	0.4	0.3	2.2	1.1	0.8
Environmental and Other Aspects	0.1	1.2	1.5	1.2	1.2	1.5	2.1	1.4	0.5	0.5
Division 5: Advancement of Knowledge	2.1	6.7	8.4	10.4	8.6	7.6	2.8	12.2	3.9	6.7
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	0.0	0.3	0.4	0.2	0.2	0.2	0.4	7.7	1.5	5.4
Social Sciences and Humanities	2.1	6.4	7.9	10.2	8.4	7.3	2.4	4.5	2.4	1.3
Total	100	100	100	100	100	100	100	100	100	100

**Table C.68: Not-for-profit sector R&D expenditure by province (2004/05 to 2013/14)**

PROVINCE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	8 151	6 589	4 850	6 164	6 790	8 136	9 790	9 493	25 610	25 478
Free State	4 301	3 687	1 974	1 255	4 763	4 418	6 385	5 096	15 297	15 963
Gauteng	82 581	104 002	102 141	115 499	126 136	104 420	61 496	69 321	162 866	175 651
KwaZulu-Natal	37 729	35 036	42 902	42 141	40 492	30 548	35 765	33 740	163 221	166 603
Limpopo	4 201	5 329	3 979	4 602	5 138	4 524	4 541	7 449	11 779	13 719
Mpumalanga	9 029	10 238	9 131	9 930	10 332	8 311	13 206	16 027	23 195	26 979
North-West	4 810	3 547	1 974	2 207	2 339	2 382	5 612	6 353	42 960	72 446
Northern Cape	1 298	1 650	1 736	2 038	2 159	4 493	2 030	1 889	3 867	3 583
Western Cape	46 169	56 436	43 852	39 367	42 500	21 609	24 003	21 236	55 038	82 753
Total	198 268	226 514	212 538	223 203	240 649	188 840	162 830	170 605	503 833	583 165

**Table C.69: Proportional not-for-profit sector R&D expenditure by province (2004/05 to 2013/14)**

PROVINCE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	4.1	2.9	2.3	2.8	2.8	4.3	6.0	5.6	5.1	4.4
Free State	2.2	1.6	0.9	0.6	2.0	2.3	3.9	3.0	3.0	2.7
Gauteng	41.7	45.9	48.1	51.7	52.4	55.3	37.8	40.6	32.3	30.1
KwaZulu-Natal	19.0	15.5	20.2	18.9	16.8	16.2	22.0	19.8	32.4	28.6
Limpopo	2.1	2.4	1.9	2.1	2.1	2.4	2.8	4.4	2.3	2.4
Mpumalanga	4.6	4.5	4.3	4.4	4.3	4.4	8.1	9.4	4.6	4.6
North-West	2.4	1.6	0.8	1.0	0.9	2.4	3.4	1.1	8.5	12.4
Northern Cape	0.7	0.7	0.9	0.9	1.0	1.3	1.2	3.7	0.8	0.6
Western Cape	23.3	24.9	20.6	17.6	17.7	11.4	14.7	12.4	10.9	14.2
Total	100	100	100	100	100	100	100	100	100	100

**Table C.70: Not-for-profit sector R&D personnel in headcounts and full-time equivalents by occupation (2004/05 to 2013/14)**

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
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
2013/14	1017	435	205	377	891.4	338.4	195.1	357.9

**Table C.71: Not-for-profit sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2011/12, 2012/13 and 2013/14)**

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTEs AS % OF HEADCOUNTS
2011/12	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
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
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	435	202	233	338.4	155.6	182.9	77.8
Technicians directly supporting R&D	205	74	131	195.1	68.0	127.1	86.5
Other personnel directly supporting R&D	377	81	296	357.9	77.9	280.0	95.2
Total	1017	357	660	891.4	301.4	590.0	94.9

**Table C.72: Not-for-profit sector R&D personnel in headcounts by occupation, qualification, population group and gender (2013/14)**

OCCUPATION AND QUALIFICATION	Total	SUB TOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	435	202	233	71	74	14	25	18	28	99	106
Doctoral degree or equivalent	106	66	40	14	8	2	4	6	6	44	22
Masters, honours, bachelor or equivalent	302	130	172	53	55	12	19	12	20	53	78
Diplomas	27	6	21	4	11	0	2	0	2	2	6
Technicians directly supporting R&D	205	74	131	44	69	5	15	6	28	19	19
Doctoral degree or equivalent	2	1	1	0	0	0	0	0	0	1	1
Masters, honours, bachelor or equivalent	86	23	63	9	28	1	7	2	14	11	14
Diplomas	117	50	67	35	41	4	8	4	14	7	4
Other personnel directly supporting R&D	377	81	296	62	198	3	27	10	35	6	36
Doctoral degree or equivalent	4	1	3	0	0	0	1	0	1	1	1
Masters, honours, bachelor or equivalent	160	35	125	26	70	2	10	4	24	3	21
Diplomas	213	45	168	36	128	1	16	6	10	2	14
Total	1017	357	660	177	341	22	67	34	91	124	161

# [TABLE C.2.3]

## GOVERNMENT SECTOR

**Table C.73: Government sector R&D expenditure by type of research (2004/05 to 2013/14)**

TYPE OF RESEARCH	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	107 912	213 351	224 774	322 270	357 786	257 806	257 235	263 380	331 587	245 167
Applied research	319 040	459 042	521 845	599 162	601 688	621 762	600 205	812 067	873 469	1 194 866
Experimental research	88 379	172 247	274 736	232 967	180 202	187 734	153 900	160 223	232 453	257 118
Total	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	1 697 151

**Table C.74: Proportional government sector R&D expenditure by type of research (2004/05 to 2013/14)**

TYPE OF RESEARCH	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Basic research	20.9	25.3	22.0	27.9	31.4	24.2	25.4	21.3	23.1	14.4
Applied research	61.9	54.3	51.1	51.9	52.8	58.3	59.3	65.7	60.8	70.4
Experimental research	17.1	20.4	26.9	20.2	15.8	17.6	15.2	13.0	16.2	15.1
Total	100	100	100	100	100	100	100	100	100	100

**Table C.75: Government sector R&D expenditure by spheres and institutes of government and accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	14 959	65 541	59 418
Capital expenditure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	144	18 605	23 033
Land, buildings and other structures	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5 400	10 000
Vehicles, plant, machinery, equipment	N/A	N/A	N/A	N/A	N/A	N/A	N/A	144	13 205	13 033
Current expenditure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14 815	46 936	36 385
Labour costs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12 715	30 131	27 513
Other current expenditure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2 100	16 805	8 872
Provincial departments	131 230	167 328	174 860	253 418	232 062	245 031	284 539	335 607	372 231	249 705
Capital expenditure	35 508	21 912	12 706	37 336	24 249	39 748	30 475	42 895	45 895	17 540
Land, buildings and other structures	13 779	9 196	4 495	8 681	2 515	11 238	13 022	10 674	7 255	2 122
Vehicles, plant, machinery, equipment	21 729	12 716	8 211	28 655	21 734	28 510	17 453	32 221	38 640	15 418
Current expenditure	95 722	145 416	162 154	216 082	207 813	205 283	254 064	292 712	326 336	232 165
Labour costs	78 489	76 598	100 676	135 695	129 187	138 397	182 175	206 583	236 367	198 440
Other current expenditure	17 233	68 818	61 478	80 387	78 626	66 886	71 889	86 129	89 969	33 725
National departments	268 843	304 709	489 971	499 085	287 333	240 412	211 176	280 005	321 632	390 301
Capital expenditure	44 144	55 321	48 920	22 507	9 340	2 022	38 629	31 879	32 669	45 930
Land, buildings and other structures	30 000	67	3 701	0	1 107	500	3 657	11 820	12 783	6 348
Vehicles, plant, machinery, equipment	14 144	55 254	45 219	22 507	8 233	1 522	34 972	20 059	19 886	39 582
Current expenditure	224 699	249 388	441 051	476 578	277 993	238 390	172 547	248 126	288 963	344 371
Labour costs	91 508	51 747	158 890	120 257	98 791	81 619	144 779	140 146	158 808	233 321
Other current expenditure	133 191	197 641	282 161	356 321	179 202	156 771	27 768	107 980	130 155	111 050
Government research institutes	91 607	342 433	327 065	365 468	579 395	553 651	483 999	573 698	644 360	973 807
Capital expenditure	18 196	71 564	57 343	38 837	49 345	168 544	113 395	35 071	157 221	98 010
Land, buildings and other structures	13 603	38 414	31 602	10 225	9 955	115 101	43 360	2 487	58 280	4 542
Vehicles, plant, machinery, equipment	4 593	33 150	25 741	28 612	39 390	53 443	70 035	32 584	98 941	93 468
Current expenditure	73 411	270 869	269 722	326 631	530 050	385 107	370 604	538 627	487 139	875 797
Labour costs	47 749	160 554	148 117	183 167	224 691	245 767	269 965	316 835	355 503	316 256
Other current expenditure	25 662	110 315	121 605	143 464	305 359	139 340	100 639	221 792	131 636	559 541
Museums	23 651	30 170	29 459	36 428	40 886	28 208	31 626	31 400	33 745	23 920
Capital expenditure	1 211	2 437	1 908	1 644	4 002	4 087	3 699	3 256	649	946
Land, buildings and other structures	21	91	481	460	2 331	2 491	2 141	2 337	30	638
Vehicles, plant, machinery, equipment	1 190	2 346	1 427	1 184	1 671	1 596	1 558	919	619	308
Current expenditure	22 440	27 733	27 551	34 784	36 884	24 121	27 927	28 144	33 096	22 974
Labour costs	18 743	23 060	20 197	25 041	27 141	17 839	20 814	21 413	25 471	20 769
Other current expenditure	3 697	4 673	7 354	9 743	9 743	6 282	7 113	6 731	7 625	2 205
Total government sector	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	1 697 151
Capital expenditure	99 059	151 234	120 877	100 324	86 936	214 401	186 198	113 245	255 039	185 459
Land, buildings and other structures	57 403	47 768	40 279	19 366	15 908	129 330	62 180	27 318	83 748	23 650
Vehicles, plant, machinery, equipment	41 656	103 466	80 598	80 958	71 028	85 071	124 018	85 927	171 291	161 809
Current expenditure	416 272	693 406	900 478	1 054 075	1 052 740	852 901	825 142	1 122 424	1 182 470	1 511 692
Labour costs	236 489	311 959	427 880	464 160	479 810	483 622	617 733	697 692	806 280	796 299
Other current expenditure	179 783	381 447	472 598	589 915	572 930	369 279	207 409	424 732	376 190	715 393

**Table C.76: Proportional government sector R&D expenditure by spheres and institutes of government and accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Municipalities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100	100	100
Capital expenditure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.0	28.4	38.8
Land, buildings and other structures	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0	8.2	16.8
Vehicles, plant, machinery, equipment	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.0	20.1	21.9
Current expenditure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	99.0	71.6	61.2
Labour costs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	85.0	46.0	46.3
Other current expenditure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14.0	25.6	14.9
Provincial departments	100	100	100	100	100	100	100	100	100	100
Capital expenditure	27.1	13.1	7.3	14.7	10.4	16.2	10.7	12.8	12.3	7.0
Land, buildings and other structures	10.5	5.5	2.6	3.4	1.1	4.6	4.6	3.2	1.9	0.8
Vehicles, plant, machinery, equipment	16.6	7.6	4.7	11.3	9.4	11.6	6.1	9.6	10.4	6.2
Current expenditure	72.9	86.9	92.7	85.3	89.6	83.8	89.3	87.2	87.7	93.0
Labour costs	59.8	45.8	57.6	53.5	55.7	56.5	64.0	61.6	63.5	79.5
Other current expenditure	13.1	41.1	35.2	31.7	33.9	27.3	25.3	25.7	24.2	13.5
National departments	100	100	100	100	100	100	100	100	100	100
Capital expenditure	16.4	18.2	10.0	4.5	3.3	0.8	18.3	11.4	10.2	11.8
Land, buildings and other structures	11.2	0.0	0.8	0.0	0.4	0.2	1.7	4.2	4.0	1.6
Vehicles, plant, machinery, equipment	5.3	18.1	9.2	4.5	2.9	0.6	16.6	7.2	6.2	10.1
Current expenditure	83.6	81.8	90.0	95.5	96.7	99.2	81.7	88.6	89.8	88.2
Labour costs	34.0	17.0	32.4	24.1	34.4	33.9	68.6	50.1	49.4	59.8
Other current expenditure	49.5	64.9	57.6	71.4	62.4	65.2	13.1	38.6	40.5	28.5
Government research institutes	100	100	100	100	100	100	100	100	100	100
Capital expenditure	19.9	20.9	17.5	10.6	8.5	30.4	23.4	6.1	24.4	10.1
Land, buildings and other structures	14.8	11.2	9.7	2.8	1.7	20.8	9.0	0.4	9.0	0.5
Vehicles, plant, machinery, equipment	5.0	9.7	7.9	7.8	6.8	9.7	14.5	5.7	15.4	9.6
Current expenditure	80.1	79.1	82.5	89.4	91.5	69.6	76.6	93.9	75.6	89.9
Labour costs	52.1	46.9	45.3	50.1	38.8	44.4	55.8	55.2	55.2	32.5
Other current expenditure	28.0	232.2	37.2	39.3	52.7	25.2	20.8	38.7	20.4	57.5
Museums	100	100	100	100	100	100	100	100	100	100
Capital expenditure	5.1	8.1	6.5	4.5	9.8	14.5	11.7	10.4	1.9	4.0
Land, buildings and other structures	0.1	0.3	1.6	1.3	5.7	8.8	6.8	7.4	0.1	2.7
Vehicles, plant, machinery, equipment	5.0	7.8	4.8	3.3	4.1	5.7	4.9	2.9	1.8	1.3
Current expenditure	94.9	91.9	93.5	95.5	90.2	85.5	88.3	89.6	98.1	96.0
Labour costs	79.2	76.4	68.6	68.7	66.4	63.2	65.8	68.2	75.5	86.8
Other current expenditure	15.6	15.5	25.0	26.7	23.8	22.3	22.5	21.4	22.6	9.2
Total government sector	100	100	100	100	100	100	100	100	100	100
Capital expenditure	19.2	17.9	11.8	8.7	7.6	20.1	18.4	9.2	17.7	10.9
Land, buildings and other structures	11.1	5.7	3.9	1.7	1.4	12.1	6.1	2.2	5.8	1.4
Vehicles, plant, machinery, equipment	8.1	12.2	7.9	7.0	6.2	8.0	12.3	7.0	11.9	9.5
Current expenditure	80.8	82.1	88.2	91.3	92.4	79.9	81.6	90.8	82.3	89.1
Labour costs	45.9	36.9	41.9	40.2	42.1	45.3	61.1	56.5	56.1	46.9
Other current expenditure	34.9	45.2	46.3	51.1	50.3	34.6	20.5	34.4	26.2	42.2



