



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

**Policy briefing on public funding for
research, science and technology
2010/11**

Contents

1. OVERVIEW AND SUMMARY	4
2. A NOTE ON METHODOLOGY	6
2.1 Key definitions and data sources	6
2.2 Methodological Limitations.....	8
2.3 Improvements	8
3. findings	11
3.1 Overall expenditure on research, science and technology.....	11
3.2 Expenditure on the categories of research, science and technology	13
3.3 Transfers and subsidies.....	14
3.4 Investments in scientific infrastructure	15
3.5 Government funding for the public research institution	17
4. CONCLUSIONS	19

List of tables

Table 1: Major adjustments to research, science and technology expenditure 9

Table 2: Research, science and technology investment in relation to GDP and national budget..... 11

Table 3: Investment on research, science and technology by government departments 12

Table 4: Research, science and technology expenditure by accounting expenditure items for 2010/11 14

Table 5: national government funding for public research institutions (Parliamentary grant) 17

List of figures

Figure 1: Conceptual model of flows of government funding for science and R&D 7

1. OVERVIEW AND SUMMARY

The report on Public Funding for Research, Science and Technology 2010/11 provides government and its stakeholders with a holistic view of public spending on research, science and technology. The report publishes information on actual expenditure and the medium-term budget appropriations by government towards research, science and technology. Its purpose is summarised as follows:

- To enable regular evaluation of the levels of public investment into the science system;
- To support planning and coordination of public funding for science and technology by various parts of government;
- To support government decision making with respect to resource deployment in key areas for science investment where government will maximise the socio-economic outcomes.

The report is informed by three major policies, namely, the White Paper on Science and Technology of 1996, the National Research and Development Strategy (NRDS) of 2002, and the Strategic Management Model (SMM) for the Public Science and Technology System of 2004. The White Paper, called for improved support for science, technology and innovation as a critical input to economic growth and development. The NRDS provided a framework of indicators for monitoring the performance of the S&T system at macro level and proposed a strategic approach to the management of the state-funded portion of South Africa's S&T system.

The data used in this report was collected through a purposive survey of the 25 national government departments that were identified to either perform research, science and technology or have a budgetary allocation to fund these areas. The 2010/11 report corrects the findings from the 2009/10 report, which had an undercount of about R6.0 billion because of non-availability of data from the

Department of Health, the Department of Police, and the Department of Communication. This point was raised as a concern in the 2009/10 report.

The structure of the data portrays the major channels with which government funds these areas: the core funding for public research institutions; the share of government budget allocated to S&T and to R&D and specific categories of funded activities, namely scientific and technical education and training (STET) and standard technology-based services (STS). The activities covered in this report comprise both natural sciences and engineering, and social sciences and humanities.

The overall key results are that:-

- The national government investment into research, science and technology in 2010/11 was R23 billion, which constituted 2.8% of the total national government budget of that year.
- Just more than R15 billion (65.3%) of the total amount can be categorised as Government Budget Appropriation or Outlays on Research and Development (GBAORD), followed by the scientific and technological services (STS) at R5.7 billion (24.6%), and the scientific and technical education and training (STET) at R2.3 billion (10.1%).
- Of the R23 billion, 82.8% (R19 billion) is spent as transfers and subsidies towards activities performed by departmental agencies, universities, public corporations, private enterprises and non-profit organisations. This is followed by the payment for capital assets at 13.3% (R3.1billion), and current payments at 4.2% (R967 million).

The overall findings of this report should inform an assessment of the adequacy of the government investment into research, science and technology as a driver for economic competitiveness and development. Methods for monitoring such investments still need to be improved to ensure timeliness of the information and

analysis. The implications of the findings also need to be communicated to the appropriate decision making bodies in good time.

2. A NOTE ON METHODOLOGY

2.1 Key definitions and data sources

In compiling this report, the DST adopted the guidelines used in the Frascati Manual of 2002¹.

