



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

Report on Government Funding for Scientific and Technological Activities in 2014/15

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ABBREVIATIONS

DST	Department of Science and Technology
ECSP	Economic Support Competitiveness Package
ENE	Estimates of National Expenditure
GBAORD	government budget appropriation or outlays on R&D
GERD	gross expenditure on research and development
MTEF	Medium Term Expenditure Framework
NSI	National System of Innovation
R&D	research and development
S&T	science and technology
SEO	socio-economic objective
STA	scientific and technological activity
STET	Scientific and Technical Education and Training
STS	Scientific and Technological Services

EXECUTIVE SUMMARY

In South Africa's current context, the government is expected to facilitate increased levels of scientific and technological activities (STAs) to help the country achieve its development ambitions in a range of areas, including the economy, education, health, minerals, energy, agriculture and the environment. The limited economic incentive for the private sector to invest at optimal socio-economic levels in these areas makes it necessary for the government to serve as a primary source of funding, particularly for fundamental basic research, human capital development, technology transfer activities and a range of scientific services that support service delivery in core areas of government competency.

This report presents information about government funding for STAs. It is based on a survey of the expenditure and budget data of 29 national government departments that confirmed having either performed or funded STAs in the 2014/15 financial year.

An estimated R37,3 billion was spent on STAs in the 2014/15 financial year. This amount represents a nominal increase of 11,7% from the R33,4 billion recorded in 2013/14. In real terms (amounts stated in constant 2010 rands), STAs increased by 5,0% from 2013/14 to 2014/15. The Medium Term Expenditure Framework (MTEF) appropriations indicate that expenditure on STAs will increase to R44,4 billion by 2017/18. The funding for STAs for the 2014/15 financial year was 3% of the total national government budget, the same level as an average of the earlier years (2011 to 2014).

Total funding for science councils and related public research institutions increased to R5,7 billion in 2014/15, a nominal increase of 3% from the previous financial year's R5,5 billion. It is projected that in 2015/16, their funding will return to the 2013/14 level of R5,5 billion. Closer examination shows that this fluctuation is linked to a combined effect of the funding window of the Economic Competitiveness Support Package (ECSP), which is due to end in the 2016/17 financial year, as well as the National Treasury budget reprioritisation intervention as part of the Estimates of National Expenditure (ENE) adjustment process. Further analysis shows that, at an aggregated level, science councils are looking at contract work as an increasingly

important source of revenue to sustain their activities. The analysis also establishes that contract income comes from government institutions, the South African private sector and contracts with foreign governments and business. However, it is not clear how much of the contract funding is sourced specifically from government institutions.

The overall pattern of the classifications of funding the STAs, namely Government Budget Appropriation or Outlays on Research and Development (GBAORD), the Scientific and Technical Education and Training (STET) and Scientific and Technological Services (STS), remained largely the same as in previous years. The bulk of STA funding (approximately 81,7% or R30,5 billion) consisted of transfers and subsidies towards extramural activities, meaning that most of the STAs were undertaken outside of government departments. For instance, R12,9 billion was spent on procuring research and development (R&D) and scientific services, institutional funding and direct transfers for science and technology (S&T) projects performed by science councils and other entities on behalf of government. A further R15,5 billion was disbursed as grants and subsidies towards STAs performed in the higher education sector and the private sector.

Drawing data from budget appropriation tables makes it possible to link specific funding to the government's policy objectives (classified broadly in this report as socio-economic objectives or targeted areas of use). The Socio-economic objectives can also assist in the effectiveness of the use of the STA information by measuring the contribution of specific sectors to the total government funding for STAs. An estimated R24 billion (64,2%) of total budgeted STA expenditure was allocated to the objective of "society" in the area of health, education and training and social development followed by R4,2 billion (11,4%) towards "justice and protection". R2,8 billion (7,5%) was appropriated towards the "advancement of knowledge" and "information and communication services" at R1,3 billion (3,5%), followed by R1,2 billion (3,3%) for "agriculture (plant production and animal production)" and R1,1 billion (2,9%) for STAs in the "energy" category. Other, smaller, categories account for the remaining R2,7 billion (7,2%).

The annual STA survey follows a funder-based approach in compiling aggregate indicators on government funding of the S&T sector, an internationally recognised

approach. Drawing data from budget appropriation tables makes it possible to produce relevant indicators in a more timely fashion than collecting data on actual spending from performers of STAs. The STA survey, therefore, measures different indicators from those measured through the R&D survey. Definition of STAs is broader than just R&D. It covers the family of scientific and technological activities of which R&D is a part. On the other hand, the R&D survey follows a performer perspective and traces the flows of funding for R&D based on the replies from performers of R&D and not the funding source. In the R&D survey, the R&D-performing units indicate the amount they spent on R&D and the sources from which they obtained funding for R&D activities, one of which is government.

1. INTRODUCTION AND OVERVIEW

The survey on public funding for STAs gives some insight into the level and pattern of public investment in the S&T sector, as well as the trend in actual and budgeted expenditure over the medium term. The regular analysis of investment trends is necessary to inform decision making, coordination and planning by government.

The Department of Science and Technology (DST) has undertaken this survey on government funding for STAs, covering representative national departments, since 2008/09. Although 29 national government departments were covered, only 22 confirmed that they had made STA budgetary allocations in 2014/15. The estimates of STA expenditure for 2014/15 are therefore based on the data from these 22 departments.

This report analyses expenditure on STAs in terms of the following:

- By department, indicating how much each department is contributing to overall STA expenditure, and what percentage of the relevant department's budget is used for STA.
- By mode and/or instrument, indicating whether the expenditure is spent within the department or is shifted to other entities as transfers or subsidies, as well as the policy instrument used.
- By socio-economic objective, indicating the policy intention with the funding by linking the expenditure with a list of "targeted areas of use".

The STA survey has always been done at national government level. The feasibility of extending the survey to provincial government is still being analysed, and a pilot study was undertaken in 2014/15. So far, it appears that inclusion of provincial-level data in the analysis will require a thorough examination of funding flows between national and provincial departments.

2. THE POLICY CONTEXT, AND THE NEED TO MONITOR STA FUNDING

The National Development Plan is clear that increased investment in S&T is needed to fuel growth and development. Furthermore, government's vital role in funding and performing STAs is set out in the 1996 White Paper on Science and Technology, the 2002 National Research and Development Strategy, and the 2004 Cabinet-approved Strategic Management Model for the Public Science and Technology System in South Africa. Government is expected to address the systemic underfunding of STAs, as well as their alignment with national development goals.