**Table C.77: Government sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	97 816
Nanotechnology	0	0	0	4 652	0	4 196	4 609	15 035	16 929
Total	9 624	21 911	8 639	26 381	32 496	218 013	86 602	139 464	114 745
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	1 697 151

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

**Table C.78: Proportional government sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Biotechnology	1.1	2.1	0.7	1.9	3.0	21.1	6.6	8.7	5.8
Nanotechnology	0.0	0.0	0.0	0.4	0.0	0.4	0.4	1.0	1.0
Total	1.1	2.1	0.7	2.3	3.0	21.5	7.0	9.7	6.8

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

**Table C.79: Government sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	194 564
Open-source software	3	4	21 494	4 658	7 238	7 261	1 345	1 501	0
New materials	686	1 054	630	726	7 156	26 166	4 107	28 708	30 945
Tuberculosis (TB), HIV/AIDS, malaria	8 775	64 750	263	240	199 977	174 382	167 522	132 264	380 640
Total	9 464	65 808	22 387	5 624	214 371	207 809	282 748	332 777	411 585
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	1 697 151

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.80: Proportional government sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	8.9	11.8	11.5
Open-source software	0.0	0.0	1.9	0.4	0.7	0.7	0.1	0.1	0.0
New materials	0.1	0.1	0.1	0.1	0.7	2.6	0.3	2.0	1.8
Tuberculosis (TB), HIV/AIDS, malaria	1.0	6.3	0.0	0.0	18.7	17.2	13.6	9.2	22.4
Total	1.1	6.4	1.9	0.5	20.1	20.5	22.9	23.1	24.3

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.81: Government sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	450 456	661 594	808 404	874 425	824 394	806 995	634 237	863 949	1 045 006	1 359 179
Mathematical sciences	17 562	21 496	24 823	20 643	20 704	24 441	22 811	2 349	1 076	1 525
Physical sciences	8 256	27 205	24 726	45 052	45 804	12 093	0	0	5 064	0
Chemical sciences	8 709	10 711	16 622	22 672	17 009	21 698	10 653	1 223	21 823	19 394
Earth sciences	32 795	100 743	109 959	161 815	163 156	47 624	42 081	39 303	90 571	65 501
Information, computer and communication technologies	14 180	42 093	56 323	82 123	22 191	28 176	31 960	15 642	7 760	8 431
Applied sciences and technologies	4 581	17 328	31 603	15 286	15 852	9 315	4 154	10 183	32 467	23 216
Engineering sciences	9 663	10 355	26 008	14 164	11 487	14 996	4 165	4 515	10 430	11 853
Biological sciences	53 988	79 402	99 841	113 409	125 152	54 893	85 990	94 662	111 871	138 000
Agricultural sciences	174 756	156 538	170 347	208 662	200 598	274 781	225 441	362 241	460 921	397 687
Medical and health sciences	84 629	137 909	187 741	173 929	180 260	288 488	168 400	270 312	211 840	594 684
Environmental sciences	19 790	39 867	40 851	8 589	11 675	10 722	9 147	34 231	54 394	55 245
Material sciences	0	150	158	637	640	0	0	4 107	9 771	10 537
Marine sciences	21 547	17 797	19 402	7 445	9 866	19 768	29 434	25 182	27 019	33 106
Division 2: Social Sciences and Humanities	64 875	183 047	212 951	279 974	315 282	260 308	377 103	371 720	392 503	337 972
Social sciences	59 831	139 536	189 155	235 299	268 058	249 155	363 055	358 892	383 172	326 603
Humanities	5 044	43 511	23 796	44 676	47 225	11 152	14 048	12 828	9 331	11 369
Total	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	1 697 151

**Table C.82: Proportional government sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	87.4	78.3	79.2	75.7	72.3	75.6	62.7	69.9	72.7	80.1
Mathematical sciences	3.4	2.5	2.4	1.8	1.8	2.3	2.3	0.2	0.1	0.1
Physical sciences	1.6	3.2	2.4	3.9	4.0	1.1	0.0	0.0	0.4	0.0
Chemical sciences	1.7	1.3	1.6	2.0	1.5	2.0	1.1	0.1	1.5	1.1
Earth sciences	6.4	11.9	10.8	14.0	14.3	4.5	4.2	3.2	6.3	3.9
Information, computer and communication technologies	2.8	5.0	5.5	7.1	1.9	2.6	3.2	1.3	0.5	0.5
Applied sciences and technologies	0.9	2.1	3.1	1.3	1.4	0.9	0.4	0.8	2.3	1.4
Engineering sciences	1.9	1.2	2.5	1.2	1.0	1.4	0.4	0.4	0.7	0.7
Biological sciences	10.5	9.4	9.8	9.8	11.0	5.1	8.5	7.7	7.8	8.1
Agricultural sciences	33.9	18.5	16.7	18.1	17.6	25.7	22.3	29.3	32.1	23.4
Medical and health sciences	16.4	16.3	18.4	15.1	15.8	27.0	16.7	21.9	14.7	35.0
Environmental sciences	3.8	4.7	4.0	0.7	1.0	1.0	0.9	2.8	3.8	3.3
Material sciences	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.7	0.6
Marine sciences	4.2	2.1	1.9	0.6	0.9	1.9	2.9	2.0	1.9	2.0
Division 2: Social Sciences and Humanities	12.6	21.7	20.8	24.3	27.7	24.4	37.3	30.1	27.3	19.9
Social sciences	11.6	16.5	18.5	20.4	23.5	23.3	35.9	29.0	26.7	19.2
Humanities	1.0	5.2	2.3	3.9	4.1	1.0	1.4	1.0	0.6	0.7

**Table C.83: Government sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	237	0	50 000	0	0	0	2 303	2 736	19 314	21 118
Defence	237	0	50 000	0	0	0	2 303	2 736	19 314	21 118
Division 2: Economic Development	245 493	322 819	350 497	429 646	373 251	438 114	500 343	469 129	480 373	510 688
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant Production And Plant Primary Products	57 072	54 523	45 951	79 290	66 503	63 570	64 400	70 754	100 956	89 446
Animal Production and Animal Primary Products	57 955	61 778	66 655	79 997	78 619	84 842	91 877	86 710	93 504	137 279
Mineral Resources (Excluding Energy)	0	0	0	0	0	0	0	0	0	311
Energy Resources	0	0	0	0	0	0	37	0	0	1 023
Energy Supply	0	8 095	8 905	14 290	12 387	2 522	6 154	10 552	7 193	8 482
Manufacturing	0	75	79	318	320	5 444	15 870	1 005	1 557	1 544
Construction	620	3 386	3 911	3 219	2 484	0	148	9 545	543	741
Transport	3 140	12 833	21 710	15 386	12 073	4 369	9 377	10 964	8 774	1 672
Information and Communication Services	6 068	39 357	32 858	69 318	11 965	13 244	44 257	20 590	5 678	5 515
Commercial Services	815	4 686	4 908	6 897	2 405	9 957	7 471	4 708	3 587	12 162
Economic Framework	35 748	74 563	76 965	98 537	105 080	161 326	187 931	157 364	161 541	116 604
Natural Resources	84 076	63 524	88 558	62 394	81 415	92 838	72 820	96 938	97 042	135 909
Division 3: Society	189 241	261 335	341 911	265 948	285 961	326 691	341 387	538 749	592 285	872 096
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	76 373	92 858	150 704	69 493	74 784	77 845	106 522	221 435	171 741	487 130
Education and Training	94 694	97 773	112 042	111 407	127 907	158 579	42 234	69 185	116 788	165 906
Social Development and Community Services	18 174	70 705	79 165	85 048	83 270	90 268	192 630	248 129	303 756	219 061
Division 4: Environment	48 560	99 112	105 792	103 372	99 985	72 614	85 347	130 742	199 677	172 006
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental Knowledge	37 663	67 106	74 710	71 734	83 429	45 360	40 610	83 089	137 679	124 445
Environmental Aspects of Development	5 252	8 995	8 112	20 797	12 424	18 153	27 635	38 467	51 795	38 877
Environmental and Other Aspects	5 645	23 011	22 970	10 841	4 132	9 101	17 102	9 186	10 204	8 684
Division 5: Advancement of Knowledge	31 800	161 373	173 155	355 434	380 480	229 883	81 960	94 314	145 860	121 243
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural Sciences, Technologies and Engineering	22 797	120 247	149 847	324 409	333 561	205 995	50 968	61 357	120 173	96 381
Social Sciences and Humanities	9 002	41 127	23 309	31 025	46 919	23 888	30 992	32 956	25 687	24 862
Total	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	1 697 151

**Table C.84: Proportional government sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	0.0	0.0	4.9	0.0	0.0	0.0	0.2	0.2	1.3	1.2
Defence	0.0	0.0	4.9	0.0	0.0	0.0	0.2	0.2	1.3	1.2
Division 2: Economic Development	47.6	38.2	34.3	37.2	32.8	41.0	49.5	38.0	33.4	30.1
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	11.1	6.5	4.5	6.9	5.8	6.0	6.4	5.7	7.0	5.3
Animal Production and Animal Primary Products	11.2	7.3	6.5	6.9	6.9	7.9	9.1	7.0	6.5	8.1
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	0.1
Energy Supply	0.0	1.0	0.9	1.2	1.1	0.2	0.6	0.9	0.5	0.5
Manufacturing	0.0	0.0	0.0	0.0	0.0	0.5	1.6	0.1	0.1	0.1
Construction	0.1	0.4	0.4	0.3	0.2	0.0	0.0	0.8	0.0	0.0
Transport	0.6	1.5	2.1	1.3	1.1	0.4	0.9	0.9	0.6	0.1
Information and Communication Services	1.2	4.7	3.2	6.0	1.0	1.2	4.4	1.7	0.4	0.3
Commercial Services	0.2	0.6	0.5	0.6	0.2	0.9	0.7	0.4	0.2	0.7
Economic Framework	6.9	8.8	7.5	8.5	9.2	15.1	18.6	12.7	11.2	6.9
Natural Resources	16.3	7.5	8.7	5.4	7.1	8.7	7.2	7.8	6.8	8.0
Division 3: Society	36.7	30.9	33.5	23.0	25.1	30.6	33.8	43.6	41.2	51.4
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	14.8	11.0	14.8	6.0	6.6	7.3	10.5	17.9	11.9	28.7
Education and Training	18.4	11.6	11.0	9.7	11.2	14.9	4.2	5.6	8.1	9.8
Social Development and Community Services	3.5	8.4	7.8	7.4	7.3	8.5	19.0	20.1	21.1	12.9
Division 4: Environment	9.4	11.7	10.4	9.0	8.8	6.8	8.4	10.6	13.9	10.1
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	7.3	7.9	7.3	6.2	7.3	4.2	4.0	6.7	9.6	7.3
Environmental Aspects of Development	1.0	1.1	0.8	1.8	1.1	1.7	2.7	3.1	3.6	2.3
Environmental and Other Aspects	1.1	2.7	2.2	0.9	0.4	0.9	1.7	0.7	0.7	0.5
Division 5: Advancement of Knowledge	6.2	19.1	17.0	30.8	33.4	21.5	8.1	7.6	10.1	7.1
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	4.4	14.2	14.7	28.1	29.3	19.3	5.0	5.0	8.4	5.7
Social Sciences and Humanities	1.7	4.9	2.3	2.7	4.1	2.2	3.1	2.7	1.8	1.5
Total	100	100	100	100	100	100	100	100	100	100

**Table C.85: Government sector R&D expenditure by province (2004/05 to 2013/14)**

PROVINCE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	77 762	84 071	109 779	122 191	107 929	100 100	114 127	127 415	194 258	133 657
Free State	24 962	41 856	69 314	62 116	58 697	46 155	39 998	44 200	38 659	55 095
Gauteng	151 197	291 639	321 176	292 757	264 273	396 124	343 096	447 635	427 173	689 915
KwaZulu-Natal	31 213	72 131	84 192	76 458	115 302	54 914	48 056	126 857	168 029	161 962
Limpopo	9 568	15 917	31 118	40 217	55 252	60 421	57 797	65 017	74 621	95 668
Mpumalanga	29 240	36 001	50 568	74 690	39 103	68 796	69 980	78 335	80 201	77 479
North-West	13 401	20 857	32 889	42 500	70 741	29 176	43 048	44 618	45 573	47 576
Northern Cape	46 075	42 539	64 733	66 921	52 907	77 978	58 918	63 556	75 440	61 932
Western Cape	131 912	239 630	257 586	376 550	375 473	233 639	236 320	238 035	333 555	347 869
Total	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	1 697 151

