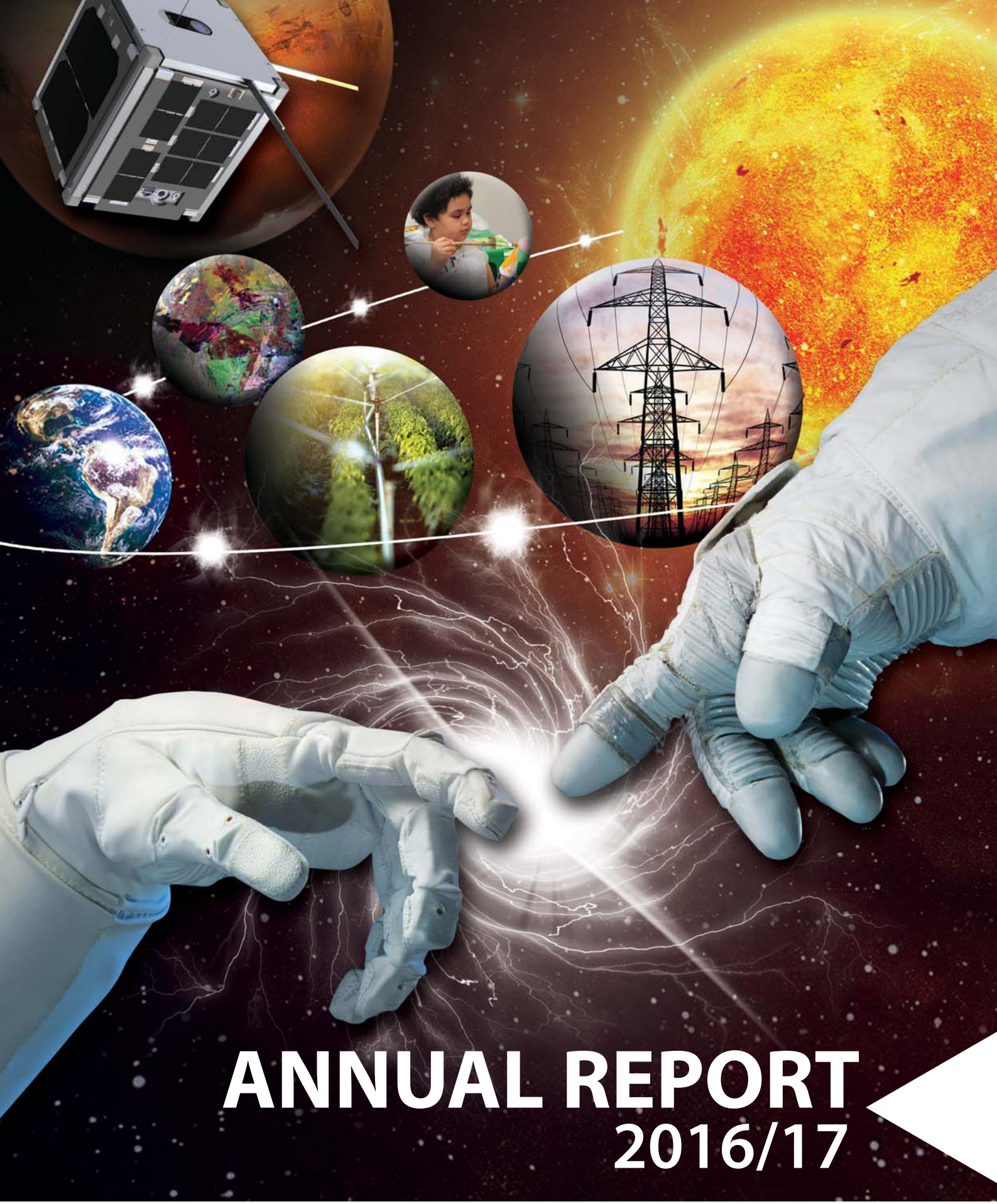

ANNUAL REPORT
2016/17

science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

sansa
SOUTH AFRICAN NATIONAL
SPACE AGENCY

ANNUAL REPORT **2016/17**

PUBLIC ENTITY'S GENERAL INFORMATION

REGISTERED NAME:	South African National Space Agency (SANSA)
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BANKERS:	ABSA Bank
BOARD SECRETARY:	Ms Lorraine Harrison

1. CONTENTS

ACRONYMS

ABBREVIATION	MEANING
AAD	African Aerospace and Defence
ACAM	Advisory Committee for Aeronautical Management
AEB	Brazilian Space Agency
AGU	American Geophysical Union
AIT	Assembly, Integration and Testing
ARC	Agricultural Research Council
ASAL	Algerian Space Agency
ASP	African School of Fundamental Physics and Applications
ATNS	Air Traffic Navigation Services
BCT	Broadcast Communication Tool
CAA	Civil Aviation Authority
CBERS 4	China, Brazil Earth Resources Satellite
CEOS	Committee on Earth Observation Satellites
CNSA	Chinese Space Administration
CoC	Centre of Competence
CoE	Centres of Excellence
CoS	Condition of Service
CPRR	Competitive Programme for Rated Researchers
CSA	Canadian Space Agency
CSD	Central Supplier Database
CSIR	Council for Scientific and Industrial Research
CW4SA	Crop Watch 4 South Africa
DGI	Directorate Geospatial Intelligence
DIFR	Disabling Injury Frequency Rate
DLR	German Space Agency
DoD	Department of Defence
DRS	Direct Receiving Station
DST	Department of Science and Technology
DTE	Development Test Equipment
EO	Earth Observation
EO-SDLC	Earth Observation-Systems Development Life Cycle
ERP	Enterprise Resource Planning
ESA	European Space Agency
ESR	EISCAT Svalbard Radar
FBM	Fractional Brownian Motion
FGN	Fractional Gaussian Noise
GAF	Geometric Alignment Facility
GEO	Group on Earth Observation
GICs	Geomagnetically Induced Currents

GPG	Gauteng Provincial Government
GPS	Global Positioning System
HCD	Human Capital Development
HF	High Frequency
ICTP	International Centre for Theoretical Physics
IDP	Individual Development Plans
ILS	Integrated Logistics Support
INPE	Instituto Nacional de Pesquise Espaciais
IRGO	Interdisciplinary Research and Global Outlook
ISES	International Space Environment Service
ISSI	International Space Science Institute
JRC	Joint Research Commission
KIC	Knowledge, Interchange and Collaboration
LCC	Life Cycle Costing
LED	Light Emitting Diodes
MEDO	Meta Economic Development Agency
MDTP	Management Development and Training Programme
MoU	Memorandum of Understanding
MTEF	Medium Term Expenditure Framework
NASA	National Aeronautics and Space Administration
NARSS	National Authority for Remote Sensing and Space Science
NCR	National Centre for Research
NDP	National Development Plan
NIPMO	National Intellectual Property Management Office
NRCan	Natural Resource Canada
NRF	National Research Foundation
NSF	National Science Foundation
NSP	National Space Programme
NUST (PON)	Namibia University of Science and Technology
NWU	North West University
OSR	Optical Space Research Laboratory
OTF	Optical Test Frame
PDP	Professional Development Programme
PFISR	Poker Flat Incoherent Scatter Radar
PFMA	Public Finance Management Act
QMS	Quality Management System

R&D	Research and Development
RAM	Reliability, Availability and Maintainability
SAAF	South African Air Force
SAAO	South African Astronomical Observatory
SAARP	South African Association for Retired Persons
SAASTA	South African Agency for Science and Technology Advancement
SAEOS	South African Earth Observation Strategy
SANAP	South African National Antarctic Programme
SANDF	South African National Defence Force
SANDIMS	South African National geophysical Data and Instrumentation Management System
SANSA	South African National Space Agency
SARS	South African Revenue Service
SAWS	South African Weather Services
SC-ADM	Standing Committee on Antarctic Data Management
SCAR	Scientific Committee on Antarctic Research
SCOSTEP	Scientific Committee on Solar-Terrestrial Physics
SE	Space Engineering
SHEQ	Safety, Health, Environment and Quality
SO	Space Operations
SPOT	Satellite Pour l'Observation de la Terre
SS	Space Science
SSAU	State Space Agency of Ukraine
STEM	Science, Technology, Engineering and Mathematics
TRS	Technical Requirement Specification
UCT	University of Cape Town
UJ	University of Johannesburg
UKSA	UK Space Agency
USAID	United States Agency for International Development
UWC	University of the Western Cape
VO	Variation Order
WBS	Work Breakdown Structure
WCED	Western Cape Education Department
CSA	Canadian Space Agency
CSIRO	Common Wealth Scientific and Research Organisation
GA	Geo-Council Australia
USGS	United States Geological Survey

MESSAGE FROM MINISTER OF SCIENCE AND TECHNOLOGY

Mrs Naledi Pandor

South Africa as a nation is ambitious to effect a significant improvement in the quality of the lives of its people and it has a leadership that seeks to address the real challenges of poverty, inequality and unemployment.

The Department of Science and Technology and its entities are instruments of realizing these improvements, through leading the nation forward in the global arena of innovation and technology. It is through the contribution of science, technology and innovation that the resources and wealth of the nation will be released to address these challenges.

The South African National Space Agency's committed team of passionate space science and technology experts, are nurturing the seeds planted during the Agency's foundation phase. Thus, the relationships forged with regional and international space agencies and organisations are beginning to bear fruit and will need continued attention to reach their full potential.

The development of our people through education, skills development and transformation remains a priority for my department. While the research outputs, products and applications resulting from space science and technology, and of space projects are of great value in their own right, they are equally important in their catalytic contribution to training and development. Together they serve to enhance the reputation of South Africa and position it as a competitive space nation and a science partner. I am pleased that SANSA is also using space as a tool to excite young people about science, and to encourage them to study science, technology, engineering and mathematics at school and tertiary level.

I would like to express my appreciation to the SANSA's Board and staff for their hard work and perseverance in delivering on the goals of the Agency in challenging financial circumstances.

Naledi Pandor

Mrs Naledi Pandor, MP

Minister of Science and Technology

FOREWORD BY THE CHAIRMAN

It is arguable that we are on the cusp of the fourth industrial revolution, with the emergence of new technologies and innovations that merge the physical, digital and biological worlds. As the South African National Space Agency, our strategic focus is 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.

The Agency has through the achievement of its key indicators achieved this in the following way for the financial year 2016/2017:

- Produced five high impact national products and applications,
- Concluded three government policy support tools,
- Published over 30 research papers in international accredited journals,
- Supported close on 11 000 satellite passes,
- Directly engaged close to 19 000 learners, and
- Supported 87 students with bursaries and scholarships.

I note also a warm welcome to the new Chief Executive Officer of SANSA Dr Val Munsami, who is familiar with the African space landscape and together with the Board we wish him well in guiding the organisation to new growth opportunities.

I would like to thank our management and staff for their support and reaffirm the Board's commitment to ensuring that SANSA is the partner of choice for growing the space industry on the continent.

Thank you to the Minister of Science and Technology and her management team for their continued support. To all our stakeholders, both nationally, and internationally thank you for partnering with SANSA as we lead and inspire the space community to create a better future using science, technology and innovation for socio-economic growth and transformation.

Joy-Marie Lawrence

Joy-Marie Lawrence

Chairman of the SANSA Board

Accounting Authority

CHIEF EXECUTIVE OFFICER'S OVERVIEW

Dr Valanathan Munsami

SANSA has shown resilience over the last financial year through its significant accomplishments despite a modest budget. Notwithstanding that two of the nineteen indicators had to be placed on hold due to technical and resource considerations, SANSA still managed to achieve 88% of its set targets for the year. This bears testament to the many men and women of SANSA, together with our valued clients and stakeholders, who are dedicated to serving the needs of our country. I am indeed thankful for this contribution and salute their tireless efforts.

I also take the opportunity in acknowledging the former CEO, Dr Sandile Malinga, and acting CEO, Mr Potlaki Maine, for the leadership provided during the inception phase of SANSA's establishment. In addition, the SANSA Board and its Committees have played a pivotal role in ensuring effective governance and providing firm strategic oversight over the core business of SANSA, which the SANSA Executive team and staff are exceedingly grateful for. We also express appreciation to our Minister, and the Officials of the Department of Science and Technology, for the unwavering support extended over the years.

The financial year boasts a number of achievements, inclusive of providing over 22 000 satellite images to our users, reaching out to over 18 000 learners as part of our space awareness programme, an outstanding research productivity score of over 1600 due to a record number of publications, and successfully downloading over 99% of data from all satellite overpasses over our footprint. South Africa's next optical satellite, EO-Sat1, underwent a repositioning exercise to ensure that a number of local technology options were considered. The repositioning exercise has been concluded and we are preparing for completion of the satellite within the next two years.

SANSA has now passed the five year mark, which period has essentially focused on stabilising the organisation, where business units from two separate sister agencies have been merged into SANSA during the establishment phase. However, based on the firm foundation that has already been established, the time is opportune for SANSA to embark on a growth oriented strategy, both for itself and the broader space sector. This projected growth path is premised on the sustained above average growth for the global space sector and the emerging African space programme.

Therefore, moving forward from the formative phase of stabilising SANSA, the next five-years will be focused on coordinating and supporting the national space sector by ensuring that the sector is further developed and globally positioned as a leader of innovative space application products and services for South Africa, and extended into Africa, as part of our contribution to the African space programme. Our primary playing field is South Africa, but our targeted partners and user base will be Africa and beyond.

In this regard, work has been initiated in defining a new Strategic Framework that will aim to realise SANSA's full mandate and at the same time maximise the growth potential of the sector. In addition, a Financial Sustainability Strategy is being finalised to seek a firmer financial footing for the agency and the broader national space sector it is mandated to support. These instruments, once approved and rolled out, will mark a transition to extending our national technology base that will support and respond to the user needs. This will also help cement our position as the leading space faring nation on the African continent.

It now gives me great pleasure to present to you the 2016/17 Annual Report of SANSA. The Report highlights SANSA's activities for the period under review and captures its performance against predefined targets that link to the goals and objectives of the organisation.

Dr Valanathan Munsami

Chief Executive Officer

STATEMENT OF RESPONSIBILITY AND CONFIRMATION OF ACCURACY OF THE ANNUAL REPORT

We confirm that, to the best of our knowledge:

All information and amounts disclosed in this Annual Report is consistent with the Annual Financial Statements audited by the Auditor-General.

The Annual Report is complete, accurate and free from any omissions and has been prepared in accordance with the Annual Report Guidelines issued by National Treasury.

The Annual Financial Statements have been prepared in accordance with the South African Standards of Generally Recognised Accounting Practice (GRAP) that apply to a public entity.

The Accounting Authority is responsible for the preparation of the Annual Financial Statements and judgements made in this information. The Accounting Authority is also responsible for establishing and implementing a system of internal control designed to provide reasonable assurance about the integrity and reliability of the performance and human resources information and the Annual Financial Statements.

The external auditors are engaged to express an independent opinion about the Annual Financial Statements.

In our opinion, the Annual Report fairly reflects the operations, performance and human resources information and the financial affairs of the public entity for the financial year ended 31 March 2017.

Yours faithfully,

Dr Valanathan Munsami

Chief Executive Officer

Ms Joy-Marie Lawrence

Chairman of the Board

STRATEGIC OVERVIEW VISION, MISSION AND VALUES

The Vision, Mission and Values of SANSA.

01

vision

South Africa to be an international hub for space solutions for the world of the future

02

mission

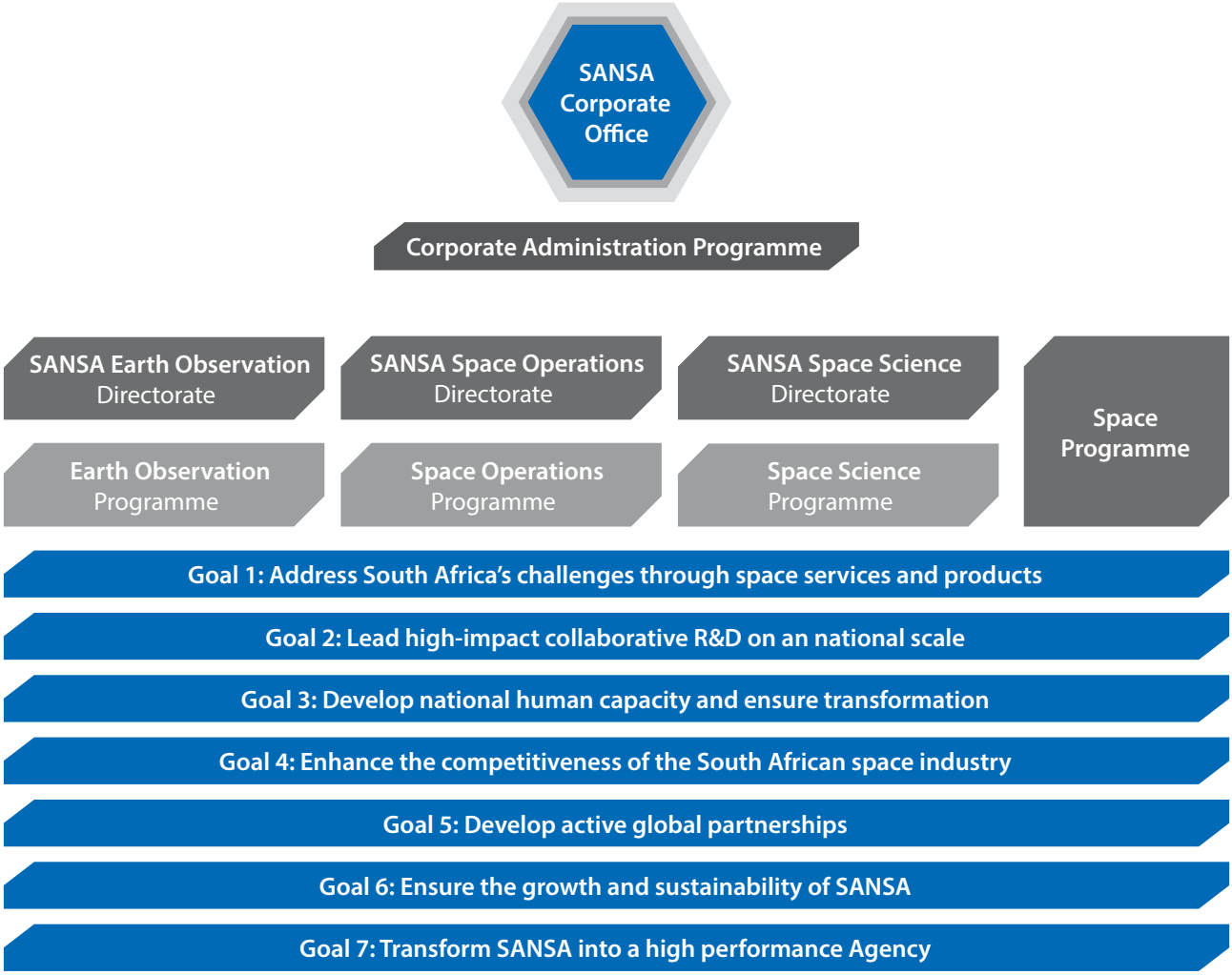
To lead and inspire the South African space community to create a better future

03

values

Service • Teamwork • Excellence • Integrity
Respect• Personal growth

SANSA BUSINESS, GOALS AND PROGRAMMES



The Functional diagram of SANSA's corporate office and its directorates

SANSA has five business centres, namely:

- SANSA Administration Programme,
- SANSA Earth Observation,
- SANSA Space Science,
- SANSA Space Operations, and
- SANSA Space Engineering.

PROGRAMME 1: CORPORATE SUPPORT PROGRAMME

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

PROGRAMME 2: EARTH OBSERVATION (EO) PROGRAMME

SANSA acquires, archives, processes and distributes imagery and products to government entities, R&D institutions and higher institutions of learning. This ensures the supply of cost-effective data and information to government departments in support of various national imperatives. In addition, the availability of processed imagery to stakeholders, such as research councils and academic institutions, enables these organisations to utilise all the multi-government licensed imagery at no additional cost. SANSA also provides Higher Education Institutions (HEIs) with geospatial resources for student training through its Fundisa Disk Programme (FDP) to promote the use of spatial information at tertiary level.

PROGRAMME 3: SPACE SCIENCE (SS) PROGRAMME

The Space Science Programme leads multi-disciplinary space science research and applications. Key functions include fundamental and applied space science research, the support of space facilitated science through data acquisition, the coordination and administration of scientific data, and the provision of space weather and magnetic technology products and services on a commercial and private basis. Through the Space Science Programme, SANSA contributes to the worldwide network of magnetic observatories responsible for monitoring the Earth's magnetic field, and participates in global scientific projects. The programme also provides leadership in post-graduate student training as well as providing science advancement, public engagement, and learner and educator support with STEM subjects.

PROGRAMME 4: SPACE OPERATIONS (SO) PROGRAMME

The Space Operations Programme is responsible for the acquisition of satellite data for the EO programme and the provision of ground segment support to the local and international space players. 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 national and international space industry clients and governments. The programme also supplies hosting capabilities and intends to extend this capability to Teleports.

PROGRAMME 5: SPACE ENGINEERING (SE) PROGRAMME

The Space Engineering Programme provides systems engineering and project management expertise and drives the satellite build programme in South Africa in partnership with primary contractors, R&D institutions and private sector partners. The programme conducts satellite and sub-systems engineering and analysis, leads the technical side of space programme management, provides human capital development in space engineering and facilitates private space industry partnership. The programme further drives efforts to support the National Development Plan and promote manufacturing and technology development in South Africa.

These programmes are geared to achieve SANSA's seven strategic goals of:

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

Goal 2: Lead high-impact collaborative research and development (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.

STRATEGIC GOALS AND PERFORMANCE OVERVIEW

STRATEGIC GOAL 1: ADDRESS SOUTH AFRICA'S CHALLENGES THROUGH SPACE SERVICES AND PRODUCTS

Space plays 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 and national safety and security. 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.

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 leads to new technologies and innovation which has a direct impact on the economy and society. It also increases our knowledge and understanding of our universe, its sustainability and ourselves. Therefore, SANSA fosters and leads collaborative R&D in space related areas on a national scale. In this regard the prime objective is to increase the national space research output.

STRATEGIC GOAL 3: DEVELOP NATIONAL HUMAN CAPACITY AND ENSURE TRANSFORMATION

For the National Space Programme (NSP) to be viable and deliver on its targets there is a need to develop interest in STEM (science, technology, engineering, mathematics) alongside the development of 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 that require scientists, engineers, and technicians. SANSA drives initiatives that develop skills with a transformation objective.

STRATEGIC GOAL 4: ENSURE THE COMPETITIVENESS OF THE SOUTH AFRICAN SPACE INDUSTRY

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

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, positions itself as a strategic partner for the African continent, BRICS countries, other continental and regional blocs, as well as other global players in space science and technology. There is socio-economic value in establishing and maintaining effective and mutually beneficial international partnerships aligned with national strategic priorities that contribute to South Africa's space programme aspirations.

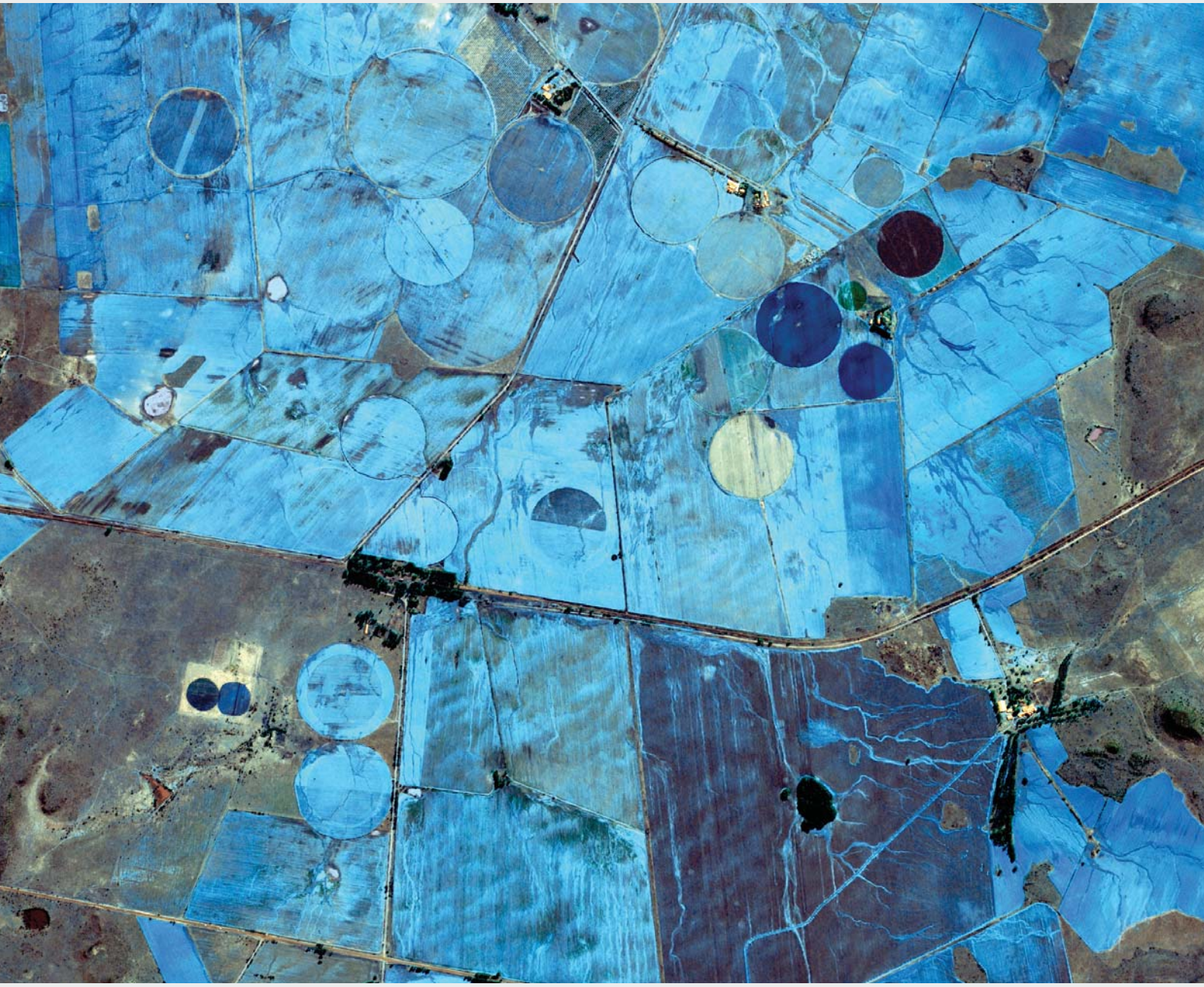
STRATEGIC GOAL 6: ENSURE THE GROWTH AND SUSTAINABILITY OF SANSA

To be able to adapt to the fast changing global space market and to meet the ever-changing socio-economic needs of the country, it is necessary for SANSA to grow and be sustainable. To be able to execute the Agency's

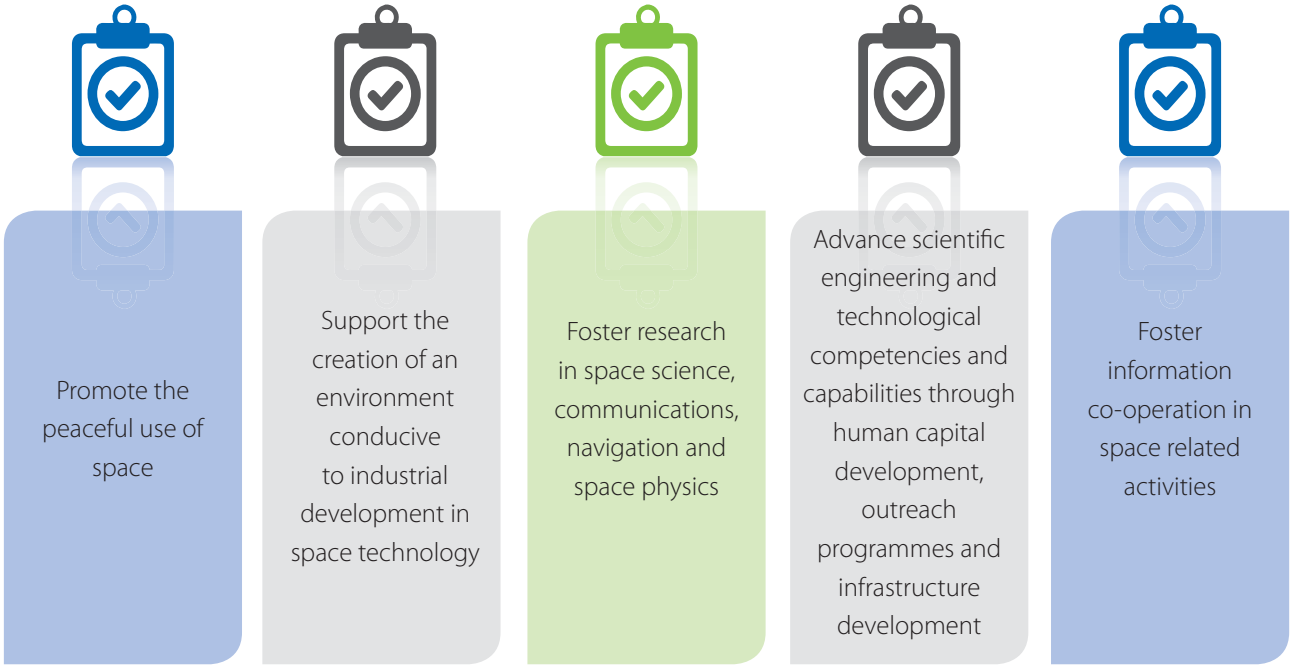
mandate efficiently and effectively, a strong focus on new business development, the effective engagement of key stakeholders, and the effective communication and promotional activities of the NSP, are initiatives to garner favourable publicity of the brand promise, as well as increase the Agency's brand value. SANSA pursues a number of activities that contribute towards the revenue growth of the Agency.

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 displays transformational leadership, human capital management, excellent business design, operational efficiency and effectiveness, and technological efficiency and effectiveness. A number of initiatives are being driven to position SANSA as a high performance Agency.



LEGISLATED MANDATE



SANSA's mandate.

SANSA PRIMARILY DERIVES ITS STRATEGIC MANDATE FROM THE:

- National Development Plan (NDP),
- Ten-Year innovation Plan,
- National Space Policy,
- National Space Strategy, and
- South African Earth Observation Strategy.

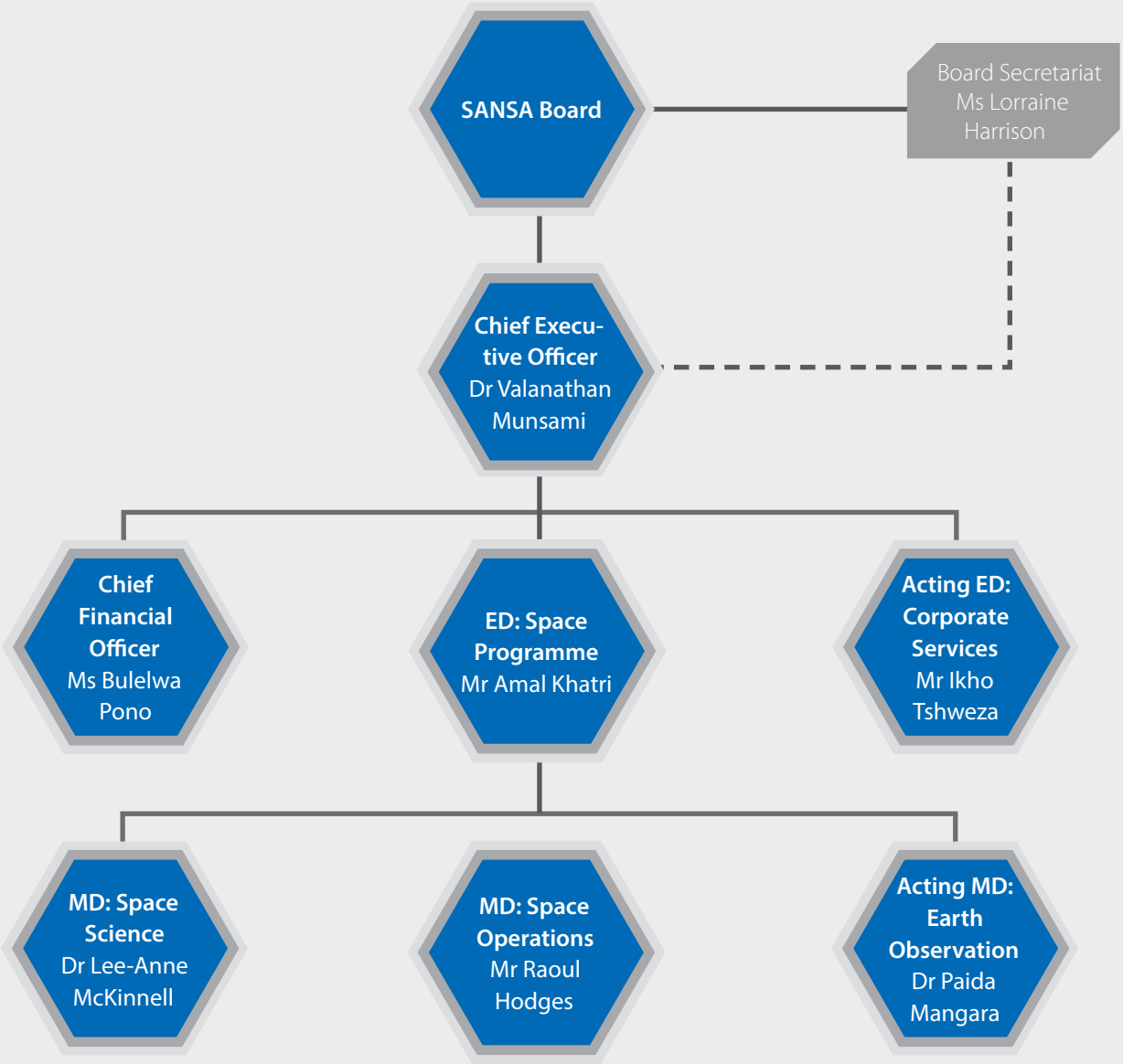
NATIONAL DEVELOPMENT PLAN

In contributing towards the NDP, SANSA will focus on the creation of jobs; the improvement of geospatial patterns to foster the development of marginalised communities; the planning and monitoring of backbone national infrastructure through space systems; health surveillance and intelligence through satellites; space-based service delivery and performance monitoring to assist in the improvement of service delivery; and the provision of geospatial decision-making tools.

THE MEDIUM-TERM STRATEGIC FRAMEWORK (MTSF)

The Government has adopted the MTSF as the vehicle for realising the NDP's Vision 2030. The MTSF lists 14 key outcomes, as well as associated activities and targets to be achieved by 2019 that cover the focus areas identified in the NDP.

ORGANISATIONAL STRUCTURE



The Executive Management structure of SANSA as at 31 March 2017

SPACE AND ITS IMPACT

SPACE AND ITS IMPACT: IMPACT REPORT

In a changing world, as the population increases and the demand for basic necessities of housing, access to water, sanitation, electricity, health care, education, safety and security increases in the face of limited natural resources, we are required to challenge how we can contribute meaningfully to the lives of millions daily.

At SANSA, space science and technology provides the knowledge and tools to contribute to a sustainable existence on planet Earth. The Agency has core programmes that give attention to EO, SS, SO and SE with cross-cutting focus on developing human capital and awareness of space for societal benefits.

In this section, we highlight the impact the various programmatic areas have made through related scientific research, projects and satellite applications. The highlights are captured into themes, which assist to demonstrate the impact space science and technology has in our daily lives.

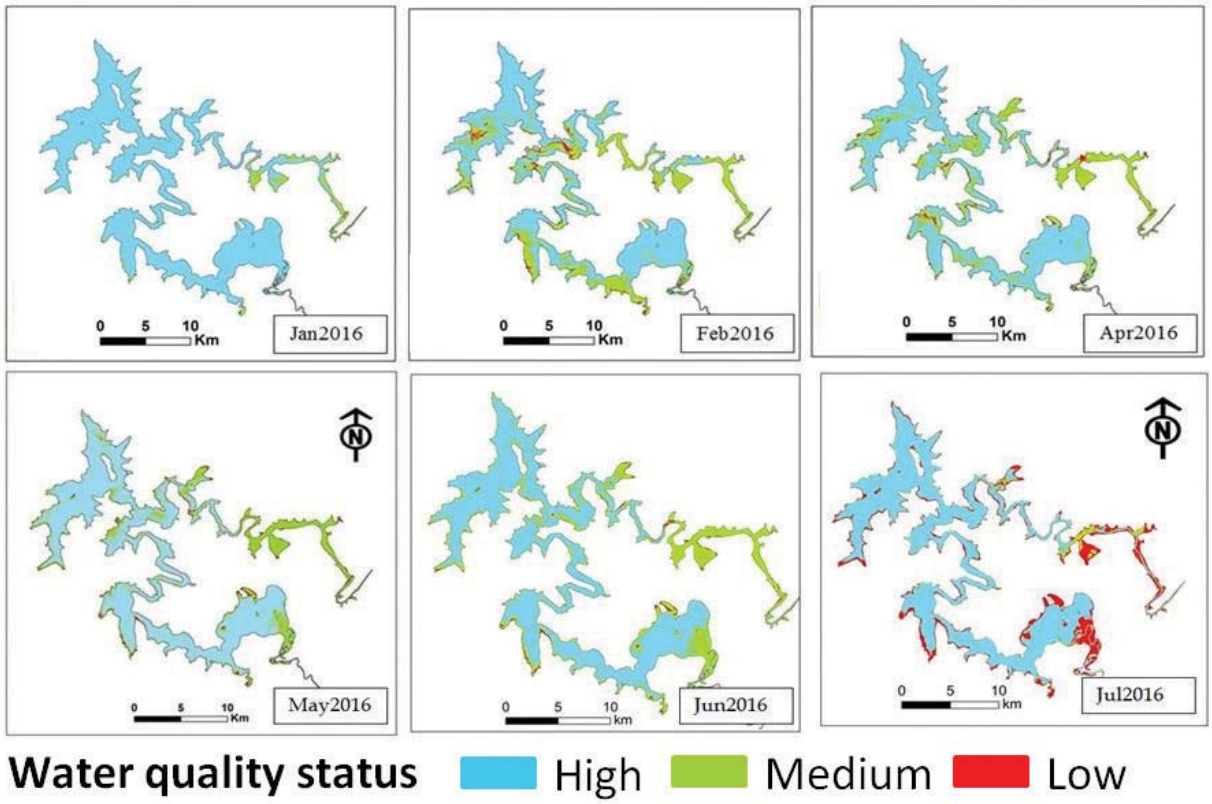
SPACE SOLUTIONS, APPLICATIONS AND TECHNOLOGY

NATIONAL GEOSPATIAL DECISION SUPPORT DATA PRODUCTS

SANSA continues to provide high quality image data products to support informed spatial decision making. The Agency has been acquiring, processing and distributing the annual mosaic of SPOT 5 since 2006 to Government stakeholders. The 2015 annual mosaic was launched in June 2016. The event was attended by users from national and provincial government departments, local municipalities, research and academic institutions as well as private industry.

The Landsat processing chains were developed to allow for the near realtime processing and dissemination of landsat 8 imagery to the user community. SANSA continues to support the users with the direct reception and processing of CBERS 4B and MODIS, which support a number of applications including the Advanced Fire Information System.

To increase the use of EO in decision making, SANSA has established a number of Memorandum of Understanding (MoUs) with the users including the Gauteng Office of the Premier, who is responsible for implementing the GIS strategy in the province. The use of satellite imagery was also demonstrated through support of a number of operations in Rand Water including algae monitoring, servitude management and land cover and land use assessment, through a six month case study which was completed in June 2016.



Algal bloom spatial distribution in the Vaal dam between January and June 2016

A policy brief on "Earth observation for water resource management" was developed to demonstrate the use of EO products to support the implementation of water related policies. SANSA continues to support government priority projects with a special focus on Operation Phakhisa: Ocean Economy. The user requirements were collected and the Agency developed the imagery acquisition plan to support the monitoring of ocean activities, including ship detection.

NATIONAL LAND USE LAND COVER BASE MAPS

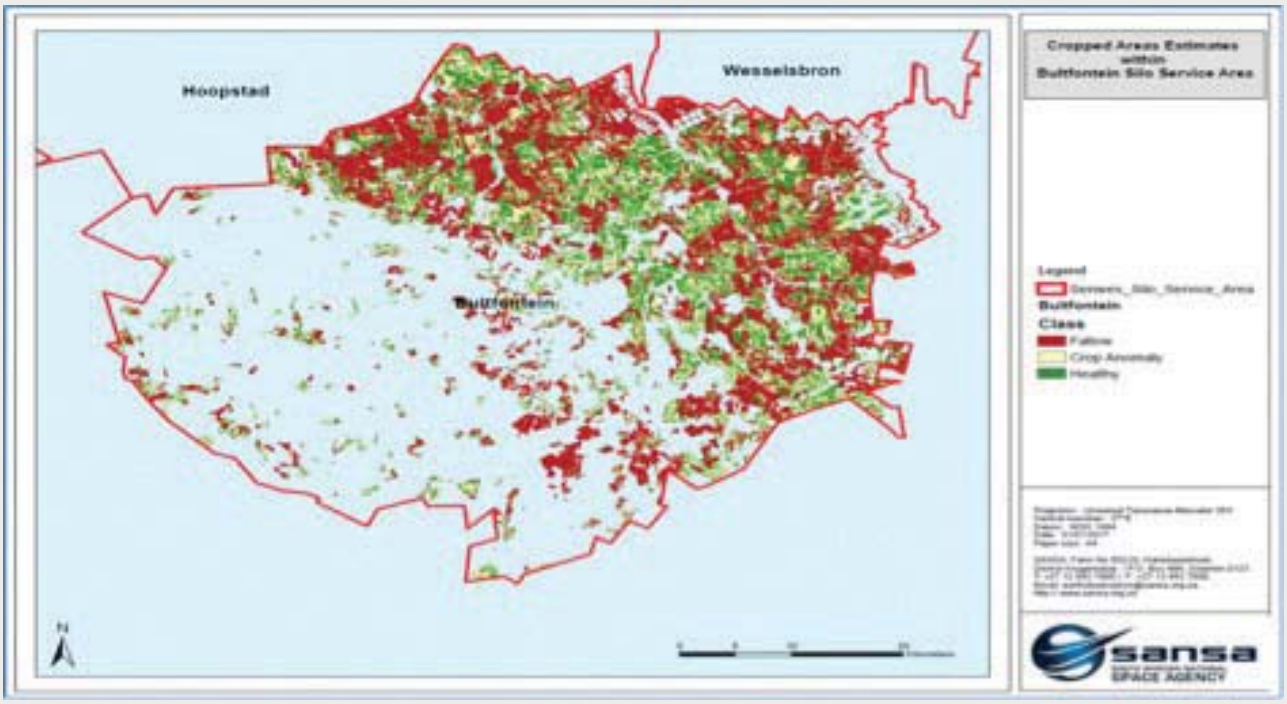
The use of satellite imagery to provide national base information products continued with SANSA having identified four key national land use and land cover maps: national water, vegetation, human settlement and disaster management layers. The main objective of land use land cover layers is to automate the detection of these classes, also known as base layers, to enable remote sensing researchers and users to develop dedicated products and services that meet the user requirements.

The base layers were developed and updated using latest satellite imagery and a methodology developed by SANSA, as described in what follows.

A national water layer map

SANSA produced two 2016 national water body layer maps, which showed the extent of water in the dams, lakes, rivers and ponds. The layers were produced using Landsat 8 data at 30m spatial resolution, which is crucial for water quantification, verification, and authorisation by the Department of Water and Sanitation (DWS). On the other hand, Landsat 8 was used to monitor the irrigation water use in some water management areas. This information was required by the DWS to assess water utilisation, river obstructions, and unauthorised water usage.

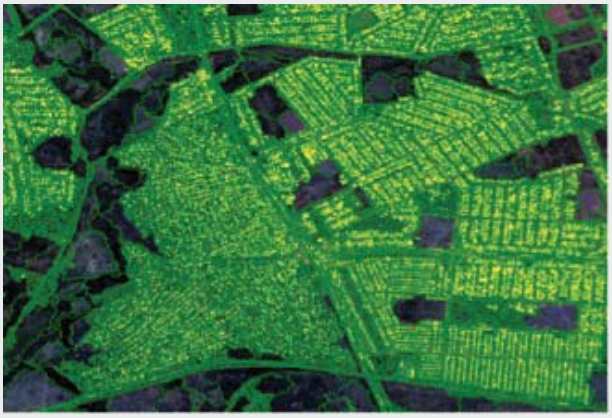
Primary focus was also on the generation of vegetation biophysical variables that are indicative of vegetation stress, biomass content and general health condition at a national scale. The variables that were generated included Leaf Area Indices, Normalised Vegetation Indices, and Fraction of Absorbed Photosynthetically Active Radiation. These biophysical parameters are critical in monitoring crops, rangelands and ecosystem health. The 2016 Landsat 8 and Sentinel images were used for the mapping. In addition to the biophysical parameters, SANSA continued to implement a cropwatch system through a case study with SENWES. EO products and statistics on planted land and crop condition were produced to assist in yield estimations.



Crop area and condition mapping and monitoring using Sentinel satellite imagery to support crop estimates and food security.