In pursuit of a more effective coordination and planning process across the national system of innovation (NSI), the DST sees the survey on the public funding of STAs as an important tool for the collation and aggregation of data for informed policy analysis.

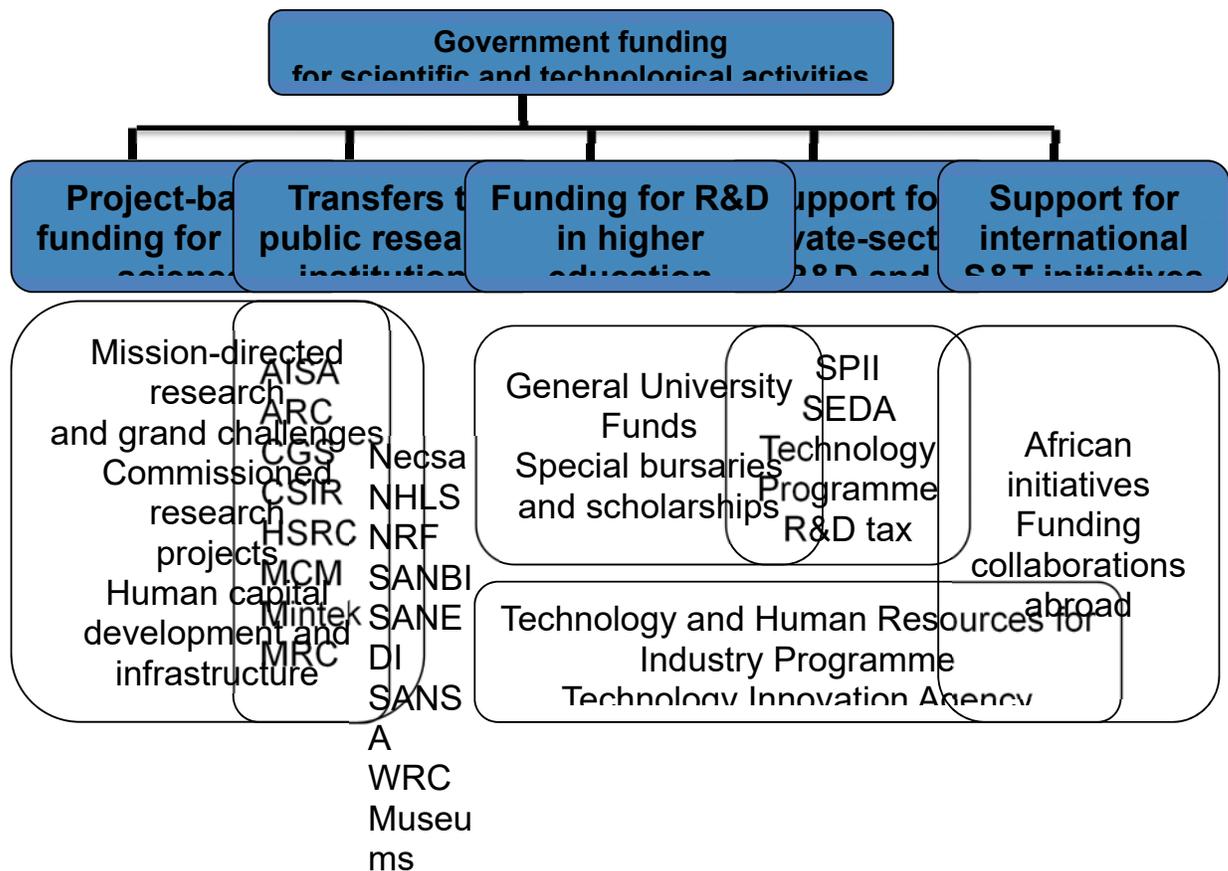
This report shows actual expenditure as well as government's projected budget allocations for STAs over the MTEF. It draws data from the relevant National Treasury databases and estimates the aggregate indicators for the public funding of STAs. The information presented in this report is intended to –

- enable regular evaluation of the level of public investment in the NSI;
- support planning and the coordination of public funding for STAs by various sections of government;
- support decision making on S&T resource deployment in priority areas to maximise socio-economic outcomes.

Government faces demands for investment in a wide range of areas, from agriculture, health, safety and security, to energy and industrial development. During a period of fiscal pressure, it is even more crucial to enhance the process of setting priorities for the allocation of public funding in the public S&T sector. Increasingly, there is pressure to improve the efficiency of translating results of publicly funded research into commercial/developmental outcomes. This is the reason why institutional platforms for identifying, protecting and using the intellectual property generated from publicly funded research have been established.

Figure 1 shows how government funding for STAs is typically deployed in ways that support research, development and innovation in South Africa. The diagram is not intended to be exhaustive, but to provide an indication of the major channels through which funding for STAs is deployed. Some entities actually perform research, some are responsible for funding research activities, and some, like the National Research Foundation and the Medical Research Council, do both. The National Research Foundation performs research through the national facilities (e.g. the South African Astronomical Observatory, the iThemba Laboratory for Accelerator-Based Sciences and the South African Institute for Aquatic Biodiversity), while it is also a major funding agency responsible for distributing funding to the research community, mostly for human capital development and infrastructure initiatives. The Technology Innovation Agency is a funding agency responsible for supporting innovation and commercialisation activities undertaken by both public and private institutions.

Figure 1: Flows of government funding for STAs



The government plays a crucial role in supporting STAs in the country towards the new knowledge and the development of human capital at all levels. Funding for STAs is vital if South Africa is to meet its development goals.

It is important that government understands the long-term nature of research, and sustains funding for the benefit of future generations. The practical benefits of research results are uncertain, and often appear only after many years, or a great deal of further research, perhaps not even obviously related to the initial research. An immediate benefit, however, is capacity building, as people acquire knowledge and skills through the STAs in which they participate. These skills can be applied elsewhere, even if a particular research project does not result in the desired outcomes.

This report focuses on government funding for scientific and technological activities at national government departments, there are other instruments that government to promote R&D investment in the private sector. The R&D tax incentive programme is one example of policy instruments used by government to promote R&D investment in the private sector. The R&D tax incentive offers a 150% tax deduction for operational R&D expenditure in terms of section 11D of the Income Tax Act. It is available to businesses of all sizes and in all sectors of the economy. The tax deduction allowed through the incentive are accounted for a tax revenues foregone, hence it is regarded as an indirect financial support for private sector R&D and innovation. The incentive is aimed at encouraging businesses to invest in R&D in South Africa and the objective is to help companies build capabilities and innovations by creating new products, processes, devices and techniques, and/or significantly improving existing ones

3. KEY FINDINGS

3.1 Overall national government expenditure on STAs

The total national government budget on STAs for the 2014/15 financial year is estimated at R37,3 billion, a nominal increase of 11,7% from the R33,4 billion recorded in 2013/14. In real terms (amounts stated in constant 2010 rands), the budget allocation for STAs increased by 5,0% from 2013/14 to 2014/15. The MTEF appropriations indicate that this expenditure will increase to R44,4 billion by 2017/18.

