10 years

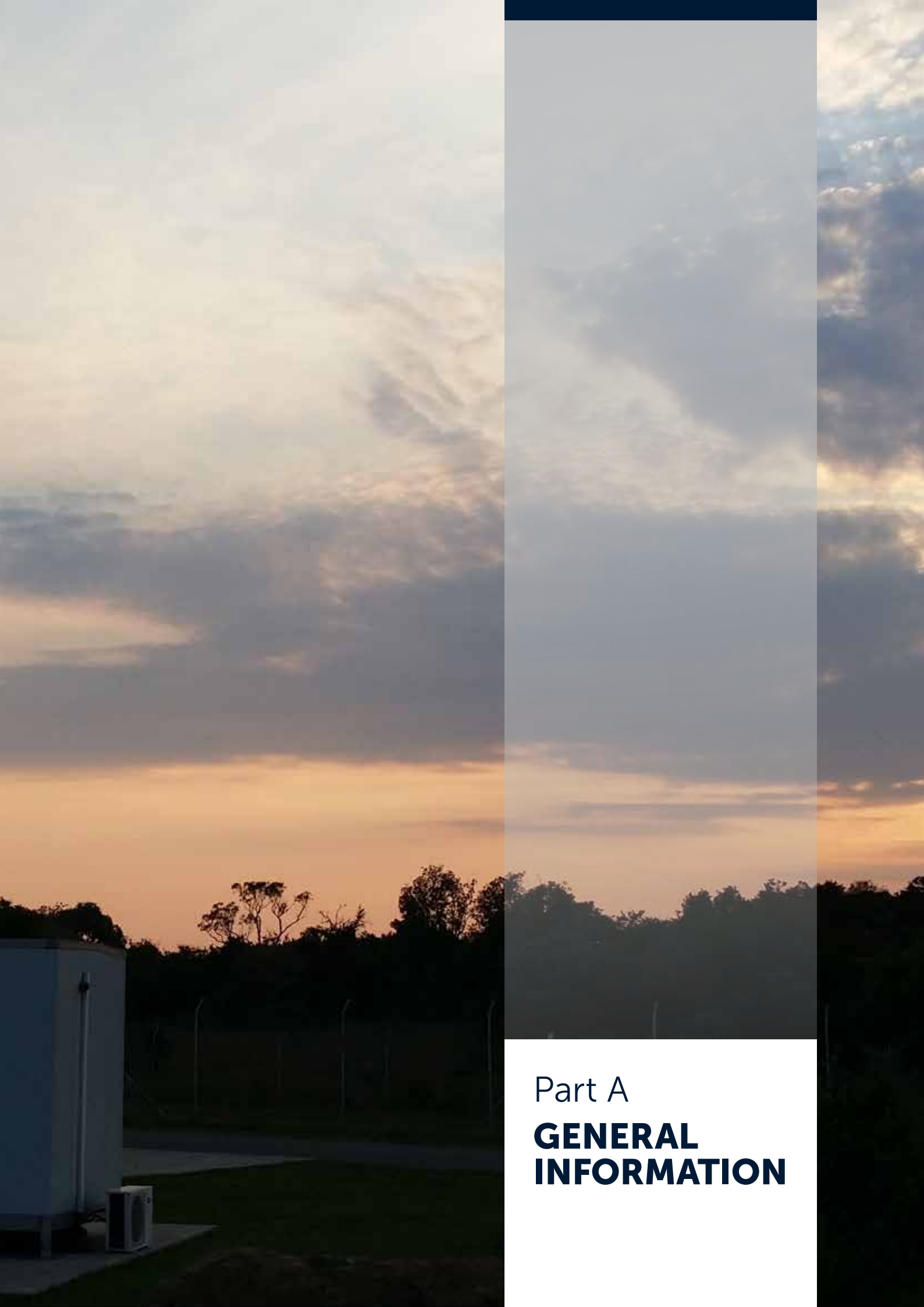
IN SERVICE OF HUMANITY

20:2021

annual report

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

sansa
SOUTH AFRICAN NATIONAL
SPACE AGENCY



Part A

GENERAL INFORMATION

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PUBLIC ENTITY'S GENERAL INFORMATION

Registered name	South African National Space Agency (SANSA)
Registered number	Not applicable
Chairperson of the Board	Ms Xoliswa Kakana
Chief Executive Officer	Dr Val Munsami
Registered office address	Enterprise Building Mark Shuttleworth Street The Innovation Hub Pretoria 0087
Postal address	PO Box 484 Silverton 0127
Contact telephone numbers	+27 12 844 0500
Fax numbers	+27 12 844 0396
Website address	https://www.sansa.org.za
Bankers	ABSA Bank 7th Floor –Absa Towers West 15 Troye Street Johannesburg 2001
External auditors	Nexia SAB&T 119 Witch-Hazel Avenue Highveld Technopark Centurion 0157
Board secretary	Ms Lorraine Harrison

LIST OF ABBREVIATIONS/ACRONYMS

ABBREVIATIONS	MEANINGS
ACMAD	African Centre of Meteorological Applications for Development
AIT	Assembly, Integration and Testing
ARC	Audit and Risk Committee
ATNS	Air Traffic and Navigation Services
APP	Annual Performance Plan
ATR	Annual Training Report
B-BBEE	Broad-Based Black Economic Empowerment
CDF	Concurrent Design Facility
CEO	Chief Executive Officer
CFO	Chief Financial Officer
COVID-19	Coronavirus Disease 2019
CRD	Critical Design Review
CPUT	Cape Peninsula University of Technology
DCDT	Department of Communications and Digital Technologies
DEFF	Department of Environment, Forestry and Fisheries
DESA	Digital Earth South Africa
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
DSI	Department of Science and Innovation
DWS	Department of Water and Sanitation
EE	Employment Equity
EEZs	Exclusive Economic Zones
EIA	Environmental Impact Assessment
EISCAT	European Incoherent Scatter radar
ERP	Enterprise Resource Planning
EOD	Earth Observation Data
EODC	Earth Observation Data Centre
ERM	Enterprise Risk Management
ESA	European Space Agency
EVP	Employee Value Proposition
EXCO	Executive Committee
FTC	File Transfer Protocol
GNSS	Global Navigational Satellite System
GPS	Global Positioning System
GRAP	Generally Recognised Accounting Practice
GTAC	Government Technical Advisory Centre
HCD	Human Capital Development
HBK	Hartebeesthoek
HF	High-Frequency
HR	Human Resource
ICT	Information and Communications Technology
IDDRR	International Day for Disaster Risk Reduction
IMS	Integrated Management System
IOCAP	Ionospheric Characterisation and Prediction
IOT	Internet of things
ISAT	Infrastructure Site Acceptance Test
ISO	International Organization for Standardization
IVT	Integrated Vessel Tracking
MDA	Marine Domain Awareness
MSc	Master of Science

ABBREVIATIONS	MEANINGS
NACH	National Anti-Corruption Hotline
NASA	National Aeronautics and Space Administration
NECTAR	Non-Linear Error Compensation Technique with Associative Restoration
NM	Neutron monitor
NRF	National Research Foundation
NSRDA	National Space Research and Development Agency
NWRS	National Water Resource Strategy
OCIMS	Oceans and Coastal Information Management System
PECASUS	Pan European Consortium for African Space weather User Services
PFMA	Public Finance Management Act (Act No. 1 of 1999)
PHD	Doctor of Philosophy
PMSE	Polar Mesospheric Summer Echo
PSETA	Public Service Sector Education Training Authority
R&D	Research and Development
RARS	Regional Advanced Retransmission System
RDIF	Research, Development, and Innovation Fund
RFI	Request for Information
RSA	Republic of South Africa
SAASTA	South African Agency for Science and Technology Advancement
SAASTEC	Southern African Association of Science and Technology Centres
SAEOSS	South African Earth Observation Systems Strategy
SAGEA	South African Graduate Employers Association
SAGTA	Southern African Geography Teachers Association
SANAE	South African National Antarctic Expedition
SANBI	South African National Biodiversity Institute
SANSA	South African National Space Agency
SANSA Act	South African National Space Agency Act (Act No. 36 of 2008)
SAR	Synthetic Aperture Radar
SAWIDRA	Satellite and Weather Information for Disaster Resilience in Africa
SBAS	Satellite-Based Augmentation System
SCM	Supply Chain Management
SDG	Sustainable Development Goal
SETA	Sector Education Training Authority
SHEQ	Safety, Health, Environment, and Quality
SIH	Space Infrastructure Hub
SIP	Strategic Infrastructure Project
SMME	Small, Medium and Micro Enterprise
SNP	Satellite Network Portals
SST	Space Science and Technology
STEM	Science, Technology, Engineering and Mathematics
TEC	Total Electron Content
the dtic	Department of Trade, Industry and Competition
USA	United States of America
VCI	Vegetation Condition Index
VDES	VHF Data Exchange System
VHF	Very High Frequency
VLF	Very Low Frequency
WSP	Work Skills Plan
WSW	World Space Week
WWLLN	World-Wide Lightning Locator Network

FOREWORD BY THE BOARD CHAIRPERSON

I am very grateful to the Department of Science and Innovation, under the leadership of Minister Dr Blade Nzimande, for its continued guidance and support.

It gives me great pleasure to share my message at such an august moment in the history of the South African National Space Agency (SANSA) as the Agency celebrates a decade of significant space successes for our country this year.

One of the decadal highlights include the evolution of the Space Weather centre since it's inauguration by Minister Pandor in 2011 from a limited, yet significant service, to a significant global player. I am pleased to share that in early August 2021, cabinet approved and welcomed the designation of South Africa as a regional Space Weather Centre for International Civil Aviation Organization (ICAO). This is after SANSA received excellent audit results from ICAO. To this end, South Africa, through SANSA has been designated to provide space weather information that is now an adopted standard by ICAO for all aviation requirements on the African continent. A new state-of-the-art facility is currently being constructed, in order to anchor our space science products that meet both global and national requirements.

True to the vision to provide routine and reliable Earth Observation data to tackle some of Africa's greatest socio-economic and sustainability challenges, our Earth Observation Programme remains at the heart of delivering critical data products and services to important sectors of Government and industry. SANSA has been selected as the host of the Digital Earth Africa Program Management Office, which aligns with our Africa-centred Vision. The initiative will include a digital data cube platform to provide essential space products and services to the African continent.

The Space Operations facility has over the past year shown immense flexibility with the space launch market disruptions and foreign exchange

fluctuations. Never wavering from the end goal of service excellence to local and global customers and partners even under restricted working conditions.

Despite the ravages of the global pandemic, SANSA courageously embarked on a new strategic direction that expanded delivery against a more complete mandate for the Space Agency. A final 82% delivery against these ambitious financial year targets under difficult financial, human, environmental and economic resources indicate the passion and commitment of SANSA's Leadership and staff, despite COVID restrictions and challenges experienced by the country.

Notwithstanding the outstanding achievements, the Agency received an adverse report on the audit of compliance with section 55 (1)(c)(i) of the PFMA in this period under review. However, SANSA's leadership has taken this matter within their strides to redress the situation.

Strategic partnerships with our stakeholders, both national and International, continue to be at the centre of our success. These partnerships have enabled SANSA to expand opportunities, such as the Innovation Challenge into the continent. SANSA continues to work closely with the Space Industry body, ZASpace Inc, in reinforcing its critical role to encourage cohesion and growth of the local industry. The Agency also provided additional support to post-graduate students and extensions to it's bursary allocations, in an effort to manage the impact of disruptions in Higher education.

