# ANNUAL PERFORMANCE PLAN

# 2016/2017

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

sansa
SOUTH AFRICAN NATIONAL
SPACE AGENCY

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# FOREWORD

The National Development Plan is the national blue print to a prosperous South Africa that is characterised by accelerated economic growth, reduced levels of poverty, unemployment and inequality. SANSA and the national space programme at large have a crucial role in contributing to these significant aspirations.

The Agency's strategic focus seeks to address South Africa's challenges through space products and services; lead high-impact space research; develop human capacity and ensure transformation; enhance the global competitiveness of the country in space and foster very strong global partnerships.

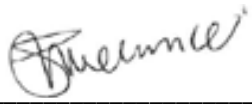
Working with national and global partners, SANSA will endeavour to use space to address societal challenges in various areas; including food security, natural resource management, energy, water, national security, human capital development, to name a few. During the course of the year, we will develop policy briefs that will inform decision making in areas of water, space weather and the status of the space industry. We will aggressively drive the generation of new knowledge in space as we seek to contribute to the transformation of the country into a knowledge-based economy.

In this regard, we will continue with the expansion of our extensive observational network, the collection and distribution of valuable data.

The training of students will be central to our efforts of increase the national skills base. We believe space, through its 'wow' factor, is a good tool for exciting young people about science. Therefore, our science advancement initiatives will be pursued with a special focus on the underprivileged.

In our strategic intent and focus, we are however, cognisant of the current constrained national economic climate which will, invariably, have an adverse effect on what the Agency can deliver. Given the marginal year-on-year increase that SANSA has received, the Agency has had to revise its performance targets downwards. This does not take away from the continued commitment of the Board, management and the staff at the Agency to deliver on our mandate within affordable limits. This undoubtedly will be a challenge that although, not insurmountable, will constrain the realisation of what could potentially be achieved.

The Minister of Science and Technology and the SANSA Board again invite all South Africans and our global partners to join us as we lead and inspire the South African community to create a better future using science, technology and innovation for socio-economic growth and transformation.



**Joy-Marie Lawrence**

**Chairman of the SANSA Board**

**Accounting Authority**

# Official sign-off

It is hereby certified that this Annual Performance Plan:

was developed by the management and Board of the South African National Space Agency (SANSA) in consultation with the Department of Science & Technology (DST);

was prepared in line with the current Strategic Plan of SANSA; and

accurately reflects the performance targets which SANSA will endeavour to achieve given the resources made available in the budget for 2016/17.

**Ms Bulelwa Pono** **Signature:** _____
**Chief Financial Officer**

**Dr Sandile Malinga** **Signature:** _____
**CEO and**

**Ms Joy-Marie Lawrence** **Signature:** _____
**Board Chairman and Accounting Authority**

**Approved by:**

**Mrs Naledi Pandor**
**Signature** _____
**Minister of Science and Technology**
**Executive Authority**

# CONTENTS

# EXECUTIVE SUMMARY

SANSA's vision is to position "South Africa as an international hub for space solutions for the world of the future" and the mission of the Agency is to "Lead and inspire the South African Space community to create a better future." To achieve this, SANSA has seven goals:

Goal 1: Address South Africa's challenges through space services and products
Goal 2. Lead high-impact collaborative R&D on a national scale
Goal 3. Develop national human capacity and ensure transformation

Goal 4. Enhance the competitiveness of the South African space industry

Goal 5. Develop active global partnerships
Goal 6. Ensure the growth and sustainability of SANSA
Goal 7. Transform SANSA into a high performance Agency

The first five goals are outwardly looking - seeking to drive the national aspects of the SANSA vision and mission. The last two are more inward looking - seeking to transform SANSA into high performance and sustainability. SANSA implements its seven strategic goals by clustering its activities along five broad strategic programmes as listed below:

Programme 1: Corporate Support Programme

Programme 2: Earth Observation Programme

Programme 3: Space Science Programme

Programme 4: Space Operations Programme

Programme 5: Space Engineering ProgrammE

The above strategic intent is underpinned by the National Development Plan (NDP), the National Space Strategy, the South African Earth Observation Strategy (SAEOS) and the strategies of the Department of Science and Technology (DST).

Areas of contribution by SANSA to the NDP include the creation of high-technology jobs; the improvement of geospatial patterns to foster the development of marginalised communities; the planning and monitoring of vital national infrastructure through space systems; health surveillance and intelligence through satellites; space-based service delivery and performance monitoring to assist in the eradication of corruption; and the provision of geospatial decision-making tools for decision-makers.

Government has adopted the 2014 - 2019 Medium-Term Strategic Framework (MTSF) to be used as the first five year building block towards realising the 2030 Vision in the NDP. The Medium-Term Strategic Framework lists 14 key outcomes and associated activities and targets to be achieved by 2019, which cover the focus areas identified in the NDP. There are eight outcomes that have a direct impact and alignment to the SANSA mandate, these being as follows: quality basic education; all people in South Africa are and feel safe; decent employment through inclusive economic growth; a skilled and capable workforce to support an inclusive growth path; comprehensive rural development and land reform; sustainable human settlement and improved quality of household life; a responsive, accountable, effective and efficient local government system; environmental assets and natural resources that are well protected and continually enhanced.

The Minister of Science and Technology has emphasised the need for the science system to address the triple challenges of inequality, poverty and unemployment. SANSA will address issues of inequality internally by driving for equity, particularly gender balance in the more technical areas of the business.

At a national scale, SANSA will contribute through a transformative skill development programme. The Agency will not address issues of poverty directly but indirectly through the various programmes that contribute to food security, water management, natural resource and environmental management, energy security and disaster mitigation. While SANSA and the space industry in general are not labour intensive, the Agency will continue with the employment of highly skilled staff with a multiplier factor of about four. Further, the Agency will continue with efforts to absorb young graduates through the existing internship programmes. The challenge though is the permanent absorption of these trained interns within SANSA and the broader space community in the current depressed economy.

With regard to the specific deliverables against set performance targets, SANSA has had to scale down on the targets in the 2015-2020 Strategic Plan based on the fact that the 2016/17 allocation represents a 0.5% increase on the 2015/16 allocation. Given that inflation stood at 4.8% as at November 2015 and forecasted to increase in the course of the year, the Agency has had to cut down on what can be achieved.

This had to be understood with the backdrop of a depreciating Rand to major foreign currencies and the substantial foreign procurement from SANSA. Areas that have had to be scaled down are the research outputs and the applications that can be delivered.

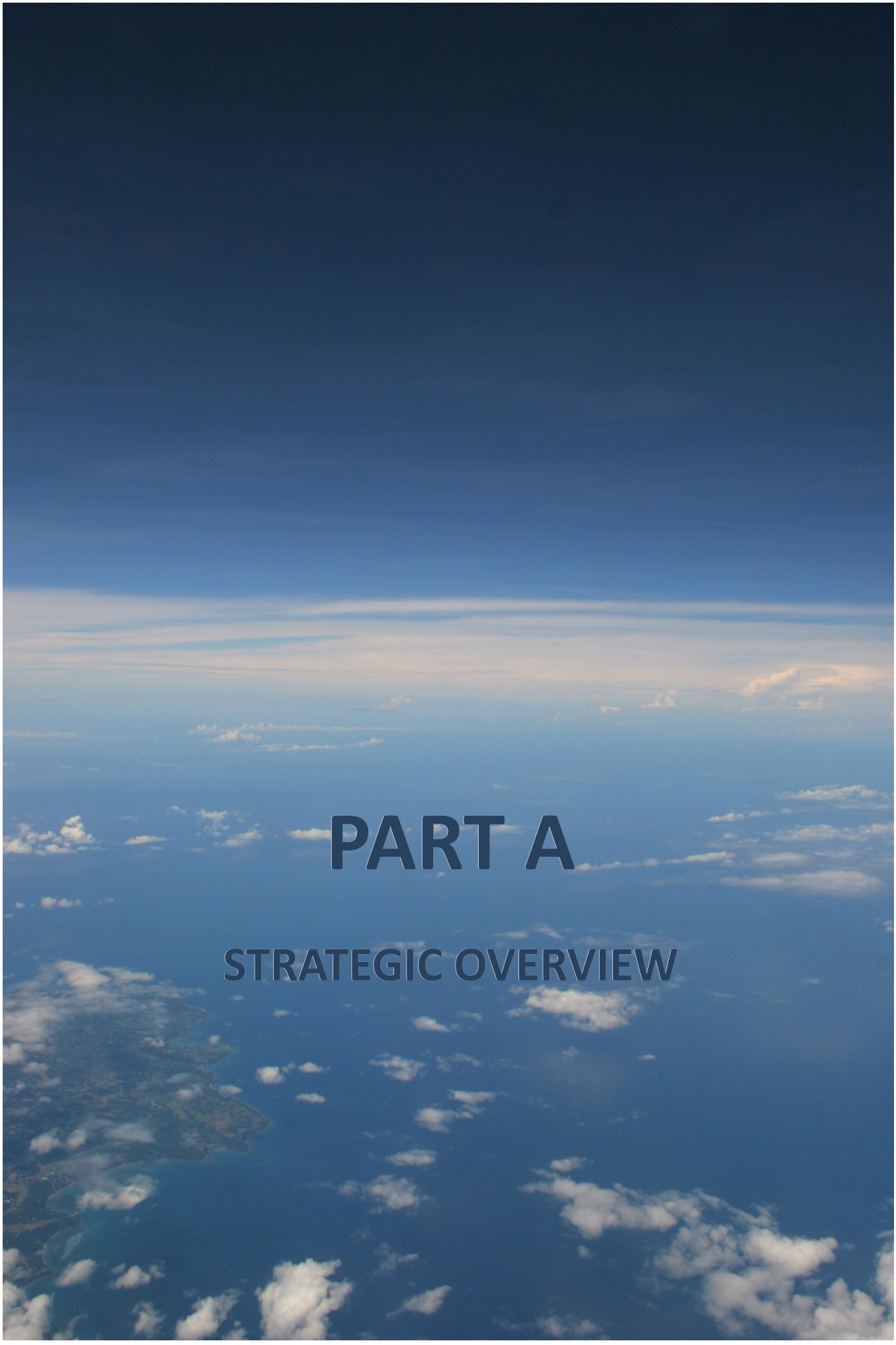
The acquisition of the satellite data from the China Brazil Earth Resource Satellite (CBERS) is under review and may have to be downscaled which will have an effect on the intent to provide data to the SADC region and hence contribute to AfriGEOSS. Science advancement efforts will also have to be reduced from a direct engagement of 10 000 young people to 9 000. Planned maintenance is also under considerable strain and this is a serious threat to the continued sustainability of the Agency.

The capacity to leverage on national and international partnerships will also be reduced from a target of 5% to 2% of SANSA's non-commercial core revenue, as they are largely reliant on SANSA's co-investments. The satellite build initiatives, being ring-fenced, will continue as planned. There are also a number of other downward adjustments that have had to be made to the targets.

SANSA fully appreciates and understands the current constrained national economic climate, and will endeavour to deliver on its mandate to the extent possible in the current environment. Much can still be achieved, and the following are the key deliverables:

1. SANSA will contribute to the Phakisa national ocean and coastal information system.
2. SANSA will deliver four high-impact products including (i) national geospatial decision support data products; (ii) national land-use and land-cover base maps; (iii) space weather products and services; (iv) magnetic technology products and services.
3. The Agency will produce three policy advisory briefs on (i) water management through Earth Observat ion; (ii) the economic impact of space weather; (iii) the current state of the South African space indus try.
4. SANSA will support about 50 students at the Hon ours to PhD level in Earth Observation, Space Sci ence and Space Engineering.
5. SANSA has set a revised research productivity score of 950 (original 1000) a composite score based on publications, student supervision and research grants.
6. The Space Operations Programme will generate about R60 million from both national and international contracts with the latter being the largest which will, to some extent but not fully, counterbalance the Agency's foreign procurement outflows.
7. Through the satellite programme, the Agency will support about 50 jobs externally and out-source in excess of R50 million to the broader space industry and R12 million to SMEs.
8. SANSA will drive its transformation agenda whenever vacancies are being filled with a primary focus on the technical areas aiming to address gender imbalances, especially representation of black women. However, given the current financial environment non-critical personnel expansion efforts will be halted.
9. SANSA will continue with efforts to transform SANSA to a high performance organisation including staff development initiatives, improved stakeholder engagement. SANSA wanted to enhance its marketing and communication as prioritised by the Minister but this will not be achieved to the level intended in the current financial environment.

Lastly, SANSA is fully committed to deliver products and services of the highest standard. This, however, has to be contextualised by the prevailing unfavourable financial resources.



# PART A

## STRATEGIC OVERVIEW

## VISION

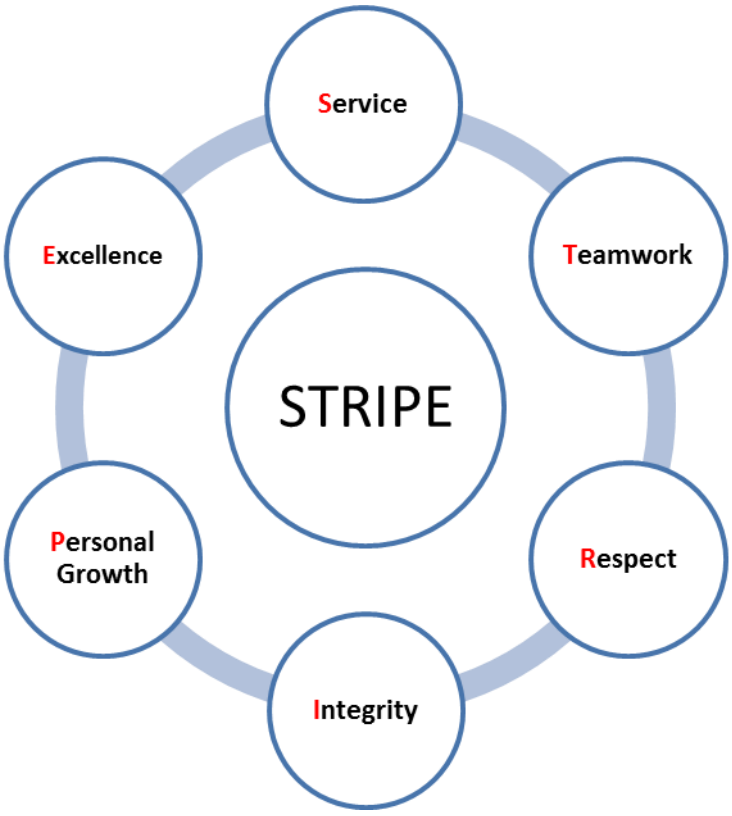
South Africa to be an international Hub for Space Solutions for the world of the future.

## MISSION

Lead and inspire the South African Space Community to create a better future.

## VALUES

SANSA has six values, namely:




*These values are institutionalised through the 'earn your STRIPEs' campaign.*

# UPDATED SITUATIONAL ANALYSIS

## The Current Global Space Environment

*The Growth of Commercial Space*

In 2014, the global space economy grew slightly more than 9%, reaching a total of $330 billion (USD) worldwide, up from 2013's $302.5 billion. The bulk of this growth was driven by the commercial space industry that includes the supply of commercial products and services, infrastructure and support industries.

*Government Space Market*

U.S. government space spending went up slightly by 2.9% from 2013 to 2014. The U.S. devoted 1.2% of the government's national budget to the space sector in 2014. Space related expenditures by governments other than the U.S. grew by 12.9% in 2014, in spite of decreases in budgets of international cooperative efforts such as the European Space Agency. Although there were significant cuts in the US Government space budget this was offset by the growth in the space budgets of other countries. The US Government Space budget is valued at $41 billion while other countries total budget estimates is at approximately $33 billion as at 2013.

*Space Applications*

Billions of people use satellite-augmented devices in their daily lives, such as GPS, tablets and even the most unsophisticated smartphone. The processors within these devices have embedded functions that provide satellite position, navigation, and timing (PNT). The innovation in these applications originates from advances in space technology. Space products and services continue to become more readily available and integrated into the daily lives of billions of people globally. Numerous technologies rely on space assets to deliver their benefits, such as satellite television broadcasting, communication and navigation devices. Space products and services are increasingly providing an interface between space and other forms of technology.

In 2014 satellite-provided imagery became more affordable and easily accessible; even on mobile devices. Mobile manufacturers were able to include imagery applications on their devices in the form of map and navigation software. Combined with a device's PNT function, this provided powerful real-time updated images of global positions and location, including real-time traffic updates as well as updated imagery of disaster areas amongst other innovations. In this regard, government and industry are increasingly sponsoring competitions to develop new and innovative applications. By harnessing the talent of developers, the space industry gains creative new techniques to further develop new products and services based on existing space systems.

*Launch Activities*

The number of satellites launched during 2014 increased by 38% from the number of satellites launched in 2013. There were 23 orbital space launch vehicles launched from the U.S. in 2014, four more than in 2013. Europe launched 11 rockets, a 57% increase from the seven launched in 2013. Although the U.S. has the largest budget for space-related activities and industries, it does not currently have its own space transportation system, and chooses to buy passage to space from Russia. Russia still conducts more launches than any other country, although its 2014 tally of 32 has not increased from 2013. The total number of space vehicle launches worldwide was 92, including two failures.

*Small Emerging Space Companies*

The declining costs in launch prices and cost-saving advances in satellite technology have combined to open the door of opportunity for small and medium space companies to enter the space market thus providing new niche services and solutions to a growing number of customers. These companies are well-positioned to serve the increasing demand for bandwidth and other space related services across regions that expect to see large population growth, such as Asia, Africa, and the Middle East.

Governments are increasingly recognising the utilisation of space as a tool for international trade and development. African governments and relevant institutions see value in increasing investment in space and the awareness of the use of space in decision-making processes. Therefore, there is a call to stimulate African dialogue on the use of space for development, building Africa's capacity in science and technology, and promoting continental coordination of space activities.

Advanced spacefaring countries reap political and economic benefits from their existing space capabilities through partnerships with emerging nations that are seeking societal and development benefits.

These partnerships involve financial assistance, infrastructure development, and training programs. Significant focus is on Africa, where demand for satellite services is forecast to grow at 11% or greater each year from 2013 through 2017.