Figure 2: Overall government expenditure on STAs

(Nominal and constant 2010 rands in R billions)

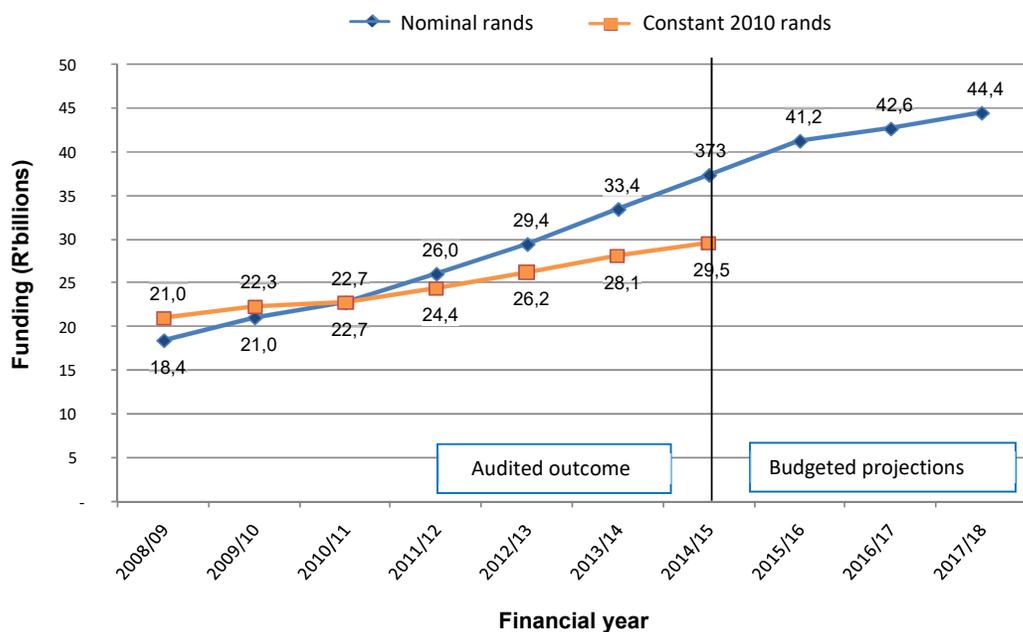
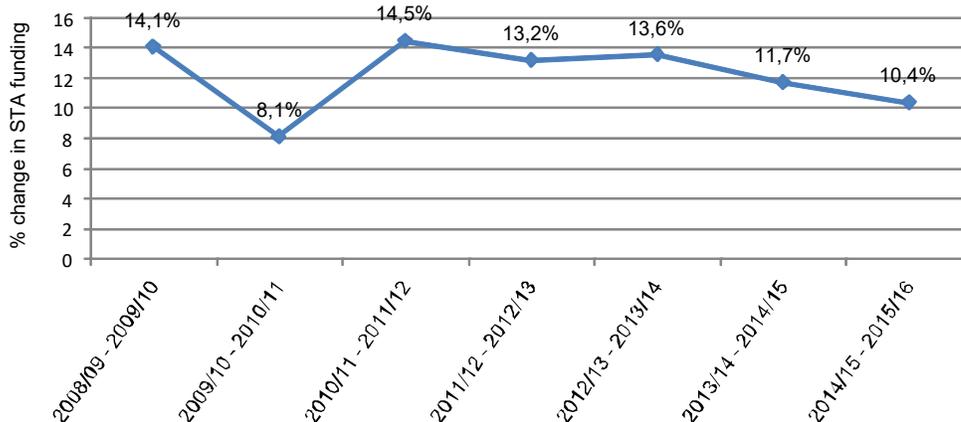


Figure 3: Year-on-year percentage changes in funding for STAs



reveals that the rate of year-on-year increases is slowing down. For instance, the nominal growth of 11,7% from 2013/14 to 2014/15 is lower than the nominal growth reported in the previous three measurement periods, and projections show a further slowdown to 10,4% going into 2015/16. The slowdown in the rate of increase in STA expenditure can be partially attributed to the need for government departments to accommodate budget cuts.

During the period covered by this report, the South African government was still operating in a constrained fiscal environment. Fiscal consolidation measures that were initiated in the previous few years had taken effect, a consequence of which were widespread budget cuts and reprioritisation, which also affected STA budgets across government, slowing the year-on-year increases in overall STA allocations compared to previous years. According to the 2015 MTEF, the budget continues to be informed by the assessment of a difficult macro-economic environment and the fiscal policy framework that has served previous budgets. Government faces an extremely tight fiscal environment and expenditure over the MTEF will be constrained.

Data for four new departments were included in the survey for the first time, bringing the total number of departments covered from 25 to 29. The additional departments are the Department of Correctional Services, the Department of Tourism, National Treasury and Statistics South Africa, and they have contributed a combined R737 million to the total STA amount for 2014/15, which is 2,0% of the total STA expenditure.

Table 1: Total expenditure on STAs in relation to annual government budget

	INDICATOR
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FINANCIAL YEAR	Total expenditure on STA	Total national government budget	STA expenditure as % of national government budget
2011/12	25 990 356	888 523 200	2,8
2012/13	29 431 921	966 967 000	3,0
2013/14	33 430 045	1 049 109 000	3,2
2014/15	37 339 424	1 243 370 000	3,0
2015/16	41 204 961	1 351 007 000	3,0
2016/17	42 600 349	1 448 804 000	2,9
2017/18	44 392 871	1 561 740 000	2,8

Source: 2015 Estimates of National Expenditure

Spending on STAs constituted 3,0% of the total national government budget in 2014/15, which is 0,2% less than the 3,2% reported in 2013/14. This ratio decreases to 2,9% in the outer years.

Estimates show a compound annual growth rate of 10,7%, from R18,4 billion in 2008/09 to R37,3 billion in 2014/15, which is comparable to the compound annual growth rate of 10,1% estimated for the overall national government budget growth over the same period.