**Table C.86: Proportional government sector R&D expenditure by province (2004/05 to 2013/14)**

PROVINCE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	15.1	10.0	10.7	10.6	9.5	9.4	11.3	10.3	13.5	7.9
Free State	4.8	5.0	6.8	5.4	5.2	4.3	4.0	3.6	2.7	3.2
Gauteng	29.3	34.5	31.4	25.4	23.2	37.1	33.9	36.2	29.7	40.7
KwaZulu-Natal	6.1	8.5	8.2	6.6	10.1	5.1	4.8	10.3	11.7	9.5
Limpopo	1.9	1.9	3.0	3.5	4.8	5.7	5.7	5.3	5.2	5.6
Mpumalanga	5.7	4.3	5.0	6.5	3.4	6.4	6.9	6.3	5.6	4.6
North-West	2.6	2.5	3.2	3.7	6.2	2.7	4.3	3.6	3.2	4.3
Northern Cape	8.9	5.0	6.3	5.8	4.6	7.3	5.8	5.1	5.2	3.6
Western Cape	25.6	28.4	25.2	32.6	32.9	21.9	23.4	19.3	23.2	20.5
Total	100	100	100	100	100	100	100	100	100	100

**Table C.87: Government sector R&D personnel in headcounts and full-time equivalents by occupation (2004/05 to 2013/14)**

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
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
2013/14	2874	1229	518	1127	2 245.5	923.7	366.3	955.4

**Table C.88: Government sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2011/12, 2012/13 and 2013/14)**

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTE AS % OF HEADCOUNTS
2011/12	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	
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	1862	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
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	1 229	586	643	923.7	456.8	466.9	75.2
Technicians directly supporting R&D	518	280	238	366.3	206.0	160.3	70.7
Other personnel directly supporting R&D	1 127	746	381	955.4	650.8	304.7	84.8
Total	2 874	1 612	1 262	2 245.5	1 313.6	931.9	78.1

**Table C.89: Government sector R&D personnel in headcounts by occupation, qualification, population group and gender (2013/14)**

OCCUPATION AND QUALIFICATION	Total	SUB TOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	1229	586	643	251	248	51	64	34	65	250	266
Doctoral degree or equivalent	309	172	137	32	15	12	8	10	16	118	98
Masters, honours, bachelor or equivalent	896	403	493	213	228	39	52	23	48	128	165
Diplomas	24	11	13	6	5	0	4	1	1	4	3
Technicians directly supporting R&D	518	280	238	151	126	34	20	13	16	82	76
Doctoral degree or equivalent	16	10	6	4	1	2	1	1	3	3	1
Masters, honours, bachelor or equivalent	286	151	135	87	85	11	8	10	7	43	35
Diplomas	216	119	97	60	40	21	11	2	6	36	40
Other personnel directly supporting R&D	1127	747	380	516	249	183	57	4	9	44	65
Doctoral degree or equivalent	1	0	1	0	0	0	0	0	0	0	1
Masters, honours, bachelor or equivalent	49	23	26	8	16	2	1	2	2	11	7
Diplomas	1077	724	358	508	233	181	56	2	7	33	57
Total	2 874	1 613	1 261	918	623	268	141	51	90	376	407



# [TABLE C.2.4]

## SCIENCE COUNCIL SECTOR

**Table C.90: Science council sector R&D expenditure by type of research (2004/05 to 2013/14)**

TYPE OF RESEARCH	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	379 044	522 861	647 191	804 731	776 406	776 505	871 635	900 830	937 826	970 785
Applied research	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	2 114 943
Experimental research	588 236	560 254	768 531	766 593	976 077	1 129 009	1 192 825	1 072 693	1 202 689	1 218 827
Total	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	4 304 556

**Table C.91: Proportional science council sector R&D expenditure by type of research (2004/05 to 2013/14)**

TYPE OF RESEARCH	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Basic research	19.0	24.9	23.6	27.9	24.7	22.5	24.2	24.2	23.3	22.6
Applied research	51.5	48.5	48.4	45.6	44.1	44.9	42.6	47.1	46.8	49.1
Experimental research	29.5	26.7	28.0	26.6	31.1	32.6	33.2	28.8	29.9	28.3
Total	100	100	100	100	100	100	100	100	100	100

**Table C.92: Science council sector R&D expenditure by accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'001
<b>Capital expenditure</b>	<b>127 465</b>	<b>209 013</b>	<b>212 625</b>	<b>205 857</b>	<b>383 927</b>	<b>452 801</b>	<b>291 830</b>	<b>323 070</b>	<b>275 750</b>	<b>323 190</b>
Land, buildings and other structures	29 299	132 485	53 713	30 704	61 063	107 455	56 141	65 442	68 565	71 602
Vehicles, plant, machinery, equipment	98 166	76 528	158 912	175 153	322 864	345 346	235 689	257 628	207 185	251 588
<b>Current expenditure</b>	<b>1 868 585</b>	<b>1 893 081</b>	<b>2 532 093</b>	<b>2 680 237</b>	<b>2 753 416</b>	<b>3 005 273</b>	<b>3 304 193</b>	<b>3 406 610</b>	<b>3 750 248</b>	<b>3 981 366</b>
Labour costs	968 610	875 467	1 162 633	1 250 480	1 283 210	1 413 128	1 293 033	1 531 460	2 053 204	2 187 401
Other current expenditure	899 975	1 017 614	1 369 460	1 429 757	1 470 206	1 592 145	2 011 160	1 875 150	1 697 044	1 793 965
Total	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	4 304 556

**Table C.93: Proportional science council sector R&D expenditure by accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
<b>Capital expenditure</b>	<b>6.4</b>	<b>9.9</b>	<b>7.7</b>	<b>7.1</b>	<b>12.2</b>	<b>13.1</b>	<b>8.1</b>	<b>8.7</b>	<b>6.8</b>	<b>7.5</b>
Land, buildings and other structures	1.5	6.3	2.0	1.1	1.9	3.1	1.6	1.8	1.7	1.7
Vehicles, plant, machinery, equipment	4.9	3.6	5.8	6.1	10.3	10.0	6.6	6.9	5.1	5.8
<b>Current expenditure</b>	<b>93.6</b>	<b>90.1</b>	<b>92.3</b>	<b>92.9</b>	<b>87.8</b>	<b>86.9</b>	<b>91.9</b>	<b>91.3</b>	<b>93.2</b>	<b>92.5</b>
Labour costs	48.5	41.6	42.4	43.3	40.9	40.9	36.0	41.1	51.0	50.8
Other current expenditure	45.1	48.4	49.9	49.5	46.9	46.0	55.9	50.3	42.2	41.7
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**Table C.94: Science council sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	143 868
Nanotechnology	11 130	14 031	47 802	173 834	117 215	101 386	102 007	118 555	114 990
<b>Total</b>	<b>140 406</b>	<b>236 221</b>	<b>264 094</b>	<b>381 084</b>	<b>301 058</b>	<b>301 320</b>	<b>310 473</b>	<b>264 226</b>	<b>258 857</b>
Science Council's 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	4 304 556

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

**Table C.95: Proportional science council sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Biotechnology	6.1	8.1	7.5	6.6	5.3	5.6	5.6	3.6	3.3
Nanotechnology	0.5	0.5	1.7	5.5	3.4	2.8	2.7	2.9	2.7
<b>Total</b>	<b>6.7</b>	<b>8.6</b>	<b>9.2</b>	<b>12.1</b>	<b>8.7</b>	<b>8.4</b>	<b>8.3</b>	<b>6.6</b>	<b>6.0</b>

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

**Table C.96: Science council sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	297 097
Open-source software	6 035	27 510	77 885	67 833	15 013	7 228	15 982	36 636	N/A
New materials	40 343	82 990	64 131	157 134	94 304	201 071	197 430	751 305	229 854
Tuberculosis (TB), HIV/AIDS, malaria	170 000	180 104	233 917	490 982	333 841	386 948	399 070	455 311	398 880
Total	216 378	290 604	375 933	715 949	443 158	595 247	1 382 821	1 622 034	925 831
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	4 304 556

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.97: Proportional science council sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	20.7	9.4	6.9
Open-source software	0.3	1.0	2.7	2.2	0.4	0.2	0.4	0.9	0.0
New materials	1.9	3.0	2.2	5.0	2.7	5.6	5.3	18.7	5.3
Tuberculosis (TB), HIV/AIDS, malaria	8.1	6.6	8.1	15.6	9.7	10.8	10.7	11.3	9.3
Total	10.3	10.6	13.0	22.8	12.8	16.6	37.1	40.3	21.5

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.98: Science council sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	1 829 632	1 922 728	2 530 246	2 623 455	2 916 350	3 258 392	3 414 985	3 517 520	3 819 642	4 109 105
Mathematical sciences	13 629	20 564	27 129	35 551	40 632	37 678	113 396	117 637	134 046	128 291
Physical sciences	58 292	114 723	126 542	93 583	115 737	87 221	97 922	120 267	123 267	129 568
Chemical sciences	28 710	21 494	33 774	37 430	44 271	49 462	8 074	20 972	14 078	18 166
Earth sciences	96 474	96 410	130 879	147 427	167 463	179 999	94 642	100 921	112 406	110 092
Information, computer and communication technologies	141 363	82 238	133 328	212 796	201 731	265 191	161 282	168 115	181 521	182 402
Applied sciences and technologies	63 696	78 065	126 107	138 849	139 267	153 830	924 104	954 616	1 092 098	1 046 934
Engineering sciences	450 079	451 924	642 923	643 349	863 084	947 315	365 980	278 125	292 940	349 666
Biological sciences	208 812	265 202	306 056	175 592	171 810	200 625	437 938	425 036	485 673	482 728
Agricultural sciences	393 682	387 569	521 454	566 561	442 060	647 750	479 449	582 438	594 638	859 600
Medical and health sciences	237 103	270 090	340 764	358 726	447 479	440 895	428 642	443 156	426 520	430 472
Environmental sciences	61 022	56 259	72 191	85 414	101 920	112 327	273 283	284 116	330 667	326 122
Material sciences	65 398	69 742	51 020	108 068	155 529	106 411	23 199	15 462	22 905	35 093
Marine sciences	11 372	8 448	18 078	20 108	25 368	29 689	7 073	6 656	8 885	9 970
Division 2: Social Sciences and Humanities	166 418	179 366	214 472	262 639	220 993	199 682	181 038	212 160	206 356	195 452
Social sciences	148 758	165 557	194 040	238 019	194 646	182 431	164 954	190 845	186 132	173 407
Humanities	17 660	13 809	20 432	24 620	26 347	17 250	16 084	21 315	20 224	22 044
Total	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	4 304 556

**Table C.99: Proportional science council sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	91.7	91.5	92.2	90.9	93.0	94.2	95.0	94.3	94.9	95.5
Mathematical sciences	0.7	1.0	1.0	1.2	1.3	1.1	3.2	3.2	3.3	3.0
Physical sciences	2.9	5.5	4.6	3.2	3.7	2.5	2.7	3.2	3.1	3.0
Chemical sciences	1.4	1.0	1.2	1.3	1.4	1.4	0.2	0.6	0.3	0.4
Earth sciences	4.8	4.6	4.8	5.1	5.3	5.2	2.6	2.7	2.8	2.6
Information, computer and communication technologies	7.1	3.9	4.9	7.4	6.4	7.7	4.5	4.5	4.5	4.2
Applied sciences and technologies	3.2	3.7	4.6	4.8	4.4	4.4	25.7	25.6	27.1	24.3
Engineering sciences	22.5	21.5	23.4	22.3	27.5	27.4	10.2	7.5	7.3	8.1
Biological sciences	10.5	12.6	11.2	6.1	5.5	5.8	12.2	11.4	12.1	11.2
Agricultural sciences	19.7	18.4	19.0	19.6	14.1	18.7	13.3	15.6	14.8	20.0
Medical and health sciences	11.9	12.8	12.4	12.4	14.3	12.7	11.9	11.9	10.6	10.0
Environmental sciences	3.1	2.7	2.6	3.0	3.2	3.2	7.6	7.6	8.2	7.6
Material sciences	3.3	3.3	1.9	3.7	5.0	3.1	0.6	0.4	0.6	0.8
Marine sciences	0.6	0.4	0.7	0.7	0.8	0.9	0.2	0.2	0.2	0.2
Division 2: Social Sciences and Humanities	8.3	8.5	7.8	9.1	7.0	5.8	5.0	5.7	5.1	4.5
Social sciences	7.5	7.9	7.1	8.2	6.2	5.3	4.6	5.1	4.6	4.0
Humanities	0.9	0.7	0.7	0.9	0.8	0.5	0.4	0.6	0.5	0.5
Total	100	100	100	100	100	100	100	100	100	100