We have a number of key upcoming developments, which include the Space Infrastructure Hub (SIH) program. At this stage we look forward concluding of work on the bankable feasibility study, which will inform the process of securing investor funding that has been lined up for the SIH. The organization will soon embark on a restructuring process, to optimize its resources for delivery on its five-year strategy towards its vision. Space planning for the new Head Office building at the innovation hub in Pretoria, is nearing completion.

I am very grateful to the Department of Science and Innovation, under the leadership of Minister Dr Blade Nzimande, for its continued guidance and support. I also am grateful to SANSAs board, its management and staff, for the passion and dedication leading into an exciting space future for South Africa.

Ms Xoliswa Kakana
SANSA Board Chairperson

CHIEF EXECUTIVE OFFICER'S OVERVIEW

It gives me great pleasure to present the South African National Space Agency (SANSA) Annual Report for the 2020/2021 financial year, more so given that the reporting period under review marks a significant 10-year milestone since the establishment of the Agency in 2010.

SANSA was launched by the Department of Science and Innovation (then known as the Department of Science and Technology), with a mandate to:

"...Provide for the promotion and use of space and co-operation in space-related activities, foster research in space science, advance scientific engineering through human capital and support the creation of an environment conducive to industrial development in space technologies within the framework of national government policy..."

Significant strides have since been made by the Agency since its formative years, for example, promoting the use of space weather technologies to improve navigation, communications, and electricity supply in the technology-dependent industries. For the past 10 years the implementation of strategic programmes has led to SANSA researchers making in-roads in terms of contributing to global scientific knowledge in space and earth sciences while government departments and customers benefited from the provision of high-quality satellite data, products, and services.

During the 2020/21 financial year, SANSA has managed to navigate through a challenging macroeconomic environment which was exacerbated by an unprecedented onset of the Corona Virus –2019 (COVID-19). This pandemic launched not only the country but the world at large into a state of crisis, and disrupted the personal, professional, social, and economic lives of people across the globe. All of us, together with our families and colleagues, were somehow impacted by its devastating effects in relation to low economic growth, wide-spread job losses and perpetual budget-cuts by government which led to escalated financial constraints for government departments and public entities alike. This situation required an immediate response on the part of SANSA in terms of the development and implementation of Business Continuity Plans that are aligned to the new "business unusual" operating model.

The following words by Steve Maraboli, in his 2009 book titled Life, the Truth, and Being Free ring true when considering the high levels of grit and commitment displayed by the SANSA employees during the 2020/21 financial year that proved challenging beyond words:

"Life doesn't get easier or more forgiving, we get stronger and more resilient."

The 2020/2021 financial year marked the beginning of a new five-year term for implementing the Strategic Plan 2020-2025 and our commitment in positioning the Agency to deliver on its full mandate, as espoused in the National Space Policy, the

National Space Strategy and the South African Earth Observation Systems Strategy has been unwavering. As part of efforts aimed at steadily advancing towards achievement of the strategic priorities provided in its 2020/2025 Strategic Plan the Agency has achieved a an unqualified external audit outcome whilst maintaining consistency in terms of achieving more than 80% of the set annual performance targets. A commendable feat given the difficult climate brought about by a pandemic that shook the country to its core, leaving behind a wave of uncertainty. This serves as a positive reflection of the critical contribution made by SANSA in terms of promoting the use of space to resolve various socio-economic-environmental challenges not only for South Africa but the African Continent at large.

The individual contribution of each employee has been crucial in promoting a high-performance culture within the entity and the current strategic term brings with it new opportunities for SANSA to re-position itself at the centre of South Africa's space initiatives. The ongoing oversight support from the Department of Science and Innovation and the exceptional strategic leadership displayed by the SANSA Board and Executives have enabled the entity to deliver good results in areas such as product development, service offerings, human capital development, science outreach initiatives, research, and innovation, as well as, developing and maintaining sound strategic partnerships.

A review of the 2020/2025 Strategic Plan and shifts in the policy drivers required a relook at the SANSA Business Model to ensure an investor-driven focus that is supported by a more commercial drive and development of the local space sector. The SANSA Board approved a new business model and macrostructure in the 2020/21 financial year, and this has set the tone for all the planned Human Resource (HR) interventions to be implemented in support of the 2020/25 strategic plan. The new business model/organisational design will provide direction to the planned initiatives inclusive of skills audit in terms of understanding the type of skills required by the organisation to fulfil its mandate.

SANSA is responsible for the implementation of the National Space Strategy and should thus remain at the centre of rolling out related programmes and strategic projects. Despite the successes over the last decade, however, SANSA's Annual Performance Plans and Strategic Plans have been pragmatically aligned against the budgetary allocations made to it for both its internal business operations and broader support to the local space sector. This approach vis-à-vis the budgetary allocations imposed a limitation on SANSA's scope of initiatives that were planned and implemented versus implementation of initiatives needed to achieve the full mandate. A consequence of the alignment of SANSA activities to the parliamentary grant allocation is as follows:

- SANSA's inability to fully meet its mandate, especially with regards to Global Navigation Satellite Services (GNSS) and satellite telecommunications solutions and applications; and
- Limited support to the broader local space industry, as per SANSA's mandate. This has limited the extent of the entity's contribution towards growing and developing the industry.

SANSA continues to play a pivotal role in transforming space sector and key successes during the 2020/21 financial year include:

- The awarding of funding to SANSA for the establishment of a Space Infrastructure Hub (SIH). This has marked a key milestone in terms of the entity's infrastructure development objectives and spin-offs during project implementation will include skills and capacity development, boosting the South African space economy and job creation.
- The announcement of Dr Martin Snow as the first SANSA Research Chair of the South African Research Chairs Initiative (SARCHI) in Space Weather through a joint initiative between SANSA, the Department of Science and Innovation (DSI) and the National Research Foundation (NRF).
- The launch of a new 24/7 Regional Space Weather Centre which was celebrated through a Sod Turning Ceremony led by the Minister of Higher Education, Science and Innovation, Dr Blade Nzimande and the SANSA Board Chair, Ms Xoliswa Kakana.
- SANSA achieved a 99.35% successful satellite pass monitoring rate for Earth observation during the period under review.
- In keeping with its objective of supporting the development of a critical mass of skills and expertise needed to give effect to national space initiatives SANSA supported 46 postgraduate students in key space science disciplines during the financial year.
- A total of 2937 learners also benefited from outreach and space awareness initiatives. Although this was a lesser number than the targeted 4000 learners due to limited contact with learners due

to lockdown restrictions efforts are continuing to ensure a greater number of learners is reached in the 2021/2022 financial year.

- Since 2016, SANSA has successfully hosted the annual Earth Observation Open Innovation Challenges in South Africa. For the first time in 2020 an Africa-wide open innovation challenge was launched through collaborations between SANSA, ZA Space Inc. and other key stakeholders.

While we acknowledge these achievements, much more work still lies ahead in terms of implementation of the new business model to enhance SANSA's contribution to satellite development and testing, satellite navigation, human capital development and research and innovation amongst other key areas.

Looking forward towards the second year in the implementation of the 2020/2025 Strategic Plan we recognise the importance of national, African, and international partnerships all of which have been instrumental in ensuring steady progress relating to the development of the local space industry. SANSA will continue to leverage on such partnerships to reinforce its resource pool and ensure an even greater distance is covered during the current 5-year term in terms of moving towards fully meeting its mandate. Such partnerships are of critical importance given that some of the SANSA aspirational initiatives will necessitate mobilisation of resources outside the fiscus to promote an ecosystem-wide implementation approach rather than an agency-only implementation approach. The value proposition for the aspirational initiatives include:

- Broader support to the South African space sector, including extended support to Small and Medium Enterprises.
- An expanded human capital development programme in line with the extended mandate, thus ensuring better absorption of the human capital development pipeline into the broader space sector.
- A wider array of space application products and services, which creates decision-making efficiencies that ultimately impact on how we respond to our socio-economic-environmental challenges.
- A reduced outflow of local capital to foreign markets, which will be offset by technology localisation and a growing market share of the approximately 350-billion-dollar global space market.
- A greater focus on the African continent to tackle global challenges that transcend national boundaries, thus effectively contributing to the African Union (AU) Vision and Agenda 2063 for "An integrated, prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in the global arena".

I look back at the past decade with pride as much ground has been covered by SANSA towards developing the sector in accordance with its mandate. The phasing –in of the new business model in 2021/22 will pave the way for the entity to improve its levels of effectiveness and efficiency while positioning itself at the centre of the local space landscape.

In conclusion, I sincerely thank the Minister of Science and Innovation, Dr Blade Nzimande and his senior management team at the Department of Science and Innovation for their continued support to SANSA –we look forward to walking the miles ahead assured of your commitment to supporting the achievement of our mandate.

Credit must also be given to the SANSA Board under the leadership of Ms Xoliswa Kakana –you have led from the front and have continued to provide strategic guidance to the Executive Team through all the highs and lows experienced over the past year.

Finally, appreciation goes to the SANSA Executive Team and employees, I thank you for your willingness to serve the organisation and the country. I look forward to walking the coming years assured of your support, as we work together towards the realisation of our Vision of:

"An integrated national space capability that responds to socio-economic challenges in Africa by 2030".

Dr Valanathan Munsami
Chief Executive Officer

STATEMENT OF RESPONSIBILITY/CONFIRMATION OF ACCURACY OF THE ANNUAL REPORT

To the best of our knowledge, we confirm the following:

All information and amounts disclosed in the annual report are consistent with the SANSA 2020/2021 Annual Financial Statements audited by the External Auditors.

The annual report is complete, accurate, free from any omissions and has been prepared in accordance with the Public Entities Annual Report guidelines as issued by National Treasury.

The Annual Financial Statements (Part E) have been prepared in accordance with the South African Standards of Generally Recognised Accounting Practice (GRAP) standards applicable to the public entity.

The Accounting Authority is responsible for the preparation of the Annual Financial Statements and for the judgements made in this information.

The Accounting Authority is responsible for establishing and implementing a system of internal control has been designed to provide reasonable assurance as to the integrity and reliability of the performance information, the human resources information and the Annual Financial Statements.

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

In our opinion, the annual report fairly reflects the operations, the performance information, the human resources information and the financial affairs of the entity for the financial year ended 31 March 2021.

Yours faithfully

Dr Val Munsami
Chief Executive Officer

Ms Xoliswa Kakana
Chairperson of the Board

STRATEGIC OVERVIEW

SANSA VISION AND MISSION

The entity's vision and mission are a major driving force behind SANSA's commitment to repositioning the South African space programme and ensuring that the agency is central to the socio-economic-environmental development of the continent.

VISION

"An integrated national space capability that responds to socio-economic challenges in Africa by 2030".

MISSION

"To provide leadership in unlocking the potential of space for the advancement and benefit of humanity".

VALUES

All activities carried out during the financial year under review were underpinned by six 'STRIPE' Values as outlined below. These core organisational values remain crucial to the transformation of SANSA into a high-performing agency.