National Human settlement Layer

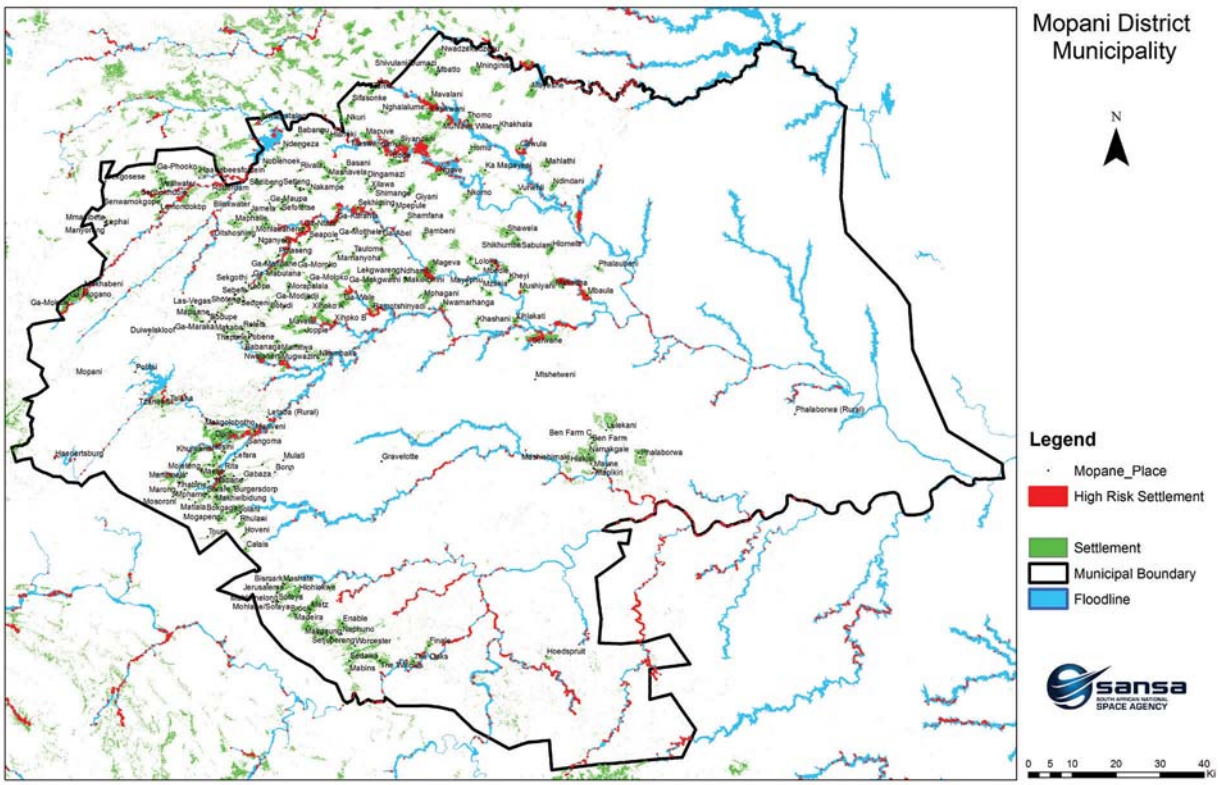
Timely information on urban expansion provided by satellite imagery is vital in ensuring integrated spatial planning and land use management as required by the Spatial Planning and Land Use Management Act. Spatial distribution of human settlements is useful in identifying vacant land parcels that are suitable for densification of human settlements as required by the NDP goals on human settlements. The extraction of human settlement data from SPOT 6&7 was developed and successfully implemented. The 2015 human settlement layer was produced and distributed to the users, including STATSSA and Eskom. This layer provides high resolution data required to support spatial planning and service delivery.



Human settlements data extracted from SPOT6

National disaster management layer

SANSA developed a flood risk map that contributes to disaster early warning systems. This system allows for the assessment of areas that are within the demarcated flood risk zones. The layer was used during cyclone Dineo to identify housing structures that were likely to get flooded.



Human Settlements at risk of floods within Mopani District

Most of the areas that were identified using the flood risk model were unfortunately affected by flash floods that occurred during the cyclone. This layer was distributed to the national and local disaster management authorities to improve flood risk preparedness and hence reduce the impact of flood disasters.

SPACE WEATHER SERVICES

SANSA provides space weather knowledge, expertise, products and services through the SANSA Space Weather Centre, which is a Regional Warning Centre under the International Space Environment Service (ISES). The Centre services a unique client set, and provides forecasts and warnings of adverse space weather that can negatively affect modern day technology such as communication and navigation systems, power grids, mobile phones and avionics, to name a few.

The Agency has commenced delivery on a two-year contract to provide space weather-related data in near-real time to Eskom. This is the first contract of its kind with the power utility, and is the result of several years' work in education and research on the impacts of space weather on the power grid. Real-time monitoring of space weather is important to the power utility as intense geomagnetic storms can cause damage to power generation and distribution infrastructure.

In May 2016, an Advanced Space Weather Course was developed for industry and delivered to 17 delegates from the Directorate Geospatial Intelligence (DGI). The course curriculum delivered through lectures and activities included sections dedicated to understanding specific impacts of space weather on the aviation and communication sectors. A highlight activity was the Ball Drop Experiment which involved using a quadrocopter to drop a tennis ball from a height of 120 metres (m) in order to measure air drag and therefore terminal velocity. The course was successful through evidence of a 100% knowledge improvement when analysing the before and after quiz results.

Space Weather Services for the aviation sector project enables SANSA the opportunity to present at several aviation forums. The presentations were arranged by Air Traffic and Navigation Services (ATNS) and included their operational OPSCOM workshop, the Aviation Weather Services Advisory Committee for Aeronautical Meteorological Services (ACAMS) meeting, and the ATNS Avi Afrique Symposium. In addition, SANSA was invited to present at the management forum of the South African

Weather Service (SAWS). These presentations aimed to create an awareness of the impact of space weather services on the aviation sector, as well as to bring together the relevant role players who can assist in a national project led by SANSA to develop applications for serving the aviation sector with space weather information.

In June 2016, a SANSA researcher was invited to participate in the Mitigation of Space Weather Threats to Global Navigation Satellite Systems (GNSS) Services Information Day with key stakeholders at Thales Alenia Aerospace in Rome, Italy. The researcher also participated in the bi-annual Beacon Satellite Symposium at the International Centre for Theoretical Physics (ICTP) in Trieste, Italy. This is important since it provided recognition of SANSA as a centre of excellence and a key data provider in space weather monitoring for the mitigation of threats to GNSS services.

MAGNETIC TECHNOLOGY (MT) – PROVIDING AEROSPACE AND DEFENSE SOLUTIONS

SANSA recently developed and presented a Compass Adjuster Course for the SA Navy. An international correspondence course is presented by Haigh Maritime Services in Australia. The South African Navy requested SANSA to develop a local course and mentoring programme that will assist its personnel to undertake the Australian course by correspondence. Given the fact that all accredited compass adjusters in South Africa are already past retirement, this course will make a tremendous contribution to the SA Navy and commercial fleet in Southern Africa in terms of maintaining the accuracy of their magnetic navigational instruments, and developing their own knowledge and skills. SANSA provides mentoring on a monthly basis to personnel from the SA Navy who are undertaking this course.

A total of 17 MT-related short courses were presented to members of the defence sector. This included five compass swing refresher courses for the South African Airforce (SAAF), ten compass adjuster courses for the SA Navy, and two Magnetic Awareness Courses. The Compass Swing Courses, which are accredited by the Civil Aviation Authority (CAA), form part of a contract that SANSA has with the SAAF to provide magnetic technology services. These courses contribute significantly to the training of defence personnel in South Africa, and ensures that the knowledge and skills are developed for the security of the nation.

In addition, electrical field surveys were undertaken on six frigates of the SA Navy that assist in obtaining the state of corrosion protection for each vessel. The training courses are a significant component of SANSA's annual service delivery and contribute to skills development within the defence sector, as well as towards the safety and security of the nation.

SANSA has developed a procedure for calibrating space qualified magnetometers, and has offered this service along with other similar magnetic services for satellites to the space industry. An international client recently spent two weeks at SANSA in Hermanus, during which the following services were provided: space qualified fluxgate magnetometer tuning; space qualified fluxgate magnetometer calibration and temperature testing; calibration and temperature testing of four space qualified Lemi magnetometers; calibration and temperature testing of Magnetic Resonance Sounding (MRS) orientation magnetometer; and the evaluation of three space qualified torquer rods. This was an important milestone as the successful completion of this work marks an entry into the international satellite build sector. The Agency also provided magnetic technology services, including the calibration of magnetometers and torquer rods to NewSpace Systems. SANSA researchers and engineers hosted a Magnetic Awareness Course to Candidate Officers of the SA Navy.

Candidate Officers of the SA Navy at the Magnetic Awareness Course

SANSA owns a 2.4 m Helmholtz coil evaluation system that is utilised for compass calibrations, and magnetic characterisation of dynamic platforms. The Helmholtz coil system requires regular calibration, which is a

lengthy procedure that led to the development of a new calibration procedure that has drastically reduced the time spent in executing the calibration from one week to approximately three hours. This will have a significant impact on the operations of the facility as delivery could not previously be scheduled during a coil calibration week.

Two Magnetic Test Bench units for the SAAF at Air Force Base Bloemspuit and Air Force Base Langebaanweg were calibrated. The Magnetic Test Bench (designed and developed by SANSA) is used for the verification of aircraft compasses prior to their installation in the aircraft. Six of these units are currently in operation at various air force bases in South Africa and SANSA provides regular calibration and maintenance on these units.

SANSA facilitated the services of a corrosion specialist engineer to execute a corrosion investigation around the water-jets inside the frigates of the SA Navy following the regular electrical field measurements done by SANSA, which indicated major corrosion problems around the water-jets. During the investigation highly specialised equipment including a three-dimensional laser scanner, was used to investigate the problem. This endorses the invaluable service provided to the SA Navy through the use of space applications and know-how in providing cost-effective solutions.

INFRASTRUCTURE DEVELOPMENT

SPACE SCIENCE AND RESEARCH

SANSA hosts and operates 11 different instruments on Marion Island that contribute to research in space physics, oceanography, seismology and satellite operations. The 2016 Marion Island relief voyage was successfully completed with reporting on routine maintenance and software upgrades having been performed on the instrumentation and high quality data captured from the instrumentation throughout the year. The SANSA Antarctic and Islands Programme is an important contributor to research and applications feeding into SANSA's space weather requirements.

In partnership with the Boston University in the USA, SANSA recently commissioned the first scientific instrument within the newly-built Optical Space Research Laboratory (OSR) in Sutherland, Northern Cape. The instrument is an Airglow Imager, which will be used to investigate a wide range of interesting atmospheric phenomena within Earth's middle atmosphere. The Imager went online at the end of July 2016 and is currently recording the first such images from South Africa.

SANSA in collaboration with the German Space Operations Center (GSOC) – operated by the German Space Agency (DLR) – started the commissioning of a space debris tracking station at the new OSR in Sutherland. The main aim of this telescope is to track space debris so as to avoid collisions and ensure safe operations for GSOC's satellites. The telescope consisting of two telescopes, a smaller telescope with an aperture of 20 centimetres (cm) for fast survey and a larger telescope with an aperture of 50cm will be used for follow-up observations. The telescopes will be operated by GSOC from Oberpfaffenhofen (near Munich in Germany) and by the Astronomical Institute of the University of Bern (AIUB) from Bern in Germany by means of an internal monitoring and control system called SMARTnetMAC.

The first development phase of the South African National geophysical Data and Instrumentation System (SANDIMS) was presented at the annual meeting of the Standing Committee on Antarctic Data Management (SC-ADM) of the Scientific Committee for Antarctic Research (SCAR) and during the SCAR Open Science meeting in Kuala Lumpur in August 2016. This demonstrated the progress SANSA has made on the implementation of a data and instrumentation management system that will facilitate the dissemination of the geophysical research data recorded at SANSA's remote observatories in Antarctica, Marion Island and Gough Island.

Technicians and engineers, (particularly those who work at remote stations) are required to work at potentially dangerous heights in order to carry out installations and repairs on SANSA's antenna systems. To comply with South African legislation, appropriate training is provided to staff members who fulfil this requirement. Recently, a Fall Protection Plan was developed ensuring a SANSA engineer was trained on the requirements for this plan as well as satisfying all legislative requirements in this regard. This ensures compliance and safety of employees.

The *SA Agulhas II* research vessel departed for Antarctica on 30 November 2016. The SANSA team onboard comprised of two new overwintering engineers and three takeover engineers. After 12 days at sea, the ship arrived safely at the ice shelf at RSA Bukta on 11 December 2016. The main aim of this takeover was preventative and corrective maintenance on all SANSA instrumentation located in and around the SANAE base. The return voyage arrived in Cape Town in February 2017, after a successful takeover where all planned maintenance was carried out. SANSA operates approximately 80% of the shore-based equipment at the South African Antarctica base, and the Antarctica Programme plays a significant role in space science research and applications.

The SANSA 2016/17 takeover team and returning 2016 overwintering engineers disembarking from the SA Agulhas I.

The first phase of an e-Callisto installation, which is a solar spectrometer used for solar flare detection and education, has been successfully completed. During this phase, the receiver and software were installed together with a Low Noise Amplifier onto an existing fixed, broadband antenna. Subsequent radio frequency interference (RFI) studies were performed in Hermanus, which showed that the RF spectrum between 40 megahertz (MHz) and 870 MHz was heavily congested and that Hermanus was not a suitable site for the permanent placement of the receiver. Phase two of the project will include a new directional antenna and azimuth/elevation rotator to be used to track the sun through the sky for more precise measurements. Implementation of the azimuth/elevation driver and controller will be conducted alongside an investigation into a more suitable location. This is an important addition to SANSA's applications platform, as it will provide real time solar data to the Space Weather Centre.

SANSA engineers have been preparing for the 2017 Marion Island Voyage through pre-work for the upgrade to SANSA's Very Low Frequency (VLF) station on Marion Island. An upgraded pre-amp, power supply and receiver was installed and tested on the VLF antenna at SANAE IV and showed good improvement in signal quality over the old system. Additional improvements will be implemented and tested during the relief voyage to Marion Island. A final version will be approved and implemented at a new VLF development station in Hermanus, where VLF loop antennas and the signal/power cables have already been installed. Regular upgrading of SANSA's instrumentation ensures that high quality data is received for space science research and applications.

Four magnetic observatories are operated by the Agency in South Africa and Namibia. All four observatories are accredited by the International Real-time Magnetic Observatory Network (INTERMAGNET). The Hermanus Magnetic Observatory is one of five global observatories that provide magnetic data to determine the global magnetic disturbance index. A requirement for global accreditation and for the provision of data to the global index calculations is the continuous provision of near real time data. SANSA was notified that the statistics for delivering quasi-definitive (QD) data for 2016 showed that the Hermanus observatory is one of only 16 observatories with a 100% record for 2016 of the 60 to 65 observatories delivering QD data worldwide. This is testimony to the dedication of the staff involved in looking after the observatory data. This is extremely important as QD data is extensively used by modellers of global magnetic field models.

SATELLITE DEVELOPMENT

The EO-Sat1 Mission level objective is to observe the Earth in the solar spectral range and to deliver reliable and accurate data in support of quantitative applications for the three priority areas of food security, land use/cover and natural disaster management. The EO-Sat1 Mission will involve the direct launch of a satellite to an operating altitude of approximately 700 km, on a Sun-synchronous orbit with a local time of the Descending Node set at 10:30 am, with the intention to achieve complementarity and compatibility with other missions.

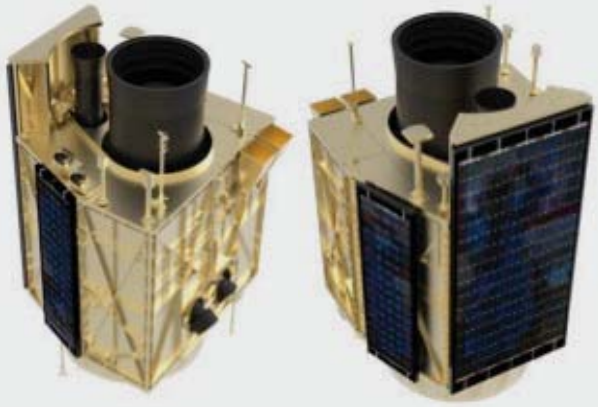
Nominal mission lifetime is five years; therefore the system design shall be done with reference to such a period. A longer operating lifetime (up to seven years) may be feasible, but it shall not represent a constraining reference for the system design. The EO-Sat1 Mission will be divided into four operational phases: Launch, Orbit Insertion, In-Orbit Testing and Operations.

EO-SAT1 SATELLITE

The EO-Sat1 Programme is currently in the Preliminary Design Phase and a Preliminary Design Review (PDR) will be conducted in the second quarter of the 2017/18 financial year. The order for the Qualification and Flight Models Sensor has been placed in the 2017/18 financial year. Developments during the past financial year include:

- The completion of procurement specifications for the solar panels.
- The commencement of a high resolution payload Development Verification Model (DVM) manufacturing.
- Design completion and development contracting of an Optical Test Frame (OTF).
- Implementation and testing of Star tracker software algorithms.
- Design completion of the Star camera optics.
- Testing of power distribution module and Power Distribution Unit (PDU) test jig completed.
- Radiation testing phase progressed.
- The Engineering Model Attitude Determination and Control System (ADCS) electronics were ordered and built.
- Electro Magnetic Compatibility (EMC) testing conducted for subsystem models.
- High-resolution (HiRes) payload optics development has been tested.
- Medium-resolution (MedRes) payload optical design completed.

The Space Engineering team has, during 2016, prepared the required EO-Sat1 L6 (Level 6) Engineering documents for the planned EO-Sat1 Space System Preliminary Design Review (PDR) in 2017/18.



Graphical rendering of EO-Sat1

LOCAL AND INTERNATIONAL COLLABORATION

SANSA remains committed to the Science and Technical Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOUPUS) to advance African partnerships in space science and technology. The UNCOPUOS platform is used by African countries to advance their developmental agenda by influencing the global space policy and law. These meetings are also used to lobby support from other global regions to support the African developmental agenda. Parallel meetings between African Union (AU) member States to discuss, among others, the African Leadership Conference and the African Space Policy and Strategy were held. The UNCOPUOS meetings are also used as a platform for African countries and BRICS nations to discuss space policy and space mission proposals.

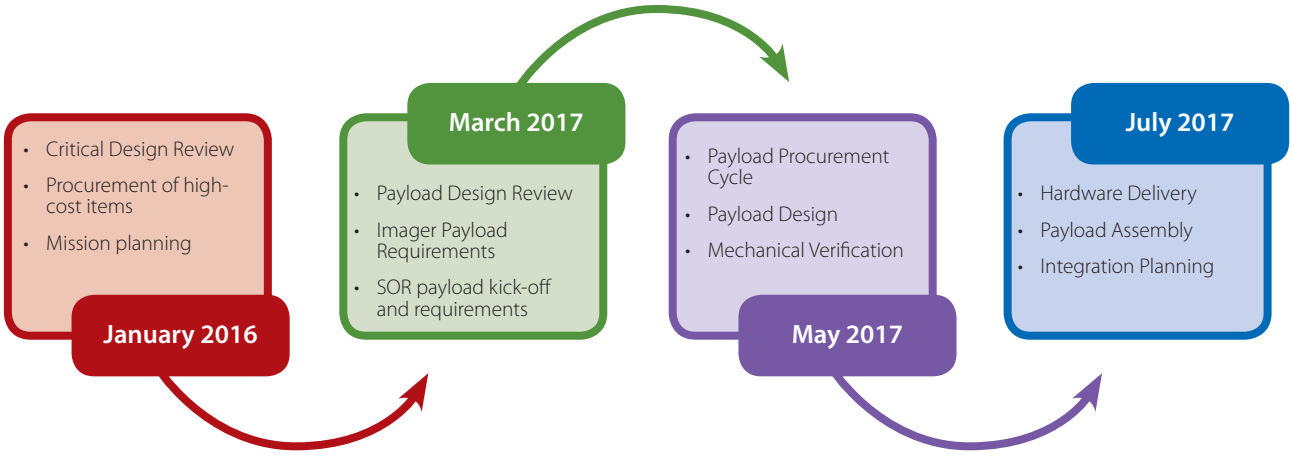
SANSA continues to participate in the International Telecommunications Union (ITU) National Preparatory Working Group (NPWG) meetings organised by the Department of Telecommunications and Postal Services (DTPS). The NPWG meetings are held locally between World Radio-Communications Conferences (WRC). Government uses these meetings to discuss the agenda items from the WRC and to develop South Africa's positions to those agenda items. SANSA represents the Radio Frequency Spectrum Policy requirement for current and future space missions at these meetings. The Agency uses the opportunity to discuss possible interference issues with other services sharing the same frequency bands or those using adjacent bands to the frequencies used by SANSA.

OPERATION PHAKISA – CUBESAT DEVELOPMENT

SANSA initiated a grant award process for Phase One implementation of the Operation Phakisa project through the Grant Award Policy that was approved by the SANSA Board in May 2016. The Cape Peninsula University of Technology (CPUT) was the only applicant, as recommended by the DST to develop a follow-up space mission to the successful ZACUBE-1 Cubesat Mission. The CPUT proposal for the grant award is based on a precursor mission called ZACUBE-2. This precursor mission will be the first 3U Cubesat that will be launched for the oceans economy.

The Operation Phakisa Cubesat Mission will have nine 3U Cubesats that will be launched and operated in a constellation. This is a first for Africa and will

actually demonstrate South Africa's space engineering capabilities and create a competitive edge for our local space economy. SANSA only has funding for Phase One, hence the call for proposals was a closed call as the rest of the Operation Phakisa mission funds are still to be made available to SANSA. CPUT will also have industry and localisation targets, which will also include human capital development. This will allow for the ZACUBE-2 Mission to be inclusive and use the local engineering capability and grow future engineers. The approval of the grant award for the ZACUBE-2 Mission will make it possible for CPUT to secure a launch opportunity for 2018.



NATIONAL SPACE INDUSTRY POLICY FRAMEWORK

The national space industry in South Africa is still challenged by lack of a viable national space industry programme to keep its capabilities relevant, competitive or sustainable. The South African Space Industry Landscape and Policy Framework document provides a clear vision and heritage of our national space programme. This policy statement indicates that South Africa requires between five to seven years for a satellite programme to be developed and implemented. This poses a huge challenge for the industry as it is difficult to retain skills and generate revenues in order to grow a sustainable company in the local space sector. A plan is required to attract government funding, local and foreign direct investments to support and grow a sustainable local space industry.

SANSA contracted Denel (Spaceteq) to develop the EO-Sat1 satellite. As part of the main satellite development contract, localisation and industrial development targets for the EO-Sat1 programme were set. This strategy is aimed at responding to the Agency's industry development and transformation targets. SANSA also uses its Intellectual Property (IP) acquired through the Sunspace and SumbandilaSat projects to encourage industry development and transformation of the space industry in South Africa.

AFRICAN SPACE POLICY AND STRATEGY AND ITS IMPLEMENTATION PLAN

SANSA contributed, through its participation in the African Union Space Working Group (AUSWG), to the development of the African Space Policy and Strategy and the Implementation Plan. It is intended that the implementation plan and the governance mechanism will be presented to the AU Heads of State meeting sometime in 2018.

The Ninth African Union Space Working Group

INTERNATIONAL BUSINESS, GROWTH AND THE LOCAL MARKET

SPACE OPERATIONS

Several international missions have been provided with a variety of support services from SANSA during the financial year. The Telemetry, Tracking and Control (TT&C) team continued to consistently provide clients with effective and successful launch support services. This continues to position the Agency as a preferred TT&C service supplier and an important role player in the global space arena. The services ranged from Transfer Orbit Support Services (TOSS) to Earth Station Verification Assistance (ESVA) and were implemented with a 100% success rate.

The TT&C launch support team successfully supported the simultaneous launch of four satellites. This is the first time that SANSA supported the simultaneous launch of four satellites aboard a single rocket. SANSA used the HBK-2 and HKB-5 antennas at Hartebeesthoek to provide launch support for the four satellites. These are the 12m dish (the first and still the largest antenna at Hartbeeshoek, installed more than fifty years ago) and the 10m dish, respectively.

SANSA HBK-2 and HBK-5

SATELLITE-BASED AUGMENTATION SYSTEM (SBAS)-AFRICA PROJECT

During the first quarter of 2016/7 the SBAS-Africa completed its final activities. The final set of workshops consisting of targeted engagements, was held to report back on the results of the trials and the analysis of the business case. The first workshop was held with the general aviation community, focusing on the flight trials held at Lanseria and in Madagascar and was also attended by Air Traffic Navigation Services (ATNS) and the South African Civil Aviation Authority (CAA). The consortium used the opportunity to finalise a set of flight trials with Grand Central airport.

Workshops were held in Cape Town focusing on the maritime, agriculture and geographic information system (GIS) communities. Thereafter, workshops were held in Pretoria including a meeting held with the International Air Transport Association (IATA), the Airlines Association of South Africa, ATNS, the Airports Company of South Africa (ACSA), the Department of Transport (Deputy Director-General: Aviation portfolio), and the Commercial Aviation Association of SA. This meeting was used to provide the group with a complete understanding of SBAS activities in South Arica.

A final workshop on innovation in SBAS was also held, resulting in the delivery of a business case for an affordable SBAS for South Africa and the region. The project's last activity on Ionospheric analysis was concluded in June after which the formal project activities drew to a close. The project left a legacy of GMS receivers deployed across the region for exploitation by the community in preparation of the next phase of Global Navigation Satellite Systems (GNNS) in the country and region. The project was then presented at the European Navigation Conference 2016, Finland, Helsinki by the consortium. SANSA continues to promote SBAS in South Africa as a sustainable space application programme.

Attendees at the final aviation workshop

INFRASTRUCTURE UPGRADE

The Ku Band will undergo upgrading with an installation date planned for mid-2017. Two antennas were installed for Intelsat with excellent technical and logistical results. These are two 4.9m diameter antennas and used for spectrum monitoring and ranging. The project was successfully completed, thus ensuring the retention of skills and maintaining excellent standards.

SUPPORT OF EO SATELLITE SENSORS

EO data is acquired from the Landsat-7, Landsat-8, Modis Aqua, Terra, Spot-6, Spot-7 and CBERS-4B satellites. Over the past year, SANSA successfully acquired EO satellite data from 4 373 satellite overpasses, i.e. on average 12 passes a day.

MISSION CONTROL ROOM

During 2016, SANSA built a state-of-the-art Mission Critical Control Room. The purpose of the room is to fulfil contractual obligations to customers, optimise the ability to serve customers with proactive remote monitoring and service excellence in an ergonomically-friendly environment.

KNOWLEDGE ECONOMY, RESEARCH AND DEVELOPMENT

APPLIED SPACE SCIENCE AND RESEARCH

A key ongoing activity within SANSA is fundamental and applied space science research primarily aimed at growing the knowledge base, and providing the foundation on which to build innovative applications that contribute towards the nation's industrial development. Researchers at SANSA performed numerous studies and experiments in applied space science over the past financial year.

A dual-frequency experiment performed on a Super Dual Radar Network (SuperDARN) radar to verify a theory that would allow the radar system to observe electron density in the ionosphere was conducted. This experiment demonstrated that the backscatter process is sensitive to other parameters, not only the background ionospheric plasma.

High-cadence experiments on a SuperDARN radar were done to verify a new theory that would allow the radar to observe neutral density in the thermosphere and it proved credible. This was important as it allowed, for the first time, the entire SuperDARN radar network to observe the effect of geomagnetic storms on the upper atmosphere, which relates directly to satellite lifetime and space debris tracking through atmospheric drag.

Wavelengths and Lomb-Scargle spectral analysis techniques were used to investigate (1) the changing pattern of the different harmonics of the 27-day solar rotation period as well as (2) the fractal and stochastic behaviour of the Auroral Electrojet (AE) index during various phases of different solar cycles between 1960 and 2014. The stochastic properties of the AE index during solar maximum and solar minimum phases of all solar cycles between 1960 and 2014 were determined by searching for scaling laws in the power spectra using data for each individual year in this period. Clear variations in the power law exponent were obtained showing that fractional Gaussian noise (FGN) dominates solar maximum periods, while fractional Brownian motion (FBM) persists during solar minimum intervals. This showed, for the first time, that the external geomagnetic field driving auroral disturbances can be described by a uniquely characterised scaling exponent.

The effects of non-thermal electrons on stopbands (forbidden ranges in fast ion-acoustic soliton speeds) was investigated for the first time and revealed that stopbands increase (decrease) in width over wider (narrower) ranges in cold ion density for increasing non-thermal effects of electrons which are kappa (Cairns) distributed. A very unique feature of the results is that stopbands are found to have infinite width in the presence of kappa-distributed electrons when non-thermal effects are very strong. The results are currently being prepared for a high impact journal. SANSA researchers proposed a useful generic or universal form of a Sagdeev potential expression that could be used to study nonlinear waves (solitons and double layers) associated with any linear wave mode in multi-component plasma models. The obtained mathematical expression is useful because the same expression can be used irrespective of whether the nature of species changes from subsonic when studying solitons associated with the slow mode wave to supersonic when studying solitons associated with the fast mode wave.

SANSA researchers, in collaboration with a Belgian researcher, introduced a new analytical tool for studying small-amplitude solitons at critical plasma compositions. Their method uses Sagdeev potentials, a tool traditionally used for studying large amplitude solitons. They found excellent agreement with the more traditional reductive perturbation analysis. This is important because it allowed them to obtain a novel analytical acoustic speed soliton solution. This solution will provide insight into recently reported acoustic speed nonlinear structures. A Collaboration with Italian researchers in utilising data from the DemoGRAPE installation at the South African Antarctic base SANAE IV revealed for the first time a simultaneous

recording of a scintillation event at two widely-separated locations in Antarctica. The event was detected by both EACF at the Brazilian Station in Antarctica and at the SANAE IV DemoGRAPE ionospheric monitoring station installed during the 2015/2016 summer expedition to SANAE. This is important because it demonstrates for the first time the extent of the structures that are responsible for ionospheric scintillation in Antarctica. A continuation of the analysis of events recorded by means of the DemoGRAPE system has proven the existence of short-duration scintillation events which are not reported in the conventional 1-minute scintillation indices.

SANSA researchers derived new regional geomagnetic field models for Southern Africa based on magnetic field survey data for 2015. These models determine both the main field as well as secular variation for D, H and Z components for the period 2015 till the end of 2016. These routines were subsequently incorporated into the existing regional geomagnetic field model for Southern Africa which now spans the time interval from 1975 to 2016. This is an important addition to SANSA's ability to identify and model abrupt changes in the Earth's magnetic field in a region strongly influenced by the South Atlantic Magnetic Anomaly.

A collaboration with Eskom for the upgrading of the Magnetotelluric Measurement Station at the Koeberg Power Plant and collection of the first data from the installation was facilitated. This is important as it provides essential data to estimate the surface impedance of the ground at Koeberg which is an essential parameter in the modelling of geomagnetically induced currents (GICs) in the South African power network, and for the verification of the algorithms developed to estimate GICs. In addition, this is the first MT data from a coastal region close to a power plant where GIC measurements are made on a power transformer. It will be useful for addressing several scientific questions about the coastal effect on GICs.

Stopbands (forbidden range in propagation speeds) for fast mode dust-acoustic solitons in dusty plasmas with cold and warm (both positive) dust constituents and much lighter ions and electrons were discovered. The discovery of stopbands in a dusty plasma which supports ultra-low frequency waves involving heavy dust dynamics is a novel finding and the results will be submitted to an international journal after thorough investigations are conducted.

An explanation as to why a switch in polarity to positive solitons, coexistence of opposite polarity solitons and the existence of supersolitons are more conducive to nonlinear disturbances associated with low and ultra-low frequency waves which are supported in plasmas with ion or heavy dust constituents was uncovered through research. The ions which are protons in earlier studied models are too heavy if high frequency nonlinear disturbances associated with electron dynamics are considered and plasma compositions with positrons are needed.

The USA (Institute of Scientific Research, Boston College), United Kingdom (UK, University of Lancaster) and India (Indian Institute of Geomagnetism) collaborated wth SANSA and published a Paper on the first simultaneous observations of poleward and equatorward travelling ionospheric disturbances during a geomagnetic storm. The research showed that in addition to the well-known atmospheric gravity waves launched in auroral regions that travel in the equator-ward direction during storm-time, 'similar waves' can be generated around the geomagnetic equator and propagate poleward in both southern and northern hemispheres. This was the first time that experimental evidence of these waves (on a global scale) has been shown since their prediction in 1969. Research of this nature contributes to the understanding of low latitude ionospheric electrodynamics during solar storm conditions, which can impact high frequency communications.

SANSA researchers reported first simultaneous observations of irregular ionospheric daytime twin peak structures from the southern and northern middle latitudes using Global Positioning System receivers and ionosondes. They found evidence that sporadic E layers appeared simultaneously with some of the peaks of these structures. This suggests that atmospheric tides influenced the meridional wind shear to generate dynamo electric fields, which causes upward vertical drifts that result in plasma peaks of these structures. In addition, the sudden decrease of ionospheric plasma during the daytime peak followed by recovery (thus creating the twin peak structure) were a result of downward drifts of the vertical component of the neutral wind. This study showed the importance of tides and neutral winds in controlling dynamical changes in the ionosphere.

The researchers have identified several rapid secular variation pulses in the Earth's geomagnetic field during the last decade. These rapid changes in the secular variation patterns identified at individual Southern African magnetic observatories can most probably be attributed to the direct influence of the South Atlantic Magnetic Anomaly (SAMA), an area of the Earth's geomagnetic field which has been diminishing at a very rapid rate over the past 400 years in comparison to regions at similar latitudes around the globe. This is important as the Southern African observatories play a crucial role in the global network that monitors geomagnetic field changes that originate both from internal and external sources.

Researchers from SANSA, Japan, the UK and USA, examined the high-latitude high-altitude oxygen ion temperature climatology over the International Polar Year (IPY) 2007 to 2008 period using the EISCAT Svalbard Radar (ESR), Norway, and Poker Flat Incoherent Scatter Radar (PFISR), Alaska. They found good agreement between observations and models during quiet times, with discrepancies explained by ion-frictional heating. However, during geomagnetic storms, the models performed poorly, indicating a need for improvement.

Canadian researchers from Natural Resources Canada (NRCan), together with SANSA researchers, investigated the severity of extreme space weather events with respect to induced electric field magnitude. Using extreme value theory they found that the greatest recent geomagnetic storm – the so-called Halloween storm from 2003 – is under represented in terms of the severity index used. This means that, statistically, more than one storm of the 2003 Halloween storm intensity (classified as severe space weather event) should have occurred. This has implications for long term planning and mitigation measures for adverse space weather conditions.

SANSA researchers have made the first TV observations of sprites using a red filter to select the nitrogen emission at 640 nm. The sprites were recorded from Sutherland in the Northern Cape. Sprites are a gas discharge phenomenon, powered by large lightning strikes in convective thunderstorms, and form part of the global electric circuit. Spectral information from the discharge is important as it will allow estimates of the electron energy within sprites.

SANSA collaborated with researchers from the Instituto Nacional de Pesquisas Espaciais (INPE) in Sao Paulo, Brazil in investigations of kinetic studies of drift wave instabilities and plasma simulations. The drift wave instability can explain the long wavelength features of the fluctuations in plasma density in the equatorial F region ionosphere (equatorial spread F or ESF). The research will be complemented by plasma simulations to understand the characteristics of equatorial plasma bubbles (EPBs) which form as a direct consequence of ESF.

Another collaboration with Queen's University Belfast (QUB) expanded the research on constant amplitude nonlinear waves to investigations of nonlinear waves with varying amplitude. New research was initiated that showed that stopbands for fast mode ion-acoustic solitons occur in a two-electron temperature (kappa-distributed) plasma. This research will be an extremely important addition to the body of knowledge in this field as very few publications have ever appeared on the topic. SANSA and Canadian researchers from NRCan investigated the accuracy of the ICEPAC model used for HF radio propagation predictions by the SANSA Space Weather Centre. It was found that HF radio frequency predictions for vertical incidence using the ICEPAC software are well matched by Ionosonde observations, and that ICEPAC is proven to be a relatively stable model with no extreme outliers even for a lead time of 98 days. Large deviations seen in the verification were partly due to the inability of ICEPAC to accommodate ionospheric variations during geomagnetic storms. This is important because this is the first verification stability study undertaken with ICEPAC for vertical incidence at mid-latitude regions. This has significant implications for the accuracy of the predictions during adverse space weather conditions and indicates the need for an improved model for storm conditions.

SCIENCE ENGAGEMENT AND AWARENESS

STUDENT ENGAGEMENT AND PUBLIC AWARENESS

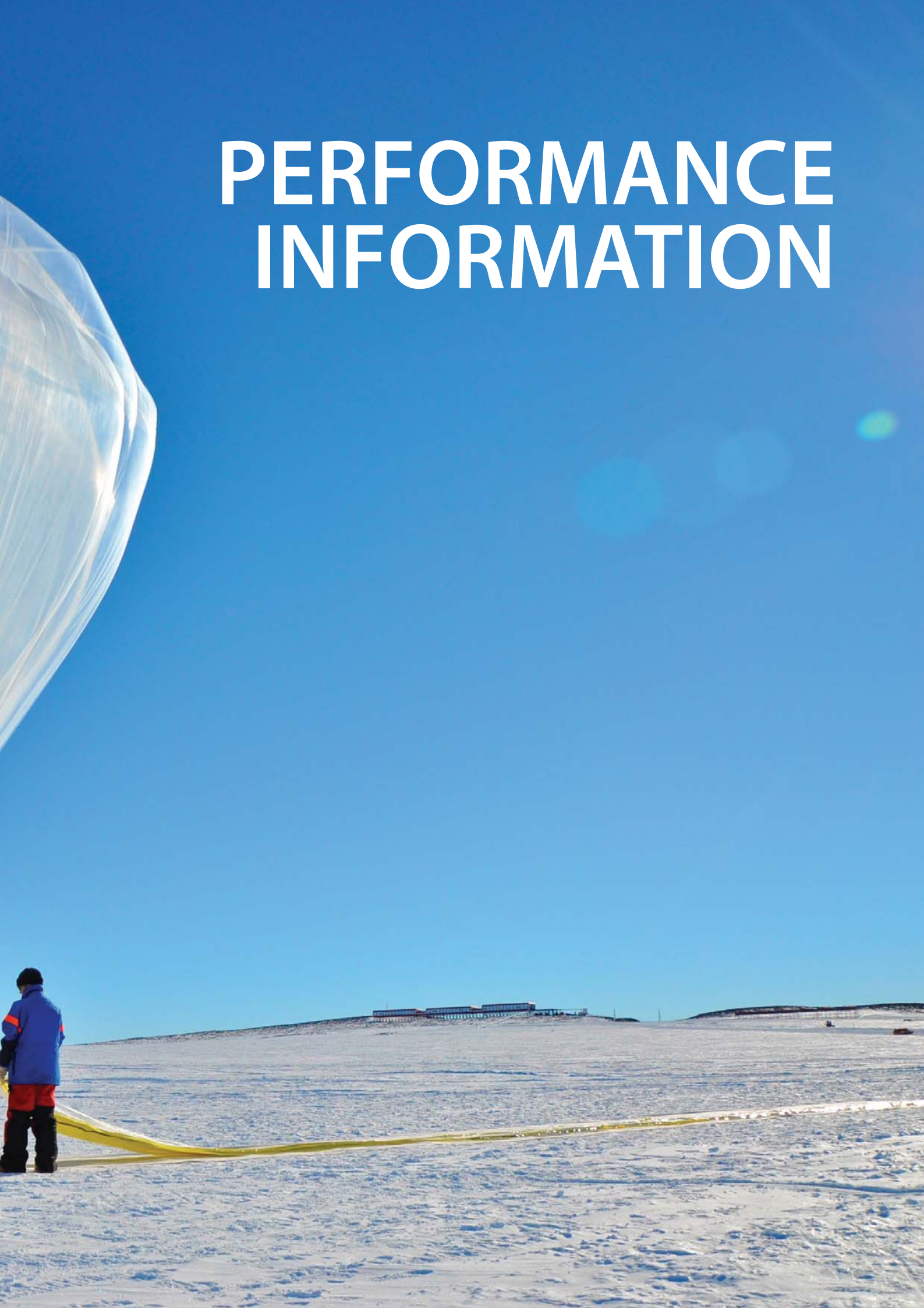
The "Image of the Week" concept designed to showcase the power of satellite imagery in capturing and describing the state of the landscape at a particular point in time has proved an informative and attractive tool to engage with stakeholders.

Parallel to South Africa's quest towards a knowledge economy is the need to develop an extensive knowledge workforce. In this regard, the 2016/17 student development programmes supported 87 postgraduate students and interns studying space science, EO and engineering. Addressing the critical skills shortages in these areas will improve South Africa's global competitiveness and reduce the currently high trade deficit in high-tech products and services.

SANSA directly engaged with 18 782 learners through various science, technology, engineering and mathematics (STEM) outreach activities to increase the uptake of these subjects at schools and to create a wide pipeline of skills in these areas. The initiatives, such as science exhibits/ festivals, mobile outreach activities and Science Centre activities, continue to excite, challenge and expose young people to new opportunities in science and technology.

Empowering young women to follow careers in STEM was under the spotlight at a Space Prep Youth Day workshop in Cape Town where SANSA assisted 140 girl learners in building small, programmable robotic rovers. The event was part of the Meta Economic Development Organisation (MEDO) Space programme to equip school girls in Africa with STEM skills to compete and thrive in a digital future. The team was accompanied by an international guest, Professor Mark Moldwin from the Climate and Space Science and Engineering Division at the University of Michigan. The learners who participated in the workshop learnt about electronics and programming to build and code small, robotic rovers. After the workshop they were able to take their rovers home and connect to an application to allow them to continue coding at will.

PERFORMANCE INFORMATION



PROGRAMME PERFORMANCE

PROGRAMME PERFORMANCE TABLE OVERVIEW

During the year 2016/17, SANSA achieved 15 of 17 key performance indicators at a success rate of 88%.

The Space Programme division had financial constraints in the satellite development programme (EO-Sat1), which is currently project managed internally. The funding challenges experienced had a negative impact on achieving the set target. The consolidated achievements are reflected in the annual performance table that follows.

Goal		Key Performance Indicator	Reporting Cycle	Annual Target	Annual Actual	Reasons for Variance
Goal 1	Address South Africa's challenges through space services and products	T1.1. The number of national high-impact products and services	**Quarterly**	**5**	**5**	Target achieved
		T1.2. The number of government decision or policy support tools	**Annually**	**3**	**3**	Target achieved
Goal 2	Lead high-impact collaborative R&D on a national scale	T2.1. 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)	**Quarterly**	**950**	**1656**	A record number of publications in 2016/17 in high impact journals resulted in a higher than expected score.

Goal		Key Performance Indicator	Reporting Cycle	Annual Target	Annual Actual	Reasons for Variance
Goal 3	Develop national human capacity and ensure transformation	T3.1. 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)	**Quarterly**	**9000**	**18782**	Several successful interventions plus availability of SAASTA grants resulted in the target being exceeded.
	Develop national human capacity and ensure transformation	T3.2. The number of supported students for formalised training (This excludes short courses and focuses on degree-registered students only)	**Quarterly**	**50**	**87**	Additional funding was received for student bursaries, and a successful student recruitment programme resulted in higher than expected number of students supported.
Goal 4	Enhance the competitiveness of the South African space industry	T4.1.1. Successful satellite pass monitoring rate for earth observation	**Quarterly**	**Actual**	**10607**	This target was exceeded due to SANSA's quality drive to improve on the current success service levels of 98%.
				Total	**10610**	
				98%	**99.98%**	
	Enhance the competitiveness of the South African s pace industry	T4.1.2. Total income generated from space operations activities	**Annually**	**R60 million**	**R66.7 million**	International clients requested additional passes during the year as well as the added benefit from gains on foreign exchange rate movements.
		T4.1.3. Total amount of space operations money invested in other SANSA programmes	**Annually**	**R11 million**	**R13 million**	This variation is due to the exchange rate benefit and the cost of a service in the international arena or space sector market.