**Table C.100: Science council sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	160 864	155 066	260 354	228 603	280 219	311 288	228 376	243 083	279 989	262 203
Defence	160 864	155 066	260 354	228 603	280 219	311 288	228 376	243 083	279 989	262 203
Division 2: Economic Development	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	2 686 504
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant Production And Plant Primary Products	198 256	297 626	332 655	433 850	349 907	485 470	478 437	448 531	473 133	624 675
Animal Production and Animal Primary Products	118 171	72 380	115 649	25 124	18 760	27 043	25 193	280 542	287 431	419 259
Mineral Resources (Excluding Energy)	251 953	286 363	62 585	63 469	67 418	387 531	294 203	202 919	213 007	234 273
Energy Resources	16 916	30 997	51 257	38 979	379 859	32 136	90 342	94 385	108 360	106 823
Energy Supply	542	595	8 033	874	0	0	0	14 715	13 237	2 937
Manufacturing	138 792	110 467	130 396	385 822	225 227	262 443	366 380	351 021	400 864	393 152
Construction	61 761	90 143	149 809	101 232	116 781	129 922	222 124	220 595	256 024	245 333
Transport	41 935	18 401	30 943	33 817	41 260	45 848	0	0	0	0
Information and Communication Services	22 090	18 271	25 177	17 429	24 146	68 506	115 342	127 021	141 495	135 629
Commercial Services	2 086	0	3 546	8 975	19 536	5 465	14 152	15 522	25 053	19 724
Economic Framework	50 045	66 540	85 194	206 878	106 105	84 205	97 367	72 109	70 509	75 411
Natural Resources	154 861	134 867	177 363	244 239	243 111	305 685	407 492	363 738	411 634	429 288
Division 3: Society	324 973	278 222	359 982	368 010	418 385	453 428	388 244	430 876	413 060	425 943
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	203 178	218 941	240 248	272 905	326 340	348 407	310 760	326 500	314 412	316 987
Education and Training	68 755	51 704	56 054	37 449	50 525	65 761	50 676	68 852	64 941	72 216
Social Development and Community Services	53 040	7 577	63 680	57 656	41 520	39 260	26 807	35 525	33 707	36 741
Division 4: Environment	144 737	168 682	225 563	263 325	338 290	355 484	52 334	31 241	39 169	46 559
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental Knowledge	87 752	94 519	120 806	130 041	173 945	190 926	24 043	19 956	22 939	28 295
Environmental Aspects of Development	20 436	43 835	50 877	46 190	59 943	48 262	19 333	8 623	13 665	14 071
Environmental and Other Aspects	36 549	30 328	53 880	87 094	104 402	116 296	8 958	2 662	2 565	4 194
Division 5: Advancement of Knowledge	308 067	373 473	726 212	465 468	508 339	503 621	816 035	833 382	893 033	883 346
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural Sciences, Technologies and Engineering	246 359	306 398	616 487	361 714	407 189	381 098	674 421	694 254	760 107	746 397
Social Sciences and Humanities	61 708	67 076	109 725	103 754	101 150	122 523	141 614	139 127	132 926	136 949
Total	1 996 050	2 102 094	2 744 718	2 886 094	3 137 343	3 458 074	2 596 023	3 729 680	4 025 998	4 304 556

**Table C.101: Proportional science council sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	8.1	7.4	9.5	7.9	8.9	9.0	6.4	6.5	7.0	6.1
Defence	8.1	7.4	9.5	7.9	8.9	9.0	6.4	6.5	7.0	6.1
Division 2: Economic Development	53.0	53.6	42.7	54.1	50.7	53.0	58.7	58.7	59.6	62.4
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	9.9	14.2	12.1	15.0	11.2	14.0	13.3	12.0	11.8	14.5
Animal Production and Animal Primary Products	5.9	3.4	4.2	0.9	0.6	0.8	0.7	7.5	7.1	9.7
Mineral Resources (Excluding Energy)	12.6	13.6	2.3	2.2	2.1	11.2	8.2	5.4	5.3	5.4
Energy Resources	0.8	1.5	1.9	1.4	12.1	0.9	2.5	2.5	2.7	2.5
Energy Supply	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.4	0.3	0.1
Manufacturing	7.0	5.3	4.8	13.4	7.2	7.6	10.2	9.4	10.0	9.1
Construction	3.1	4.3	5.5	3.5	3.7	3.8	6.2	5.9	6.4	5.7
Transport	2.1	0.9	1.1	1.2	1.3	1.3	0.0	0.0	0.0	0.0
Information and Communication Services	1.1	0.9	0.9	0.6	0.8	2.0	3.2	3.4	3.5	3.2
Commercial Services	0.1	0.0	0.1	0.3	0.6	0.2	0.4	0.4	0.6	0.5
Economic Framework	2.5	3.2	3.1	7.2	3.4	2.4	2.7	1.9	1.8	1.8
Natural Resources	7.8	6.4	6.5	8.5	7.7	8.8	11.3	9.8	10.2	10.0
Division 3: Society	16.3	13.2	13.1	12.8	13.3	13.1	10.8	11.6	10.3	9.9
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	10.2	10.4	8.8	9.5	10.4	10.1	8.6	8.8	7.8	7.4
Education and Training	3.4	2.5	2.0	1.3	1.6	1.9	1.4	1.8	1.6	1.7
Social Development and Community Services	2.7	0.4	2.3	2.0	1.3	1.1	0.7	1.0	0.8	0.9
Division 4: Environment	7.3	8.0	8.2	9.1	10.8	10.3	1.5	0.8	1.0	1.1
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	4.4	4.5	4.4	4.5	5.5	5.5	0.7	0.5	0.6	0.7
Environmental Aspects of Development	1.0	2.1	1.9	1.6	1.9	1.4	0.5	0.2	0.3	0.3
Environmental and Other Aspects	1.8	1.4	2.0	3.0	3.3	3.4	0.2	0.1	0.1	0.1
Division 5: Advancement of Knowledge	15.4	17.8	26.5	16.1	16.2	14.6	22.7	22.3	22.2	20.5
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	12.3	14.6	22.5	12.5	13.0	11.0	18.8	18.6	18.9	17.3
Social Sciences and Humanities	3.1	3.2	4.0	3.6	3.2	3.5	3.9	3.7	3.3	3.2
Total	100	100	100	100	100	100	100	100	100	100

**Table C.102: Science council sector R&D expenditure by province (2004/05 to 2013/14)**

PROVINCE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	75 170	123 956	131 126	138 342	171 669	155 501	150 665	178 594	182 664	115 925
Free State	33 725	50 197	52 773	67 901	58 561	74 355	60 443	37 138	39 054	47 271
Gauteng	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	3 062 983
KwaZulu-Natal	171 424	201 811	267 620	201 009	231 033	235 432	249 137	292 246	307 302	239 387
Limpopo	23 887	48 058	69 808	67 562	63 455	78 662	66 250	99 104	105 150	7 286
Mpumalanga	35 580	48 051	69 859	66 333	55 547	66 881	55 690	100 476	103 468	62 349
North-West	43 581	45 751	72 968	49 390	41 541	51 295	42 854	104 139	110 361	39 615
Northern Cape	20 051	64 284	55 676	45 250	43 624	35 253	64 774	81 998	78 714	122 454
Western Cape	280 591	416 702	478 856	441 036	480 059	541 086	578 497	548 223	562 256	607 285
Total	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	4 304 556

**Table C.103: Proportional science council sector R&D expenditure by province (2004/05 to 2013/14)**

PROVINCE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	3.8	5.9	4.8	4.8	5.5	4.5	4.2	4.8	4.5	2.7
Free State	1.7	2.4	1.9	2.4	1.9	2.2	1.7	1.0	1.0	1.1
Gauteng	65.7	52.5	56.3	62.7	63.5	64.2	64.7	61.3	63.0	71.2
KwaZulu-Natal	8.6	9.6	9.8	7.0	7.4	6.8	6.9	7.8	7.6	5.6
Limpopo	1.2	2.3	2.5	2.3	2.0	2.3	1.8	2.7	2.6	0.2
Mpumalanga	1.8	2.3	2.5	2.3	1.8	1.9	1.5	2.7	2.6	1.4
North-West	2.2	2.2	2.7	1.7	1.3	1.5	1.2	2.8	2.7	0.9
Northern Cape	1.0	3.1	2.0	1.6	1.4	1.0	1.8	2.2	2.0	2.8
Western Cape	14.1	19.8	17.4	15.3	15.3	15.6	16.1	14.7	14.0	14.1
Total	100	100	100	100	100	100	100	100	100	100



**Table C.104: Science council sector R&D personnel in headcounts and full-time equivalents by occupation (2004/05 to 2013/14)**

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
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
2013/14	5 884	1 956	1 396	2 532	5 164.5	1 781.3	1 247.3	2 136.0

**Table C.105: Science council sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2011/12, 2012/13 and 2013/14)**

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)			
2011/12	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTE'S AS 0% 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	1695.2	84.6
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTE'S AS 0% 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
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTE'S AS 0% OF HEADCOUNTS
Researchers	1 956	1 101	855	1 781.3	993.8	787.5	91.1
Technicians directly supporting R&D	1 396	814	582	1 247.3	724.9	522.4	89.3
Other personnel directly supporting R&D	2 532	1 308	1 224	2 136.0	1 034.2	1 101.8	84.4
Total	5 884	3 223	2 661	5 164.5	2 752.8	2 411.7	87.8

**Table C.106: Science council sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2011/12, 2012/13 and 2013/14)**

OCCUPATION AND QUALIFICATION	Total	SUB TOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	1 956	1 101	855	467	334	52	56	63	104	519	361
Doctoral degree or equivalent	747	464	283	181	76	18	16	26	32	239	159
Masters, honours, bachelor or equivalent	1 163	610	553	278	246	33	40	35	71	264	196
Diplomas	46	27	19	8	12	1	0	2	1	16	6
Technicians directly supporting R&D	1 396	814	582	366	324	63	22	39	58	346	178
Doctoral degree or equivalent	27	22	5	1	1	0	0	1	0	20	4
Masters, honours, bachelor or equivalent	717	404	313	161	154	15	11	28	44	200	104
Diplomas	652	388	264	204	169	48	11	10	14	126	70
Other personnel directly supporting R&D	2 532	1 308	1 224	913	705	104	140	70	64	221	315
Doctoral degree or equivalent	82	58	24	27	8	4	3	6	2	21	11
Masters, honours, bachelor or equivalent	866	386	480	210	271	26	23	41	41	109	145
Diplomas	1 584	864	720	676	426	74	114	23	21	91	159
Total	5 884	3 223	2 661	1 746	1 363	219	218	172	226	1 086	854

**Table C.107: Science council sector R&D personnel in headcounts by occupation, qualification, population group and gender (2013/14)**

SCIENCE COUNCILS	2012/13				2013/14			
	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	37 821	18.0	37 821	234	11 748	16.0	8 224	802
Agricultural Research Council	691 498	482.0	89 895	76 941	1 008 401	466.0	131 092	119 384
Council for Scientific and Industrial Research	2 095 576	508.0	209 558	112 234	2 007 913	561.0	200 791	115 075
Council for Geoscience	113 879	100.0	88 826	20 564	109 577	75.0	87 662	17 210
Human Sciences Research Council	224 713	124.5	56 178	354	224 938	176.0	61 235	2 397
Medical Research Council	394 975	260.0	236 985	5 924	390 820	220.0	234 492	11 728
Mintek	239 878	93.2	59 970	25 824	281 883	137.0	76 108	18 739
National Research Foundation	227 658	111.4	158 594	33 675	249 276	130.0	171 182	37 855
Total	4 025 998	1 697.1	937 826	275 750	4 304 556	1 781.0	970 785	323 190

# [TABLE C.2.5]

## HIGHER EDUCATION SECTOR

**Table C.108: Higher education sector R&D expenditure by type of research (2004/05 to 2013/14)**

TYPE OF RESEARCH	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	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	3 785 149
Applied research	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	2 412 316
Experimental research	505 014	552 321	667 882	650 102	757 621	911 994	899 695	1 039 712	1 099 157	1 095 388
Total	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	7 292 853

**Table C.109: Proportional higher education sector R&D expenditure by type of research (2004/05 to 2013/14)**

TYPE OF RESEARCH	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Basic research	41.4	41.5	40.9	47.2	46.9	48.2	48.6	49.8	52.4	51.9
Applied research	38.7	38.3	38.9	34.9	35.0	33.9	34.8	34.5	32.6	33.1
Experimental research	19.9	20.2	20.2	17.9	18.1	17.9	16.6	15.7	15.0	15.0
Total	100	100	100	100	100	100	100	100	100	100

**Table C.110: Higher education sector R&D expenditure by accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'001
Capital expenditure	193 536	150 224	216 037	295 813	281 193	376 057	393 758	564 179	602 116	706 336
Land, buildings and other structures	16 693	21 622	69 123	51 734	38 564	97 533	146 602.0	137 530.0	192 324.0	256 114.0
Vehicles, plant, machinery, equipment	176 843	128602	146 914	244 079	242 629	278 524.0	247156	426 649.0	409 792.0	450 222.0
Current expenditure	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	6 586 517
Labour costs	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	3 248 542.0
Total cost of R&D postgraduate students	308 454	313 645	438 486	495 128	532 883	581 140	756 930.0	1 074 207.0	1 186 653.0	1 224 611.0
Other current expenditure	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	2 113 364
Total	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	7 292 853

**Table C.111: Proportional higher education sector R&D expenditure by accounting category (2004/05 to 2013/14)**

TYPE OF EXPENDITURE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	7.6	5.5	6.5	8.2	6.7	7.4	7.3	8.5	8.2	9.7
Land, buildings and other structures	0.7	0.8	2.1	1.4	0.9	1.9	2.7	2.1	2.6	3.5
Vehicles, plant, machinery, equipment	7.0	4.7	4.5	6.7	5.8	5.5	4.6	6.5	5.6	6.2
Current expenditure	92.4	94.5	93.5	91.8	93.3	92.6	92.7	91.5	91.8	90.3
Labour costs	43.3	44.0	41.7	40.5	35.9	33.5	34.7	37.5	40.9	44.5
Total cost of R&D postgraduate students	12.2	11.5	13.3	13.7	12.7	11.4	14.0	16.3	16.2	16.8
Other current expenditure	36.9	39.0	38.4	37.7	44.7	47.7	44.1	37.7	34.7	29.0
Total	100	100	100	100	100	100	100	100	100	100