Initiatives of the Group on Earth Observation (GEO) and the Committee on Earth Observation Satellites (CEOS) are progressing well. In particular, this year when SANSA takes the chair of the CEOS Working Group on Capacity Building and Data Democracy as well as developments by AfriGEOSS which will lead to better coordination of Earth observation initiatives on the African continent. SANSA and other national partners will contribute to this important initiative as led by the Department of Science and Technology (DST). This will promote South Africa's ability to facilitate the sharing of knowledge, resources and skills in Africa.

## National Space Strategy

The National Space Strategy (NSS) is a national road map and implementation framework for a viable and sustainable national space programme. The NSS as approved by Cabinet sets national goals and objectives for space science and technology. The table below indicates the alignment of SANSA's strategic goals with the objectives of the NSS.

| No | National Space Strategy Objectives | SANSA's Goal Alignment |
|---|---|---|
| 1 | Developing the local private space science and technology industry sector | Goal 4 |
| 2 | Developing services and products that can respond to user needs | Goal 1 |
| 3 | Satellite or services offered from existing facilities | Goal 1 and 2 |
| 4 | Organising some of the current space science and technology activities into strategic programmes | Goal 2 |
| 5 | Optimising the organisation of future space activities to respond to opportunities with international industrial partners or international space agencies | Goal 5 |
| 6 | Partnerships with established and developing spacefaring countries for industrial and capacity development purposes | Goal 2, 3 and 5 |
| 7 | Strengthening training and technology transfer programmes, including the sharing of experience and expertise | Goal 3 and 4 |
| 8 | Promoting space science and technology in academic institutions and science centres and the provision of opportunities for both short-term and long-term training and education | Goal 3 |
| 9 | Responding to challenges and opportunities in Africa | Goal 5 |
| 10 | Advocating the importance of space science and technology as a priority measure for meeting national development needs | Goal 1 and 3 |
| 11 | Building local awareness of space science and technology | Goal 1, 2, 3 and 4, 6,7 |

## SANSA's Interface in the NSI Landscape

SANSA has six key stakeholder groups, namely:

I. Government departments with an interest in space-related activities, including but not limited to the DST, to which the Agency reports;

II. Departments/Entities that fulfil some agency function e.g. funding agencies;

III. Government departments and state entities that SANS A supports in one form or the other;

IV. Partner R&D institutions; and

V. Industry partners and clients

VI. Students, educators and the general public

## National Development Plan

The National Development Plan (NDP) is now at the initial phase of implementation. SANSA will play a key role in addressing some of the central challenges identified in the plan as well as supporting the broad NDP implementation strategies as indicated in the Department of Science and Technology 2015-2020 Strategic Plan.

Areas of contribution include the creation of high-technology jobs; the improvement of geospatial patterns to foster the development of marginalised communities; the planning and monitoring of vital national infrastructure through space systems; health surveillance and intelligence through satellites; space-based service delivery and performance monitoring to assist in the eradication of corruption; and the provision of geospatial decision-making tools for decision-makers.

# The 2014 - 2019 Medium-Term Strategic Framework

The Government has adopted the 2014 - 2019 Medium-Term Strategic Framework (MTSF) to be used as the first five year building block towards realising the 2030 Vision in the NDP.

The Medium-Term Strategic Framework lists 14 key outcomes and associated activities and targets to be achieved by 2019 that cover the focus areas identified in the NDP. There are eight outcomes that have a direct impact and alignment to the SANSA mandates, as follows:

**Outcome 1: Quality basic education.** The initiatives encompassed in this outcome include sustaining and accelerating improvements in school performance. Satellite technologies can assist the Department of Basic Education to design digital classrooms to assist remote and rural located learners with accessing learning material. This quality learning can assist to improve and increase school performance results.

**Outcome 3: All people in South Africa are and feel safe**. Achieving this outcome will require ensuring South Africa's borders are secure; an area in which SANSA can contribute. Earth observation satellites and space weather applications provide information on monitoring cross-border theft; drug trafficking; African peacekeeping; crime prevention and national security monitoring. SANSA's contribution is in line with the DST actions and commitments towards developing R&D capacity in the acceleration of knowledge creation and exploitation for development.

**Outcome 4: Decent employment through inclusive economic growth**. Key targets in this outcome include contributing towards growing the economy to above 5%, achieving much higher levels of employment creation, and more rapid reduction of inequality.
Data from the SARB indicates that the country's trade deficit was at R69 billion in 2014, indicating that the gap between imports and exports has been increasing, which is driven by manufacturing inputs. To address this deficit the country has to reduce imports and become a net exporter rather than net importer. By growing the capacity of locally developed technologies and local satellite manufacturing South Africa can become a key stakeholder in a growing international industry.

SANSA has a role to play in the development of specialised high-tech skills, creating new opportunities and potential employment generation across the space industry value chain. Therefore, a planned Satellite Development Programme and the current development of South Africa's next Earth observation satellite can enhance job creation, contribute to economic growth and address the growing trade deficit that poses a structural concern for the economy. SANSA will make a meaningful contribution towards the achievement of this outcome.

**Outcome 5: A skilled and capable workforce to support an inclusive growth path**. Through both fundamental and applied science, as well as human capital development initiatives, SANSA will contribute towards building an inclusive society to support a growing and competitive economy through the creation of new knowledge and highly skilled individuals. For example, the FUNDISA Disk Resources, an initiative started by SANSA, provides students and learners with an overview and gateway to remote sensing and Earth observation technologies.

**Outcome 6: Comprehensive rural development and land reform**. SANSA will advocate for the use of space technology to improve access to quality basic infrastructure and services, particularly education in remote, rural and infrastructure-challenged regions of our country. Partnerships and collaborations that promote cost-effective satellite enabled distance-learning programmes that function independently of ground-based infrastructure ensure connectivity across physical boundaries and thus help bridge the gap between the "haves" and the "have-nots".

**Outcome 8: Sustainable human settlements and improved quality of household life.** Through the provision of satellite - derived products such as the National Human Settlements Map, SANSA will enable government to clearly map human settlement patterns particularly with respect to the dynamics of informal settlements. This will enable better linkages between human settlement planning, economic and commercial development and spatial planning frameworks to guide investment decisions and promote more integrated and better-located human settlements.

**Outcome 9: A responsive, accountable, effective and efficient local government system.** The central focus is to ensure sustainable and reliable access to basic services. Through the provision of national geospatial decision support data products as well as national land-use and land-cover information products, SANSA will equip municipalities and local governments to extend basic services to millions of households. GIS and RS technologies assist government to make better decisions and monitor service delivery progress.

**Outcome 10: Environmental assets and natural resources that are well protected and continually enhanced**. In order to achieve this outcome government must improve decision-making tools, harness research and information management capacity to identify, develop and maintain datasets to generate policy-relevant statistics, indicators and indices. Space-based systems are crucial for risk prediction and mitigation all around the globe. Space has a crucial role in providing operational applications or solutions that will address national challenges and provide decision support tools for government. These include applications in space weather research and monitoring, natural resource management, climate change and environmental management, and disaster management. SANSA will facilitate the integration of space-derived solutions into service delivery for the benefit of society.

## National Space Programme (NSP) Formulation

The National Space Strategy sets the national goals and objectives for space science and technology. The draft implementation plan from the DST ***"provides a framework for the formalisation of a national space programme and further provides guiding principles on how the operationalisation is to be realised"***. In line with this, a national consultative process was undertaken with a view to formulate a coherent National Space Programme (NSP 2030).
This plan defines programmatic and technology road mapping that will take the South African space programme to the year 2030. The NSP 2030 consists of the National Earth Observation Programme (NEOP), the National Space Science Programme (NSSP), the National Space Engineering Programme (NSEP) and the National Space Operations Programme (NSOP). The NSP sets project and resourcing priorities; clarifies institutional interfaces and highlights high-level outputs and measures of success for the NSP. The draft NSP is being finalised with the DST.

# ORGANISATIONAL ENVIRONMENT

To deliver on its mandate SANSA is structured into the following units:

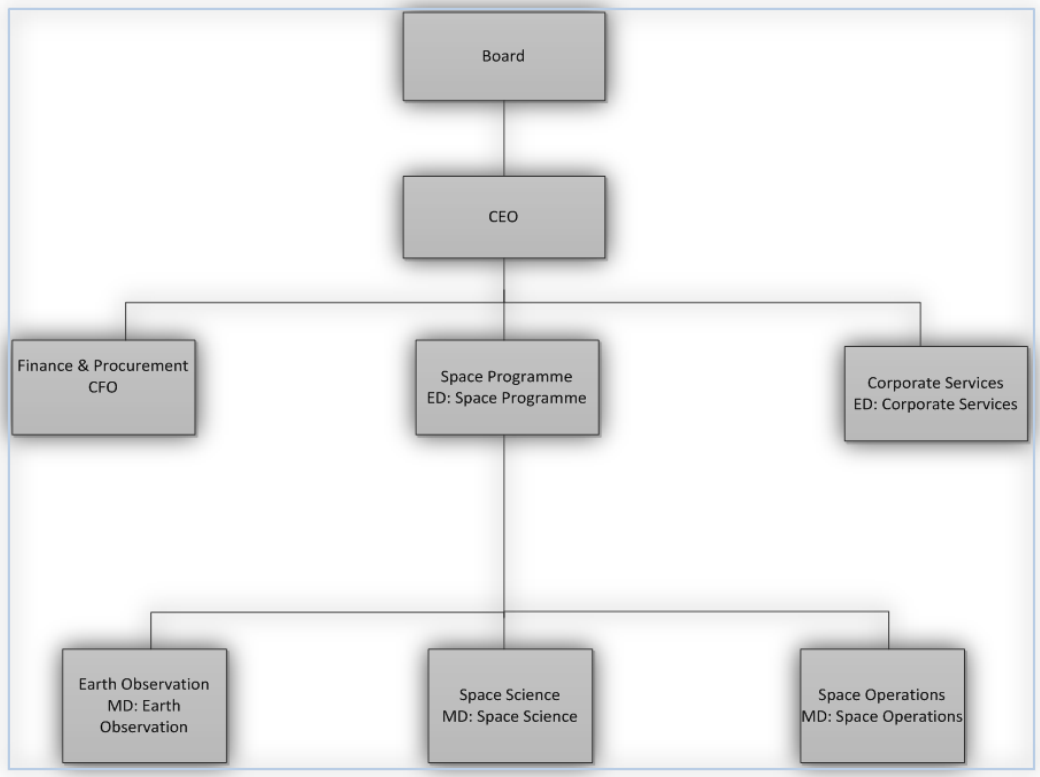
SANSA Corporate Office:

SANSA Earth Observation directorate;

SANSA Space Operations directorate;

SANSA Space Science directorate;

**SANSA Organisational Structure**



# REVISIONS TO LEGISLATIVE AND OTHER MANDATES

There are no significant changes to the South African National Space Agency legislation and other mandates that directly relate to SANSA.

## STRATEGIC OUTCOME ORIENTED GOALS

SANSA has seven strategic goals as a means of achieving its mandate. The first five strategic goals are outward looking, focusing on the core functional areas of SANSA and have a predominantly national emphasis. They reflect SANSA's strategic intent to lead, coordinate and drive programmes in collaboration with its national partners to achieve SANSA's legislated mandate and the attainment of the national objectives in line with the NSS and the NSP.

The remaining two strategic goals are more inwardly focused seeking to ensure that SANSA grows, is sustainable and is a high-performing Agency.

SANSA implements its seven strategic goals by clustering its activities along five broad strategic programmes as listed below:

### Programme 1: Corporate Support Programme (CSP)

### Programme 2: Earth Observations Programme (EOP)

### Programme 3: Space Science Programme (SSP)

### Programme 4: Space Operations Programme (SOP)

### Programme 5: Space Engineering Programme (SEP)

Each of the programmes contributes in varying degrees to the strategic goals as indicated below:

| | Programmes | | | | |
|---|---|---|---|---|---|
| **Strategic Goals** | Corporate Support | Earth Observation | Space Science | Space Operations | Space Engineering |
| **Address South Africa's challenges through space services and products** | | ● | ● | | |
| **Lead high-impact collaborative R&D on a national scale** | | ● | ● | | |
| **Develop national human capacity and ensure transformation** | | ● | ● | ● | ● |
| **Enhance the competitiveness of the South African space industry** | | ● | | ● | ● |
| **Develop active global partnerships** | ● | ● | ● | ● | ● |
| **Ensure the growth and sustainability of SANSA** | ● | | | | |
| **Transform SANSA into a high performance Agency** | ● | | | | |

# Strategic Goal 1: Address South Africa's challenges through space services and products

Space has a crucial role in providing operational applications or solutions that will address national challenges and provide decision support tools for government. These include applications in natural resource management, climate change and environmental management, disaster management, rural development and urban planning, national safety and security.

Achieving this strategic goal is in alignment with the DST strategic goal of accelerating inclusive development through scientific knowledge, evidence and appropriate technology. Through contributing these products and services and decision-support tools, SANSA strengthens or improves the delivery of various government services or functions.

***The primary objective here is to ensure that space is integrated into service delivery and is an indispensable tool of government decision and policy formulation.***

## Annual Priorities

### 1. Products and Services

SANSA will focus on the following services and products:

- **Operation Phakisa (Marine Information Services)** – Earth Observation Programme
- **National Geospatial Decision Support Data Products** – Earth Observation Programme
- **National Land Use Land Cover Base Maps** – Earth Observation Programme
- **Space Weather Services** – Space Science Programme
- **Magnetic Technology Services** – Space Science Programme

### 2. Decision and Policy Support Tools

One of the key roles of SANSA and the space programme is to facilitate better, efficient and effective public sector decision making and policy formulation, implementation, monitoring and evaluation.

SANSA will provide the Minister, the government and other key stakeholders with policy briefs and other decision support tools. This is to ensure that space is an integral part of service delivery.

# Strategic Goal 2: Lead high-impact collaborative R&D on a national scale

SANSA firmly believes in the value of science. Both fundamental and applied science creates new knowledge that lead to new technologies, and innovation that have a direct impact on the economy and society. Science also increases our knowledge and understanding of our universe, its sustainability, and advances South Africa towards a knowledge economy.

High quality impactful research and development leads to the development of sustainable space based applications that bring future benefit to the nation.

Through engagement with various universities around South Africa, a close collaboration will be developed in areas of space science and technology to meet the broader requirements of the NSP. SANSA is committed to the creation of new research to support the wider space community and the growth of innovative ideas through engagement with other government agencies.

Therefore, SANSA will foster and lead collaborative research and development (R&D) in space related areas on a national scale. In this regard, the prime objective is to: ***Increase the national space research output.***

## Annual Priorities

### 1. Increase research publications in space related areas

The number of high impact publications produced by South Africans in 2012 was 9793, translating to a world share of 0.73%. South African research outputs are below the BRICS counterparts where Brazil, Russia and India produced 37000, 28000 and 48000 research publications respectively in 2012. The priority for the year is to increase the number of space related publications in high impact factor journals at a national level.

The NSP has identified key research themes to pursue which will guide the country's research priorities and the allocation of resources. This will be followed within SANSA and in any R&D that SANSA supports.

### 2. Supervise MSc and PhD students in space related areas

The MTSF has a target of 2400 PhDs per year from 2014, with a total of 12 000 by 2019. Of 1 878 doctoral degrees awarded by South African universities in 2012, only 985 or 52% were in SET fields. The NSP has prioritised human capacity development and identified a number of programmes to be provided, including the Accelerated Capacity Development programme. SANSA, through dedicated and planned supervision of MSc and PhD students in space related areas, which aims to contribute to the sustained increase in doctoral degrees. A greater pool of doctoral graduates will contribute to better quality research outputs and lead to a higher standard of new knowledge creation. The priorities for the year will include:

- fostering a higher uptake of students by researchers;
- implementing strategic interventions aimed at increasing the Doctoral pipeline, and the pool of scarce skill capabilities that are required;
- strengthening space research linkages with universities both nationally and internationally; and
- providing SANSA bursaries to students, and facilitating student development through skills intervention programmes, and targeted opportunities.

### 3. Increase the success rate of winning grant funding for space research

In an environment of scarce resources, there is a need for researchers to increase their research funding through the sourcing of specific research grant funding. Success of research grant proposals provide a quality indicator of the research undertaken. The priorities for this year include:

- proactively scanning for research grant opportunities both nationally and internationally;
- systematically communicating research grant opportunities;
- providing grant proposal training to young researchers and students in order to increase the success rate;
- collaboratively developing high quality, multi-institutional, multi-disciplinary research proposals in space research projects; and
- strategically aligning research focus areas to important national and international focus areas.

The weighting of the different components that contribute to the research productivity score are given on the following page.

**Research Productivity Scoring Method**

| Description | Points per item |
|---|---|
| Publications | The sum of the weighted points per impact factor and author position |
| Research Funding | 1 point per R30 000 of research funding |
| MSc Students graduated | 20 per student |
| PhD Students graduated | 60 per student |
| Technical reports | 5 per report |
| Conference Proceedings | 5 per proceeding |
| Whole Books | 100 per book |
| Chapters in Books | 15 per chapter |
| First time A rating | 100 per researcher |
| First time other than A rating | 50 per researcher |
| Improvement in rating | 50 per researcher |
| Retention in rating | 40 per researcher |

# Strategic Goal 3: Develop national human capacity and ensure transformation

For the NSP to be viable, and deliver on its targets, there is a need to develop interest in STEM (science, technology, engineering, mathematics) areas and develop rare and transferable skills to meet national demand.

Capacity development in space related areas will not only benefit space but will have a spill over effect and impact in other areas nationally that require scientists, engineers, and technicians.

## Annual Priorities

### 1. Increase youth awareness of science

SANSA's role in increasing the STEM pipeline ranges from stimulating interest in science and infusing space science into the South African curriculum to undergraduate and postgraduate student training, work-force training and employment.

The socio-economic value of improving the overall scientific literacy of society and educating the public on the benefits of space is immense.

The planned engagement over the next five years will substantially contribute towards the DST strategic goal of reaching 5 521 160 people through science engagement activities by 2019.

- SANSA, through collaborative partnership with SAASTA, will run curriculum based activities using space as the driver to create excitement in science and technology;
- SANSA will participate in national science advancement activities such as SciFest Africa; and
- SANSA will continue to develop the SANSA Science Centre and the Mobile Space Lab as vehicles for engaging the youth in science.