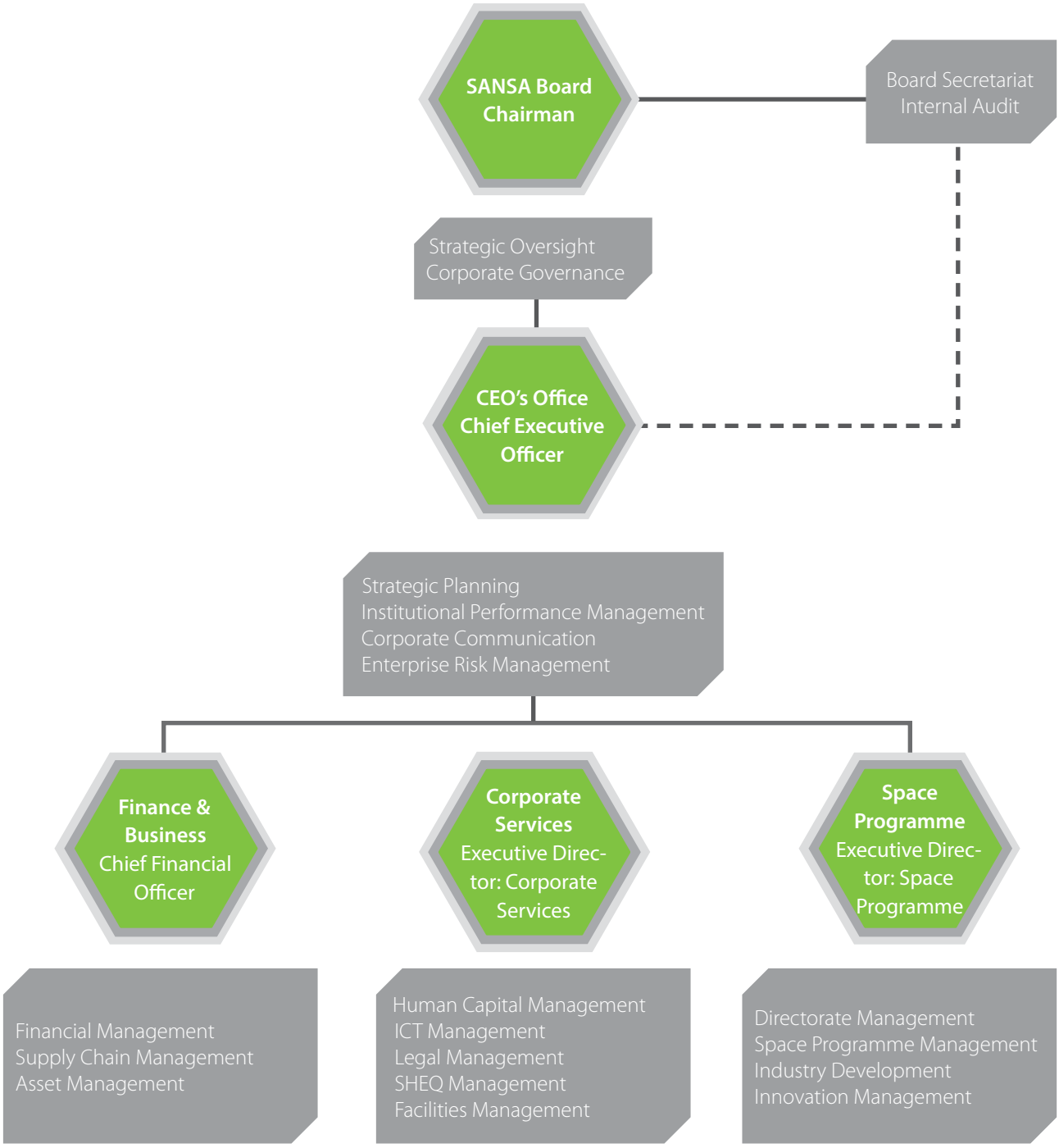
Goal		Key Performance Indicator	Reporting Cycle	Annual Target	Annual Actual	Reasons for Variance
Goal 4	Enhance the competi-tiveness of the South African s pace industry	T4.2.1. The number of direct jobs supported externally through SANSA programme contracting	**Annually**	**50**	**52**	Denel Spaceteq, which is contracted to build the satellite, employed two employees on a temporary basis to increase AIT capacity in support of the satellite build programme.
		T4.2.2. The progress status on the EO-Sat1 development project	**Annually**	**50%**	**37%**	Financial restrictions were applied to the contract until the full funding for the programme can be secured. Hence the contracted work was limited to the available funding. Further to this a repositioning strategy was developed to determine ways of reducing the costs on the programme. This was presented to the board for further negotiation with DST on funding the programme.
	Enhance the competi-tiveness of the South African s pace industry	T4.2.3. The total contract expenditure to SMEs for core space projects	**Annually**	**R12 million**	**R13 million**	Denel Spaceteq increased their sub-contracting to boost their AIT capacity and maintain progress on the project.
	Enhance the competi-tiveness of the South African s pace industry	T4.2.4. The total contract expenditure to the broad space related industry for core space projects	**Annually**	**R55 million**	**R77 million**	The Board lifted the restrictions on the full contract. This allowed SANSA to execute additional work packages to ensure progress on the programme.
Goal 5	Develop active global partnerships	T5.1. The equivalent revenue generated through partnerships as a proportion of the SANSA non-commercial operating revenue	**Quarterly**	**Actual**	**12 363 524**	The agreement between DST and BRICS secured the receiving of CBERS satellite data to the value of R4.1 million.
				Total	**196 741 813**	
				2%	**6%**	

Goal		Key Performance Indicator	Reporting Cycle	Annual Target	Annual Actual	Reasons for Variance
Goal 6	Ensure the growth and sustainability of SANSA	T6.1.1. Total non-ring-fenced SANSA revenue	**Annually**	**R200 million**	**R217 million**	SANSA secured additional international income from launch support services and also supported local public sector clients for value added remote sensing applications.
		T6.1.2. Estimated monetised impact per annum	**Annually**	**On hold**		Placed on hold due to technical and resource considerations.
		T6.1.3. SANSA's public value awareness	**Annually**	**60%**	**97%**	97% of the respondents are aware of SANSA programmes.
		T6.2. High-level NSP implementation progress status	**Annually**	**On hold**		Placed on hold due to technical and resource considerations.
Goal 7	Transform SANSA into a high performance Agency	T7.1.1. Implementation of identified initiatives that enhance organisational performance	**Quarterly**	**4**	**3.5**	Due to budget constraints and divisional needs taking priority only a few of the generic training plans could be implemented. Variance of 30% on succession planning activities as most have been informal discussions and limited PDPs have been put in place.
		T7.1.2. Proportional (%) representation of permanent staff from designated groups in the D to F grades	**Quarterly**	**65%**	**77%**	Targeted recruitment was successful coupled with a few resignations from the non-PDI category led to a SANSA wide actual that was more than expected.

PROGRAMME CONTRIBUTION AND HIGHLIGHTS

PROGRAMME 1: ADMINISTRATION SUPPORT

The Administration Support Programme provides management, administrative and technical support across all operating units. This facilitates operational efficiency and cost-effective management, aligned with sound governance principles and the seamless integration and collaboration between SANSA directorates. In this section we report only on the functional structure, legal and stakeholder liaison in the Administration Support Programme.



Administration Support Programme structure

LEGAL SERVICES

POLICY AND REGULATION

The Legal Unit represented the organisation as part of the Intergovernmental Working Group responsible for the review of the Space Affairs Act (Act 84 of 1993). The Working Group facilitated the review process and also drafted the proposed new Bill that will regulate and oversee space affairs and activities in South Africa. The proposed Bill, to be called the South African Outer Space Draft Bill, will be published for public comment in the 2017/2018 financial year.

SANSA was also represented as part of the South African delegation that participated in the 56th Session of the Legal Sub-Committee of the UNCOUPUS early in 2017, in Vienna, Austria. South Africa made various interventions and presented country statements on four agenda items. The country also made impactful interventions in supporting the Latin American States in their plea for the complete and undiluted reference of the segments or principles of the Outer Space Treaty to be used for the "Declaration on the 50th anniversary of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space" that will be made and celebrated at UNISPACE +50.

STAKEHOLDER MANAGEMENT

A stakeholder survey run at the end of the financial year indicates a 97% awareness of SANSA programmes by responding stakeholders. Additional questions around engagement was included to get clarity on how best to ensure access and engagement with stakeholders. Respondents were mostly from research or science councils followed by government departments, academia, industry and media, respectively. The responses indicate the stakeholders would prefer increased engagement with SANSA. Projects and partnership opportunities rate highest as the best means for engagement, followed by meetings and conferences/seminars.

The table below outlines the key relationships that were active or persued for the 2016/2017 financial year in terms of strategic stakeholder partnership.

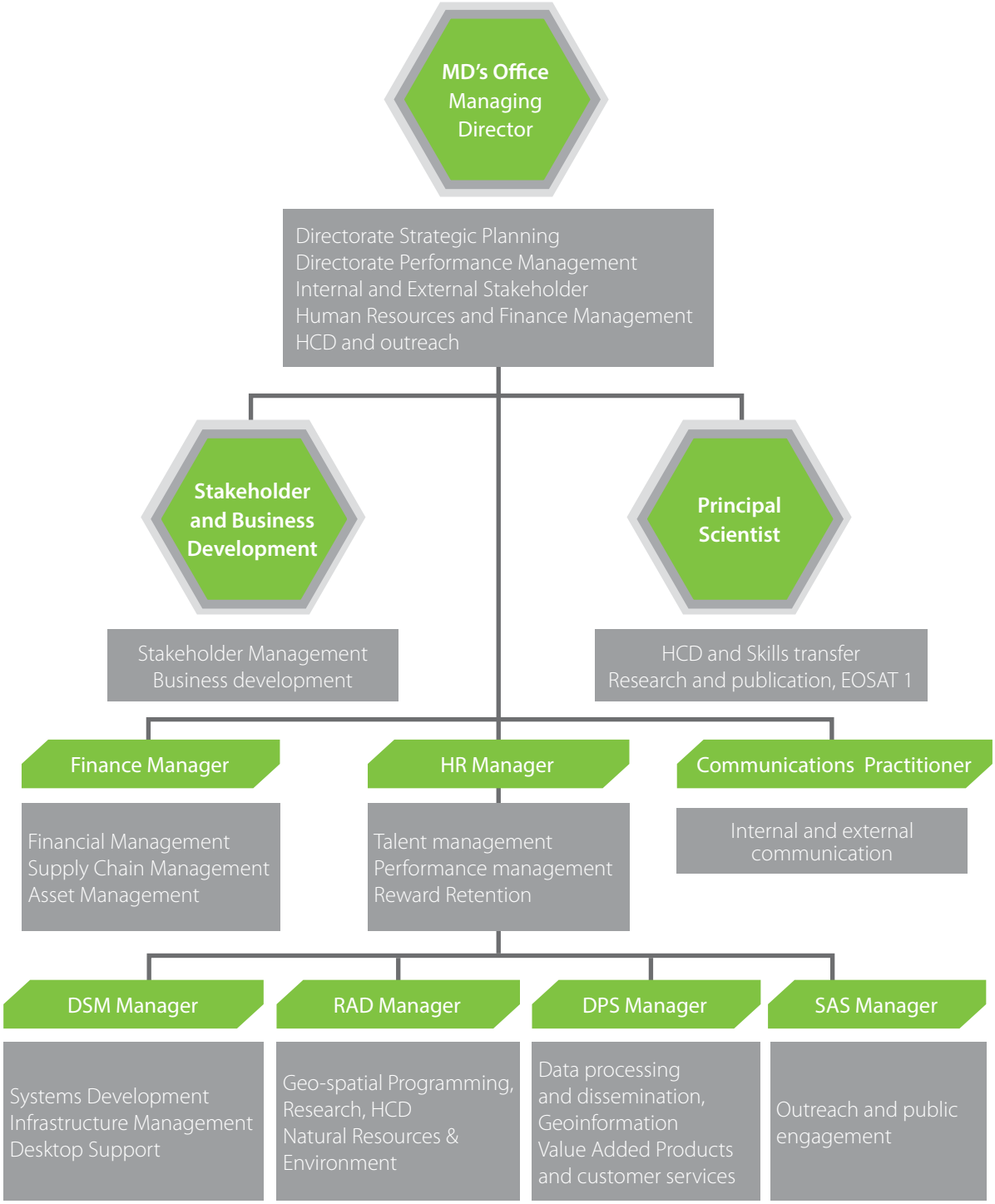
NO.	STAKEHOLDER	INSTRUMENT OF ENGAGEMENT	STRATEGIC INTENT	AREAS OF COOPERATION
1	German Space Agency (DLR, (Germany)	Framework Agreement	Aimed at building on the strengths of DLR to advance SANSA and to develop mutual beneficial projects.	EO, SS, SO, Capacity Building
2	National Aeronautics and Space Administration (NASA, USA)	Agreement	A mechanism through which SANSA is able to send South African students to NASA for internship.	Science advancement.
3	Joint Research Commission (JRC, Belgium)	MoU	Aimed at contributing more effectively to the exploitation of remote sensing technologies.	EO
4	CRESDA/INPE (China/Brazil)	MoU	Allows SANSA to distribute CBERS data to Africa.	EO
5	UK Space Agency (UKSA, UK)	MoU	The MoU provides a framework for mutual beneficial collaborative projects in space.	EO, SS, industry development
6	Chinese Space Administration (CNSA, China)	MoU	The MoU provides a framework for mutual beneficial collaborative projects in space.	EO, SS, industry development
7	State Space Agency of Ukraine (SSAU, Ukraine)	MoU	Framework for mutual beneficial collaborative projects in space.	EO, SS, industry development
8	National Resource Canada (Nana, Canada)	MoU	Aimed at developing and implementing joint projects in the space.	EO, SS
9	European Space Agency (ESA, Europe)	Agreement (under discussion)	Aimed at developing and implementing joint projects in space.	EO, SS, SO, industry development, science advancement
10	Canadian Space Agency (CSA, Canada)	MoU/ Framework Agreement (under discussion)	Aimed at developing and implementing mutual beneficial projects in space.	EO, SS, SO, industry development
11	Brazilian Space Agency (AEB, Brazil)	MoU (under discussion)	Aimed at developing and implementing joint projects with universities and industry on CubeSat development projects.	SE, industry development
12	Centre National deludes Spatulas (CNES)	MoU (under discussion)	Aimed at developing and implementing joint projects in space.	EO, SS, SO, industry development, science advancement
13	Algerian Space Agency (ASAL, Algeria)	MoU	Joint space projects.	EO, SE, capacity building

NO.	STAKEHOLDER	INSTRUMENT OF ENGAGEMENT	STRATEGIC INTENT	AREAS OF COOPERATION
14	Namibia University of Science and Technology (Pond, Namibia)	MoU	Joint space projects.	EO, SE
15	National Centre for Research (NCR, Sudan)	MoU (under discussion)	Collaboration on the margins of the ARMC, Sudan Space Policy development, training and human capital development in EO and Space Engineering.	EO, SE
16	National Authority for Remote Sensing and Space Science (NARSS, Egypt)	MoU (under discussion)	Collaboration on the margins of the ARMC and joint microsatellite development.	EO, SE
17	Council for Scientific and Industrial Research (CSIR, South Africa)	MoU	A requirement to establish a CoC in support of the satellite development strategy and payload development aspects of the EO-Sat1 mission.	EO, SS, SE, capacity building
18	South African Weather Service (SAWS, South Africa)	MoU	Facilitates effective and appropriate strategies for the systematic improvement of relevance of space applications with respect to climate and weather services in the country.	EO, SS, SO, capacity building
19	DENEL, South Africa	MoA	Denel SpaceTeq are commercial partners for the development of EO-Sat1.	Satellite Build Programme
20	Statistics South Africa (STATS SA)	Contract	For the development of data products and related services that will enable the successful execution of the national community survey that will be undertaken in 2016.	EO
21	Agricultural Research Council (ARC)	MoU (under discussion)	Facilitation for joint collaboration in GEO related activities and agricultural research.	EO
22	Department of Water and Sanitation (DWA)	Ongoing collaboration	Provision of satellite imagery in support of water services in the country, water related value-added products and provision of remote sensing training.	EO
23	Department of Public Service and Administration (DPSA)	MoU	Provision of satellite imagery in support of government service delivery.	EO
24	Council for Geoscience	MoU (ready for signature)	Joint geoscientific projects.	EO, SS
25	New Partnership for Africa's Development (NEPAD) Agency	MoU concluded	Provision of a support role to the NEPAD Agency using EO technology.	EO

Stakeholder relations at SANSA

PROGRAMME 2: EARTH OBSERVATION

Programme structure, functional scope and strategic objectives



Earth Observation Programme Structure

EARTH OBSERVATION FUNCTIONAL SCOPE

SANSA acquires, archives, processes and distributes imagery and products to government entities, R&D institutions and higher institutions of learning. This ensures the supply of cost-effective data and information to government departments in support of various national imperatives. In addition, the availability of processed imagery to stakeholders, such as research councils and academic institutions, enables these organisations to utilise all the multi-government licensed imagery at no additional cost. SANSA also provides HEIs with geospatial resources for student training through its FDP to promote the use of spatial information at tertiary level.

Earth observation, as a source for geo-information, contributes to the management, sustained utilisation, preservation and understanding of natural resources; improved health, safety and security; disaster management: forecasting, monitoring and mitigation; increased R&D data stock and value-added data products and information; and the provision of decision-making, policy-making and planning instruments for government and other stakeholders. Collectively these elements contribute to a vast array of socio-economic benefits and improved livelihoods.

The impact of EO lies in providing:

- Essential EO services for socio-economic benefit, including water, environmental and other natural resources management, disaster management, and health, safety and security management and environmental change, including climate change.
- Data and value-added remote sensing services for research and development in EO applications.
- National geospatial information aiding better decision making in support of key government priorities.
- Human capital development and science advancement in geo-informatics, image and data processing and remote sensing.

CORE FUNCTIONS

The core functions of the EO programme include:

- Contributing to the implementation of the South African Earth Observation Strategy (SAEOS).
- Maintaining a long-term archive of satellite data for national benefits that is essential for change detection for better understanding environmental change in time and space.
- Continuous data acquisition from South African and global EO satellites.
- Coordinated procurement of satellite data and distribution of data/images to government departments, national R&D institutions and higher education institutions.
- Processing and production of value-added satellite image and information products and services for various geo-information applications.
- Continuous improvement of in-house processing chains and reference datasets to higher geometrical accuracies using improved digital surface and elevation models.
- Development and maintenance of easily accessible and efficient distribution channels of value-added image products through catalogue systems.
- Development of human capital to advance the above and meet the skills need of the country.
- Advancement of science among the youth and the public.
- Development and maintenance of international partnerships for the advancement of the above objectives.
- Contribute to the development of innovative EO sensors.
- Development of EO applications as per stakeholder needs.
- Participation and contribution to regional and international Earth observation fora such as AfriGEOSS, Group on Earth Observations (GEO) and the Committee on Earth Observation Satellites (CEOS).

KEY ACTIVITIES AND IMPACTS

EO DATA ACCESS AND INFRASTRUCTURE

22 857 images were distributed to various stakeholders during the financial year. There was a significant increase in the last quarter due to the distribution of the Fundisa Disk that is disseminated to various universities to contribute to academic research and supplement the learning of GIS and remote sensing professionals of the future. Apart from universities, these images were also disseminated to various stakeholders, including government departments, state institutions, as well as research institutions. The data that was distributed was acquired from various sensors including SPOT2, SPOT4, SPOT5, SPOT6, SPOT7, Landsat5 and CBERS-4. SANSA has also disseminated the following value added products in the current financial year: the National Human Settlement Layer, the National Vegetation Density Layer, and the National Flood Risk Layer.

These data and value added products enable these institutions to fulfil their constitutional mandates, and also support a number of national thematic areas of focus. Below follows a brief description of the impact that EO data and products have made this financial year to the various end-user departments and institutions:

- Department of Water and Sanitation (DWA) was provided with the SPOT6/7 National Mosaic, the National Human Settlement Layer, the National Water Bodies Layer, as well as the national vegetation density maps. These key data sets enable the Department to manage the country's water resources in an efficient and effective manner through mapping the location of water bodies in the country, enabling assessments of water levels in rivers and dams, as well as establishing the quality of the water in these water bodies. This enables the Department to fulfil the requirements of the National Water Act.
- The Gauteng Provincial Government (GPG) received the SPOT data, the Human Settlement Layer, the Flood Risk Layer, as well as the 30m Digital Elevation Model. The Development Planning and the GIS functions in the GPG are coordinated within the Premier's Office, where a number of strategic programmes are being supported, including the development and implementation of the Gauteng Spatial Development Framework (GSDF) that drives spatial development in the province. The base data sets developed by SANSA have proven to be useful in supporting the implementation of the GSDF.
- Eskom uses the SPOT data to plan the distribution of electricity and to monitor encroachments on their servitudes around powerlines.
- CSIR (Meraka Institute) supports the development of other downstream applications through the use of SPOT data that they receive from SANSA on a regular basis. SANSA recently provided Meraka with historical SPOT imagery from 2008 – 2015, to support projects that they undertake on behalf of their clients.

Forty fire reports were developed. These reports contained details on the origin and extent of the fires. Fire investigations are a value-added service that is proving to be sought after.

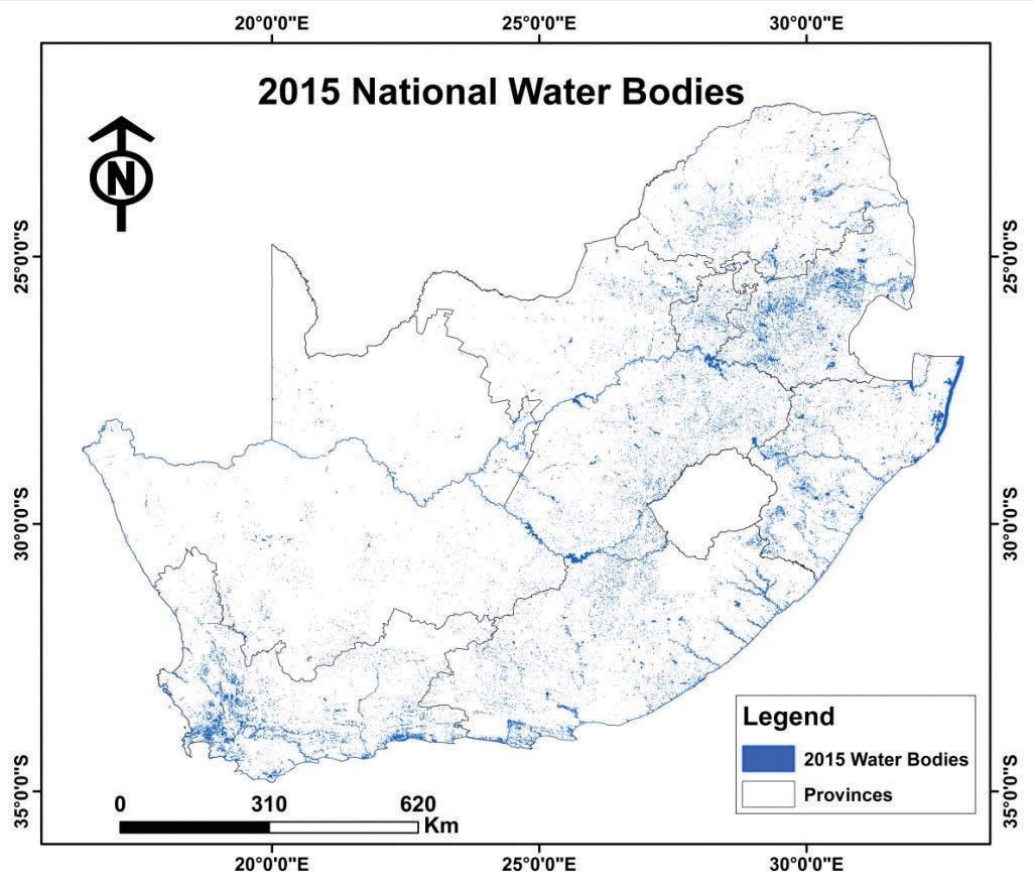
Engagements with key government stakeholders have taken place during the period under review, with the purpose of strengthening relations and entering into agreements that will facilitate the provision of EO products and services. Engagements were initiated with the Development Bank of Southern Africa (DBSA), the NEPAD Planning and Coordinating Agency, as well as the Municipal Demarcation Board (MDB). It is envisaged that MoUs will be signed with these institutions in due course.

SANSA has been invited to participate in the Education and Training Sub-Committee of the Committee of Spatial Information, an initiative aimed at facilitating access to spatial information for all stakeholders in the geo-information industry. SANSA envisages participating in the Data Sub-Committee as well, in the context of the Agency being recognised by the Spatial Data Infrastructure Act as a custodian for satellite imagery.

NATIONAL GEOSPATIAL PRODUCTS

SANSA completed the development of a National Flood Risk Layer. The potential flood map was developed from the Height Above Nearest Drainage (HAND) product, which is hydrologically relevant elevation data based on topography.

The layer shows areas that are likely to get flooded in case of heavy rains when the water level rises by 1m, 3m and 5m. The layer can be used by disaster authorities to improve preparedness efforts, warning and response during floods. This layer was distributed to National Joint Operational and Intelligence Structure (NATJOINTS) members to improve decision making relating to floodmanagement. Value-added services and products from this layer are being investigated to support disaster management stakeholders.

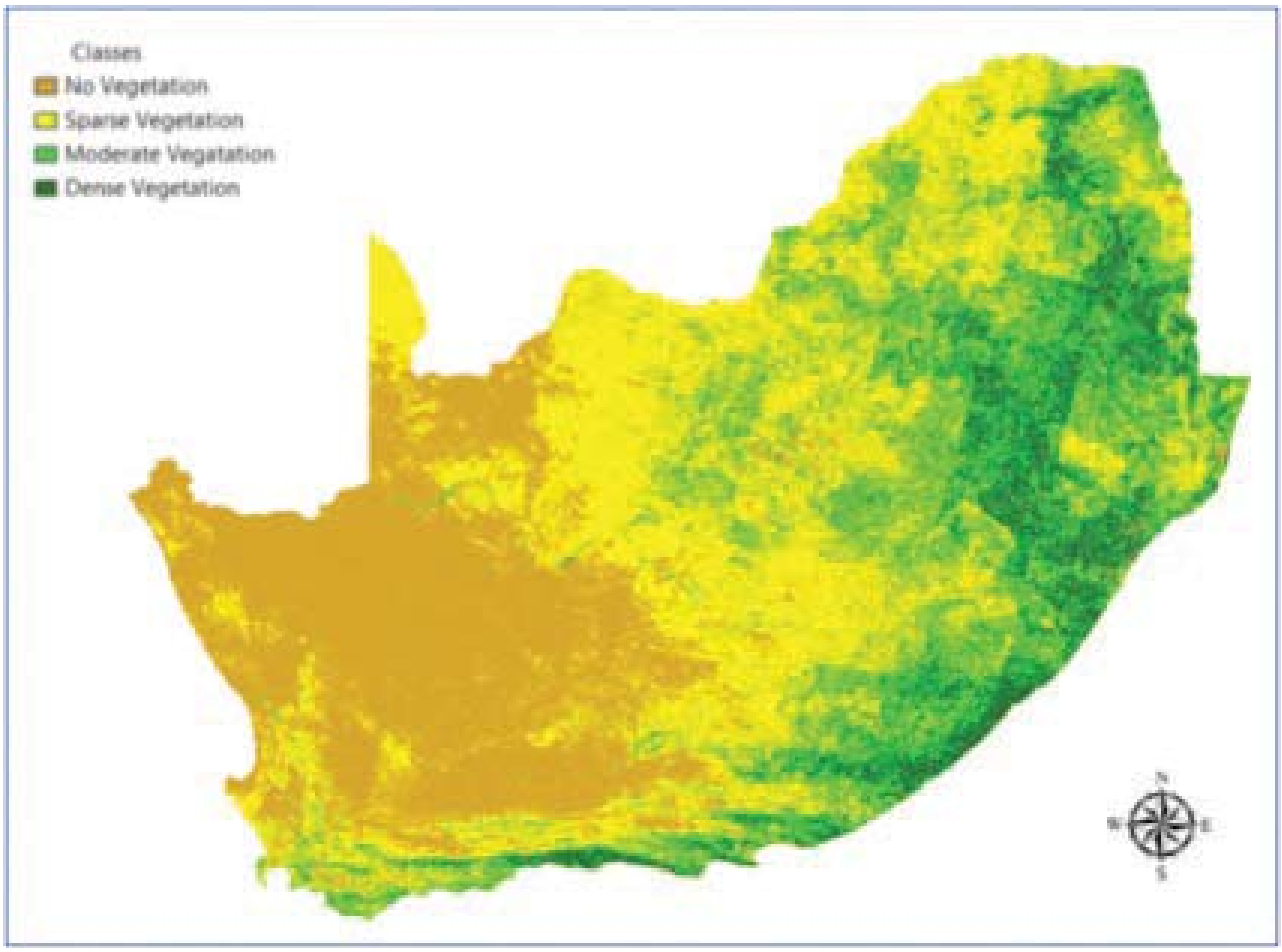


National flood risk map layer

SANSA continues to make great strides in demonstrating the use of EO technology in food security through the Crop Watch (CW4SA) project. This project aims to increase food security by providing support for improved decision-making in the planning, conduct and monitoring of agricultural production activity.

Potential Crop Watch users including the Grain Farmer Development Association (GFADA), Mobbisurance, Senwes, Cotton South Africa, the Department of Agriculture, Forestry and Fisheries (DAFF), and the Department of Rural Development and Land Reform (DRDLR) are being engaged, to consolidate their specific user needs. A six-month pilot study is being implemented with Senwes, as part of a sustainability work package for the CW4SA project. In this pilot study, Crop Area Land Fraction (CALF) products are being developed and relevant statistics are provided twice a month over eight selected areas of interest. This product allows Senwes to estimate the total planted area and to monitor crop stress in different farms, which enable them to establish the capacity required to process maize from the farmers in the different silos.

Various biophysical parameters were developed and distributed to key stakeholders including National and Provincial Departments of Agriculture. In addition to crop condition parameters SANSA developed methodologies to produce a national vegetation density map using Landsat 8. This layer can be used as a base dataset during environmental monitoring studies. This product will be available on the Web Mapping Portal to promote their use by decision-makers.



National vegetation density map

South Africa experienced effects from cyclone Dineo in early 2017 and SANSA participated in the NATJOINTS committee, which comprises of the National Disaster Management Centre (NDMC), national departments and the SANDF. This activity demonstrated the value of EO during natural disasters. Sentinel 1 images taken during the cyclone were processed and a layer showing settlements that were exposed to flood risk was produced and shared with the committee members. SANSA will continue engaging with the NDMC and provide them with products that can assist in reducing the negative impact of floods.

The Agency continued to improve methodologies to extract human settlement data from SPOT 6 satellite imagery and demonstrated the application of human settlement data through development of value added products. Following the participation at the UN Data Forum, SANSA began investigating how this human settlement product could assist in deriving the SDG indicators such as the investigation of indicator "11.3.1: Ratio of land consumption rate to population growth rate".

The figure below indicates the results achieved using human settlement layers derived from 2007 and 2012 images. The results show spatial urban growth versus pollution and land consumption (LC) within the three metropolitan municipalities in Gauteng.

Results achieved using human settlement layers derived from 2007 and 2012 images

SANSA investigated how the national base products could assist in achieving the country and continent's development goals.

The methodology to extract water bodies was enhanced and used to develop a 2016 Water Body Layer. This layer provided DWA and other users with base data to improve water management activities in the country and understand the spatio-temporal changes of our water bodies, which may inform future policies aimed at conservation and management of this scarce resource.

In addition to the development of value added products, an Online Web Mapping Portal was created to allow users to access the products online and run necessary analyses. The web mapping portal with all base layers was deployed with input from the users.

HUMAN CAPITAL DEVELOPMENT AND CONTRIBUTION TO NEW KNOWLEDGE

The CEOS Working Group on Capacity Building and Data Democracy (WGCapD)-JICA Radar Remote Sensing Training Workshop and Advanced Training on Sinkholes was hosted by SANSA. Ten participants from nine countries (Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia, and Zimbabwe), as well as nine participants from South Africa joined the workshop. The participants were divided into two groups based on their experience on the Synthetic Aperture Radar (SAR), and joined a basic course and an advanced course respectively. The advanced course focused on sinkholes, which has been one of the serious problems in South Africa while participants of the basic course learned about the basic knowledge and techniques to handle SAR data.

Participants at the CEOS WGCapD-JICA Radar Remote Sensing Training Workshop and Advanced Training on Sinkholes

NATIONAL AND GLOBAL PARTNERSHIPS

SANSA signed a MoU with the Namibian Ministry of Agriculture, Water and Forestry. A collaborative project on water body change detection is currently underway. The water body detection methodology will be used to detect and assess spatio-temporal changes over the selected dams.

SANSA is the co-chair of the AfriGEOSS working group on Sustainable Urban Development with support from representatives from GEO, the United Nations Economic Commission for Africa (UNECA), Housing Development Agency (HDA) and the African Regional Centre for Space Science and Technology Education in English (ARCSSTE-E). The working group will focus on matters relating to the use of EO in urban development, including understanding African requirements in support of urban development, as well as the AU agenda 2063 and the UN 2030 agenda; identifying ongoing relevant initiatives in the continent and outlining linkages with international programmes such as GEO. SANSA and DST launched the working group on human settlement that will focus on the use of EO in urban development. The meeting included representatives from the CSIR, Eskom, the Limpopo Office of the Premier, the South African Environmental Observation Network (SAEON), the Department of Performance Monitoring and Evaluation (DPME), GeoTerraImage and Statistics South Africa (STATS SA).

Members of the SA-GEO Human Settlement Working Group

As members of the Operations Phakisa Steering Committee, SANSA collaborated with the CSIR in developing user requirements for SAR data in support of maritime domain awareness application for the Oceans Economy. These user requirements will form the basis for the acquisition of SAR data in support of Operations Phakisa for the Oceans Economy.

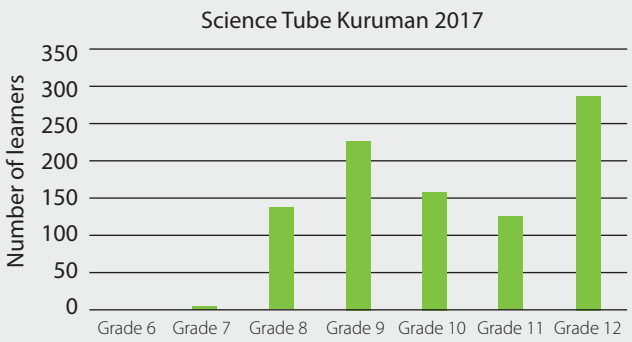
A SANSA representative was nominated to the task team to develop the implementation plan of the African space programme. The team, comprising volunteers from space agencies across the continent, has been tasked with the identification of user requirements and completing a gap analysis, which will lead to the identification of suitable activities for the continental space programme. An EO audit survey was distributed electronically and surveys for space science, space engineering, telecommunications, navigation and positioning and astronomy will be launched in the next financial year.

SCIENCE ADVANCEMENT

The EO team engaged with youth in the Northern and Eastern Cape provinces through partnership with Science Beyond Borders who organised the Science Tube science festival in Kuruman, Northern Cape, to reach out to learners from 24 schools at the Thabo Moorosi Multipurpose Centre in Mothibistad during February 2017.

The team also visited the Mothibistad Science Centre, which was one of the science centres that received SANSA training in 2016 and conducted some further training for the staff of the science centre, including installation of the satellite simulation software to help the staff to conduct space science and technology outreach activities.

The following figure indicate the statistics of the learners and schools reached in Kuruman during Science Tube.



The distribution of learner grades reached during Science Tube 2017 in Kuruman

In order to leverage resources from the National System of Innovation, SANSA has been engaging with the South African Repository for Astronomy and Space Science Educational Materials (SARASSEM) organised by the NRF, the South African Agency for Science and Technology Advancement (SAASTA) and the DST Science Promotion unit. The outreach team has coordinated the development of two posters contributed to SARASSEM for printing and distribution to schools targeting grades 4 – 7 learners nationwide.

SANSA took part in the Perfect Life Expo that was held at five schools around Pretoria, Gauteng, during February and March 2017, which exposed learners from 19 Tshwane schools to careers in space science and technology.

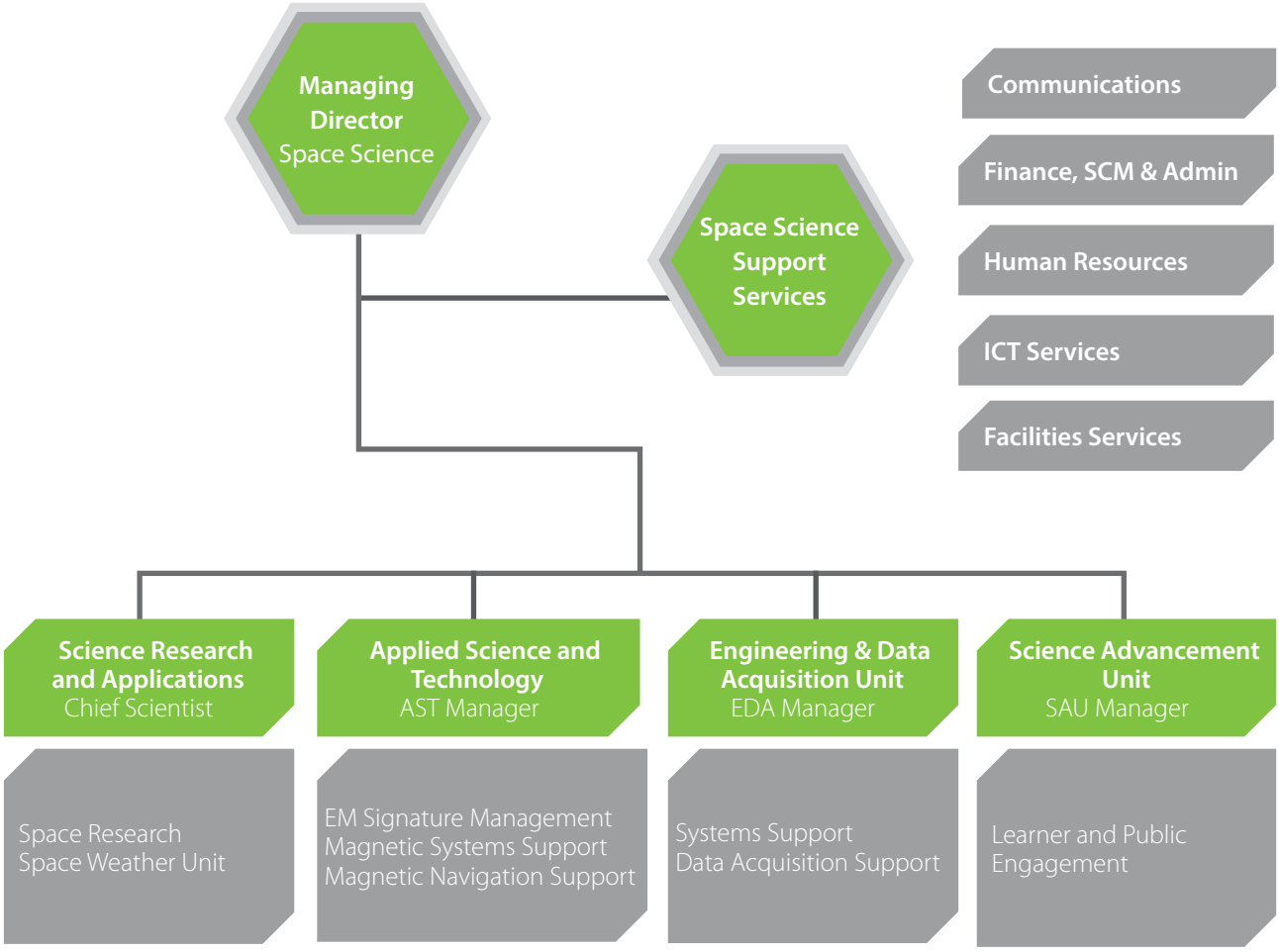
The team engaged directly with 380 youth at the Scifest Africa 2017 science festival in Grahamstown during March 2017.

PROGRAMME 3: SPACE SCIENCE

PROGRAMME STRUCTURE AND FUNCTIONAL SCOPE

The **Space Science Programme** leads multi-disciplinary space science research and applications. Key functions include fundamental and applied space science research, the support of space facilitated science through data acquisition, the coordination and administration of scientific data, and the provision of space weather and magnetic technology products and services on a commercial and private basis. Through the Space Science Programme, SANSA contributes to the worldwide network of magnetic observatories responsible for monitoring the Earth's magnetic field, and participates in global scientific projects. The programme also provides leadership in post-graduate student training as well as providing science advancement, public engagement, and learner and educator support with STEM subjects.

The programme structure for the Space Science Programme is as follows:



Structure of Space Science Programme

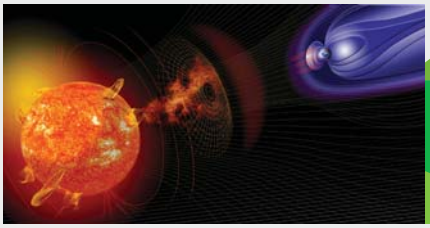
The Space Science Programme can be described in terms of three main components as follows:

Space Weather, Geo-space Data Services & Spare Research

Functional space weather centre
Space weather services
Geomagnetic services
Space Environment research

Space Research Instrumentation and Data management

Geophysical Instrumentation Support
Data collection and processing
Data archiving and distribution



Applied Science and Technology Services

Magnetic navigation ground support
Magnetic system integration
Electromagnetic signature management

Space Science Functional Areas

KEY ACTIVITIES AND IMPACTS

SPACE SCIENCE RESEARCH

SIGHTINGS IN SPACE SCIENCE

Coexistence of negative and positive polarity solitons and the existence of supersolitons for high frequency nonlinear disturbances associated with the fast electron-acoustic wave were discovered. This is a novel finding as previously co-existence and supersoliton existence was only reported for low frequency (ion-acoustic) and ultra-low frequency (dust-acoustic) wave phenomena.

New regional geomagnetic field models for Southern Africa based on magnetic field survey data for 2015 were derived. These models determine both the main field as well as secular variation for D, H, and Z components for the period 2015 until the end of 2016. These routines were subsequently incorporated into the existing regional geomagnetic field model for Southern Africa, which now spans the time interval 1975 – 2016. This contributes to SANSA's ability to identify and model abrupt changes in the Earth's magnetic field in a region strongly influenced by the South Atlantic Magnetic Anomaly.

In collaboration with Eskom, the Magnetotelluric Measurement Station at the Koeberg Power Plant was upgraded to enable the collection of data from the installation that enables the estimation of the surface impedance of the ground at Koeberg. This is an essential parameter in the modelling of geomagnetically induced currents (GICs) in the South African power network, and for the verification of the algorithms SANSA developed to estimate GICs.

Researchers investigated the use of radio occultation data in studying ionospheric peak parameters on a long term scale. Ionosonde F2 peak parameters were compared with radio occultation derived data from 2003 to 2015 over Grahamstown, South Africa. It was shown, for the first time, that the quality of radio occultation data is not degraded significantly over mid-latitude regions and can therefore be used in regions devoid of ground-based

instrumentation such as ionosondes. This is a useful result as it opens new opportunities for studying regions over ocean areas and mid-latitude regions in the northern hemisphere of the African continent.

SPACE WEATHER APPLICATIONS FOR DEFENCE

A critical factor for the SA Navy in meeting its mandate to defend and protect the country with a professional and cost-effective maritime force, services and facilities, both in times of war and of peace, is information superiority.

IMPACT

The nature of the SA Navy's mandate requires that its formal communication is conducted securely at all times. Communication mustering, therefore, is very important to safeguarding the integrity of communication within the SA Navy. SANSA's customised tools for the SA Navy are using space science and technology for the eventual benefit of all the citizens of our country.

A fast and efficient flow of information enables the SA Navy to protect and preserve its own information assets and increase its situational awareness and interoperability.

SANSA responded to this need with the development of customised tools that enable the SA Navy to use space weather information to more effectively communicate with its vessels at sea.

The initial National Communication Tool (NCT) was developed in 2014 as a demonstrator of a space weather tool. The success of its application gave rise to the development, during the past two years, of the Broadcast Communication Tool (BCT) in consultation with the SA Navy and Armscor. The final BCT was delivered to the SA Navy and installed for use in September 2016.

Since then, the NCT has been upgraded to use the same prediction engine with similar capability as the BCT. The new NCT was installed for use in February 2017. Naval operators can now create multiple sets of frequency predictions between shore stations and vessels at sea instantaneously. The tool that is intuitive and highly efficient, yet easy-to-learn and employ under demanding operational conditions, while producing frequency predictions with unprecedented degrees of accuracy.

Once more, SANSA is using space know-how to provide solutions for the defence sector, which is aligned with our mission to use national space science and technology programmes and implement space-related activities that benefit the citizens of South Africa.

MAGNETIC TECHNOLOGY FOR NAVIGATING SKY AND SEA

From helping marine vessels avoid explosive sea mines, to assisting aircraft find their way through the Earth's magnetic field, SANSA's Applied Science and Technology (AST) Unit uses its unique expertise to demagnetise and calibrate compasses. A division of SANSA, AST has been the true north of South African navigation for decades.

SANSA assist clients with integrating and calibrating sensors on board dynamic platforms such as aircraft, unmanned aerial vehicles (UAVs), ships or combat vehicles. Such sensors include the simplest magnetic sensor of all, the humble compass which can be found in any aircraft or marine vessel. These vehicles are made from magnetic materials and accumulate additional magnetism by travelling through the Earth's magnetic field, which affects compass readings. SANSA provided 155 unique calibrations to help clients compensate for this magnetism.

SANSA also provided 20 training courses for the armed forces, helping them navigate the concept of magnetism so they can perform compass calibrations themselves. International safety regulations require that there be mechanical compasses on board all aircraft and marine vessels, in addition to the modern GPS systems and electronic compasses. SANSA also provided training courses to the local aviation industry on how to perform aircraft compass swings; a procedure where the magnetism of the aircraft is measured and calculated and the aircraft's compass is adjusted accordingly.

Completing the same process for a marine vessel is much more complex. Currently there are very few marine compass adjusters in Southern Africa with the necessary skills to perform such compass calibration for marine vessels. It is for this reason that the South African Navy is working with SANSA to train more qualified marine compass adjusters in South Africa, through an accredited Australian company that provides correspondence courses.

Reducing the magnetism of a marine vessel is vital as it can trigger active sea-mines that can still be found in certain locations at sea. Thus, it is in the interest of the SA Navy to measure and manage the magnetic signature of their vessels. SANSA assisted with 1 deperming procedure for the SA Navy to ensure the management of magnetic signatures of marine vessels. Vessels are treated magnetically at a degaussing measurement facility, where

the deperming of marine vessels and other systems is achieved by wrapping the whole object in copper coils and using high currents in a specific procedure to reduce the magnetism of the object.