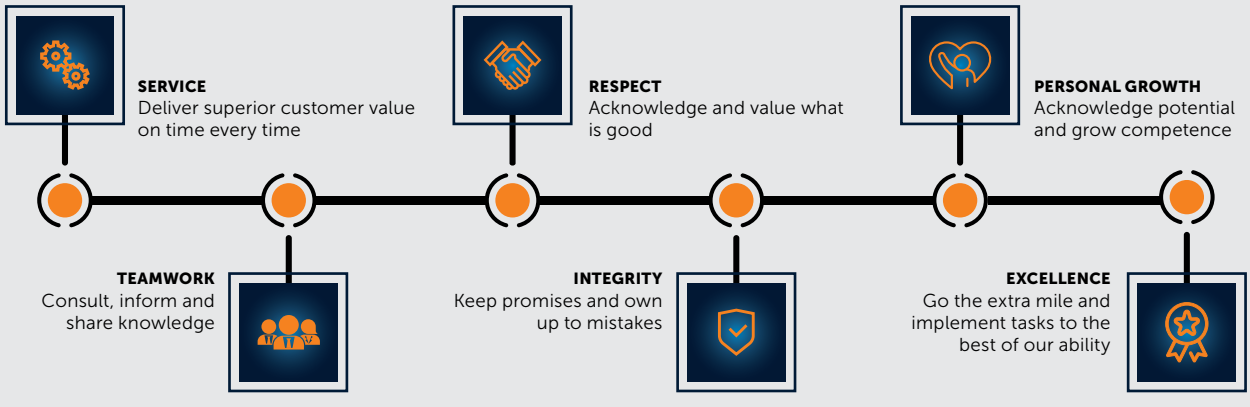


Figure 1: SANSA Organisational Values

LEGISLATIVE AND OTHER MANDATES

LEGISLATIVE MANDATE

SANSA a Schedule 3A national public entity that was established in terms of the Public Finance Management Act (PFMA), No. 1 of 1999. The legislative mandate is premised on two primary Acts, namely (i) the Space Affairs Act (Act No. 84 of 1993) and (ii) the South African National Space Agency (SANSA) Act (Act No. 36 of 2008). The former, an instrument of the Department of Trade, Industry and Competition (the dtic) caters for the regulatory/ policy context for the South African space programme, whereas the latter, an instrument of the Department of Science and Innovation (DSI), enables the establishment of SANSA as an implementing agency for the South African space programme.

The agency's priorities during the 2020/2021 financial year were informed by the following key objectives as provided in the SANSA Act:

- Promote the peaceful use of outer space.
- Support the creation of an environment conducive to industrial development in space technology.
- Foster research in space science, communications, navigation, and space physics.
- Advance scientific, engineering, and technological competencies and capabilities through human capital development outreach programmes and infrastructure development.
- Foster international cooperation in space related activities.

POLICY MANDATE

Aligned to the legislative instruments above the National Space Policy provides an overarching guideline to all national space actors on the key principles for implementation of a South African space programme. The National Space Policy is an instrument of the dtic and is aligned to the Space Affairs Act.

The National Space Policy is the anchor tenet and reference point by which all other policy and strategy instruments are crafted. The primary objectives of the National Space Policy are to:

- Improve coordination throughout the South African space arena to maximise the benefits of current and planned space activities, avoid or minimise duplication of resources and efforts, and organise existing initiatives, programmes, and institutions into a coherent network for all providers and users of space systems.
- Promote capacity building initiatives, both as a means towards effective participation in the space arena, as well as to develop capacity in space science and technology, and science and technology in general.
- Facilitate the provision of appropriate and adequate space capabilities to support South Africa's domestic and foreign policy objectives.
- Foster a robust science and technology base in research institutions and the higher education sector.
- Promote the creation and implementation of a supportive regulatory environment to facilitate industrial participation in the space arena, in accordance with domestic law and South Africa's foreign policy objectives and international obligations.
- Promote the development of an appropriate and competitive domestic commercial space sector to provide the industrial base to meet the nation's needs for space technology.
- Promote improved cooperation with other nations in the mutually beneficial peaceful uses of outer space.
- Promote greater awareness and appreciation, at all levels of South African society, of the relevance and benefits of space science and technology.

ORGANISATIONAL STRUCTURE

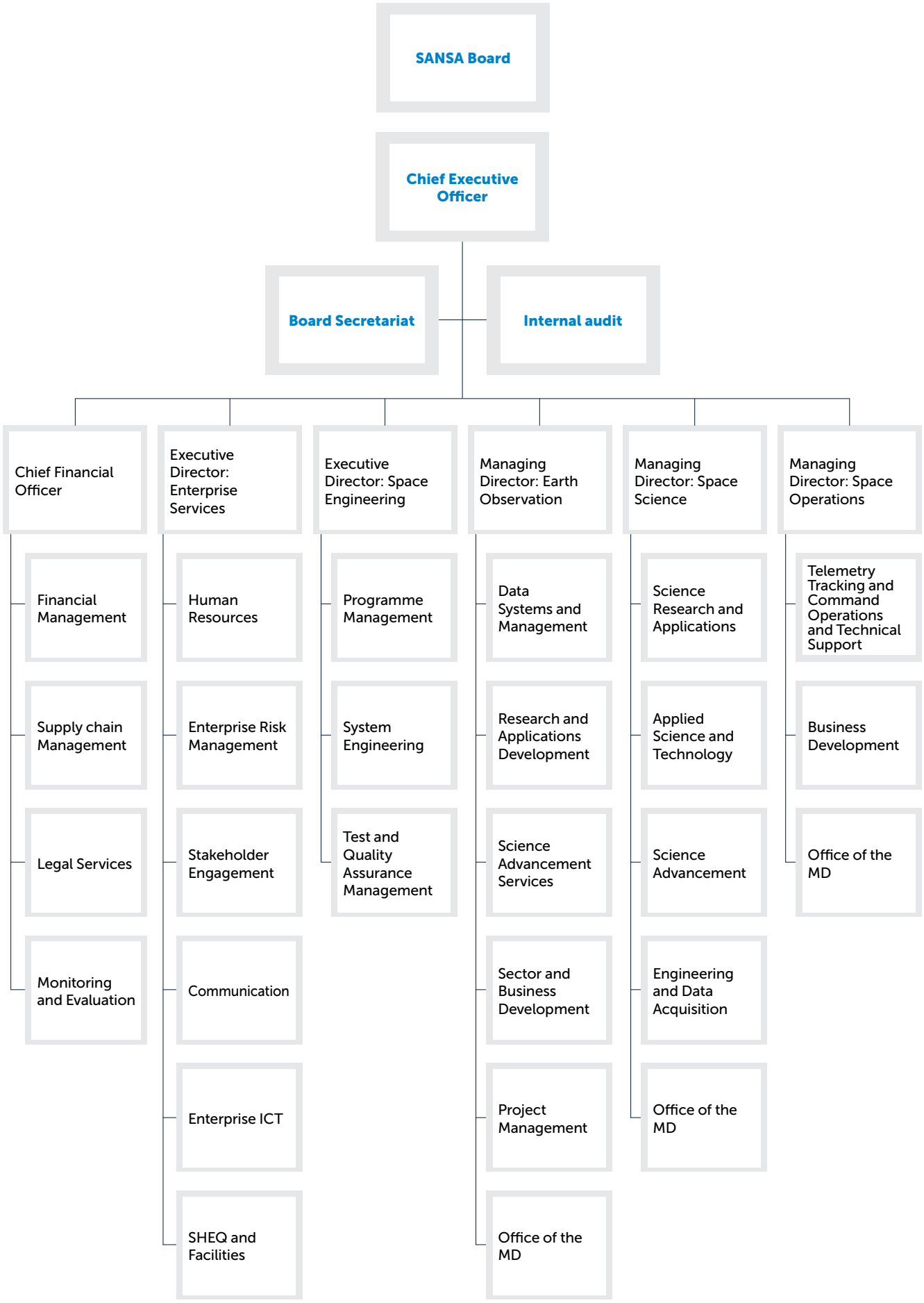
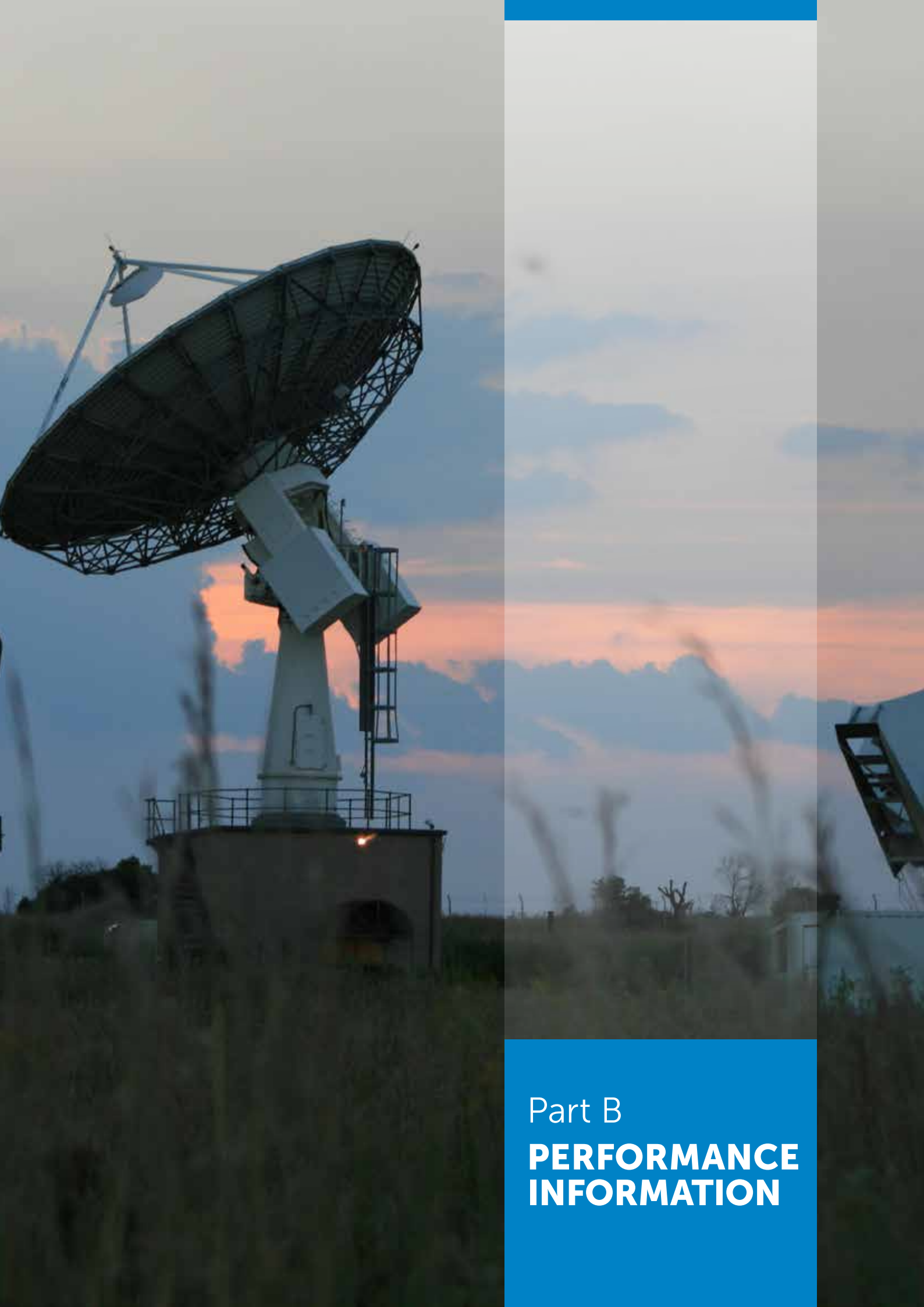


Figure 2: Organisational Structure



Part B

PERFORMANCE INFORMATION

IMPACT REPORT: SANSA'S JOURNEY

INNOVATION INCREASES THE SCOPE OF SPACE TECHNOLOGY TOOLS

Expanding the reach of space services

SANSA has developed a new software package called the Ionospheric Characterisation and Prediction (IOCAP) Tool, which is a modern, user friendly High-Frequency (HF) communication prediction application that is designed to simplify HF communication planning requirements. The product was originally developed with the defence user in mind, however, the range of applications for IOCAP have increased.