### 2. Support student training with a transformation agenda

The National Development Plan aims to increase the participation rate in higher education to over 30% by 2030. Currently South Africa's gross tertiary enrolment ratio is at position 96, which is lower than the other BRICS (Brazil, Russia, India, China and South Africa) countries. The rankings for Russia, China, Brazil and India are 13th, 80th, 82nd and 94th respectively.

Therefore, South Africa must further grow tertiary education enrolment to meet the NDP target and ensure the country is on par with other BRICS nations.

The planned mobilisation of resources and support over the next five years will substantially contribute towards the DST's strategic goal of supporting 70 960 postgraduate students by 2019, as well as contribute towards the DST's strategic goal of ensuring equity and transformation of HCD-bursary beneficiaries, aiming for targets of 80% black, 55% women and 4% disabled. SANSA will focus on the development of postgraduate students, specifically those pursuing space related careers.

- SANSA, through collaborative partnerships with the NRF and global space partners, will identify research niche areas and pursue funding opportunities for prospective and existing MSc and PhD students as well as bursary funding.
- SANSA will include student supervision within the performance agreements of researchers.
- To create further student awareness of space research areas, SANSA scientists will partner with universities and introduce guest lecturing on space related topics.SANSA will aim to ensure that its bursary calls reach all national universities, and that the application platform is accessible to all.
- SANSA will develop a student portal that showcases available student projects, bursaries and opportunities, as well as providing access to researchers as potential supervisors.

# Strategic Goal 4: Enhance the competitiveness of the South African space industry

The global space industry is growing at a rapid rate and is currently estimated at USD 314 billion. It is an industry that drives new technologies and innovation, giving rise to applications which go beyond space systems, advancing other sectors such as medicine, manufacturing, security, and energy, to name a few. One of the objectives of the National Space Strategy is for South Africa to capture a reasonable share of this global space market.

## Annual Priorities

- Earth Observation Support
- Income Generation
- Supporting space industry jobs
- EO-Sat1 Development
- Assembly Integration Facility ( AIT) development
- Support of SMMEs and broader space industry through sub-contracting

# Strategic Goal 5: Develop active global partnerships

Space science and technology, by its nature, can only be effectively undertaken as part of a global partnership. South Africa, through SANSA, must position itself as a strategic partner for the African continent, BRIC countries, as well as other global players in space science and technology. In line with South Africa's foreign policy agenda, the DST has prioritised partnerships with African countries over the next five years through supporting the development of Science, Technology and Innovation (STI) capacities in Africa.

The Department will aim to secure support and investment for African STI initiatives from international partners using the Southern African Development Community (SADC) and African Union (AU) frameworks.

The overall goal will be to ensure that South Africa plays a leading role in the implementation of the AU's Science, Technology and Innovation Strategy for Africa. SANSA will contribute to AfriGEOSS initiatives to foster closer collaboration with African countries. SANSA will further continue to contribute to the African Resource Management Constellation (ARMC) that is a collaborative project in partnership with Algeria, Kenya and Nigeria to build and deploy satellites for the monitoring of natural resources for better management on the African continent.

The DST's priority over the next five years is to build a diverse and vibrant portfolio of international STI partnerships, seeking appropriate expansion, greater geographic diversity and deeper partnerships with a focus on innovation and market-orientated research.

Internationally, SANSA will work with various partners within BRICS business communities, Europe, and the US. Further, the Agency will focus on actively taking part in multi-national projects and forums like ISES, GEO, CEOS, IAF, SCAR and COSPAR and the continuous servicing of a number of memorandums of understanding that target projects of mutual benefit. SANSA will have to enter into strategic partnerships at an inter-agency level with a view of giving broader access to other national partners. This will enable local scientists and engineers to participate in expensive missions and complex and high-impact projects at a fraction of the associated costs. This will require SANSA to directly invest in these partnerships in order to leverage external partner funding.

### Annual Priorities

- drive a clear business development plan; and
- nurture and enhance strategic stakeholder relationships within all SANSA programmes
- drive an aggressive national and international partnership programme.
- focus on the African continent and the BRICS countries will be intensified
- strengthen industry partnerships

## Strategic Goal 6: Ensure the growth and sustainability of SANSA

To adapt to the fast changing global space market and to meet the ever-changing socioeconomic needs of the country, it is necessary for SANSA to grow and be sustainable.

To ensure the Agency's mandate is efficiently and effectively executed, a strong focus on new business development, effective engagement of key stakeholders, and the effect - tive communication and promotional activities of the NSP, are imperatives in order to garner favourable publicity of the brand promise as well as to increase the Agency's brand equity.

A combination of the activities below will contribute towards the revenue growth of the Agency.

### Annual Priorities

- Clarify the role and function of SANSA and ensure proper alignment with government priorities
- Develop a Growth and Sustainability Strategy and Framework for SANSA
- Quantify the Socio-Economic Benefits of Space
- Enhance the marketing and communication of space activities
- Improve stakeholder interfaces
- Monitor the implementation of the National Space Programme

## Strategic Goal 7: Transform SANSA into a high performance Agency

SANSA cannot achieve its objectives if it is not efficient and effective and this implies being a high performance organisation that is dependent on transformational leadership, human capital management, business design, operational efficiency and effectiveness, and technological efficiency and effectiveness.

### Annual Priorities

- Improve talent management
- Improve the employee value proposition and work environment
- Enhance the organisational design and operational interface
- Improve business systems and processes

## CONSOLIDATED PERFORMANCE OUTPUTS

The tables below present the consolidated performance outputs for SANSA for the seven goals for the MTEF.

| | | | | Previous Year | MTEF | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Five-Year Target** | **2015/16 Estimate** | **2016/17** | **2017/18** | **2018/19** |
| **Goal 1: Address South Africa's challenges through space services and products** | S1.1 Lead and facilitate the creation of high-impact products and services to address society's needs and challenges | M1.1 The number of national high-impact products and services | T1.1 Total of 22 national high-impact operational space related products & services by end March 2020 | Four national high-impact products and services | Five national high-impact products and services | Five national high-impact products and services | Five national high-impact products and services |
| | S1.2 Provide government with effective policy or decision tools and support | M1.2 The number of government decision or policy support tools | T1.2 Ten effective decision or policy support tools by end March 2020 | Two policy tools for government | Three policy tools for government | Three policy tools for government | Three policy tools for government |
| **Goal 2: Lead high-impact collaborative R&D on a national scale** | S2.1 Increase the national space research output | M2.1 The national research productivity score for space support R&D (This productivity score is based on a function of research funding sourced + publications (journals, books, reports, proceedings) + students graduated + research rating status) | T2.1 Research productivity score of 2000 per annum by end March 2020 | 750 | 950 | 1500- | 2000 |

| | | | | Previous Year | MTEF | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Five-Year Target** | **2015/16 Estimate** | **2016/17** | **2017/18** | **2018/19** |
| **Goal 3: Develop national human capacity and ensure transformation** | S3.1. Increase youth awareness of science | M3.1 The number of youth directly engaged through science awareness & outreach activities (This excludes arms-length engagement with the youth e.g. a visit to one of SANSA's exhibition stands) | T3.1 Total of 58500 young people directly engaged through science awareness & outreach by end March 2020 | 8 000 | 9000 | 12 000 | 13 500 |
| | S3.2 Support students with a transformation agenda | M3.2 The number of supported students for formalised training (This excludes short courses and focuses on degree-registered students only) | T3.2 Total of 350 students supported by end March 2020 | 40 | 50 | 70 | 90 |

| | | | | Previous Year | MTEF | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Five-Year Target** | **2015/16 Estimate** | **2016/17** | **2017/18** | **2018/19** |
| **Goal 4: Enhance the competitiveness of the South African space industry** | S4.1. Generate greater benefit for the space programme through space operations activities | M4.1.1: Successful satellite pass monitoring rate for Earth observation | T4.1.1 Success pass monitoring rate of 99% per year for Earth observation by end March 2020 | 97% | 98% | 99% | 99% |
| | | M4.1.2: Total income generated from space operations activities | T4.1.2 Total income of R326 million over five years generated from space operations activities | R58 million | R60 million | R65 million | R69 million |
| | | M4.1.3: Total amount of space operations income invested in other SANSA programmes | T4.1.3 Total income of R60 million over five years generated of space operations money invested in other SANSA pro- | R10 million | R11 million | R12 million | R13 million |
| | S4.2 Grow the national space industry | M4.2.1 The number of direct jobs supported externally through SANSA programme contracting | T4.2.1 A total of 390 direct jobs supported externally through SANSA programme contracting | 40 | 50 | 100 | 100 |
| | | M4.2.2 The progress status on the EO-Sat1 development project | T4.2.2 Proportional progress culminating in EO-Sat1 launch | 25% | 50% | 75% | 100% |
| | | M4.2.3 The total contract expenditure to SMEs for core space projects | T4.2.3 A total contract expenditure of R65 million over five years to SMEs for core space projects | R10 mil | R12 Mil | R13 mil | R15 mil |

| | | | | | | |
|---|---|---|---|---|---|---|
| | M4.2.4 The total contract expenditure to the broad space related industry for core space projects | T4.2.4 The total contract expenditure of R306 million over five years to the broad space related industry for core space projects | R50 mil | R55 Mil | R61 mil | R67 mil |

| | | | | Previous Year | MTEF | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Five-Year Target** | **2015/16 Estimate** | **2016/17** | **2017/18** | **2018/19** |
| **Goal 5: Develop active global partnerships** | S5.1. Leverage a significant benefit for the space programme through global partnerships | M5.1 The equivalent revenue generated through partnerships as a proportion of the SANSA non-commercial operating revenue | T5.1 Global partnerships contributing an equivalent of 10% to the SANSA non-commercial operating revenue | 5% | 2% | 7% | 8% |
| **Goal 6: Ensure the growth and sustainability of SANSA** | S6.1. Ensure that SANSA has annual measurable growth and is sustainable | M6.1 Total non-ring-fenced SANSA revenue | T6.1 Total SANSA non-ring-fenced revenue of R1,259 billion by end March 2020 | R223 mil | R200 mil | R251 mil | R266 mil |
| | | M6.2 Estimated monetised impact per annum | T6.2 Estimated monetised impact of R600 million by end March 2020 | R100 mil | The economic study will be put on hold. | R120 mil | R130 mil |
| | | M6.3 SANSA's public value awareness | T6.3 SANSA's national public value awareness of 90% by end March 2020 | 50% | 60% | 70% | 80% |
| | S6.2. Ensure the effective implementation of the NSP | M6.4. High-level NSP implementation progress status. | About 70% of the NSP projects are active by end March 2020 | 30% | 40% | 50% | 60% |

| | | | | Previous Year | MTEF | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Five-Year Target** | **2015/16 Estimate** | **2016/17** | **2017/18** | **2018/19** |
| **Goal 7: Transform SANSA into a high performance Agency** | S7.1. Ensure that SANSA has been optimised for high performance | M7.1Implementation of identified initiatives that enhance organisational performance | T7.1 Total of 20 identified initiatives fully implemented by end March 2020 | 4 | 4 | 4 | 4 |
| | | M.7.2 Proportional (%) representation of permanent staff from designated groups in the D to F grades | T.7.2<br>65% Proportional (%) representation of permanent staff from designated groups in the D to F grades by end March 2020 | 65% | 65% | 65% | 65% |

# ALIGNMENT OF SANSA OUTPUTS TO KEY NATIONAL PRIORITIES

## Alignment to the NDP through the MTSF

The 2014 - 2019 Medium-Term Strategic Framework (MTSF) is the first five-year implementation block towards realising the 2030 Vision in the NDP. SANSA will contribute as tabulated in the table below to the MTSF and the NDP.

| No. | MSTF Outcome | SANSA's Contribution |
|---|---|---|
| 1 | Quality basic education | Promotion of science and motivation of young people through science advancement activities. A total of 9000 young people will be |
| 2 | A long and healthy life for all | Development of the national water information that will assist in water management including water demand modelling and the monitoring of the degradation of water catchments. This will contribute to the improvement of water access and sanitation and hence to health. |
| 3 | All people in South Africa are and feel safe | Provision of satellite imagery, space weather services, electromagnetic services, space operations services, navigation services and training to the South African Defence Force and other security ser- |
| 4 | Decent employment through inclu- | |
| 5 | Skilled and capable workforce to support an inclusive growth path | Support 50 postgraduate students and ensure that they are properly equipped for the job market. |
| 6 | An efficient, competitive and responsive economic infrastructure network | Provision of satellite imagery to Eskom for power station location planning and controlling human encroachment on transmission lines. Provision of space weather services to protect the electricity grid from geomagnetically induced currents. These contribute to the national economic infrastructure. |
| 7 | Vibrant, equitable, sustainable rural communities contributing to food security for all | Mapping of rangeland conditions to improve grazing and stocking capacity management.<br><br>Use Cropwatch4SA to provide national vegetation conditions as a proxy for suitable agricultural areas.<br><br>Provision of geospatial products to DAFF for optimised agricultural |
| 8 | Sustainable human settlements and improved quality of household life | Deliver Human Settlement Planning solutions that will improve the quality of lives of its citizens. SANSA has developed a national human settlement mapping tool. |
| 9 | Responsive, accountable, effective and efficient local government system | Provision of geospatial data, data products and services to government departments and municipalities for improved service delivery. |
| 10 | Protect and enhance our environment assets and natural resources | Provision of geospatial data, geospatial information products for natural environmental management and sustainable development. |
| 11 | Create a better South Africa, a | |
| 12 | An efficient, effective and develop- | |
| 13 | Social protection | |
| 14 | Nation building and social cohesion | Ensure a 65% representation of permanent staff from designated groups in the D to F grades by end March 2020. |

## Alignment to the Triple Challenges of Inequality, Poverty and Unemployment

Government has prioritised the drive to address the triple challenges of inequality, poverty and unemployment. SANSA will contribute to addressing some of these challenges as indicated below.

| Inequality | Poverty | Unemployment |
|---|---|---|
| Ensure a 65% representation of permanent staff from designated groups in the D to F grades by end March 2020. (Goal 7) | Deliver Human Settlement Planning solutions that will improve the quality of lives of its citizens. SANSA has developed a national human settlement mapping tool. (Goal 1) | Support 50 postgraduate students and ensure that they are properly equipped for the job market (Goal 3). |
| Support 50 postgraduate students with a drive on race and gender equity (Goal 3). | A total contract expenditure of R12 million to be outsourced to SMEs for core space projects (Goal 4) | A total of 50 direct jobs supported externally through SANSA programme contracting<br>(Goal 4) |
| Directly engage<br>9000 young through science awareness & outreach activities with a focus on previously disadvantaged communities (This excludes arms-length engagement with the youth e.g. a visit to one of SANSA's exhibition stands) (Goal 3) | | |

## Alignment to the Government's Nine-Point Plan

During the 2015 State of the Nation Address, President Jacob Zuma announced the Nine-Point Plan with the intention of boosting economic growth and the creation of jobs. SANSA will directly contribute to five of the nine activity areas as indicated below.

| No. | Nine-Point Activity | SANSA's Contribution |
|---|---|---|
| 1 | Resolving the energy challenge | Provision of satellite imagery to Eskom for demand management, power station location planning, control human encroachment on transmission lines.<br><br>Continue with research on Geomagnetically Induced Currents (GICs) to assist in mitigating space weather related power support interruptions. |
| 2 | Revitalising agriculture and the agro-processing value chain | Mapping of rangeland conditions to improve grazing and stocking capacity management.<br><br>Use Cropwatch4SA to provide national vegetation conditions as a proxy for suitable agricultural areas.<br><br>Provision of geospatial products to DAFF for optimised agricultural planning and management. |
| 3 | Advancing beneficiation or adding value to the mineral wealth | |
| 4 | More effective implementation of a higher-impact Industrial Policy Action Plan | |
| 5 | Encouraging private sector investment | |
| 6 | Moderating workplace conflict | |
| 7 | Unlocking the potential of small, medium and micro enterprises (SMMEs), cooperatives, township and rural enterprises | A total contract expenditure of R12 million to be outsourced to SMEs for core space projects (Goal 4)<br><br>Innovation competition aimed at small to medium enterprises to develop innovative products using EO data with a potential to be commercialised. |
| 8 | State reform and boosting the role of state-owned companies, information and communications technology infrastructure or broadband roll-out, water, sanitation and transport infrastructure | Development of the national water information that will assist in the water management including water demand modelling and the monitoring of the degradation of water catchment.<br><br>Development of 18 satellite-based augmentation base stations in South Africa in partnership with the UKSA. |
| 9 | Operation Phakisa, which is aimed at growing the ocean economy and other sectors. | 100% data acquisition plan towards implementation of the research plan for coastal and marine monitoring |

## Alignment to DST's Strategic Deliverables

SANSA reports and contributes to DST's strategies including the National Space Strategy, the South African Earth Observation Strategy (SAEOS) and the DST's Strategic Plan and Annual Performance Plan. The mapping of such alignment to some of the key outputs of the DST is tabulated below.

| DST Output | SANSA Contribution |
|---|---|
| Knowledge outputs | Achieve a research productivity score of 750. This is a composite score of research publications, research grants sourced, research student graduated, |
| Decision Support Interventions | Produce three policy briefs covering the following: (i) Integrated water management using Earth observation technology; (ii) Economic impact of space weather, (iii) The Current state of the space industry |
| Postgraduate Research Students | Support 50 postgraduate students with a drive on |
| Knowledge application products | Produce two national geospatial information mosaics. (Goal 1)<br><br>Produce a national flood risk map, human settlement information and water base maps. (Goal 1)<br><br>Deliver daily space weather bulletins and high frequency predictions. (Goal 1)<br><br>Calibrate at least 20 navigation compasses for defence and private clients. (Goal 1) |
| Commercial outputs | Generate R60 million through commercial or contractual arrangements. (Goal 4)<br><br>A total contract expenditure of R12 million to be |
| Return leveraged through partnerships | Generate an equivalent of 2% of SANSA's non-commercial operating revenue through partnerships |

# CONSOLIDATED RESOURCE CONSIDERATION

## Overview of 2016/17 budget and Medium Term Expenditure Framework (MTEF)

### Expenditure estimates

**Table 3.1 South African National Space Agency expenditure trends and estimates by programme**

| Programme | Audited outcome | | | Revised estimate | Medium-term expenditure estimate | | | Total MTEF |
|---|---|---|---|---|---|---|---|---|
| R thousand | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| Corporate Support | 38 410 | 37 137 | 49 446 | 38 802 | 39 002 | 40 946 | 43 321 | 123 269 |
| Earth Observation | 57 197 | 56 357 | 97 495 | 69 601 | 72 164 | 74 784 | 77 986 | 224 934 |
| Space Operations | 57 724 | 86 084 | 74 308 | 47 442 | 47 022 | 48 084 | 49 430 | 144 536 |
| Space Science | 37 894 | 39 122 | 36 291 | 33 779 | 35 125 | 36 769 | 37 205 | 109 099 |
| Space Engineering | 17 858 | 27 572 | 56 978 | 91 387 | 102 653 | 114 681 | 12 657 | 229 991 |
| **Total** | **209 083** | **246 272** | **314 518** | **281 011** | **295 966** | **315 263** | **220 599** | **831 828** |

**Table 3.2 South African National Space Agency expenditure trends and estimates by economic classification**

| Economic classification | Audited outcome | | | Revised estimate | Medium-term expenditure estimate | | | Total MTEF |
|---|---|---|---|---|---|---|---|---|
| R thousand | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| Compensation of Employees | 62 729 | 75 093 | 90 265 | 103 305 | 111 703 | 119 299 | 127 411 | 358 413 |
| Goods and Services | 114 026 | 124 602 | 136 793 | 90 683 | 87 348 | 86 686 | 82 080 | 256 114 |
| Payments for Capital Assets | 32 328 | 46 577 | 87 460 | 87 023 | 96 915 | 109 278 | 11 108 | 217 301 |
| **Total Expenditure** | **209 083** | **246 272** | **314 518** | **281 011** | **295 966** | **315 263** | **220 599** | **831 828** |

The projected total annual funding for SANSA is 295 million in 2016/17, R315 million in 2017/18 and R220 million in 2018/19 with a total of R831.8 million over the medium term.