**Table C.112: Higher education sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	406 285
Nanotechnology	85 162	140 998	170 405	153 013	156 176	204 802	317 649	293 300	356 826
Total	261 980	356 604	424 277	456 496	523 076	586 027	661 688	674 028	763 111
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	7 292 853

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

**Table C.113: Proportional higher education sector expenditure on multidisciplinary areas of R&D (2005/06 to 2013/14)**

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Biotechnology	6.5	6.5	7.0	7.2	7.2	7.0	5.2	5.2	5.6
Nanotechnology	3.1	4.3	4.7	3.7	3.1	3.8	4.8	4.0	4.9
Total	9.6	10.8	11.7	10.9	10.3	10.8	10.0	9.2	10.5

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

**Table C.114: Higher education sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	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	340 386
Open-source software	27 723	41 441	41 234	49 532	58 643	75 195	15 982	85 508	105 008
New materials	106 912	135 803	160 993	202 242	283 711	266 419	197 430	321 744	381 136
Tuberculosis (TB), HIV/AIDS, malaria	276 591	391 002	583 726	650 502	815 431	845 216	399 070	714 966	794 810
Total	411 226	568 246	785 953	902 276	1 157 785	1 186 830	1 382 821	1 422 224	1 621 339
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	7 292 853

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.115: Proportional higher education sector R&D expenditure on selected areas of interest (2005/06 to 2013/14)**

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	11.7	4.1	4.7
Open-source software	1.0	1.3	1.1	1.2	1.1	1.4	0.2	1.2	1.4
New materials	3.9	4.1	4.4	4.8	5.6	4.9	3.0	4.4	5.2
Tuberculosis (TB), HIV/AIDS, malaria	10.1	11.9	16.1	15.5	16.0	15.6	6.0	9.7	10.9
Total	15.1	17.2	21.7	21.5	22.7	21.9	20.9	19.4	22.2

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.116: Higher education sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	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	1 646 731	1 846 022	2 294 479	2 389 525	2 703 975	3 374 024	3 558 265	4 486 057	5 045 892	4 925 713
Mathematical sciences	81 251	79 707	104 323	109 354	151 880	168 689	283 942	311 572	342 093	278 183
Physical sciences	100 761	97 252	121 559	146 726	135 002	352 628	175 110	189 341	193 849	198 735
Chemical sciences	101 808	117 914	106 214	143 897	136 528	161 856	158 775	317 389	444 258	286 511
Earth sciences	101 262	115 680	119 682	121 419	136 955	84 777	157 781	174 141	190 744	207 261
Information, computer and communication technologies	98 240	105 873	143 037	119 600	125 413	121 750	112 985	186 870	232 090	192 911
Applied sciences and technologies	43 653	55 779	101 400	96 972	78 904	306 195	90 761	245 611	251 278	280 310
Engineering sciences	307 141	268 250	349 889	294 630	352 114	305 953	461 980	741 462	768 810	855 529
Biological sciences	192 658	195 380	230 480	271 216	282 280	349 343	593 219	610 408	731 389	721 229
Agricultural sciences	97 248	143 104	151 950	159 793	192 265	179 309	205 311	268 834	276 857	311 355
Medical and health sciences	440 249	582 798	710 386	785 630	966 365	1 195 597	1 226 127	1 245 284	1 391 838	1 339 755
Environmental sciences	40 388	42 719	58 256	58 793	68 869	52 431	60 458	111 612	147 367	166 493
Material sciences	29 918	29 348	86 764	72 484	68 467	76 732	26 629	81 749	68 849	82 479
Marine sciences	12 154	12 220	10 539	9 013	8 933	18 764	5 186	1 783	6 469	4 961
Division 2: Social Sciences and Humanities	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	2 367 140
Social sciences	577 653	594 579	658 419	796 281	967 204	1 273 479	1 433 610	1 664 653	1 844 744	1 825 026
Humanities	309 587	291 615	345 910	436 056	520 187	453 721	432 727	458 505	442 517	542 114
Total	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	7 292 853

**Table C.117: Proportional higher education sector R&D expenditure by research field (2004/05 to 2013/14)**

MAIN RESEARCH FIELD	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	65.0	67.6	69.6	66.0	64.5	66.1	65.6	67.9	68.8	67.5
Mathematical sciences	3.2	2.9	3.2	3.0	3.6	3.3	5.2	4.7	4.7	3.8
Physical sciences	4.0	3.6	3.7	4.1	3.2	6.9	3.2	2.9	2.6	2.7
Chemical sciences	4.0	4.3	3.2	4.0	3.3	3.2	2.9	4.8	6.1	3.9
Earth sciences	4.0	4.2	3.6	3.4	3.3	1.7	2.9	2.6	2.6	2.8
Information, computer and communication technologies	3.9	3.9	4.3	3.3	3.0	2.4	2.1	2.8	3.2	2.6
Applied sciences and technologies	1.7	2.0	3.1	2.7	1.9	6.0	1.7	3.7	3.4	3.8
Engineering sciences	12.1	9.8	10.6	8.1	8.4	6.0	8.5	11.2	10.5	11.7
Biological sciences	7.6	7.2	7.0	7.5	6.7	6.8	10.9	9.2	10.0	9.9
Agricultural sciences	3.8	5.2	4.6	4.4	4.6	3.5	3.8	4.1	3.8	4.3
Medical and health sciences	17.4	21.3	21.5	21.7	23.1	23.4	22.6	18.8	19.0	18.4
Environmental sciences	1.6	1.6	1.8	1.6	1.6	1.0	1.1	1.7	2.0	2.3
Material sciences	1.2	1.1	2.6	2.0	1.6	1.5	0.5	1.2	0.9	1.1
Marine sciences	0.5	0.4	0.3	0.2	0.2	0.4	0.1	0.0	0.1	0.1
Division 2: Social Sciences and Humanities	35.0	32.4	30.4	34.0	35.5	33.9	34.4	32.1	31.2	32.5
Social sciences	22.8	21.8	20.0	22.0	23.1	25.0	26.4	25.2	25.2	25.0
Humanities	12.2	10.7	10.5	12.0	12.4	8.9	8.0	6.9	6.0	7.4
Total	100	100	100	100	100	100	100	100	100	100



**Table C.118: Higher education sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	2 069	2 423	2 711	4 328	5 150	3 620	7 271	10 211	12 009	6 121
Defence	2 069	2 423	2 711	4 328	5 150	3 620	7 271	10 211	12 009	6 121
Division 2: Economic Development	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	2 547 254
Economic Development unclassified	102 936	115 029	150 668	171 520	209 400	0	0	0	0	0
Plant Production And Plant Primary Products	60 922	91 790	119 949	123 126	153 054	178 033	188 513	277 764	234 309	534 417
Animal Production and Animal Primary Products	72 192	75 076	85 256	95 219	117 255	130 828	128 705	151 334	176 645	173 865
Mineral Resources (Excluding Energy)	15 898	48 914	89 559	74 725	88 576	83 294	99 966	129 185	69 062	129 459
Energy Resources	16 709	21 461	51 923	84 459	71 648	81 689	88 657	87 659	92 947	82 011
Energy Supply	31 871	58 314	90 365	96 209	106 457	107 759	144 462	157 304	162 879	221 160
Manufacturing	102 001	145 485	210 910	172 947	210 009	297 303	245 037	272 287	348 845	340 630
Construction	26 956	20 407	27 521	28 313	46 175	23 858	73 340	116 141	74 322	79 775
Transport	14 347	16 440	16 447	22 770	29 517	30 456	24 045	53 043	31 830	32 503
Information and Communication Services	50 745	71 439	80 322	67 026	87 013	110 589	93 281	144 313	101 980	139 305
Commercial Services	41 588	47 260	41 037	93 285	54 604	282 078	54 659	106 287	111 587	156 001
Economic Framework	93 107	115 993	133 600	164 759	193 599	206 625	217 501	302 693	335 217	363 483
Natural Resources	106 057	96 382	102 399	77 260	172 228	205 728	184 287	274 612	256 874	294 645
Division 3: Society	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	1 569 371
Society unclassified	102 936	115 029	150 668	171 520	209 400	0	0	0	0	0
Health	328 251	422 804	507 767	556 914	644 763	701 007	776 688	686 152	1 150 349	654 525
Education and Training	132 616	149 270	199 056	195 917	227 502	187 291	294 482	359 897	402 285	547 108
Social Development and Community Services	159 016	144 529	204 691	224 740	278 132	289 353	322 530	537 752	313 280	367 738
Division 4: Environment	226 063	223 302	261 464	317 863	339 148	346 483	377 151	509 533	554 758	456 619
Environment unclassified	34 312	38 343	50 223	57 173	69 800	0	0	0	0	0
Environmental Knowledge	94 667	107 922	112 319	108 189	135 472	170 901	188 250	230 135	232 440	184 169
Environmental Aspects of Development	40 122	37 006	42 619	93 853	72 050	92 353	86 295	123 344	168 956	154 462
Environmental and Other Aspects	56 963	40 030	56 303	58 648	61 826	83 229	102 606	156 054	153 362	117 989
Division 5: Advancement of Knowledge	847 691	750 868	772 495	878 959	947 737	1 835 231	2 104 026	2 433 048	2 903 975	2 713 487
Advancement of Knowledge unclassified	102 936	115 029	150 668	171 520	209 400	0	0	0	0	0
Natural Sciences, Technologies and Engineering	427 087	297 837	329 497	416 081	423 469	969 079	1 263 802	1 443 913	1 731 540	1 633 257
Social Sciences and Humanities	317 668	338 002	292 330	291 359	314 868	866 152	840 223	989 135	1 172 435	1 080 231
Total	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	7 292 853

**Table C.119: Proportional higher education sector R&D expenditure by socio-economic objective (2004/05 to 2013/14)**

SOCIO-ECONOMIC OBJECTIVE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1
Defence	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1
Division 2: Economic Development	29.0	33.8	36.4	35.1	36.7	34.1	28.4	31.4	27.2	34.9
Economic Development unclassified	4.1	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0	0.0
Plant Production And Plant Primary Products	2.4	3.4	3.6	3.4	3.7	3.5	3.5	4.2	3.2	7.3
Animal Production and Animal Primary Products	2.8	2.7	2.6	2.6	2.8	2.6	2.4	2.3	2.4	2.4
Mineral Resources (Excluding Energy)	0.6	1.8	2.7	2.1	2.1	1.6	1.8	2.0	0.9	1.8
Energy Resources	0.7	0.8	1.6	2.3	1.7	1.6	1.6	1.3	1.3	1.1
Energy Supply	1.3	2.1	2.7	2.7	2.5	2.1	2.7	2.4	2.2	3.0
Manufacturing	4.0	5.3	6.4	4.8	5.0	5.8	4.5	4.1	4.8	4.7
Construction	1.1	0.7	0.8	0.8	1.1	0.5	1.4	1.8	1.0	1.1
Transport	0.6	0.6	0.5	0.6	0.7	0.6	0.4	0.8	0.4	0.4
Information and Communication Services	2.0	2.6	2.4	1.9	2.1	2.2	1.7	2.2	1.4	1.9
Commercial Services	1.6	1.7	1.2	2.6	1.3	5.5	1.0	1.6	1.5	2.1
Economic Framework	3.7	4.2	4.0	4.5	4.6	4.1	4.0	4.6	4.6	5.0
Natural Resources	4.2	3.5	3.1	2.1	4.1	4.0	3.4	4.2	3.5	4.0
Division 3: Society	28.5	30.4	32.2	31.7	32.4	23.1	25.7	24.0	25.4	21.5
Society unclassified	4.1	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0	0.0
Health	13.0	15.5	15.4	15.4	15.4	13.7	14.3	10.4	15.7	9.0
Education and Training	5.2	5.5	6.0	5.4	5.4	3.7	5.4	5.4	5.5	7.5
Social Development and Community Services	6.3	5.3	6.2	6.2	6.6	5.7	5.9	8.1	4.3	5.0
Division 4: Environment	8.9	8.2	7.9	8.8	8.1	6.8	7.0	7.7	7.6	6.3
Environment unclassified	1.4	1.4	1.5	1.6	1.7	0.0	0.0	0.0	0.0	0.0
Environmental Knowledge	3.7	3.9	3.4	3.0	3.2	3.4	3.5	3.5	3.2	2.5
Environmental Aspects of Development	1.6	1.4	1.3	2.6	1.7	1.8	1.6	1.9	2.3	2.1
Environmental and Other Aspects	2.2	1.5	1.7	1.6	1.5	1.6	1.9	2.4	2.1	1.6
Division 5: Advancement of Knowledge	33.5	27.5	23.4	24.3	22.6	36.0	38.8	36.8	39.6	37.2
Advancement of Knowledge unclassified	4.1	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0	0.0
Natural Sciences, Technologies and Engineering	16.9	10.9	10.0	11.5	10.1	19.0	23.3	21.8	23.6	22.4
Social Sciences and Humanities	12.5	12.4	8.9	8.0	7.5	17.0	15.5	15.0	16.0	14.8
Total	100	100	100	100	100	100	100	100	100	100