The deperming process of vessels and other platforms are usually conducted on an annual basis but sometimes a platform can get magnetised so quickly that more regular deperming is needed. Factors such as heat, vibration, corrosion and lightning strikes can accelerate the rate at which deperming is needed.

Overall, the deperming procedure makes a significant contribution to the country's safety and security. The services of SANSA's AST Unit will prove valuable to both the public and private sector for the foreseeable future.

SANSA works with the SA Navy to ensure their vessels are demagnetised to avoid triggering explosive sea mines

ANOTHER EYE TOWARDS THE SKY – UNVEILING SOUTH AFRICA'S OPTICAL SPACE RESEARCH LABORATORY

SANSA's robust endeavours to strengthen the country's role in multinational space science research, this time specifically in upper-atmosphere studies, come to fruition with the unveiling of the Optical Space Research (OSR) Laboratory at the South African Astronomical Observatory (SAAO) in Sutherland.

Research of the Earth's atmosphere and ionosphere is crucial for understanding our near-Earth space and the interconnected processes that govern our natural environment and its impact on the technology we rely on daily. One of the areas the OSR Laboratory will be used to study is atmospheric gravity waves in order to gain greater insight into the dynamics of the Earth's middle atmosphere. Such knowledge is important because the middle atmosphere couples space weather from above with the terrestrial weather below.

The laboratory houses specialised research equipment, including an airglow imager to observe atmospheric gravity waves in the mesosphere through a variety of wavelengths; night-vision video cameras to observe sprites in white-light and multiple wavelengths; an Extremely Low Frequency (ELF) receiver to observe lightning and sprites in the ELF spectrum; a mesospheric temperature mapper to estimate mesospheric temperature and a SBAS receiver for aircraft navigation.

This facility will add significantly to our knowledge about the Earth's upper-atmosphere and further enable SANSA to leverage the benefits of space science and technology for socio-economic development, environmental conservation and space asset management in service of humanity.

The DLR, SAAO and SANSA teams at the South African Optical Space Research Laboratory

NEW DATA AND INSTRUMENTATION MANAGEMENT SYSTEM SET TO CONTRIBUTE TO GLOBAL RESEARCH PROJECTS

A wide range of space monitoring instruments is operated by SANSA, forming a geophysical network across Southern Africa and the South Atlantic Ocean, providing valuable space science data for national and international research projects. The instrumentation network provides valuable data for a wide variety of applications, such as in space weather, which contribute to the defence, communications and aviation sectors. The data is also used for important international modelling projects and national and regional research projects undertaken at universities and other research institutions.

IMPACT

The SANDIMS will meet national and international obligations and expectations, as well as raise the standard of South African research. The system's unique database will contain high-quality data from areas in space that, potentially, could supply information for unanswered scientific questions and enhance scientific development.

SANSA's geophysical network includes an array of instruments located at the South African Antarctic research base, SANAE IV, which monitors space weather and the Earth's atmosphere and four permanent geomagnetic observatories – two in South Africa (Hermanus and Hartebeeshoek) and two in Namibia (Tsumeb and Keetmanshoop) – which monitor the time variation of the Earth's magnetic field. SANSA also collects geomagnetic data from 40 geomagnetic repeat stations across southern Africa (South Africa, Namibia and Botswana). Studies from this data shed light on the rapid decrease of magnetic field intensity observed at the Earth's surface stretching across southern Africa and the South Atlantic Ocean. All four observatories are accredited by INTERMAGNET which requires that data is provided to the international geomagnetic community in real-time and at a certain acceptable standard and quality.

During the last financial year, SANSA has made significant strides in developing the SANDIMS, which will essentially control the Agency's instrumentation network used for research and application purposes. A preliminary workable version with operating hardware will be ready in late 2017.

The new instrumentation system will collect, archive and distribute the ground-based space data recorded by the geophysical network and host mirror databases of international networks. In addition, SANDIMS will provide easier access to international ground-based space data, not only to South African researchers and institutions, but also to the non-space community to more efficiently and effectively use space data for non-space applications, such as magnetic declination mapping. The system will also be a valuable resource for student and cross-disciplinary intern projects and contribute to the training needs of the country.

The SANDIMS project includes all aspects of the development and implementation of the system, such as instrumentation management and control; data policy review and development; system design to accommodate different data types and volumes; and data archiving, distribution and quality control. Additional attributes include a reliable data storage hardware platform, back-up (including an off-site back-up for disaster recovery) and redundancy and server storage to host international complimentary databases to provide South African stakeholders with ready access to national and global data.

A compact disc with a standard set of geophysical data and algorithms for processing the data will be distributed to all universities, so that researchers at remote universities will, for the first time, be able to conduct research projects without having access to equipment or a space science specialist. When coupled with an online "speak-to-a-scientist" blog, students today will become the research users of tomorrow, which will increase the user base for SANDIMS.

The system will be available as a national research facility and academic and research institutions will not be charged for its use. Research proposals to use the facility will, however, be scrutinised to verify quality and a focus on national research priorities. Depending on the amount of data and level of processing required, commercial users will be charged for the data, but not the time spent on the system.

The SANDIMS will essentially control SANSA's instrumentation network used for research and application purposes

FROM AFRICA, FOR AFRICA – CONTRIBUTING TO SCIENCE AND THE WORLD COMMUNITY

Early-career research excellence has again seen SANSA researcher, Dr John Bosco Habarulema, as the recipient of an award from the American Geophysical Union (AGU) – this time as one of two winners of the prestigious 2016 Africa Award for Research Excellence in Space Science.

The American Geophysical Union (AGU) is a not-for-profit, professional, scientific organisation with nearly 60 000 members in 139 countries. The AGU advances the Earth and space sciences for the benefit of humanity through scholarly publications, conferences and outreach programmes. AGU's Honours Programme recognises outstanding contributions to advancing Earth and space sciences, service to the community and the public understanding of science

Established in 2015, these twin awards – in space science and Earth/ocean sciences – recognise early-career scientists from the African continent for outstanding contributions to research in Earth and space sciences.

John attended the annual Honours Ceremony and Banquet at the 2016 AGU Fall Meeting in San Francisco on 14 December 2016 to receive his award.

As a NRF Y1-rated scientist with a Doctorate (PhD) in space physics, one area of research which John is focused on is gaining a better understanding of the physical mechanisms that drive ionospheric and plasmaspheric electrodynamics particularly over the African region and on a global scale in general. The AGU award recognises not only his contribution but also that of his colleagues and postgraduate students at SANSA and highlights SANSA's commitment and contribution to the advancement and generation of knowledge in space science research.

In 2014, John was the first African recipient of the International Sunanda and Santimay Basu Early-Career Award in Sun-Earth systems science for his contributions to ionospheric physics and space weather, while at the time also contributing to space science education and research in Africa.

John's contributions to science and the world community are outstanding and have also helped SANSA and the AGU take a further step toward strengthening space science and technology for a sustainable future.

Dr John Bosco Habarulema, award winning space science researcher at SANSA, and recipient of the prestigious 2016 AGU Africa Award for Excellence in Space Science

SPACE STORMS COULD COST ECONOMIES BILLIONS

A severe space weather storm could cost billions of dollars a day through electricity blackouts, communication failures and disruption of commercial aviation, according to a recent study. SANSA is working with the industry in South Africa to ensure the country is better prepared for such events.

In the UK, space weather is listed on the National Risk Register – it's regarded as a disaster. SANSA is working to ensure that space weather is recognised as a high impact, low probability national disaster and that it is included in the Disaster Management Act (Act 57 of 2002).

SANSA recently completed a policy brief on space weather risks to the aviation sector, which will help to inform policymakers and the CAA about the urgency of planning for severe space weather storms. This forms part of SANSA's research focus and aims to address the impact of space weather on the aviation sector and its associated industries.

The agency is collecting data to get a better idea of the economic impact of space weather in South Africa and is working with industry to determine ways of mitigating the impact. It's an important and pressing task: by 2018 the International Civil Aviation Organisation (ICAO) will require that national civil aviation authorities ensure that space weather risks are included as part of international flight plans.

The most pressing space weather concern is solar storms, which can wreak havoc on our modern world such as power grid blackouts, satellite malfunctions, global navigation systems errors, and communications blackouts. In aviation, there are four key risk areas to consider - communication, navigation, avionics and radiation exposure.

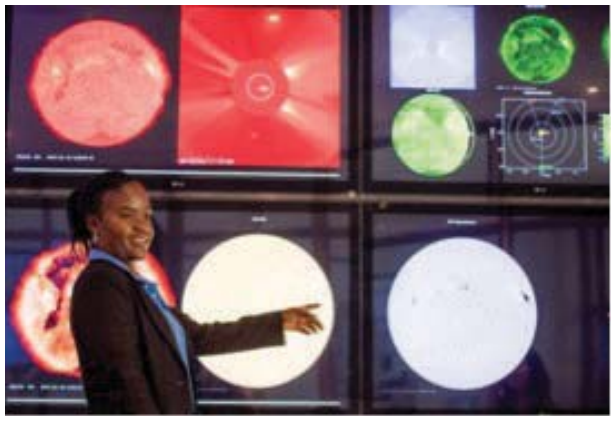
High frequency and very high frequency radio communication, as well as ground- and air-based navigation systems, can be affected or knocked out entirely by solar storms. Delicate electronics can also be damaged, and radiation exposure poses a hazard for crew and passengers especially for long haul flights.

All of these effects can have serious consequences for pilots, crew and passengers, but the impact does not end there – space weather can have a major knock-on effect on airline companies and airports.

SANSA is building a model for South Africa that describes this interdependency, so that the agency can start to predict the effects of a space weather event on various areas of the South African aviation industry. At the same time SANSA is building relationships with the civil aviation authority, domestic airlines, and the international space weather risk community.

The Agency is committed to ensuring the aviation industry understands the risks related to space weather, what to look out for and what to expect. The necessary information will be provided to enable key decision makers to make informed decisions and ensure they know what to look out for and can then decide on how best to mitigate the impact of space weather effects.

The US has estimated the economic impact of a severe space weather storm to range from USD ten billion to USD two trillion during the first year alone, with recovery times of four to ten years. Scaling this to an estimate for South Africa, these numbers could be translated to R one to two trillion during the first year alone. While these examples only provide approximate costs of the impact they do illustrate the potential risk to the economy resulting from a space weather event.



SANSA's Space Weather Centre is looking at how space weather will affect the aviation industry

SCIENCE ENGAGEMENT FOR A BRIGHTER FUTURE

Once again this year, the third quarter of 2016 saw the staging of two flagship events on the national and global science and technology calendars – National Science Week and World Space Week. Locally, the events brought together the role players, decision-makers and scholars involved and interested in science and technology and showcased local and international achievements in this dynamic field of endeavour.

NATIONAL SCIENCE WEEK (NSW)

National Science Week (NSW) is a DST initiative that involves stakeholders and role players in science-related activities to showcase the benefits of science to society. The theme for NSW 2016 was "Science for Sustainable Development and Improved quality of Life" and took place from 8 –13 August.

DST Minister, Naledi Pandor attended the event that reached more than 3,000 learners from across the province with messages about the importance of science and technology in sustainable development and quality of life in her opening address at the NSW launch event at the University of the Western Cape on 6 August 2016.

In addition to hosting an exhibition at the main event, SANSA hosted a number of space science-based activities throughout the 8 –13 August focus week, including school visits, public talks, a community day and an open day in Hermanus, which reached a total of 690 members of the public.

SANSA's NSW Open Day included fun, hands-on activities such as satellite, rocket and planet building, soldering of LED flasher kits, engaging with exhibits in the science centre and launching water rockets. Visitors were also treated to "Speed Chat a Scientist" and a fascinating talk on space spin-offs

WORLD SPACE WEEK (WSW)

WSW is the largest public space event on Earth and is celebrated annually across the globe from 4 – 10 October, as declared by the UN in 1999. Themed "Remote Sensing – Enabling Our Future", WSW 2016 attracted more than 1 800 events in 73 countries to celebrate the contribution of space science and technology to the development of humankind.

SANSA and DST hosted a live televised broadcast with key stakeholders and hosted a local school at Hartebeestehoek. This was used as a platform to demonstrate South Africa's space infrastructure and engineering capability.

SANSA hosted and participated in a range of activities, from balloon launches to designing satellites and building circuit boards with youth – all to create awareness about the benefits of space technology in our daily lives.

At a SANSA hosted event at the Cape Town Science Centre, 60 grade 7 learners teamed up to design and build a satellite, as well as a rocket to launch the satellite. The teams had to factor in technical details, such as the satellite's science mission, desired orbit and size and had to construct a visual model of a satellite, either sketched on paper or built from everyday items. A panel of judges selected the winning team.

Grade 7 learners presenting their satellite and rocket building ideas at the World Space Week event hosted by SANSA at the cape town science centre

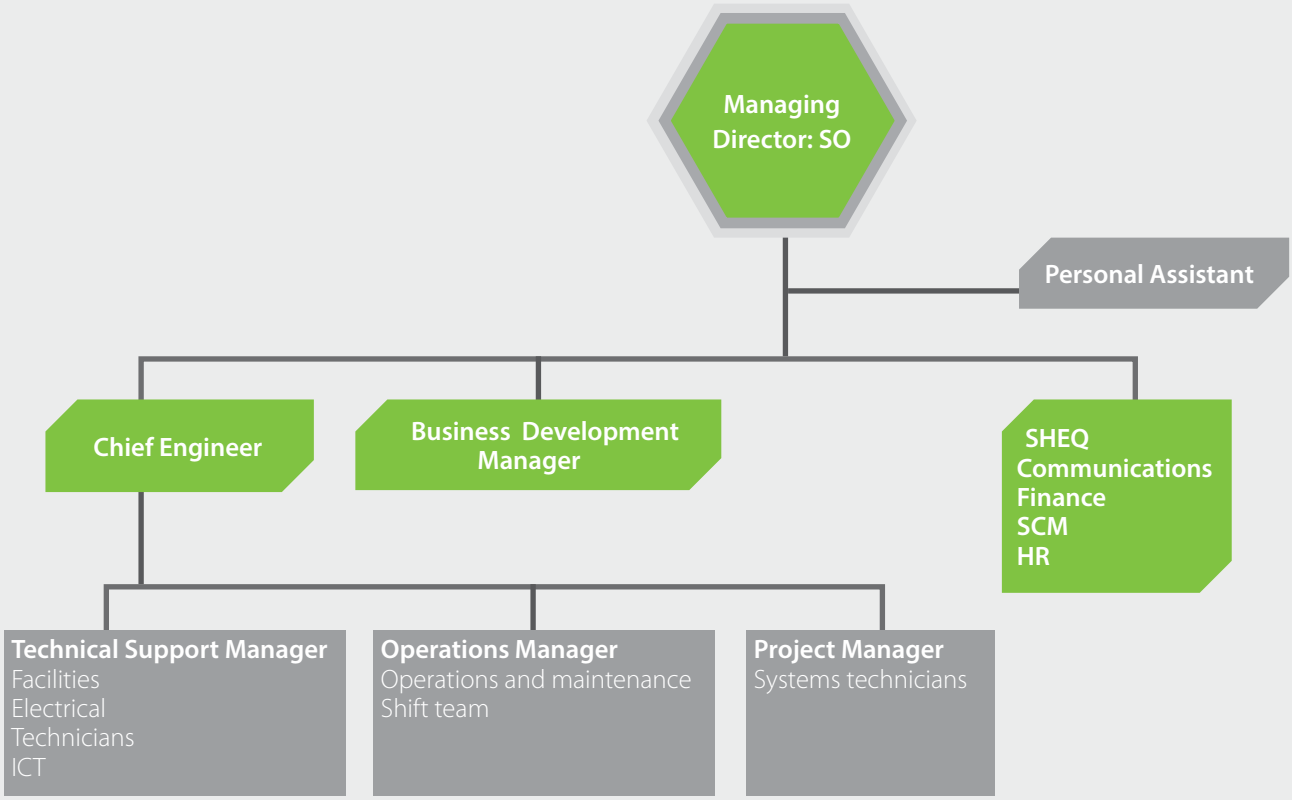
DEVELOPING SCARCE AND CRITICAL SKILLS IN SPACE SCIENCE AND TECHNOLOGY

Since SANSA's establishment in 2010, the agency's science advancement drive has reached more than 6 000 learners annually through practical space science and technology based workshops, its mobile space laboratory and the agency's interactive science centre, to give learners a better understanding of space science and technology and its benefits for South African society. Through initiatives such as these SANSA aims to improve scientific literacy among South African learners, especially young women, develop scarce and critical skills in key areas of national importance and enable the future generation to contribute towards transforming our country into a knowledge-based and technology-rich economy.

Over 140 young ladies from high schools across the Western Cape put their robotic rovers to the test

PROGRAMME 4: SPACE OPERATIONS

PROGRAMME STRUCTURE, FUNCTIONAL SCOPE AND STRATEGIC OBJECTIVES



Space Operations Programme Structure

The Space Operations Programme is structured according to three outputs:

Mission Control	**Support of all EO satellite sensors**
	SA satellite mission control
Space Operations services	**Satellite launch support**
	Transfer Orbit support
	In - Orbit testing
	Life & emergency support
	Hosted infrastructure
	Carrier Monitoring
Space Applications	**Navigation**
	Space based Augmentation

STRATEGIC OBJECTIVES

Provide state-of-the-art ground station facilities and services 24/7

Position South Africa globally and regionally in the space industry

Improve Navigation signal accuracy and reliability

Space Operations strategic objectives

KEY ACTIVITIES AND IMPACTS

INTERNATIONAL SUPPORT FOR CUSTOMER MANAGEMENT

PIONEERING DEEP SPACE NETWORK (DSN) ESTABLISHMENT IN SOUTH AFRICA

The DSN is the largest and most sensitive scientific telecommunications system in the world made up of more an international array of giant radio antennas that support interplanetary spacecraft missions, plus a few that orbit Earth. It also provides radar and radio astronomy observations that improve our understanding of the solar system and the larger universe. The DSN consists of three facilities spaced equidistant from each other – approximately 120 degrees apart in longitude – around the world. These sites are at Goldstone, near Barstow, California; near Madrid, Spain; and near Canberra, Australia. A similar facility is being scoped for South Africa, due to the saturated use of the existing DSN.

INFRASTRUCTURE DEVELOPMENT

Following the Board approval of the business case on Teleport Services and Dark Fibre Connectivity, SANSA began the process of definition, design, integration, validation, delivery and operation of the teleport antenna in Hartbeeshoek.

SANSA will be in charge of providing the site infrastructure, which includes antenna civil works, power, equipment shelter, air conditioning, fire detection and suppression, telecommunications, building management system, etc.).

SCIENCE ADVANCEMENT

SCIENCE TUBE FESTIVAL

The Science Tube, in partnership with the Northern Cape Education Department, hosted its annual Science Festival. The event gave learners an opportunity to see, touch and experience science.

To celebrate the International Year of Light, participants were exposed to an activity and presentation based on satellites and functions performed at space operations. The presentation covered how satellites are placed in orbit, various applications of satellites, how we use satellites in our daily lives and engineering studies to take at university if one wants to pursue a career at SO or in EO. Participants were also taught about the radio frequencies used to communicate with satellites.

The aim of this activity was to equip learners with the knowledge of space and satellites; and for learners to understand how satellites help with GPS locations, remote sensing, communications and monitoring of the sun's activity.

As part of the festival activities, SANSA installed the orbitron software at the Kuruman science centre to enable tutors to show learners how satellites are tracked. Tutors were provided with a crash course on how the software works and were also given a bird's eye view on the types of satellites tracked by SANSA.

SCI-FEST AFRICA

Primary school learners, parents, high school learners, university students and delegates showed immense support for the outreach representatives from DST entities and science councils/organisations.

Workshops for learners were also conducted in Rhini (Grahamstown township). Through their line of questions, learners showed enthusiasm and had a lot of interest in space, satellites, communications and EO.

ANNUAL DEVELOPMENT OF RADIO ASTRONOMY IN AFRICA (DARA) TRAINING

SANSA hosted a joint UK-South Africa Newton Fund human capital development project to help drive economic development in Africa. This project aims to develop high tech skills using radio astronomy in a number of African countries.

During the annual DARA training for students from the Square-Kilometre Array (SKA) partner countries, which was held at Hartbeeshoek Radio Astronomy Observatory (Hartrao), SANSA (an industrial partner of the DARA Steering Committee) hosted the students for a talk on industrial opportunities and took them on a tour of the facility. Together with Goonhilly Earth station in the UK, the industrial partner's role is to present opportunities to the participants for the application of their skills beyond radio astronomy in the space sector.

Students from South Africa, Namibia, Botswana, Kenya and Zambia participated in this training

The DARA Network Conference was held concurrently and there were status updates given on the AVN, SKA and precursor telescopes, as well as astrophysics research talks from the DARA partners and advanced students. The industrial representatives provided training on opportunities in related areas such as space science, satellite communications, telecommunications and big data.

The DARA Steering Committee meeting discussed issues such as the levels of student participation from each country, budget and opportunities for graduates. The status of the AVN infrastructure and access to training infrastructure and 'in kind' contribution were further discussion points. The DARA events concluded successfully and the project will be continuing for the next 24 months.

SUPPORT OF EO SATELLITE SENSORS

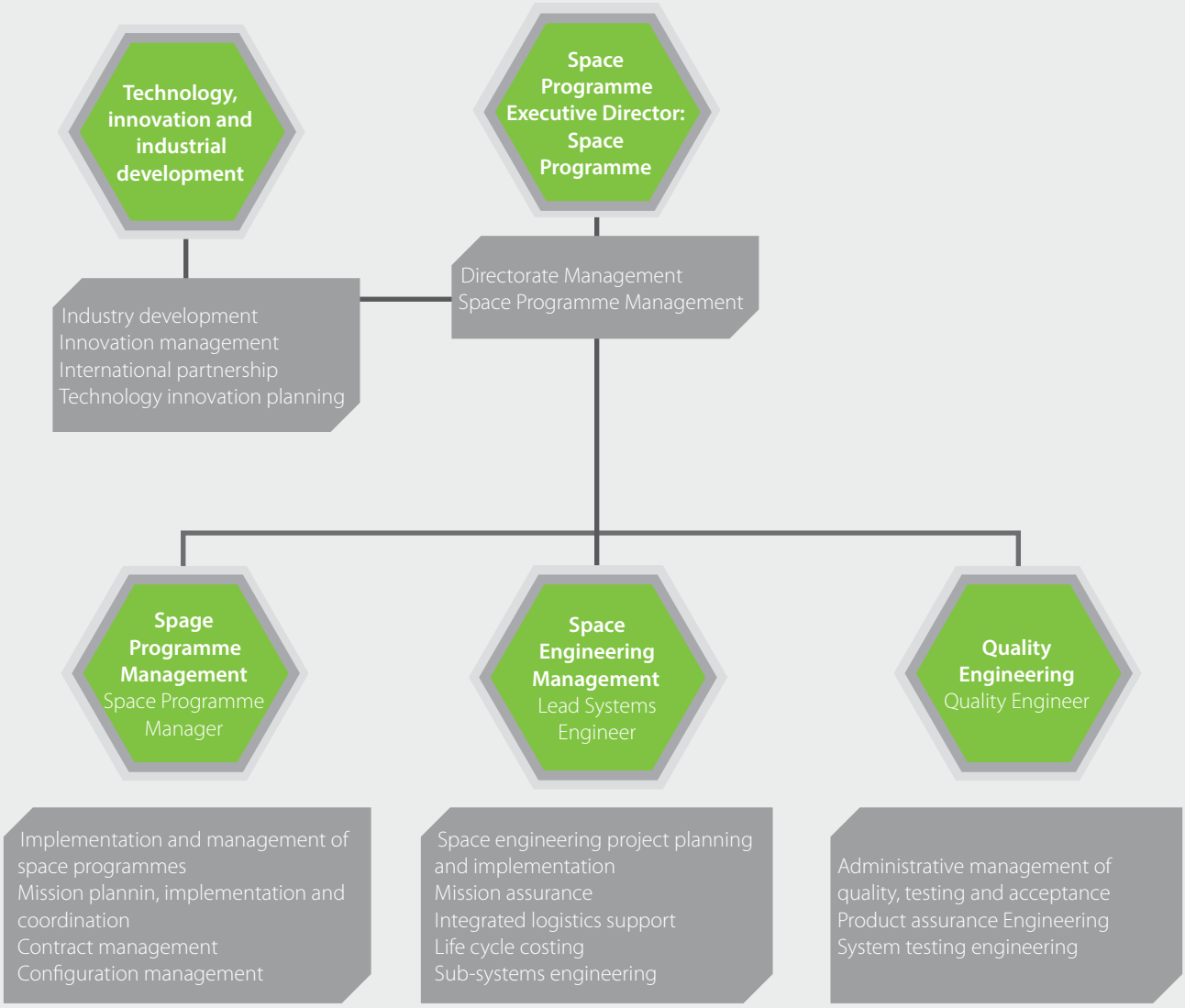
During the financial year, SANSA successfully acquired EO satellite data from 1077 satellite overpasses. The sum of data acquired from all overpasses over the period concerned is 10795.51 minutes, while 9.1 minutes in total was lost over the same period. The overall proficiency score achieved was 99.92%.

Mission Control Room at Hartebeesthoek

PROGRAMME 5: SPACE ENGINEERING

PROGRAMME STRUCTURE, FUNCTIONAL SCOPE AND STRATEGIC OBJECTIVES

The Space Engineering Programme (SEP) provides systems engineering and project management expertise and drives the satellite build programme in South Africa in partnership with primary contractors, R&D institutions and private sector partners. The Programme conducts satellite and sub-systems analysis, leads the technical side of space programme management, provides human capital development in space engineering and facilitates private space industry partnership. The Programme further drives efforts to support the NDP and promote manufacturing and technology development in South Africa.



Space Engineering organogram

Space Programme Management
Development of South African capability in space systems

Industrial Development
Develop local space industry for wider impact on the economy

Science Advancement and Human Capital Development (HCD)
Create awareness and appreciation of science and technology among youth, public and policy makers and drive HCD in engineering

Space Programme functions

KEY ACTIVITIES AND IMPACTS

EO-SAT1 DEVELOPMENT

The overall purpose of the EO-Sat1 Programme is to generate and deliver reliable and accurate information on food security, natural resources and environmental processes to stakeholders within government, industry, academia and other national or international users and customers. The EO-Sat1 Mission is an operational mission aimed at providing long-term and reliable data of consistent and acceptable quality that addresses recurrent socio-economic user needs.

SPD SPACE ENGINEERING MANAGEMENT

EO-SAT1 REPOSITIONING

Much time and effort was spent on producing and analysing various options by which EO-Sat1 could be repositioned, looking at quality (technical performance), schedule and cost. Technical workshops were held to reflect on various options. As a part of this process, several variants of the Technical Review Specifications (TRS) were created.

The system engineering team followed a process to determine options to put forward to management on the information available from Spaceteq and internal analysis:

- A list of 23 possible specification changes was drawn up and this was filtered down to four system options.
- A trade-off matrix was prepared for these options detailing which of the 23 specification change items should be applied to which of the four system options. The pros and cons were established for each of the specification change items.
- An analysis was also undertaken on the effect on various mission parameters of changing the orbital altitude from 700km to 560km. Eighteen different parameters were studied and the effect on the specification was also considered for each of these 18 parameters.

L6 SYSTEM ENGINEERING ACTIVITIES

Calibration and Validation (Cal/Val) – Work was started on correlating the Cal/Val requirements implied by the TRS (Technical Review Specification) to the work being carried out by the various Cal/Val workgroups/ committees. This is with a view to ensure that the Cal/Val requirements (facilities/equipment/expertise) of EO-Sat1 will be fulfilled and that no superfluous costs are incurred by the EO-Sat1 project.

TRS 09E: TRS – Preparatory work for the generation of TRS 09E was started, based on the continuing evolution of the specification, changing circumstances and observations made.

Interface Control Document (ICD) – Work was started on refining the definition and design of the EO-Sat1 internal and external interfaces as captured by the Interface Requirements Document (IRD).

Data Ground Segment Products – Workshops were held with EO to determine the EO-Sat1 programme standard products that will fulfil the user community needs and identify what product levels the users will develop themselves.

Other activities that were accomplished include:

1. Drafting of the Control Ground Segment (CGS) technical requirement specification.
2. Drafting of the Data Ground Segment (DGS) specification.
3. Initiating contact and technical reviews for the SCS Imaging Payload.
4. Draw up specifications of hardware and software for SPD System Engineering management tools with IT.
5. Investigation on a high level sub 1m panchromatic imager.

LIFE CYCLE COST MODELLING

The Life Cycle Report was prepared in line with the current technical baseline. Cost modelling of various repositioning options were documented and provided to management.

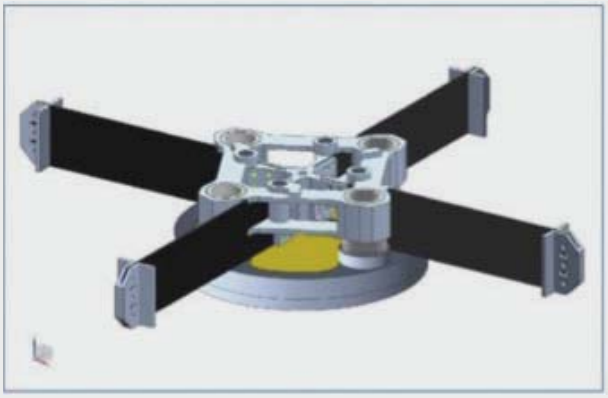
EO-SAT1 TECHNICAL MEETINGS

SE supported SPD Product Assurance to verify the technical achievement of various contractual milestones by Spaceteq.

Some of the highlights were:

Hi-Res Imager Optical Layout

a. The figure below is the design of the Hi-Res Secondary Mirror Mounting. The secondary mirror assembly consists of four 2 millimetre (mm) thick spider parts which hold most of the weight of the secondary mirror assembly when exposed to gravity. It is important to reduce the vertical deflection of the assembly during integration as far as possible, to eliminate or reduce associated optical errors.

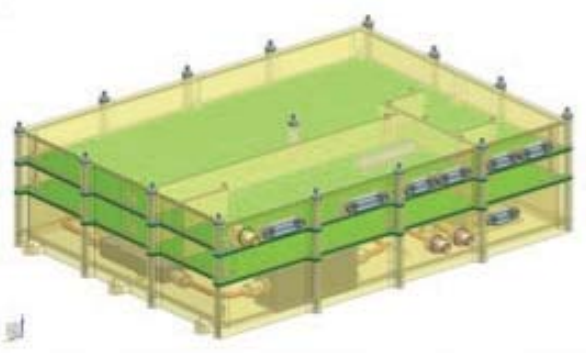


Hi-Res Secondary Mirror Mounting design

2. EO-SAT1 MC DT-X PDR MEETING

SANSA participated with Spaceteq in the PDR of the high-rate DT-X major component through which imager payload data is transmitted to the ground station. The DT-X can generate 45 mega symbols per second of 8-Phase Shift Keying in the lower X-Band frequency range (8 to 8.4 GHz).

The figure below gives the mechanical concept design for the DT-XMC.



Concept mechanical design of the DT-X MC

EO-SAT1 PROGRAMME PROGRESS

The Satellite Programme has undergone several reviews to optimise the current design. Various options were investigated to the current programme in order to minimise the costs of the project and launch of the satellite. The Programme has completed 15 PDRs of the 27 major components. Investigations are currently being done on the best possible propulsion options for the satellite. The current orbital height of the satellites is being investigated together with the impact on the programme. The satellite development is currently preparing for Level 6 PDR to ensure that all the specifications meet the requirements of the user.

Three of these components designed are as follows:

- There are two star trackers (or cameras) on the satellite, i.e. STAR-A and STAR-B. In both cases star images are sent to the on-board computer where they are processed to extract the star maps.
- Payload data from the HiRes and MedRes instruments are stored in non-volatile memory on the Data Router and Storage (DRS) Major Component on the satellite, from where it gets downloaded via the X-band data transmitter to the ground segment.
- The purpose of the developed Reaction Wheel (RW-A) is to exchange angular momentum with the satellite. Four of these wheels will be mounted in a tetrahedral configuration inside the satellite, and will be used as primary actuator to control the attitude of the satellite in orbit.

Several engagements were held between various parties to determine the most optimal programme with the current constraints. These are now being quantified to be presented to DST and SANSA for approval.

OPERATION PHAKISA – CUBESAT DEVELOPMENT

SANSA has contracted CPUT/FSATI to develop, fabricate, test and launch a nano-satellite, ZACUBE-2, which is a precursor mission for a constellation of nine 3U Cubesats that will be used to monitor illegal fishing in our oceans. The main payload of the mission is an AIS/VDES Sensor. The ZACUBE-2 Mission is part of a Grant Award received from SANSA through the DST. ZACUBE-2 Mission will also have an imager that will be used for remote sensing purposes. The CSIR-DPSS Division will develop this sensor. The CSIR-Meraka Institute will also add a fire-detection sensor on ZACUBE-2 Mission as part of a Technology Demonstration mission. ZACUBE-2 will also have a store and forward communication capability that could be used for rural and remote communications.

This mission will be expected to deliver on the industry development and localisation targets as agreed in the contract. Small, medium and micro-enterprise (SMME) development is one of the key requirements for this programme. CPUT is also expected to spin-out a company in order to encourage the growth and sustainability of the programme. CPUT will also focus on skills and professional development short-courses for the African continent and developing countries. This precursor mission is expected to be launched early in 2018.

ZACUBE-2: Operation Phakisa Phase1 Mission

POLICY BRIEF

The South African Space Industry Landscape and Policy Brief was completed. This document will assist Government to position the space industry correctly. It will assist government to make informed policy decisions when deciding which space missions to pursue and what budgets to allocate for the implementation. The document will further support the development of the National Space Industry Development Framework. This framework will provide guidance on the identification and development of requisite skills, expertise and capabilities.

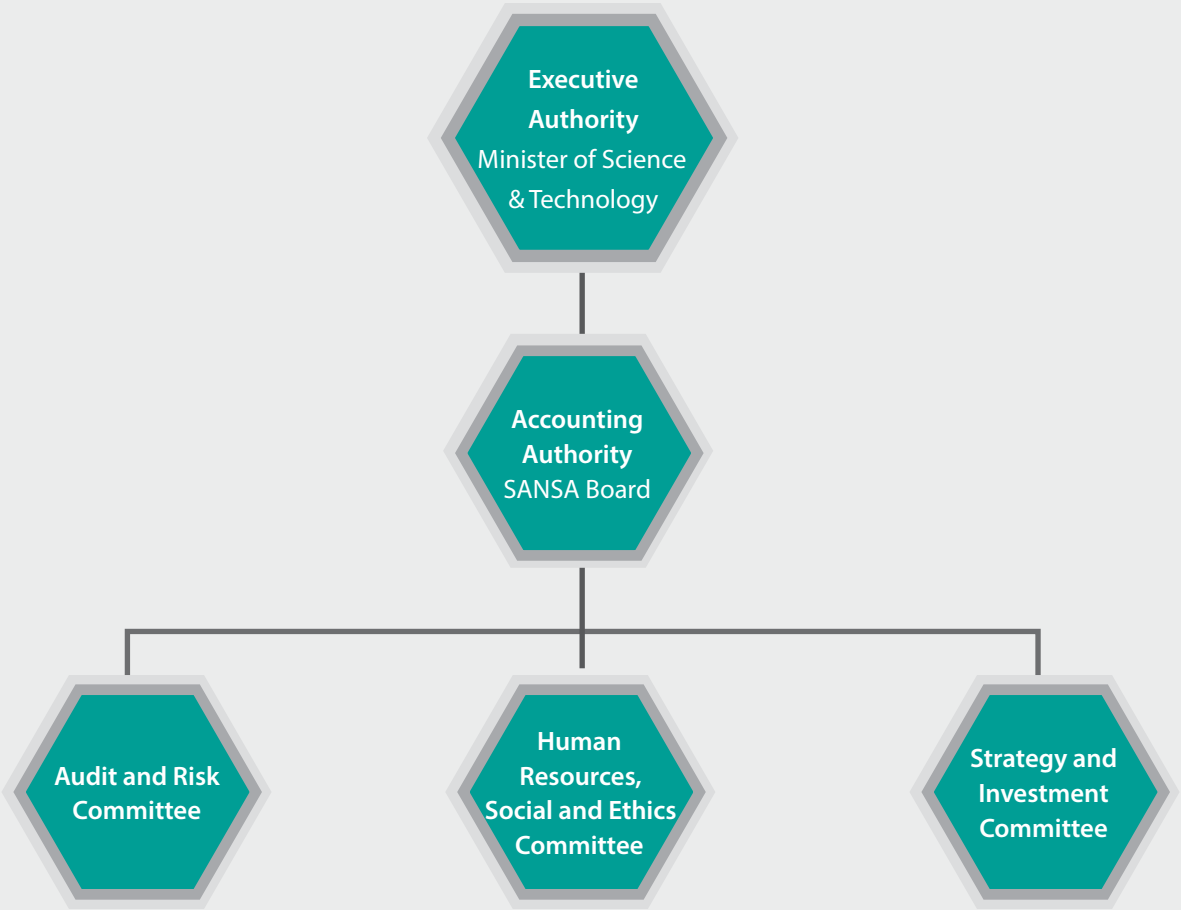

6:50:16

GOVERNANCE

GOVERNANCE

BOARD, MANAGEMENT STRUCTURES AND GOVERNANCE

SANSA is established in terms of the South African National Space Agency Act (SANSA Act 36 of 2008), and forms part of the portfolio of entities reporting to the DST. The Agency is governed by the Public Finance Management Act (PFMA, Act 1 of 1999) and related National Treasury Regulations, and is a Schedule 3A entity. SANSA furthermore strives to abide by the highest standards of governance and best practice and through the financial year ended 31 March 2017 adopted principles of the King Report on Governance for South Africa, 2009 (King III) where feasible.



The Board and standing Board Committees structure

BOARD

ROLE

The Board is the Accounting Authority in terms of the PFMA and reports to the Minister of Science and Technology. The Board is responsible for providing SANSA with strategic direction and leadership and ensuring that the Agency abides by good corporate governance principles. The role and responsibilities of the Board are prescribed by the PFMA, SANSA Act and the Board Charter.

The responsibilities of the Board are dictated primarily by the SANSA Act and the PFMA . According to its legislative powers, specifically as stipulated in Section 9 of the SANSA Act , the Board's main function and responsibility are to add significant value to SANSA by:

- Performing any function imposed upon it in accordance with the policy issued by the Minister and in terms of the SANSA Act.
- Overseeing the functions of the Agency.
- Monitoring the research priorities and programmes of the Agency.
- Giving effect to the strategy of the Agency in the performance of its functions.
- Notifying the Minister immediately of any matter that may prevent or materially affect the achievement of the objectives of the Agency.
- Establishing or disbanding the Agency's organisational divisions, as appropriate, after consultation with the Minister.

COMPOSITION OF THE BOARD

The Minister of Science and Technology takes into account the appropriate mix of skills and qualifications when considering suitable candidates for appointment to the Board. As at 31 March 2017, the Board consisted of a non-executive Chairperson, 15 non-executive Members and the CEO as an *ex-officio* Member, as indicated in the table overleaf. The Board was assisted in discharging its duties by the following standing committees:

- Audit and Risk Committee.
- Strategy and Investment Committee.
- Human Resources, Social and Ethics Committee.

Board member	Designation	Date appointed to Board	Date Board term ended	Highest qualification
Joy-Marie Lawrence	Board Chairman	1 June 2010 Extended from 1 June 2014 Reappointed 1 September 2014	to 31 May 2014 to 31 August 2014 to date	LLM (Masters in Law) Executive MBA with distinction; CD(SA)
Mbali Mfeka	Chairman: Audit and Risk Committee	1 September 2014	to date	BCom (Hons); Masters in Business Leadership (MBL); Management Development Programme (MDP); Global Executive Development Program (GEDP)
Johan Prinsloo	Member: Audit and Risk Committee	1 September 2014	to date	BEng (Electronic Engineering)
Simphiwe Hamilton	Member: Audit and Risk Committee	1 September 2014	to date	B Mil, a B Mil Hons (Politics) and an MDA (RMCS - UK)
***Potlaki Maine**	Member: Audit and Risk Committee	1 June 2010 Extended from 1 June 2014 Reappointed 1 September 2014	to 31 May 2014 to 31 August 2014 to date	BSc (Hons) (Mathematics) (Magna-cum-laude); MSc (Information Science); CAIB (SA).
****Innocentia Pule**	Member: Audit and Risk Committee	8 June 2016	to date	CA(SA), BCom, Global Executive Development Programme (GEDP)
Matsie Matooane	Chairman: HR, Social and Ethics Committee	1 September 2014	to date	MBA, MSLIS
Gaborekwe Khambule	Member: HR, Social and Ethics Committee	1 May 2013 Extended from 1 June 2014 Reappointed 1 September 2014	to 31 May 2014 to 31 August 2014 to date	MBA, DMS, MAP, NHDP (Meteorology)
Willie van Biljon	Member: HR, Social and Ethics Committee	1 September 2014	to date	BSc Eng (Mech), M Eng (Mech)
Vincent Gore	Member: HR, Social and Ethics Committee	1 June 2010 Extended from 1 June 2014 Reappointed 1 June 2014	to 31 May 2014 to 31 August 2014 to date	BSc (Eng) (Elec)

Board member	Designation	Date appointed to Board	Date Board term ended	Highest qualification
Ashley Naidoo	Member: HR, Social and Ethics Committee	1 September 2014	to date	BSc (Paed), BSc (Hons); MSc (Marine Zoology)
Marius Rezelman	Chairman: Strategy and Investment Committee	1 May 2013 Extended from 1 June 2014 Reappointed 1 September 2014	to 31 May 2014 to 31 August 2014 to date	BCom (Hons)
Prof Ramesh Bharuthram	Member: Strategy and Investment Committee	1 September 2014	to date	PhD (Theoretical Plasma Physics)
Eugene Jansen	Member: Strategy and Investment Committee	1 September 2014	to date	MSc (Eng) , MBA
Mmuso Riba	Member: Strategy and Investment Committee	1 September 2014	to date	BSc (Math, Chem), BSc (Surveying)
Dr Nozi Mjoli	Member: Strategy and Investment Committee	1 September 2014	to date	BSc (Hons), MSc (Microbiology), PhD (Microbiology)
Dr Sandile Malinga* **	CEO and member: Strategy and Investment Committee	1 April 2011	31 August 2016	PhD (Physics), MBA
Dr Valanathan Munsami * **	CEO and member: Strategy and Investment Committee	1 January 2017	to date	PhD (Physics), MBL

SANSA Board Members

**Mr Potlaki Maine was appointed as Acting CEO from 1 September 2016 until 31 December 2016. Mr Maine did not serve as a voting Member on the Board or Board Committees for the duration of this appointment.*

*** During the latter part of the quarter ended 30 June 2016, the Minister appointed Ms Innocentia Pule, to fill a Board vacancy which arose during the financial year ended 31 March 2016.*

****Dr Sandile Malinga resigned as CEO effective 31 August 2016 and Dr Valanathan Munsami was appointed as CEO effective 1 January 2017.*

SANSA Board members for the 2016/17 financial year

Joy-Marie Lawrence
Board Chairman

Marius Rezelmen
Chairman: Strategy & Investment

Matsie Matooane
Chairman: HR, Social & Ethics

Mbali Mfeka
Chairman: Audit & Risk

Eugene Jansen

Gaborekwe Khambule

Johan Prinsloo

Innocentia Pule

Willie van Biljon

Simphiwe Hamilton

Ashley Naidoo

Dr Nozi Mjoli

Mmuso Riba

Potlaki Maine

Prof Ramashwar Bharuthram

Vincent Gore

During the twelve months to 31 March 2017, the Board convened nine meetings and held two strategy sessions in May 2016 and March 2017 respectively. All nine meetings were quorate and Board Member attendance was as shown in table below.

Member	Strategy Session 25 May 2016	Meeting 26 May 2016	Special Meeting 11 July 2016	Meeting 27July 2016	Special Meeting 08 September 2016	Special Meeting 23 September 2016	Meeting 27 October 2016	Special Meeting 11 November 2016	Special meeting 18 January 2017	Meeting 28 February 2017	Strategy Session 29 March 2017
J Lawrence	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
A Naidoo	Y	X	Y	Y	X	Y	X	Y	X	X	Y
E Jansen	Y	Y	X	Y	Y	Y	Y	Y	X	Y	Y
G Khambule	X	X	Y	Y	Y	Y	Y	X	Y	Y	Y
I Pule	■	■	Y	X	X	Y	Y	X	Y	Y	Y
J Prinsloo	Y	Y	Y	Y	X	Y	Y	Y	Y	Y	Y
M Rezelman	Y	Y	X	X	Y	X	Y	Y	Y	Y	Y
M Matooane	Y	Y	Y	X	Y	Y	X	X	Y	Y	Y
M Mfeka	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
M Riba	Y	Y	Y	X	X	Y	Y	Y	Y	X	X
N Mjoli	Y	Y	Y	X	X	Y	Y	Y	X	X	X
P Maine*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
R Bharuthram	X	X	Y	Y	X	X	X	Y	Y	Y	Y
S Hamilton	X	X	Y	X	Y	Y	Y	Y	Y	Y	Y
V Gore	Y	X	Y	Y	Y	Y	Y	X	Y	X	Y
W van Biljon	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
S Malinga**	Y	Y	Y	Y	■	■	■	■	■	■	■
V Munsami**	■	■	■	■	■	■	■	■	Y	Y	Y

Board attendance Y – present X – apology ■ - Not a Member

**Mr Potlaki Maine was appointed as Acting CEO from 1 September 2016 until 31 December 2016. Mr Maine did not serve as a voting Member on the Board or Board Committees for the duration of this appointment.*

***Dr Sandile Malinga resigned as CEO effective 31 August 2016 and Dr Valanathan Munsami was appointed as CEO effective 1 January 2017. The CEO is an ex officio Member of the Board.*

BOARD COMMITTEES

Three standing Board Committees support the Board in discharging its functions. The responsibilities and functions of the Board Committees are set out in respective Board-approved charters which are reviewed annually.