In line with strategic Goal 1, to address South Africa's challenges through space services and products, spending over medium term will be focused on ensuring that space is integrated into service delivery and it is an indispensable tool of government decision and policy formulation by providing space services and products so as to address challenges in the agricultural; water; energy and health, safety & security industries. The Earth Observation and Space Science Programmes will largely contribute to this strategic objective and they account for 40 percent of expenditure over the medium term reaching R334 million by 2018/19.

Strategic Goal 2 is to lead high-impact collaborative R&D on a national scale.

Expenditure related to collaborative research over the medium term is mainly from research grants that are applied for and salaries for researchers. This is estimated at R42.8 million over the medium term and is mostly led by the Space Science Programme.

In meeting Goal 3, which is to develop national human capacity and ensure transformation, R15 million over the medium term is allocated to support 50 to 90 students in space related areas through bursaries and internships and student supervision to contribute to better quality of research outputs and increased number of space publications produced.

Strategic Goal 4 is to enhance the competitiveness of the South African space industry. The Space Operations and Space Engineering Programmes are the key drivers for this objective. The space operations activities are estimated to cost R147 million over the medium term, with average annual expenditure of R48 million.

These activities are conducted largely to service the international commercial market and also provide ground support infrastructure maintenance for telemetry services to enable remote sensing processes in the acquisition of satellite data and imagery. As the primary driver of the Agency's industry development initiatives, the satellite build programme has an allocation of R230 million over the medium term. The decrease in expenditure in the 2018/19 year in the Space Engineering Programme is as a result of the current approved funding of R450 million allocated from the inception of the satellite build programme in 2011, reaching its sealing of the R450 million in the outer year 2018/19.

Strategic Goal 5 is to develop active global partnerships. A large part of the cost is related to travel local and internationally as well as hosting and participating in space related conferences and seminars. R15 million is allocated over the medium term for these activities.

Strategic Goal 6, which is to ensure the growth and sustainability of SANSA and Goal 7 to transform SANSA into a high performance Agency are driven by the Corporate Support Programme. R123 million has been allocated over the medium term to drive initiatives that will enhance revenue growth and institutional performance.

## Expenditure by economic classification

The Agency derives its revenue from transfers from the DST. Other sources of revenue include interest earned on investments, rendering services and other income.

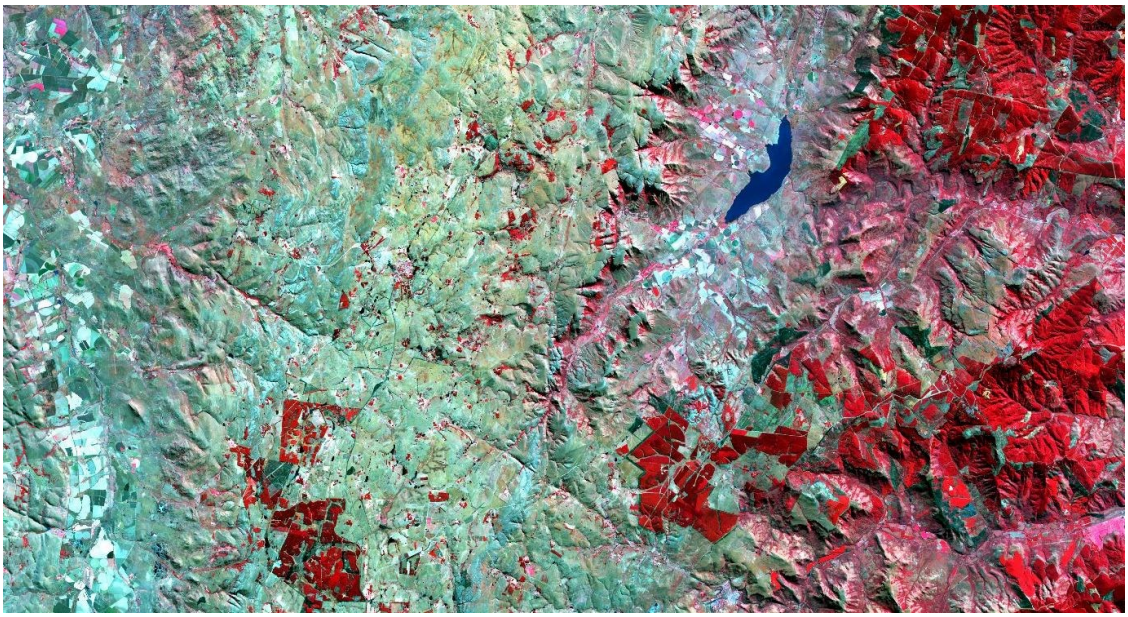
Revenue is thus expected to grow over the medium term by 3% as a result of a limited scope in terms of providing mandate work at a fee from state institutions; fixed term hosting contracts from international clients reaching their term end and the inability to project for launch support revenues as these are dependent of the success of the launches.

Compensation of employees remains one of the significant drivers of expenditure contributing 43% so as to enable the Agency to source scientists, engineers and researchers in the space science industry to support its mandated as well as the satellite build programme. The head count will marginally increase from 214 in 2016/17 to 218 in 2018/19 to ensure the effectiveness of the satellite build programme.

Expenditure on goods and services contributes to 31% of the total budget, and noticeably decreases over the medium term. This is due to total transfers over the medium term decreasing by 11% coupled with a marginal increase of only 3% on contract revenue, whereas personnel costs increase at an average of 6.8% over the medium term. The decrease in income directly causes the available budget for goods and services to also decrease over the medium term.

The impact of the decrease will affect the institution's ability to source satellite imagery and will result in also ceasing the satellite build programme.

Payments for capital assets constitutes 26% of the total budget over the medium term and are largely for the satellite build programme.



Landsat8 –2013 (Dullstroom, RSA)

| | | | | Inherent Risk | | |
|---|---|---|---|---|---|---|
| | SANSA Objective | Risk Description | Consequences of Risk | Impact | Likelihood | Rating |
| 1 | Goal 1, 2,3,4, 5, 6&7 | Inadequate funding for current business activities within SANSA | 1. SANSA not sustainable as a business<br>2. Inability to demonstrate impact of our service offerings<br>3. Loss of credibility as a key player in the space industry<br>4. Large portion of the grant is allocated to salaries.<br>5. Reputational damage | 5 | 5 | 25 |
| 2 | Goal 4 &5 | Inability to execute and deliver on the objectives; i.e. EO-SAT 1 Satellite program and Industry Development. | 1. Inadequate Satellite program<br>2. No Competitive Space Industry<br>3. Unable to develop the required human capital to capacitate the space programme<br>4. Unable to develop required technologies to give SA Space Industry the global competitive edge<br>5. Extended delays to the satellite program | 5 | 5 | 25 |
| 3 | Goal 7 | Non-compliance relating to procurement of goods and services | 1. Irregular and fruitless expenditure<br>2. Disciplinary action leading to dismals or imprisonment<br>3. Reputation damage to SANSA's brand<br>4. Financial losses | 5 | 5 | 25 |
| 4 | Goal 6 & 7 | Current SAP system functionality not adequate | 1. Poor Management Information<br>2. Too many manual interventions<br>3. Time consuming tasks<br>4. Audit queries<br>5. Financial losses as a result of errors<br>6. Delays in reporting<br>7. Inaccuracy in reporting. | 5 | 5 | 25 |
| 5 | Goal 1, 2,3,4, 5, 6 &7 | The planned organisational re- design may lead to unintended change management challenges | 1. Failure to achieve SANSA strategic goals<br>2. Poor staff morale<br>3. Misalignment to the SANSA strategy<br>4. Low productivity related to the change process demands. | 5 | 5 | 25 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | Goal 1, 2,3,4, 5, 6&7 | Inability to achieve SANSA strategic objectives due to inadequate employees with capabilities to deliver SANSA's on goals. | 1. Overworked staff<br>2. Low staff morale<br>3. Poor performance<br>4. High staff turnover<br>5. Staff productivity<br>6. Business sustainability<br>7. Strategic drift | 5 | 4 | 20 |
| 7 | Goal 1,2& 7 | Insufficient disaster recovery plans for infrastructure to support the organisation in case of disruptions in enterprise systems | 1. Disruption to business operations<br>2. Inability to provide services<br>3. Increased costs of acquiring and processing data<br>4. Reputation damage to SANSA<br>5. Difficulties in retrieval of data | 5 | 4 | 20 |
| 8 | Goal 6 & 7 | Inadequate institutional performance management processes to support the SANSA strategy | 1. Unable to accurately measure SANSA performance against set objectives<br>2. Audit findings against SANSA<br>3. Reputational Risk<br>4. Possible under/ over achievement against targets<br>5. No progress made towards achievement of summative targets | 4 | 4 | 16 |
| 9 | Goal 1, 2, 4,5, 6 &7 | Inability to maintain and replace infrastructure | 1. Loss of income<br>2. Loss of credibility (reputational risk)<br>3. Failure to fulfil the SANSA mandate<br>4. Increase replacement and replacement costs.<br>5. Repudiated claims | 5 | 3 | 15 |
| 10 | Goal 1 & 5 | Failure to map SANSA products and services to the user needs | 1. SANSA becomes irrelevant and does not attract investment, funding and contract income.<br>2. Other entities and space agency fulfilling SANSA's role<br>3. Reputational loss<br>4. Failure to identify the needs of the users<br>5. Failure to fulfil SA's national challenges.<br>6. Loss of market share | 5 | 3 | 15 |

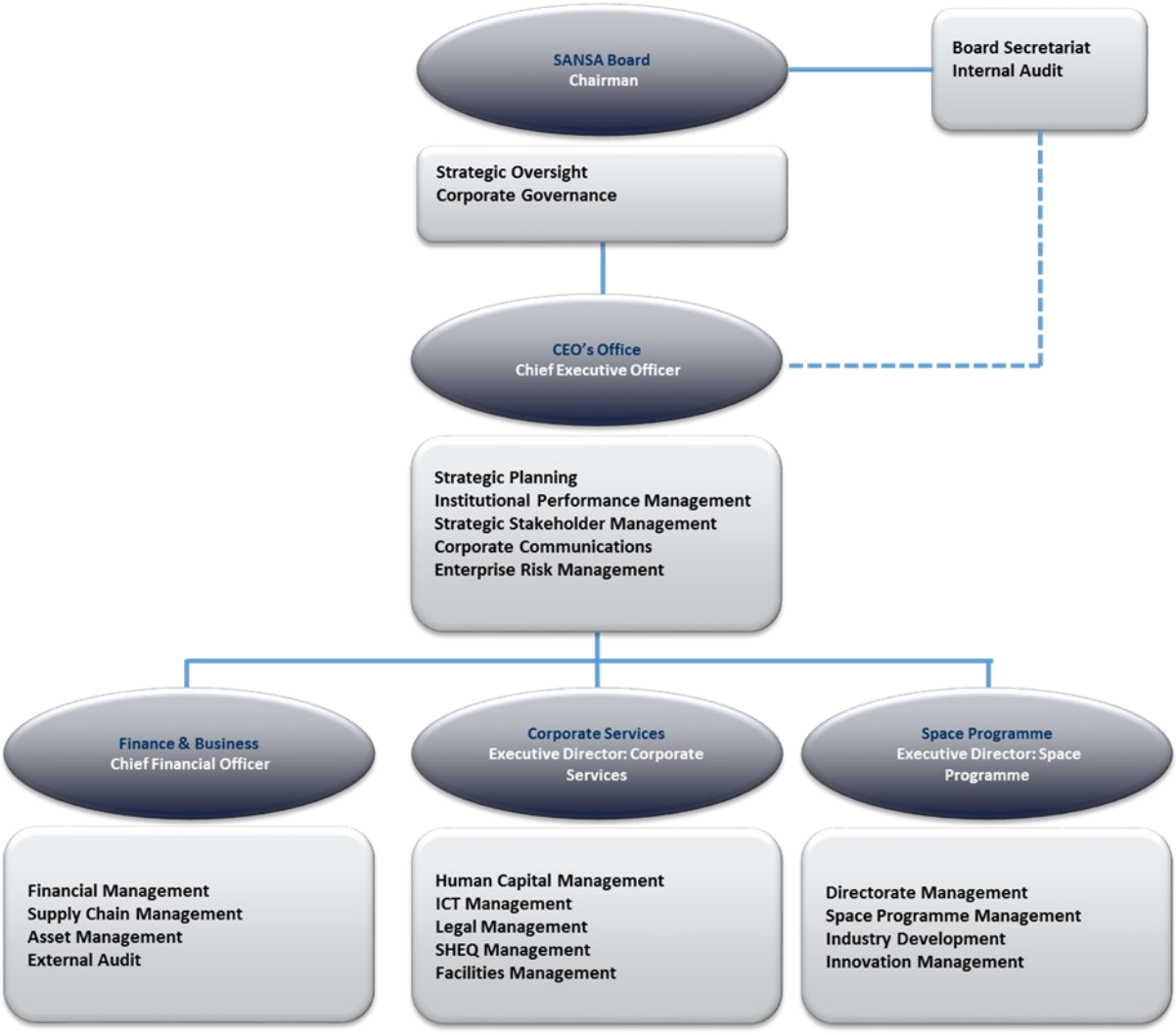

Part B
Programme Performance Plans

# PROGRAMME 1: CORPORATE SUPPORT PROGRAMME (CSP)

## Purpose

The Corporate Support Programme provides management, administrative and technical support across all operating units. This facilitates operational efficiency and cost-effective management, alignment with sound governance principles and the seamless integration and collaboration between SANSA directorates.

## Programme Structure



## Strategic Focus

**Goal 6:** Ensure the growth and sustainability of SANSA

- Effective strategic planning, implementation and performance management
- Strategic relevance and impact
- Driving new business development
- Ensuring financial sustainability
- Marketing and communication
- Efficient financial management and strategic procurement

**Goal 7:** Transform SANSA into a high performance Agency

- High-level talent management

# Strategic Goal 6: Ensure the growth and sustainability of SANSA

### Growth and Financial Sustainability

To ensure the proper growth and sustainability of SANSA there is a need to clarify the institutional nature and function of SANSA in relation to its legislated mandate. This will require the finalisation of an Institutional Plan that was required by the Minister.

Further, SANSA has to develop a clear Growth and Sustainability Strategy that should consider amongst other things ways the diversification of the resources of SANSA, the development of a Sustainability Strategy and Measurement Framework.

### Quantification of the Socio-economic Benefits of Space

The benefits of space are generally not fully understood and appreciated. It is therefore necessary for SANSA to lead the process of quantifying the socio-benefit of space both to leverage resources and to increase awareness and understanding of what space can be used for. The latter will ensure a greater uptake of the use of space and the greater benefit to the country.

### Space-use Promotion and Awareness

Currently space is not considered as an integral part of business and service delivery in the public sector. SANSA aims to promote and market the use of space in the public sector, in the main, and in the private sector, in general. In addition to this promotion/marketing SANSA will monitor and evaluate the awareness levels on the use of space, especially amongst potential users of space. The focus will not be on the general public but potential practitioners of space products and services.