Recently, the product was featured in several articles which included glowing reviews from current users.

This sparked interest from several parties while the first IOCAP client engagement with a non-defence user also took placed during the financial year. In addition, a website platform to provide insight and information on IOCAP was developed and can be accessed via the SANSA website. For potential users, this provides an easy access point for further information. International Defence Forces and the global trade industry are using IOCAP to improve their operations through improved HF communication predictions.

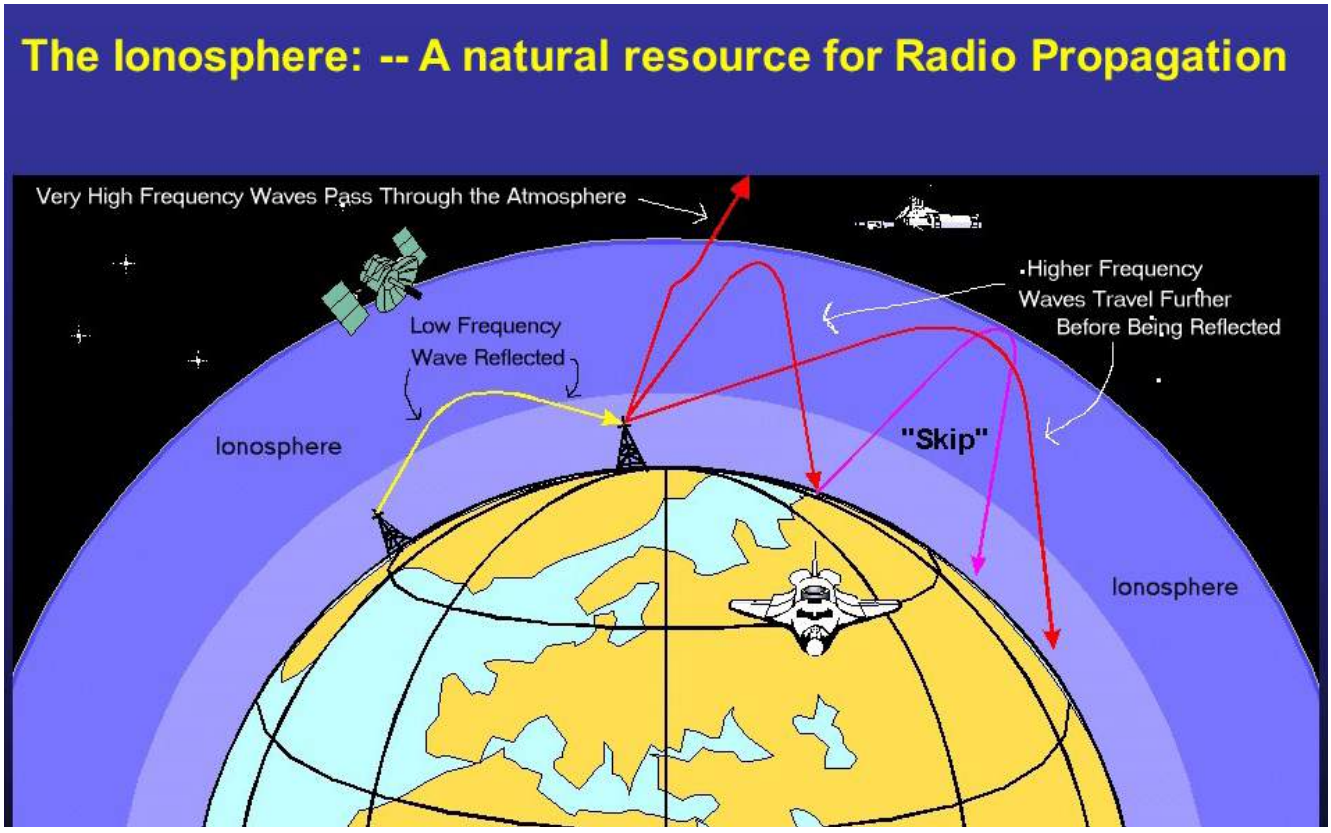


Figure 3: The IOCAP interface makes it easy for clients to do their communications planning

Partnerships provide sought after products

SANSA hosted Dr Daniel Okoh from the National Space Research and Development Agency (NSRDA) in Abuja, Nigeria, to work on developing a space weather product for forecasting the Total Electron Content (TEC) over the African region. The visit was intended for a period of two months, however due to the COVID-19 lockdown in both South Africa and Nigeria, the visit was extended by a further three months, during which time the product was developed to the validation and production stage. The product, called AfriTEC, was defined as a priority for development within the domain of navigation applications impacted by space weather, and has now been completed. It will be included in the range of products and services offered as part of the 24-hour Regional Space Weather Centre. AfriTEC will allow clients to estimate the delay on GPS satellites and will serve as a basis for estimating frequencies for HF communications.

Figure 4: Dr John Bosco Habarulema, SANSA Researcher and Darren van Roodt, SANSA Computer Programmer with the new product displayed in Space Weather Centre.

Equipment upgrade supports Kenyan Space Weather capability

SANSA has operated a GNSS scintillation receiver at Pwani University in Kenya for several years. The station has been extremely successful due to its close proximity to the equator, where the effects of ionospheric scintillation on GNSS signals are most likely to be measured. As part of SANSA's continued efforts to expand its instrumentation network into Africa, this important station received an equipment upgrade with the latest, state-of-the-art GNSS receiver from Septentrio that has multi-frequency and multi-constellation support. Kenya is perceived as a key strategic partner in Africa and this partnership will be used to further support and nurture the creation of a Kenyan operational space weather capability as well as support the expansion of Kenyan infrastructure around the country to monitor the near-Earth space environment.

Open innovation challenge

Since 2016, SANSA has successfully hosted the annual Earth Observation Open Innovation Challenges in South Africa. In 2020, for the first time the Open Innovation challenge was launched Africa wide. SANSA and ZASpace Inc. formed a collaborative partnership with MAXAR Technologies, First National Bank, SA Innovation Summit, Regional Connect, Anza Capital, and Tech Tribe Accelerator to host a pan- African Space-Tech EO open innovation challenge, targeting downstream Space-Tech applications in the agriculture, insurance, retail, sustainability, and conservation industries.

A total of 39 submissions were received across Africa and fifteen finalists were selected to go through to the final round, which included a business development training programme, and an opportunity for applicants to pitch their businesses to the programme partners. Finalists were also allowed to showcase their innovations at the Industry Track of GEO Week 2020, that had over 340 attendees from around the world. Awarded prizes included:

- A four-month online incubation, virtual mentorship, and ongoing access to a peer-to-peer network through the TechTribe Accelerator.
- The first-place winner, **Hydro Blu** –Joash Kisten from **South Africa** received a 5GB SecureWatch Premium valid for three months to the value of $12 500.
- The second place winner **Smart AgrIoT** –Jabu Madlala, **South Africa** www.smartagriot.co.za and the tie third-place winners, **HeHe** –Crepin Kayisire, of **Rwanda** www.dmmhehe.com and **FieldDev Group Nigeria** –Nduka Okpue, https://agcfarmlands.herokuapp.com received a 2GB SecureWatch Premium valid for three months to the value of $5 000.

SANSA/NASA: A deep space partnership

Following a cabinet decision, SANSA received the green light to explore the feasibility to support the National Aeronautics and Space Administration (NASA) in establishing and hosting a deep-space satellite tracking ground station in South Africa. The Environmental Impact Assessment (EIA) for the Matjiesfontein site was submitted to Department of Environment, Forestry and Fisheries (DEFF) for public comment and approval.

As part of the Radio Frequency Interference study, SANSA engaged relevant operators in the area to create awareness maintaining the area free from potential harmful interference. The project awaits decision making from NASA to continue the collaborative activities. SANSA continues to develop the implementation plan for the site with the intention of developing the site even in the absence of NASA who have encountered funding constraints to develop the 34m antennae they require. They will in the interim, investigate the option to establish the 18m LGS antenna required for the Artemis missions. SANSA is working towards a design that will support all the initial programs and be easily expandable to the deep space requirements in the future. The SANSA/NASA signing ceremony and prospective ground station site are depicted in figures 5 and 6 below:

Figure 5: SANSA and NASA Signing ceremony

Government decision making and decision support tools

Investments in systems and data in support of a capable state, through effective management of environmental resources, including oceans and marine, human settlements, drought monitoring and water resource management, led to the development of or supported the implementation of several tools that government deployed for evidenced based decision making. These included the following tools:

OCIMS vessel tracking for the Department of Environmental Affairs

South Africa's national Oceans and Coastal Information Management System (OCIMS) aims to develop world-class decision-making tools which utilise remote sensing and other sources of maritime data. SANSA provides Synthetic Aperture Radar data to the National OCIMS Integrated Vessel Tracking (IVT)-DeST so that the tool can intelligently monitor ships and pollution in near-real time to provide this information directly to users. OCIMS is a contribution to the government's Operation Phakisa.

Monitoring of illegal activity

There were six trawlers arrested in the Port of Cape Town for illegally entering South African waters late in March 2021. Vessels were apprehended by the DEFF Fishery Patrol Vessel west of Cape Town and escorted to Cape Town outer port limits where it was fined, and later released. Whilst transiting the Republic of South Africa (RSA) coast the vessels were continuously monitored to ensure no further transgressions. In addition to this, Phakisa 5 enabled the tracking of a vessel when it was proven that she had approached the coast to throw stowaways overboard. The vessel was detained in Richards Bay where the Master and six crew members were criminally charged and found guilty of attempted murder.

Figure 6: Prospective Ground Station Site

The Agency also reacted on information from the Western Sahara Resource Watch based in Brussels, that a reefer vessel planned to discharge fish illegally fished off the Western Sahara coast in Port Elizabeth. The vessel was tracked whist transiting South African waters and it was confirmed that it had managed to enter Port Elizabeth or another port.

Mapping informal settlement growth patterns (Department of Human Settlements)

The National Department of Human Settlements has been working with SANSA in the development of human settlement products and services to help create situational awareness on the characteristics of settlements, environmental conditions and access to the services. SANSA products were used to identify settlements requiring basic services such as temporary shelter and water at the beginning of COVID-19 pandemic, as these products are based on the most up-to-date base data available. *Some of the settlements which were not previously mapped by the provinces or municipalities would have been left out during planning of the Human Settlement interventions had the department not had access to the SANSA human settlement data. One of the major questions that the SANSA products provided solutions to is "how many informal settlements are there in the country?".*

National Integrated Water Information System (NIWIS) Drought Status Information (Department of Water and Sanitation)

SANSA developed the Vegetation Condition Index (VCI) to generate drought information for the National Integrated Water Information System. VCI indicates different vegetation conditions from month-to-month in comparison to the long-term average (Normal/No drought, Light, Moderate, Severe, Extreme).

The National Integrated Water Information System (NIWIS) currently provides integrated monthly drought status information based on the Multi-Criteria Decision Analysis using rainfall, streamflow, dam levels, and groundwater. The information system disseminates all water and sanitation information to all relevant users/stakeholders, including those in the fields of agriculture and food security. The information disseminated covers business requirements such as climate change and weather, disaster management, water quantity and quality, water ecosystems, and water services.