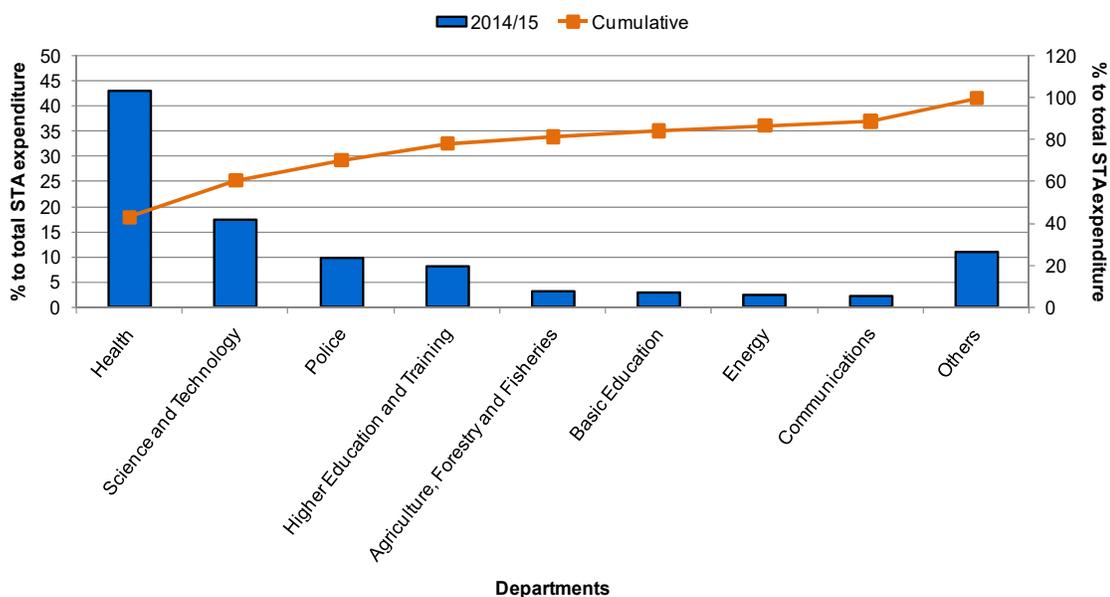
Table 2: Expenditure on STAs by national government department

National government department (R'000)	Audited outcome			Actual expenditure	Medium-Term Expenditure Estimate		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Agriculture, Forestry and Fisheries	804 965	1 081 103	1 018 461	1 138 325	1 194 726	1 253 948	1 316 645
Arts and Culture	186 649	20 452	33 058	35 069	36 235	38 047	39 950
Basic Education	70 000	771 612	1 003 102	1 058 681	1 338 269	1 406 055	1 476 358
Communications	952 823	737 499	916 995	823 798	864 988	908 237	953 649
Cooperative Governance and Traditional Affairs	10 695	541 446	565 401	596 699	617 298	649 819	682 310
Correctional Services	-	-	4 298	1 815	1 643	1 726	1 812
Defence and Military Veterans	500 405	496 095	505 171	613 959	613 630	601 125	574 790
Energy	631 134	623 689	726 526	923 363	645 219	619 963	731 146
Environmental Affairs	415 657	437 894	476 816	505 425	530 696	557 231	585 093
Health	10 445 279	11 415 551	14 074 864	16 225 859	18 353 596	19 273 123	20 212 559
Higher Education and Training	2 232 000	2 403 401	2 743 149	3 003 557	3 261 381	3 425 620	3 596 901
Home Affairs	103 700	386 690	125 729	343 466	219 108	230 063	241 567
Human Settlements	13 080	0	18 446	0	0	0	0
Labour	7 441	1 844	4 274	4 345	8 165	8 573	9 002
Mineral Resources	351 361	476 537	612 741	626 295	699 856	647 443	679 815
National Treasury	-	-	-	692 497	654 643	484 721	412 008
Police	4 353 784	4 834 560	3 704 057	3 625 723	3 876 052	4 086 175	4 379 332
Public Enterprises	0	0	0	57 250	63 141	66 298	69 613
Public Service and Administration	40 799	0	0	3 050	5 785	6 074	6 378
Public Works	0	0	0	0	0	0	0
Rural Development and Land Reform	475 762	56 272	10 245	18 716	18 447	19 369	20 337
Science and Technology	4 032 690	4 591 196	6 198 155	6 479 890	7 482 120	7 562 186	7 608 642
Social Development	0	51 393	490	5 097	5 034	5 273	5 524
Sport and Recreation South Africa	41 412	37 588	51 456	43 982	61 377	64 301	67 595
Statistics South Africa	-	-	27 753	42 479	49 672	50 675	55 656
Tourism	-	-	300	451	315	497	695
Trade and Industry	218 377	211 871	215 495	224 725	233 526	245 202	257 462
Transport	9 597	79 817	14 104	17 308	15 411	16 243	17 054
Water and Sanitation	92 746	175 411	378 959	227 600	354 629	372 360	390 978
TOTAL	25 990 356	29 431 921	33 430 045	37 339 424	41 204 961	42 600 349	44 392 871
Zeros in the table indicate that no allocations were made for STAs. Hyphens indicate that there is no data available.							

Table 2 indicates the expenditure on STAs by the 29 departments surveyed. Of the 2014/15 expenditure on STAs, 81,6% (R30,5 billion) came from five departments, namely, the Department of Health (R16,2 billion), the Department of Science and

Technology (R6,5 billion), the South African Police Service (R3,6 billion), the Department of Higher Education and Training (R3,0 billion), and the Department of Agriculture, Forestry and Fisheries (R1,2 billion). The remaining 18,4% (R6,8 billion) came from the other departments surveyed.

Figure 4: Concentration of STAs on departments over the years



Expenditure on STAs in 2014/15 by the Department of Water and Sanitation decreased significantly from 2013/14. According to the department's ENE, this was because of a realignment of funding priorities and the need to use existing allocations to fund opportunities that arose for the department to expand and improve service delivery.

Analysis of the overall expenditure pattern reveals that the top five STA spending departments shown in Figure 4 have continued to spend a high percentage of their total annual budgets on STAs. This expenditure included allocations to the science councils.