### The monitoring of National Space Programme Activities

The monitoring of the implementation of the NSP will be done at a high-level and more qualitatively using a dashboard system that evaluates the status on the NSP projects as outlined in the table on the following page. It is recognised that not all the projects will be instituted at once and so the monitoring will be at the level of assessing if there is activity going on in each of the projects.

| NSP Core Administration and Governance (NSP CAG) [SANSA Corporate Office] | National Earth Observation Programme (NEOP ) | National Space Science Programme (NSSP) | National Space Engineering Programme (NSEP) | National Space Operations Programme (NSOP) |
|---|---|---|---|---|
| P1:<br>Space Coordination and Industrial Development | P1:<br>Earth Observation Data Centre (EODC) at SANSA | P1:<br>Magnetic Anomaly Investigations | P1:<br>Technology and Mission Development | P1:<br>TT & C |
| P2:<br>Space Programme Management | P2:<br>Remote Sensing and Data Management Competence Development | P2:<br>Status of the Space Environment | P2:<br>Nano and Pico-satellites | P2:<br>Mission Control |
| P3:<br>Infrastructure and Facilities Management | P3:<br>Applications development and deployment | P3:<br>Space Science in Remote Areas | P3:<br>Mini Satellites | P3:<br>Navigation |
| P4:<br>Human Capacity Development | P4:<br>EO for Earth System and Global Change Research | P4:<br>Hazard Mitigation and Disaster Management | P4:<br>Micro Satellites | P4:<br>Communications |
| P5:<br>Science Advancement and | P5:<br>Human Capacity Development | P5:<br>Applied Electromagnetic | P5:<br>Industrial Development and | P5:<br>Infrastructure and |
| P6:<br>International Partnerships | P6:<br>Cyber Infrastructure | P6<br>Infrastructure and Facilities | P6:<br>Infrastructure and Facilities | P6:<br>Invest and grow Teleport hosting |
| | P7:<br>Science Advancement | P7<br>Human Capacity Development | P7:<br>Human Capacity Development | |
| | P8:<br>User needs and future vison | P8:<br>Science Advancement | P8:<br>Science Advancement | |
| | P9:<br>African Resource and Environment Management Satellite Constellation (ARMC) | | | |

**Table 7: NSP Dashboard**

## Annual Priorities

- Intensify SANSA's communication and marketing
- Develop a SANSA-wide database of commercially relevant opportunities for potential business development;
- Develop and present a long-term resourcing plan with clear milestones to the SANSA Board for approval;
- Aggressively develop the SANSA business and revenue streams;
- Develop, consult and obtain approval of a coherent balanced product portfolio encompassing both pro-bono and price listed items available at SANSA;
- Actively engage high-level stakeholders to clarify and emphasise the SANSA value proposition;
- Engage external expertise to produce a research report that evaluates and quantifies the value and impact created by space research to reaffirm the SANSA mandate. Space research remains a new frontier whose value proposition to humanity is evolving and benefits of which need to be continuously communicated and quantified;
- Develop, consult and obtain approval on a Marketing Plan to effectively communicate, promote and educate the public, partners, and key stakeholders on SANSA, the NSP and its value proposition and promise;
- Develop and implement a brand promotion programme; and
- Monitor and evaluate the SANSA brand awareness and value.and to increase awareness.

# Strategic Goal 7: Transform SANSA into a high performance Agency

SANSA cannot achieve its objectives if it is not efficient and effective and this implies being a high performance organisation that is dependent on transformational leadership, human capital management, business design, operational efficiency and effectiveness, and technological efficiency and effectiveness.

**To ensure that SANSA is optimised for high performance, the following will be undertaken**:

- Ensuring leadership alignment and effectiveness;
- Ensure transformation particularly by addressing gender imbalances in the SET sectors of SANSA
- Increase the absorption of the youth
- Review of organisation design to ensure that the structure reflects the organisation's strategic focus;
- Ensuring a dynamic Human Resource strategy that continuously seeks to attract and retain the most capable individuals;
- Culture alignment to achieve SANSA's strategic objectives and goals;
- Development and communication of a clear Employee Value Proposition (EVP) to align SANSA's personnel to deliver on its mission, vision and strategy; and
- Grow and develop Business Support Systems to optimise information and business systems to support business, operations, innovation and managerial processes through:
  - *Implementing the ICT governance framework; and*
  - *Developing and approving the ICT Roadmap for the next two years.*
  - *Develop maintenance framework for broader SANSA*

## Programme Performance Outputs

| | | | | Quarterly Targets | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 6: Ensure the growth and sustainability of SANSA** | S6.1. Ensure that SANSA has annual measurable growth and is sustainable | M6.1 Total non-ring-fenced SANSA revenue | R200 million | | | | R200 million |
| | | M6.2 Estimated monetised impact per annum | The economic study to be withheld. | On hold | On hold | On hold | On hold |
| | | M6.3 SANSA's public value awareness | 60% | | | | 60% |
| | S6.2. Ensure the effective implementation of the NSP | M6.4. High-level NSP implementation progress status. | 40% | | | | 40% |

| | | | | Quarterly Targets | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 7: Transform SANSA into a high performance Agency** | S7.1. Ensure that SANSA has been optimised for high performance | M7.1Implementation of identified initiatives that enhance organisational performance | Employee Engagement Score (Progressive Quantitative Target) | Develop & administer employee engagement survey | Develop & communicate employee engagement strategy | Develop action plans for improvement of employee engagement | Implement employee engagement plans and measure employee engagement. |
| | | | Investment in employee development (Progressive Quantitative Target) | Talent, succession and training plans developed by 30 June 2016 | Organisation talent and succession plan implementation report. | Implemented Management Training and Development Programme by 30 October 2016 | Implemented training plans and staff Personal Development Plans (PDPs) |
| | | | Establishment and maintenance of good and long-term relationships with all stakeholders. (Progressive Quantitative Target) | Develop a strategic stakeholder engagement plan | Implement strategic stakeholder engagements and produce reports documenting impact | Evaluate engagements and develop projects based on the impact reports | Project reports with deliverables |
| | | | Financial sustainability programme (Progressive Quantitative Target) | Finalise the Financial Sustainability Measurement Framework & the Financial Sustainability Strategy | Develop an Annual Financial Sustainability Plan and matrix | Report on YTD financial sustainability matrix developed | Report of annual progress and projections for the next three year budget cycle |
| | | M7.2 Proportional (%) representation of permanent staff from designated groups in the D to F grades | 80% | 80% | 80% | 80% | 80% |

## Resource Considerations

Table 1. Corporate Support Programme Expenditure

| | Audited Outcome | | | Revised budget | Medium Term Expenditure Framework | | | Total MTEF |
|---|---|---|---|---|---|---|---|---|
| Rand thousand | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| **Corporate Support Programme** | **38 410** | **37 137** | **49 446** | **38 802** | **39 002** | **40 946** | **43 321** | **123 269** |
| **Current payments** | | | | | | | | |
| Compensation of employees | 18 212 | 23 627 | 21 800 | 23 968 | 25 645 | 26 844 | 31 506 | 83 995 |
| Goods and services | 14 122 | 11 709 | 16 169 | 11 517 | 9 866 | 12 846 | 11 714 | 34 426 |
| Payments for capital assets | 6 076 | 1 801 | 11 477 | 3 317 | 3 491 | 1 256 | 102 | 4 849 |
| **Total Expenditure** | **38 410** | **37 137** | **49 446** | **38 802** | **39 002** | **40 946** | **43 321** | **123 269** |

The Corporate Support Programme is allocated R123 million over the medium term, with annual allocation of R39 million in 2016/17, R41 million in 2017/18 and R43 million in 2018/19.

The spending is mainly governance and administrative support to all the core programmes as well as driving the strategic goals 6 and 7 to ensure growth and sustainability of SANSA and transform into a high performance institution.

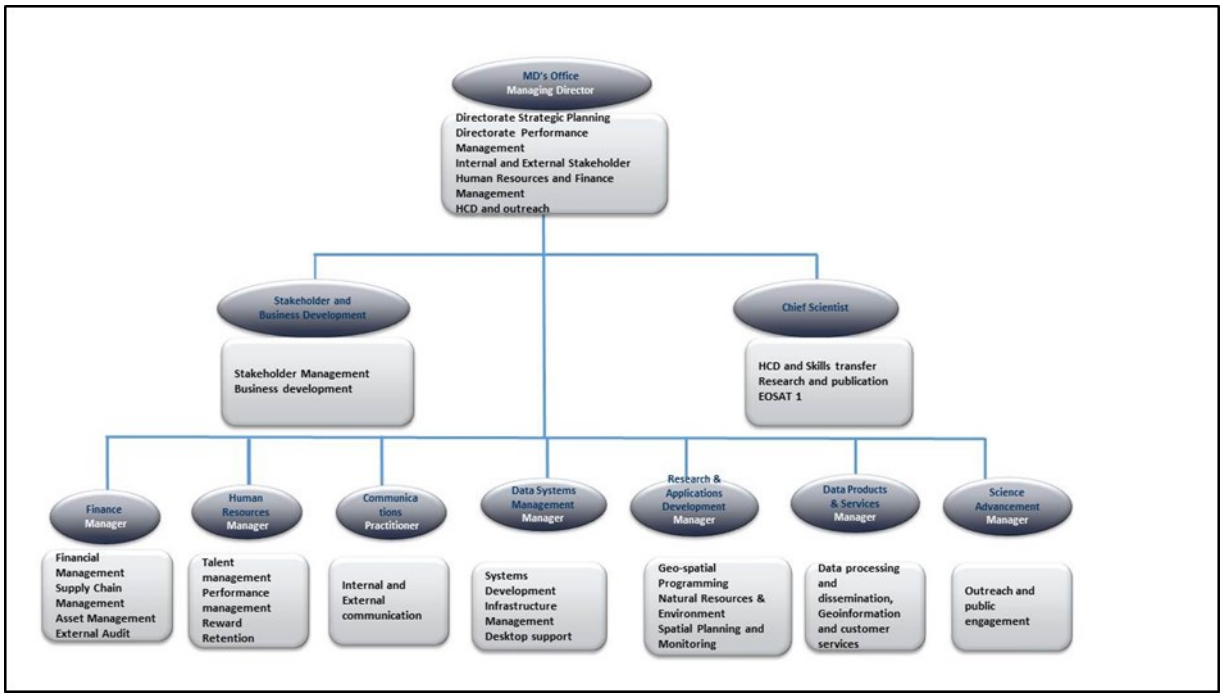
# PROGRAMME 2: EARTH OBSERVATION PROGRAMME (EOP)

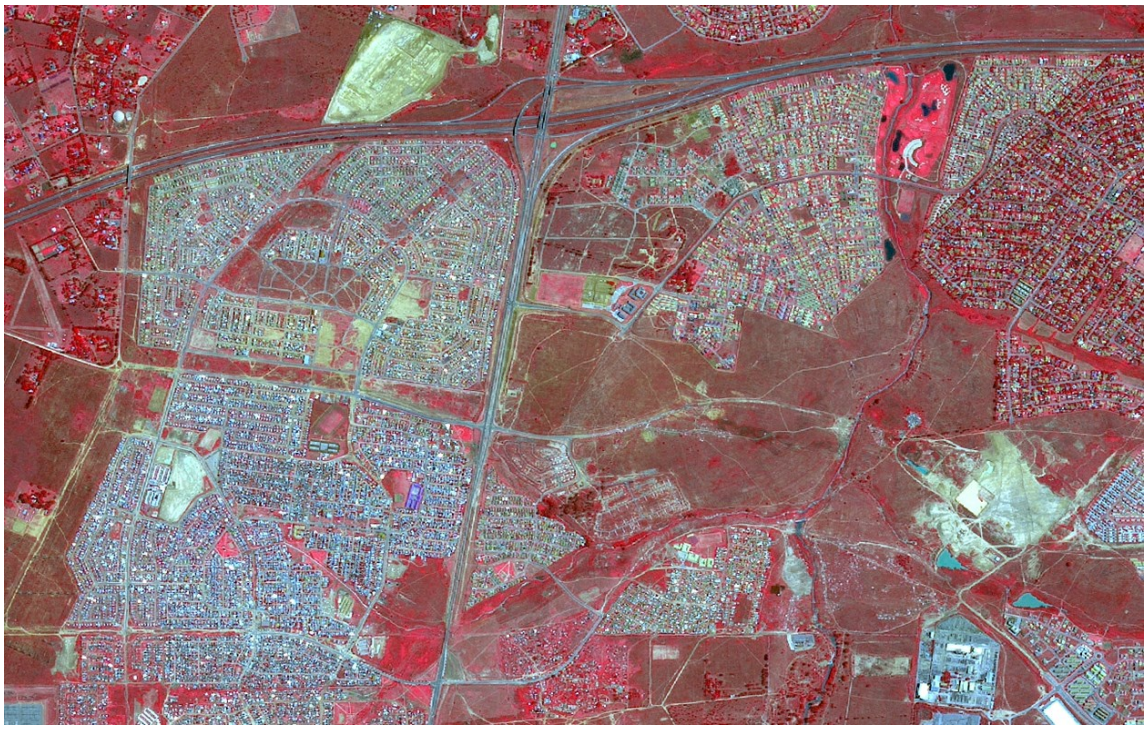
## Purpose

The Earth Observations Programme is responsible for the collection, processing, archiving and distribution of Earth observation data and data products for societal benefit.

SANSA maintains an Earth observation portfolio of sensors, provides an R&D platform in Earth observation technologies, conducts satellite image processing and correction, and provides human capital development in Earth observation and science advancement.

## Programme Structure



## Strategic Focus

**Goal 1:** Address South Africa's challenges through space services and products

- National geospatial decision support data products including the Earth Observation Data Centre (EODC)
- National land use, land cover base maps (National Human Settlement Map; National Water Map; National Vegetation Map; National Disaster Management Map)
- Marine Information Services (Operations Phakisa)

**Goal 2:** Lead high-impact collaborative R&D on a national scale

- Remote sensing research
- Data management and algorithm R&D

**Goal 3:** Develop national human capacity and ensure transformation

- Science outreach and awareness
- Student and intern training
- Student funding
- Fundisa resources
- University support

**Goal 5:** Develop active global partnerships

- Development and servicing of national and international partnerships
- Joint projects with external partners

**Goal 7:** Transform SANSA into a high performance Agency

- Ensuring equity and transformation

# Strategic Goal 1: Address South Africa's challenges through space services

### 1. Operation Phakisa (Marine Information Services)

As part of the NDP, the country has embarked on Operation Phakisa. The initiative seeks to leverage R177 billion from ocean activities by 2033. SANSA will contribute to the establishment and operationalisation of the national ocean and coastal information system and will enhance the country's maritime Earth observation monitoring capability through the utilisation of optical and radar imagery.

Earth Observation based information will play an integral role in ocean protection through ship surveillance, water pollution detection and monitoring of fishing activities. SANSA will avail its sensor portfolio and research capability to support maritime spatial planning and coastal infrastructure mapping. The agency will also extend its Earth observation capability to support the national ocean and coastal water monitoring programme.

## 2. National Geospatial Decision Support Data Products

SANSA will timely and efficiently provide the users with high quality image data products. SANSA acquires satellite data from a number of international satellites for national benefit. These include Landsat 8, SPOT 6 and 7, and MODIS.

This centralised acquisition under single-license multi-user arrangements eradicates unnecessary and duplicated acquisition in the public sector, ensures long-term archiving of the valuable data stock, and results in over 80% saving on the commercial list prices for the collective public sector.

An estimated 40 government entities, on both the national and provincial level, use these data resources.

SANSA has also negotiated favourable licensing to allow for discounted access to this data to the South African private sector and the SADC region. SANSA seeks to:

- increase the ease of access to the national geospatial decision support data products;
- improve its processing tools so as to enhance the user experience and benefit;
- improve the quality of the data products; and
- improve its turnaround times.

## 3. National Land Use Land Cover Base Maps

SANSA will further process some of the satellite imagery to provide base information products for national use. SANSA has identified four key national land use and land cover maps.

- ***National Human Settlements Map:*** This map will focus on mapping all built up areas using automated algorithms. The results of the human settlements maps will be distributed to the Department of Human Settlements, Housing Development Agency, Statistics South Africa, Municipal Demarcation Board, Eskom, Department of Environmental Affairs, municipalities, Department of Agriculture, Forestry and Fisheries and Department of Water Affairs and Sanitation.

  The digital human settlements maps will also be deployed on the web to allow users to interactively query the geo-databases and extract attributes of interest from the maps.

- ***National Water Map:*** This map will focus on supporting the Department of Water Affairs and Sanitation, Department of Environmental Affairs and Department of Agriculture, Forestry and Fisheries with water information products. Priority will be given to the automated extraction of water bodies using Landsat 8 and SPOT 6 & 7 satellite imagery. Water body maps will produce an inventory of all water bodies such as dams in the country to ensure compliance with the Water Act and for water licences purposes. Additional work will also be undertaken to support water quality assessment, water demand modelling and land degradation assessment at water catchment level. Work on this project will be undertaken in line with the ESA-funded TIGER programme.

- ***National Vegetation Map:*** This map will focus on automating the generation of vegetation indices at a national scale using Landsat 8 data. These products will be delivered to the clients as mosaicked normalised vegetation composites on a monthly basis. The vegetation mapping project will also encompass the mapping of rangelands in South Africa which will be undertaken with the GEOGLAM framework. The users of vegetation products will include Department of Agriculture, Forestry and Fisheries for rangeland assessment together with Department of Water Affairs and Sanitation and Department of Environmental Affairs. SPOT 6, 7 and CBERS 4 will also be integrated into this project.

- ***National Disaster Management Map:*** This map will be developed for the National Disaster Management Centre. Focus will be on flood prediction and vulnerability modelling, development of flood and fire maps, drought monitoring and generation of reference of datasets for disaster management. SANSA will support various disaster management authorities at provincial level. Collaborations with NASA and ESA will be strengthened in order to reach this goal.

### 4. Decision and Policy Support Tools

The Earth Observation Programme will develop a policy brief on the "Integrated water management using Earth observation technology." South Africa is water scarce country and, therefore, there is a need to optimise the management of water.

Earth observation is a good tool for water management. This work will be an extension of the partnership between SANSA and the Department of Water and Sanitation, the Water Research Commission and European partners under the Tiger Project.

## Strategic Goal 2: Lead high-impact collaborative R&D on a national scale

Conduct remote sensing research that seeks to strengthen the delivery of the key outputs in Goal 1.

The research will focus on improving the data management and processing routines with a view to increasing the extraction of information from the data, the archiving and distribution of data.

## Strategic Goal 3: Develop national human capacity and ensure transformation

Science advancement will focus more on the more northern provinces working together with the Space Operations Programme.

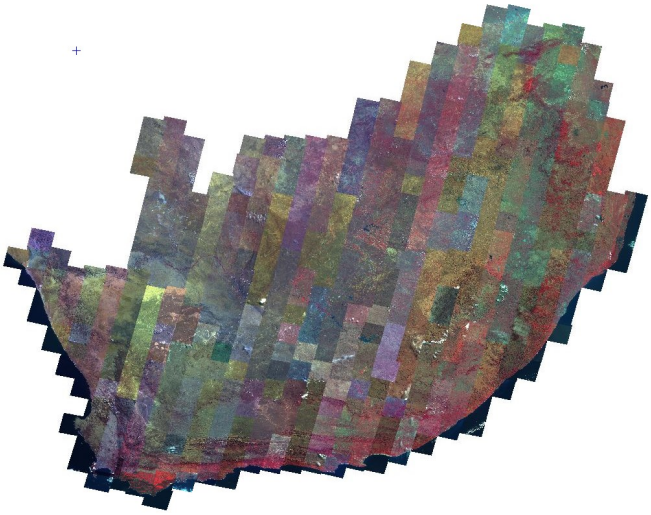
Student training with be pursued through targeted funding the provision of the Fundisa disc to universities, strengthening the Fundisa student portal, and supporting universities with satellite data.