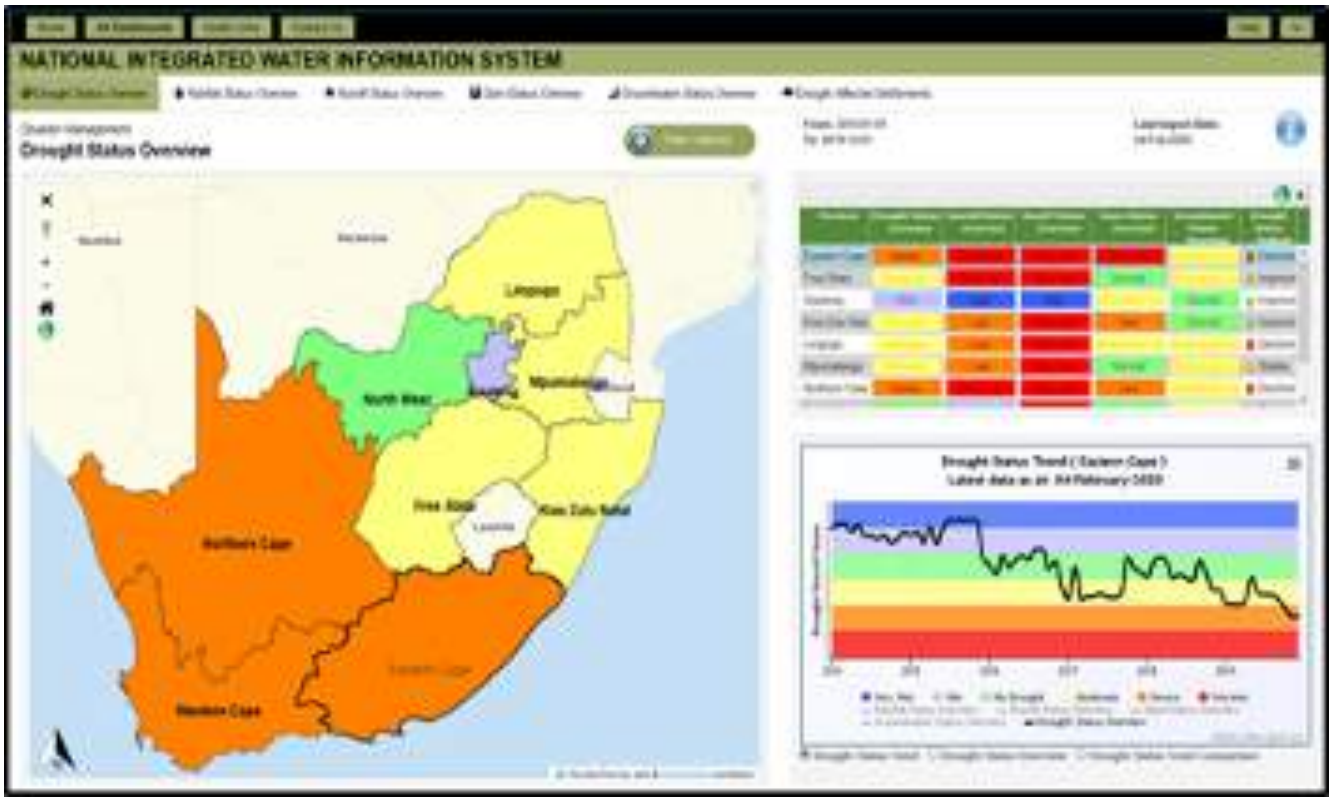


Figure 7: The developed vegetation condition information per province

Water volume (Department of Water and Sanitation)

Monthly water quantity data from the Mzansi-Amanzi National Water Quantity Information Service is currently being distributed to the Department of Water and Sanitation. The water volume data was procured from the private sector in line with SANSA's mandate to develop South Africa's Earth observation industry. The Department of Water and Sanitation utilises the data to monitor water quantity in both small and large dams across South Africa monthly.

EXPANDING THE HORIZONS THROUGH NEW RESEARCH

Local researchers growing the international footprint and impact

SANSA Researcher, Dr Lerato Shikwambana, achieved his first NRF rating as a Y2 young researcher, and was nominated for the NRF Research excellence for emerging researcher awards. Dr Shikwambana has published more than ten research papers in international peer reviewed journals since being permanently appointed to SANSA as a senior scientist in 2020.

Figure 8: SANSA Researcher Dr Lerato Shikwambana

Figure 9: Dr John Bosco Habarulema: recognised as one of the top 10 reviewers for the Journal –Advances in Space Research

Another SANSA researcher, John Bosco Habarulema, was also acknowledged for the fifth consecutive year as one of the top 10 reviewers for the journal – Advances in Space Research. *Habarulema was also awarded the prestigious International Space Science Institute award to lead a team of 12 scientists from seven countries to undertake a space science research project.* This two-year project will start in the second part of 2021 and continue into 2022. Representatives of South Africa, Nigeria, United States of America (USA), Germany, Czech Republic, Sweden, and China form the research team. Their aim is to study the long-term ionospheric effects and their associated modelling during extreme space weather events over the African sector. Thus, increasing comprehensive understanding of different phenomena over this sector by combining measurements of existing sparsely located ground-based instruments with satellite-based instruments.

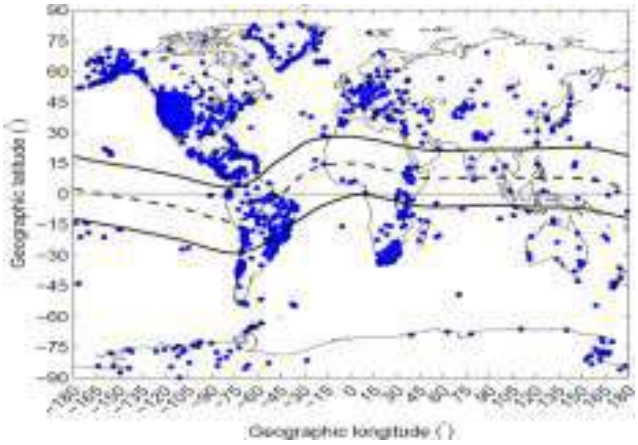


Figure 10: Global Navigational Satellite System (GNSS) receiver locations indicated by the blue dots

New research published in Nature Scientific Reports

Two SANSA Researchers, Dr Amoré Nel and Prof Mike Kosch, published pioneering research in Nature Scientific Reports, a prestigious journal that has an extremely tough peer review process handled by some of the world's biggest research critics and is the seventh most cited journal in the world and has an impact factor of 3.998, which is considered high within the Space Science field. The paper, first authored by Nel, a postdoctoral researcher, is entitled "A new auroral phenomenon, the anti-black aurora". It reports, for the first time, on an elusive small-scale optical structure called the anti-black aurora.

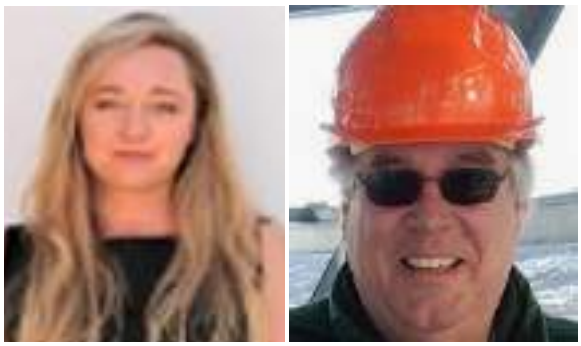


Figure 11: SANSA Researchers Dr Amoré Nel and Prof Mike Kosch

This is the world's first spectral optical recordings of the anti-black aurora in the high Arctic in Norway and was made in conjunction with the European Incoherent Scatter radar (EISCAT). The data allowed the researchers to estimate the electron energy inside the anti-black auroras as well as for the nearby black auroras. This is the first time that this has been done, and the contribution to new knowledge on the space environment is extremely valuable.

Figure 12: Time lapse white light images of the first anti-black aurora observed on 16 March 2007 from Tromsø, Norway, at about 21:30 UT

First publication by three African women

In March 2021, three SANSA researchers published an article in Polar Science on a unique observation of a medium-scale travelling ionospheric disturbance using SANSA's SuperDARN radar, making the first ever estimate of the power dissipated by this phenomenon. This is an impressive achievement since the lead author is a Doctor of Philosophy (PhD) student, and this is the first time that three women of African origin have led and published together in space science.

DATA DRIVES DEVELOPMENT, DEMAND AND DEMOCRACY

Magnetic field data in high demand to reduce satellite damage

SANSA's data on the South Atlantic Anomaly is in demand as the phenomenon's area of influence rapidly expands, potentially threatening satellite communications and navigation in southern Africa. The South Atlantic Anomaly is a region in the earth's magnetic field in the South Atlantic region where the magnetic field is approximately 30% weaker than at similar latitudes and altitudes around the globe.

This 'hole' in the earth's protective magnetic field is a region where space weather radiation can penetrate the earth's atmosphere and has the potential to create damage to low-earth orbiting satellites in that region.

Satellite operators design their satellites to withstand damage whilst traversing this region –the Hubble Space Telescope for instance turns off its sensors. At Hermanus, which started doing magnetic field measurements in 1941, we detected a drop in the earth's magnetic field of close to 20%, which is extremely fast in comparison to other parts of the world, which can normally expect a 10% decrease over a period of approximately 100 years. As satellite and magnetic navigation services are affected, SANSA continues to provide space weather warnings and up-to-date magnetic information to the global community. This data is sought after, especially now that the magnetic field is changing at such a rapid rate.

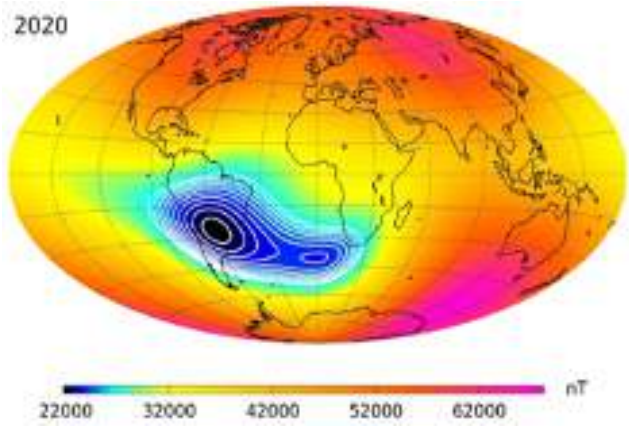


Figure 13: The strength of Earth's magnetic field, as of 2020

Polar-orbiting satellite data for disaster resilience in Africa

The Satellite and Weather Information for Disaster Resilience in Africa (SAWIDRA) continental project requires the establishment of an African network of reception stations to acquire real-time polar-orbiting satellite data for distribution to ACMAD for Numerical Weather Prediction and the South African Weather Service as input to the Global Telecommunication System. SANSA's Space Operations facility was one of the four sites identified to implement this Africa network. The SAWIDRA RARS establishment project completed its final activities in December 2020. The antenna installations were competed at the four sites in South Africa, Gabon, Kenya, and Niger despite the COVID restrictions. The SANSA site served as the test and integration site, due to it being completed ahead of the other sites.

Figure 14: SAWIDRA Sun Tracking

Lightning observed halfway around the world

SANSA is a participating member of the World-Wide Lightning Locator Network (WWLLN) with stations located in Antarctica, Marion Island and Hermanus. Recently, SANSA received recognition from the international Principal Investigator for WWLLN for the excellent data received from these stations and the contribution this data is making internationally. In particular, the Marion Island station has detected more than 10% of all global lightning strikes and has low enough noise that the detector can see lightning strikes from more than half-way around the world. Considering that the global network has over 80 stations, and most stations can only see out to 7000 km, Marion Island is seen as a key data contributor.