Audit and Risk Committee

The establishment of the Audit and Risk Committee complies with Sections 76(4)(d) and 77 of the PFMA and National Treasury Regulation 3. As at 31 March 2017, the Committee consisted of five non-executive Members as indicated in the table below. Ms Mbali Mfeka was the appointed Chairman of the Committee.

The Audit and Risk Committee provides independent oversight of:

- The effectiveness of SANSA's internal control systems and functions, including the audit function.
- The management of SANSA's risks.
- The adequacy, reliability and accuracy of the financial information.

The Audit and Risk Committee convened four ordinary meetings and six special meetings during the twelve months ended 31 March 2017.

AUDIT AND RISK COMMITTEE MEMBERS, MEETINGS AND ATTENDANCE

Member	Special Meeting 18 April 2016	Special Meeting 18 May 2016	Meeting 23 May 2016	Special Meeting 30 May 2016	Meeting 18 July 2016	Special Meeting 20 Septmeber 2016	Meeting 18 October 2016	Special Meeting 03 November 2016	Special Meeting 18 January 2017	Meeting 16 February 2017
M Mfeka	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
I Pule*	■	■	■	■	Y	Y	Y	Y	Y	X
J Prinsloo	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
P Maine**	Y	Y	X	Y	Y	Y	X	Y	X	Y
S Hamilton	X	Y	X	X	X	Y	X	X	Y	X

Committee Membership and attendance Y – present X – apology ■ - Not a Member

** Ms Innocentia Pule was appointed as a Member of the Committee during the three months ended 30 September 2016.*

*** Not a voting Member for the duration of being appointed as Acting CEO from 1 September 2016 until 31 December 2016.*

Strategy and Investment Committee

As at 31 March 2017, the Strategy and Investment Committee consisted of five non-executive Members and SANSA's CEO as an *ex officio* Member of the Committee. In addition, the Chief Financial Officer (CFO) and Executive Director: Space Programme served as non-voting *ex officio* Members of the Committee. Mr Marius Rezelman was the appointed Chairman of the Committee.

The Committee assists the Board in discharging its responsibilities to, among others:

- Facilitate and oversee the strategic planning process.
- Ensure that the Strategic Plan sets out performance priorities.
- Ensure relevant resourcing of SANSA's strategic initiatives.

As shown in the table, the Strategy and Investment Committee convened four ordinary meetings and six special meetings during the period ended 31 March 2017.

STRATEGY AND INVESTMENT COMMITTEE MEMBERS, MEETINGS AND ATTENDANCE

Member	Special Meeting 18 April 2016	Meeting 11 May 2016	Meeting 15 July 2016	Special Meeting 20 September 2016	Meeting 17 October 2016	Special Meeting 03 November 2016	Special Meeting 16 January 2017	Special Meeting 18 January 2017	Meeting 09 February 2017	Special Meeting 21 February 2017
M Rezelman	Y	Y	X	X	Y	Y	Y	Y	Y	Y
E Jansen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
M Riba	X	X	Y	Y	X	Y	X	Y	Y	Y
N Mjoli	Y	Y	Y	Y	Y	Y	Y	X	Y	X
R Bharuthram	Y	Y	Y	Y	X	Y	X	Y	Y	Y
S Malinga	Y	Y	Y	■	■	■	■	■	■	■
B Pono	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
A Khatri	X	Y	Y	Y	Y	Y	Y	Y	Y	Y
P Maine*	■	■	■	Y	Y	Y	■	■	■	■
V Munsami**	■	■	■	■	■	■	Y	Y	Y	Y

Committee Membership and attendance Y – present X – apology ■ - Not a Member

** Non-voting ex officio Member for the duration of being appointed as Acting CEO from 1 September 2016 to 31 December 2016.*

***Dr Valanathan Munsami was appointed as CEO with effect from 1 January 2017.*

Human Resources, Social and Ethics Committee

The Human Resources, Social and Ethics Committee consisted of five non-executive Members and the Executive Director: Corporate Services as an *ex-officio* Member, as at 31 March 2017. Ms Matsie Matooane served as the Chairman of the Committee. The Committee assists the Board with oversight of matters relating to human resources, remuneration, code of conduct and social and ethics. The Committee is responsible to, among others:

- Ensure that the Human Resources strategy supports the Agency's vision, mission and associated activities.
- Oversee human resource-related issues, including employee benefits, succession planning, organisational design and talent management.

During the twelve months ended 31 March 2017, the Human Resources, Social and Ethics Committee convened four meetings.

HUMAN RESOURCES, SOCIAL AND ETHICS COMMITTEE MEMBERS, MEETINGS AND ATTENDANCE

Member	Meeting 10 May 2016	Meeting 06 July 2016	Meeting 29 September 2016	Meeting 06 February 2017
M Matooane	Y	Y	Y	Y
A Naidoo	Y	Y	X	Y
G Khambule	Y	Y	Y	Y
V Gore	Y	Y	Y	X
W van Biljon	Y	Y	Y	Y
Z Ndziba*	Y	Y	X	■
I Tshweza*	■	■	■	Y

Committee Membership and attendance Y – present X – apology ■ - Not a Member

**Mr Zweli Ndziba, the Executive Director: Corporate Services, resigned with effect from 30 September 2016. Mr Ikho Tshweza was appointed as the Acting Executive Director: Corporate Services until 31 March 2017.*

BOARD MEMBER REMUNERATION

Board Member remuneration is aligned with National Treasury guidelines and is set out in Note 22 to the Annual Financial Statements. The Board is categorised at level A2 and Board Members are paid to prepare for and attend meetings. Board Members are also reimbursed for travel costs (airfares, car hire and accommodation) and incidental expenses such as parking, train fares and the use of personal vehicles (reimbursed per kilometre as per the SANSA travel policy) and receive a monthly cellphone and data allowance in line with SANSA's cell phone and 3G policy.

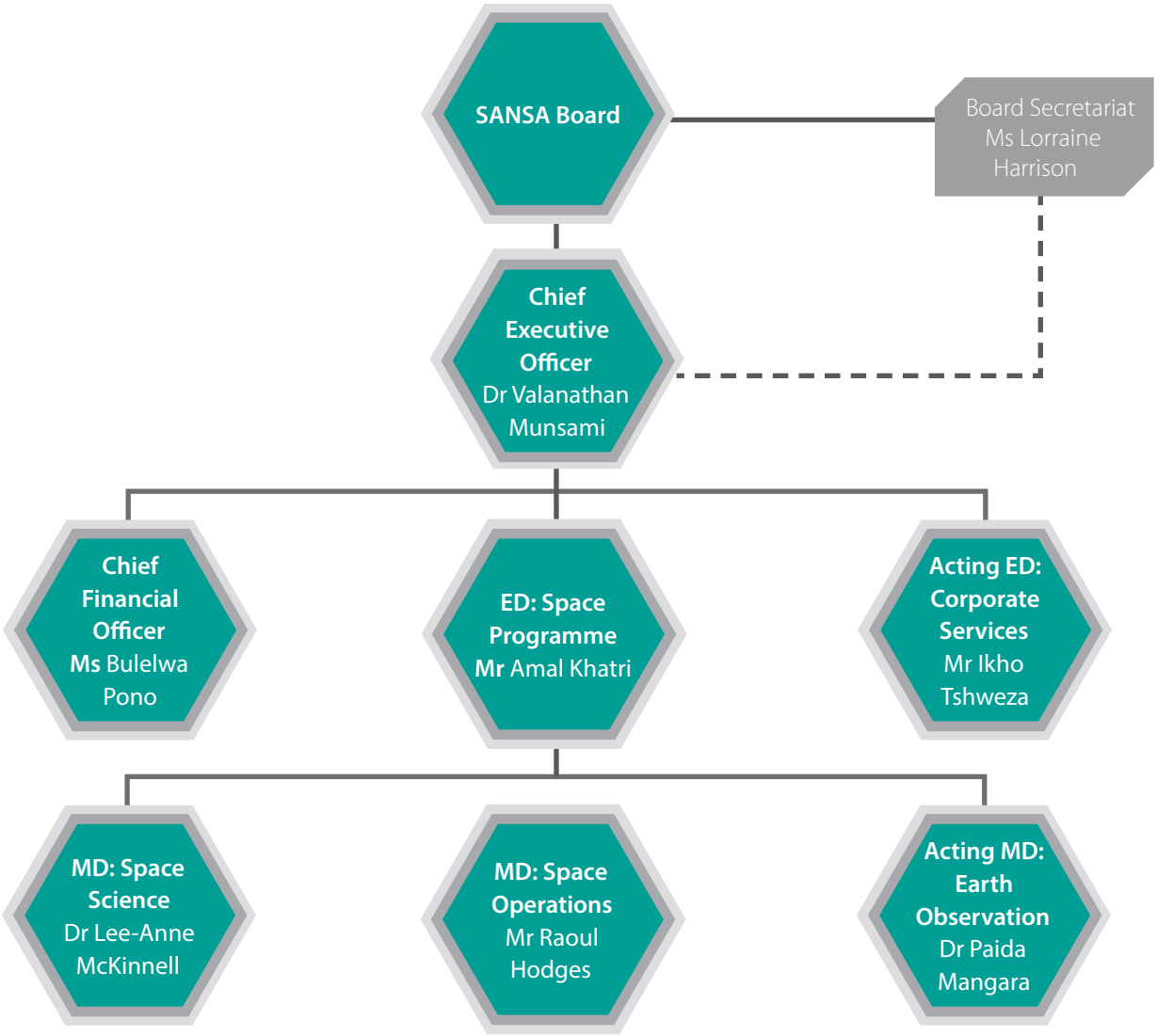
Board Members who represent other government departments or institutions are not remunerated unless proof of permission to do remunerative work outside their normal official duties is submitted.

EXECUTIVE COMMITTEE

The CEO and the executive management are responsible for ensuring effective and efficient management of SANSA's operations and driving the achievement of SANSA's mandate. The management structure was designed to meet SANSA's needs towards attaining its goals.

Dr Sandile Malinga resigned as CEO of SANSA during the quarter ended 30 September 2016, effective 31 August 2016. The Board was required to appoint a senior person in the service of SANSA to act as the CEO until such time as the vacancy was filled. As per the SANSA Act, Mr Potlaki Maine was appointed with the concurrence of the Minister of Science and Technology from 1 September 2016 until 31 December 2016. The vacancy was filled with the appointment of Dr Valanathan Munsami as CEO of SANSA with effect from 1 January 2017.

The executive management organogram as at 31 March 2017.



Executive Management

Executive Managment Committee

Valanathan Munsami

Lorraine Harrison

Bulelwa Pono

Amal Khatri

Ikho Tshweza

Paida Mangara

Raoul Hodges

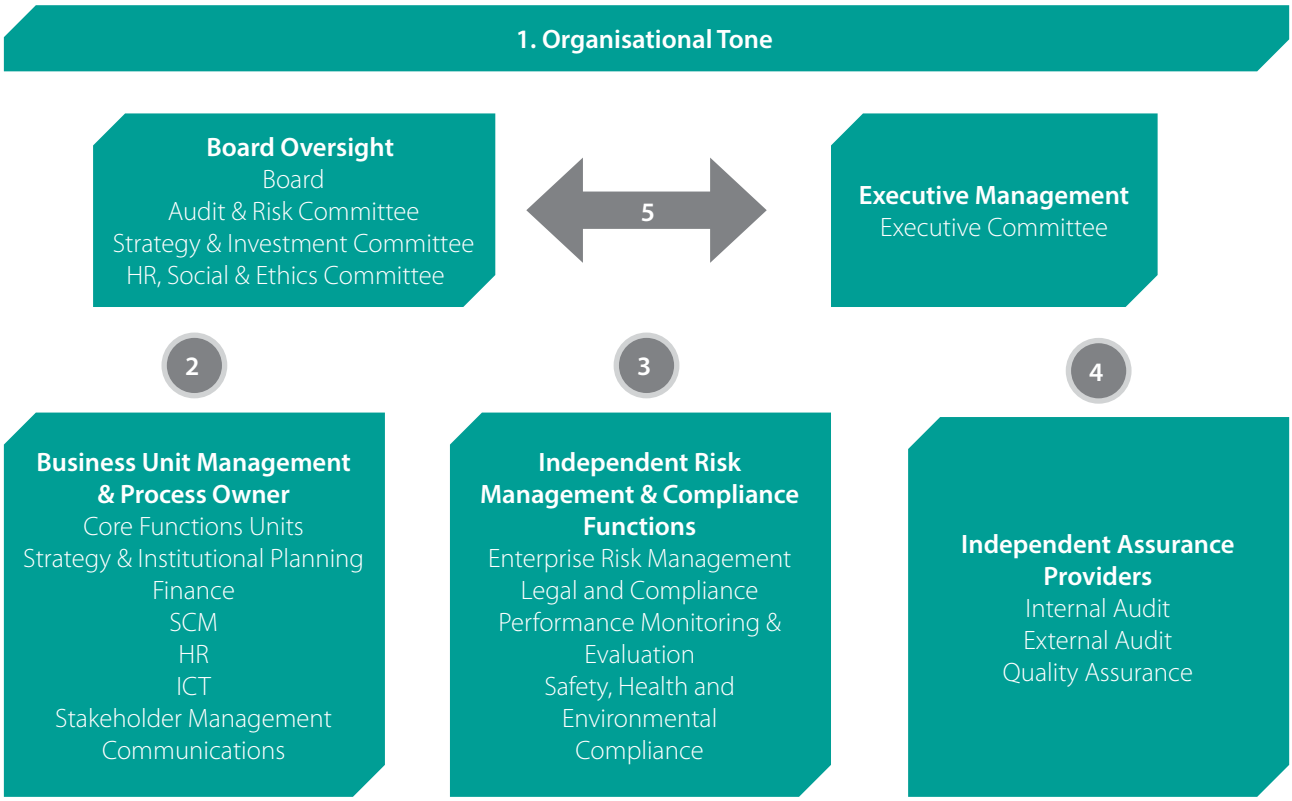
Lee-Anne McKinnell

INTERNAL AUDIT, ENTERPRISE RISK MANAGEMENT, PERFORMANCE MANAGEMENT

The *King III* recommends that the Audit Committee should ensure that a combined assurance model is applied to provide a coordinated approach to all assurance activities. SANSA has a Combined Assurance Plan that has been compiled based on the risk analysis of the Agency. The objectives of the Combined Assurance Plan are mainly to:

- Identify and specify the sources of assurance over the institution's risks.
- Provide the Audit and Risk Committee, the Board and Management with a framework of the various assurance parties.
- Link risk management activities with assurance activities. This will also assist the Board/CEO to review the effectiveness of the risk management system.
- Provide a basis for identifying any areas of potential assurance gaps.

The Combined Assurance Plan has been designed to highlight the relevant high risk areas and the assurance to be provided by management, external audit, internal audit and other consultants or service providers in order for the Executive Authority to be appraised of the risk management efforts undertaken to manage the risks to an acceptable level.



Organisational Tone

The combined assurance model is depicted in diagram of organisational tone and the corresponding roles of functions and lines of defence are detailed below.

- **First line of defence –** Management has embedded systems and processes to support business operations, this entails shaping the culture and a continuous commitment to the value system.
- **Second line of defence –** Business unit management and process owners are primarily accountable for identifying, prioritising, sourcing, managing and monitoring risks. These divisions/units implement and maintain effective control procedures on a day-to-day basis.
- **Third line of defence –** These functions provide an oversight on specific areas. They determine appropriate frameworks and ensure it is implemented effectively and consistently across SANSA.
- **Fourth line of defence –** Independent assurance providers offers assurance by systematically analysing and evaluating business processes to ensure the effectiveness of SANSA's operations. They identify areas for improvement for management implementation.
- **Fifth line of defence –** Ensure an institution-wide consistency in strategies, operations and is the focal point of corporate governance

ENTERPRISE RISK MANAGEMENT (ERM)

During the past financial year, the main focus was on improved risk methodologies and policies, embedding a robust risk culture within the organisation and providing strategic support to SANSA management.

ERM is an integral part of SANSA's business strategy and planning and is applied across the organisation through a robust ERM Policy and Framework.

EMBEDDING A ROBUST RISK CULTURE

In line with the integrated risk management methodology, risks are continuously reviewed with a focus on effectiveness of controls. Regular risk assessments or both operational risk and strategic risk registers are conducted on a continuous basis in order to embed risk management principles with SANSA.

The implementation of the ERM Framework and Policy included an organisation-wide operational risk awareness campaign which led to increased enterprise risk management awareness and it set the foundation for embedding a robust risk culture within the organisation.

Key objectives of the ERM process included:

- Identification, assessing, mitigating and monitoring of risk.
- Risk awareness and training sessions with management and staff.
- The use of the implemented key risk indicators, which enable ongoing monitoring of risk to reduce both impact and likelihood of the occurrences.
- Quarterly monitoring and review of the risk registers (strategic and operational).
- Quarterly monitoring and review of risk management activities by the SANSA's executive management, the Audit and Risk Committee and the Board.

The enterprise-wide risk assessment process included the identification, prioritisation and mitigation of material risks that could significantly impact SANSA's strategic objectives.

The Audit and Risk Committee and the Board are responsible for governance oversight of risk management at SANSA.

FRAUD PREVENTION, DETECTION AND INVESTIGATION

There is an Anti-Fraud Fraud Management Policy and Fraud Prevention Plan in place which provides guidelines to management how to deal and manage fraud, corruption and any unethical behaviour. The Plan takes into account the fraud risks identified in the Fraud Risk Register where the detailed fraud and corruption risks are addressed. The plan seeks to address the following, among others:

- Early detection and prevention of fraud.
- Investigate fraud to minimise any negative impact.
- Raise fraud awareness within SANSA.
- Encourage a culture within and for SANSA where all employees, public and other stakeholders behave ethically in dealings with or on behalf of SANSA.
- Report fraud, corruption or any other unethical behaviour that could have an undesirable impact on SANSA through the fraud hotline.

The fraud hotline is functional and there have been incidents reported via the hotline.

ERM is now firmly embedded and is applied across the organisation in line with the Board approved ERM Policy and Framework. The risk registers (both strategic and operational) are reviewed periodically and the current status is as follows:

The overall effectiveness of the mitigating measures ranges between unsatisfactory and good.

The residual exposure of the top key risks in the register (see Table below) indicates that up to 44.4% (i.e. a total of four) of the risk items have unsatisfactory (1) or weak (3) risk control effectiveness. The balance of the risk items (5) indicates that 55.6% have satisfactory to good control effectiveness levels.

The unsatisfactory matters relate to the following:

i. **Inability to execute and deliver on the objectives; i.e. EO-Sat 1 Satellite Programme and Industry Development** which also relates to the lack of funding for the Satellite Programme. Continuous engagements are held with the DST to unbundle the funding for the Satellite Programme and the life cycle costing estimation was completed in this regard to support the funding request. Currently, the EO-Sat1 repositioning document is being developed to be presented to the Board and the DST.

The weak controls matters relates to:

i. **The ERP system inadequacies due the inadequacies in the current ERP system**. There is a project underway already to implement a new ERP system which assists to improve the control environment. The ERM implementation plan is progressing well with the majority of the actions completed and the project risk assessment having been completed. The project is currently on 66% towards completion.

ii. **Organisational change management** challenges for the re-organisation of SANSA. The Strategic Framework has been developed and presented to the Board.

iii. **Lack of business continuity and disaster recovery plan.** The ICT Manager has been appointed and will assist the the development of the ICT roadmap of the IT business and establish disaster recovery cost for SANSA. The draft IT Disaster Recovery Plan is in place. A meeting was held between ERM, ICT, the CFO and the CEO's office to initiate the formulation of a SANSA-wide Business Continuity Plan.

The overall effectiveness of the mitigating measures ranges between unsatisfactory and good. The table below highlights the residual risk exposure of the key risks identified:

Residual exposure			
Actions	Control effectiveness	Number of risks	Percentage
Priority 1	Unsatisfactory	1	11.11%
Priority 2	Weak	3	33.33%
Priority 3	Satisfactory	4	44.44%
Priority 4	Good	1	11.11%

Residual risk exposure

The Table below reflects the residual risk movement between Quarter 1 and Quarter 4.

Risk	Quarter 1 Residual risk	Quarter 2 Residual risk	Quarter 3 Residual risk	Quarter 4 Residual risk	Movement (Changes)
Failure to reach SANSA set performance targets	Unsatisfactory	Unsatisfactory	Unsatisfactory	Satisfactory	↓
Inability to deliver on the Space Programme Unit objectives – Satellite Programme	Unsatisfactory	Unsatisfactory	Unsatisfactory	Unsatisfactory	↔
Non-compliance to PFMA (1999) and Treasury Regulations	Good	Good	Weak	Satisfactory	↓
Current ERP system not adequate	Weak	Weak	Weak	Weak	↔
Organisational change management challenges	Weak	Weak	Weak	Weak	↔
Non-achievement of SANSA's goals	Satisfactory	Satisfactory	Satisfactory	Satisfactory	↔
Lack of business continuity (Disaster Recovery Plan)	Weak	Weak	Weak	Weak	↔
Inadequate institutional performance management	Satisfactory	Satisfactory	Satisfactory	Satisfactory	↔
Infrastructure failure	Good	Good	Good	Good	↔

Quarterly movement of residual risk exposure

There has been an area of improvement on the residual risk between Quarter 3 and Quarter 4 with implementation of action plans. The area of improvement on the residual risk was highlighted on the following:

i. **Failure to reach SANSA set performance targets (unsatisfactory) as a result of inadequate funding for SANSA**. SANSA has managed to achieve 88% of the annual targets as at the end of Quarter 4. Although SANSA achieved the set performance targets, funding remains a challenge and long term funding plans are addressed with the new Strategic Framework and Sustainability Funding Strategy.

   Additional action plans with regard to funding challenges are being addressed through ongoing discussions with the DST to look at the long term funding strategy for SANSA.

ii. **Non-compliance to the PFMA (1999) and Treasury Regulations**. Irregular, fruitless and wasteful expenditure cases were investigated internally and a report was finalised in this regard. Recommendations to condone irregular expenditure are noted for some cases in line with the PFMA (1999) and Treasury Regulations.

FRAUD RISK MANAGEMENT

SANSA has implemented the necessary measures to manage the risk of fraud, corruption and unethical behaviour. An Anti-Fraud Risk Management Policy and Fraud Prevention Plan is in place to provide staff with guidelines around the management of fraud. Fraud risk awareness training has been rolled out to all staff. Fraud awareness has also been incorporated into the induction programme for new staff.

SAFETY, HEALTH, ENVIRONMENT & QUALITY (SHEQ)

The implementation of the planned SHEQ management activities identified and mitigated SHEQ risks effectively and ensured that SANSA continues to comply with SHEQ training and certification. Quarterly SHEQ meetings are held at all SANSA worksites and due attention is paid to maintaining a safe and healthy working environment as well as delivering quality outputs.

SAFETY AND HEALTH

The South African Bureau of Standards (SABS) audited the SANSA Space Operations Directorate at Hartebeesthoek for compliance with the OHSAS 18001 and ISO 14001 standards and identified 16 minor and four major non-conformance areas that have been rectified. All worksite locations undergo routine safety checks, and any identified issues are dealt with immediately.

The SANSA Disabling Injury Frequency Rate (DIFR) remained at 0.

ENVIRONMENT

SANSA is committed to minimising its impact on the environment and maximising its responsible use of natural resources. Activities in this regard included controlled waste disposal and recycling, as well as ongoing communication and awareness creation about managing our energy resources, such as electricity and water consumption.

A tree planting ceremony for retiring SANSA employees has been introduced at the SS worksite in Hermanus. This provides an opportunity for indigenous trees to be planted on the site conserving the natural fynbos environment that the worksite is located in.

In our endeavour to continuously engage in meaningful environmental healing activities, SO has over the years introduced a tree planting tradition when celebrating work/service anniversaries. During the month of May, three employees celebrated 20 years of service within the organisation, and as a result three indigenous trees were planted.

QUALITY

The focus of SANSA's quality activities is to:

- Establish and maintain a certified Quality Management System and SHE Management System according to ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007.
- Maintain accreditation for focused courses such as compass swing training.
- Communicate quality procedures, best practices and knowledge throughout the Agency.

Activities included regular updating of SANSA's Quality Management System (QMS) with newly-approved policies, procedures, business forms and processes, as well as ensuring sufficient training of key personnel in SHEQ procedures.

REPORT BY THE AUDIT AND RISK COMMITTEE

The Committee is pleased to present its report for the financial year ended 31 March 2017.

The Audit and Risk Committee comprises the Members listed on page 82 of this Annual Report and is required to meet at least four times per annum, as per its approved Terms of Reference. During the period under review the Committee met ten times, some of which meetings were held via telecon. The Committee Members' meeting attendance is disclosed on page 82 of this report.

RESPONSIBILITIES OF THE AUDIT AND RISK COMMITTEE

The Committee adopted appropriate formal Terms of Reference in its Audit and Risk Committee Charter, which are line with the requirements of Section 51(1) (a) of the PFMA as well as with its responsibilities as set out in Treasury Regulations 3.1.13 and 27.1. The Committee regulated its affairs in compliance with the Charter and discharged its responsibilities contained therein.

THE EFFECTIVENESS OF INTERNAL CONTROLS

The Committee is satisfied that an adequate system of internal controls are in place to mitigate risks to an acceptable level and that these controls were effective during the financial year under review. Internal Audit provided the Audit and Risk Committee with the assurance that the internal controls were appropriate and effective.

RISK MANAGEMENT

The Committee is satisfied with the ongoing risk management process of identifying, assessing, managing and monitoring both strategic and operational risks within the organisation.

SANSA's legal mandate is to develop and implement effective and efficient risk management and internal control systems in accordance with Treasury Regulation 27.2.1, which requires the regular conducting of risk assessments and development of a risk management strategy that includes a fraud prevention plan and the management capacity required to manage the identified risks.

SANSA strives to be a sustainable and performance-driven entity and, as such, has adopted an enterprise-wide risk management approach to manage all its business risks. Risk management methodologies are applied in strategy setting, planning, projects, decision-making and all other business processes. The aim is to ensure that SANSA's strategic objectives are met whilst the Agency and its brand are protected effectively against reputational and financial damage. The top risks of SANSA are as follows:

- Inability to execute and deliver on the Space Programme Unit objectives because of funding challenges; i.e. EO-Sat 1 Satellite Programme and Industry Development.
- The ERP system inadequacies due to the challenges in the current ERP system.
- Organisational change management challenges for the re-organisation of SANSA.
- The lack of business continuity and disaster recovery plans.

The Audit and Risk Committee is kept abreast of developments through scheduled meetings in accordance with the Board-approved year plan. Risk assessment is conducted annually at strategic and operational levels and aligned with the Agency's strategic planning process. The risks are captured and documented in a risk register and monitored on an ongoing basis as directed in the risk mitigation strategies.

INTERNAL AUDIT

The Committee directs monitors and evaluates the activities of the Internal Audit function. The head of Internal Audit reports directly to the Audit and Risk Committee Chairman and administratively to the CEO. The SANSA internal audit unit has adopted a co-sourced model whereby the organisation makes use of an internal audit service provider as well as an in-house audit to meet the mandate and responsibilities of the unit.

The Internal Audit Plan and the Internal Audit Charter are reviewed and approved by the Committee on an annual basis. The Internal Audit assignments were successfully completed during the financial period.

Internal Audit provided assurance that SANSA operates in a responsibly governed manner by performing the following functions:

- objectively assuring effectiveness of risk management and the internal control framework;
- analysing and assessing business processes and associated controls; and
- reporting audit findings and recommendations to management and the Audit and Risk Committee.

IN-YEAR MANAGEMENT AND MONTHLY/ QUARTERLY REPORTING

SANSA has submitted monthly and quarterly reports to the Executive Authority.

RECOMMENDATION OF THE ANNUAL FINANCIAL STATEMENTS

In terms of SANSA's Annual Financial Statements, the Committee has:

- Reviewed and discussed the Audited Annual Financial Statements, to be included in the Annual Report, with the external auditors.
- Reviewed the Agency's management letter and management's response to it.
- Reviewed changes in accounting policies and procedures where applicable.
- Reviewed information on predetermined objectives to be included in the Annual Report
- Considered the applicability of the going concern assumption.
- Reviewed the Agency's compliance with legal and regulatory provisions.
- Reviewed significant adjustments resulting from the audit.

The Committee concurs with, and accepts, the External Auditor's report included in the 2016/17 Annual Financial Statements.

AUDITOR'S REPORT

We have reviewed the public entity's implementation plan for audit issues raised in the prior year and we are satisfied that the matters have been adequately resolved.

The Audit and Risk Committee concurs and accepts the conclusions of the External Auditor on the Annual Financial Statements and is of the opinion that the audited Annual Financial Statements be accepted and read together with the report of the Auditor.

Ms Mbali Mfeka

Audit and Risk Committee Chairman

HUMAN RESOURCE MANAGEMENT

INTRODUCTION

This sections focuses on management development programme, the ERP implementation programme, staff engagement and human resource statistics.

HUMAN CAPITAL MANAGEMENT

SANSA recognises the invaluable contribution of the people within the organisation. The achievement of SANSA's goals and objectives is not possible without the hard work, dedication and commitment of the employees.

The human resource management programme for the reporting period was aligned with the business requirements. This section reflects on the performance against high-level strategic priorities during the past year, and highlights key achievements of the programme along with key statistics.

PRIORITIES AND KEY ACHIEVEMENTS

MANAGEMENT DEVELOPMENT PROGRAMME

Fifteen SANSA employees graduated from the Management Development Programme (MDP) with a Postgraduate Diploma in Business Management through Regenesys Business School. This was the first group of SANSA employees to complete the programme and is an important step both for the individual's own career aspirations, and in building capacity within the organisation for the next level of leadership to emerge.

SANSA's first MDP graduates

EMPLOYEE WELLNESS

SANSA partnered with the Employee Wellbeing partner, ICAS, to launch an Employee Wellness Programme on various platforms. The services offered by ICAS to employees have been promoted throughout the organisation, and the employees are actively using ICAS services for themselves and their dependents. In addition, ICAS presentations on various wellness topics were held at facilities of SANSA.

Wellness Day events were organised at the Hermanus and Pretoria worksites enabling all employees an opportunity to undertake free wellness checks and participate in fun wellness activities. In total, there were 125 participants across the organisation (including students and interns).

SANSA employees in Pretoria making the most of wellness day

ERP IMPLEMENTATION PROJECT

SANSA is migrating to the SAGE ERP system, and the project has been in implementation phase through 2016/17. Monthly communications were sent to staff on project progress. The training schedule was finalised for all SAGE X3 Modules ensuring that all applicable employees are afforded the opportunity to be trained on the system. The training will commence in May 2017. The Go-live launch will take place in August 2017 and the system promises a more efficient service with excellent reporting capabilities.

TRAINING AND DEVELOPMENT

During the financial year 116 employees were trained, on individual development programmes and generic training. Currently, 29 employees are on the SANSA Study Assistance Programme for formalised degree\diploma programmes. During the financial year, 22 employees graduated including four with university degrees, two with Master's degrees, one with a Doctoral degree, one with a Master's in Business Administration (MBA) and 15 who underwent the SANSA MDP (a post-graduate Diploma in Business Management). In total, 47 post gradutate SET bursars were supported by SANSA. The Agency is also a host employer for ten interns and four other interns are on SANSA's payroll.

Interns hosted by SANSA have also secured employment after their internship in other organisations such as Think Tank Marketing and Nissan South Africa. These interns cited their learning experiences at SANSA as the main contributing factor to their success.

EMPLOYEE ENGAGEMENT

In January 2017, a culture survey was conducted to measure employee opinion with regards to the work environment and SANSA workplace culture. Executive management and all business units are being engaged on the results. The aim is to develop an action plan that will lead to tangible changes and movement towards the desired culture.

An employee engagement workshop on the desired SANSA culture

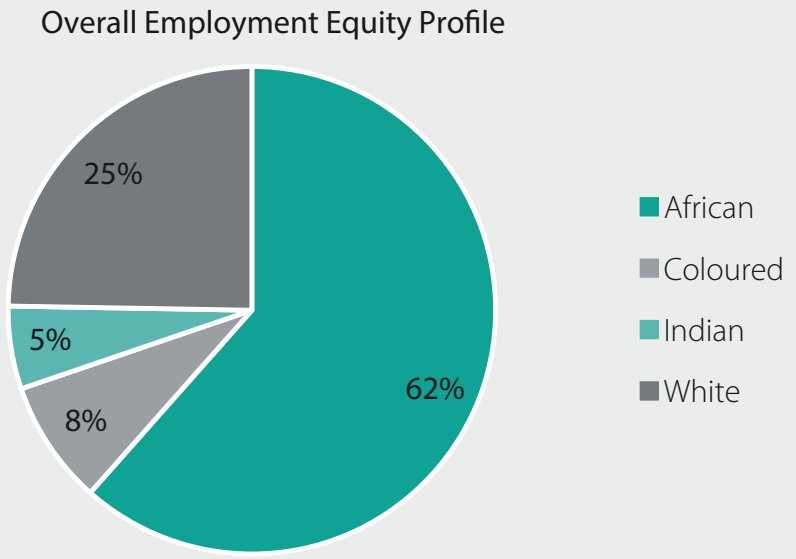
The Human Resource Oversight Statistics shows data on the entire SANSA workforce. The data is presented graphically for ease of reference. The SANSA workforce includes both temporary and permanent employees.

In the 2016/17 financial year the total workforce was made up of 182 employees with an overall workforce employment equity profile of 62% African; 8% Coloured; 5% Indians and 25% Whites. The snapshot of the employment equity profile is by race and gender, which highlights 68 African males and 45 females; 7 Coloured males and 8 females; 7 Indian males and 2 females and lastly 30 White males and 15 females. This gives a total of 112 males and 70 females; indicating the gender imbalance that is still evident within the science and technology landscape.

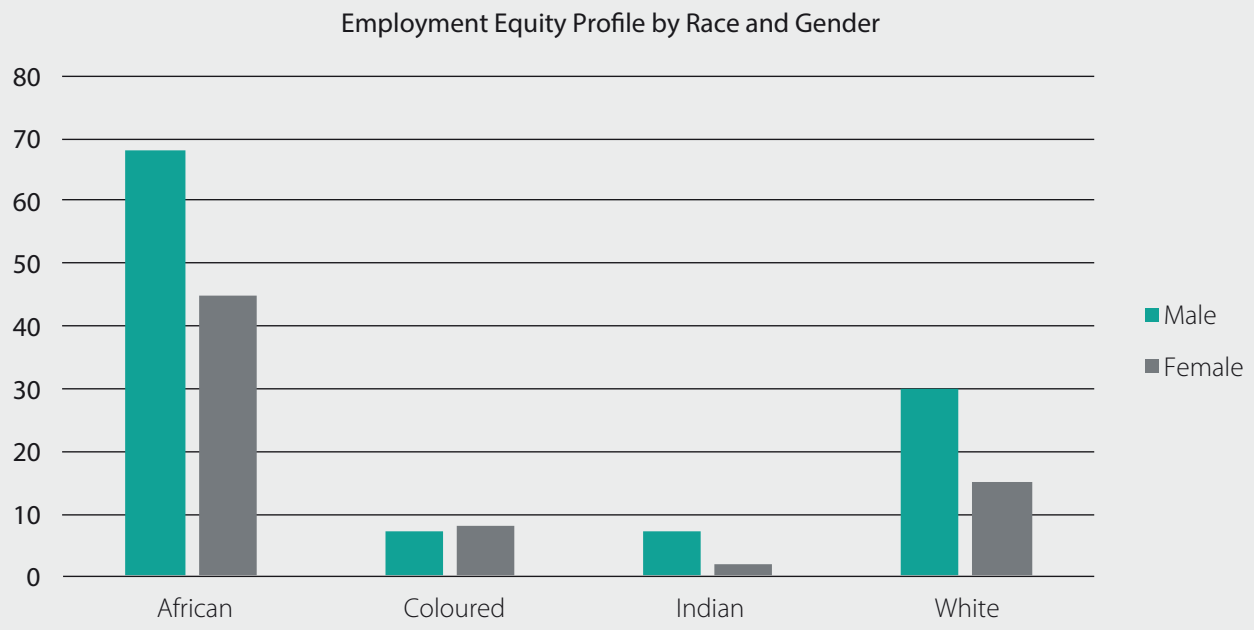
Furthermore the workforce is profiled by race, gender and job category. In the engineering category SANSA employees are made up of 3 African males and 2 females; 1 Coloured male; 5 White males and 2 females. Leadership/ Senior management representation has 2 African males and 1 female; 1 Indian male; 1 White male and 2 females. In the Science/Researcher category SANSA employs 11 African males and 6 females; 2 Indian males and 5 White males. The support\administration function is where the bulk of the workforce is represented with 24 African males and 28 females; 3 Coloured males and 7 females; 1 Indian male and 2 females; 6 White males and 9 females. Lastly technical category representation is made up of 28 African males and 8 females; 3 Coloured males and 1 females; 3 Indian males; 13 White males and 2 females.

SANSA recognises that attention is needed with a focus on the women representation within the organisation especially in the Science, Engineering and Technology job categories. Relevant initiatives will be rolled out in the next financial years to address these challenges. SANSA is committed to achieving gender balance at all levels by 2020 and to ensuring that gender considerations are part of its programmes and projects.

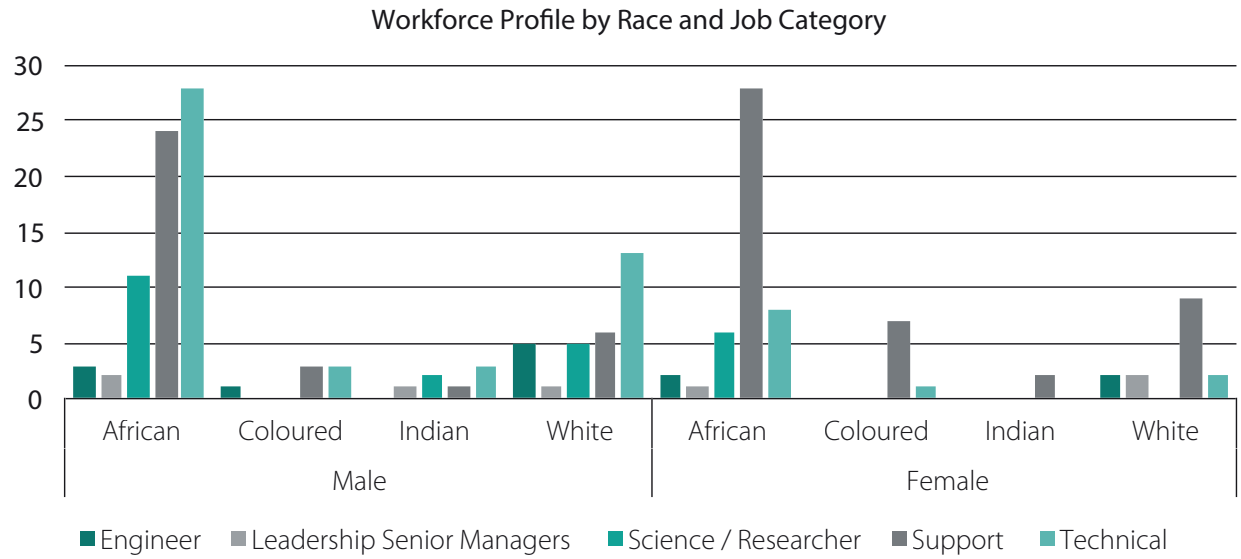
HUMAN RESOURCE OVERSIGHT STATISTICS



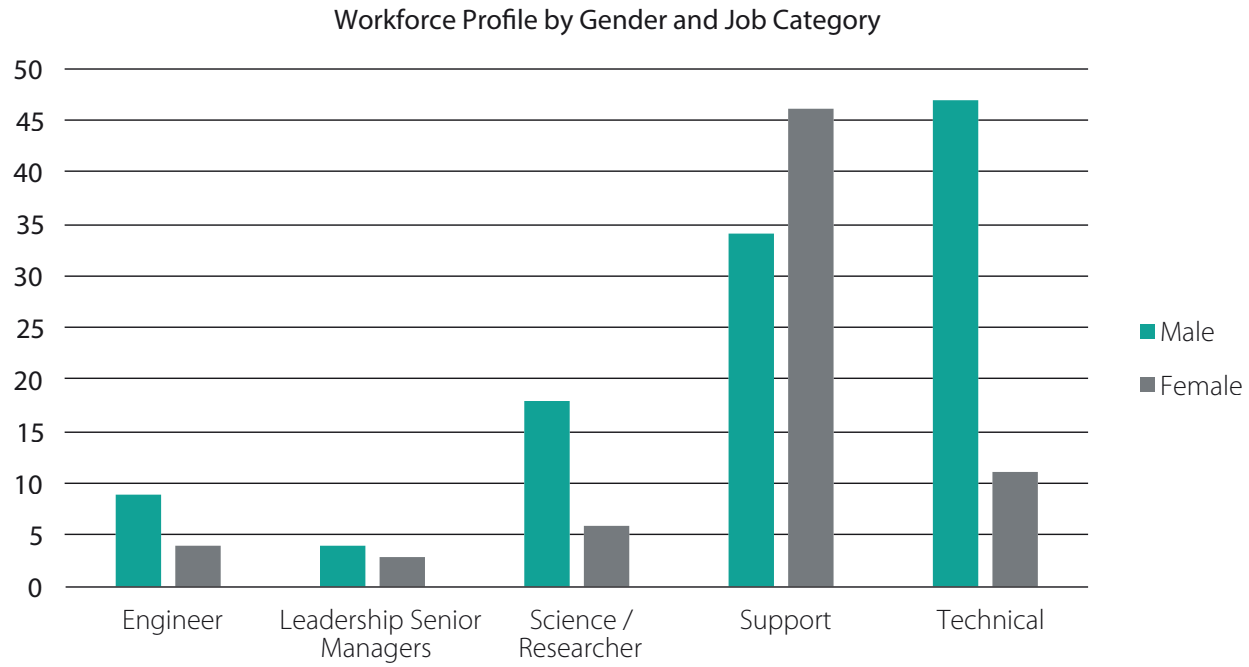
Overall Employment Equity Profile



Employment Equity Profile by Race and Gender



Workforce Profile by Race and Gender

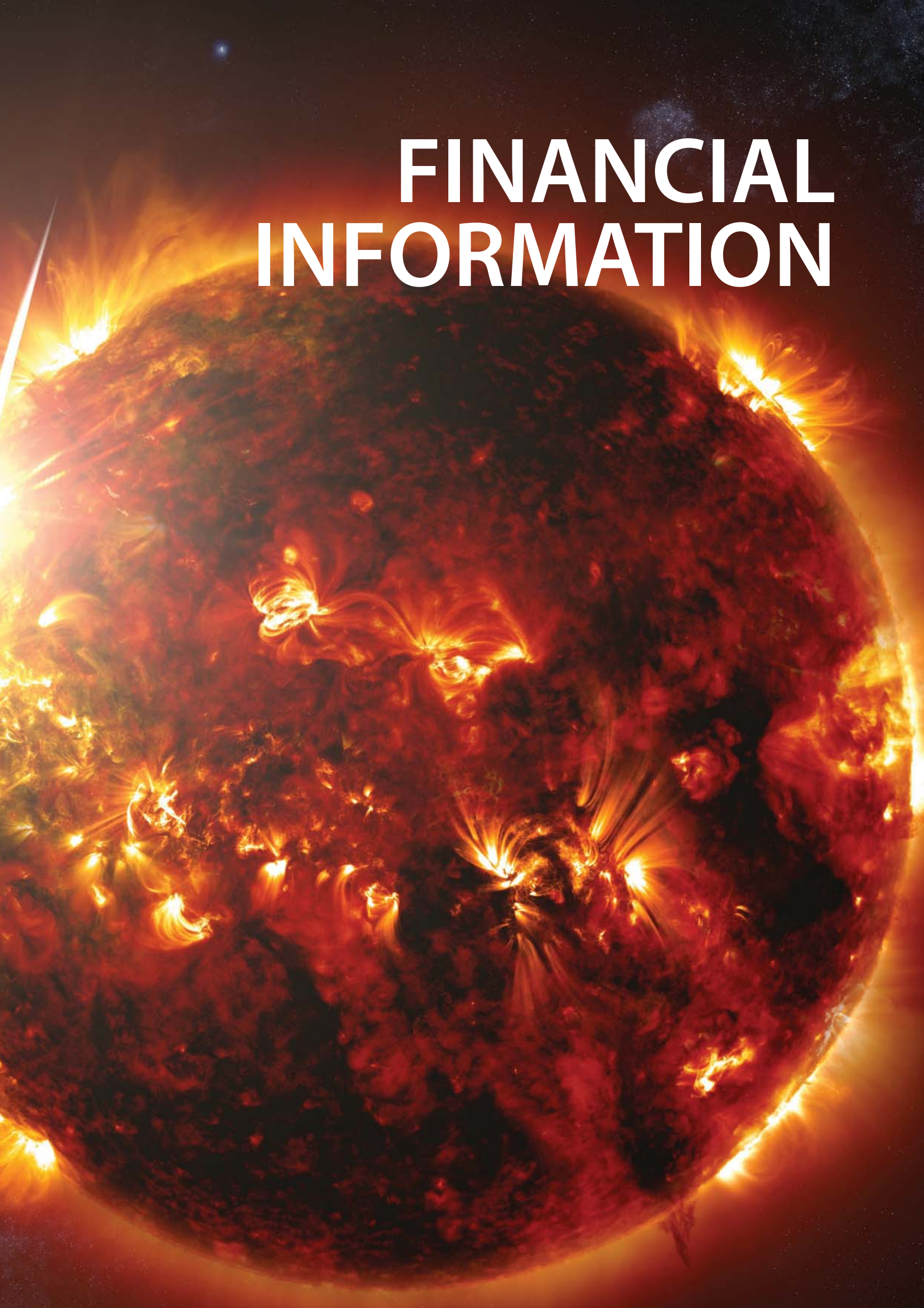


Workforce Profile by Gender and Job Category

TOTAL NUMBER OF EMPLOYEES (INCLUDING EMPLOYEES WITH DISABILITIES) BY OCCUPATIONAL CATEGORY:

Indicator description	Males				Females				Foreign Nationals		
	Africans	Coloureds	Indians	Whites	Africans	Coloureds	Indians	Whites	Male	Female	
Top management	0	0	2	0	1	0	0	0	0	0	3
Senior management	0	0	0	1	0	0	0	2	0	0	3
Professionally qualified and experienced specialists and mid-management	16	0	3	13	10	1	2	6	0	0	51
Skilled technical and academically qualified workers, junior management, supervisors, foremen, and superintendents	40	5	3	9	22	3	0	6	0	0	88
Semi-skilled and discretionary decision making	7	2	0	0	5	2	0	0	0	0	16

FINANCIAL INFORMATION



INDEPENDENT AUDITOR'S REPORT TO PARLIAMENT ON THE SOUTH AFRICAN NATIONAL SPACE AGENCY

REPORT ON THE AUDIT OF THE FINANCIAL STATEMENTS

Opinion

We have audited the financial statements of the South African National Space Agency set out on pages 104 to 167 , which comprise the statement of financial position as at 31 March 2017, and the statement of financial performance, statement of changes in net assets, and cash flow statement and the statement of comparison of budget and actual amounts for the year then ended, as well as the notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the financial statements present fairly, in all material respects, the financial position of the South African National Space Agency as at 31 March 2017, and its financial performance and cash flows for the year then ended in accordance with the Standards of Generally Recognised Accounting Practice (GRAP) and the requirements of the Public Finance Management Act of South Africa] (PFMA).