- **Government Budget Appropriation or Outlays on R&D¹ (GBAORD)**: includes all appropriations allocated to R&D and innovation in central government or federal budgets; provincial or state government data is included when their input is significant. Unless stated otherwise, data include both current and capital expenditure. They cover government-financed R&D and innovation carried out in government establishments and in the business enterprise, higher education and private non-profit sectors.
- **Scientific and technical education and training (STET)**: “covers all activities comprising specialised non-university higher education and training, higher education and training leading to a university degree, postgraduate and further training, and organised lifelong training for scientists and engineers.”
- **Scientific and technological services (STS)**: “are defined as activities concerned with supporting research and experimental development and contributing to the generation, dissemination and application of scientific and technical knowledge. This includes activities such as patenting, geological surveys, standards generation, operation of libraries and national scientific databases and the like”.

Following the guidelines, a purposive survey of 25 national government departments that have a science mandate or a research unit was conducted. This included the studying of the Estimates of National Expenditure (ENE) document,

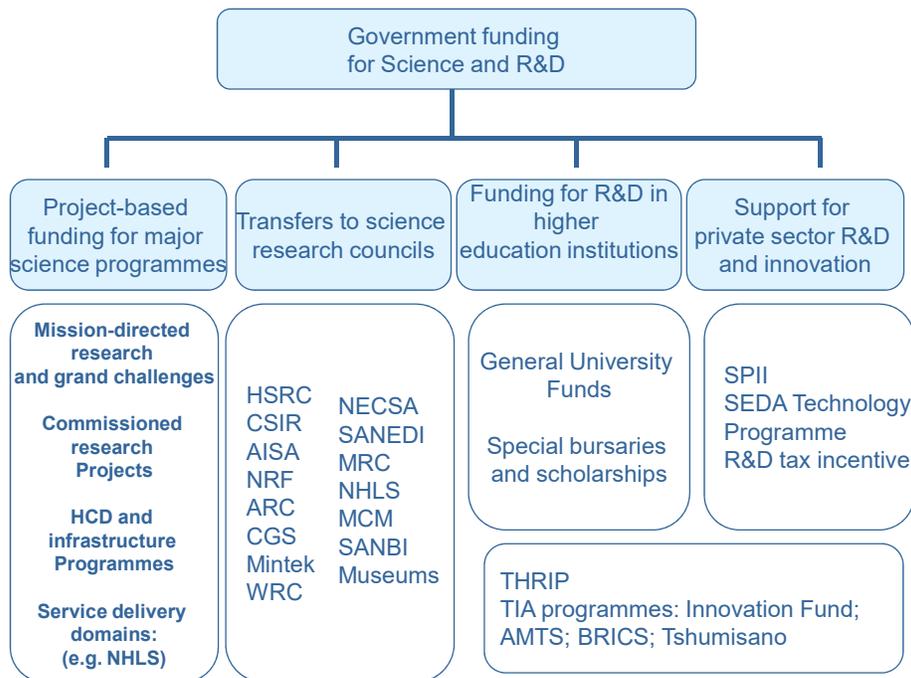
¹ Organisation for Economic Cooperation and Development - OECD (2002),)Frascati Manual “Proposed standard practice for surveys on research and experimental development”.

the departmental strategic plan, annual report, and Excel spreadsheet questionnaire captured by government departments. The draft report was discussed with all the departments in planned meetings and workshops to validate the accuracy of the information.

The basic model for understanding the flows of government funding for science and R&D is presented in a diagram below, indicating the following components:

- Project based funding for major science programmes;
- Transfers to science research councils;
- Funding for R&D in higher education institutions; and
- Funding appropriated for the support of private sector R&D and innovation activities.

Figure 1: Conceptual model of flows of government funding for science and R&D



This conceptual model simplifies the aggregated view of major flows for funding from government to different areas where scientific and technological research is undertaken, merely for purposes of this report. A more detailed model of funding flows would also indicate flows of funds between different players in the system

and commissioned research as well as flows between South Africa and other countries.

2.2 Methodological Limitations

On compiling this report the DST noted specific methodological limitations, as well as a need to improve data collection during the compilation of the future reports.