## Strategic Goal 5: Develop active global partnerships

National partnerships with government departments and other public entities will be strengthened to ensure that space is integrated into national service delivery. Global partnerships under GEO, AfriGEOSS and CEOS will be enhanced.

## Strategic Goal 7: Transform SANSA into a high performance Agency

The Programme will pursue a transformation agenda in terms of staff and students.



## Programme Performance Outputs

| | | | | Quarterly Targets | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 1: Address South Africa's challenges through space services and products** | S1.1 Lead and facilitate the creation of high-impact products and services to address society's needs and challenges | M1.1 The number of national high-impact products and services | **1. PHAKISA**: National ocean and coastal information system and extending Earth observation capacity (Progressive Qualitative | *Contribute to a research and development plan for coastal and marine monitoring* | *50% of data acquisition plan towards implementation of the research plan for coastal and marine monitoring* | *80% data acquisition plan towards implementation of the research plan for coastal and marine monitoring* | *100% data acquisition plan towards implementation of the research plan for coastal and marine monitoring* |
| | | | 2. National geospatial decision support data products (Progressive Qualitative Target) | Develop an image processing implementation plan for SPOT 6, and Landsat 8 mosaicking. | 1 National Mosaic | | 1 National Mosaic |
| | | | 3. National land-use and land-cover base maps (information products) (Progressive Qualitative Target) | Develop and implement a land cover classification plan, for water bodies and disasters | 50 % National flood risk map layer completed | 80 % National flood risk map completed | 100% of National flood risk map completed |
| | S1.2 Provide government with effective policy or decision tools and support | M1.2 The number of government decision or policy support tools | A policy advisory brief on integrated water management using Earth observation technology (Progressive Qualitative Target) | Develop proposal for the policy brief | First draft for the policy brief | Second draft peer reviewed policy- | Refine the document & submit for approval. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Goal 2: Lead high-impact collaborative R&D on a national scale** | S2.1 Increase the national space research output | M2.1 The national research productivity score for space supported R&D (This productivity score is based on a function of research funding sourced + publications (journals, books, reports, proceedings) + students graduated + research rating status.) | 200 | 0 | 100 | 0 | 100 |

| | | | | Quarterly Targets | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 3: Develop national human capacity and ensure transformation** | S3.1. Increase youth awareness of science | M3.1 The number of youth directly engaged through science awareness & outreach activities (This excludes arms -length engagement with the youth e.g. a visit to one of SANSA's exhibition stands) | 3000- | 600 | 1400 | 400 | 600 |
| | S3.2 Support students with a transformation agenda | M3.2 The number of supported students for formalised training (This excludes short courses and focuses on degree-registered students only) | 10 | 5 | 0 | 0 | 5 |
| **Goal 5: Develop active global partnerships** | S5.1. Leverage a significant benefit for the space programme through global partnerships | M5.1 The equivalent revenue generated through partnerships as a proportion of the EO non-commercial operating revenue | 2% | 2% | 2% | 2% | 2% |
| **Goal 7: Transform SANSA into a high performance Agency** | S7.1. Ensure that SANSA has been optimised for high performance | M7.2 Proportional (%) representation of permanent staff from designated groups in the D to F grades | 80% | 80% | 80% | 80% | 80% |

## Programme Resource Considerations

| Rand thousand | Audited Outcome | | | Adjusted Budget | Medium Term Expenditure Framework | | | Total MTEF |
|---|---|---|---|---|---|---|---|---|
| | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| **Earth Observation Programme** | 57 197 | 56 357 | 97 495 | 69 601 | 72 164 | 74 784 | 77 986 | 224 934 |
| **Current payments** | | | | | | | | |
| **Compensation of employees** | 14 220 | 16 433 | 19 391 | 22 461 | 22 541 | 24 643 | 25 781 | 72 965 |
| Goods and services | 36 055 | 35 620 | 45 840 | 44 640 | 48 023 | 48 291 | 50 205 | 146 519 |
| Payment for capital assets | 6 922 | 4 304 | 32 265 | 2 500 | 1 600 | 1 850 | 2 000 | 5 450 |
| **Total Expenditure** | **57 197** | **56 357** | **97 495** | **69 601** | **72 164** | **74 784** | **77 986** | **224 934** |

The Earth Observation Programme has an allocation of R224 over the medium term. Annual allocations are at R 72 million in 2016/17; R74 million in 2017/18 and R78 million in 2018/19. The major expenditure in this programme is mainly towards access to Earth observation satellites and the related maintenance for data processing and storage facilities for satellite imagery acquired over the years.

SANSA acquires satellite data and images at a cost of R43 million per annum in licence fees, from a number of international satellites for national benefit. These include Landsat 8, SPOT 6 and 7(French: Satellite Pour observation de la Terre, "Satellite for observation of Earth"), MODIS (Moderate Resolution Imaging Spectroradiometer from NASA), Geo Eye, Worldview and CBERS (The China–Brazil Earth Resources Satellite programme), to name a few.

This centralised acquisition under single-license multi-user arrangements eradicates unnecessary and duplicated acquisition in the public sector, ensures long-term archiving of the valuable data stock, and results in over 80 per cent saving on the commercial list prices for the collective public sector.

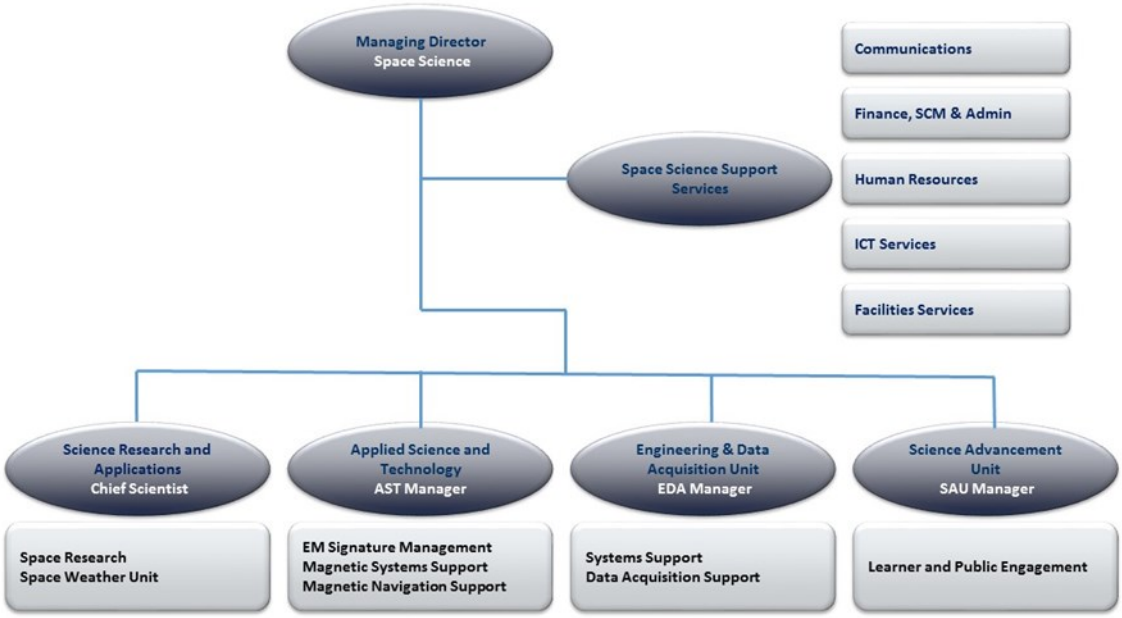
An estimated 40 government entities, on both the national and provincial level, use these data resources. In addition to the licence fees, the cost of processing, archiving and dissemination of satellite imagery including the maintenance of the ICT infrastructure and ground support costs R57 million per annum, requiring an a total of R224 million over the MTEF average of R100 million per annum for the overall cost of providing satellite data and imagery to respective users.

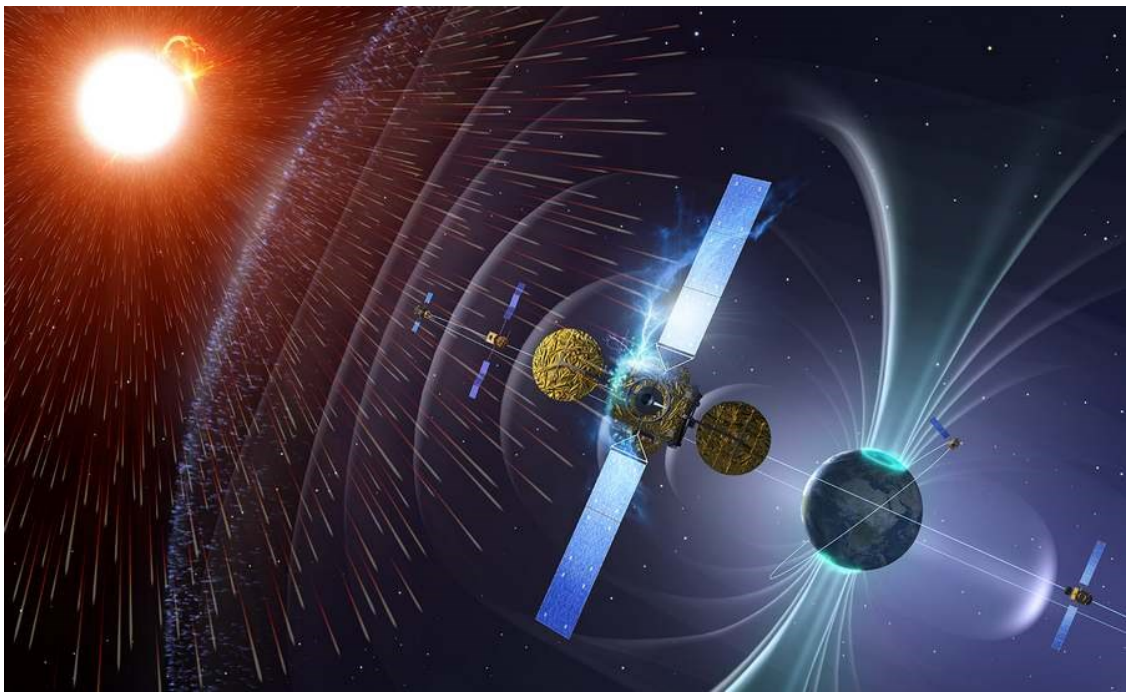
# PROGRAMME 3: SPACE SCIENCE PROGRAMME (SSP)

## Purpose

The Space Science Programme leads multi-disciplinary space science research and development. Key functions include, fundamental and applied space science research, the support of space-facilitated science through science data acquisition, coordination and management of scientific data ground segments, provision of space weather and other geo-space and magnetic technology products and services on a commercial and private basis to the defence, maritime, communications, aviation and energy sectors. The programme also provides leadership in post-graduate science and engineering student training as well as science advancement including both learner and educator science support.

## Programme Structure



## Strategic Focus

**Goal 1: Address South Africa's challenges through space services and products**

- Space weather services for satellite systems, electric power networks, satellite-based navigation, communication, defence, and aviation applications
- Geomagnetic services
- Magnetic technology services for defence, maritime and aviation sectors

**Goal 2: Lead high-impact collaborative R&D on a national scale**

- Space science research
- Geo-space observational network
- Data management and distribution

**Goal 3: Develop national human capacity and ensure transformation**

- Science outreach and awareness
- Student and intern training
- Student funding
- University support

**Goal 5: Develop active global partnerships**

- Development and servicing of national and international partnerships
- Joint projects with external partners

# Strategic Goal 1: Address South Africa's challenges through space services

## 1. Space Weather Services

Space weather is an important field of research as severe solar storms can affect the technology society has become increasingly dependent on. Space Weather is a global phenomenon that has regional impact. SANSA aims to develop expertise in the impact areas that affect South Africa in order to enable decision-makers to take the necessary mitigation steps. The relevant technologies that are vulnerable to space weather are:

- *Satellite systems:* Space weather may affect the electronics, communication and navigation systems of a satellite. It can also cause changes in the satellite orbit, and lead to interrupted telemetry. Satellites play a vital role in the communication and navigation sector as well as base systems such as in banking, medicine and disaster and resource management etc., therefore the loss of a satellite system or its use (even for a short time) can result in significant economic losses impacting various sectors.
- *Electric power networks:* Space weather changes may result in Geomagnetically Induced Currents (GICs) flowing in long distance pipelines such as those utilised in the national power grid and in some mining applications. GICs may result in the damage of costly transformers with significant economic loss to the country due to power outages.
- *Satellite-based navigation:* Satellite-based navigation (e.g. GPS) range errors increase when there is a variation in the total electron content induced by space weather. This can impact the aviation sector that is dependent on satellite based navigation as a primary tool for landing systems and other navigation applications.

- *HF-based communication:* The extent to which radio signals within the High Frequency (HF) band travelling through the ionosphere are refracted, attenuated and absorbed is dependent on the geomagnetic conditions in space, which in turn depends on space weather conditions. Adverse space weather may lead to **HF radio communication blackout**, both ground to ground, and ground to air, which affects the defence, aviation, and amateur radio sectors.
- *Aviation:* Space weather impacts on aviation can include effects such as disruption in HF communications, satellite navigation system errors and avionics. In addition, space weather can increase radiation levels on-board planes, particularly long-haul flights because they fly at higher altitudes. The aviation industry require space weather products that assist with flight planning, and the International Civil Aviation Organisation (ICAO) have recommended that by 2017 all flight plans include space weather information by law. SANSA aims to be ready to provide this service.

SANSA operates the Space Weather Regional Warning Centre for Africa, which forms part of the International Space Environment Service (ISES). SANSA's Space Weather Centre provides an important service to the nation by monitoring the sun and its activity to provide information, early warnings and forecasts on space weather conditions. Space weather and related geospace products and services are required primarily for communication and navigation systems, in the defence, aeronautics, navigation and communication sectors. SANSA currently provides daily (working day) space weather updates and early warnings, and on-call service for clients as well as space weather training courses to improve utilisation of the provided information. SANSA Space Weather Centre has a mobile SMS and email warning system and a Twitter account to facilitate emergency warnings.

Priorities for 2016/17include:

- further improvements to the space weather product and service portfolio; and

provision of appropriate products and services to the aviation industry.

### 2. Magnetic Technology Services

SANSA operates a magnetically clean facility that includes a large three axis Helmholtz coil system and a Non-magnetic temperature chamber among other specialised magnetic technology related equipment.

The facility provides an important service to the nation and clients in both the space and non-space sectors through the provision of electric and magnetic navigation ground support, magnetic field modelling, and other magnetic technology services such as landing compass calibrations, and magnetic sensor sourcing and integration. SANSA's magnetic technology services are primarily provided to the defence, navigation and aviation sectors. Priorities for the 2016/17 include:

- continued support to the defence, aviation and maritime sectors; and
- increased focus on magnetic sensor integration, and the provision of services to the international space community.

### 3. Decision and Policy Support Tools

The Space Science Programme will develop a policy brief on the "Economic Impacts of Space Weather." Given that space weather affects communication, navigation, electric power and other products and services that humanity depend on, it is important to quantify the impact of space weather and strengthen the value proposition for offering this service to policy makers.

## Strategic Goal 2: Lead high-impact collaborative R&D on a national scale

Conduct space science research and create new knowledge and a better understanding of the universe. SANSA operates a wide and multi-faceted geo-space observational network in the southern African region extending to Antarctica. This provides a geo-space laboratory for the country to conduct cutting-edge research on the geomagnetic and space environments

## Strategic Goal 3: Develop national human capacity and ensure transformation

Science advancement will focus more on the more southern provinces working together with the other SANSA programmes that focus on the more northern parts of the country.

Student training will be pursued through targeted funding, university partnerships and the National Astronomy and Space Science Programme (NASSP).

## Strategic Goal 5: Develop active global partnerships

National partnerships with universities will be pursued with the intention of enhancing benefit from the geo-space laboratory

Global partnerships with ISES, INTERMAGNET, EISCAT, COSPAR, SCAR and various space agencies/entities will be strengthened.

## Strategic Goal 7: Transform SANSA into a high performance Agency

The Programme will pursue a transformation agenda in terms of staff and students. The location of SANSA Space Science in Hermanus does pose a challenge in attracting and retaining young scientists and engineers.