Basis for opinion

We conducted our audit in accordance with the International Standards on Auditing (ISAs). Our responsibilities under those standards are further described in the auditor's responsibilities for the audit of the financial statements section of our report.

We are independent of the public entity in accordance with the Independent Regulatory Board for Auditors' Code of professional conduct for registered auditors (IRBA code) and other independence requirements applicable to performing audits of the financial statements in South Africa. We have fulfilled our other ethical responsibilities in accordance with the IRBA code and in accordance with other ethical requirements applicable to performing audits in South Africa. The IRBA code is consistent with the International Ethics Standards Board for Accountants' Code of ethics for professional accountants (parts A and B).

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of the Accounting authority

The accounting authority is responsible for the preparation and fair presentation of the financial statements in accordance with GRAP and the requirements of the PFMA and for such internal control as the accounting authority determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the accounting authority is responsible for assessing the public entity's ability to continue as a going concern, disclosing, as applicable, matters relating to going concern and using the going concern basis of accounting unless the accounting authority either intends to liquidate the public entity or to cease operations, or has no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the ISAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

A further description of our responsibilities for the audit of the financial statements is included in the annexure to the auditor's report.

REPORT ON THE AUDIT OF THE ANNUAL PERFORMANCE REPORT

Introduction and scope

In accordance with the Public Audit Act of South Africa, 2004 (Act No. 25 of 2004) (PAA) and the general notice issued in terms thereof we have a responsibility to report material findings on the reported performance information against predetermined objectives for selected objectives presented in the annual performance report. We performed procedures to identify findings but not to gather evidence to express assurance.

Our procedures address the reported performance information which must be based on the approved performance planning documents of the public entity. We have not evaluated the completeness and appropriateness of the performance indicators/measures established and included in the planning documents. Our procedures also did not extend to any disclosures or assertions relating to planned performance strategies and information relating to future periods that may be included as part of the reported performance information. Accordingly our findings do not extend to these matters.

We evaluated the usefulness and reliability of the reported performance information in accordance with the criteria developed from the Performance management and reporting framework, as defined in the general notice, for the following selected objectives presented in the annual performance report of the public entity for the year ended 31 March 2017:

Objectives	Pages in the annual performance report
Strategic Goal 1: Address South Africa's challenges through space services and products	40
Strategic Goal 2: Lead high impact collaborative R&D on a national scale	40
Strategic Goal 3: Develop national human capacity and ensure transformation	41
Strategic Goal 4: Enhance the competitiveness of the South African space industry	41-42

We performed procedures to determine whether the reported performance information was properly presented and whether performance was consistent with the approved performance planning documents. We performed further procedures to determine whether the indicators and related targets were measurable and relevant, and assessed the reliability of the reported performance information to determine whether it was valid, accurate and complete.

We did not identify any material findings on the usefulness and reliability of the reported performance information for the following objectives:

- Strategic Goal 1: Address South Africa's challenges through space services and products
- Strategic Goal 2: impact collaborative R&D on a national scale
- Strategic Goal 3: Develop national human capacity and ensure transformation
- Strategic Goal 4: Enhance the competitiveness of the South African space industry

Other matters

We draw attention to the matter below. Our opinions are not modified in respect of this matter.

Achievement of planned targets

Refer to the annual performance report on page(s) 40 to 43 for information on the achievement of planned targets for the year and explanations provided for the under/overachievement of a significant number of targets.

REPORT ON THE AUDIT OF COMPLIANCE WITH LEGISLATION

Introduction and scope

In accordance with the PAA and the general notice issued in terms thereof we have a responsibility to report material findings on the compliance of the public entity with specific matters in key legislation. We performed procedures to identify findings but not to gather evidence to express assurance.

We did not identify any instances of material non-compliance with selected specific requirements of applicable legislation, as set out in the general notice issued in terms of the PAA.

OTHER INFORMATION

The South African National Space Agency accounting authority is responsible for the other information. The other information comprises the information included in the annual report. The other information does not include the financial statements, the auditor's report thereon and those selected objectives presented in the annual performance report that have been specifically reported on in the auditor's report.

Our opinion on the financial statements and findings on the reported performance information and compliance with legislation do not cover the other information and we do not express an audit opinion or any form of assurance conclusion thereon.

In connection with our audit, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements and the selected objectives presented in the annual performance report, or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, on the other information obtained prior to the date of this auditor's report, we conclude that there is a material misstatement of this other information, we are required to report that fact.We have nothing to report in this regard.

INTERNAL CONTROL DEFICIENCIES

We considered internal control relevant to our audit of the financial statements, annual performance report and compliance with legislation, however the objective is not to express any form of assurance thereon.We did not identify any significant deficiencies in internal control.

OTHER REPORTS

We draw attention to the following engagements conducted by various parties that have or could potentially have an impact on the matters reported on the public entity's financial-, performance- and compliance related matters.The reports noted do not form part of our opinion on the financial statements or our findings on the reported performance information or compliance with legislation.

Audit-related services and special audits

An agreed-upon procedures engagement was performed on donor funding concerning the application of grant funding received from the National Research Foundation (NRF) for the period 1 January 2016 to 31 December 2016 and was issued to the South African National Space Agency management on the 27th of June 2017.

Investigations

An Independent consultant is reviewing an allegation of unethical behaviour related to human resources processes at the request of the public entity which is represented in two cases reported during the period 1 April 2016 to 31 March 2017. The review is currently in-progress.

AUDIT TENURE

In terms of the IRBA rule published in Government Gazette Number 39475 dated 4 December 2015, we report that SizweNtsalubaGobodo has been the auditor of the South African National Space Agency for five years.

Anton Van den Heever
Director
Registered Auditor
31 July 2017
20 Morris Street East, Woodmead 2191

Annexure – Auditor's responsibility for the audit

As part of an audit in accordance with the ISAs, we exercise professional judgement and maintain professional scepticism throughout our audit of the financial statements, and the procedures performed on reported performance information for selected objectives and on the public entity's compliance with respect to the selected subject matters.

Financial statements

In addition to our responsibility for the audit of the financial statements as described in the auditor's report, we also:

- identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- obtain an understanding of internal control relevant to the audit to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the public entity's internal control.
- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the accounting authority.
- conclude on the appropriateness of the accounting authority's use of the going concern basis of accounting in the preparation of the financial statements. We also conclude, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the South African National Space Agency`s ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements about the material uncertainty or, if such disclosures are inadequate, to modify the opinion on the financial statements. Our conclusions are based on the information available to me at the date of the auditor's report. However, future events or conditions may cause a public entity to cease to continue as a going concern.
- evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

Communication with those charged with governance

We communicate with the accounting authority regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also confirm to the accounting authority that we have complied with relevant ethical requirements regarding independence, and communicate all relationships and other matters that may reasonably be thought to have a bearing on our independence, and where applicable, related safeguards.

STATEMENT OF FINANCIAL POSITION

For the year ended 31 March 2017

	Note	2017 R	2016 R
ASSETS			
Current Assets		**172 021 594**	**199 397 438**
Cash and Cash Equivalents	**5**	150 757 680	178 458 539
Receivables from exchange transactions	**6**	20 800 639	20 587 079
Inventory	**7**	463 275	351 820
Non-Current Assets		**364 814 245**	**279 597 014**
Property, Plant and Equipment	**8**	344 714 713	257 881 588
Intangible Assets	**9**	20 099 532	21 715 426
Total Assets		**536 835 839**	**478 994 452**
LIABILITIES			
Current Liabilities		**129 531 895**	**151 319 696**
Trade and Other Payables from Exchange Transactions	**10**	20 850 135	34 046 843
Provisions	**11**	7 645 025	6 961 610
Liability held on behalf of principal	**17**	9 268 569	22 083 483
Committed Conditional Grant Liability	**12**	86 815 945	82 335 930
Current Portion -Long Term Liability	**13**	4 875 500	5 891 830
Operating Lease Liability	**14**	76 721	-
Non-Current Liabilities		-	**5 891 799**
Non -Current Portion -Long Term Liability	**13**	-	5 891 799
Total Liabilities		**129 531 895**	**157 211 495**
NET ASSETS		**407 303 944**	**321 782 957**
Accumulated Surplus	**15**	407 303 944	321 782 957
Total Net Assets		**407 303 944**	**321 782 957**

STATEMENT OF FINANCIAL PERFORMANCE

For the year ended 31 March 2017

	Note	2017 R	2016 R
REVENUE			
Revenue from Non-exchange Transactions			
Transfers and Subsidies Received	**16**	227 232 738	232 441 074
Revenue from Exchange Transactions			
Interest Income	**18**	9 578 633	8 394 522
Rendering of Services	**19**	71 764 813	96 828 628
Other Income	**20**	1 835 459	5 174 125
Total Revenue		**310 411 643**	**342 838 349**
EXPENDITURE			
Employee Related Costs	**21**	104 695 500	96 046 176
Board Member Remuneration	**22**	1 069 887	914 270
Depreciation and Amortisation	**23**	23 878 330	25 097 187
Repairs and Maintenance	**24**	7 435 449	8 355 117
Finance Costs	**25**	24 339	10 202
Data Licence fees	**26**	36 124 088	31 406 738
Grants and Subsidies Paid	**27**	5 452 793	3 622 398
Antenna Infrastructure Services	**28**	203 266	4 146 811
Training Expenses	**29**	1 720 023	1 733 802
General Expenses	**30**	42 370 357	47 378 832
Net Losses on foreign exchange transactions	**31**	1 352 017	5 470 529
Loss on Disposal of Property, Plant and Equipment	**32**	564 608	1 149 071
Total Expenditure		**224 890 657**	**225 331 133**
SURPLUS FOR THE YEAR [1]		**85 520 986**	**117 507 216**

[1] The surplus for the year mainly represents capital transfers declared in revenue of R93.02 million. Refer to note 16.1 reconciliation of movements in ring-fenced grants under conditions met transferred to revenue.

STATEMENT OF CHANGES IN NET ASSETS

For the year ended 31 March 2017

	Accumulated Surplus R	Total R
2016		
Balance at 1 April 2015	**204 275 741**	**204 275 741**
Surplus for the year	117 507 216	117 507 216
Balance as at 31 March 2016 (restated)	**321 782 957**	**321 782 957**
2017		
Balance at 1 April 2016 (restated)	**321 782 957**	**321 782 957**
Surplus for the year	85 520 986	85 520 986
Balance at 31 March 2017	**407 303 944**	**407 303 944**

CASH FLOW STATEMENT

For the year ended 31 March 2017

	Note	2017 R	2016 R
CASH FLOWS FROM OPERATING ACTIVITIES			
Receipts			
Grants	**16**	227 232 738	232 441 074
Grants received on behalf of principal	**17**	(18 353 253)	58 892 000
Sales of goods and services		71 764 813	96 828 628
Interest Received		9 578 633	8 394 522
Other Receipts		1 835 459	5 174 125
Payments			
Employee Costs		(104 695 500)	(96 046 176)
Suppliers		(89 748 100)	(97 598 019)
Payments on behalf of principal	**17**	(8 258 803)	(34 225 427)
Interest Paid		(24 339)	(10 202)
NET CASH FLOWS FROM / (RECEIVED IN) OPERATING ACTIVITIES	**33**	**89 331 648**	**173 850 525**
CASH FLOWS FROM INVESTING ACTIVITIES			
Purchase of Property, Plant and Equipment	**8**	(104 503 038)	(113 353 141)
Purchase of Intangible Assets	**9**	(5 621 340)	(179 776)
NET CASH FLOWS (USED IN) INVESTING ACTIVITIES		**(110 124 378)**	**(113 532 917)**
CASH FLOWS FROM FINANCING ACTIVITIES			
Movement in Long term liability		(6 908 129)	(5 087 618)
NET CASH FLOWS (USED IN)/ FROM FINANCING ACTIVITIES		**(6 908 129)**	**(5 087 618)**
NET (DECREASE) INCREASE IN CASH AND CASH EQUIVALENTS		**(27 700 859)**	**55 229 990**
Cash and Cash Equivalents at the beginning of the year	**5**	178 458 539	123 228 549
Cash and Cash Equivalents at the end of the year	**5**	150 757 680	178 458 539

STATEMENT OF COMPARISON OF BUDGET AND ACTUAL AMOUNTS

For the year ended 31 March 2017

	Note	Approved Budget	Final Budget	Actual Amounts on a Comparable Basis	Difference
		2016/17	2016/17	2016/17	2016/17
Revenue		R	R	R	R
Revenue from Non-exchange					
Transactions		**228 632 000**	**337 346 035**	**331 588 972**	**(5 757 063)**
Parliamentary Grant		124 977 000	124 977 000	124 977 000	-
Ring Fenced Transfers	**4.3.1**	102 653 000	202 679 176	193 370 177	(9 308 999)
Research Grants		1 002 000	7 216 060	7 123 996	(92 064)
Post graduate student bursary support	**4.3.2**	-	2 473 799	6 117 799	3 644 000
Revenue from Exchange Transactions		**66 588 930**	**64 513 474**	**71 764 813**	**7 251 339**
Contract Income: Public	**4.3.3**	31 904 763	18 327 163	21 438 027	3 110 864
Contract Income: Private		1 087 500	967 088	797 973	(169 115)
Contract Income: Foreign	**4.3.4**	33 596 667	45 219 223	49 528 813	4 309 590
Finance and other Income	**4.3.5**	745 070	6 389 108	11 414 092	5 024 984
Prior years Surplus Retained			55 849 150	55 849 150	-
Total Revenue		**295 966 000**	**464 097 767**	**470 617 027**	**6 519 260**
Economic Classification					
Current Payments					
Compensation of Employees	**4.3.6**	110 957 356	114 085 922	104 695 500	(9 390 422)
Board Costs		745 644	745 644	1 069 887	324 243
Goods and services	**4.3.7**	87 348 000	98 921 801	119 125 270	20 203 469
		199 051 000	**213 753 367**	**224 890 657**	**11 137 290**
Payments for Capital Assets					
Machinery and equipment	**4.3.8**	6 051 000	44 134 406	13 067 204	(31 067 202)
Software and intangible assets	**4.3.9**	3 285 000	14 276 994	5 621 340	(8 655 654)
Satellite Development	**4.3.10**	87 579 000	191 933 000	91 435 834	(100 497 166)
		96 915 000	**250 344 400**	**110 124 378**	**(140 220 022)**
Total Expenditure		**295 966 000**	**464 097 767**	**335 015 035**	**(129 082 732)**
Surplus/Deficit		**-**	**-**	**135 601 992**	**135 601 992**

STATEMENT OF COMPARISON OF BUDGET AND ACTUAL AMOUNTS

For the year ended 31 March 2017

Reconciliation of Actual amounts on a Comparable Basis and Actual amounts on the Annual Financial Statements

Net Cash flows from	**Operating Activities R**	**Financing Activities R**	**Investing Activities R**	**Total R**
Actual Amount on Comparable Basis as Presented in the Budget and Actual Comparative Statement	**245 726 371**	**-**	**(110 124 378)**	**135 601 992**
Basis Differences	(156 394 723)	(6 908 129)	-	(163 302 851)
Actual amount in Cash Flow Statement	**89 331 648**	**(6 908 129)**	**(110 124 378)**	**(27 700 859)**

ACCOUNTING POLICIES

For the year ended 31 March 2017

1. BASIS OF PRESENTATION

The annual financial statements have been prepared using the accrual basis of accounting, in terms of which items are recognised as assets, liabilities, net assets, revenue and expenses when they satisfy the definitions and recognition criteria for those elements, which in all material aspects are consistent with those applied in the previous year, except where a change in accounting policy has been recorded. The historic cost convention has been used, except where indicated otherwise.

The Annual Financial Statements are prepared in South African Rand (R) and have been prepared on a going concern basis.

1.1 STATEMENT OF COMPLIANCE

The Annual Financial Statements have been prepared in accordance with the Standards of Generally Recognised Accounting Practice (GRAP), including any interpretations and directives issued by the Accounting Standards Board (ASB) and the Public Finance Management Act (PFMA).

The presented Annual Financial Statements have been rounded to the nearest Rand value. The impact that the rounding will have on the disclosed numbers in the Annual Financial Statements, will not be material and should not significantly understate nor overstate the reported numbers.

1.2 CRITICAL JUDGEMENTS, ESTIMATIONS AND ASSUMPTIONS

In the application of the entity's accounting policies, which are described below, management is required to make judgements, estimates and assumptions about the amounts of assets, liabilities, revenue and expenses that are not readily apparent from other sources. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results may differ from these estimates.

These estimates and underlying assumptions are reviewed on an on-going basis. Revisions to accounting estimates are recognised in the period in which the estimate is revised if the revision affects only that period, or in the period of the revision and future periods if the revision affects both current and future periods.

The following are the critical judgements that management have made in the process of applying the entity's Accounting Policies and have the most significant effect on the amounts recognised in the Annual Financial Statements:

1.2.1 FINANCIAL ASSETS AND LIABILITIES

The classification of financial assets and liabilities, into categories, is based on the relevant GRAP standards and the terms of the instruments. Accounting Policy 1.7.2 on Financial Assets Classification and Accounting Policy 1.7.3 on Financial Liabilities Classification describe the factors and criteria considered by the management of the entity in the classification of financial assets and liabilities.

In making the above-mentioned judgement, management considered the definition and recognition criteria for the classification of financial instruments as set out in GRAP.

1.2.2 IMPAIRMENT OF FINANCIAL ASSETS

Accounting Policy 1.7.5 on Impairment of Financial Assets describes the process followed to determine the value by which financial assets should be impaired. In making the estimation for impairment, management of the entity considered the detailed criteria for impairment of financial assets as set out in GRAP, and used its judgement to select a variety of methods and make assumptions that are mainly based on market conditions existing at the end of the reporting period.

Management of the entity is satisfied that impairment of financial assets recorded during the year is appropriate.

Calculation in respect of impairment of debtors is based on an assessment of the extent to which debtors have defaulted on payments already due, and an assessment of their ability to make payments based on their creditworthiness.

1.2.3 USEFUL LIVES OF PROPERTY, PLANT AND EQUIPMENT AND INTANGIBLE ASSETS

Property, plant and equipment and intangible assets are depreciated over their useful life taking into account residual values, where appropriate. The useful lives of the assets and residual values are assessed annually and may vary depending on a number of factors. In re-assessing useful lives, factors such as technological innovation and maintenance programmes are taken into account. Residual value assessments consider issues such as future market conditions, the remaining life of the asset and projected disposal values.

1.2.4 IMPAIRMENT: WRITE DOWN OF PROPERTY, PLANT AND EQUIPMENT AND INTANGIBLE ASSETS

Property, plant and equipment and intangible assets are considered for impairment if there is a reason to believe that impairment may be necessary. The future cash flows expected to be generated by the assets are projected taking into account market conditions and the expected useful lives of the assets. The present value of these cash flows, determined using an appropriate discount rate, is compared to the current carrying value and, if lower, the assets are impaired to the present value taking into account the reasonable cost of replacement.

In making the above-mentioned estimates and judgement, management considered the subsequent measurement criteria and indicators of potential impairment losses as set out in GRAP 17: Property, Plant and Equipment and GRAP 31: Intangible assets. In particular, the calculation of the recoverable service amount for PPE and intangible assets involves significant judgment by management.

1.2.5 PROVISIONS AND CONTINGENT LIABILITIES

Management judgement is required when recognising and measuring provisions and when measuring contingent liabilities. Provisions are discounted where the effect of discounting is material using actuarial valuations. The amount of a provision is the best estimate of the expenditure expected to be required to settle the present obligation at the reporting date. SANSA recognises provision for bonuses based on the expected performance bonuses to be paid out to employees.

1.2.6 REVENUE RECOGNITION

Accounting Policy 1.9.2 on Revenue from Exchange Transactions and Accounting Policy 1.9.3 on Revenue from Non-exchange Transactions describe the conditions under which revenue will be recorded by management of the entity.

In making their judgement, management considers the detailed criteria for the recognition of revenue as set out in GRAP 9: Revenue from Exchange Transactions and GRAP 23: Revenue from Non-Exchange transactions , as far as Revenue from Exchange and Non-Exchange Transactions is concerned. In particular, revenue from services rendered is recognised in surplus or deficit in proportion to the stage of completion of the transaction at the reporting date.

The stage of completion is assessed by reference to work performed as at the reporting date. Contract revenue includes the initial amount agreed in the contract plus any variations in contract work, claims and incentive payments to the extent that it is probable that these will result in revenue and can be measured reliably. As soon as the outcome of a contract can be estimated reliably, contract revenue and expenses are recognised in profit or loss in proportion to the stage of completion of the contract.

The stage of completion is assessed by reference to work performed as at reporting date. When the outcome of a contract cannot be estimated reliably, contract revenue is recognised only to the extent of contract costs incurred that are likely to be recoverable. An expected loss on a contract is recognised immediately in surplus or deficit.

Management of the entity is satisfied that recognition of the revenue in the current year is appropriate.

ACCOUNTING POLICIES

For the year ended 31 March 2017

1.2.7 GOING CONCERN ASSUMPTION

The Annual Financial Statements have been prepared on a going concern basis. This basis presumes that funds will be available to finance future operations and that the realisation of assets and settlement of liabilities, contingent liabilities and commitments will occur in the ordinary course of business.

1.3 OFFSETTING

Assets, liabilities, revenues and expenses have not been offset except when offsetting is required or permitted by a standard of GRAP.

1.4 STANDARDS, AMENDMENTS TO STANDARDS AND INTERPRETATIONS ISSUED BUT NOT YET EFFECTIVE

Standard number	Standard name	Effective date (if applicable)
GRAP 20	Related party disclosures	No effective date
GRAP 32	Service Concession Arrangements: Grantor	No effective date
GRAP 34	Separate Financial Statements	No effective date
GRAP 35	Consolidated Financial statements	No effective date
GRAP 36	Investment in Associates and Joint Ventures	No effective date
GRAP 37	Joint Arrangement	No effective date
GRAP 38	Disclosure of Interests in Other Entities	No effective date
GRAP 108	Statutory Receivables	No effective date
GRAP 109	Accounting by Principals and Agents	No effective date
GRAP 110	Living and Non-living Resources	No effective date

GRAP 20 – Related parties

This standard provides the requirements for the disclosure of related parties and transactions and balances with related parties. This standard was based on IPSAS 20 as currently applied by the entity for its related party disclosures. Accordingly it is not expected that the adoption of this standard will have a material impact on the financial statements of the entity. This standard does not yet have an effective date.

GRAP 32 – Service Concession Arrangements: Grantor

The objective of this Standard is to prescribe the accounting for service concession arrangements by the grantor, a public sector entity. The implementation of the statement will not be applicable to SANSA currently as SANSA is not an operator providing a mandated function related to the service concession asset.

GRAP 34 – Separate Financial Statements

The objective of this Standard is to prescribe the accounting and disclosure requirements for investments in controlled entities, joint ventures and associates when an entity prepares financial statements. The implementation of the statement will not be applicable to SANSA as SANSA does not have investments in controlled entities, joint ventures and investments in associates.

GRAP 35 – Consolidated Financial Statements

The objective of this Standard is to establish principles for presentation and preparation of consolidated financial statements when an entity controls one or more other entities. The implementation of the statement will not be applicable to SANSA as SANSA does not have controlled entities.

GRAP 36 – Investment in Associates and Joint Ventures

The objective of this Standard is to prescribe the accounting for investments in associates and joint ventures and set out the requirements for the application of the equity method when accounting for investments in associates and joint ventures. The implementation of the statement will not be applicable to SANSA currently as SANSA does not have investments and does not have joint ventures.

GRAP 37 – Joint Arrangements

The objective of this Standard is to establish principles for financial reporting by entities that have an interest in arrangements that are controlled jointly. The standard will not have an impact on SANSA as SANSA has no joint arrangements.

GRAP 38 – Disclosure of interest in Other Entities

The objective of this Standard is to require an entity to disclose information that enables users of its financial statements to evaluate the nature of, and risks associated with, its interests in controlled entities, unconsolidated controlled entities, joint arrangements and associates, and structured entities that are not consolidated; and the effects of those interests on its financial position, financial performance and cash flows. The standard will not have an impact on SANSA as SANSA has no interest in other entities.

GRAP 108 – Statutory Receivables

The objective of this Standard is to prescribe accounting for the recognition, measurement, presentation and disclosure of statutory receivables. The standard will not have an impact on SANSA as SANSA is a schedule 3A public entity as listed in the PFMA however if SANSA was to be listed as a schedule 3B National Government Business Enterprise it would have to register for VAT and Income Tax and thus the statement will be applicable.

GRAP 109 – Accounting by Principals and Agents

The objective of this Standard is to outline principles to be used by an entity to assess whether it is party to a principal-agent arrangement, and whether it is a principal or an agent in undertaking transactions in terms of such an arrangement. This Standard does not introduce new recognition or measurement requirements for revenue, expenses, assets and/ or liabilities that result from principal-agent arrangements. The Standard does however provide guidance on whether revenue, expenses, assets and/or liabilities should be recognised by an agent or a principal, as well as prescribe what information should be disclosed when an entity is a principal or an agent.

SANSA has elected to adopt GRAP 109 Accounting by Principals and Agents early to illustrate the impact of early adoption of this statement (see Note 17), no effective date has been determined by the Minister of Finance. The impacts of the early adoption on the Financial Statements of SANSA are disclosed in accounting policy note 1.9.3.2

GRAP 110 – Living and Non-Living Resources

The objective of this Standard is to prescribe accounting for the recognition, measurement, presentation and disclosure of living resources and disclosure requirements for non -living resources. The standard will not have an impact on SANSA as SANSA's operations does not involve dealing with living organisms such as animals and plants.

1.5 PROPERTY, PLANT AND EQUIPMENT

1.5.1 INITIAL RECOGNITION AND SUBSEQUENT MEASUREMENT

Property, plant and equipment are measured at cost, net of accumulated depreciation and/ or accumulated impairment losses, if any. Property, plant and equipment are tangible assets which are held for use in the production or supply of goods and services or for administrative purposes and are expected to be used during more than one financial period.

ACCOUNTING POLICIES

For the year ended 31 March 2017

The cost of an item of property, plant and equipment is recognised as an asset when:

- It is probable that future economic benefits or service potential associated with the item will flow to the entity; and
- The cost of the item can be measured reliably

Costs include costs incurred initially to acquire or construct an item of property, plant and equipment and significant costs incurred subsequently to add to, replace part of, or service it. If a replacement cost is recognised in the carrying amount of an item of property, plant and equipment, the carrying amount of the replaced part is derecognised. All Property, Plant and Equipment is measured at cost, less depreciation, less impairment subsequent to the initial recognition.

Where an asset is acquired at no cost, (i.e. non-exchange transaction), it's cost will be it's fair value as at the date of acquisition.

All repairs and maintenance costs are recognised in surplus or deficit as incurred. The present value of the initial expected estimate cost for the decommissioning of the asset after its use is included in the cost of the respective asset if the recognition criteria for a allowance is met. When parts of an item of property, plant and equipment have different useful lives, they are accounted for as separate items (major components) of property, plant and equipment.

1.5.2 DEPRECIATION

Depreciation is recognised in surplus or deficit on a straight line basis over the estimated useful lives of each part of an item of property, plant and equipment. Depreciation is recognised even if the fair value of the asset exceeds its carrying amount, as long as the asset's residual value does not exceed its carrying amount. Repair and maintenance of an asset do not negate the need to depreciate it. SANSA's accounting policy is to depreciate assets as follows:

a. Freehold land

Land has an unlimited useful life and therefore is not depreciated but stated at cost less any impairment losses.

b. Freehold buildings

SANSA identified the following major components of buildings.

- Buildings
- Alterations and other fixtures

The useful lives of the various components of buildings have been assessed to be:

c. Equipment and Motor Vehicles

The useful lives of the various categories of equipment and vehicles have been assessed to be:

- Office furniture 3-10 years
- Motor vehicles 3-10 years
- Computer equipment 1-10 years
- Research equipment 2-15 years
- Property, Plant & Machinery 2-20 years
- Office Equipment 3-10 years
- Exhibits 10 years
- Laboratory Equipment 5 years

d. Leasehold improvements

These improvements are depreciated over the shorter of the contract period or the assessed useful lives of the assets.

The residual values, depreciation methods and useful lives of the asset categories are reviewed at each financial year end and adjusted if necessary. If the expectations differ from previous estimates, the change is accounted for as a change in accounting estimate.

During the 2017 financial year amendments were made to GRAP 17 as follows:

An entity shall assess at each reporting date whether there is any indication that the entity's expectations about the residual value and the useful life of an asset have changed since the preceding reporting date. If any such indication exists, the entity shall revise the expected useful life and/or residual value accordingly. The change(s) shall be accounted for as a change in an accounting estimate in accordance with the Standard of GRAP on Accounting Policies, Changes in Accounting Estimates and Errors (GRAP3)

In assessing whether there is any indication that the expected useful life of an asset has changed, an entity considers the following indications:

a. The composition of the asset changed during the reporting period, i.e. the significant components of the asset changed.

b. The use of the asset has changed, because of the following:

- The entity has changed the manner in which the asset is used.
- The entity has changed the utilisation rate of the asset.
- The entity has made a decision to dispose of the asset in a future reporting period(s) such that this decision changes the expected period over which the asset will be used.
- Technological, environmental, commercial or other changes that occurred during the reporting period that have, or will, change the use of the asset.
- Legal or similar limits placed on the use of the asset have changed.
- The asset was idle or retired from use during the reporting period.
- The asset is approaching the end of its previously expected useful life.

c. Planned repairs and maintenance on, or refurbishments of, the asset and/or its significant components either being undertaken or delayed.

d. Environmental factors, e.g. increased rainfall or humidity, adverse changes in temperatures or increased exposure to pollution.

e. There is evidence that the condition of the asset improved or declined based on assessments undertaken during the reporting period.

f. The asset is assessed as being impaired in accordance with GRAP 21 and GRAP 26.

In assessing whether there is any indication that the expected residual value of an asset has changed, an entity shall consider whether there has been any change in the expected timing of disposal of the asset, as well as any relevant indicators included above.

ACCOUNTING POLICIES

For the year ended 31 March 2017

Disclosure

The financial statements shall also disclose for each class of property, plant and equipment recognised in the financial statements:

a. the existence and amounts of restrictions on title and property, plant and equipment pledged as securities for liabilities;

b. the amount of contractual commitments for the acquisition of property, plant and equipment;

c. if it is not disclosed separately on the face of the statement of financial performance, the amount of compensation from third parties for items of property, plant and equipment that were impaired, lost or given up that is included in surplus or deficit.

An entity shall disclose the following in the notes to the financial statements in relation to property, plant and equipment which is in the process of being constructed or developed:

a. The cumulative expenditure recognised in the carrying value of property, plant and equipment. These expenditures shall be disclosed in aggregate per class of asset.

b. The carrying value of property, plant and equipment that is taking a significantly longer period of time to complete than expected, including reasons for any delays.

c. The carrying value of property, plant and equipment where construction or development has been halted either during the current or previous reporting period(s). The entity shall also disclose reasons for halting the construction or development of the asset and indicate whether any impairment losses have been recognised in relation to these assets.

Derecognition

An item of property, plant and equipment is derecognised upon disposal or when no future economic benefits or service potential is expected from its use or disposal. The gain or loss arising from the derecognition of an item of property, plant and equipment is included in surplus or deficit when the item is derecognised. The gain or loss arising from the derecognition of an item of property, plant and equipment is determined as the difference between the net disposal proceeds, if any, and the carrying amount of the item.

1.5.3 IMPAIRMENT OF NON-FINANCIAL ASSETS

Cash generated units are determined as the smallest identified group of assets which can generate cash flows independently from other assets or groups of assets. Non-cash generating assets are primarily held for service delivery purposes.

1.5.3.1 CASH GENERATING ASSETS

The entity assesses at each reporting date whether there is any indication that an asset may be impaired. If any such indication exists, the entity estimates the recoverable amount of the individual asset.

If there is any indication that an asset may be impaired, the recoverable amount is estimated for the individual asset. If it is not possible to estimate the recoverable amount of the individual asset, the recoverable amount of the cash-generating unit to which the asset belongs is determined.

A cash generating unit is the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other assets or groups of assets.

The recoverable amount of an asset or a cash-generating unit is the higher of its fair value less costs to sell and its value in use.

If the recoverable amount of an asset is less than its carrying amount, the carrying amount of the asset is reduced to its recoverable amount. That reduction is an impairment loss.

An impairment loss of assets carried at cost less any accumulated depreciation or amortisation is recognised immediately in surplus or deficit.

An impairment loss is recognised for cash-generating units if the recoverable amount of the unit is less than the carrying amount of the unit. The impairment loss is allocated to reduce the carrying amount of the assets of the unit as follows:

- to the assets of the unit, pro rata on the basis of the carrying amount of each asset in the unit.

A entity assesses at each reporting date whether there is any indication that an impairment loss recognised in prior periods for assets may no longer exist or may have decreased. If any such indication exists, the recoverable amounts of those assets are estimated and the carrying amount is increased to the recoverable amount.

The increased carrying amount of an asset attributable to a reversal of an impairment loss should not exceed the carrying amount that would have been determined had no impairment loss been recognised for the asset in prior periods.

A reversal of an impairment loss of assets carried at cost less accumulated depreciation or amortisation is recognised immediately in surplus or deficit.

1.5.3.2 NON-CASH GENERATING ASSETS

The entity assesses at each reporting date whether there is any indication that an asset may be impaired. If any such indication exists, the entity estimates the recoverable service amount of the asset.

The recoverable service amount is the higher of a non-cash generating asset's fair value less costs to sell and its value in use. The value in use for a non-cash generating asset is the present value of the asset's remaining service potential.

If the recoverable service amount of an asset is less than its carrying amount, the carrying amount of the asset is reduced to its recoverable service amount. That reduction is an impairment loss and is recognized in surplus/deficit.

An impairment loss is recognised for non cash-generating units if the recoverable service amount of the unit is less than the carrying amount of the unit. The impairment loss is allocated to reduce the carrying amount of the assets of the unit as follows:

- to the assets of the unit, pro rata on the basis of the carrying amount of each asset in the unit.

An entity assesses at each reporting date whether there is any indication that an impairment loss recognised in prior periods for assets may no longer exist or may have decreased. If any such indication exists, the recoverable service amounts of those assets are estimated and increases the carrying amount to the recoverable service amount.

The increased carrying amount of an asset attributable to a reversal of an impairment loss does not exceed the carrying amount that would have been determined had no impairment loss been recognised for the asset in prior periods.

A reversal of an impairment loss of assets carried at cost less accumulated depreciation or amortisation is recognised immediately in surplus or deficit.

1.6 INTANGIBLE ASSETS

An intangible asset is recognised when:

- It is probable that the expected future economic benefits or service potential that are attributable to the asset will flow to the entity; and

ACCOUNTING POLICIES

For the year ended 31 March 2017

- The cost of the asset can be measured reliably.

Intangible assets are initially recognised at cost.

Expenditure on research (or on the research phase of an internal project) is recognized in surplus or deficit when it is incurred.

An intangible asset arising from development (or from the development phase of an internal project) is recognized when:

Subsequent expenditure is capitalised only when it increases the future economic benefits embodied in the asset to which it relates. The amortisation is calculated at a rate considered appropriate to reduce the cost of the asset less residual value over the shorter of its estimated useful life or contractual period. Residual values and estimated useful lives are reviewed annually. The amortization method used is the straight line method.

Intangible assets that meet the recognition criteria are stated in the statement of financial position at amortised cost, being the initial cost price less any accumulated amortisation and impairment losses. The assets residual values, useful lives and methods of amortization are reviewed at each financial year end, and adjusted prospectively if appropriate. Amortisation is charged to surplus or deficit so as to write off the cost of intangible assets over their estimated useful lives, using the straight-line method as follows: Computer Software : 3 years

An item of intangible assets is derecognised upon disposal or when no future economic benefits or service potential are expected from its use or disposal. The surplus or deficit arising from the derecognition of an item of intangible assets is included in the surplus or deficit when the item is derecognised. The surplus or deficit arising from the derecognition of an item of intangible assets is determined as the difference between the net disposal proceeds, if any, and the carrying amount of the item.

1.7 FINANCIAL INSTRUMENTS

The entity has various types of financial instruments and these can be broadly categorised as either financial assets, financial liabilities or equity instruments in accordance with the substance of the contractual agreement .

1.7.1 INITIAL RECOGNITION

Financial assets and financial liabilities are recognised on the entity's Statement of Financial Position when the entity becomes party to the contractual allowances of the instrument, therefore trade date accounting applies.

The entity does not offset a financial asset and a financial liability unless a legally enforceable right to set off the recognised amounts currently exists; and the entity intends either to settle on a net basis, or to realise the asset and settle the liability simultaneously.

1.7.2 FINANCIAL ASSETS - CLASSIFICATION

A financial asset is any asset that is cash or a contractual right to receive cash or another financial assets.

The financial assets of the entity are classified as Financial instruments at amortised cost.

The Financial assets are carried at cost are investments in residual interests that do not have a quoted market price in an active market, thus fair value cannot be reliably measured.

The entity has the following types of financial assets as reflected on the face of the Statement of Financial

Position or in the notes thereto:

Type of Financial Asset	Classification
Bank Balances and Cash	Financial instruments at amortised cost
Trade receivables	Financial instruments at amortised cost

Cash includes cash on hand (including petty cash) and cash with banks. Cash equivalents are short-term highly liquid investments, readily convertible into known amounts of cash, that are held with registered banking institutions with maturities of three months or less and are subject to an insignificant risk of change in value. For the purposes of the cash flow statement, cash and cash equivalents comprise cash on hand, deposits held on call with banks, net of bank overdrafts.

Trade receivables consists of amounts due by customers within a 30 day collection period.

1.7.3 FINANCIAL LIABILITIES - CLASSIFICATION

A financial liability is a contractual obligation to deliver cash or another financial asset to another entity. The entity has the following types of financial liabilities as reflected on the face of the Statement of Financial Position or in the notes thereto:

Type of Financial liability	Classification
Trade and other payables	Financial instruments at amortised cost
Finance leases	Financial instruments at amortised cost

1.7.4 INITIAL AND SUBSEQUENT MEASUREMENT

Financial Assets:

Financial Assets (upon initial recognition) are stated at fair value, plus transaction costs that are directly attributable to the acquisition or issue of the financial asset. Subsequent to initial recognition, financial assets are measured at amortised cost.

Financial liabilities:

Financial Liabilities (upon initial recognition) are stated at fair value, plus transaction costs that are directly attributable to the acquisition or issue of the financial liabilities. Subsequent to initial recognition, financial liabilities are measured at amortised cost.

1.7.5 IMPAIRMENT OF FINANCIAL ASSETS

Financial assets, other than those at fair value, are assessed for indicators of impairment at the end of each reporting period. Financial assets are impaired where there is objective evidence of impairment of Financial Assets (such as the probability of insolvency or significant financial difficulties of the debtor). If there is such evidence the recoverable amount is estimated and an impairment loss is recognised.

Financial assets carried at amortised cost

Financial assets are carried at amortised cost encompass accounts receivables and cash and cash equivalents. An estimate is made for doubtful debt based on past default experience of all outstanding amounts at year-end. Bad debts are written off the year in which they are identified as irrecoverable.

An allowance for impairment of accounts receivables is established when there is objective evidence that the entity will not be able to collect all amounts due according to the original terms of receivables. The allowance is made whereby the recoverability of accounts receivable is assessed individually and then collectively after grouping the assets in financial assets with similar credit risk characteristics. The amount of the allowance is the difference between the financial asset's carrying amount and the present value of estimated future cash flows, discounted at the original effective interest rate.

ACCOUNTING POLICIES

For the year ended 31 March 2017

Future cash flows in a group of financial assets that are collectively evaluated for impairment are estimated on the basis of historical loss experience for assets with credit risk characteristics similar to those in the group.

When a debtor is considered uncollectible, it is written off. Changes in the carrying amount of the allowance account are recognised in the Surplus/Deficit.

1.7.6 DERECOGNITION OF FINANCIAL ASSETS

The entity derecognises financial assets only when the contractual rights to the cash flows from the asset expire or it transfers the financial asset and substantially all the risks and rewards of ownership of the asset to another entity. The entity transfers a financial asset if either it transfers the contractual rights to receive the cash flows of the financial asset or retains the contractual rights to receive the cash flows of the financial asset.

1.7.7 DERECOGNITION OF FINANCIAL LIABILITIES

The entity derecognises financial liabilities when, and only when, the entity's obligations are discharged, cancelled or they expire.

The entity recognises the difference between the carrying amount of the financial liability (or part of a financial liability) extinguished or transferred to another party and the consideration paid, including any non- cash assets transferred or liabilities assumed, in surplus or deficit.

1.8 RISK MANAGEMENT OF FINANCIAL ASSETS AND LIABILITIES

It is the policy of the entity to disclose information that enables the user of its financial statements to evaluate the nature and extent of risks arising from financial instruments to which the entity is exposed on the reporting date.

The entity has exposure to the following risks from its use of financial instruments:

- market risk
- credit risk
- liquidity risk

Risks and exposure are disclosed as follows:

Market Risk

Market risk is the risk that changes in market prices, such as foreign exchange rates, interest rates and equity prices will affect the entity's income or the value of its holdings of financial instruments. The objective of market risk management is to manage and control market risk exposures within acceptable parameters, while optimising the return.

Credit Risk

Credit risk is the risk of financial loss to the entity if a customer or counterparty to a financial instrument fails to meet its contractual obligations, and arises principally from the entity's receivables from customers and investment securities.

Each class of financial instrument is disclosed separately. The maximum exposure to credit risk not covered by collateral is specified, and financial instruments covered by collateral are specified.

Liquidity Risk

Liquidity risk is the risk that the entity will encounter difficulty in meeting the obligations associated with its financial liabilities that are settled by delivering cash or another financial asset. The Entity's approach to managing liquidity is to

ensure, as far as possible, that it will always have sufficient liquidity to meet its liabilities when due, under both normal and stressed conditions, without incurring unacceptable losses or risking damage to the entity's reputation.

Liquidity risk is managed by ensuring that all assets are reinvested at maturity at competitive interest rates in relation to cash flow requirements. Liabilities are managed by ensuring that all contractual payments are met on a timeous basis and, if required, additional new arrangements are established at competitive rates to ensure that cash flow requirements are met.

1.9 REVENUE RECOGNITION

1.9.1 GENERAL

Revenue, is derived from a variety of sources which includes government grants, rendering of services and finance income.

Revenue comprises the fair value of the consideration received or receivable for services rendered in the

ordinary course of the entity's activities. Revenue is shown net of rebates and discounts.

The entity recognises revenue when the amount of revenue can be reliably measured, it is probable that future economic benefits will flow to the entity and when specific criteria have been met for each of the entity's activities as described below. The amount of revenue is not considered to be reliably measurable until all contingencies relating to the sale have been resolved. The entity bases its estimates on historical results, taking into consideration the type of customer, the type of transaction and the specifics of each arrangement.