**Table C.120: Higher education sector R&D expenditure by province (2004/05 to 2013/14)**

PROVINCE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	184 868	214 701	259 254	276 740	286 605	536 792	556 496	608 815	592 861	557 292
Free State	139 497	146 823	155 326	180 713	226 892	246 298	281 889	323 335	356 177	449 852
Gauteng	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	2 233 696
KwaZulu-Natal	373 595	379 681	451 992	459 299	567 999	662 518	677 740	902 386	1 137 258	750 507
Limpopo	63 508	43 565	63 233	79 716	86 635	147 397	224 603	349 559	300 435	187 317
Mpumalanga	47 379	58 548	67 029	105 629	72 590	88 680	119 231	170 966	182 192	147 134
North-West	123 817	73 456	97 246	166 137	150 125	190 570	184 514	275 088	311 325	405 963
Northern Cape	21 152	15 263	42 944	48 277	68 443	92 062	107 581	148 425	164 483	161 603
Western Cape	694 867	769 377	947 209	1 044 360	1 264 162	1 599 741	1 671 766	1 802 496	2 169 606	2 399 489
Total	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	7 292 853

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

**Table C.121: Proportional higher education sector R&D expenditure by province (2004/05 to 2013/14)**

PROVINCE	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	7.3	7.9	7.9	7.6	6.8	10.5	10.3	9.2	8.1	7.6
Free State	5.5	5.4	4.7	5.0	5.4	4.8	5.2	4.9	4.9	6.2
Gauteng	34.9	37.7	36.8	34.8	35.0	30.1	29.5	30.7	28.9	30.6
KwaZulu-Natal	14.7	13.9	13.7	12.7	13.6	13.0	12.5	13.7	15.5	10.3
Limpopo	2.5	1.6	1.9	2.2	2.1	2.9	4.1	5.3	4.1	2.6
Mpumalanga	1.9	2.1	2.0	2.9	1.7	1.7	2.2	2.6	2.5	2.0
North-West	4.9	2.7	2.9	4.6	3.6	3.7	3.4	4.2	4.2	5.6
Northern Cape	0.8	0.6	1.3	1.3	1.6	1.8	2.0	2.2	2.2	2.2
Western Cape	27.4	28.2	28.7	28.8	30.2	31.4	30.8	27.3	29.6	32.9
Total	100	100	100	100	100	100	100	100	100	100

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

**Table C.122: Higher education sector R&D personnel in headcounts and full-time equivalents by occupation (2004/05 to 2013/14)**

YEAR	HEADCOUNTS				FULL TIME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
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
2013/14	23 543	18 212	2 284	3 047	7 005.7	5 000.5	843.7	1 161.5

\*Excludes doctoral students and post-doctoral fellows.

**Table C.123: Higher education sector R&D personnel (including doctoral students and post-doctoral fellows) in headcounts and full-time equivalents by occupation and gender (2011/12, 2012/13 and 2013/14)**

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS			FTEs AS % OF HEADCOUNTS
2011/12	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
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 directly supporting R&D	2 344	1 346	998	737.3	428.8	308.6	31.5
Other personnel directly supporting R&D	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
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	36 133	19 920	16 213	15 772.5	8 825.3	6 947.2	43.7
Technicians directly supporting R&D	2 284	1 314	970	843.7	465.1	378.6	36.9
Other personnel directly supporting R&D	3 047	989	2 058	1 161.5	367.8	793.7	38.1
Total	41 464	22 223	19 241	17 777.7	9 658.2	8 119.5	42.9

\*Excludes doctoral students and post-doctoral fellows.

**Table C.124: Higher education sector R&D personnel in headcounts by occupation and gender, and full-time equivalents by occupation (2011/12, 2012/13 and 2013/14)**

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS	
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 directly supporting R&D	2 344	1 346	998	737.3	31.5
Other personnel directly supporting R&D	2 906	899	2 007	1 133.5	39.0
Total	22 691	11 711	10 980	6 571.5	29.0
2013/14	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Researchers*	18 212	9 736	8 476	5 000.5	27.5
Technicians	2 284	1 314	970	843.7	36.9
Other personnel	3 047	989	2 058	1 161.5	38.1
Total	23 543	12 039	11 504	7 005.7	29.8

\*Excludes doctoral students and post-doctoral fellows.

**Table C.125: Higher education sector R&D postgraduates in headcounts by qualification and gender, and full-time equivalents by qualification (2011/12, 2012/13 and 2013/14)**

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS	
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
2013/14	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Post-doctoral fellows	1 801	1 101	700	1 706.9	94.8
Doctoral students	16 120	9 083	7 037	9 065.2	56.2
Masters students	36 274	17 932	18 342	18 933.6	52.2
Total	54 195	28 116	26 079	29 705.6	54.8

**Table C.126: Higher education sector R&D personnel in headcounts by occupation, qualification, population group and gender (2013/14)**

OCCUPATION AND QUALIFICATION	TOTAL R&D PERSONNEL	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers*	18 212	9 736	8 476	3 349	2 156	543	601	803	800	5 041	4 919
Doctoral degree or equivalent	7 456	4 536	2 920	1 125	494	251	169	336	237	2 824	2 020
Masters, honours, bachelor or equivalent	8 238	4 041	4 197	1 710	1 167	248	363	350	431	1 733	2 236
Diplomas	2 518	1 159	1 359	514	495	44	69	117	132	484	663
Technicians directly supporting R&D	2 284	1 314	970	390	279	237	124	112	98	575	469
Doctoral degree or equivalent*	142	96	46	18	7	7	4	2	2	69	33
Masters, honours, bachelor or equivalent	840	409	431	139	107	49	68	30	23	191	233
Diplomas	1 302	809	493	233	165	181	52	80	73	315	203
Other personnel directly supporting R&D	3 047	989	2 058	364	486	172	458	39	77	414	1 037
Doctoral degree or equivalent*	248	145	103	32	27	9	11	8	4	96	61
Masters, honours, bachelor or equivalent	931	288	643	97	737	37	120	15	29	139	357
Diplomas	1 868	556	1 312	235	322	126	327	16	44	179	619
Total	23 543	12 039	11 504	4 103	2 921	952	1 183	954	975	6 030	6 425

\*Excludes doctoral students and post-doctoral fellows.

**Table C.127: Higher education sector overview (2013/14)**

HIGHER EDUCATION INSTITUTES	R&D EXPENDITURE	RESEARCHERS	RESEARCHERS	POSTGRADUATES	POSTGRADUATES
	R'000	(HEADCOUNTS)	(FTEs)	(HEADCOUNTS)	(FTEs)
Private Universities	38 937	134	48.6	3	2.2
Public Universities	6 736 612	15 385	4 534.1	16 851	10 137.9
Nelson Mandela Metropolitan University	216 191	500	88.7	488	248.0
North West University	585 124	1 103	400.5	1 311	713.6
Rhodes University	211 956	444	149.9	511	511.0
University of Cape Town	1 178 888	1 185	455.6	1 714	1 100.6
University of Fort Hare	40 986	327	65.4	358	214.8
University of Johannesburg	252 049	1 042	200.0	895	895.0
University of KwaZulu-Natal	648 942	1 716	518.7	2 411	1 070.0
University of Limpopo	86 758	290	56.0	237	122.4
University of Pretoria	644 215	1 850	424.5	2 152	955.7
University of South Africa	605 001	1 978	986.0	1 893	1 331.4
University of Stellenbosch	827 137	1 118	347.4	1 585	977.4
University of the Free State	330 182	705	245.8	651	307.8
University of the Western Cape	171 979	912	248.8	768	353.6
University of the Witwatersrand	896 566	1 916	287.0	1 716	1 240.0
University of Zululand	40 638	299	59.8	161	96.6
Public Universities of (Science) and Technology	517 304	2 693	418	1 067	632
Cape Peninsula University of Technology	115 701	428	76.7	191	191.0
Central University of Technology, Free State	47 665	240	49.8	102	57.3
Durban University Technology	60 665	363	48.3	151	98.5
Mangosuthu University of Technology	25 559	154	30.8	4	4.0
Tshwane University of Technology	155 674	312	51.7	361	127.7
University of Venda for Science and Technology	21 968	337	33.7	172	103.2
Vaal University of Technology	38 605	283	40.3	38	21.4
Walter Sisulu University of Technology and Science	51 467	576	86.4	48	28.8
Total	7 292 853	18 212	5 000.5	17 921	10 772.0

*Note: Collected personnel data may differ from Higher Education Management Information System (HEMIS) data in some cases due to definitional differences in personnel categories.*

# [D] METHODOLOGICAL NOTES

## 1. SURVEY DESIGN AND PLANNING

The South African National Survey of Research and Experimental Development (R&D survey) is the longest running statistical product in the statistical programme that falls under the mandate of the Department of Science and Technology (DST). It forms part of the tools for monitoring and evaluating the performance of the National System of Innovation (NSI). The R&D survey produces statistics on expenditure, sources of funds and human resources devoted to R&D in South Africa on an annual basis. This report contains the results for the 2013/14 reference period produced by the HSRC on behalf of the DST.

The data are collected in accordance with national (Stats SA, 2010b) guidelines and standards set by the South African Statistical Quality Assessment Framework (SASQAF). The Frascati Manual (OECD, 2002) provides detailed guidelines that have been applied within the survey processes to allow for coherence and international comparability of the statistics. These data are used to compile national and international indicators on R&D for South Africa and to conduct analysis for policy purposes. Standard output tables are agreed in advance of the survey between CeSTII and the DST.

The scope of the survey includes all units performing R&D, either continuously or occasionally. These units were selected from a register that CeSTII has built up and maintained since 2001. The R&D survey is composed of three survey instruments covering the four main sectors described in the Frascati Manual: business enterprise, government, 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 South African sector.

The System of National Accounts (EC, IMF, OECD, UN and World Bank, 2009) 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 exist between the two systems, as shown in Table D.1.

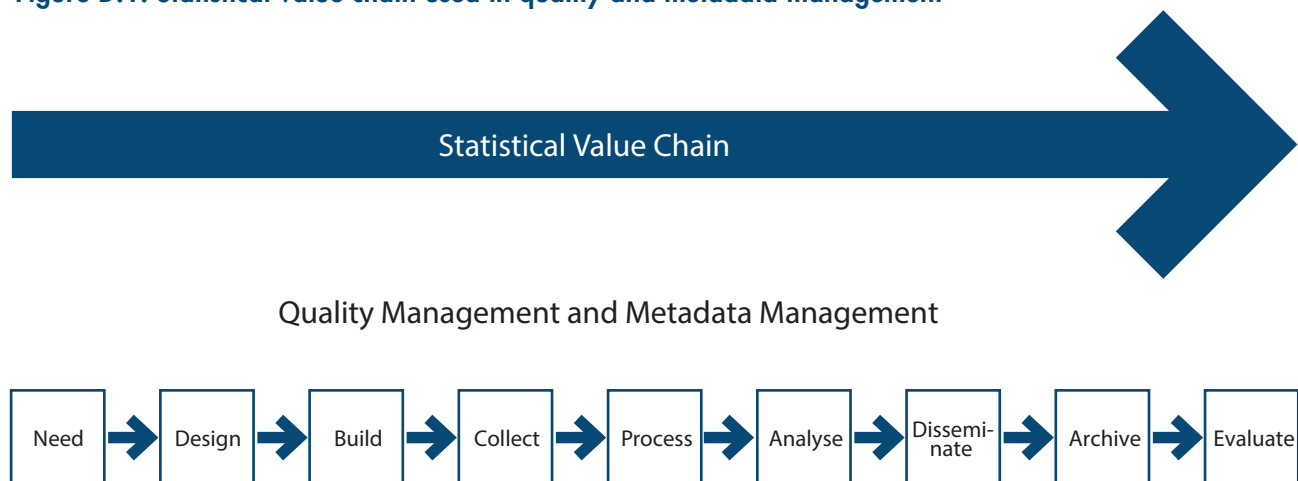
**Table D.1: Main institutional sectors in the economy**

SYSTEM OF NATIONAL ACCOUNTS SECTOR	NATIONAL SYSTEM OF INNOVATION SECTOR DESCRIPTION
Non-financial corporations Financial corporations	<b>Business enterprise sector:</b> "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	<b>Government sector:</b> "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	<b>Private non-profit sector:</b> "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	<b>Higher education:</b> "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	<b>Abroad</b>



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 Statistics SA surveys – gross domestic product values are the values for the 2013 annual reference period taken from the quarterly Stats SA GDP statistical release P0441 (Stats SA, 2014a), 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, 2014b). This is also in line with OECD guidelines. The GDP series was revised by Statistics SA in 2014 (Stats SA, 2014a), and these values were used to calculate financial quantities in real terms and R&D expenditure as a percentage of GDP in this report. The survey also uses the Standard Industrial Classification (Stats SA, 2004) codes for business sector industrial classifications employed by Statistics SA. Overall, HSRC-CeSTII performs quality management in line with practices recommended by Statistics 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**



Since 2011, the R&D survey has been undergoing a comprehensive improvement in quality with respect to methodological soundness, interpretability, comparability and coherence, timeliness and accuracy. It is committed to continual improvement to all dimensions of quality. Key focus areas currently are improvements in response and collection rates, frame management practices, coverage, timeliness, standards development and revisions practice.