The limitations noted in this report are as follows:

- The scope of data collection excluded provincial departments, local government and other national departments whose research, science and technology were not that obvious. More work is needed to understand how much of the data has been omitted as a result of this.
- Data on General University Funds have not been included in the data presented in this report. This could be included in future reports once the analysis is clear concerning the composition of that fund in relation to the technical definition used in the Frascati Manual.

2.3 Improvements

The following improvements were made, largely responding to the limitations highlighted in the 2009/10 report:

- Significant amount of work has been done in preparing the 2010/11 data to correct the inconsistencies and omissions highlighted in the 2009/10 report. Part of the challenge relates to the identification of expenditure items for research, science and technology, largely due to the differences in technical definitions adopted from the Frascati Manual and the structure of financial reporting in government. Dedicated work was undertaken to ensure that relevant officials in the departments understand the technical definitions in order to identify the relevant expenditure items and how they should be categorised.

- The expenditure category of “scientific and technological innovation” was replaced by “Government Budget Appropriation or Outlays on Research and Development” (GBAORD). This change provided more clarity amongst departments and made it easier to identify relevant expenditure items and also enabled better classification of data, thus eliminating the category of ‘unspecified’ referred to in the 2009/10 report. As a result, the proportion of scientific and technological services increased from 12.8% in the 2009/10 report to 24.6%, largely because of the improved classification of data.
- The three departments whose data have been omitted in the 2009/10 report have provided data in the 2010/11 report. The table below indicates the new data that was included from the Department of Health, the Department of Communication and the Department of Police.

Table 1: Major adjustments to data of three departments from 2009/10 to 2010/11

<i>Name of the Departments</i>	<i>2009/10 report (in R'000)</i>		<i>2010/11 report (in R'000)</i>	
	<i>2009/10</i>	<i>2010/11</i>	<i>2009/10</i>	<i>2010/11</i>
<i>Communication</i>	9,346	2,486	384,359	536,841
<i>Health</i>	2,338,517	2,469,290	6,968,530	8,837,315
<i>Police</i>	404,700	576,900	2,110,304	2,895,744

Inclusion of the information from these three departments has improved coverage, and resulted in a revision of the reported 2009/10 total of R14.8 billion to R20.8 billion in 2010/11. The difference, which is just above R6 billion comprises the expenditure on the HIV/AIDS research grants of R4.4 billion from the DoH to universities; the R940 million spent technology infrastructure on construction of a forensic laboratory and the criminal record database (R772 million) from the Department of Police; and the R384 million investment on ICT by the DoC. Historical data of these departments, starting from 2007/08, were also included and updated.

Another area that was affected was transfers and subsidies. Inclusion of the previously omitted data and better classification resulted in shifts in the composition of transfers and subsidies. The 2010/11 report indicates that the majority of transfers go to the universities and universities of technology at 43.4% (R8.3 billion), whereas in the previous report it was reported that the bulk (44.8% or R5.7 billion) constituted transfers and subsidies to departmental agencies and accounts.

The DST will continue to support the departments in identifying their research, science and technology activities and in interpreting the technical definitions.

There is ongoing work between the National Treasury and the DST to improve the identification of relevant expenditure items. Several departments are being assisted to 'tag' the expenditure items within the Basic Accounting System (BAS) so that it becomes easy to identify and extract data for purposes of monitoring expenditures on research, science and technology.

3. FINDINGS

3.1 Overall expenditure on research, science and technology

The total national government expenditure on research, science and technology for 2010/11 is R23 billion. This amount is reported by 25 national departments that were identified to either perform or fund the research, science and technology in 2010. The amount represents a nominal increase of 10.6% from the R21 billion of the 2009/10² financial year. These investments constitute 2.8% of the total national government budget of that year and about 0.87% of the Gross Domestic Product (GDP).