The 77th Marion Expedition continues despite COVID-19 complications

Monitoring and maintenance of systems and instruments on Marion Island continued despite the significant challenges posed by COVID-19. The Cape Agulhas II left for Marion Island on 21 April 2020. During this time, one of the five members of the Marion Island team, a SANSA Space Weather Engineer developed new hardware and software to maximise efficiency, reliability, and uptime of the systems. A tide gauge which forms part of the International Tsunami Early Warning System was upgraded along with installation of a Doppler Orbitography and integration of a Radiopositioning Satellite (DORIS) beacon, which helps satellites stay in orbit by compensating for loss of altitude due to atmospheric drag.

Figure 15: It is easy to practice social distancing on Marion Island with only eight people on the whole island

Antarctic team on schedule despite reduction in resources

The 2020/21 Antarctic team returned to South Africa on 5 February 2021. The returning SANSA team included the two 2020 overwintering engineers. All planned projects were completed within the available time, despite the reduction in team resources due to COVID-19 restrictions. Maintenance was performed on the Digital HF Radar arrays, the Very Low Frequency (VLF) system and the magnetometer systems, as well as routine summer maintenance on the equipment infrastructure and the recovery and repatriation of data for the year.

The two, 2021 overwintering engineers remained in Antarctica to maintain SANSA's instrumentation over the next 12 months. The team was grateful for the assistance from team members from the University of Stellenbosch and the University of Cape Town, who assisted SANSA when needed despite having their own projects to manage.

Figure 16: The SANSA 2020/21 Antarctic Takeover Team returned safely to South Africa in February 2021 after a successful trip to the SANAE IV base

SECURING A SPACE FUTURE THROUGH EMPOWERED YOUTH

Student Development Programme

The Student Development Programme focused on building a skills pipeline through the support of postgraduate students (Honours, Masters and Doctoral) in space related areas or fields that are required within the space programme. SANSA received student development funding through National Research Foundation (NRF) grants, and the DSI Human Capital Development (HCD) grant. The Agency supported a total of 45 postgraduate students financially during the 2020/21 financial year as shown in Figures 17, 18, 19 and 20.

Qualification distribution

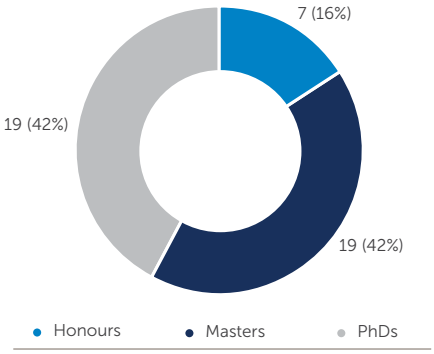


Figure 17: Degree distribution of supported students

Gender distribution

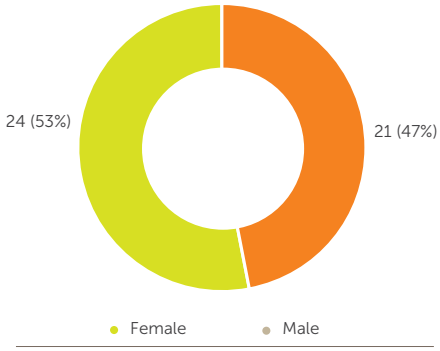


Figure 18: Gender distribution of supported students

Race distribution

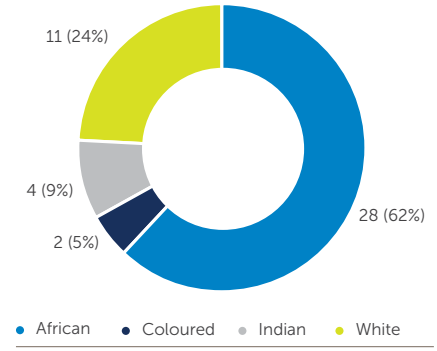


Figure 19: Race distribution of supported students

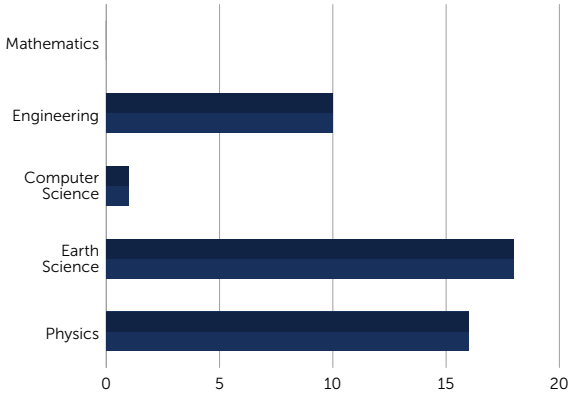


Figure 20: Study cluster distribution of funding

The majority of the supported students are Africans from various institutions of higher learning across South Africa including those identified as previously disadvantaged institutions. SANSA has made great strides in ensuring visibility to all university students and run a transparent application and selection process as is seen in the increase of our bursar equity and gender profiles. Historically science was seen as a male dominated field, however, SANSA is slowly changing that stereotype through increased visibility at previously disadvantaged universities, whether through face-to-face engagements or via a virtual platform. The Agency has gradually funded an annual increase in student numbers over the past five years while being mindful of the transformative agenda in terms of both gender and equity. Targeted support has thus been provided to a greater number of previously disadvantaged individuals (i.e. 76% Africans and 47% females) having benefited from bursaries in the financial year.

The provision of capacity building opportunities for South Africans and the development of skills that can be utilised in the space industry and other core sectors of the economy remain key areas of focus for SANSA.

Figure 21: SANSA –supported students during a student workshop

SANSA celebrates 22 years of South Africa as spacefaring nation

Scifest Africa provided the platform for the SANSA celebration of the 22 years of South Africa as an African spacefaring nation on 23 February 2021. The event, which featured a high-profile panel of space professionals that included the SANSA CEO, attracted audiences from South Africa and other African countries. NASA also contributed to the discussion.

Figure 22: Public engagement during World Space Week 2020 celebrations

Attracting the interest of students through skills development

SANSA participated in the first ever three-day virtual career fair hosted by the South African Graduate Employers Association (SAGEA) in collaboration with over 20 universities. The aim of the career fair was to take prospective career opportunities directly to the living rooms of students. Over 97 406 individuals visited the fair and 1 324 individuals visited the SANSA booth of which 384 indicated an interest in SANSA opportunities. The platform provided students with an opportunity to chat with expert representatives from SANSA on topics such as supervision of postgraduate students, projects SANSA is involved in, funding opportunities as well as prospective intern positions and career paths within the space industry. Overall career fairs, virtual or face-to-face, assist with SANSA's visibility and we can see it in the annual increase in our applications dating back to 2016.

Figure 23: Juchelle Ontong SANSA's Student Administrator

Dr Rendani Nndanganeni, SANSA Researcher during the career fair

SCIENCE ENGAGEMENT ACTIVITIES

SPACE AWARENESS AND HUMAN CAPITAL DEVELOPMENT

Highlights of the 2020/21 space awareness campaigns:

1. Space exhibit takes shape at Flagship Cofimvaba Science Centre.
2. Support given to the National Network of Science Centres to promote space.
3. Youth engagement on the space value chain goes virtual.
4. SANSA journeys to Virtual Science Festival in Zimbabwe.
5. SANSA hosts holiday programme.
6. Earth and beyond.
7. Geography educators take space to their classroom.
8. SANSA supports Maths and Science teacher in space science studies.
9. Educators and learners supported during lockdown.
10. Robotics Club receives boost from FirstSA.
11. World Space Week 2020 becomes space month in South Africa.
12. Space Club in Cape Town inspired by SANSA.
13. SANSA established 16 Science Clubs in Limpopo Province.
14. Celebrating 22 years of South Africa as a spacefaring nation.

1. Space exhibit at Flagship Cofimvaba Science Centre

SANSA is developing the Space Science and Technology (SST) exhibit, alongside other organisations in the National System of Innovation, at the Department of Science and Innovation (DSI) Flagship Science Centre in Cofimvaba. Both SANSA and CPUT were awarded the grants by the National Research Foundation (NRF) South African Agency for Science and Technology Advancement (SAASTA) to develop the space exhibit showcasing the space value chain to support STEM education in the Chris Hani District of the Eastern Cape Province. The DSI has a collaboration agreement with the Eastern Cape Department of Basic Education and the Intsika Yethu Local Municipality.

2. Support of the National Network of Science Centres

Following the support mechanisms announced at the first Online Southern African Association of Science and Technology Centres (SAASTEC) Colloquium –Beyond the Cliché, hosted by SAASTEC in collaboration with the Greater Tzaneen Community Foundation, SANSA delivered the ZACUBE-02 satellite models and the National Oceans Information Management System posters to five Science centres: the Sci-Bono Discovery Science Centre in Newtown, Gauteng, the University of Limpopo Science Centre in Polokwane, Limpopo, Mondi Science Centre in Mkhondo, Mpumalanga, the UniZulu Science Centre in Richards Bay, KwaZulu Natal and Nkomazi Mathematics and Science Centre in Shongwe Mission, Mpumalanga.

Figure 24: SANSA delivers ZACUBE-02 satellite model to five Science Centres in four Provinces

SANSA was invited by the Nelson Mandela Bay Science and Technology Centre, South African Astronomical Observatory and Scifest Africa to contribute to the International Science Communication Webinar on best practices for science communication using digital platforms on 21 October 2020. Three African Science Centres joined the international panel gave presentations on how they coped with the COVID-19 global pandemic, with recommended ways to use digital platforms and SANSA provided webinar summary at the end.

Figure 25: SANSA at the international science communication webinar

3. Youth engagement on the space value chain goes virtual

In celebration of youth month, SANSA brought together a broad panel of space professionals to showcase the entire South African space value chain to the public on the value of space science and technology in addressing the global, continental, and national development agendas. The event took place on 19 June 2020 on the Scifest Webinar Zoom platform and was broadcast live on Facebook. The recording can be viewed at https://www.facebook.com/ScifestAfrica/videos/265347147890405, the link shared with the Network of Partners nationwide. In celebration of the Nelson Mandela month, SANSA worked in collaboration with the DSI and the Department of Communications and Digital Technologies (DCDT) to host the Mandela Month Space Webinar for Youth Empowerment on 31 July 2020 via the Zoom platform.

The event focused on the 20 years of youth empowerment in the space industry through the journey of two previously disadvantaged youth from Limpopo and North West Provinces who currently serve in the space policy making

and the space agency implementing the space policies. The recording can be viewed at https://drive.google.com/file/d/1LUOnKpMGp6pldVbmzQo2CeBKKg4oGC4s/view?usp=sharing

4. SANSA participated at the African Science Festival in Zimbabwe

SANSA presented for the first time at the fourth African Science Buskers event held virtually on 29 August 2020. The title of the SANSA presentation was "Space for Inspiring Future Scientists". The Africa Science Buskers Festival is a science communication celebration event that gathers young scientists and science communicators in primary and high schools across Africa. This event aimed to engage over 5000 children in Africa during the Festival. Organised by the Zimbabwe Science Fair and Broadcom Foundation, the goal was to inspire curiosity and a deep appreciation for science in the youth. The recording can be found at the link https://www.youtube.com/watch?v=CBiMeX2aEHI&feature=youtu.be

5. SANSA hosts holiday programme

A very well attended and successful SANSA holiday programme took place on the 17 and 18 December 2020, with a total of 80 learners split over four sessions enjoying the hands-on activities. The aim of the holiday programme was to engage the local youth in science activities and provide practical illustration of space science concepts. By engaging the youth in fun and practical manner, the team hoped to encourage the youth to pursue science, technology, engineering, and maths studies. Learners had to build a 3D solar system model, a rocket and a rocket launcher. The holiday programme was well supported with parents indicating a need for this kind of programme in Hermanus. Due to COVID-19 protocols, the programme was presented in a different format in 2020 with the children divided into age groups and then split into two consequent sessions on each of the two days. The holiday programme was a huge success and enjoyed by all involved.