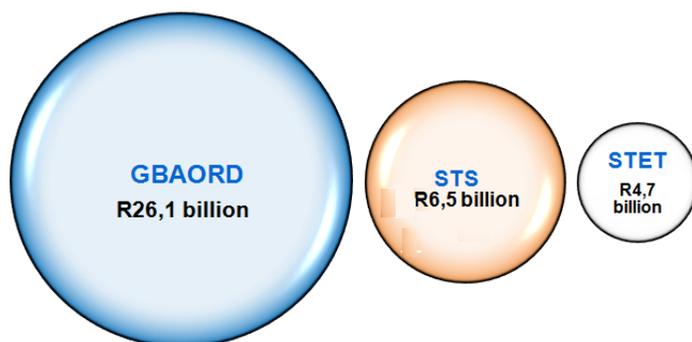
Table 3: Expenditure on STAs as % percentage of STA Expenditure to Total Budget

National government department (R'000)	STA Expenditure (R'000)	Departmental Budget (R'000)	% of STA Expenditure to Total Budget
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Cooperative Governance and Traditional Affairs	596 699	63 212 700	0.94%
Home Affairs	343 466	6 623 700	5.19%
Public Works	0	6 121 300	0.00%
Public Enterprises	57 250	259 800	22.04%
Public Service and Administration	3 050	875 100	0.35%
Arts and Culture	35 069	3 524 700	0.99%
Basic Education	1 058 681	19 680 100	5.38%
Health	16 225 859	33 955 500	47.79%
Higher Education and Training	3 003 557	50 306 700	5.97%
Labour	4 345	2 527 300	0.17%
Social Development	5 097	128 799 400	0.00%
Sport and Recreation South Africa	43 982	970 400	4.53%
Defence and Military Veterans	613 959	42 831 200	1.43%
Police	3 625 723	72 507 200	5.00%
Agriculture, Forestry and Fisheries	1 138 325	6 692 400	17.01%
Communications	823 798	1 593 400	51.70%
Energy	923 363	7 415 600	12.45%
Environmental Affairs	505 425	5 668 400	8.92%
Human Settlements	0	30 521 400	0.00%
Mineral Resources	626 295	1 471 300	42.57%
Rural Development and Land Reform	18 716	9 455 300	0.20%
Science and Technology	6 479 890	6 479 890	100.00%
Trade and Industry	224 725	9 835 000	2.28%
Statistics SA	42 479	2 242 500	1.89%
Correctional Services	1 815	19 721 100	0.01%
National Treasury	692 497	514 823 800	0.13%
Tourism	451	1 662 100	0.03%
Transport	17 308	48 726 500	0.04%
Water Affairs	227 600	12 480 300	1.82%
TOTAL	37 339 424	1 110 984 090	0

3.2 Main categories of expenditure on STAs

Figure 5: Main categories of expenditure on STAs¹, 2014/15



GBAORD accounts for 69,9% (R26,1 billion) of the overall budget on STAs in 2014/15, followed by Scientific and Technological Services (STS) at 17,4% (R6,5 billion) and Scientific and Technical Education and Training (STET) at 12,6% (R4,7 billion).

The GBAORD estimation through this survey and the value of government-funded R&D as estimated by the R&D survey are different, primarily because of the different approaches used in data collection. GBAORD is derived from budgets, while the R&D survey follows a performer perspective and traces the flows of funding for R&D based on responses to a survey from performers of R&D and not the funding source. In the R&D survey, the R&D-performing units indicate the amount they spent on R&D and the sources from which they obtained funding for R&D activities, one of which is government.

Government Budget Appropriation or Outlays on Research and Development (GBAORD) includes all the appropriations allocated to R&D undertaken within national departments, the transfers made towards government-financed R&D carried out by government entities and elsewhere outside government, and direct government financial support for R&D carried out by business enterprises, higher education and private non-profit sectors.

The Scientific and Technical Education and Training (STET) category includes 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, engineers and technologists. These are activities directly related to human capital development.

The Scientific and Technological Services (STS) category includes activities involving the application of scientific and technical knowledge, such as patenting, geological surveys, the generation of standards, and the operation of libraries and national scientific databases.

¹ The main categories of STAs are described in the Organisation for Economic Cooperation and Development's *Frascati Manual: Proposed standard practice for surveys on research and experimental development*.

3.3 Transfers and subsidies (intramural vs extramural activities)

Table 4: Intramural and extramural STA allocations

STAs	Intramural activities (R'000)	Extramural activities (R'000)	
		Funding support for government STAs	Funding support for non-government STAs
GBAORD	2 244 619	6 997 120	16 823 627
STS	4 590 489	1 820 436	113 476
STET	4 593	4 085 896	659 168
Total STAs expenditure	6 839 700	12 903 452	17 596 271
% of total	18,3%	34,6%	47,1%

An estimated R6,84 billion (18,3%) of the total budgeted for STAs in 2014/15 was used to support intramural activities, with R1,79 billion allocated for capital assets and R5,05 billion budgeted for current expenditure items.

The bulk of STA funding (approximately 81,7%, or R30,5 billion) consisted of transfers and subsidies towards extramural activities. Of this amount, R12,9 billion was budgeted by departments for procuring R&D and scientific services, institutional funding, and direct transfers for S&T projects performed by science councils and other entities on behalf of government. In the National Treasury expenditure tables, these amounts appear under transfers to science councils (departmental agencies and accounts), provincial and local authorities, and transfers for project funding. The data collected for this report do not provide any further breakdown of how recipients of transfers and subsidies (departmental agencies and public corporations) allocated the funds.

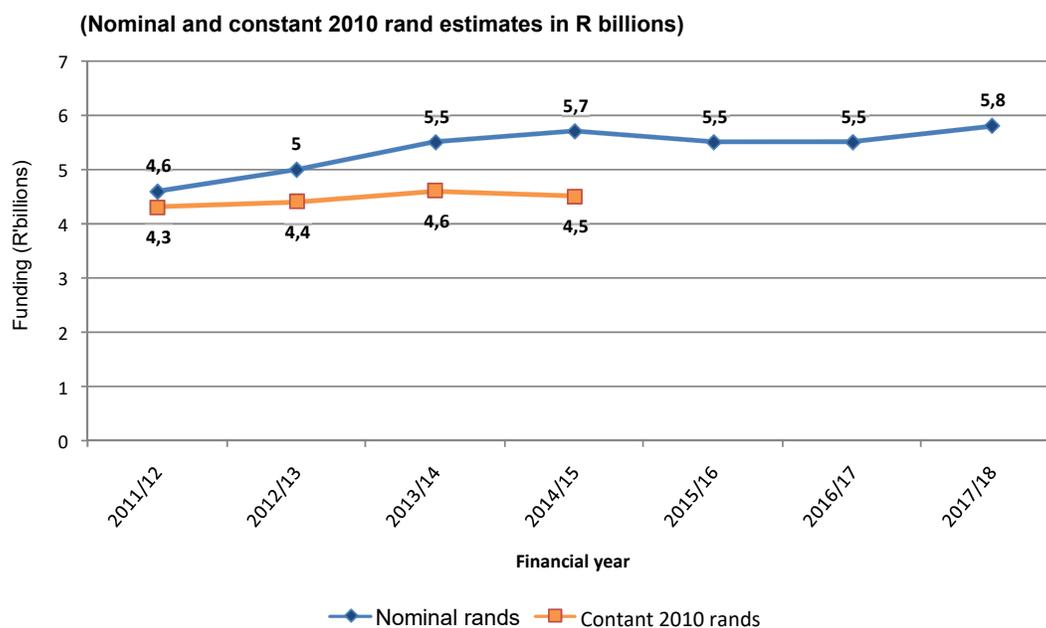
The remaining R17,6 billion for extramural activities was used to provide funding support for non-government STAs, including financial support in the form of direct incentives and concessions to the private sector by the Department of Trade and Industry and the DST, as well as the general university funds provided by the Department of Higher Education and Training. The distinguishing factor is that the government provides funding support in these areas without expecting ownership of the resulting output, but in order to advance national priorities, including competitiveness. Examples include the Department of Trade and Industry's Support Programme for Industrial Innovation, Technology and Human Resources for Industry