1.9.2 REVENUE FROM EXCHANGE TRANSACTIONS

Revenue from exchange transactions refers to revenue that accrued to the entity directly in return for services rendered, the value of which approximates the consideration received or receivable.

1.9.2.1 FINANCE INCOME

Interest earned on investments is recognised in surplus or deficit on a time proportionate basis that takes into account the effective yield on the investment.

1.9.2.2 RENDERING OF SERVICES

Rendering of Services constitute revenue which arises from service delivery to customers.

The stage of completion is assessed by reference to work performed as at the reporting date. Contract revenue includes the initial amount agreed in the contract plus any variations in contract work, claims and incentive payments to the extent that it is probable that these will result in revenue and can be measured reliably. As soon as the outcome of a contract can be estimated reliably, contract revenue and expenses are recognised in surplus or deficit in proportion to the stage of completion of the contract.

The stage of completion is assessed by reference to work performed as at reporting date. When the outcome of a contract cannot be estimated reliably, contract revenue is recognised only to the extent of contract costs incurred that are likely to be recoverable. An expected loss on a contract is recognised immediately in surplus or deficit.

1.9.3 REVENUE FROM NON-EXCHANGE TRANSACTIONS

Revenue from non-exchange transactions refers to transactions where the entity received revenue from another entity without directly giving approximately equal value in exchange. Revenue from non-exchange transactions is generally

ACCOUNTING POLICIES

For the year ended 31 March 2017

recognised to the extent that the related receipt or receivable qualifies for recognition as an asset and there is no liability to repay the amount.

1.9.3.1 GOVERNMENT GRANTS/SUBSIDIES

Conditional Grants and receipts

Income received from conditional grants, donations and funding are recognised as revenue to the extent that the entity has complied with any of the criteria, conditions or obligations embodied in the agreement. To the extent that the criteria, conditions or obligations have not been met a liability is recognised.

Unconditional Grants and receipts

Government grants that are receivable as compensation for expenditure or losses already incurred or for the purpose of giving immediate financial support to the entity with no future related costs are recognised in surplus or deficit in the period in which they become receivable.

1.9.3.2 GOVERNMENT GRANTS/SUBSIDIES

Liability held on behalf of principal

Income received from conditional grants where SANSA is acting as an agent rather than as a principal, SANSA as agent recognises only that portion of the revenue and expenses it receives or incurs in executing the transactions on behalf of the principal

An entity is an agent when, in relation to transactions with third parties, when all three of the following criteria are present,

a. It does not have the power to determine the significant terms and conditions of the transaction.

b. It does not have the ability to use all, or substantially all, of the resources that result from the transaction

c. It is not exposed to variability in the results of the transaction

1.10 LEASES

Lease Classification

Leases of property, plant and equipment, in which a significant portion of the risks and rewards of ownership are retained by the lessor are classified as operating leases.

Leases are classified as finance leases where substantially all the risks and rewards associated with ownership of an asset are transferred to the entity.

The Entity as Lessee

Determining whether an arrangement contains a lease

At inception of an arrangement, the entity determines whether such an arrangement is or contains a lease. A specific asset is the subject of a lease if fulfilment of the arrangement is dependent on the use of that specified asset. An arrangement conveys the right to use the asset if the arrangement conveys to the entity the right to control the use of the underlying asset. At inception or upon reassessment of the arrangement, the entity separates payments and other consideration required by such an arrangement into those for the lease and those for other elements on the basis of their relative fair values. If the entity concludes for a finance lease that it is impracticable to separate the payments reliably, an asset and a liability are recognised at an amount equal to the fair value of the underlying asset. Subsequently the liability is reduced as payments are made and an imputed finance charge on the liability is recognised using the entity's incremental borrowing rate.

Finance leases

Where the entity enters into a finance lease, Property, plant and equipment or Intangible Assets subject to finance lease agreements are capitalised at amounts equal to the fair value of the leased asset or, if lower, the present value of the minimum lease payments, each determined at the inception of the lease. Corresponding liabilities are included in the Statement of Financial Position as Finance Lease Liabilities. The corresponding liabilities are initially recognised at the inception of the lease and are measured as the sum of the minimum lease payments due in terms of the lease agreement, discounted for the effect of interest. In discounting the lease payments, the entity uses the interest rate that exactly discounts the lease payments and unguaranteed residual value to the fair value of the asset plus any direct costs incurred. Lease payments are allocated between the finance cost and capital repayment using the effective interest rate method. Finance costs are expensed when incurred.

Subsequent to initial recognition, the leased assets are accounted for in accordance with the stated accounting policies applicable to property, plant, equipment or intangibles. The lease liability is reduced by the lease payments, which are allocated between finance cost and capital repayment using the effective interest rate method. Lease finance costs are expensed when incurred. The accounting policies relating to DE recognition of financial instruments are applied to lease payables. The lease asset is depreciated over the shorter of the asset's useful life or the lease term.

Operating leases

The entity recognises operating lease rentals as an expenditure in surplus or deficit on a straight-line basis over the term of the relevant lease. The difference between the amounts recognised as an expenditure and the contractual payments are recognised as an operating lease asset or liability

1.11 RELATED PARTIES

Individuals as well as their close family members, and/or entities are related parties if one party has the ability, directly or indirectly, to control or jointly control the other party or exercise significant influence over the other party in making financial and/or operating decisions. SANSA is a related entity to all other entities (and their controlled / jointly controlled entities) for which the Minister of Science and Technology is the executive authority and more broadly, to all entities controlled by the national executive.

1.12 EVENTS AFTER THE REPORTING DATE

Events after the reporting date that are classified as adjusting events have been accounted for in the Annual Financial Statements, please refer to note 41. Events after the reporting date that are classified as non-adjusting events have been disclosed in the notes to the Annual Financial Statements.

1.13 COMPARATIVE INFORMATION

Prior year comparatives

When the presentation or classification of items in the Annual Financial Statements is amended, prior period comparative amounts are reclassified. The nature and reasons for the reclassification is disclosed.

1.14 CAPITAL COMMITMENTS AND EXPENDITURE

Items are classified as commitments where the entity commits itself to future transactions that will normally result in the outflow of resources.

Capital commitments are not recognised in the statement of financial position as a liability but are included in the disclosure notes in the following cases:

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

- Approved and contracted commitments, where the expenditure has been approved and the contract has been awarded at the reporting date, where disclosure is required by a specific standard of GRAP.

1.15 CONTINGENT LIABILITIES

Contingent liabilities represent a possible obligation that arises from past events and whose existence will be confirmed only by an occurrence or non-occurrence of one or more uncertain future events not wholly within the control of the entity.

1.16 FOREIGN CURRENCIES

Transactions in foreign currencies are initially recorded at the prevailing exchange rate on the dates of the transactions.

Monetary assets and liabilities denominated in such foreign currencies are translated to the functional currencies at the rates prevailing at the reporting date. Exchange differences are included in surplus or deficit.

Foreign currency translation

a. Functional and presentation currency

Items included in the financial statements are measured using the currency of the primary economic environment in which the entity operates ('the functional currency'). Financial Statements are presented in South African Rends, which is the company's functional and presentation currency.

b. Transactions and Balances

Foreign currency transactions are translated into the functional currency using the exchange rates prevailing at the date of the transaction. Foreign exchange gains and losses resulting from the settlement of such transactions, and from the translation of monetary assets and liabilities denominated in foreign currencies at year end are recognised in the Statement of Financial Position.

1.17 IRREGULAR EXPENDITURE

Irregular expenditure is expenditure that is contrary to the Public Finance Management Act (Act No 56 of

2003) and is in contravention of any legislation. Irregular expenditure excludes unauthorised expenditure. All expenditure relating to irregular expenditure is recognised as an expense in the Statement of Financial Performance in the year that expenditure was incurred. Expenditure is classified in accordance with the nature of the expense, and where recovered, it is subsequently accounted for as revenue in the Statement of Financial Performance.

1.18 FRUITLESS AND WASTEFUL EXPENDITURE

Fruitless and wasteful expenditure is expenditure that was made in vain and would have been avoided had reasonable care been exercised. Fruitless and wasteful expenditure is accounted for as expenditure in surplus or deficit.

1.19 EMPLOYEE BENEFITS

1.19.1 SHORT-TERM EMPLOYEE BENEFITS

Remuneration to employees is recognised in the Statement of Financial Performance as the services are rendered, except for non-accumulating benefits, which are only recognised when the specific event occurs.

The entity treats its provision for leave pay as an accrual.

The costs of all short-term employee benefits such as leave pay and bonus are recognised during the period in which the employee renders the related service. The liability for leave pay is based on the total accrued leave days at year end and is shown as a creditor in the Statement of Financial Position. The entity recognises the expected cost of performance bonuses only when the entity has a present legal or constructive obligation to make such payment and a reliable estimate can be made.

1.20 PROVISIONS

Provisions are recognised when the entity has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources embodying economic benefits or service potential will be required to settle the obligation and a reliable estimate can be made.

Provisions are reviewed at reporting date and the amount of a provision is the present value of the expenditure expected to be required to settle the obligation. When the effect of discounting is material, provisions are determined by discounting the expected future cash flows that reflect current market assessments of the time value of money at a rate adjusted for the specific risks of a liability. The impact of the periodic unwinding of the discount is recognised in surplus or deficit as a finance cost as it occurs.

1.21 INVENTORY

The entity uses the first in first out method (FIFO) to account for inventory. Inventories are valued at the lower of cost price or net realisable value. The net realisable value is the estimated selling price in the ordinary course of business, less the estimated or selling costs.

The cost of inventories comprises of all costs of purchase, costs of conversion and other costs incurred in bringing the inventories to their present location and condition.

The amount of any write-down of inventories to net realisable value and all losses of inventories are recognised as an expenditure in the period the write-down or loss occurs.

1.22 TRANSFER OF FUNCTIONS UNDER COMMON CONTROL

If a transfer of functions between entities within the same sphere of government or between entities that are part of the same economic entity the transfer is considered to have occurred between entities under common control. Assets and liabilities transferred between entities under common control are recognised at the carrying values. In instances where the carrying amount is not available or can't be accurately determined, the depreciated replacement cost is used as the deemed carrying amount.

1.23 BUDGET INFORMATION

The Financial Statements and budget are not presented on the same basis, Financial Statements are prepared on accrual basis whilst the budget is prepared on a cash basis of accounting. A reconciliation between the surplus/(deficit) for the period as per the Statement of Financial Performance and budgeted surplus/(deficit) is included in the Statement of Comparison of Budget and Actual Amounts. At the end of September each year the budget may be revised if necessary due to changes in the operations of the entity which require a reallocation of resources. All budget changes are approved by the board of directors prior to the implementation of the revised budget.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

2. GENERAL INFORMATION

Domicile	South Africa
Nature of business and principal activities	The South African National Space Agency (SANSA) is mandated by the SANSA Act, 36 of 2008 and is South Africa's government body for the promotion and use of space. It also fosters cooperation in space-related activities and research in space science, seeks to advance scientific engineering through human capital, and supports the creation of an environment conducive to the industrial development of space technologies
Legal form of entity	Schedule 3A Public entity, as defined by the Public Finance Management Act (Act No. 1 of 1999 as amended by Act No. 29 of 1999).
Executive authority	Minister of the Department of Science and Technology
Board members	Ms. J Lawrence (Chairperson) Prof. R Bharuthram Mr. V Gore Mr. S Hamilton Mr. E Jansen Ms. G Khambule Mr. P Maine Dr. S Malinga (Resigned 31 August 2016) Ms. M Matooane Ms. M Mfeka Dr. N Mjoli Dr. V Munsami (Chief Executive Officer) (Appointed 1 January 2017) Mr. A Naidoo Mr. J Prinsloo Ms. I Pule (Appointed 8 June 2016) Mr. M Rezelman Mr. M Riba Mr. W Van Biljon
Registered office	Enterprise Building, Mark Shuttleworth street, Innovation Hub Pretoria Gauteng, South Africa
Business address	Enterprise Building, Innovation Hub Mark Shuttleworth street, Innovation Hub Pretoria Gauteng, South Africa
Postal address	PO Box 484, Silverton 0127, Gauteng, South Africa
Auditor	Sizwe Ntsaluba Gobodo Incorporated (011) 231 0600 20 Morris Street East, Woodmead, 2191

3. SEGMENT INFORMATION

General information about segments

The entity is organised and reports on a basis of four business units comprising of five functional areas: the corporate support programme, the earth observation programme, the space science programme, the space operations programme and the space engineering programme. The programmes were organised around the type of services provided and the related space science fields. Management used the same segments for determining and delivering on its strategic objectives. The space engineering programme is aggregated into the corporate programme for reporting purposes. It is not an operation on its own but a business unit within the corporate programme overseeing key projects across the divisions.

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

SANSA's Space Engineering Programme leads systems engineering and project management expertise and drives a small satellite build programme in South Africa in partnership with primary 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 and facilitates private space industry partnerships

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

The Space Science Programme leads multidisciplinary space science. Key functions include basic and applied science research, the support of space facilitated science through science data acquisition, the coordination and administration of scientific data ground segments, provision of space weather and other geo-space products and services on a commercial and private basis. The programme also provides leadership in postgraduate science student training, as well as primary science advancement and learner and educator space science support

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 national and international space industry clients and governments. The programme also supplies hosting capabilities.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

2017	Corporate Office & Space Engineering	Earth Observation	Space Operations	Space Science	Eliminations	Total
	R	R	R	R	R	R
3.1 REVENUE						
Revenue from Non - Exchange Transactions						
Transfers and Subsidies Received	134 884 081	62 678 631	-	29 670 026		**227 232 738**
Revenue from Exchange Transactions						
Interest Income	8 165 801	815 722	164 406	432 704		**9 578 633**
Rendering of Services	-	10 304 616	52 653 295	8 806 902		**71 764 813**
Other Income	1 699 326	175 791	14 082 973	1 220 934	(15 343 565)	**1 835 459**
Total Revenue	**144 749 208**	**73 974 760**	**66 900 674**	**40 130 566**	**(15 343 565)**	**310 411 643**
Expenditure						
Employee Related Costs	27 264 397	23 337 493	31 231 084	22 862 526		**104 695 500**
Board Member Remuneration	1 069 887	-	-	-		**1 069 887**
Depreciation and Amortisation	1 362 128	8 357 660	9 725 172	4 433 370		**23 878 330**
Repairs and Maintenance	274 944	2 473 603	3 677 254	1 009 648		**7 435 449**
Finance Costs	24 339	-	-	-		**24 339**
Data Licence fees	-	36 124 088	-	-		**36 124 088**
Grants and Subsidies Paid	927 500	1 445 100	-	3 080 193		**5 452 793**
Antenna Infrastructure Services	-	-	203 266	-		**203 266**
Training Expenses	1 036 187	319 919	150 574	213 343		**1 720 023**
General Expenses	17 296 065	17 353 807	15 888 276	7 175 772	(15 343 565)	**42 370 357**
Net Losses on foreign exchange transactions	154 563	(6 761)	1 321 073	(116 858)		**1 352 017**
Loss on Disposal of Property, Plant and Equipment	36 306	-	314 394	213 908		**564 608**
Total Expenditure	**49 446 316**	**89 404 909**	**62 511 094**	**38 871 902**	**(15 343 565)**	**224 890 657**
Surplus (Deficit) for the year	**95 302 892**	**(15 430 149)**	**4 389 580**	**1 258 664**	**-**	**85 520 986**

2017	Corporate Office & Space Engineering	Earth Observation	Space Operations	Space Science	Eliminations	Total
	R	R	R	R	R	R
3.1						
Assets						
Non-current - Segment assets	246 622 192	18 731 143	70 578 727	28 882 183		**364 814 245**
Current - Segment assests	309 540 697	23 699 164	25 463 857	11 130 061	(197 812 185)	**172 021 594**
Total Segment assets	**556 162 889**	**42 430 307**	**96 042 584**	**40 012 244**	**(197 812 185)**	**536 835 839**
Liabilities						
Non - current Segment Liabilities	-	-	-	-	-	-
Current Segment Liabilities	99 836 534	154 651 891	5 212 221	67 643 434	(197 812 185)	129 531 895
Total Segment Liabilities	**99 836 534**	**154 651 891**	**5 212 221**	**67 643 434**	**(197 812 185)**	**129 531 895**
Capital expenditure	**91 370 622**	**247 363**	**16 023 356**	**2 483 037**	**-**	**110 124 378**
Non cash items excluding depreciation						
Accrued expenses	2 016 383	3 231 235	432 104	277 751	-	5 957 473
Deferred revenue	-	361 065	5 953 053	1 010 377	-	7 324 495

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

2016	Corporate Office & Space Engineering	Earth Observation	Space Operations	Space Science	Eliminations	Total
	R	R	R	R	R	R
REVENUE						
Revenue from Non - Exchange Transactions						
Transfers and Subsidies Received	146 721 364	47 064 068	8 367 999	30 287 643		**232 441 074**
Revenue from Exchange Transactions						
Interest Income	5 435 177	726 328	1 898 881	334 136		**8 394 522**
Rendering of Services	-	20 320 424	68 023 332	8 484 872		**96 828 628**
Other Income	19 489	26 507	4 652 988	475 141		**5 174 125**
Total Revenue	**152 176 030**	**68 137 327**	**82 943 200**	**39 581 792**	-	**342 838 349**
Expenditure						
Employee Related Costs	25 055 505	21 594 546	29 682 347	19 713 778		**96 046 176**
Board Member Remuneration	914 270	-	-	-		**914 270**
Depreciation and Amortisation	2 417 048	8 567 055	9 675 833	4 437 251		**25 097 187**
Repairs and Maintenance	352 187	2 940 145	3 662 999	1 399 786		**8 355 117**
Finance Costs	10 125	-	-	77		**10 202**
Data Licence fees	-	31 406 738	-	-		**31 406 738**
Grants and Subsidies Paid	1 161 500	258 396	-	2 202 502		**3 622 398**
Antenna Infrastructure Services	-	-	4 146 811	-		**4 146 811**
Training Expenses	604 532	374 216	549 831	205 224		**1 733 802**
General Expenses	13 437 605	12 208 877	14 680 746	7 051 604		**47 378 832**
Net Losses on foreign exchange transactions	49 839	5 274 975	79 894	65 821		**5 470 529**
Loss on Disposal of Property, Plant and Equipment	-	-	14 301	1 134 770		**1 149 071**
Total Expenditure	**44 002 611**	**82 624 948**	**62 492 762**	**36 210 813**	-	**225 331 133**
Surplus for the year	**108 173 419**	**(14 487 621)**	**20 450 439**	**3 370 979**		**117 507 216**
Assets						
Non-current - Segment assets	150 845 958	26 841 440	70 836 910	31 072 706		**279 597 014**
Current - Segment assests	98 304 310	17 386 544	77 068 505	6 638 079		**199 397 438**
Total Segment assets	**249 150 268**	**44 227 984**	**147 905 415**	**37 710 785**	-	**478 994 452**
Liabilities						
Non - current Segment Liabilities	(32)	5 891 830	-	1		**5 891 799**
Current Segment Liabilities	120 050 351	16 529 753	8 624 572	6 115 020		**151 319 696**
Total Segment Liabilities	**120 050 319**	**22 421 583**	**8 624 572**	**6 115 021**		**157 211 495**
OTHER INFORMATION						
Capital expenditure	**101 156 137**	**2 873 348**	**5 153 316**	**5 438 388**		**114 621 188**
Non cash items excluding depreciation	-					
Accrued expenses	6 797 112	1 891 668	1 431 007	513 944		**10 633 730**
Deferred revenue	-	3 866 358	2 039 443	11 718		**5 917 519**

3.2 MEASUREMENT OF SEGMENT SURPLUS OR DEFICIT, ASSETS AND LIABILITIES

The accounting policies of the segments are the same as those described in the summary of the significant accounting policies.

3.3 INFORMATION ABOUT GEOGRAPHICAL AREAS

The majority of the entity's operations are in the Gauteng province, with one facility located in Hermanus in the Western Cape

	2017 R	2016 R
Revenue from Non-exchange Transactions		
Gauteng Province		
Corporate	134 884 081	146 721 364
Earth Observation	62 678 631	47 064 068
Space Operations	-	8 367 999
	197 562 712	**202 153 431**
Western Cape Province		
Space Science	29 670 026	30 287 643
Total Revenue from Non-exchange Transactions	**227 232 738**	**232 441 074**
Revenue from Exchange Transactions		
Gauteng Province		
Corporate	9 865 127	5 454 666
Earth Observation	11 296 129	21 073 259
Space Operations	66 900 674	74 575 201
	88 061 930	**101 103 126**
Western Cape Province		
Space Science	10 460 540	9 294 149
Total Revenue from Exchange Transactions	**98 522 470**	**110 397 275**
Segment Expenditure		
Gauteng Province		
Corporate	49 446 316	44 002 611
Earth Observation	89 404 909	82 624 948
Space Operations	62 511 094	62 492 761
	201 362 319	**189 120 320**
Western Cape Province		
Space Science	38 871 902	36 210 813
Total Segment Expenditure	**240 234 221**	**225 331 133**
Non - Current Segment Assets		
Gauteng Province		
Corporate	246 622 192	150 845 958
Earth Observation	18 731 143	26 841 440
Space Operations	70 578 727	70 836 910
	335 932 062	**248 524 308**
Western Cape Province		
Space Science	28 882 183	31 072 706
Total Non - Current Segment Assets	**364 814 245**	**279 597 014**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

4. STATEMENT OF COMPARISION OF BUDGET AND ACTUAL AMOUNTS

4.1 The South African National Space Agency presents its approved budget on a cash basis and the financial statements on the accrual basis

4.2 The budget is approved on a cash basis by functional classification as well as economic classification. The approved budget covers the fiscal period from 1 April 2016 to 31 March 2017. The budget and the accounting bases differ. The Financial Statements for the entity are prepared on the accrual basis using a classification based on the nature of expenses in the Statement of Financial Performance. The Financial Statements differ from the budget, which is approved on the cash basis. The Statement of Comparison of Budget and Actual Amounts is prepared on a comparable basis to the budget. The reconciliation of the actual comparable amounts to the net cash flows per the Cash Flow Statement is presented on the Statement of Comparison of Budget and Actual Amounts.

4.3 The variance between the actual and budgeted values is explained as follows:

4.3.1 The unfavourable variance on ring fenced transfers is as a result of R9.3 million less received from the department for the satellite programme than the initial budget. These funds are committed to the satellite development programme which is a multi year project and the related upgrades required on the national assembly integration and test facilities.

4.3.2 The favourable variance against budget on Post graduate student bursary support relates to current year allocation of R3.6 million being confirmed subsequent to budget approval process, as the amount is not guaranteed until receipt of allocation letter.

4.3.3 The favourable variance against budget on contract revenue from the public sector relates to additional income received for the placement of orders on high resolution images. The budget was revised down due to contracts not renewed with two key customers, as they were for finite projects and not ongoing.

4.3.4 The favourable variance on foreign contract income is due to additional launch support services revenue received and a cash benefit derived from the weakness of the rand against major foreign currencies during the year when foreign customers were invoiced.

4.3.5 The favourable variance is due to the budget value including an estimated foreign exchange gains from foreign client contracts as the actual benefit is realised on the invoiced value, as well as insurance pay-outs received for the replacement of weather damaged equipment.

4.3.6 The variance on compensation of employees relates to vacancies during the financial year, mainly in operations for specialised skills in space operations and senior management roles due to resignations during the year.

4.3.7 The variance on goods and services mainly consists of the catch up on spending on items on order not yet delivered in prior years, which normally have long lead times.

4.3.8 Most of the equipment is sourced internationally for both the ground infrastructure and research equipment. There are currently items on order that are expected to be received in the next financial year, in particular the upgrade of antennae and connection for the dark fibber link in anticipation of the teleport business.

4.3.9 The variance on software and intangible assets relates to the commitment on the acquisition of the ERP system and its implementation over the two financial years. The estimated completion is July 2017.

4.3.10 The satellite programme is a multi year project with an estimated launch date of 2019/20 if the project is fully funded to its completion. The variance against budget reflects some delays in the project, due to funding constraints for the project as it was funded from the Economic Competitiveness Support Programme which may discontinued as well as funding constraints to upgrade the existing assembly integration and testing facilities which are critical for quality testing before commissioning.

5. CASH AND CASH EQUIVALENTS

	2017 R	2016 R
Cash and Cash Equivalents	150 757 680	178 458 539
Total Cash and Cash Equivalents	**150 757 680**	**178 458 539**

Cash and cash equivalents are measured at amortised cost. Cash includes cash on hand and cash with banks.

5.1 BANK ACCOUNTS

Cash in Bank for operational requirements[1]	54 669 031	74 030 553
Cash in the bank held on behalf of principal[2]	9 268 569	22 083 483
Cash in Bank held for Committed Conditional Grants[3]	86 815 945	82 335 930
Total Bank Accounts	**150 753 545**	**178 449 966**

5.2 CASH ON HAND

Cash on hand	4 135	8 573
Cash on hand	**4 135**	**8 573**
Total Cash and cash equivalents	**150 757 680**	**178 458 539**

[1] Cash held for operational requirements represents cash to be utilised to settle trade and other payables R20.8m (2016: R34m) which are due in 30 days, provision for performance bonus R7.6m (2016: R6.9m), The current portion of the long term liability R4.9m (2016: R5.9m) and the remaining balance to cover expenditure commitments on order, but not yet delivered by year end.

[2] Cash held on behalf of the principal is to be utilised to pay for grant expenditure for the Cube Satellite Constellation Initiative by the Cape Peninsula University of Technology of R9.3m.

[3] Cash in the bank held for committed conditional grants to cover the Satellite development programme of R48.9m (2016: R73m); Operation Phakisa Data acquisition and Ocean and Coast Information management system of R26.6m (2016: R nil); Assembly Integration and Test Facilities of R6.5m (2016:Rnil); Post graduate support programme of R2.3m (2016: R2.5m) and Research grants of R2.5m (2016:R2.2m).

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

6. RECEIVABLES FROM EXCHANGE TRANSACTIONS

	2017 R	2016 R
Trade receivables	11 160 159	18 046 991
Other receivables	9 640 480	2 540 088
	20 800 639	**20 587 079**

6.1.1 TRADE RECEIVABLES

As at 31 March 2017	**Gross**	**Allowance for Impairment**	**Net**
Trade customers	11 160 159	-	11 160 159
Total	**11 160 159**	**-**	**11 160 159**

As at 31 March 2016	**Gross**	**Allowance for Impairment**	**Net**
Trade customers	18 046 991	-	18 046 991
Total	**18 046 991**	**-**	**18 046 991**

6.1.2 AGEING OF TRADE RECEIVABLES

	2017 R	2016 R
Current:		
0 - 30 days	10 850 646	17 206 194
Past Due:		
31 - 60 Days	119 139	433 146
61 - 90 Days	7 400	172 546
91 - 120 Days	182 974	235 105
Total	**11 160 159**	**18 046 991**

6.1.3 ALLOWANCE FOR IMPAIRMENT

Trade receivables - not past due and not impaired

Trade receivables at the end of the year have been assessed for impairment, the outcome of which indicated that they are recoverable. The carrying amounts of fully performing financial assets included in trade and receivables at year-end are:

	2017 R	2016 R
Trade customers - current	**10 850 646**	**17 206 194**

Trade receivables - past due and not impaired

Financial assets included in trade receivables that are outside their normal payment terms are considered to be past due. The following represents an analysis of the past due financial assets that are past due but not impaired as these customers paid subsequent to year end:

	2017 R	2016 R
Trade customers - past due and not impaired	**309 513**	**840 797**
Receivables from Local debtors	1 425 038	9 681 652
Receivables from International debtors	9 735 121	8 365 339
Total Trade Debtors	**11 160 159**	**18 046 991**

6.1.4 CREDIT QUALITY OF TRADE RECEIVABLES

Trade receivables consist of local customers mainly in government and international customers mainly from the US and Europe that are in the space industry. Trade receivables are non-interest bearing and are generally on 30 - 60 day collection terms. The maximum exposure to credit risk at the reporting date is the carrying amount of trade receivables.

In determining the recoverability of a receivable, management considers any change in the credit quality of the debtor from the date credit was initially granted up to the reporting date. Any allowance for impairment on trade and other receivables (loans and receivables) exists predominantly due to the possibility that these debts will not be recovered. Management assesses these debtors individually for impairment and where impairment is identified, these are disclosed as an allowance for impairment under trade customers.

The credit quality of trade receivables that are neither past due nor impaired are considered as such by the entity taking into account the contract arrangements with these customers and their payment history.

6.1.5 FAIR VALUE OF TRADE RECEIVABLES

Trade and other receivables from exchange transactions (upon initial recognition) are stated at fair value, plus transaction costs that are directly attributable to the acquisition or issue of the financial asset. Subsequent to initial recognition, financial assets are measured at amortised cost.

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Management considers the carrying amounts of financial assets recorded at amortised cost in the financial statements to approximate their fair values on 31 March 2017, as a result of the short-term maturity of these assets and liabilities.

6.1.6 CLASSIFICATION OF FINANCIAL ASSETS

Financial Assets of the entity are classified as follows:

Financial Assets	Classification
Trade receivables	
Trade receivables	At amortised cost

6.2 OTHER RECEIVABLES

	2017 R	2016 R
Other Receivables	9 640 480	2 540 088
	9 640 480	**2 540 088**

6.2.1 OTHER RECEIVABLES

As at 31 March 2017	Gross	Allowance for Impairment	Net
Prepaid expenses[1]	7 510 433	-	7 510 433
Sundry Deposits [2]	2 037 808	-	2 037 808
Other Debtors	92 239	-	92 239
Total	**9 640 480**	**-**	**9 640 480**

As at 31 March 2016	Gross	Allowance for Impairment	Net
Prepaid expenses	527 399	-	527 399
Sundry Deposits 2	1 988 908	-	1 988 908
Other Debtors	23 781	-	23 781
Total	**2 540 088**	**-**	**2 540 088**

[1] Prepaid expenses consist of advance payments on projects with such contractual arrangements. The major prepayments are for the guaranteed security payment of R3.2m for the shipment of specialised equipment for the Ku-band antenna upgrade from an international supplier; payment of R1.8 m for a venue booking for the SANSA hosted ISRSE conference to be held in May and R1.1m for various instrumentations for repairs sourced from international suppliers.

[2] Sundry Deposits consist of electricity consumption and office space lease deposits as per the contractual requirements and are recoverable at the end of the contract term.

6.2.2 CREDIT QUALITY OF OTHER RECEIVABLES

Periodic credit evaluation is performed on the financial condition of accounts receivable and, where appropriate, credit guarantee is increased accordingly. Prepaid expenses and deposits are non- interest bearing. The maximum exposure to credit risk at the reporting date is the fair value of each class of receivable mentioned above.

In determining the recoverability of a receivable, management considers any change in the credit quality of the debtor from the date credit was initially granted up to the reporting date. Any allowance for impairment on trade and other receivables (loans and receivables) exists predominantly due to the possibility that these debts will not be recovered. Management assesses these debtors individually for impairment and group them together in the Statement of Financial Position as financial assets with similar credit risk characteristics.

The credit quality of trade receivables from non-exchange that are neither past due nor impaired are considered fair by the entity taking into account the historical information available.

6.2.3 FAIR VALUE OF RECEIVABLES FROM TRADE AND OTHER RECEIVABLE

Receivables from non-exchange transactions (upon initial recognition) are stated at fair value, plus transaction costs that are directly attributable to the acquisition or issue of the financial asset. Subsequent to initial recognition, financial assets are measured at amortised cost.

Management considers the carrying amounts of financial assets recorded at amortised cost in the financial statements to approximate their fair values on 31 March 2017, as a result of the short-term maturity of these assets and liabilities.

6.2.4 CLASSIFICATION OF FINANCIAL ASSETS

The Financial Assets of the entity are classified as follows:

Financial Assets	Classification
Receivables from non-exchange transactions	
Prepaid expenses	At amortised cost
Sundry Deposits	At amortised cost
Other Debtors	At amortised cost

7. INVENTORY

	2017 R	2016 R
Fuel - at cost	463 275	351 820
Total Inventory	**463 275**	**351 820**

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8. PROPERTY, PLANT AND EQUIPMENT

31 March 2017

Reconcilliation of Carrying Value

Description	Land	Leasehold Improvements	Leased Assets	Buildings	Plant and Machinery	Research Equipment	Vehicles	Office Equipment	Furniture and Fittings	Computer Equipment	Exhibits	Work In Progress	Laboratory equipment	Total
	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Carrying values at 1 April 2016	**4 307 700**	**58 798**	**218**	**12 252 245**	**60 354 508**	**8 740 801**	**4 782 465**	**2 566 935**	**2 868 305**	**13 827 586**	**274 432**	**146 281 349**	**1 566 245**	**257 881 588**
Cost	4 307 700	1 700 946	328 387	14 230 505	91 863 596	17 140 218	6 964 535	8 044 225	4 813 983	33 621 553	388 800	146 281 349	1 975 005	331 660 803
Completed Assets	4 307 700	1 700 946	328 387	14 230 505	91 863 596	17 140 218	6 964 535	8 044 225	4 813 983	33 621 553	388 800	-	1 975 005	185 379 454
Under construction	-	-	-	-	-	-	-	-	-	-	-	146 281 349	-	146 281 349
Accumulated Depreciation	-	(1 642 148)	(328 169)	(1 978 260)	(31 509 088)	(8 399 417)	(2 182 070)	(5 477 290)	(1 945 678)	(19 793 967)	(114 368)	-	(408 760)	(73 779 215)
Acquisitions					**6 682 315**	**1 719 429**		**69 433**	**1 295 093**	**2 960 863**		**91 435 834**	**340 071**	**104 503 039**
Acquisitions at cost					6 682 315	1 719 429		69 433	1 295 093	2 960 863		-	340 071	13 067 204
Capital under Construction - Additions					-	-		-	-	-		91 435 834	-	91 435 834
Depreciation	**-**	**(18 837)**		**(442 440)**	**(7 682 299)**	**(2 347 423)**	**(371 905)**	**(464 088)**	**(478 320)**	**(4 370 562)**	**(41 280)**	**-**	**(423 946)**	**(16 641 101)**
Carrying value of Disposals				**(214 476)**	**(90 528)**	**(594 236)**	**-**	**(10 779)**	**(36 395)**	**(82 398)**				**(1 028 813)**
Cost of Disposed Asset				(354 181)	(138 866)	(823 813)	-	(34 762)	(68 584)	(332 401)				(1 752 607)
Accumulated Depreciation of Disposed Asset				139 705	48 338	229 577	-	23 983	32 189	250 003				723 794
Capitalised work in progress														
Carrying values at 31 March 2017	**4 307 700**	**39 961**	**218**	**11 595 329**	**59 263 996**	**7 518 571**	**4 410 560**	**2 161 501**	**3 648 683**	**12 335 489**	**233 152**	**237 717 183**	**1 482 370**	**344 714 713**
Cost	4 307 700	1 700 946	328 387	13 876 324	98 407 045	18 035 834	6 964 535	8 078 896	6 040 492	36 250 015	388 800	237 717 183	2 315 076	434 411 234
Completed Assets	4 307 700	1 700 946	328 387	13 876 324	98 407 045	18 035 834	6 964 535	8 078 896	6 040 492	36 250 015	388 800	-	2 315 076	196 694 051
Under construction	-	-	-	-	-	-	-	-	-	-	-	237 717 183	-	237 717 183
Accumulated Depreciation	-	(1 660 985)	(328 169)	(2 280 995)	(39 143 049)	(10 517 263)	(2 553 975)	(5 917 395)	(2 391 809)	(23 914 526)	(155 648)	-	(832 706)	(89 696 521)

8. PROPERTY, PLANT AND EQUIPMENT (CONTINUED)

31 March 2016

Reconcilliation of Carrying Value

Description	Land	Leasehold Improvements	Leased Assets	Buildings	Plant and Machinery	Research Equipment	Vehicles	Office Equipment	Furniture and Fittings	Computer Equipment	Exhibits	Work In Progress	Laboratory equipment	Total
	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Carrying values at 1 April 2016	**4 307 700**	**622 785**	**80 004**	**12 696 653**	**64 651 220**	**10 415 143**	**4 974 688**	**3 482 797**	**3 135 554**	**11 233 148**	**288 342**	**48 284 527**	**658 459**	**164 831 024**
Cost	4 307 700	1 700 946	328 387	14 230 505	88 867 053	16 823 783	6 774 703	9 096 568	4 648 928	26 502 858	364 800	48 284 527	811 587	222 742 345
Completed Assets	4 307 700	1 700 946	328 387	14 230 505	88 867 053	16 823 783	6 774 703	9 096 568	4 648 928	26 502 858	364 800	-	811 587	174 457 819
Under construction	-	-	-	-	-	-	-	-	-	-	-	48 284 527	-	48 284 527
Accumulated Depreciation	-	(1 078 161)	(248 383)	(1 533 852)	(24 215 833)	(6 408 640)	(1 800 015)	(5 613 771)	(1 513 374)	(15 269 711)	(76 458)	-	(153 128)	(57 911 326)
Acquisitions					**3 104 783**	**1 197 676**	**829 839**	**289 988**	**242 440**	**7 415 902**	**24 000**	**99 085 095**	**1 163 418**	**113 353 141**
Acquisitions at cost					3 104 783	1 197 676	829 839	289 988	242 440	7 415 902	24 000	-	1 163 418	14 268 046
Capital under Construction - Additions					-	-	-	-	-	-	-	99 085 095	-	99 085 095
Depreciation		**(563 987)**	**(79 786)**	**(444 408)**	**(7 387 331)**	**(2 418 725)**	**(498 628)**	**(534 451)**	**(475 425)**	**(4 797 875)**	**(37 910)**	**-**	**(255 632)**	**(17 494 158)**
Carrying value of Disposals:					**(14 165)**	**(453 292)**	**(523 435)**	**(671 400)**	**(34 264)**	**(23 590)**				**(1 720 144)**
Cost of disposed asset					(14 505)	(881 241)	(640 009)	(1 245 996)	(67 686)	(297 209)				(3 146 646)
Accumulated depreciation of disposed asset					(93 736)	-	-	(96 336)	(9 700)	-				(199 772)
Accumulated depreciation - reversal of prior year incorrect disclosure					340	427 949	116 574	574 596	33 422	273 619				1 426 500
Capitalised amounts					93 736	-	-	96 336	9 700	-				199 772
Capitalised work in progress												(1 088 273)		(1 088 273)
Carrying values at 31 March 2016	**4 307 700**	**58 798**	**218**	**12 252 245**	**60 354 508**	**8 740 801**	**4 782 465**	**2 566 935**	**2 868 305**	**13 827 586**	**274 432**	**146 281 349**	**1 566 245**	**257 881 588**
Cost	4 307 700	1 700 946	328 387	14 230 505	91 863 596	17 140 218	6 964 535	8 044 225	4 813 983	33 621 553	388 800	146 281 349	1 975 005	331 660 802
Completed Assets	4 307 700	1 700 946	328 387	14 230 505	91 863 596	17 140 218	6 964 535	8 044 225	4 813 983	33 621 553	388 800	-	1 975 005	185 379 453
Under construction	-	-	-	-	-	-	-	-	-	-	-	146 281 349	-	146 281 349
Accumulated Depreciation	-	(1 642 148)	(328 169)	(1 978 260)	(31 509 088)	(8 399 417)	(2 182 070)	(5 477 290)	(1 945 678)	(19 793 967)	(114 368)	-	(408 760)	(73 779 215)

[1] - During the 2014/15 financial year closing balances disclosure on Property, Plant and Equipment for both cost and accumulated depreciation were overstated as follows: Plant and Machinery R93 736, Office Equipment R96 336 and Furniture and Fittings R9 700. The error had no impact on the Net Book Value disclosed and does not present any errors in the financial results of SANSA as the error only affected amounts disclosed, the Trial Balance agreed to the Fixed Asset Register however amounts disclosed on the Annual Financial Statements did not agree to both the Trial Balance and the Fixed Assets Register.

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For the year ended 31 March 2017

	2017 R	2016 R

8. PROPERTY, PLANT AND EQUIPMENT (CONTINUED)

8.1 WORK IN PROGRESS

Work in progress consists of the following asset classes		
Plant and Machinery - Satellite Development	**237 717 183**	**146 281 349**

The satellite development programme commenced in 2015 with an expected completion date of August 2018, however the estimated completion date has been revised to December 2019. The revision on completion date is due to lack of funding for the Development Test Equipment and AIT Facilities upgrade and project stoppages by the Board due to insufficient funds to contract.

The project is funded by the Department of Science and Technology, through annual ring fenced transfers. This is the first flagship project for SANSA and prior to its commencement, it required a consolidation of the space engineering industry through a programme to retain satellite built capabilities in South African. Development test equipment and the upgrade of assembly integration and test facilities needed an upgrade in order to perform quality tests on the instrument prior to its commissioning.

8.2 ASSETS GIVEN AS SECURITY

No assets were given as security.

8.3 INSURANCE PAY-OUTS RECEIVED

During the year a total amount of R 0.594m was received as insurance pay out to pay for assets that were either damaged or stolen split as follows: Plant Equipment R0.021m , Computer Equipment R0.693m and Research Equipment R0.504m

8.4 CHANGE IN ESTIMATE PLANT AND EQUIPMENT

During the year the following changes were made to the estimations employed in the accounting for asset transactions:

Change in depreciation resulting from reassessment of useful lives, affecting the following categories:

	Value derived using the original estimate R	Value derived using amended estimate R	Value impact of change in estimate R
Computer Equipment	1 239 217	1 128 064	(111 153)
Office Equipment	72 995	42 309	(30 686)
Furniture and Fittings	925	947	22
Plant and Equipment	208 617	104 089	(104 528)
Research equipment	84 161	54 397	(29 764)
Vehicles	41 976	112 895	70 919
Total	**1 647 891**	**1 442 701**	**(205 190)**

	2017 R	2016 R

9. INTANGIBLE ASSETS

At cost less accumulated amortisation and accumulated impairment losses	**20 099 532**	**21 715 426**

Reconciliation of carrying value of intangible assets

31 March 2017

	Work in Progress - Computer Software	Intellectual Property	Computer Software	Total
Carrying value at 01 April 2016	**-**	**262 660**	**21 452 766**	**21 715 426**
Cost	-	2 822 660	36 870 141	39 692 801
Accumulated impairment	-	(1 440 000)	-	(1 440 000)
Accumulated amortisation	-	(1 120 000)	(15 417 375)	(16 537 375)
Acquisitions	**5 606 381**	**-**	**14 959**	**5 621 340**
Cost	5 606 381	-	14 959	5 621 340
Capitalised	-	-	-	-
Disposals	**-**	**-**	**(5)**	**(5)**
Cost of disposed asset	-	-	(144 675)	(144 675)
Accumulated amortisation of disposed asset	-	-	144 670	144 670
Amortisation				
Amortisation during the year	-	(240 000)	(6 997 229)	(7 237 229)
Carrying value at 31 March 2017	**5 606 381**	**22 660**	**14 470 491**	**20 099 532**
Cost	5 606 381	2 822 660	36 740 425	45 169 466
Accumulated impairment	-	(1 440 000)	-	(1 440 000)
Accumulated amortisation	-	(1 360 000)	(22 269 934)	(23 629 934)

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

9. INTANGIBLE ASSETS (CONTINUED)

Reconciliation of carrying value of intangible assets

31 March 2016

	Work in Progress	Intellectual Property	Computer Software	Total
Carrying values at 01 April 2015	**-**	**800 000**	**27 250 407**	**28 050 407**
Cost	-	2 800 000	35 624 753	38 424 753
Accumulated impairment	-	(1 440 000)	-	(1 440 000)
Accumulated amortisation	-	(560 000)	(8 374 346)	(8 934 346)
Acquisitions	**-**	**22 660**	**1 245 388**	**1 268 048**
Cost	-	22 660	157 116	179 776
Capitalised	-		1 088 272	1 088 272
Amortisation				
Amortisation during the year	**-**	**(560 000)**	**(7 043 029)**	**(7 603 029)**
Carrying values at 31 March 2016	**-**	**262 660**	**21 452 766**	**21 715 426**
Cost	-	2 822 660	36 870 141	39 692 801
Accumulated impairment	-	(1 440 000)	-	(1 440 000)
Accumulated amortisation	-	(1 120 000)	(15 417 375)	(16 537 375)

9.1 CHANGE IN ESTIMATE INTANGIBLE ASSETS

During the year the following changes were made to the estimations employed in the accounting for intangibles assets transactions: Change in depreciation resulting from reassessment of useful lives, affecting the following:

	Value derived using the original estimate	Value derived using amended estimate	Value impact of change in estimate
	R	R	R
Computer Software	**45 071**	**24 379**	**(20 692)**

10. TRADE AND OTHER PAYABLES FROM EXCHANGE TRANSACTIONS

	2017 R	2016 R
Trade creditors	752 383	10 432 582
Other creditors	267 247	85 148
Income received in advance[1]	7 324 495	5 917 519
Accrued expenses	5 747 134	10 633 730
Accrued leave[2]	5 928 786	6 312 739
Accrued Board Fees	210 339	-
Accrual for 13th cheque	619 751	665 125
Total Creditors	**20 850 135**	**34 046 843**

[1] Income received in advance consists of prepayments from customers of R5m (2016:R5.9m) and ISRSE conference registration fees R2.3m (2016:Rnil).

[2] Leave accrues to employees on an monthly basis, subject to certain conditions. The accrual is an estimate of the amount due at the reporting date. Employees may not accumulated more than 50 leave days at any given time and may not roll forward leave for a period of more than 6 months after year end, with the exception of employees that had been absorbed from CSIR and NRF with the high leave balances as it was part of the business transfer agreement that the employee(s) terms and conditions of employment will not change.