Table 2: Research, science and technology investment in relation to GDP and national budget

	<i>2007/08</i>	<i>2008/09</i>	<i>2009/10</i>	<i>2010/11</i>
Total expenditure on research, science and technology (R'000)	16,447,719	18,392,558	20,857,634	23,030,282
GDP ³ (at market prices in R'000)	2,016,184,000	2,262,502,000	2,398,156,000	2,661,435,000
Total national government budget ⁴ (R'000)	541,443,400	635,953,300	747,196,800	812,143,000
Expenditure on research, science and technology % of GDP	0.82%	0.81%	0.87%	0.87%
Expenditure on research, science and technology % of total national government budget	3.04%	2.89%	2.79%	2.84%

The departments within the cluster⁵ of Social Services spent R11.0 billion (or 48.1%) of the total national government expenditure on research, science and technology, which is the highest contribution amongst the different clusters. This is followed by the Economic Service and Infrastructure cluster, which spent R8.1 billion (or 35.3%). The Economic Services and Infrastructure cluster spent the highest proportion (of 9.8%) of its total budget allocation for 2010/11 on scientific and technological activities. Other clusters contributed as follows: The Justice,

² The data presented in this report represents a correction to the omissions that were noted in the published 2009/10 STA report. Initial estimations of the 2009/10 STA expenditures was R13.9 billion, and this figure has been revised to R21 billion by inclusion of data that was previously omitted, by the Departments of Health, of Police, and Communication.

³ Source: Statistics South Africa. P0441 – Gross Domestic Product (GDP), 3rd Quarter 2011 (29 November 2011)

⁴ Source: National Treasury - 2011 Estimates of National Expenditure

⁵ The National Treasury clusters are categorised into 5, namely, the Central Government Administration, the Financial and Administrative Services; the Social Services; the Justice, Crime Prevention and Security; and the Economic Services and Infrastructure.

Crime Prevention and Security, R3.3 billion (or 14.2%); The Central Government Administration cluster, R362 million (or 0.6%) and Financial and Administrative Services cluster, R203 million (or 0.05%).

**Table 3: Investment on research, science and technology by government departments
(Figures in R'000)**

National Government Department	Audited Outcomes			Adjusted appropriations 2010 / 11	Medium – term – estimates		
	2007 / 08	2008 / 09	2009 / 10		2011 / 12	2012 / 13	2013/14
Central Government and Administration	544,376	695,871	801,255	362,402	114,395	114,207	117,530
Cooperative Governance and Traditional Affairs	2,676	3,171	3,355	3,550	10,695	10,407	7,502
Home Affairs	221,700	214,700	227,900	107,400	103,700	103,800	110,028
Public Works	320,000	478,000	570,000	251,452	-	-	-
Financial and Administrative Services	2,542,320	2,167,063	1,981,986	203,065	40,799	43,956	46,841
Public Enterprise	2,502,273	2,129,000	1,946,280	158,600	-	-	-
Public Service Administration	40,047	38,063	35,706	44,465	40,799	43,956	46,841
Social Services	6,054,163	7,245,107	8,896,897	11,074,012	12,959,273	13,991,712	16,047,089
Arts and Culture	148,637	168,674	124,619	186,649	195,935	205,799	217,118
Basic Education	28,270	61,230	34,106	14,660	70,000	100,000	105,500
Health	4,472,454	5,478,316	6,968,530	8,837,315	10,432,920	11,291,406	13,210,741
Higher Education and Training	1,384,000	1,521,000	1,738,000	2,003,000	2,232,000	2,343,600	2,460,780
Labour	8,000	13,400	12,700	10,000	9,241	9,495	10,017
Social Development	12,802	2,487	888	1,050	-	-	-
Sports and Recreation South Africa	-	18,054	-	21,338	41,418	42,400	44,794
Justice and Protection Services	2,032,162	2,280,953	2,411,337	3,275,038	3,566,724	4,116,977	2,813,295
Defence and Military Veterans	368,788	313,155	301,033	379,294	451,276	441,643	445,778
Police	1,663,374	1,967,798	2,110,304	2,895,744	3,115,448	3,675,334	2,367,517
Economics Services and Infrastructure	5,274,698	6,003,564	6,766,159	8,131,705	8,737,830	7,375,273	7,856,932
Agriculture, Forestry and Fisheries	529,614	549,784	577,788	674,859	815,027	921,524	865,016
Communications ⁶	232,484	288,757	384,359	536,841	846,790	865,572	1,035,125
Energy	432,390	596,514	604,114	617,707	695,388	627,565	608,768
Environmental Affairs	336,214	390,119	518,001	870,912	917,133	437,894	476,816
Human Settlement	-	-	-	12,340	13,080	13,865	146,797
Mineral Resources	270,080	258,507	293,785	302,345	351,361	381,745	382,355
Rural Development and Land Reform	256,970	220,893	251,811	475,497	375,127	392,066	413,410
Science and Technology	2,929,382	3,402,984	3,821,112	4,306,627	4,407,286	3,420,342	3,591,359
Trade and Industry	202,502	217,052	215,588	228,131	206,000	210,000	222,600
Transport	9,165	10,982	11,565	12,141	10,117	10,618	11,206
Water Affairs	75,897	67,972	88,036	94,305	100,521	94,082	103,480
TOTAL	16,447,719	18,410,612	20,839,580	23,046,222	25,441,262	25,643,113	26,751,448