Programme, and the Small Enterprise Development Agency Technology Programme, which are part of the portfolio of direct funding instruments to stimulate private sector investments into research, development and innovation. The National Treasury expenditure tables classify these amounts under transfers to public corporations and private enterprises, non-profit institutions, foreign governments, and international organisations.

Higher education institutions received the largest portion (R15,5 billion or 50,8%) of the total amount that was allocated as transfers and subsidies (for extramural STAs). Departmental agencies and accounts received the second largest allocation (R7,2 billion or 23,6%), which included funding allocations to science councils and other public research organisations. This figure represents both the parliamentary grants reported as funding for public research institutions in Table 4, and funding that is transferred to these institutions for specific projects over and above the parliamentary grants. These organisations perform a wide range of activities, including basic and applied research, and experimental and technological development. Transfers to provincial and local tiers of government make up the third largest allocation (R5,7 billion or 18,7%), while the remaining R2,1 billion comprised other expenditure items.

3.4 Government funding for public research institutions

This section presents information on government funding for various public research institutions by means of parliamentary grants. The section also looks at contract work as an increasingly important source of revenue to sustain the activities of these institutions. Parliamentary grants are intended to finance the public research institutions' research mandates and operating costs.

Figure 6: Parliamentary grant funding to science councils and related institutions**Table 5: National government funding for public research institutions (Parliamentary grants)**

Science councils (R'000)	Financial year						
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Academy of Science of South Africa	18 952	16 284	20 744	27 782	29 481	29 628	31 109
Agricultural Research Council	755 510	943 026	950 254	1 029 151	803 933	812 989	974 583
Council for Geoscience	154 405	223 006	271 232	292 839	325 914	357 627	348 978
Council for Mineral Technology	196 956	253 531	364 709	370 854	390 742	311 416	299 287
Council for Scientific and Industrial Research	873 849	958 766	974 378	1 029 785	1 041 183	1 086 589	1 140 918
Human Sciences Research Council	238 609	247 820	258 867	276 010	288 706	290 149	304 656
Medical Research Council	283 564	288 863	419 460	446 331	623 892	657 590	614 961
National Research Foundation	1 114 110	1 075 469	1 139 014	864 221	899 429	896 403	940 242
South African National Biodiversity Institute	220 387	209 698	264 254	289 951	309 412	324 331	329 928
South African Nuclear Energy Corporation	45 100	56 110	134 344	162 685	64 861	20 625	59 774
South African National Energy Development Institute	106 719	126 008	123 708	118 298	124 355	124 977	131 226
South African National Space Agency	586 034	567 579	592 182	760 678	580 358	599 338	671 372
Total	4 594 195	4 966 160	5 513 146	5 668 585	5 482 266	5 511 662	5 847 034

Source: 2015 Estimates of National Expenditure

Total parliamentary grant funding for public research institutions increased from R5,5 billion in 2013/14 to R5,7 billion in 2014/15. This translates to a nominal increase of 3%. In 2015/16, parliamentary grant funding for public research institutions is projected to return to the 2013/14 level of R5,5 billion. This decline can be associated with the end of the ECSP in 2016/17 as well as National Treasury ENE budget reprioritisation. Declines in budget of institutions such as the Agricultural Research Council, South African National Energy Development Institute, South African National Space Agency, and the South African Nuclear Energy Corporation demonstrate this point.

The ECSP has provided the much-needed funding boost that enabled science councils to start new initiatives and scale up some important initiatives. The end of the ECSP may pose a risk to the continuation of some of those initiatives. Institutions such as the Council for Geoscience, Medical Research Council and Agricultural Research Council, for example, used the ECSP to fund animal vaccine development and to leverage additional private sector and donor funding.

Table 6: Parliamentary grant vs own/ contract income

Statement of financial performance (R'000)	Audited outcome			Revised estimate	Medium-Term Expenditure Estimate		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Transfers received (parliamentary grant)	4 594 195	4 966 160	5 513 146	5 668 585	5 482 266	5 511 662	5 847 934
Own revenue/ contract funds	4 996 080	5 418 652	5 957 430	5 714 719	6 434 671	6 815 017	7 377 044
TOTAL REVENUE	9 590 275	10 384 812	11 470 576	11 383 304	11 916 937	12 326 679	13 224 078
Parliamentary grant as % of total revenue	48	48	48	50	46	45	44
Contract funding as % of total revenue	52	52	52	50	54	55	56

Comparisons of the funding transferred by the executive authority (parliamentary grant) and revenue generated by the institution through contract work indicates that contract work is an increasingly important source of revenue to sustain science councils' activities. On average, government funding to science councils through parliamentary grants is lower than the revenue that most science councils and public research institutions raise through contract work or projects (the ratio is approximately 55:45). The total revenue generated by the 12 science councils in the 2014/15 financial year was R11,4 billion, compared to the estimated R11,9 billion in the 2015/16 financial year.

It has been established that contract income is secured from government institutions, the South African private sector and contracts with foreign governments and companies. However, it is not possible through this survey to determine how much contract funding is sourced specifically from government institutions.

3.5 Analysis by socio-economic objective

The socio-economic objective (SEO) classification is useful in indicating the policy intentions of the government, as a funder, when committing funds for STAs. Each responding department indicated the intentions of their STA allocations per SEO primary purpose. The SEO classifications were aggregated and used to estimate the expenditure devoted to the targeted areas of use.