10.1 CREDIT TERMS OF TRADE AND OTHER PAYABLES

The average credit period on trade creditors is 30 days from the receipt of the invoice. No interest is charged for the first 30 days from the date of receipt of the invoice. Thereafter interest is charged in accordance with the credit policies of the various individual creditors that the entity deals with. The entity has financial risk policies in place to ensure that all payables are paid within the credit timeframe.

10.2 CLASSIFICATION OF FINANCIAL LIABILITIES

The Financial Liabilities of the entity is classified as follows:

Financial Liabilities	Classification
Trade and other payables	
Trade creditors	Financial liabilities at amortised cost
Other creditors	Financial liabilities at amortised cost
Accrued expenses	Financial liabilities at amortised cost

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

11. PROVISIONS

	2017 R	2016 R
Performance bonus provision	7 645 025	6 961 610
Total Provisions	**7 645 025**	**6 961 610**

The bonus provision represents the estimated liability in respect of performance bonuses payable to employees. Performance bonuses are not guaranteed and based on the assessed performance of the entity as well as employees.

Reconciliation of movement in provisions

Balance at beginning of year	6 961 610	6 160 602
Reversal of prior year (unutilised)/under estimated provision	(1 685 108)	(1 390 437)
Contributions to provision	7 645 025	6 961 610
Amount utilised during the year	(5 276 502)	(4 770 165)
Balance at end of year	**7 645 025**	**6 961 610**

12. COMMITTED CONDITIONAL GRANT LIABILITY

Transfer payment from controlling entity	84 245 123	80 097 493
Transfer payment from other departments/entities	2 570 822	2 238 437
Total Committed conditional grant liability	**86 815 945**	**82 335 930**

Committed conditional grant liability is made up of amounts not yet spent on ring fenced transfers for projects as follows:

Satellite development programme	48 869 897	73 077 888
Post graduate student bursary support programme	2 257 696	2 463 799
Research and human capital development grants	2 570 822	2 238 437
Operation Phakisa - Earth observation data acquisition	4 548 000	-
Operation Phakisa - Ocean and coast information management system	22 044 000	-
Assembly, integration and test facilities upgrade	6 525 530	-
NRF human capital development programme	-	4 466 806
Sunspace transition	-	89 000
	86 815 945	**82 335 930**

Refer to Note 16 (Transfers and subsidies received) for a reconciliation of the grants received, recognised as revenue and committed as at year end.

13. LONGTERM LIABILITY

	2017 R	2016 R
Current portion of long-term liability	4 875 500	5 891 830
Non-current portion of long-term liability	-	5 891 799
Total Long-term liability	**4 875 500**	**11 783 629**

The long term liability is the balance remaining as a result of a payment arrangement for the acquisition of the Spot satellite telemetry terminal which was acquired at a cost of EUR 4.2m (R30m) in 2013 payable in EUR 0.175m bi-annually over a five year period to October 2017. There is no interest levied on this payment arrangement. There are two instalments remaining and payable in the next financial year.

14. OPERATING LEASE LIABILITY

The following liabilities have been recognised in respect of non-cancellable operating leases:

Balance at beginning of year	-	232 043
Operating lease liability during the period	76 721	(232 043)
Total Operating lease liability	**76 721**	**-**

14.1 AMOUNTS PAYABLE UNDER OPERATING LEASES

At the reporting date the entity had outstanding commitments under non-cancellable operating leases, which fall due as follows:

Up to 1 year	**3 415 868**	**782 720**
Buildings	3 348 530	742 594
Office equipment	67 338	40 126
2 to 5 years	**-**	**67 338**
Buildings	-	-
Office equipment	-	67 338
Total Operating Lease Arrangements	**3 415 868**	**850 058**

The entity has operating lease agreements for the following classes of assets,
- Buildings - for the rental of office space whose initial term was extended for a further 18 months.
- Office Equipment - for the rental of copier machines

No restrictions have been imposed on the entity in terms of the operating lease agreements.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

15. ACCUMULATED SURPLUS

	2017 R	2016 R
Accumulated Surplus	407 303 944	321 782 957
Total Accumulated Surplus	**407 303 944**	**321 782 957**

The accumulated surplus represents the residual interest in the assets of the entity after deducting all its liabilities. This is mainly made up of the net book value of non-current assets of R364m (2016: R280m) which in their nature will depreciate over a longer term as SANSA will continue to derive economic benefits from an investment in these assets. The summarised net book values of these assets are: Land and Buildings R15.9m (2016: R16.6m); Plant and Machinery R59.2m (2016: R60.4m); Work in Progress R237.7m (2016: R146m); Research Equipment R7.5m (2016: R8.7m); Other assets R24.3m (2016: R25.9m) and Intangible assets R20m (2016: R21.7m). The balance of R43m relates to committed funds generated during the financial year, which are committed to mainly capital expense items that are on order, but not yet received and thus not recorded as expenditures.

16. TRANSFERS AND SUBSIDIES RECEIVED

Operational grant	**124 977 000**	**124 355 000**
Parliamentary grant	124 977 000	124 355 000
Ring fenced grants	**102 255 738**	**108 086 074**
Conditions met - transferred to revenue	102 255 738	108 086 074
Total Transfers and subsidies received	**227 232 738**	**232 441 074**

16.1 RECONCILIATION OF MOVEMENT IN RING FENCED GRANTS

Balance unspent at beginning of year	77 633 694	86 100 500
Separate disclosure of balance unspent at beginning of year (notes 16.1.4; 16.1.5 and 16.1.6)	44 892 000	-
Reallocation of funds (notes 16.1.1; 16.1.2 and 16.1.3)	(41 161 770)	-
Current year receipts	93 653 000	91 386 000
Conditions met - transferred to revenue	(93 029 497)	(99 852 806)
Management fee: Transferred to revenue (note 17)	(825 881)	-
Conditions still to be met - remain in liabilities	**81 161 546**	**77 633 694**

See the breakdown of this grant with the descriptions for each component below:

16.1.1 SAEON & NRF HCD PROGRAMME

	2017 R	2016 R
Balance unspent at beginning of year	4 466 806	4 466 806
Funds reallocated to the Cube satellite constellation initiative	(4 353 253)	-
Funds reallocated to the Satellite development programme	(112 449)	-
Funds reallocated to the Satellite development programme	(1 104)	-
Conditions still to be met - remain in liabilities	**-**	**4 466 806**

16.1.2 SUNSPACE TRANSITION TO DENEL DYNAMICS

Balance unspent at beginning of year	89 000	89 000
Funds reallocated to the Satellite development programme	(89 000)	-
Conditions still to be met - remain in liabilities	**-**	**89 000**

16.1.3 SATELLITE DEVELOPMENT PROGRAMME

Balance unspent at beginning of year	73 077 888	81 544 694
Current year receipts	93 653 000	91 386 000
Consolidation and reallocation of funds - from liability held on behalf of principal (note 17.1)	(36 808 517)	-
Funds reallocated from - SunspaceTransition to Denel, SAEON & NRF HCD programme	202 553	-
Conditions met - transferred to revenue	(81 255 027)	(99 852 806)
Conditions still to be met - remain in liabilities	**48 869 897**	**73 077 888**

The satellite development project is a multi year project funded through a grant from DST. SANSA has a current contractual commitment with Denel Dynamics, the main contractor for the development of the satellite. The project is estimated to be completed in 2019/20 when additional funding to complete the project is secured.

16.1.4 OPERATION PHAKISA - EARTH OBSERVATION DATA ACQUISITION

Separate disclosure of balance unspent at beginning of year - from satellite development programme	4 548 000	-
Conditions met - transferred to Revenue	-	-
Conditions still to be met - remain in liabilities	**4 548 000**	**-**

16.1.5 OPERATION PHAKISA - OCEAN AND COAST INFORMATION MANAGEMENT SYSTEM

Separate disclosure of balance unspent at beginning of year - from satellite development programme	22 044 000	-
Conditions met - transferred to revenue	-	-
Conditions still to be met - remain in liabilities	**22 044 000**	**-**

16.1.6 ASSEMBLY, INTEGRATION AND TEST FACILITIES

Separate disclosure of balance unspent at beginning of year - from liability held on behalf of principal	18 300 000	-
Conditions met - transferred to Revenue	(11 774 470)	-
Conditions still to be met - remain in liabilities	**6 525 530**	**-**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

16.2 POST GRADUATE STUDENT BURSARY SUPPORT PROGRAMME

	2017 R	2016 R
Balance unspent at beginning of year	2 463 799	-
Current year receipts	3 654 000	3 736 000
Conditions met - transferred to revenue	(3 860 103)	(1 272 201)
Conditions still to be met - remain in liabilities	**2 257 696**	**2 463 799**

16.3 RESEARCH AND HUMAN CAPITAL DEVELOPMENT GRANTS

Total		
Balance unspent at beginning of year	2 238 438	3 045 854
Current year receipts	4 885 558	6 393 869
Current year refunds	(12 917)	(240 575)
Conditions met - transferred to revenue	(4 540 257)	(6 960 711)
Conditions still to be met - remain in liabilities	**2 570 822**	**2 238 437**

These grants are for multiple purposes which include research infrastructure grants as well as student bursaries linked to research projects. The research project grants include running expenses and travel funds as well. The grants were received from the National Research Fund (NRF) by particular researchers after successful application to a competitive programme. Some of the grants were purely mobility grants. All of the grants are multiple year awards and are on-going until the project is completed.

17. LIABILITY HELD ON BEHALF OF PRINCIPAL

Balance unspent at beginning of year	22 083 483	(2 583 090)
Current year receipts	-	58 892 000
Reallocation of funds (notes 17.1 and 17.2)	(3 730 230)	-
Transferred to grant recipients	(8 258 803)	(34 225 427)
Management fee- transferred to revenue	(825 881)	-
Conditions still to be met - remain in liabilities	**9 268 569**	**22 083 483**

17.1 REALLOCATION OF FUNDS

Balance unspent at beginning of year	22 083 483	(2 583 090)
Current year receipts	-	58 892 000
Reallocation to AIT Facilities upgrade	(18 300 000)	-
Reallocation to Cube satellite constellation initiative	(14 000 000)	-
Reallocation to Operation Phakisa - Earth observation data acquisition	(4 548 000)	-
Reallocation to Operation Phakisa - Oceans and coast information management systems	(22 044 000)	-
Reallocation from Satellite development to fund liability held on behalf of principal	36 808 517	-
Transferred to grant recipients	-	(34 225 427)
Conditions still to be met - remain in liabilities	**-**	**22 083 483**

17.2 OPERATION PHAKISA - CUBE SATELLITE CONSTELLATION INITIATIVE

	2017 R	2016 R
Balance unspent at beginning of year	-	-
Reallocation from Assembly Integration Facilities	14 000 000	-
Reallocation from the SAEON & NRF HCD Programme	4 353 253	-
Current year receipts	-	-
Transferred to grant recipients	(8 258 803)	-
Management fee - transferred to revenue	(825 881)	-
Conditions still to be met - remain in liabilities	**9 268 569**	**-**

Funding was received from DST to fund in respect of Operation Phakisa - Cube Satellite Constellation Initiative. SANSA in compliance with its Grant Award Policy, went on an Ad-hoc Grant Call Advert to solicit proposals in respect of Operation Phakisa - Cube Satellite Constellation Initiative, which lead to the Board approving the proposal from the Cape Peninsula University of Technology (CPUT). SANSA has entered into a contractual arrangement with CPUT in respect of the design, development, fabrication, qualification and delivery of the ZACube 2 Satellite Flight Model launch and operation.

Financial risks associated with the relationship is in relation to cash flow where the principal obligations for the year might be above the current cash available, however the risk is minimised by the fact that cash allocation for SANSA's operational requirements and project requirements are all funded by the Department of Science and Technology (DST).

The non financial risk is that by using SANSA as an agent, for the above transaction DST is in fact giving SANSA the oversight role and thus SANSA will be held liable for delivery on the project.

18. INTEREST INCOME

Bank account	9 578 633	8 394 522
	9 578 633	**8 394 522**

19. RENDERING OF SERVICES

Services to local public entities	21 438 027	28 872 468
Services to local private entities	797 973	1 241 507
Services to foreign clients	49 528 813	66 714 653
Other services rendered	-	-
	71 764 813	**96 828 628**

20. OTHER INCOME

Sundry Income	541 183	280 611
Project Revenue	294 773	199 750
Rent Received	311 064	2 217
Discount Received	845	26 507
Donation received	2 360	-
Expense Recovery	90 742	92 719
Insurance pay-out	594 492	4 572 321
Total Other Income	**1 835 459**	**5 174 125**

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For the year ended 31 March 2017

21. EMPLOYEE RELATED COSTS

	2017 R	2016 R
Employee related costs - salaries	88 166 457	79 458 910
Contributions to UIF, workmen's compensation and pension funds	7 125 212	7 509 897
Remote location allowance	3 177 341	3 088 170
Cell phone allowance	417 604	418 026
Performance bonuses current year adjustment	5 808 886	5 571 173
Total Employee related costs	**104 695 500**	**96 046 176**

The members of key management personnel of SANSA during the year were:

Chief Executive Officer - Dr. V Munsami Appointed January 2017 (Ex-officio member of the Board)

Chief Executive Officer - Dr. S Malinga Resigned August 2016

Interim Chief Executive Officer - P Maine Acting September 2016-January 2017

Chief Financial Officer - Ms. B Pono

Executive Director Corporate Services - Mr. Z Ndziba Resigned September 2016

Executive Director Corporate Services - Mr. I Tshweza Acting September 2016- March 2017

Executive Director Space Programme - Mr. A Khatri

Managing Director Space Operations - Mr. R Hodges

Managing Director Earth Observations - Dr. J Olwoch Resigned January 2017

Managing Director Earth Observation - Dr. P Mangara Acting February 2017-March 2017

Managing Director Space Science - Dr. L McKinnell

21. EMPLOYEE RELATED COSTS (CONTINUED)

	2017 R	2016 R
Remuneration of the Chief Executive Officer: Dr. V Munsami		
Annual Remuneration (Appointed January 2017)	443 287	-
Performance Bonus	-	-
Contributions to UIF, Medical, cellphones and Pension Funds	36 134	-
Total	**479 421**	**-**
Remuneration of the Chief Executive Officer: Dr. S Malinga		
Annual Remuneration (Resigned August 2016)	792 376	1 720 906
Performance Bonus	-	109 109
Contributions to UIF, Medical, cellphones and Pension Funds	75 585	163 590
Leave Pay Out	358 150	-
Total	**1 226 111**	**1 993 605**
Remuneration of the Acting Chief Executive Officer: Mr. P Maine		
Annual Remuneration[1] (August 2016 - January 2017)	910 241	-
Performance Bonus	-	-
Car and Travel Allowance	-	-
Contributions to UIF, Medical, cellphones and Pension Funds	7 042	-
Leave Pay Out	78 680	-
Total	**995 963**	**-**

[1] Mr Maine did not receive Board remuneration during his appointment as the interim CEO

Remuneration of the Chief Financial Officer: Ms. B Pono		
Annual Remuneration	1 441 551	1 347 991
Performance Bonus	90 511	84 590
Car and Travel Allowance	-	-
Contributions to UIF, Medical, cellphones and Pension Funds	117 262	110 249
Total	**1 649 324**	**1 542 830**
Remuneration of the Executive Director: Mr. Z Ndziba		
Annual Remuneration (Resigned September 2016)	721 515	1 135 776
Performance Bonus	-	79 145
Car and Travel Allowance	-	212 850
Contributions to UIF, Medical, cellphones and Pension Funds	5 181	10 065
Leave Pay Out	198 186	-
Total	**924 882**	**1 437 836**

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For the year ended 31 March 2017

21. EMPLOYEE RELATED COSTS (CONTINUED)

	2017 R	2016 R
Remuneration of the Executive Director: Mr. A. Khatri		
Annual Remuneration	1 320 140	856 255
Performance Bonus	62 109	-
Car and Travel Allowance	-	-
Contributions to UIF, Medical, cellphones and Pension Funds	108 145	75 396
Total	**1 490 394**	**931 651**
Remuneration of the Managing Director Space Operations: Mr. R Hodges		
Annual Remuneration	1 150 631	1 070 780
Performance Bonus	75 712	71 091
Car and Travel Allowance	60 000	57 105
Contributions to UIF, Medical, cellphones and Pension Funds	166 278	155 820
Total	**1 452 621**	**1 354 796**
Remuneration of the Managing Director Earth Observation: Dr. J Olwoch		
Annual Remuneration (Resigned January 2017)	958 052	1 069 454
Performance Bonus	71 809	67 111
Contributions to UIF, Medical, cellphones and Pension Funds	79 591	89 548
Leave Pay Out	36 050	
Total	**1 145 502**	**1 226 113**
Remuneration of the Managing Director Space Science: Dr. L McKinnell		
Annual Remuneration	1 161 157	1 076 437
Performance Bonus	72 277	67 549
Contributions to UIF, Medical, cellphones and Pension Funds	96 527	90 067
Total	**1 329 961**	**1 234 053**
Remuneration of the Acting Executive Director: Mr. I Tshweza		
Acting Allowance	82 226	-
Total	**82 226**	**-**
Remuneration of the Acting Managing Director Earth Observation: Dr. P Mangara		
Acting Allowance	30 022	
Total	**30 022**	**-**

22. BOARD MEMBERS REMUNERATION

	2017		
	R Board Fees	R Other Benefits	R Total
Non-executive Chairperson Ms J Lawrence	99 702	14 760	114 462
Other Board members	825 854	129 571	955 425
Total Board members Remuneration	**925 556**	**144 331**	**1 069 887**
Mr. V Gore	50 470	8 280	58 750
Mr. L S Hamilton	29 458	8 930	38 388
Mr. E Jansen	86 108	9 107	95 215
Ms. G Khambule	58 710	9 624	68 334
Mr. P Maine	53 560	5 796	59 356
Ms. M I Matooane	75 808	8 717	84 525
Ms. M Mfeka	98 880	10 102	108 982
Dr. N P Mjoli	54 796	9 213	64 009
Mr. J Prinsloo	79 310	25 407	104 717
Prof. R Bharuthram	49 234	8 280	57 514
Mr. M Rezelman	77 868	11 279	89 147
Mr. W J van Biljon	71 894	12 380	84 274
Mr M Riba [1]	-	-	-
Mr A Naidoo [2]	-	-	-
Ms. I M Pule (Appointed 8 June 2016)	39 758	2 456	42 214

[1] Mr M Riba is a senior manager at the Department of Rural Development and Land Reform and appointed to the SANSA Board as a representative of DRDLR

[2] Mr A Naidoo is a senior manager at the Department of Environmental Affairs and is appointed to the SANSA Board as a representative of DEA

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

22. BOARD MEMBERS REMUNERATION (CONTINUED)

		2016	
	R Board Fees	R Other Benefits	R Total
Non-executive Chairperson Ms J Lawrence	88 566	15 925	104 491
Other Board members	680 623	129 156	809 779
Total Board members Remuneration	**769 189**	**145 081**	**914 270**
Mr. V Gore	26 532	8 897	35 429
Mr. L S Hamilton	43 416	8 764	52 180
Mr. E Jansen	51 456	11 181	62 637
Ms. G Khambule	35 376	8 779	44 155
Mr. O A Latiff (Deceased September 2015)	25 728	4 140	29 868
Mr. P Maine	48 240	10 712	58 952
Ms. M I Matooane	77 731	10 288	88 019
Ms. M Mfeka	78 631	10 023	88 654
Dr. N P Mjoli	63 516	9 072	72 588
Mr. J Prinsloo	62 712	11 848	74 560
Prof. R Bharuthram	41 808	9 941	51 749
Mr. M Rezelman	70 001	13 319	83 320
Mr. W J van Biljon	55 476	12 192	67 668
Mr M Riba [1]	-	-	-
Mr A Naidoo [2]	-	-	-

[1] Mr M Riba is a senior manager at the Department of Rural Development and Land Reform and appointed to the SANSA Board as a representative of DRDLR

[2] Mr A Naidoo is a senior manager at the Department of Environmental Affairs and is appointed to the SANSA Board as a representative of DEA

	2017 R	2016 R

23. DEPRECIATION AND AMORTISATION

Depreciation: Property, Plant and Equipment	16 641 101	17 494 158
Amortisation: Intangible Assets	7 237 229	7 603 029
Total Depreciation and Amortisation	**23 878 330**	**25 097 187**

24. REPAIRS AND MAINTENANCE

Land & Buildings	1 800 243	1 671 660
Plant & Machinery	1 382 974	2 160 864
Research Equipment	224 444	228 395
Vehicles	90 343	66 308
Office Equipment	-	-
Furniture & Fittings	4 520	8 932
Computer Equipment	667 325	286 054
Computer Software	395 870	919 222
Exhibits	-	-
Laboratory Equipment	7 320	7 329
General Repairs	2 862 410	3 006 353
Total Repairs and Maintenance	**7 435 449**	**8 355 117**

25. FINANCE COSTS

Finance Leases	-	10 202
Interest Paid	24 339	-
Total Interest Paid	**24 339**	**10 202**

26. DATA LICENCE FEES

Data licence fees	36 124 088	31 406 738
Total Data Licence Fees	**36 124 088**	**31 406 738**

Data licence fees consists mainly of SPOT data access fees for downloading satellite imagery for earth observation services.

27. GRANTS AND SUBSIDIES PAID

Bursaries to students	5 158 393	3 344 598
Research and development	294 400	277 800
Total Grants and subsidies paid	**5 452 793**	**3 622 398**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

	2017 R	2016 R

28. ANTENNA INFRASTRUCTURE SERVICES

Antenna Infrastructure Services	203 266	4 146 811
Total Antenna Infrastructure Services	**203 266**	**4 146 811**

29. TRAINING EXPENSES

Staff Training	1 399 441	1 271 440
Board Member Training	-	9 536
Staff Bursaries	320 582	452 826
Total Training Expenses	**1 720 023**	**1 733 802**

30. GENERAL EXPENSES

Advertising & Marketing	1 458 394	1 649 695
Audit Fees	1 922 055	1 566 068
Bank Charges	162 832	154 666
Consulting fees	575 497	877 336
Conferences and Seminars	1 003 739	725 250
Consumables	82 950	60 594
Electricity	7 229 075	6 548 621
Entertainment	207 206	218 622
Fuel and Oil	556 690	943 819
Insurance	1 486 721	1 350 627
Legal Costs	-	348 726
License fees	4 725 036	3 290 574
Other General Expenses	6 096 045	5 266 186
Printing and Stationery	901 864	832 735
Rent and lease charges	3 850 524	3 766 740
Travel and accommodation	6 440 028	5 860 448
Security	1 130 511	1 226 719
Telephone Cost	1 092 485	1 162 923
Data and internet services	3 249 289	11 368 589
Transport Costs	199 415	159 894
	42 370 356	**47 378 832**

The amounts disclosed above for Other General Expenses are in respect of costs incurred in the general management of the entity and not directly attributable to a specific service or class of expense.

	2017 R	2016 R

31. NET GAINS/LOSSES ON FOREIGN EXCHANGE TRANSACTIONS

Gains in foreign exchange transactions	**(1 478 419)**	**(1 005 392)**
Gains in net Foreign Exchange - realised	(41 217)	(2 392 571)
Gains in net Foreign Exchange - unrealised	(1 437 202)	1 387 179
Losses in net Foreign Exchange:	**2 830 436**	**6 475 921**
Losses in net Foreign Exchange - realised	2 774 775	3 350 597
Losses in net Foreign Exchange -unrealised	55 661	3 125 324
Net Losses on foreign exchange transactions	**1 352 017**	**5 470 529**

SANSA's policy has always been to use foreign debtors and creditors as a natural hedge for its foreign currency denominated transactions. Due to the volatile Rand during the year under review and the huge SPOT liability that SANSA is carrying (refer to Note 13), that was not supplemented by an equivalent foreign debtor revenue the SPOT transactions resulted in significant forex currency losses.

32. LOSS ON DISPOSAL OF PROPERTY, PLANT & EQUIPMENT

Loss on Disposal of Property, Plant and Equipment	564 608	1 149 071
	564 608	**1 149 071**

33. NET CASH FLOWS FROM OPERATING ACTIVITIES

Surplus for the Year	**85 520 986**	**117 507 216**
Adjustment for:		
Depreciation and Amortisation	23 878 330	25 097 187
Loss on Disposal of Property, Plant and Equipment	564 608	1 149 071
Net Losses on foreign exchange transactions	1 352 017	5 470 529
Sundry income	(926 698)	237 668
Operating lease smoothing	76 721	232 043
Interest Paid	-	10 202
Other non cash items	39 736	-
Discount Received	(845)	(26 507)
Operating surplus before working capital changes	**110 504 855**	**149 677 409**
Increase in Inventories	(111 455)	(16 409)
Increase In Receivables	(213 560)	(736 368)
(Decrease)/Increase in Payables	(20 848 192)	24 925 893
Cash flow from operating activities	**89 331 648**	**173 850 525**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

34. CORRECTION OF PRIOR PERIOD ERROR

	2016 R
The comparative amount(s) relating to the Statement of Financial Performance have been restated as follows:	
Other Income	
Other Income - Previously reported	(939 808)
Other income - Restated amount	5 174 125
Net effect on Surplus/(deficit) for the year	**4 234 317**
The comparative amount(s) relating to the Statement of Financial Position have been restated as follows:	
Trade and Other Payables from Exchange Transactions	
Trade and Other Payables from Exchange Transactions - Previously reported	(38 281 160)
Trade and Other Payables from Exchange Transactions - Restated amount	34 046 843
Net effect on Current Liabilities	**(4 234 317)**
Receivables from Exchange Transactions	
Receivables from Exchange Transactions - Previously reported	(18 046 991)
Receivables from Exchange Transactions - Restated amount	20 587 079
	2 540 088
Receivables from Non-Exchange Transactions	
Receivables from Non-Exchange Transactions - Previously reported	(2 540 088)
Receivables from Non-Exchange Transactions - Restated amount	-
	(2 540 088)
The comparative amount(s) relating to the Statement of Changes in Net Assets have been restated as follows:	
Surplus for the year - Previously reported	(113 272 899)
Surplus for the year - Restated amount	117 507 216
Net effect on Accumulated Surplus	**4 234 317**

The correction of the prior period error relates to the incorrect recognition of insurance proceeds received of R4.2 million as income received in advance in trade and other payables instead of other income. Receivables from non-exchange transactions were reclassified to receivables from exchange transactions as their nature related to exchange items (see note 6)

	2017 R	2016 R

35. FRUITLESS AND WASTEFUL EXPENDITURE

Fruitless and Wasteful Expenditure

Reconciliation of Fruitless Expenditure:		
Opening balance	-	-
Fruitless and Wasteful Expenditure incurred	10 032	-
Fruitless and Wasteful Expenditure Condoned	(10 032)	-
Fruitless and Wasteful Expenditure awaiting recovery or write off	-	-

Details of Fruitless and Wasteful Expenditure condoned

Nature of the expenditure	Condoned by Accounting Authority		
Fruitless expenditure incurred due to additional costs incurred for reworking of recognition award trophies as a result of an error on the message submitted for engraving	The error was not intentional and administrative in nature. There is no employee liable in law.	10 032	-
		10 032	-

36. IRREGULAR EXPENDITURE

Reconciliation of Irregular Expenditure:		
Opening balance	-	-
Irregular Expenditure incurred	37 553	-
Irregular Expenditure condoned	(37 553)	-
Irregular Expenditure awaiting condonation	-	-

Details of irregular expenditure condoned

Contract management	Condoned by Accounting Authority		
No proper approval of the extension of the copier machine contract through a variation order. Subsequent approval obtained, but due to payments made, these became a non-compliance with supply chain management regulations in particular to the management of variation of contracts.	SANSA did not suffer any loss, as the copier machines were used in the course of business. There is therefore no person liable in law.	37 553	-
		37 553	**-**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

37. COMMITMENTS FOR EXPENDITURE

	2017 R	2016 R
Capital and Expenditure Commitments		
- Approved and Contracted for:-	**78 423 380**	**353 021 114**
Property, Plant and Equipment	55 971 464	335 383 847
Intangible assets	3 828 211	8 662 628
Principal agent	8 258 803	-
Expenditure	10 364 902	8 974 639
Total Capital and Expenditure Commitments	**78 423 380**	**353 021 114**
This expenditure will be financed from:		
Own Resources - Grant Funding	78 423 380	353 021 114
	78 423 380	**353 021 114**

38. EMPLOYER RETIREMENT BENEFIT INFORMATION

The only obligation of the entity with respect to the retirement benefit plans is to make the specified contributions.

The total expense recognised in the Statement of Financial Performance represents contributions payable to the plan by the entity at rates specified in the rules of the plan. These contributions have been expensed under employee related costs. Refer to Note 21.

39. RELATED PARTY TRANSACTIONS

Related party relationships:

South African National Space Agency (SANSA) is a Public Entity under the control of the Department of Science and Technology South Africa. The Agency is a schedule 3A Public entity in terms of the Public Finance Management Act, Act 1 of 1999 as amended by Act 29 of 1999, and therefore falls within the national sphere of government. SANSA has a significant number of related parties, being those that fall within the national sphere of government. Amounts due from / (to) these entities are subject to the same terms and conditions as normal trade receivables and trade payables and transactions with these entities are concluded at arm's length.

A detailed list of transactions with related parties and amounts due to / from related parties are as follows:

	2017 R		2016 R	
	Revenue	**Receivables**	**Revenue**	**Receivables**
Entity Name				
Department of Science and Technology	227 232 738	-	232 441 074	-
Air Traffic Navigation Services SOC Limited (ATNS)	-	-	31 890	-
Armaments Corporation of South Africa Limited (ARSMCOR)	2 745 022	238 660	3 089 114	-
Council for Scientific and Industrial Research (CSIR)	32 330	-	306 632	306 632
Denel Aviation	5 000	2 500	75 976	-
Denel Soc Ltd t/a Denel Dynamics	85 498	58 895	108 430	14 168
Eskom	446 468	46 399	5 000 000	-
Institute for Maritime Technology	719 311	310 575	1 222 848	636 608
National Research Foundation (NRF)	4 855 558	-	6 205 478	-
National Research Foundation (NRF - HartRAO)	3 762 077	-	2 916 180	-
South African Agency for Science and Technology (SAASTA)	125 612	-	63 496	-
Statistics SA	-	-	9 000 000	-
	240 009 614	**657 029**	**260 461 118**	**957 408**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

For the year ended 31 March 2017

39. RELATED PARTY TRANSACTIONS (CONTINUED)

	2017 R		2016 R	
	Purchases	Payables	Purchases	Payables
Entity Name				
Council for Scientific and Industrial ResearchCSIR	93 365	-	-	-
Armaments Corporation of South Africa Limited (ARSMCOR)	817	-	5 989	-
Compensation Fund	-	-	54 101	
Denel Soc Ltd t/a Denel Dynamics	77 248 813		118 801 306	13 240 597
Denel Overberg Test Range	1 452	-	1 368	-
Engineering Council of South Africa (ECSA)	9 166	-	7 540	-
Eskom	4 381 347		4 871 722	-
Government Printing Works	19 657		15 656	1 036
Independent Communications Authority of South Africa (ICASA)	1 669 077		675 270	-
National Research Foundation	4 540 257			-
SA Post Office	795	-	1 431	-
Sentech	17 200		16 429	-
South African Astronomical Observatory (SAAO)	259 559	-	110 810	7 520
South African Broadcasting Corporation Limited	5 458	-	6 503	-
South African Bureau of Standards	131 936		129 963	-
South African Civil Aviation Authority (SACAA)	3 380	-	3 355	-
South African Revenue Services (SARS)			642 336	-
South African Agency for Science & Technology Advancement (SAASTA)	185 974	9 058		
Telkom SA Limited	69 696	-	773 676	5 290
	88 637 949	**9 058**	**126 117 455**	**13 254 443**

With the exception of transactions disclosed below, all other transactions with related parties were normal supplier and/or client/recipient relationships on terms and conditions no more or less favourable than those which it is reasonable to expect the entity to have adopted if dealing with that individual entity or person in the same circumstances; and

terms and conditions within the normal operating parameters established by that reporting entity's legal mandate.

During the year under review mosaic images were provided at none arms length to the following related party as no fee was charged for the services rendered:

1. Council for Scientific and Industrial Research (CSIR)
2. Department of Water and Sanitations
3. Eskom
4. Department of Agriculture, Forestry and Fisheries
5. Department of Environmental Affairs
6. Statistics South Africa

7. Chief Directorate -National Geo-spatial Information (CD-NGI)
8. South African Police Service

During the 2016 financial year mosaic images were provided at none arms length to the following related party as no fee was charged for the services rendered:

1. Council for Scientific and Industrial Research (CSIR)
2. Department of Geospatial Information (DGI)
3. Electoral Commission of South Africa (IEC)
4. Department Public Service & Administration
5. Department of Environmental Affairs
6. Square kilometer Array (SKA)

During the year under review SANSA received grants from the National Research Fund (NRF) to fund different research projects, the details of the grants the liabilities and revenues relating to the grant are disclosed in note 16.3

SANSA received funding to stimulate the local space industry, which is mainly focused on the retention of the core capability for the satellite engineering, through an incentive payable to former Sunspace employees payable over three years and the upgrade of the assembly, integration and testing facilities. Transfers were mainly to Denel who are the custodians of the facilities and have absorbed the former Sunspace employees refer to Note 16.1.3 and 16.1.6: (2016: note 17) for detailed disclosure of revenues and liabilities relating to this commitment.

Further more the satellite development project is a multi year project funded through a grant from DST. SANSA has a current contractual commitment with Denel for the development of the satellite. The current remaining contract value for the satellite build project is R187.3 million. The project is estimated to be completed in 2018/19, refer to Note 16.1.3 and 16.1.6 for detailed disclosure of revenues and liabilities relating to this commitment.

For key management emoluments, refer to note 21 and note 22.

40. PENDING LAND CLAIM

The land claim remains pending since approximately 2008 in respect of the property upon which SANSA Space Operations is located. South African National Space Agency (SANSA) is not the owner of the land, however the Department of Science and Technology has pronounced it's support of the application to be made by SANSA to the Department of Public Works to formalise the land use rights toward the property. In respect of the land claim proceedings, SANSA has also facilitated the filing of the notice to intervene as an interested party in November 2014 with the Randburg Land Claims Court. A scientific expert report is also being finalised and will be submitted in support of the notice to intervene and also used in support of the submission to Department of Public Works as part of the application for formalised land use rights.

41. IN-KIND DONATIONS AND ASSISTANCE

No donations in-kind and assistance were received at 31 March 2017

42. EVENTS AFTER THE REPORTING DATE

No events having financial implications requiring disclosure occurred subsequent to 31 March 2017.

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For the year ended 31 March 2017

43. GOING CONCERN

The annual financial statements have been prepared on the basis of accounting policies applicable to a going concern. This basis presumes that funds will be available to finance future operations and that the realisation of assets and settlement of liabilities, contingent obligations and commitments will occur in the ordinary course of business.

44. FINANCIAL RISK MANAGEMENT OBJECTIVES AND POLICIES

All Financial instruments arise directly from operations.

The entity does not enter into any derivative transactions. The main risk arising from the entity's financial instruments are cash flow interest rate risk, liquidity risk and credit risk.

The entity reviews and implements policies managing each of these risks. There are no significant concentrations of risk. Compliance with policies and procedures is reviewed by internal and external auditors on a continuous basis.

	2017 R	2016 R
The carrying amounts of financial liabilities at reporting date was:		
Trade and other payables	20 850 135	34 046 840
Current Portion -Long Term Liability	4 875 500	5 891 830
Current Portion of Finance Lease	-	-
Operating Lease Liability	76 721	-
Non -Current Portion -Long Term Liability	-	5 891 799
	25 802 356	**45 830 469**

Interest Rate Risk

No material risk exists due to there being no material finance costs in the current finance year. The only real risk that exists is the risk of variations in cash flow due to changes in the interest rate, which will affect interest income.

The entity's income and operating cash flows are substantially independent of changes in the market interest rates.

	Floating Interest Rate R	Non-interest Bearing R	Total R
31 March 2017			
Assets			
Receivables from Exchange Transactions	-	20 800 639	**20 800 639**
Cash and cash equivalents	150 753 545	4 135	**150 757 680**
Liabilities			
Trade and other payables	-	(20 850 135)	**(20 850 135)**
Long Term Liability	-	(4 875 500)	**(4 875 500)**
Operating lease	76 722	-	**76 722**
Net Financial assets/(Liabilities)	**150 830 267**	**(4 920 861)**	**145 909 406**

44. FINANCIAL RISK MANAGEMENT OBJECTIVES AND POLICIES (CONTINUED)

	Floating Interest Rate R	Non-interest Bearing R	Total R
31 March 2016			
Assets			
Receivables from Exchange Transactions	-	20 587 079	**20 587 079**
Cash and cash equivalents	178 449 966	8 573	**178 458 539**
Liabilities			
Trade and other payables	-	(34 046 843)	**(34 046 843)**
Long Term Liability		(11 783 629)	**(11 783 629)**
Net Financial assets/(Liabilities)	**178 449 966**	**(25 234 820)**	**153 215 146**

Interest Rate Sensitivity Analysis

The sensitivity analysis below was determined based on the exposure to interest rates at the reporting date. For variable rate long-term instruments, the analysis is prepared assuming the amount of the instrument outstanding at the reporting date was outstanding for the whole year. A 100 basis point increase or decrease was used, which represents management's assessment of the reasonably possible change in interest rates.

Effect of a change in interest rate on interest bearing financial assets and liabilities

Financial Assets	Classification	2017 R	2016 R
External investments:			
Call Deposits	Loans and receivables	-	-
Bank Balances	Loans and receivables	150 753 545	178 449 966
Cash Floats and Advances	Loans and receivables	4 135	8 573
		150 757 680	**178 458 539**
Interest received		**9 578 633**	**8 394 522**
Interest rate		**6.4%**	**4.7%**
Effect of a change in interest rate on interest earned from external investments:			
Effect of change in interest rate	%	**1%**	**1%**
Effect of change in interest rate	Rand value	**1 507 577**	**1 784 585**
Effect of change in interest rate	%	**-1%**	**-1%**
Effect of change in interest rate	Rand value	**(1 507 577)**	**(1 784 585)**

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Liquidity risk

The entity prevents liquidity risk by maintaining adequate banking facilities and by receiving contributions annually in the form of Grants.

The following are the contractual maturities of financial liabilities, including interest payments and excluding the impact of netting agreements for the entity:

44. FINANCIAL RISK MANAGEMENT OBJECTIVES AND POLICIES (CONTINUED)

	2017				
	Carrying amount	Contractual cash flows: 1 month or less	Contractual cash flows: 1 - 3 months	Contractual cash flows: 3 - 12 months	Contractual cash flows: 12 - 60 months
	R'000	R'000	R'000	R'000	R'000
Non-derivative financial liabilities					
Trade and other payables	20 850 135	20 850 135	-	-	-
Long term Liability	4 875 500	-	1 929 585	2 945 915	-
Operating Lease	76 721	412	1 237	75 072	-
	25 802 356	**20 850 547**	**1 930 822**	**3 020 987**	**-**

	2016				
	Carrying amount	Contractual cash flows: 1 month or less	Contractual cash flows: 1 - 3 months	Contractual cash flows: 3 - 12 months	Contractual cash flows: 12 - 60 months
	R'000	R'000	R'000	R'000	R'000
Non-derivative financial liabilities					
Trade and other payables	34 046 840	34 046 840	-	-	-
Operating Lease	-	-	-	-	-
Long term Liability	11 783 629	2 945 915	-	2 945 915	5 891 799
	45 830 469	**36 992 755**	**-**	**2 945 915**	**5 891 799**

Market and Credit risk

Financial assets which potentially subject the entity to the risk of non-performance by counter parties consist of Receivables from exchange and non-exchange.

An allowance for impairment is established based on management's estimate of any identified potential losses in respect of Receivables from exchange and non- exchange. Bad debts identified are written off as they occur. The entity does not have any significant credit risk exposure to any single counterparty. There is a foreign exchange risk due to the existence of international debtors. These debtors however have strict 30 day payment terms which ensures that the movement in exchange rates are limited to a shorter time period.

44. FINANCIAL RISK MANAGEMENT OBJECTIVES AND POLICIES (CONTINUED)

The entity's exposure to foreign currency risk was as follows:

			31 March 2017		
	Total	**ZAR**	**EURO**	**USD**	**GBP**
Receivables from Exchange Transactions	20 800 639	11 065 518	97 471	616 979	1 250
Trade payables	(20 850 135)	(20 850 135)	-	(131 299)	-
Gross exposure	**(49 496)**	**(9 784 617)**	**97 471**	**485 680**	**1 250**

			31 March 2016		
	Total	**ZAR**	**EURO**	**USD**	**GBP**
Receivables from Exchange Transactions	20 587 079	12 221 740	218 074	158 742	363 765
Trade payables	(34 046 840)	(34 046 843)	(131 299)	(36 764)	
Gross exposure	**(13 459 761)**	**(21 825 103)**	**86 775**	**121 978**	**363 765**

The following significant exchange rates applied during the year:	**2017**	**2016**
Year-end spot rate		
Euro	13.93	17.16
GBP	16.16	16.56
USD	12.97	15.24

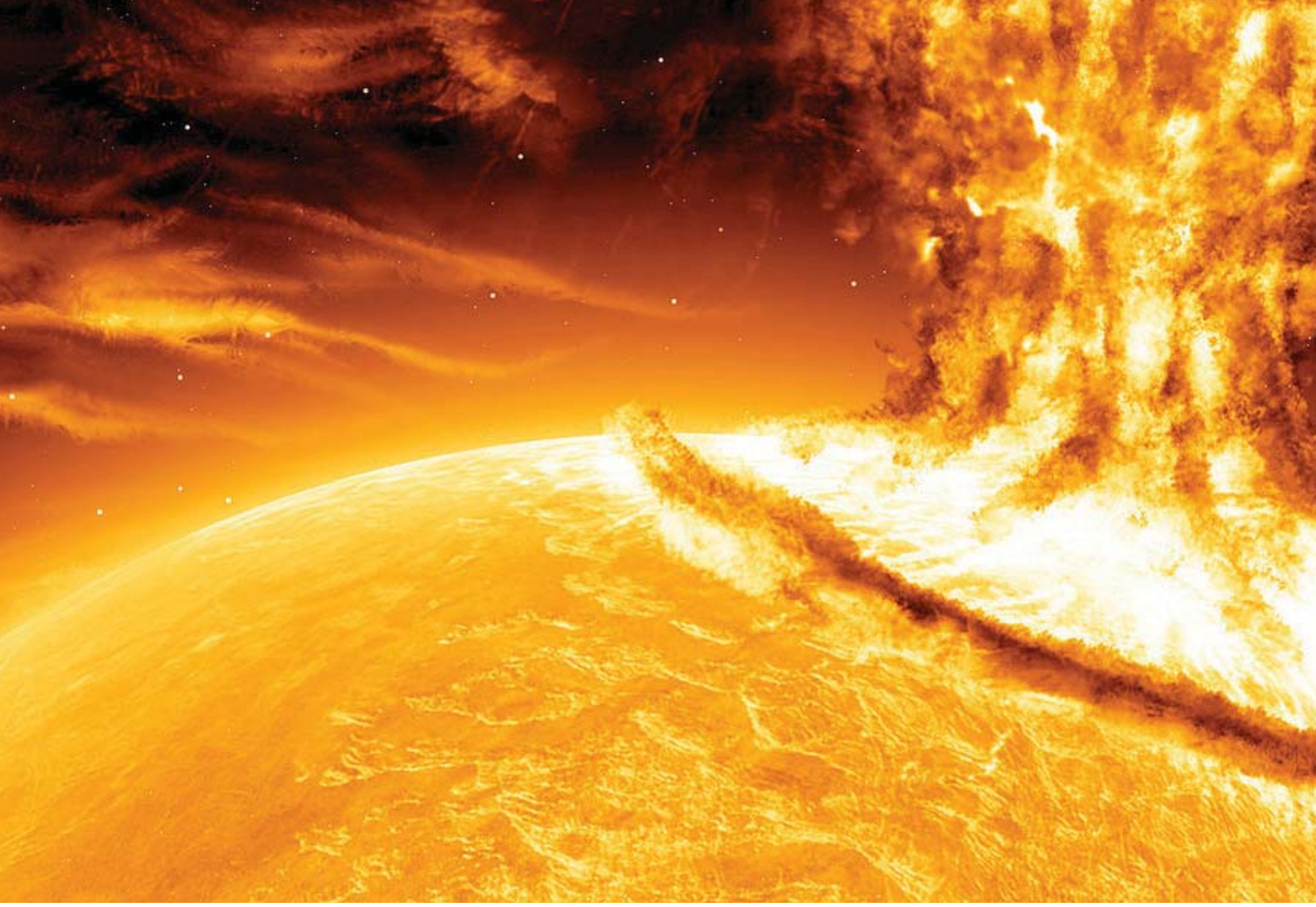
Sensitivity analysis

A 10% weakening of the rand against the above currencies at 31 March would have had the equal but opposite effect on the above currencies to the amounts shown above, on the basis that all other variables remain constant.

Euro	135 770	148 906
GBP	2 020	602 395
USD	630 160	185 894
Total	**767 950**	**937 195**

A 10% strengthening of the rand against the following currencies at 31 March 2017 would have decreased profit or loss by the amounts shown below. This analysis assumes that all other variables remain constant. The analysis is performed on the same basis as was performed at 31 March 2017.

NOTES:



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