Figure 26: SANSA hosted a holiday programme at the Hermanus facility during December 2020

6. Earth and beyond

SANSA engages local schools within the Overberg District Municipality in the Western Cape on an ongoing basis and as COVID-19 protocols allow. The aims of these engagements are to encourage an uptake of learners in science, technology engineering and maths. SANSA presented the Earth and Beyond theme to learners from Generation School, Voortrekker Home School and Vyeboom Christelike Privaatskool in October and November 2020. Here, learners were required to replicate either a solar or lunar eclipse with three different sizes of Styrofoam balls, representing the sun, the earth, and the moon. The learners were also given batteries, light bulbs, cardboards, paints (yellow, grey, and blue), sticks, pencils, and rulers as basic tools. With these simple materials they created a representation of either a lunar or solar eclipse. This activity is directly linked to the school science curriculum and assists learners to gain a better understanding of the concepts taught in school thus enhancing their understanding and practical application of theoretical concepts.

Figure 27: SANSA engaging with learners during Earth and Beyond activities

7. SANSA supports geography educators in the classroom

SANSA presented on space science and technology (SST) to the Southern African Geography Teachers Association (SAGTA) through the SAGTA Webinar to share the various classroom activities that can be developed from SST to support the teaching of remote sensing and GIS in grades 10 –12. The feedback received from the educators was overwhelmingly positive with a demand for space science to be incorporated into the Geography curriculum. The presentation recording can be viewed at https://www.youtube.com/watch?v=6ffdwePyVYk&feature=youtu.be

Figure 28: SANSA engagement with SAGTA

SANSA collaborated with SAGTA and Kartoza to present space activities in the classroom for grade 10 Geography learners on 12 February 2021 during the SAGTA webinar. SANSA and Kartoza showcased the various career opportunities that flow from the studying of Geography and the diversity of industries the 77 registered grade 10 learners can pursue after school.

Figure 29: SANSA collaborated with SAGTA and Kartoza to present space activities for grade 10 Geography learners

8. SANSA supports Maths and Science teacher in space science studies

SANSA supported Memory Dizha, a Mathematics and Physical Science teacher in Cape Town who received the nine-months scholarship to study space science at the African Regional Centre for Space Science and Technology Education in Nigeria established by the United Nations Centre for English-speaking countries in Africa. SANSA hosted Memory at the Earth Observation division in October 2020 when her studies commenced and continued to support her while studying at Ile Ife, Nigeria.

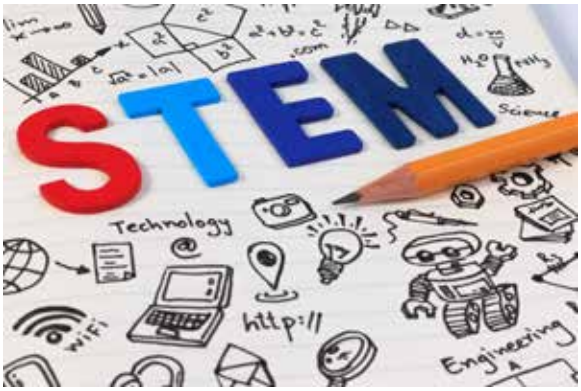


Figure 30: SANSA supports Maths and Science educator in remote sensing and GIS studies

9. Educators and learners supported during lockdown

As part of SANSA's initiatives aimed at maintaining contact and providing science – related information and updates to learners and educators during the lockdown period, the Agency continued to support learners and educators in the Overberg district through a bi-weekly SANSA newsletter. These newsletters and related worksheets are targeted at Grade 8 and 9 learners in 12 schools across the Overberg District and contain activities, information and resources related to the school curriculum.

10. Robotics Club receives boost from FirstSA

SANSA continued to host its four Robotic Clubs from the Hermanus facility when COVID-19 restrictions allowed for physical interactions with youth beneficiaries. The Robotics Clubs are a long-standing project by SANSA which gives Hermanus based learners aged 11 to 15 the opportunity to attend Robotics sessions on a weekly basis thereby gaining valuable skills aimed at preparing them for the Fourth Industrial Revolution. SANSA applied for a Robotics grant from First SA a division of UNISA and was sponsored Robotics equipment and laptops to assist SANSA in developing young talent within the Robotics sector. Given the success of this initiative in the 2020/21 financial year it is envisaged that a greater number of young learners will participate in the Robotics Club during the 2021/22 period as part of continued skills development and outreach programmes.

Figure 31: Members of the Robotics Club from Qhayiya High School in Hermanus plays with SANSA's Space Weather game on the tablets

11. World Space Week 2020 becomes space month in South Africa

In celebration of World Space Week (WSW) 2020, SANSA worked in collaboration with the DSI to engage the South African public through three radio interviews conducted on Radio 702, Barberton FM (Mpumalanga) and Lesedi FM (Free State). The joint IDDRR and WSW event was featured on Energy FM in Limpopo where collaborator Ms. Lebogang Mosotho was interviewed and highlighted the collaboration with SANSA.

Figure 32: Public engagement during World Space Week 2020 celebrations

SANSA leveraged its new working partnership with Kodumela Bokamoso, a Non-Profit Organisation (NPO) operating since 2009 in three Limpopo Province Education Circuits to engage with 345 Matric 2020 learners in the Capricorn North Education District at The District Top 200 Excellent Performing Grade 12 Learners event held at Dendron Secondary school on 17 October 2020. SANSA also engaged with district officials (including the District Director: Mr Mothemane KD), Circuit Managers, School Principals, educators, learners, and exhibitors from the University of Pretoria and Kodumela Bokamoso NPO.

Figure 33: SANSA local partnership with Kodumela Bokamoso bears immediate fruit

SANSA and the Capricorn District Municipality jointly celebrated the International Day for Disaster Risk Reduction (IDDRR) and World Space Week 2020 under the theme "Satellites Improve Life" with the Capricorn District 'adopted schools' to profile the role of Earth Observation in Disaster Management and stimulate youth interest in Science, Technology, Engineering and Mathematics (STEM) careers. The event was held virtually in October 2020 and reached 36 learners and 16 educators from nine of the 13 adopted Capricorn schools. Day one of the event featured the University of Limpopo Science Centre to profile the SANSA partnerships in the district and Day two featured a Cape Town-based Mathematics and Physical Science educator who is studying space science and technology at the United Nations Training Centre in Nigeria to highlight the SST training opportunities for science educators on the African continent.

12. SANSA supports Space Club in Cape Town

The SANSA Science Engagement team engaged with and virtually supported the founder of the Cape Town-based ESTEAM Space Club during quarters 3 and 4 to promote space to the Mars generation. The enthusiastic and highly driven Grade 12 learner, Ludovico Miscia reignited SANSA to develop the SANSA Science Clubs model nationwide. SANSA contributed an interview to the youth space documentary and supported several youth initiatives by ESTEAM Space Club, including the ESTEAM Conference held virtually on 25 March 2021.

Figure 34: SANSA supports Cape Town-based Space Club

13. SANSA celebrates 22 years of South Africa as spacefaring nation

Scifest Africa provided a platform for the celebration of 22 years of South Africa as an African spacefaring nation. Various space awareness initiatives were held during February 2021 using virtual platforms, including virtual classroom presentations to SAGTA members, virtual interviews of space professionals to share their experiences with youth and profiling careers in space science and technology with partners.

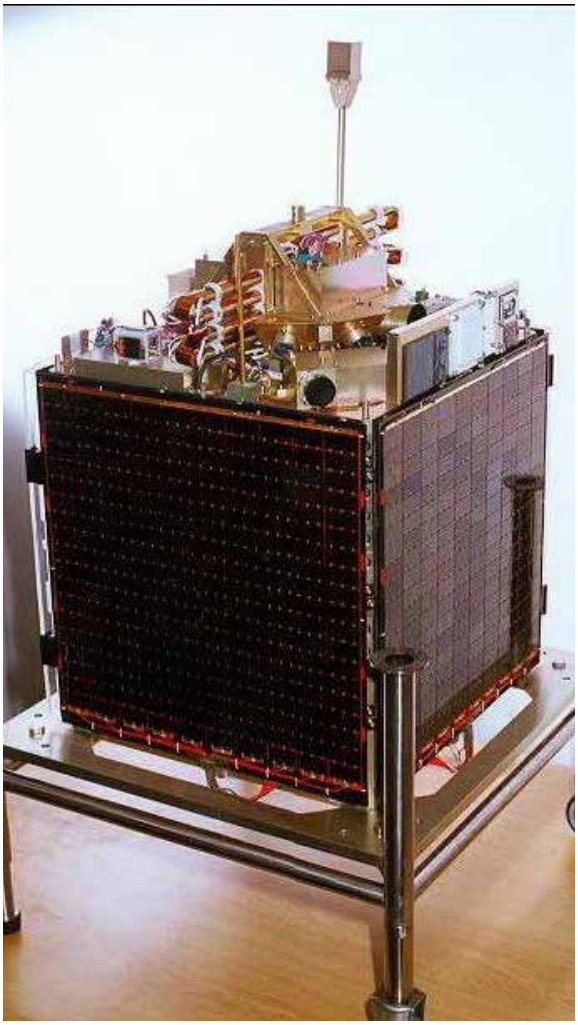


Figure 35: SANSA public engagement during the February spacefaring month

14. SANSA established 16 Science Clubs in Limpopo Province

SANSA established 16 Science Clubs in the Capricorn District to improve learners' attitude towards Mathematics and Science subjects. SANSA leveraged the partnership with the Capricorn District Municipality who run the Disaster Risk Reduction School Competition to promote the Space Science and Technology (SST) priority research area with grant funding from NRF SAASTA through which 1153 youth were directly engaged in the Limpopo Province during the period 15 –19 March 2021, covering all the four local municipalities of Blouberg, Molemole, Polokwane and Lepelle-Nkumpi in the Capricorn District.

Figure 36: SANSA established 16 Science Clubs in the Limpopo Province

EXTERNAL AUDIT REPORT: PREDETERMINED OBJECTIVES

The External Auditors perform the necessary audit procedures on the Agency's performance information to provide reasonable assurance in the form of an audit conclusion. The audit conclusion on the performance against predetermined objectives is included in the report to management, with material findings being reported under the Predetermined Objectives heading in the Report on other legal and regulatory requirements section of the auditor's report.

Refer to pages 96 – 99 of the Report of the Auditors Report, published as Part E: Financial Information.