Table 7: Analysis by socio-economic objective

Major division	SEO classification	STA expenditure		% of total
Justice and Protection	Defence	613 959	4 239 682	1,6
	Police	3 625 723		9,7
Economic Development	Energy	1 080 824	5 687 362	2,9
	Agriculture (Plant Production and Animal Production)	1 218 028		3,3
	Transport	57 250		0,2
	Economic Framework	247 461		0,7
	Commercial Services	719 268		1,9
	Mineral Resources (excl. Energy)	626 295		1,7
	Manufacturing	226 796		0,6
	Construction	200 288		0,5
	Information and Communication Services	1 311 152		3,5
	Natural Resources	0		0,0
Society	Health	16 358 049	23 987 215	43,8
	Education and Training	6 081 832		16,3
	Social Development and Community Services	1 547 335		4,1
Environment	Environmental Knowledge	0	609 178	0,0
	Environmental Aspects of Development	85 545		0,2
	Environmental Management and Other Aspects	523 633		1,4
Advancement of knowledge	Natural Sciences, Technologies and Engineering	2 449 993	2 815 987	6,6
	Social Sciences and Humanities	365 994		1,0
TOTAL		37 339 424		100,0

An estimated R24 billion (64,2%) of total budgeted STA expenditure was allocated under "Society", towards health, education and training, and social development objectives, as shown in Table 5. The departments who directed most of their expenditure to these objectives were the Department of Health, the Department of Higher Education and Training, and the DST.

"Justice and Protection" received the second largest proportion of funding support, at R4,2 billion (11,4%), mostly from the South African Police Service and the Department of Defence and Military Veterans.

Of the total budget, R2,8 billion (7,5%) went to the "Advancement of Knowledge" in the natural sciences, engineering and technologies. The "Advancement of Knowledge" division includes basic research to acquire new knowledge generally or to explore broad areas that may lead to discoveries.

Under "Economic Development", "Information and Communication Services received the most support, at R1,3 billion (3,5%), followed by R1,2 billion (3,3%) for Agriculture (Plant Production and Animal Production)" and R1,1 billion (2,9%) for "Energy". Other, smaller, categories account for the remaining R2,7 billion (7,2%).

3.6 Examples of STAs funded by national departments

This section provides some examples of STA initiatives funded by the government. This project-level information was collected from eight departments beginning in the 2013/14 financial year, and shows some of the significant areas for which STA funding has been allocated.

The departments were selected either because they had contributed a large proportion of the overall STA expenditure in 2014/15, or because they allocated relatively high proportions of their 2014/15 annual budget to STAs. Departments allocate funding to various sectors depending on their respective mandates. Some of the STAs funded are complementary.

Box 1: Examples of S&T-related activities funded by national departments**Departments with highest budgeted allocations for STAs in 2014/15**

Department of Health (R18,4 billion). Of the department's 2014/15 budget, 47,8% was allocated to STAs. This included institutional funding for the Medical Research Council, the National Health Laboratory Service, the National Health Scholars Programme, the Health Systems Trust, and HIV/Aids research grants to higher education institutions.

Department of Science and Technology (R6,2 billion). The DST allocated 95,9% of its 2014/15 budget for STAs. This included institutional funding (for the Africa Institute of South Africa, incorporated into the Human Sciences Research Council in June 2014, the Council for Scientific and Industrial Research, the Human Sciences Research Council, the National Research Foundation, the South African National Space Agency, the Technology Innovation Agency, and the Association of Science of South Africa), funding for R&D infrastructure, funding for human capital development initiatives (e.g. the South African Research Chairs Initiative and the centres of excellence) and innovation platforms to develop new or strengthen existing R&D capabilities and industries (e.g. astronomy and space science, biotechnology and health research, information and communication technologies, new and advanced materials, local systems of innovation, and local manufacturing), as well as the facilitation of South Africa's role in the international S&T arena.

South African Police Service (R3,6 billion), STA expenditure accounted for 5,0% of this department's 2014/15 budget. This included funding towards the Criminal Record Centre and Forensic Science Laboratories as part of the revamp of the criminal justice sector, and the acquisition of specialised technical analysis equipment and related resources.

Department of Higher Education and Training (R3,3 billion). Of the department's 2014/15 budget, 6,0% was allocated to STAs. This included funding for broadband connectivity and general information and communication technology infrastructure at higher education institutions, as well as research output subsidies (intended to encourage research productivity by rewarding quality research output at public higher education institutions). The University of Pretoria and the University of Cape Town received the highest budgeted grants on research output grants disbursed to higher education institutions for the 2014/15 financial year.

Department of Agriculture, Forestry and Fisheries (R1,1 billion). STAs accounted for 17,0% of the department's 2014/15 budget. This included institutional funding to the Agricultural Research Council and funding for programmes on agricultural production, health, food safety, food security and agrarian reform, as well as the modernisation of vaccine production facilities and equipment for Onderstepoort Biological Products, and the Stellenbosch Plant Quarantine Station.

Department of Basic Education (R1,1 billion). STAs accounted for 5,4% of the department's 2014/15 budget. This includes funding towards the Dinaledi schools (aimed at significantly improving performance and increasing participation in Mathematics and Science), the building of schools under the accelerated schools infrastructure delivery initiative; and programmes such as the Funza Lushaka Bursary Programme, a multi-year programme that promotes teaching as a profession, particularly in areas of national priority like Mathematics and Science.

Department of Energy (R923 million). STAs accounted for 12,5% of the department's 2014/15 budget. This includes transfers to the South African National Energy Development Institute for carbon capture and storage and hydraulic fracturing projects in which the institute is involved. The projects will result in an increase in South Africa's energy sector knowledge.

Department of Communications (R823 million). STAs accounted for 51,7% of this department's 2014/15 budget. This included funding for programmes such as the ICT Infrastructure Broadband Strategy, the National ICT Strategy, and a digital library and digital playout centre for the South African Broadcasting Corporation.

4. CONCLUSION AND RECOMMENDATIONS

The aggregated indicators of government spending on STAs provided in this report give a sense of how R&D and related STAs are prioritised within the overall government budget, within specific departments and across a range of policy objectives.

The report shows growth in the funding for STAs that is comparable to the overall national budget. However, the rate of increase in funding for STAs slowed down in 2014/15 compared to the previous three measurement periods owing to fiscal pressures. This has been the case for many other functions of government. Despite this, government funding for STAs remains crucial in the context of the National Development Plan, which requires an increase prioritisation of S&T in supporting national development.

Budget pressures require departments to make better use of the available resources, through, for example, building partnerships with the private sector and leveraging resources from international partners. Within government, the budget coordination process that has been initiated jointly by the DST and National Treasury through the Research, Development and Innovation Technical Group for the 2015 MTEC process is therefore a relevant one at this stage to find ways for improving the coordination of public investment in the S&T sector in South Africa.