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## 2. REVISION OF INDICATORS OF R&D EXPENDITURE

The R&D survey series has improved its timeliness in recent years, and is still in a process of further improvement in making data available to users at an earlier time. This has implications on revisions that have to be made to the statistics and indicators that it produces, especially in response to revisions to statistics that are used in the survey by the external data producers, which are currently Statistics South Africa and the Organisation for Economic Cooperation and Development. The data that is sourced from Stats SA are GDP, labour force and population statistics, and the data that is sourced from the OECD are purchasing price parities (used in the accompanying Main Analysis Report). GDP is revised by Stats SA on an annual basis for the most recent previously published year, and also on a five-year cycle where a more comprehensive revision is done in tandem with the rebasing of GDP. The most recent rebasing of GDP was done in 2014 (Stats SA, 2014a). The R&D survey adheres to a revision policy as part of its commitment to improving quality processes, as an outcome of the SASQAF review concluded in 2010. The policy is to revise data in line with those done by the external partners, and to use the most recent data available for the purpose of revision.

R&D expenditure was converted to R&D expenditure in constant 2010 terms using the rebased (and revised) GDP series provided by Statistics South Africa. This process aligns the statistics and indicators produced by the R&D survey with revisions that had occurred within the national statistical framework. It also aligns the R&D intensity numbers with those reported for South Africa by the OECD, and in this way it improves the quality of statistics produced by the survey, by promoting its comparability and coherence.

Tables D.2 to D.5, and Figure D.2 illustrate the effect of revisions on key statistics and indicators. In these tables and figures, R&D expenditure and R&D intensity values from 2001/02 to 2013/14 were obtained from the National Survey of Research and Experimental Development series. R&D expenditure data before 2001/02 were sourced from archived data (Blankley, 2011, pers. comm.), and may constitute a break in the series due to unknown differences in survey frames. Sectoral data were not obtained for years prior to 2001/02.

**Table D.2: R&D expenditure by sector (1991/92 to 2013/14)**

YEAR	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NON-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
1991/92	2 786 087					
1993/94	2 594 000					
1997/98	4 103 000					
2001/02	7 488 074	203 110	1 294 454	1 896 156	4 023 576	70 778
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	233 202
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
2013/14	25 660 573	1 697 151	4 304 556	7 292 853	11 782 848	583 165

Data from 2001/02 to 2013/14 were obtained from the CeSTII database.

**Table D.3: R&D expenditure in constant 2005 Rand values by sector (1993/94 to 2012/13)**

YEAR	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NON-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
1993/94	6 490 401					
1997/98	7 263 776					
2001/02	9 814 901	266 224	1 696 690	2 485 363	5 273 853	92 771
2003/04	11 308 953	521 972	1 957 806	2 323 300	6 271 427	234 448
2004/05	12 663 888	543 389	2 104 729	2 671 938	7 134 769	209 063
2005/06	14 149 239	844 640	2 102 094	2 732 215	8 243 776	226 514
2006/07	15 508 271	958 771	2 576 533	3 096 671	8 676 782	199 515
2007/08	16 175 959	1 002 658	2 506 728	3 145 782	9 326 927	193 863
2008/09	16 920 549	916 492	2 522 953	3 370 565	9 917 017	193 522
2009/10	15 549 298	791 985	2 566 044	3 785 334	8 265 807	140 128
2010/11	13 960 796	697 109	2 478 712	3 739 137	6 933 600	112 237
2011/12	14 459 218	804 478	2 428 195	4 302 907	6 812 566	111 072
2012/13	14 878 301	895 961	2 509 298	4 570 561	6 588 455	314 026

Data from 2001/02 to 2012/13 were obtained from the CeSTII database. R&D expenditure in constant 2005 (or constant 2000 prices) quoted in previous R&D reports will differ from the values in this table for years prior to 2012/13, because those values used unrevised GDP values in their calculation. GDP values (current and constant 2005 values): Stats SA GDP statistical release P0441 (2013, Quarter 3)

**Table D.4: R&D expenditure in constant 2010 Rand values by sector (1993/94 to 2013/14)**

YEAR	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NON-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
1993/94	9 464 320					
1997/98	10 639 319					
2001/02	14 372 187					
2003/04	16 302 345	752 445	2 822 263	3 349 138	9 040 533	337 966
2004/05	18 228 945	782 178	3 029 637	3 846 103	10 270 093	300 934
2005/06	20 366 188	1 215 761	3 025 720	3 932 707	11 865 959	326 041
2006/07	22 375 580	1 383 329	3 717 463	4 467 926	12 518 999	287 863
2007/08	23 173 761	1 436 413	3 591 152	4 506 664	13 361 804	277 729
2008/09	24 056 683	1 303 016	3 586 992	4 792 079	14 099 456	275 139
2009/10	22 285 512	1 135 087	3 677 697	5 425 204	11 846 692	200 833
2010/11	20 253 805	1 011 340	3 596 023	5 424 602	10 059 010	162 830
2011/12	20 824 028	1 158 602	3 497 064	6 197 006	9 811 392	159 965
2012/13	21 213 079	1 277 438	3 577 690	6 516 582	9 393 640	447 730
2013/14	21 515 350	1 422 992	3 609 196	6 114 761	9 879 440	488 960

Revised GDP values (current and constant 2010 values): Stats SA GDP statistical release P0441 (2014a, Quarter 3)

The constant 2010 revised GDP values were generally greater than the constant 2005 (unrevised) GDP series.

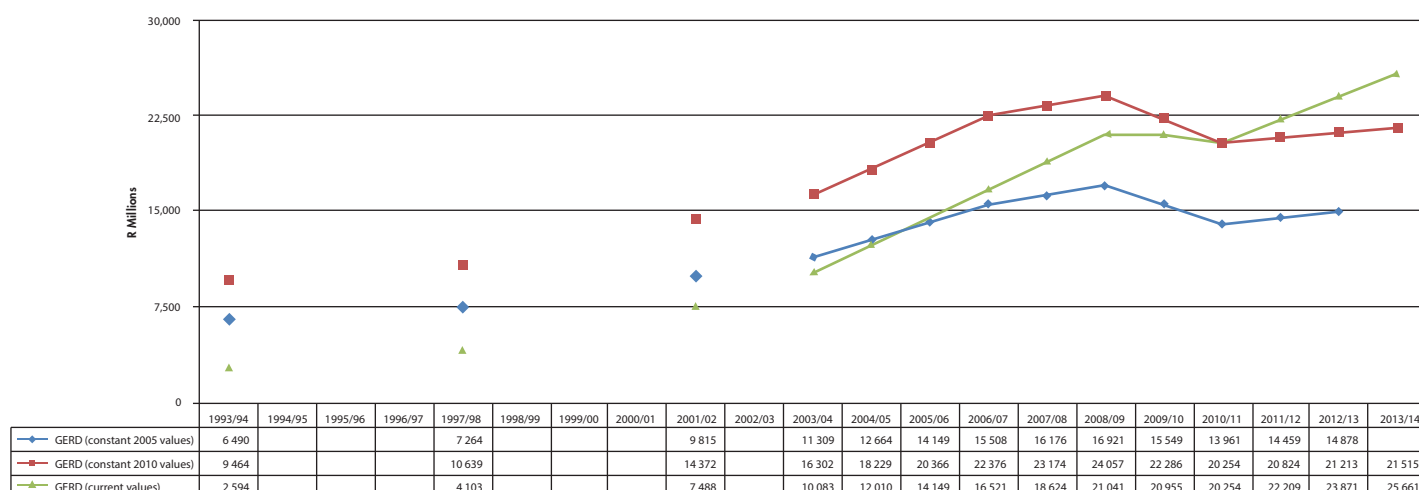
**Table D.5: R&D expenditure as a percentage of GDP by sector (1993/94 to 2013/14)**

YEAR	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NON-FOR-PROFIT
	%	%	%	%	%	%
1993/94	0.59					
1997/98	0.58					
2001/02	0.72					
2003/04	0.76					
2004/05	0.81	0.03	0.14	0.17	0.46	0.01
2005/06	0.86	0.05	0.13	0.17	0.50	0.01
2006/07	0.90	0.06	0.15	0.18	0.50	0.01
2007/08	0.88	0.05	0.14	0.17	0.51	0.01
2008/09	0.89	0.05	0.13	0.18	0.52	0.01
2009/10	0.84	0.04	0.14	0.20	0.44	0.01
2010/11	0.74	0.04	0.13	0.20	0.37	0.01
2011/12	0.73	0.04	0.12	0.22	0.35	0.01
2012/13	0.73	0.04	0.12	0.22	0.32	0.02
2013/14	0.73	0.05	0.12	0.21	0.33	0.02

Data from 2001/02 to 2013/14 were obtained from the CeSTII database.

A graphic illustration of the effect of revisions on the key values is provided by Figure D.2.

**Figure D.2: R&D expenditure of all sectors (GERD) in current Rand values, in constant 2005 Rand values and in (revised) constant 2010 Rand values, 1993/94 to 2013/14**

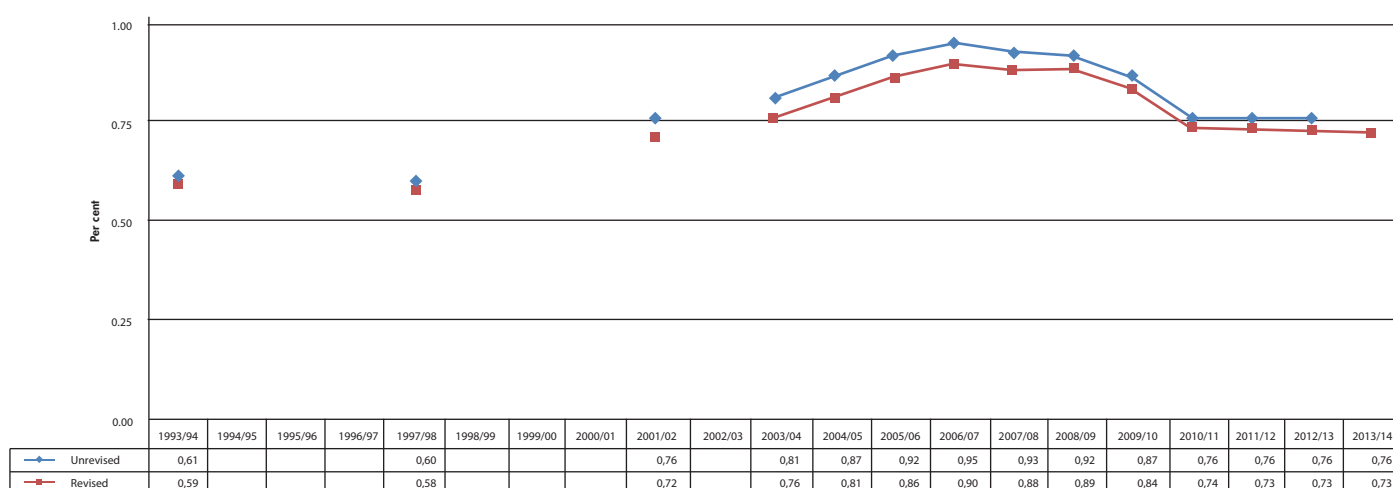


Revised GDP values (current and constant 2010 values): Stats SA GDP statistical release P0441 (2014a, Quarter 3)

GDP values (current and constant 2005 values): Stats SA GDP statistical release P0441 (2013, Quarter 3)

Due to the generally upward revision of the GDP level between 1993 and 2013, the revision of GERD as a percentage of GDP resulted in generally lower values of this indicator (Figure D.3).

**Figure D.3: GERD as a percentage of revised GDP and previous GERD as a percentage of GDP series, 1993/94 to 2013/14**



After the inclusion of the effects of revisions, the trend shows that GERD as a percentage of GDP increased from 0.72% in 2001/02, peaked at 0.90% in 2006/07, and declined until it reached 0.73% in 2011/12, where it has remained for three consecutive years. This is similar to the trend behaviour of GERD as a percentage of GDP before the revisions were incorporated, as can be seen from Figure D.3.

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### 3. QUALITY INDICATORS OF SURVEY COVERAGE

The nature of R&D collection, which is often erratic and sparse in nature particularly for large R&D projects, affects the consistency of frame selection of statistics units. Often units are determined as being out-of-scope only once the fieldwork has started. Register maintenance and fieldwork processes were enhanced to partially address this over the previous three R&D survey cycles in order to provide a more realistic and fair representation of the response from the field. Furthermore, the Clearance Committee for R&D Statistics suggested using collection rates as an additional statistical quality indicator following the 2012/13 R&D survey clearance process.

The relatively high number of out-of-scope units 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 would probably perform R&D again in the future. For this reason the R&D survey will henceforth use collection rate instead of questionnaire response rate alone as key quality indicators of the collect phase of the SVC.

The summary set of quality indicators for the collection and imputation phases of the survey processes in Table D.6 records an overall questionnaire response rate of 85.4%. The collection rates was slightly higher at 85.8%.

The weighted response rate of 99.6% 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 proportion of eligible statistical units that were imputed was 10.2%.

Non-response 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.<sup>4</sup>

Out-of-scope units are defined as units that should not be included during 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 2013/14 R&D survey.

<sup>4</sup>Adapted from Särndal, Swensson & Wretman, 1992.

In-scope 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 2013/14 period were classified as out-of-scope.<sup>5</sup> 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:

$$\text{Questionnaire response rate} = \frac{\text{Responses}}{(\text{Responses} + \text{Non-response}) - (\text{Out-of-scope})}$$

Collection rate was defined according to the following formula as the proportion of completed questionnaires received for the survey compared with the total number of actively-reporting sample units on the sample registry.

$$\text{Collection rate} = \frac{\text{Responses}}{\text{Active reporting units}}$$

The weighted response rate is a measure of the fraction of R&D collected from responses.<sup>6</sup> It was calculated using the following formula:

$$\text{Weighted response rate} = \frac{\text{R\&D expenditure obtained from responses}}{(\text{R\&D expenditure from responses} + \text{unit imputations})}$$

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:

$$\text{Survey unit imputation rate} = \frac{\text{Unit imputations}}{(\text{Response} + \text{Non-response}) - (\text{Out-of-scope})}$$

<sup>5</sup>This is the HSRC -CeSTII operational definition.