⁶ Starting of investments on: Broadband services infrastructure in under serviced and rural areas

Based on the information available, the government appropriations into research, science and technology indicate a compounded annual growth rate (CAGR) of 7.20% from R16.4 billion in 2007/08 to R26.7 billion in 2013/14. This rate of growth appears modest, especially when considering the level of ambition expressed in various policies of government.

Significant increases are noted in appropriation by the Department of Health, which increased by R1.9 billion from 2009 to 2010, largely attributed to the funding for the HIV/AIDS research grants and provincial conditional grants towards health professional training. Other departments that have shown increases are the Departments of Police, Science and Technology, Environmental Affairs, Higher Education and Training and Communication.

Significant declines are noted in the Department of Public Enterprises, from R1.9 billion to R158 million between 2009 and 2010. This decline in allocation is attributed to the end of investment in the Pebble Bed Modular Reactor (PBMR), which was a significant government investment in the energy sector. Other departments that have declining appropriations are Home Affairs, Public Works, Energy and Basic Education.

3.2 Expenditure on the categories of research, science and technology

The majority of government investments on research, science and technology was on Government Budget Appropriation or Outlays on R&D (GBAORD) at 65.3% (R15 billion), followed by the scientific and technological services at 24.6% (R5.7 billion) and the scientific and technical education and training at 10.1% (R2.3 billion).

3.3 Transfers and subsidies

The expenditures are also categorised in terms of the accounting categories for which it is used, namely current payments, the transfers and subsidies and the payments for capital assets.

Table 4 shows that R19.0 billion (or 82.6% of the total) was disbursed by national departments as transfers and subsidies towards activities performed by departmental agencies, public corporations, universities and universities of technology, foreign governments and international organisation, and non-profit organisations. These institutions perform research and scientific work on behalf of government departments. Table 4 also shows that R3.0 billion (or 13.3%) constituted payments to capital assets. Current payments comprised 4.2%.

Table 4: Research, science and technology expenditure by accounting expenditure items for 2010/11 (Amounts in R'000)

<i>Economic Classification</i>	<i>GBAORD</i>	<i>STET</i>	<i>STS</i>	<i>TOTALS</i>	<i>% to totals</i>
Current payments					
Sub-total: current payments	186,356	60,918	719,943	967,217	4.20%
Payment for capital assets					
Sub-total: capital assets	1,537,137	-	1,516,833	3,053,970	13.30%
Transfer and subsidies					
Provinces and municipalities	-	1,865,387	556,963	2,422,350	12.70%
Departmental agencies and accounts	3,667,082	383,524	2,564,158	6,614,764	34.80%
Universities and universities of technology	8,054,841	17,228	192,127	8,264,196	43.40%
Public corporations and private enterprises	75,000	-	1,306	76,306	0.40%
Foreign governments and international organisations	1,049,049	-	6,242	1,055,291	5.50%
Non-profit institutions	473,800	-	117,282	591,082	3.10%
Households	-	-	1,046	1,046	0.00%
Sub-total: transfer and subsidies	13,319,772	2,266,139	3,439,124	19,025,035	82.60%
Totals	15,043,265	2,327,057	5,675,900	23,046,222	

The majority of transfer and subsidies was to the universities and universities of technology at 43.4% (R8.3 billion), and the majority of this investment was made by the Department of Health for the comprehensive HIV and AIDS research grant amounting to R6.1 billion.