## Programme Performance Outputs

| | | | | Quarterly Targets | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 1: Address South Africa's challenges through space services and products** | S1.1 Lead and facilitate the creation of high-impact products and services to address society's needs and challenges | M1.1 The number of national high-impact products and services | 4. Space weather products and services<br>HF Propagation Prediction Services<br>Space Weather Bulletins & Alerts<br>Space Weather Course<br>Space Weather Support Tools<br>(Progressive Qualitative Target) | Provide daily space weather bulletins and HF predictions through subscription service and on website.<br>Deliver all requested special predictions: Inform clients of adverse space weather as warnings through subscription service; Provide space weather support as requested. | Provide daily space weather bulletins and HF predictions through subscription service and on website; Deliver all requested special predictions; Inform clients of adverse space weather as warnings through subscription service; Provide space weather support as requested; Deliver requested space weather training courses; | Provide daily space weather bulletins and HF predictions through subscription service and on website; Deliver all requested special predictions; Inform clients of adverse space weather as warnings through subscription service; Provide space weather support as requested; Deliver requested space weather training courses;<br>Produce user engagement and impact report. | Provide daily space weather bulletins and HF predictions through subscription service and on website; Deliver all requested special predictions; Inform clients of adverse space weather as warnings through subscription service; Provide space weather support as requested |
| | | | 5. Magnetic Technology products and services<br>Compass Calibrations<br>Magnetic Navigation Ground Support Services<br>Magnetic Field Model Maps<br>Magnetic Sensor Sourcing<br>Aircraft Swing Courses<br>(Progressive Qualitative Target) | Calibrate at least 20 compasses for private and defence clients;<br>Provide all requested magnetic navigation ground support consultation, magnetic field variation, aircraft swing courses & magnetic sensor services. | Calibrate at least 20 compasses for private and defence clients;<br>Provide all requested magnetic navigation ground support consultation, magnetic field variation, aircraft swing courses & magnetic sensor services. | Calibrate at least 20 compasses for private and defence clients;<br>Provide all requested magnetic navigation ground support consultation, magnetic field variation, aircraft swing courses & magnetic sensor services.<br>Produce user engagement and impact report. | Calibrate at least 20 compasses for private and defence clients;<br>Provide all requested magnetic navigation ground support consultation, magnetic field variation, aircraft swing courses & magnetic sensor services. |
| | S1.2 Provide government with effective policy or decision tools and support | M1.2 The number of government decision or policy support tools | A policy advisory brief covering the economic impact of space weather<br>(Progressive Qualitative Target) | Develop the concept & identify the key impact areas to be covered | Design a framework document from which a policy brief will be drafted | Draft the policy brief | Refine the document & submit for approval |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Goal 2: Lead high-impact collaborative R&D on a national scale** | S2.1 Increase the national space research output | M2.1 The national research productivity score for space support R&D (This productivity score is based on a function of research funding sourced + publications (journals, books, reports, proceedings) + students graduated + research rating status.) | 750 | 250 | 150 | 100 | 250 |

| | | | | Quarterly Targets | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 3: Develop national human capacity and ensure transformation** | S3.1. Increase youth awareness of science | M3.1 The number of youth directly engaged through science awareness & outreach activities (This excludes arms -length engagement with the youth e.g. a visit to one of SANSA's exhibition stands) | 4000 | 1200 | 1600 | 1000 | 200 |
| | S3.2 Support students with a transformation agenda | M3.2 The number of supported students for formalized training (This excludes short courses and focuses on degree-registered students only) | 29 | 20 | 3 | 0 | 5 |
| **Goal 5: Develop active global partnerships** | S5.1. Leverage a significant benefit for the space programme through global partnerships | M5.1 The equivalent revenue generated through partnerships as a proportion of the Space Science non-commercial operating revenue | 2% | 2% | 2% | 2% | 2% |
| **Goal 7: Transform SANSA into a high performance Agency** | S7.1. Ensure that SANSA has been optimised for high performance | M7.2 Proportional (%) representation of permanent staff from designated groups in the D to F grades | 55% | 55% | 55% | 55% | 55% |

## Programme Resource Considerations

| Rand thousand | Audited Outcome | | | Revised budget | Medium Term Expenditure Framework | | | Total MTEF |
|---|---|---|---|---|---|---|---|---|
| | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| **Space Science Programme** | **37 894** | **39 122** | **36 291** | **33 779** | **35 125** | **36 769** | **37 205** | **109 099** |
| **Current payments** | | | | | | | | |
| Compensation of employees | 13 397 | 19 870 | 21 205 | 21 262 | 23 696 | 26 458 | 30 170 | 80 324 |
| Goods and services | 18 202 | 17 881 | 13 086 | 10 295 | 9 483 | 9 389 | 6 060 | 24 932 |
| Payment for capital assets | 6 295 | 1 371 | 2 000 | 2 222 | 1 946 | 922 | 975 | 3 842 |
| **Total Expenditure** | **37 894** | **39 122** | **36 291** | **33 779** | **35 125** | **36 769** | **37 205** | **109 099** |

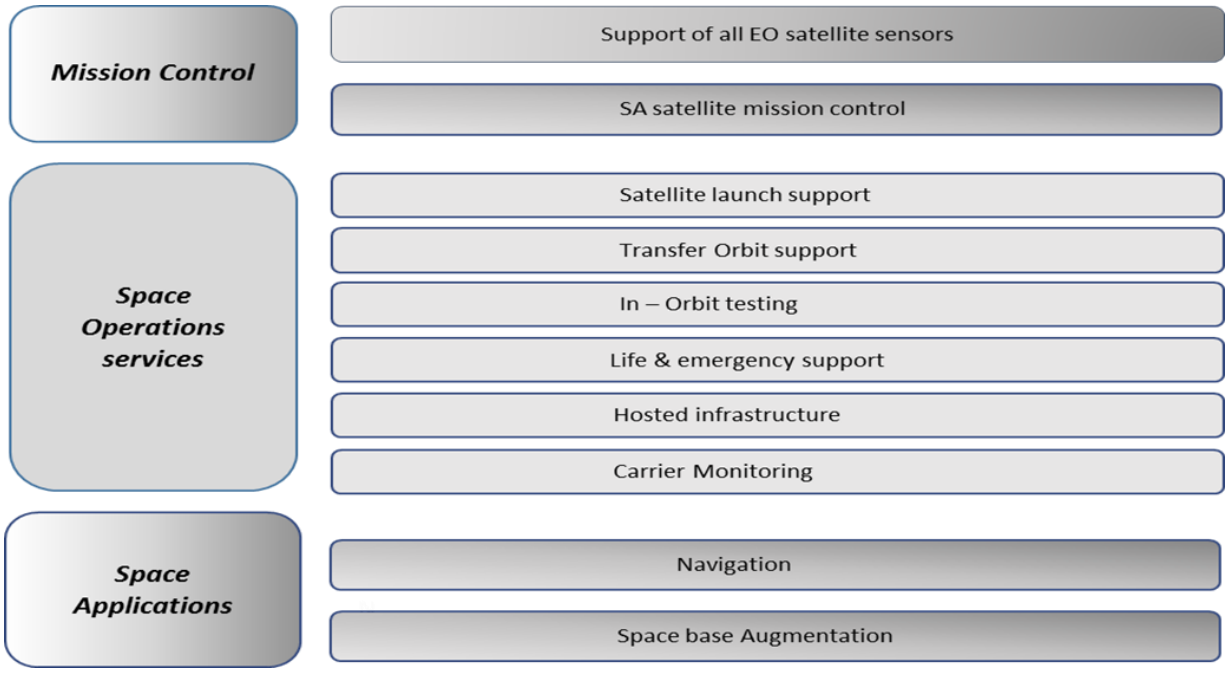
The Space Science programme has an allocation of R109 million over the medium term, with annual allocations of R35 million in 2016/17, R36 million in 2017/18 and R37 million in 2018/19. The major expense allocation is in employee costs attributed to scientists and engineers focused on fundamental and applied space science research, the management of scientific data ground segments, and the provision of space weather and other geo-space prod-

# PROGRAMME 4: SPACE OPERATIONS PROGRAMME (SOP)

## Purpose

The Space Operations Programme is responsible for the acquisition of satellite data for the Earth Observation Programme and the provision of ground segment support. Through this programme, SANSA conducts various space operations, including launch and early orbit support, in-orbit testing, satellite life-cycle support and satellite mission control for both national and international space industry clients and governments. The programme also supplies hosting capabilities with the intention of expanding this capability to Teleports.

## Programme Structure




## Strategic Focus

**Goal 4: Enhance the competitiveness of the South African space industry**

- Data acquisition for the Earth Observation Programme
- Space operations support for various global launch activities
- Satellite in-orbit-testing
- Carrier monitoring
- Hosting of space operations infrastructure
- Satellite-based navigation

**Goal 3: Develop national human capacity and ensure transformation**

- Science outreach and awareness
- Intern training

# Strategic Goal 3: Develop national human capacity and ensure transformation

Science advancement will focus more on the northern provinces working together with the other with the Earth Observation Programme.

Skills development will largely be in the form of internships and creating a career path for potential trainees.

# Strategic Goal 4: Enhance the competitiveness of the South African space industry

### Earth Observation Support

A large proportion (100%) of SANSA's space operations activities with respect to daily passes of Low Earth Orbit (LEO) satellites are devoted to data acquisition for SANSA's Earth Observation Programme. A total of 5150 satellite passes are forecast for the year for Earth observation with a targeted success pass acquisition of 98%.

The intention is to automate the process in the future. This would lead the organisation to be more efficient enabling it to maintain the current success rate.

### Income Generation

The Space Operations Programme activities generate large foreign revenue with some local income from Earth observation data acquisition and defence related work. The value of the programmes activities is related to its self-funding ability. Therefore, the level of income generated is important. The targeted revenue to be generated for 2016/17 is R58 million, an increase of R3 million from the 2014/15 baseline of R55 million.

# Strategic Goal 7: Transform SANSA into a high performance Agency

The Programme will pursue a transformation agenda in terms of staff and students. The use of the internship programme and creating a clear career progression pathway will be key in enhancing equity in the technical areas.

## Programme Performance Outputs

| | | | | Quarterly Targets | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 3: Develop national human capacity and ensure transformation** | S3.1. Increase youth awareness of science | M3.1 The number of youth directly engaged through science awareness & outreach activities (This excludes arms -length engagement with the youth e.g. a visit to one of SANSA's exhibition stands) | 2000 | 500 | 500 | 500 | 500 |
| **Goal 4: Enhance the competitiveness of the South African space industry** | S4.1. Generate greater benefit for the space programme through space operations activities | M4.1.1: Successful satellite pass monitoring rate for Earth Observation | 98% | 98% | 98% | 98% | 98% |
| | | M4.1.2: Total income generated from space operations activities | R60 million | R15 million | R15 million | R15 million | R15 million |
| | | M4.1.3: Total amount of space operations income invested in other SANSA programmes | R11 million | | | | R11 million |

| | | | | Quarterly Target | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 7: Transform SANSA into a high performance Agency** | S7.1. Ensure that SANSA has been optimised for high performance | M7.2 Proportional (%) representation of permanent staff from designated groups in the D to F grades | 55% | 55% | 55% | 55% | 55% |

## Programme Resource Considerations

| Rand thousand | Audited Outcome | | | Revised budget | Medium Term Expenditure Framework | | | Total MTEF |
|---|---|---|---|---|---|---|---|---|
| | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| **Space Operations Programme** | **57 724** | **86 084** | **74 308** | **47 442** | **47 022** | **48 084** | **49 430** | **144 536** |
| **Current payments** | | | | | | | | |
| Compensation of employees | 16 569 | 22 255 | 25 128 | 26 435 | 28 575 | 30 401 | 31 328 | **90 304** |
| Goods and services | 25 743 | 40 693 | 17 548 | 17 007 | 16 147 | 13 683 | 14 102 | **43 932** |
| Payment for capital assets | 15 412 | 23 136 | 31 632 | 4 000 | 2 300 | 4 000 | 4 000 | **10 300** |
| **Total Expenditure** | **57 724** | **86 084** | **74 308** | **47 442** | **47 022** | **48 084** | **49 430** | **144 536** |

The budget for the medium term is externally sourced at R145 million, with annual revenue generation of R47 million in 2016/17, R47 million in 2017/18 and R48 million in 2018/19. In order to maintain the investments in the antennae infrastructure and related operating systems, international client's infrastructure is hosted to generate income for the operations. Current estimates for the medium term indicate that most of the fixed term hosting contracts from international clients are reaching their term end. The launch support revenue is excluded from estimates, as it is difficult to estimate the probability of the launches happening as well as the success of the launches. With the available budget, expenditure is largely on man-hours for the maintenance support and operations staff as well as the ICT infrastructure and communication networks and repairs and maintenance for ground infrastructure equipment.

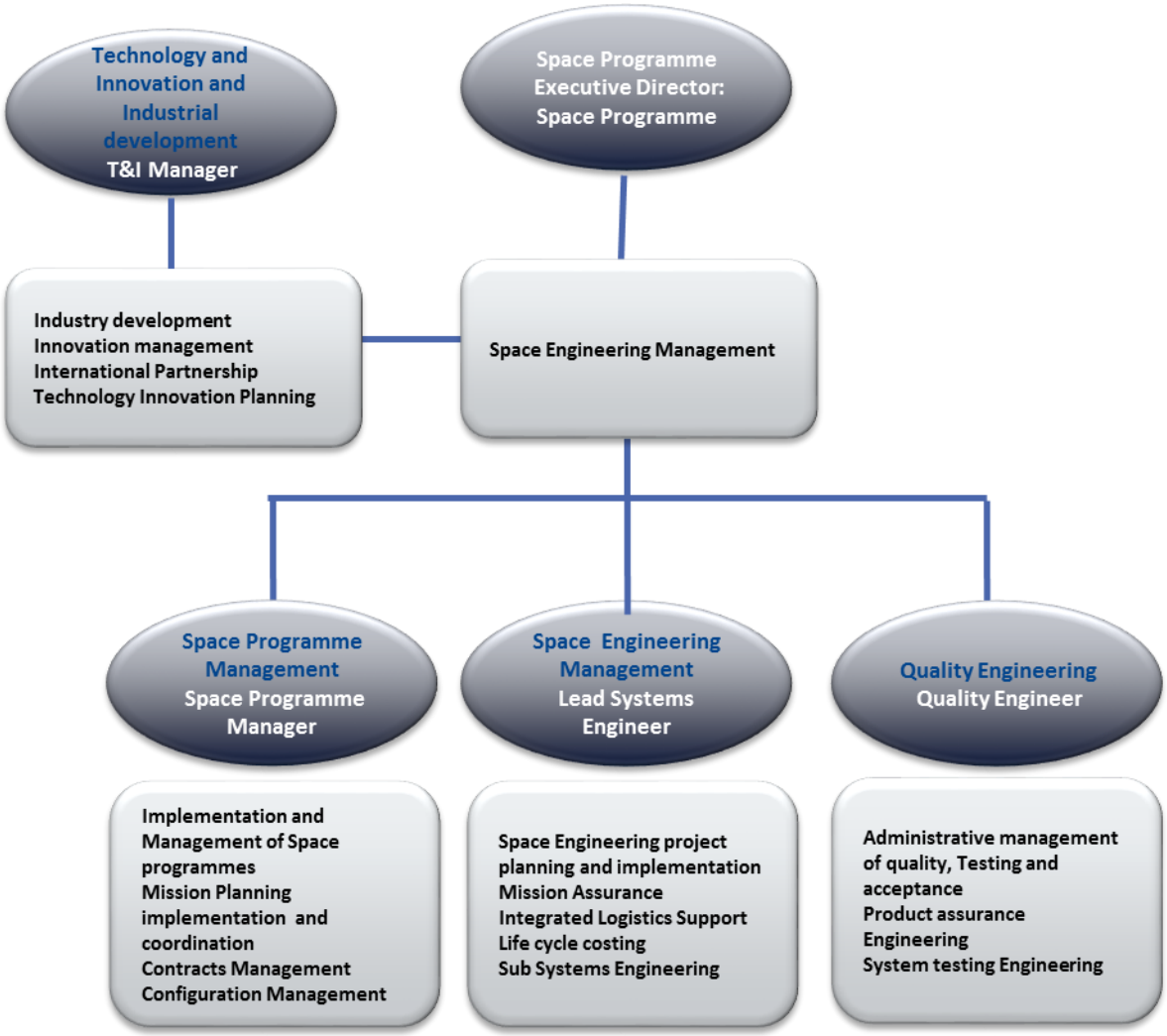
# PROGRAMME 5: SPACE ENGINEERING PROGRAMME (SEP)

## Purpose

The Space Engineering Programme leads systems engineering and project management excellence, and drives a small satellite development programme in South Africa in partnership with external contractors, R&D institutions and private sector partners.

The programme conducts satellite and sub-systems analysis, leads the technical side of space programme project management, provides human capital development in space engineering as well as facilitates private space industry partnerships.

## Programme Structure



## Strategic Focus

**Goal 4: Enhance the competitiveness of the South African space industry**

- EO-Sat1 development
- Industry development
- Innovation management
- Facilities development
- Space programme management

**Goal 3: Develop national human capacity and ensure transformation**

- Student and intern training
- Student funding

**Goal 7: Transform SANSA into a high performance Agency**

# Strategic Goal 3: Develop national human capacity and ensure transformation

South Africa has a shortage of skilled personnel in the space engineering arena particularly from amongst previously disadvantaged individuals.

Through the bursary programme and internship programme, SANSA aims to address this by strategically using the satellite build programme.

# Strategic Goal 4: Enhance the competitiveness of the South African space industry

### Jobs Supported

SANSA and Denel Dynamics have a core compliment of employees that are directly involved with the Satellite Development Programme. A total of 50 such employees are forecast for the year up from 40 in 2015/16.

### EO-Sat1 Development

The vehicle for technology development and innovation is the Satellite Development Programme. Therefore, progress in this project will give an indication of the technological and innovation progress of the country.

A 50% progress status in terms of the technical development milestones is the target for 2016/17 with a baseline of 25% from 2015/16.

### Assembly Integration and Testing Facility (AIT)

SANSA will develop various business cases and operating models for the use of Houwteq as an AIT facility. The facilities will provide support to both the South African space industry and potential international markets.

The facility should cater for the South African Space, Automotive, and Defence industries, with a business model that is designed to incentivize the growth of those industries. An added benefit is that SANSA will develop closer relationships with the various stakeholders, and be able to determine the market needs and aspirations. The AIT facility will provide a neutral ground to stimulate a competitive market for space and related technologies. The model will encourage international customers to use the facility which in turn will stimulate the local economy. The initial development cost would largely be dependent on government funding and, through the development of strategic partnerships, become sustainable over the long term.

**Contracting value to private SME space industry**

SANSA's mandate as prescribed in the SANSA Act is to stimulate the South African space industry. Therefore, SANSA will ensure that its contracting efforts are made to stimulate the private industry for the benefit of the country.

This will entail setting clear private company outsourcing targets. The industries to be targeted are both in the space technology development sectors and the Earth observation value-adding services. SANSA's target for SME industry contracting for 2016/17 is R12 million with a baseline estimate of R2.4 million.

### Contracting value to public and private space industry

To broadly meet SANSA's mandate of stimulating the space industry as a whole, the Agency will ensure that there is significant contracting of the space industry. Space, by its nature, is high risk and globally relies heavily on government as the anchor client for the national space industry of the said country. SANSA, as the lead implementer of the space programme, has to provide the necessary anchor to the local space industry.

This requires ensuring steady contracting to provide the base work to keep the industry going. The targeted broad industry contractual spend is R50 million. Support for these industries and the embedded small medium enterprises will be through such mechanisms such as the DST led Technology Localisation Programme (TLP) which spearheads the improvement of the technological capability of local firms leading to increased competitiveness (quality, cost, customisation), expanded capabilities (new products, services) and expanded new markets both locally and globally.