<sup>6</sup>This is also referred to as the GERD response in the Metadata Report accompanying the 2013/14 R&D Survey.

**Table D.6: 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	Collection rate	Survey unit imputation rate	Weighted response rate
Business	515	455	60	48	373	96.9%	98.4%	13.8%	90.3%
Not-for-profit	105	81	34	11	46	66.7%	58.8%	1.4%	99.9%
Government	222	127	57	11	70	60.3%	59.1%	4.3%	74.2%
Science councils	13	13	0	0	13	100.0%	100.0%	0.0%	100.0%
Higher education	32	32	9	0	23	71.9%	84.4%	12.5%	97.9%
Total	887	708	160	70	525	85.4%	85.8%	10.2%	99.6%

#### 4. FRAME, SAMPLE SELECTION AND FIELDWORK PERIODS

Three questionnaires were used in the survey, one for the business sector, another for the higher education sector, and 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 2013/14. Table D.7 describes each of the sectors and provides their respective reference periods.

**Table D.7: 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 2014 (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.	17 July 2014 to 21 April 2015
Not-for-profit	Non-governmental and other organisations formally registered as NPOs.	Financial year ending 28 February 2014 (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.	16 July 2014 to 20 March 2015
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 2014.	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.	17 July 2014 to 21 April 2015
Science councils	The science councils established through Acts of Parliament.	Financial (fiscal) year ending 31 March 2014.	Eight statutory science councils were surveyed, using a census approach.	17 July 2014 to 21 April 2015
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 2013).	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.	17 July 2014 to 21 April 2015

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.



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## BUSINESS SECTOR

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Since 2001, CeSTII has developed and maintained a register of potential R&D performers in the business sector. This is updated 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 455 business sector units selected for surveying from the R&D business sector included 76 units that were new to the frame. In addition, 438 units indicated continued R&D activity in the 2013/14 survey. The difference between the 455 units selected and the 438 units actually dispatched is commonly the result of the following factors:

- Some new companies selected for dispatch, were later found to be non-R&D active and known previous R&D performers reported no R&D activity in the 2013/14 survey period in such cases questionnaires were not dispatched, impacting the net growth rate of the sample.
- Other units were found to be part of a group of companies and to avoid double counting, the questionnaires were not dispatched.

Between the time of contact verification and the actual questionnaire dispatch, certain units had closed their operations or were deemed to be out of scope.

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## SCIENCE COUNCILS SECTOR

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Eight R&D-active science councils were selected for surveying and responded to the survey questionnaire. Namely:

- African Institute of South Africa
- Agricultural Research Council
- Council for Scientific and Industrial Research
- Council for Geoscience
- Human Science Research Council
- Medical Research Council
- Mintek
- National Research Foundation

The National Research Foundation was surveyed at the level of its constituent units, resulting in a total of 13 reporting units in the science council sector.

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## NON-FOR-PROFIT SECTOR

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There is an on-going process of coverage improvement of the not-for-profit sector through the investigation of a comprehensive list of NPOs. A total of 105 units were investigated for the 2013/14 survey, comprising units selected for the 2012/13 survey as well as a sample of units from the list. The NPO frame for the 2013/14 survey comprised a total of 81 units identified as likely R&D performers and selected for surveying.

## GOVERNMENT SECTOR

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In the government sector a list of 222 units was investigated, consisting of national and provincial departments, municipalities, research centres and museums, of which 127 units were selected by excluding those units that confirmed that they were either not R&D performers or would not be performing any R&D in the three reference periods after 2013/14. Museums that had no line item for research in their budgets were not selected. One unit was added to the register.

## HIGHER EDUCATION SECTOR

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In the 2013/14 R&D survey, the survey frame for the higher education sector was 32, comprising nine private universities and 23 public universities.

## 5. 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 the Support Programme for Industrial Innovation (SPII).

## 6. 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 value reported by the respondent (by e-mail or telephone), to imputing the remaining data items from available sector R&D profiles, or 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 structure of the imputation models was unchanged from those used in the 2012/13 survey, with adjustment data updated annually. Details of the imputation methods are available on request. Financial data on R&D were adjusted by a GDP inflation factor of 7.849. Table D.8 presents survey imputation according to the age of the data used.

**Table D.8: 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)	1	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)	37	0	0	0	1
Commuted (data more than one year old)	15	1	0	0	4
Total	53	1	0	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.

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## 7. 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.

## 8. DISSEMINATION OF SURVEY RESULTS

The 2013/14 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.

Any data requests should be made by e-mail to [CeSTIIData@hsrc.ac.za](mailto:CeSTIIData@hsrc.ac.za).

## 9. STORAGE AND ARCHIVING OF SURVEY RESULTS

The data from the R&D survey series are 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 offsite. All data are stored electronically on secure servers, and daily back-ups of databases are generated.

# [E] REFERENCE

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# [F] R&D SURVEY QUESTIONNAIRE



## NATIONAL SURVEY OF RESEARCH & EXPERIMENTAL DEVELOPMENT (R&D) INPUTS 2013/14 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 2013 to 28 February 2014 (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
Ms Kesewaa Koranteng	021 466 7834	kkoranteng@hsrc.ac.za
Ms Isabel Basson	021 466 7830	ibasson@hsrc.ac.za

### DETAILS OF PERSON COMPLETING THE QUESTIONNAIRE:

Name (with title)	
Designation	
Date	
Sign	
Tel	
Fax	
Cell	
E-mail	

Dr Neo Molotja

Senior Research Specialist  
nmolotja@hsrc.ac.za

Tel: 021 466 7818

## 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.

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## 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 2013/14 financial year?

YES	<input type="text"/>	NO	<input type="text"/>
-----	----------------------	----	----------------------

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

	2014-2015	2015-2016	2016-2017
YES	<input type="text"/>	<input type="text"/>	<input type="text"/>
NO	<input type="text"/>	<input type="text"/>	<input type="text"/>

8c. Did your company Outsource R&D during the 2013/14 financial year?

YES	<input type="text"/>
-----	----------------------

[Proceed to Part 5: Question 21 and 22 on Outsourced R&D](#)

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	<input type="text"/>
----	----------------------

[i.e. No in-house nor out-sourced 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)**

## PART 2: IN-HOUSE R&D PERSONNEL

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

**Provide the headcount of all R & D personnel according to categories below**

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												
<b>RESEARCHER TOTAL</b>												
Technicians /Technologists directly supporting R&D												
Doctorates												
Masters/Hons/Bachelors or equivalent												
Diplomas and other qualifications												
<b>TECHNICIAN TOTAL</b>												
Other personnel directly supporting R&D												
Doctorates												
Masters/Hons/Bachelors or equivalent												
Diplomas and other qualifications												
<b>TECHNICIAN TOTAL</b>												

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

$1 \times 1 \times 1 = 1$  person years on R&D

-a full time employee spending 40% of his/her time on R&D during half of the survey year:

$1 \times 0.4 \text{ persons} \times 0.5 \text{ years} = 0.2 \text{ person years of R\&D effort}$

-a part-time employee working 40% of a full time year doing only R&D

$0.4 \times 1 \times 1 = 0.4 \text{ FTE to the R\&D effort.}$

-20 fulltime male researchers spending 40% of their time on R&D during the survey year:

$20 \times 0.4 \times 1 = 8$

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								
<b>TOTAL LABOUR COST OF R&amp;D</b>								

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

<ul style="list-style-type: none"> <li>The full value of capital expenditure must be reported in the year of purchase (do not depreciate).</li> <li>If the asset has been/will be used for more than one activity, include an estimate of the portion used for R&amp;D.</li> </ul>	
<b>Including - but not limited to:</b> <ul style="list-style-type: none"> <li>Expenditure on fixed assets used in the R&amp;D projects of your business.</li> <li>Acquisition of software for R&amp;D, including fees, expected to be used for more than one year.</li> <li>Purchase of databases expected to be used for more than one year.</li> <li>Major repairs &amp; improvements on land &amp; buildings used for R&amp;D.</li> </ul>	<b>Excluding:</b> <ul style="list-style-type: none"> <li>Other repairs and maintenance expenses.</li> <li>Depreciation provisions.</li> <li>Proceeds from the sale of R&amp;D assets.</li> </ul>

		R'000 (Excl. VAT)
Vehicles, plant, machinery and equipment	A	
Land, buildings and other structures	B	

		R'000 (Excl. VAT)
LABOUR COSTS of R&D (To match Question 10)	c	

#### OTHER CURRENT EXPENDITURE ON R&D

<b>Including - but not limited to:</b> <ul style="list-style-type: none"> <li>Materials, fuels and other inputs (including all running costs).</li> <li>Water, electricity and other overhead expenses.</li> <li>Repair and maintenance expenses.</li> <li>Payments to outside organisations for use of specialised testing facilities.</li> <li>Payments to outside organisations for analytical work, engineering or other specialised services in support of R&amp;D projects carried out by your business.</li> <li>Commission/consultant expenses for research projects carried out by your business.</li> <li>Other R&amp;D expenses and indirect costs not specified in 11 A, B or C.</li> </ul>	<b>Excluding:</b> <ul style="list-style-type: none"> <li>R&amp;D activities where the research project is carried out elsewhere by others on behalf of your business.</li> <li>Payments for purchases of technical know-how.</li> <li>Payments for patent searches.</li> <li>Depreciation provisions.</li> </ul>
---	--

		R'000 (Excl. VAT)
Other current expenditure	D	

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

## 12. PLEASE ESTIMATE FUTURE IN-HOUSE R&D EXPENDITURE:

### ESTIMATED FUTURE R&D EXPENDITURE:

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 Organisations* (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								
<b>TOTAL</b>		<b>TOTAL to correspond with Foreign funds in Q 13 above</b>							

\* 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	%
Free State	%
Gauteng	%
KwaZulu-Natal	%
Limpopo	%

Mpumalanga	%
Northern Cape	%
North-West	%
Western Cape	%
<b>TOTAL</b> (must sum to 100%)	<b>%</b>

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



### 18.A. 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		RF Codes		Percentage	
SIC			%	SIC			%
SIC			%	SIC			%
SIC			%	SIC			%
SIC			%	SIC			%
SIC			%	SIC			%
Total (must sum to 100%)							%

### 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	
-----------------------	--

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

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

#### 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

R'000 (Excl. VAT)

21. State value of R&D outsourced inside South Africa.

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)

R'000 (Excl. VAT)

22. State value of R&D outsourced outside South Africa. 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								
<b>TOTAL</b>	<b>R</b>								

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 [CeSTIIData@hsr.ac.za](mailto:CeSTIIData@hsr.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 your area of work? Mark with 'X'.

Government	<input type="checkbox"/>	International organisation	<input type="checkbox"/>
Private enterprise	<input type="checkbox"/>	Media	<input type="checkbox"/>
Public enterprise	<input type="checkbox"/>	Not-for-profit organisation	<input type="checkbox"/>
Academic or research institution	<input type="checkbox"/>	Other, specify	<input type="checkbox"/>

### 3. In which country do you work?

--

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

Excellent	<input type="checkbox"/>	Good	<input type="checkbox"/>	Average	<input type="checkbox"/>	Satisfactory	<input type="checkbox"/>	Poor	<input type="checkbox"/>
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### 5. How useful is this publication for your work?

Extremely useful	<input type="checkbox"/>	Very useful	<input type="checkbox"/>	Useful	<input type="checkbox"/>	Partly useful	<input type="checkbox"/>	Not at all useful	<input type="checkbox"/>
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### 6. How accurate is the picture of R&D in your sector or research field/s as presented in this publication?

Very accurate	<input type="checkbox"/>	Fairly accurate	<input type="checkbox"/>	Not very accurate	<input type="checkbox"/>	Partly useful	<input type="checkbox"/>	Not at all accurate	<input type="checkbox"/>
---------------	--------------------------	-----------------	--------------------------	-------------------	--------------------------	---------------	--------------------------	---------------------	--------------------------

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

Extremely easy	<input type="checkbox"/>	Very easy	<input type="checkbox"/>	Easy	<input type="checkbox"/>	Not very easy	<input type="checkbox"/>	Not at all easy	<input type="checkbox"/>
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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.

<p><b>Department of Science and Technology (DST)</b></p> <p>Private Bag X894, Pretoria, 0001 Republic of South Africa www.dst.gov.za</p>	<p><b>Centre for Science, Technology and Innovation Indicators (CeSTII)</b></p> <p>Human Sciences Research Council Private Bag X9182, Cape Town, 8001 www.hsrc.ac.za</p>
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<p><b>Mr Imraan Patel</b></p> <p>Deputy Director-General: Socio-Economic Partnerships, DST Imraan.Patel@dst.gov.za</p>	<p><b>Dr Nazeem Mustapha</b></p> <p>Chief Research Specialist: CeSTII nmustapha@hsrc.ac.za</p>
<p><b>Mr Godfrey Mashamba</b></p> <p>Chief Director: Science and Technology Investment, DST Godfrey.Mashamba@dst.gov.za</p>	<p><b>Dr Neo Molotja</b></p> <p>Senior Research Specialist: CeSTII nmolotja@hsrc.ac.za</p>
<p><b>Ms Tshidi Mamogobo</b></p> <p>Director: Science and Technology Indicators, DST Tshidi.Mamogobo@dst.gov.za</p>	<p><b>Dr Moses Mefika Sithole</b></p> <p>Chief Research Specialist: CeSTII msithole@hsrc.ac.za</p>