The category of departmental agencies and accounts received the second largest allocation, with 34.8% (R6.6 billion). This expenditure item includes the investments made towards the statutory science councils and other public research organisations. These organisations perform a wide range of activities including basic and applied research as well as experimental or technology development. Further details on funding for public research institutions are presented in a later section.

The transfers to provinces and municipalities received the third largest allocation that constituted 12.7% (R2.4 billion). The Department of Health indicated that it had transferred about R1.9 billion of this amount to provinces to fund the health professional training conditional grant. Other categories of funding transfers went to foreign governments and international organisations, the public corporations and private enterprises, the non-profit institutions and households.

3.4 Investments in scientific infrastructure

Table 4 also present information on payments for capital assets, which can appropriately be used proxy for investments in scientific infrastructure. Just more than R3.0 billion has been allocated to payments for capital assets in 2010/11. The majority of this investments was towards buildings and other fixed structures at R2.3 billion (76%), followed by the machinery and equipment at R474 million (16%), and R252 million (8%) was shared amongst the software and other intangible assets, and the land and soil assets.

An assessment that was undertaken by the DST, working in conjunction with relevant departments, during 2010 and 2011 has highlighted serious concerns regarding the deteriorating capabilities of some of the critical technology intensive services that support public service delivery. An observation was made that the allocations of public investment has been generally inadequate to sustain the required growth. The totality of these services include the national health

laboratories and police forensic laboratories, weather services, the national metrology (scientific standards) laboratory, the geological survey function, maintenance of critical genetic resources, earth observation data management and services, and certain national defence technical evaluation facilities.

A comprehensive plan for ongoing public investment to renew and upgrade the infrastructure of these institutions is required. This is important to ensure that these facilities are put on a sustainable technological path to keep up with the requirements for effective service delivery and in managing national risks.

3.5 Government funding for the public research institution

Table 5 presents information on government funding for the various public research institutions by means of parliamentary grant.

Table 5: National government funding for public research institutions (Parliamentary grant) (Amounts in R'000)

Public Research Institutions	Audited Outcomes			Adjusted appropriations 2010 / 11	Medium – term – estimates		
	2007 / 08	2008 / 09	2009 / 10		2011 / 12	2012 / 13	2013/14
Department of Science and Technology	1,449,030	1,513,290	1,523,417	2,070,441	2,542,212	2,596,809	2,733,630
Africa Institute of South Africa	26,530	30,464	29,280	30,594	32,440	34,062	35,883
Council for Scientific and Industrial Research	517,352	554,687	599,384	685,784	687,169	727,491	765,580
Human Science Research Councils	155,949	163,851	166,185	194,293	206,169	216,365	227,616
National Research Foundation	657,699	683,420	692,131	749,142	1,089,035	1,068,156	1,126,087
South African National Energy Research Institution	42,000	44,268	0	0	0	0	0
South African National Space Agency	0	0	0	0	93,583	95,539	100,247
Technology innovation Agency	0	0	0	410,628	433,816	455,196	478,217
Tshumisano Trust	49,500	36,600	36,437	0	0	0	0
Department Of Health	292,719	306,734	328,006	348,633	353,812	369,391	389,833
Medical Research Council	223,290	236,133	251,139	270,509	271,205	284,289	300,475
National Health Laboratory Services	69,071	70,223	76,475	77,709	82,167	84,640	88,873
National Health Laboratory Services (Cancer Register)	358	378	392	415	440	462	485
Department of Environmental Affairs	288,196	352,776	492,833	822,768	887,366	396,382	422,119
Oceans and Coastal Management	177,500	223,945	353,947	679,938	723,279	227,384	245,655
South African National Biodiversity Institute	110,696	128,831	138,886	142,830	164,087	168,998	176,464
Department of Arts and Culture	30,015	32,893	36,306	37,963	45,270	49,102	52,205
Natal Museum	10,386	11,418	12,905	13,501	14,310	15,031	15,858
National Museum	19,629	21,475	23,401	24,462	30,960	34,071	36,347
Department of Agriculture, Forestry and Fisheries	488,499	452,378	537,153	622,266	755,510	869,242	797,391
Agriculture Research Council	488,499	452,378	537,153	622,266	755,510	869,242	797,391
Department of Mineral Resources	270,080	258,507	293,785	302,345	351,361	381,745	382,355
Council for Geoscience	145,511	122,672	132,677	136,505	154,405	162,897	172,985
Council for Mineral Technology	124,569	135,835	161,108	165,840	196,956	218,848	209,370
Department of Energy	432,390	596,514	604,114	617,707	695,388	627,565	608,768
South African National Energy Development Institute	-	-	-	-	20,100	22,110	22,344
South African Energy Research Institute	44,134	41,788	39,970	43,597	89,254	32,418	32,418
South African Nuclear Energy Corporation	388,256	554,726	564,144	574,110	586,034	573,037	554,006
TOTAL	3,250,929	3,513,092	3,815,614	4,822,123	5,630,919	5,290,236	5,386,301