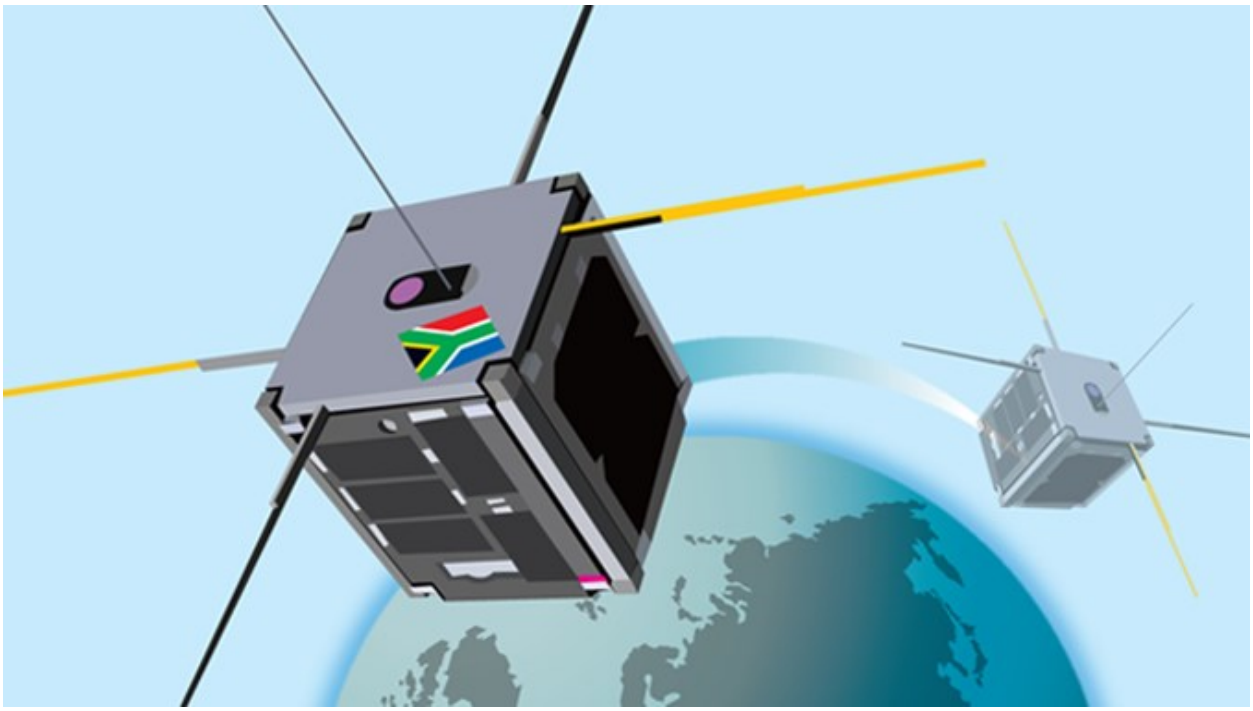
**The priorities for the year are:**

- Further development of EO-Sat1
- Conducting a comprehensive analysis of the current state of the local space industry;
- Identifying the current demand and supply of skills and existing skills gaps in the local space industry;
- Reviewing the of current state of provision for training in the local space industry;
- Conducting an analysis of the current global spacecraft ground support market and South African competitive position as a service provider in order to develop clear share of market metrics; and

Developing the *2030 South African Space Industry Growth Plan* based on the NSP.

## Strategic Goal 7: Transform SANSA into a high performance Agency

The Programme will pursue a transformation agenda in terms of staff and students. The satellite build programme has to be strategically used to achieve this through focused recruitments and retention strategies.



## Programme Performance Outputs

| | | | | Quarterly Targets | | | |
|---|---|---|---|---|---|---|---|
| **Strategic Goal** | **Strategic Objective** | **Key Performance Indicator/Measure** | **Annual Target** | **Q1** | **Q2** | **Q3** | **Q4** |
| **Goal 1: Address South Africa's challenges through space services and products** | S1.2 Provide government with effective policy or decision tools and support | M1.2 The number of government decision or policy support tools | A policy advisory brief on the current state of the space industry in South Africa (Progressive Qualitative Target) | Undertake workshop on space industry capability and capacity. | Develop an assessment survey and qualitative study based on the workshop outputs. | Consolidate the finding through data analysis | Analyse finding and formulate report. |
| **Goal 3: Develop national human capacity and ensure transformation** | S3.2 Support students with a transformation agenda | M3.2 The number of supported students for formalized training (This excludes short courses and focuses on degree-registered students only) | 10 | 5 | 0 | 0 | 5 |
| **Goal 4: Enhance the competitiveness of the South African space industry** | S4.2 Grow the national space industry | M4.2.1 The number of direct jobs supported externally through SANSA programme contracting | 50 (Non-accumulative target) | 50 | 50 | 50 | 50 |
| | | M4.2.2 The progress status on the EO-Sat1 development project | 50% | | | | 50% |
| | | M4.2.3 The total contract expenditure to SMEs for core space projects | R12 Mil | R3 mil | R3 mil | R3 mil | R3 mil |
| | | M4.2.4 The total contract expenditure to the broad space related industry for core space projects | R55 Mil | R13.75 mil | R13.75 mil | R13.75 mil | R13.75 mil |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Goal 7: Transform SANSA into a high performance Agency** | S7.1. Ensure that SANSA has been optimised for high performance | M7.2 Proportional (%) representation of permanent staff from designated groups in the D to F grades | 80% | 80% | 80% | 80% | 80% |

## Programme Resource Considerations

| Rand thousand | Audited Outcome | | | Approved budget | Medium Term Expenditure Framework | | | Total MTEF |
|---|---|---|---|---|---|---|---|---|
| | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| **Space engineering** | 17 858 | 27 572 | 56 978 | 91 387 | 102 653 | 114 681 | 12 657 | 229 991 |
| **Current payments** | | | | | | | | |
| Compensation of employees | - | 3 000 | 4 156 | 10 420 | 11 246 | 10 954 | 8 626 | 30 826 |
| Goods and services | - | 556 | 3 900 | 4 395 | 3 828 | 2 477 | - | 6 305 |
| Payements for capital assets | 17 858 | 24 016 | 48 922 | 76 573 | 87 579 | 101 251 | 4 031 | 192 860 |
| **Total Expenditure** | 17 858 | 27 572 | 56 978 | 91 387 | 102 653 | 114 681 | 12 657 | 229 991 |

The satellite build programme has an allocation of R230 million over the medium term. About 96% of the programme costs are towards the satellite build programme. The decrease in allocation in the outer year 2018/19 is as a result of the current approved funding of R450 million allocated from the inception of the satellite build programme in 2011, reaching its ceiling of R450 million in the outer year 2018/19. Funding for the continuation of the programme is still under discussion with the Department of Science and Technology.

# ANNEXURE A – Amendments to the 2015-2020 Strategic Plan

## INTRODUCTION

The Framework for Strategic Plans and Annual Performance Plans states, "A Strategic Plan may be changed during the five-year period that it covers. However, such changes should be limited to revisions related to significant policy shifts or changes in the service-delivery environment. The relevant institution does this by issuing an amendment to the existing plan, which may be published as an annexure to the Annual Performance Plan, or by issuing a revised Strategic Plan."

The 2015-2020 SANSA Strategic Plan was implemented for the first time in 2015/16 and in the process of implementation and due to comments from the auditors, it became necessary to modify some of the KPIs and make sure that they are SMART and clearer.

Listed below are the modifications that have been implemented in red. Further, given the financial constraints and the year-on-year increase of 0.5% that SANSA has received for the 2016/17 financial year, the Agency has scaled down some of the 2016/17 targets. The changes in the targets are also indicated in read below.

## MODIFICATIONS TO MEASURES OR KPIs

| Strategic Goal | Original | Modification |
|---|---|---|
| **Goal 1: Address South Africa's challenges through space services and products** | M1.1 Number of national high-impact products and applications | M1.1 Number of national high-impact products and services |
| | M1.2<br>The number of government decision or policy support tools | M1.2 The number of government decision support or policy tools |
| **Goal 2: Lead high-impact collaborative R&D on a national scale** | M2.1 The national research productivity score for space supported R&D | M2.1 The national research productivity score for space supported R&D (This productivity score is based on a function of research funding sourced + publications (journals, books, reports, proceedings) + students graduated + research rating status.) |
| **Goal 3: Develop national human capacity and ensure transformation** | M3.1 Number of youth directly engaged | M3.1 Number of youth directly engaged through science awareness & outreach activities (This excludes arms-length engagement with the youth e.g. a visit to one of SANSA's exhibition stands) |
| | M3.2 Number of students and interns supported for formalised training | M3.2 The number of supported students for formalised training (This excludes short courses and focuses on degree-registered students only) |

| | | |
|---|---|---|
| **Goal 4: Enhance the competitiveness of the South African space industry** | M4.1 Successful satellite pass monitoring rate for Earth Observation | M4.1.1: Successful satellite pass monitoring rate for Earth Observation |
| | M4.2 Total income generated from space operations activities | M4.1.2: Total income generated from space operations activities |
| | M4.3 Total amount of space operations money invested in other SANSA programmes. | M4.1.3: Total amount of space operations income invested in other SANSA programmes |
| | M4.4 The number of direct jobs supported externally through SANSA programme contracting | M4.2.1 The number of direct jobs supported externally through SANSA programme contracting |
| | M4.5 The progress status on the EO -Sat1 development project | M4.2.2 The progress status on the EO-Sat1 development project |
| | M4.6 The total contract expenditure to SMEs for core space projects | M4.2.3 The total contract expenditure to SMEs for core space projects |
| | M4.7 The total contract expenditure to the broad space related industry for core space projects | M4.2.4 The total contract expenditure to the broad space related industry for core space projects |
| **Goal 5: Develop active global partnerships** | M5.1 The equivalent revenue generated through partnerships as a proportion of the SANSA revenue | M5.1 The equivalent revenue generated through partnerships as a proportion of the SANSA non-commercial operating revenue |
| **Goal 6: Ensure the growth and sustainability of SANSA** | M6.1 Total SANSA Income | M6.1 Total non-ring-fenced SANSA revenue |
| | M6.2 Estimated monetised impact per annual | M6.2 Estimated monetised impact per annum |
| | M6.3 SANSA's public value awareness | M6.3 SANSA's public value awareness |
| | M6.4. High-level NSP implementation progress status. | M6.4. High-level NSP implementation progress status. |
| **Goal 7: Transform SANSA into a high performance Agency** | M7.1 Implementation of identified initiatives that enhance organisational performance | M7.1 Implementation of identified initiatives that enhance organisational performance |
| | M.72 Proportional (%) representation of permanent staff from designated groups in the top two management levels (manager, senior manager.) | M.7.2 Proportional (%) representation of permanent staff from designated groups in the D to F grades |

## MODIFICATIONS TO TARGETS

| Strategic Goal | Strategic Objective | Key Performance Indicator/Measure | Five-Year Target | Original 2016/17 Target | Modified 2016/17 Target (in Red) |
|---|---|---|---|---|---|
| **Goal 1: Address South Africa's challenges through space services and products** | S1.1 Lead and facilitate the creation of high-impact products and services to address society's needs and challenges | M1.1 The number of national high-impact products and services | T1.1 Total of 22 national high-impact operational space related products & services by end March 2020 | Four national high-impact products and services | Five national high-impact products and services |
| | S1.2 Provide government with effective policy or decision tools and support | M1.2 The number of government decision support or policy tools | T1.2 Ten effective decision or policy support tools by end March 2020 | Two policy tools for government | Three policy tools for government |
| **Goal 2: Lead high-impact collaborative R&D on a national scale** | S2.1 Increase the national space research output | M2.1 The national research productivity score for space support R&D (This productivity score is based on a function of research funding sourced + publications (journals, books, reports, proceedings) + students graduated + research rating | T2.1 Research productivity score of 2000 per annum by end March 2020 | 1000 | 950 |
| **Goal 3: Develop national human capacity and ensure transformation** | S3.1. Increase youth awareness of science | M3.1 The number of youth directly engaged through science awareness & outreach activities (This excludes arms-length engagement with the youth e.g. a visit to one of SANSA's exhibition stands) | T3.1 Total of 58500 young people directly engaged through science awareness & outreach by end March 2020 | 10 000 | 9000 |
| | S3.2 Support students with a transformation agenda | M3.2 The number of supported students for formalised training (This excludes short courses and focuses on degree-registered students only) | T3.2 Total of 350 students supported by end March 2020 | 50 | 50 |

| Strategic Goal | Strategic Objective | Key Performance Indicator/Measure | Five-Year Target | Original 2016/17 Target | Modified 2016/17 Target (in Red) |
|---|---|---|---|---|---|
| **Goal 4: Enhance the competitiveness of the South African space industry** | S4.1. Generate greater benefit for the space programme through space operations activities | M4.1.1: Successful satellite pass monitoring rate for Earth observation | T4.1.1 Success pass monitoring rate of 99% per year for Earth observation by end March 2020 | 98% | 98% |
| | | M4.1.2: Total income generated from space operations activities | T4.1.2 Total income of R326 million over five years generated from space operations activities | R61 million | R60 million |
| | | M4.1.3: Total amount of space operations income invested in other SANSA programmes | T4.1.3 Total income of R60 million over five years generated of space operations money invested in other SANSA programmes | R11 million | R11 million |
| | S4.2 Grow the national space industry | M4.2.1 The number of direct jobs supported externally through SANSA programme contracting | T4.2.1 A total of 390 direct jobs supported externally through SANSA programme contracting | 50 | 50 |
| | | M4.2.2 The progress status on the EO-Sat1 development project | T4.2.2 Proportional progress culminating in EO-Sat1 launch | 50% | 50% |
| | | M4.2.3 The total contract expenditure to SMEs for core space projects | T4.2.3 A total contract expenditure of R65 million over five years to SMEs for core space projects | R12 mil | R12 Mil |
| | | M4.2.4 The total contract expenditure to the broad space related industry for core space projects | T4.2.4 The total contract expenditure of R306 million over five years to the broad space related industry for core space projects | R55 mil | R55 Mil |

| Strategic Goal | Strategic Objective | Key Performance Indicator/Measure | Five-Year Target | 2015/16 Estimate | 2016/17 |
|---|---|---|---|---|---|
| **Goal 5: Develop active global partnerships** | S5.1. Leverage a significant benefit for the space programme through global partnerships | M5.1 The equivalent revenue generated through partnerships as a proportion of the SANSA non-commercial operating revenue | T5.1 Global partnerships contributing an equivalent of 10% to the SANSA non-commercial operating revenue | 5% | 2% |
| **Goal 6: Ensure the growth and sustainability of SANSA** | S6.1. Ensure that SANSA has annual measurable growth and is sustainable | M6.1 Total SANSA income | T6.1 Total SANSA non-ring-fenced revenue of R1,259 billion by end March 2020 | R237mil | R200 mil |
| | | M6.2 Estimated monetised impact per annum | T6.2<br>Estimated monetised impact of R600 million by end March 2020 | R110 mil | The economic study<br>will be put on hold. |
| | | M6.3 SANSA's public value awareness | T6.3 SANSA's national public value awareness of 90% by end March 2020 | 60% | 60% |
| | S6.2. Ensure the effective implementation of the NSP | M6.4. High-level NSP implementation progress status. | About 70% of the NSP projects are active by end March 2020 | 40% | 40% |
| **Goal 7: Transform SANSA into a high performance Agency** | S7.1. Ensure that SANSA has been optimised for high performance | M7.1Implementation of identified initiatives that enhance organisational performance | T7.1 Total of 20 identified initiatives fully implemented by end March 2020 | 4 | 4 |
| | | M.7.2 Proportional (%) representation of permanent staff from designated groups in the D to F grades | T.7.2<br>65% Proportional (%) representation of permanent staff from designated groups in the D to F grades by end March 2020 | 65% | 65% |

# ACRONYMS

| ABBREVIATION | MEANING |
|---|---|
| AfriGEOSS | African Group on Earth Observation System of Systems |
| AIT | Assembly Integration and Testing Facility |
| ARMC | African Resource Management Constellation |
| AU | African Union |
| BRICS | Brazil Russia India China and South Africa |
| CBERS | China Brazil Earth Resource Satellite |
| CEOS | Committee on Earth Observation Satellites |
| COSPAR | Committee on Space Research |
| CSP | Corporate Support Programme |
| DST | Department of Science and Technology |
| EISCAT | European Incoherent Scatter Scientific Association |
| EODC | Earth observation Data Centre |
| EOP | Earth Observation Programme |
| ESA | European Space Agency |
| EVP | Employee Value Proposition |
| GEO | Group on Earth Observation |
| GEOGLAM | Group on Earth Observation Global Agriculture Monitoring |
| GICs | Geomagnetically Induced Currents |
| GPS | Global Positioning System |
| HCD | Human Capacity Development |
| HF | High Frequency |
| IAF | International Astronautical Fedderation |
| ICAO | International Civil Aviation Organisation |
| ICT | Information Communication Technology |
| ISES | International Space Environment Service |
| LEO | Low Earth Orbit |
| MODIS | Moderate Resolution Imaging Spectroradiometer |
| MTEF | Medium Term Expenditure Framework |
| MTSF | Medium- Term Strategic Framework |
| NASA | National Aeronautics and Space Administration |
| NASSP | National Astronomy and Space Science Programme |
| NDP | National Development Plan |
| NEOP | National Earth Observation Programme |
| NRF | National Research Foundation |
| NSEP | National Space Engineering Programme |
| NSOP | National Space Operations Programme |
| NSP | National Space Programme |

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|---|---|
| NSS | National Space Strategy |
| NSSP | National Space Science Programme |
| PNT | Positioning Navigation and Timing |
| R&D | Research and Development |
| SAASTA | South African Agency for Science and Technology |
| SADC | Southern African Development Community |
| SAEOS | South African Earth Observation Strategy |
| SARB | South African Reserve Bank |
| SCAR | Scientific Committee on Antarctic Research |
| SEP | Space Engineering Programme |
| SET | Science Engineering and Technology |
| SMEs | Small Medium Enterprises |
| SMMEs | Small Medium and Micro-sized Enterprises |
| SOP | Space Operations Programme |
| SSP | Space Science Programme |
| STEM | Science, technology, engineering, mathematics |
| STI | Science Technology Innovation |
| US | United States |

# REFERENCES

Science Councils and NSI Reports

South African Government Reports and Plans

The Space Report 2015: The Authoritative Guide to Global Space Activity