ANNEXURE A: METHODOLOGY

A1. Survey planning and design

The survey on public funding for STAs is undertaken by the Department of Science and Technology as part of monitoring the performance of the NSI. Regular monitoring of public investment in the system is required in terms of the 1996 White Paper on Science and Technology and the 2002 National Research and Development Strategy, and was also recommended in the 2012 report of the Ministerial Review Committee on the Science, Technology and Innovation Landscape in South Africa.

The survey has been undertaken annually since 2008/09. The DST collects data from national government departments that either perform STAs or have a budgetary allocation to fund them. There are currently 29 national government departments in this category. They are included in each annual data collection. The survey information is used in estimating the aggregated indicators of government funding for the NSI.

The survey design is based on international guidelines, namely, the United Nations Education, Scientific and Cultural Organisation's *Recommendation concerning the International Standardization of Statistics on Science and Technology* (1978) and the OECD's *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development* (2002). Particular focus has been on improving the survey's relevance to those who use this type of information for policy making, analysis and research.

The approach in South Africa has been gradually improved as lessons are learnt from the survey each year. The main categories of STAs that are presented in this survey are GBAORD, STS and STET. Descriptions of these appear in par. 3.2 of this report.

A2. Data collection process

The survey plan identified 29 national departments from which data had to be collected. Nominated officials in the national departments were trained on the data collection tool.

After filling the data collection tool with preliminary data obtained from the National Treasury's Estimates of National Expenditure for national departments and from the Estimates of Provincial Revenue and Estimates for provincial departments, departmental strategic plans and departmental annual reports, the DST sent the tool to the national and provincial departments for verification and validation. This step is important to ensure the accuracy of the information.

Of the 29 national departments, 22 verified and validated their data within the targeted time frame. Their responses covered 75,9% of the total STA appropriation; the other 24,1% of the data was imputed/estimated. A closer relationship with National Treasury on data sharing and collection is needed to ensure optimal response from relevant departments and the accuracy of the information.

A3. Data processing, analysis and report writing

We have developed an internal database which holds historical data of the annual analyses. The responses from departments were used to compute aggregates of key indicators of government funding for STAs. Responses were checked against the figures from previous financial years and, where necessary, verified with the department concerned. Standard data tables and graphs were developed and used in preparing the report and analysing historical and medium-term trends.

A4. Dissemination and use of results

The report is published for use by government and other interested parties, both in print and on the DST website. The information on government STA funding is of great value to policy and decision-makers. An annual workshop is therefore held with government departments to discuss the content and implications of the findings of the STAs survey. The findings are also submitted to Cabinet. .

A5. Future enhancements

This report focuses on the 2015/16 financial year; with newly established departments included in this report.

An online system to facilitate online submission of information by the departments and ensure the proper storage of historical information for future reference is in the final stages of development.

The DST survey team will continue to hold workshops and one-on-one meetings to guide departments in identifying their STAs and in interpreting technical definitions. Once finalised, the ongoing revisions to the Frascati Manual may inform further enhancements to the STA survey.

ANNEXURE B: DIFFERENCES BETWEEN STA MEASUREMENT AND MEASUREMENT OF R&D PERFORMANCE

This annexure is meant to explain the key differences between the data in this report on government funding of STAs and the data generated from the R&D survey.

This report presents data from the funder's perspective. It reflects the budget intentions of government in supporting the S&T sector. This is more than just spending on R&D, covering a whole family of STAs of which R&D is a part, including innovation, the processing of scientific samples, and the implementation of research results.

The R&D survey, on the other hand, captures the performer perspective. It traces the flows of funding for R&D based on the replies from performers of R&D and not the funding source. In the R&D survey, the R&D-performing units indicate the amount they spent on R&D and the sources from which they obtained funding for R&D activities.

The table below outlines some key differences between the two surveys in terms of scope, reference period and key indicators.

Table 3: Differences between the R&D survey and the survey on the public funding of STAs

	Government funding for STAs	National Survey of Research and Experimental Development
Conceptual basis	STAs funded by government, including government funding for R&D	Focus is on R&D, which is a component of a broader set of STAs
Focus of data collection and analysis	Government departments as funders of STAs	Performers of R&D (government, science councils, higher education institutions, and the business and non-profit sectors)
Reference period	One financial year (retrospective survey of actual spending by departments for the two previous financial years, and prospective survey of the budget appropriations for the next three financial years)	One financial year (retrospective survey of actual spending by R&D-performing units), published two years after financial year reviewed
Key indicators	<ul style="list-style-type: none"> Total government expenditure on STA funding Total government expenditure on STAs funding as a percentage of overall government budget Estimation of GBAORD direct from budget appropriations Expenditure on STAs by socio-economic objective, department, etc. Modes and/or instruments for public funding for STAs (i.e. channels for disbursing funds for STAs) 	<ul style="list-style-type: none"> Gross expenditure on research and development (GERD) as a percentage of gross domestic product GERD by funding sources (GBAORD can be estimated indirectly/as a derived figure) GERD by R&D-performing sectors, type of research, field of research, SEO, etc.

This report publishes both the retrospective and prospective STA budgets for government departments and public research entities. The measurement is done from the funder's perspective, showing how much government has budgeted and planned for S&T. The data collected for this report is the administrative financial data from departments.

Budget information is available earlier than the results generated by the retrospective R&D surveys. The STAs survey will therefore be used in the future as a basis for generating a country-level indicator on GBAORD, which can be used as a leading indicator for future R&D investment. International experience shows that the two approaches for generating GBAORD complement each other, although they do not produce exactly the same figures. A parallel analysis is necessary to ensure the correlation of information between these two sources.

2012/13 National Survey of Research and Experimental Development (R&D survey)

Government funded the largest proportion of R&D in South Africa in 2012/13. The funding increased by 13,3% from R9,6 billion in 2011/12 to R10,8 billion in 2012/13. Higher education received 49,8% (R5,4 billion) of the total government R&D funding, while government institutions, including science councils, received 42,8% (R4,6 billion).

Government provides funding for most of the scientific research that takes place in South Africa. The R&D survey indicates that the bulk of STAs are outsourced (to provincial and municipal authorities, departmental agencies and accounts, higher education institutions, public corporations and private enterprises, etc.). Science councils and higher education institutions receive the most STA funding from government.

Government funding of R&D in the public sector (excluding science councils) increased from R1,1 billion in 2011/12 to R1,3 billion in 2012/13. The business sector received R684 million from government in 2012/13, while not-for-profit organisations received R114 million in funding over the same period

Source: 2012/13 National Survey of Research and Experimental Development

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