The parliamentary grant funding through national departments towards the public research institutions (PRIs) was R4.8 billion in 2010/11. This constituted 20.9% of the total government investment on research, science and technology. For the seven year period 2007/08 to 2013/14, the allocations show a CAGR of 7.5%. This rate of growth is on par with the increase in overall government funding for science and research, and considered modest to attain the organic growth and contribution expected of these institutions.

The majority of investments for public research institutions is captured under the departmental agencies and accounts in Table 4. It makes up 73.3% (R4.8 billion) of the total R6.6 billion investment of 2010/11.

Statutory science councils⁷ received just above R2.9 billion from national government departments through parliamentary grants. These funds are used to finance the research mandate of these science councils including the running costs of the institutions.

⁷ There are eight science councils used for purposes of analysis, namely, the Africa Institute of South Africa, Agriculture Research Institute, Council for Geosciences, Council for Mineral Technology, Council for Scientific and Industrial Research, Human Science Research Councils, Medical Research Council, and National Research Foundation.

4. CONCLUSIONS

An accurate estimation of the level and composition of government investment into the science system is a useful starting point in evaluating how scientific and technological innovation is prioritised as a key input to economic growth and development.

Key conclusions from the findings are that:

- The levels of public investment are increasing but at a declining rate over a period of seven years from 2007 to 2014. With a compounded annual growth of 7.2%, the rate of increases seems modest, especially given the level of ambition expressed in different policy documents of government.
- The proportion of the total investment made on major government programmes is visible, and clearly reflects the intent of government in establishing new and growing existing capacity for science, R&D and human capital development. The few examples of major expenditure items are the Square Kilometre Array, the HIV/AIDS research grant and the health professional training.
- A comprehensive plan for ongoing public investment to renew and upgrade the scientific infrastructure is needed. A concern of deteriorating capacity should be reversed through a deliberate plan for human resources development and upgrading of technological facilities in areas such as health, police forensics, weather, agricultural extension services and others.

The work that has been undertaken by the DST in establishing systems for monitoring public investments in this area has established a baseline from which future work can be based. The observations made throughout the report indicate that the methods for monitoring such investments still need to be improved to ensure timeliness of the information and analysis so that it can be communicated to the appropriate decision making bodies in good time.

The beneficial impact of science and technology on our lives is often obvious. Science and technology also underpins many of our most successful industries and it is for this reason that there are programmes of interventions to drive the transformation of the South African economy to a knowledge economy in which the major proportion of the workforce is employed in knowledge based jobs and the major proportion of firms that innovate use technology to do so.