SITUATIONAL ANALYSIS

SERVICE DELIVERY ENVIRONMENT

SANSA is comprised of various programmes such as the; Head Office that oversees the Agency's administrative operations, governance and management; the Earth Observation programme that provides Earth observation data, products and research; the Space Operations programme (located in Hartebeesthoek) that is responsible for the acquisition of satellite data for the Earth Observation Programme and the provision of ground segment support; and the Space Science programme (located in Hermanus) that leads the space science research and hosts the regional Space weather centre; as well as a newly established Space Engineering programme aimed at providing Space engineering and mission development through systems and project management. The Agency's performance, as driven by its five core programmes during the 2020/21 financial year, reflected an overall achievement of 82% against the planned targets provided in the Annual Performance Plan (APP) for the same period. Despite unforeseen challenges that came with the lockdown restrictions related to COVID-19, SANSA managed to deliver in accordance with the following areas of its mandate amongst other key achievements:

- SANSA celebrated a ground-breaking milestone at the sod-turning ceremony in Hermanus which marked the start of the Hermanus Facility construction project for a state of the art 24-hour Regional Space Weather Centre on 09 March 2021.
- SANSA established 16 Science Clubs in the Capricorn District to improve learners' attitude towards Mathematics and Science subjects. The Agency leveraged the partnership with the Capricorn District Municipality who run the Disaster Risk Reduction School Competition to promote the Space Science and Technology (SST) priority research area with grant funding from the South African Agency for Science and Technology Advancement (SAASTA) of the National Research Foundation (NRF) through which 1 153 youth were directly engaged in the Limpopo Province.
- Through the three levels of products and services, namely data as service, remote sensing products as a service and infrastructure as a service, SANSA reached the targeted 30% of government institutions/entities that utilised geospatial information through usage of various space products and services during the year.
- SANSA is developing a space science exhibit, alongside other organisations in the National System of Innovation, at the Department of Science and Innovation (DSI) Flagship Science Centre in Cofimvaba.
- SANSA exceeded its targeted score of 1300 for research productivity by 604 due to the Agency having met and exceeding requirements relating to publications, graduated students, research funding, and the rating achieved by researchers.

Despite these successes, however, software, data licence and human resources challenges faced in the development of Digital Earth South Africa (DESA) caused delays in terms of implementing some of the planned Earth Observation projects. Implementation of the planned Assembly, Integration and Testing (AIT) facility upgrades was also delayed due to unresolved Houwteq ownership issues which impacted both the project milestones and the related capital expenditure.

ORGANISATIONAL ENVIRONMENT

The national Space Infrastructure Hub programme was Gazetted as a Strategic Infrastructure Project (SIP) 22 and aims to attract R4.47 billion of investor funding to strengthen the space value chain. Once these funds are secured, changes to the current SANSA Strategic Plan and APPs for 2021/22 will be made to meet the deliverables. As at the end of the 2020/21 financial year SANSA had initiated a process of developing a bankable feasibility study that would pave the way for contracting and project implementation.

With support from the Government Technical Advisory Centre (GTAC), SANSA has taken crucial steps that have led to the development of a business model and macro structure, both of which seek to enhance the ability to deliver on its mandate. As at financial year-end, the focus remained on the development of a micro-structure, change management initiatives and measures to strengthen the Agency's policies, procedures, and governance framework in support of the Board's oversight responsibilities.

KEY POLICY DEVELOPMENTS AND LEGISLATIVE CHANGES

The Science and Technology Laws Amendment Act has been promulgated and the implications to SANSA will be studied and enforced, as part of our regulatory compliance measures. The dtic was also in the process of revoking and replacing the Space Affairs Act, which is envisaged to be realised in the next year or two.

STRATEGIC OUTCOME ORIENTED GOALS

This annual report for the 2020/2021 performance period reflects SANSA's progress towards achieving the following five strategic goals as outlined in the 2020/2025 Strategic Plan:

- **Goal 1:** The development of a suite of space application products and services that directly respond to user needs.
- **Goal 2:** The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services.
- **Goal 3:** The generation of space relevant knowledge that supports the developmental Agenda.
- **Goal 4:** The development of requisite human capacity that is needed for the implementation of key space initiatives.
- **Goal 5:** The positioning of SANSA as a key enabler of government's policy imperatives.

To ensure greater organisational alignment with the Impact and Outcomes –based national planning methodology of the South African government as provided in guidelines by the Department of Planning, Monitoring and Evaluation, SANSA has revised its 2020/2025 Strategic Plan to focus on the following six outcomes:

- **Outcome 1:** Increased –space relevant knowledge that supports the developmental agenda.
- **Outcome 2:** Growth of the space sector through SANSA space related industry expenditure.
- **Outcome 3:** Increased human capacity for the implementation of key space initiatives.
- **Outcome 4:** SANSA re-positioned as a key enabler of government's space–related policies.
- **Outcome 5:** Appropriate infrastructure developed to support the local space sector.
- **Outcome 6:** Increased share of the global space operations market.

2020/2021 PERFORMANCE INDICATORS, TARGETS AND ACHIEVEMENTS

SANSA's performance was at 82% achievement as at the end of the first year of implementing the 2020/25 Strategic Plan. Despite the slight decline from the 100% performance achievements reported for the year prior, these achievements are to be considered as a major accomplishment given the difficult climate the Agency was operating in which took a significant toll on employees and beneficiaries of SANSA products and services alike. Further to this, the Agency continues to be confronted by funding constraints that impact on its delivery against the mandate of contributing towards developing the space industry as required by the SANSA Act.

Performance indicators, targets and achievements: originally –tabled 2020/21 Annual Performance Plan

The five indicators reflected in Table 1 below were impacted by in-year adjustments to the SANSA 2020/2025 Strategic Plan and 2020/2021 Annual Performance Plan following the onset of the COVID-19 pandemic, its resultant lockdown, and budget cuts.

STRATEGIC OUTCOME ORIENTED GOALS CONTINUED

Programmes: Earth Observation, Space Science and Space Engineering					
Strategic Goal (s)	**Strategic objective**	**Activities**	**Indicators**	**Audited actual performance 2018/2019**	
Goal 4 The development of requisite human capacity that is needed for the implementation of key space initiatives **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S1** To support the development of a critical mass of skills and expertise needed to give effect to national space initiatives	**S1.1** Increase youth awareness of science	**M1.1.1** Number of youth directly engaged	24 337	
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 2** The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S3** To develop, grow and transform the indigenous space industry that is responsive to local needs and is globally positioned	Expenditure to the broad space related industry	**M3.2.2** The total contract expenditure to the broad space related industry for core space projects	R0	
Goal 2 The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S4** To build and host the appropriate infrastructure that will support the national space sector	**S4.1** Successful launch and operations CubeSat missions	**M4.1.1** Progress status on the follow on ZaCube2 mission	Not applicable	
			M4.1.2 Progress status on ARMC nanosatellite mission	Not applicable	
		S4.2 Development or upgrade of infrastructure	**M4.2.3** An upgraded AIT facility	Not applicable	

Table 1: 2020/2021 Performance Indicators, Targets and Achievements vs. the originally –tabled Annual Performance Plan

	Audited actual performance 2019/2020	Planned annual target 2020/2021	Actual achievement 2020/2021 until date of re-tabling	Deviation from planned target to actual achievement 2020/2021	Reasons for deviations	Reasons for revisions to targets
	36 506	25 500	0	(25 500)	National lockdown led to suspension of all science engagement activities	School science engagement activities impacted by lockdown restrictions
	Not applicable	R50 million	R0	(R50 million)	AIT implementation on hold due to Houwteq ownership issues and impact of COVID-19	Budget cuts and unresolved contracting delays
	Not applicable	Launch and commission and post launch satellite reliability and validation assessment of segment 1 (three nanosatellites)	Project was delayed	Project delayed	Project delayed due to COVID-19	Indicator removed due to funding constraints
	Not applicable	Conceptualisation and design of ARMC constellation	Project was not started	Conceptualisation and design of ARMC constellation not achieved	No new cooperation framework with ARMC partners	Indicator removed due to funding constraints
	Not applicable	20%	Project was not started	(20%)	Execution impacted by COVID-19 and Houwteq ownership issues	Unresolved contracting/ ownership issues

The deviations reflected for the indicators in Table 1 above have been calculated against the annual targets of the originally tabled 2020/21 SANSA APP in accordance with the 2021 National Treasury annual reporting guidelines. The negative variances have resulted from the reported actual performance only being a representation of quarter 1 achievements against the originally tabled APP's annual targets.

The section below provides an overview of SANSA's performance for the entire 2020/21 financial year.

Progress towards achievement of performance indicators and targets: re-tabled 2020/21 Annual Performance Plan

Programme 1: Administration					
Strategic Goal (s)	**Strategic objective**	**Activities**	**Indicators**	**Audited actual performance 2018/2019**	
Goal 5 The positioning of SANSA as a key enabler of government's policy imperatives	**S5** Develop active partnerships and implement changes	**S5.2** Develop and implement Organisation Redesign and Marketing Initiatives	**M5.2.3** Number of initiatives to transform SANSA into a high performing Agency	Not applicable	

Table 2: Programme 1 Performance Indicators, Targets and Achievements

	Audited actual performance 2019/2020	Annual target 2020/2021	Actual achievement 2020/2021	Deviation from planned target to actual achievement 2020/2021	Reasons for deviations
	Not applicable	Four initiatives	Four initiatives (Human Resources Strategy, Communications Strategy, Business Model/Macro Structure, Business Development/ Marketing Strategy)	No variance	Annual target met

STRATEGIC OUTCOME ORIENTED GOALS CONTINUED

Programme 2: Earth observation				
Strategic Goal (s)	**Strategic objective**	**Activities**	**Indicators**	
Goal 4 The development of requisite human capacity that is needed for the implementation of key space initiatives **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S1** To support the development of a critical mass of skills and expertise needed to give effect to national space initiatives	**S1.1** Increase youth awareness of science	**M1.1.1** Number of youth directly engaged	
		S1.2 Support students and interns	**M1.2.1** Number of students and interns supported for formalised training	
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 3** The generation of space relevant knowledge that supports the developmental Agenda **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S2** To expand and exploit our knowledge base for the development of essential services and products that respond to user needs	**S2.1** Lead and facilitate the creation of applications to address society's needs and challenges	**M2.1.1** Number of products and applications	
		S2.2 Increase the national space research output	**M2.2.1** The national research productivity score for space supported R&D	
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 2** The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S3** To develop, grow and transform the indigenous space industry that is responsive to local needs and is globally positioned	**S3.2** Grow the local space industry	**M3.2.1** The total contract expenditure to SMEs for core space projects	

	Audited actual performance 2018/2019	Audited actual performance 2019/2020	Annual target 2020/2021	Actual achievement 2020/2021	Deviation from planned target to actual achievement 2020/2021	Reasons for deviations
	16 497	25 648	2000	2 660	660	Target exceeded due to realised opportunities for youth engagement
	15	22	20	20	No variance	Annual target met
	Not applicable	Not applicable	3	2	(1)	ARD processing delays
	Not applicable	Not applicable	Data as a service offering	Data as a service offering	No variance	Annual target met
	Not applicable	Not applicable	Earth observation products and services to support decision-making	Earth observation products and services to support decision-making	No variance	Annual target met
	Not applicable	Not applicable	Infrastructure as a service offering	Validation of demonstration use case	Infrastructure as a service offering not achieved	Delays in ARD processing and ingestion into DESA
	375	511	300	567.44	267.44	Target exceeded due to approved publications submitted
	R705 563	Not applicable	20% (Measure changed to percentage spend)	51%	31%	Annual target was exceeded due to projects rolled out during the financial year

STRATEGIC OUTCOME ORIENTED GOALS CONTINUED

Programme 2: Earth observation				
Strategic Goal (s)	**Strategic objective**	**Activities**	**Indicators**	
Goal 2 The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S4** To build and host the appropriate infrastructure that will support the national space sector	**S4.2** Development or upgrade of infrastructure	**M4.2.2** Development of Digital Earth South Africa	
Goal 5 The positioning of SANSA as a key enabler of government's policy imperatives	**S5** Develop active partnerships	**S5.1** Leverage a significant benefit for the space programme through partnerships	**M5.1.1** Number of active formal overseas partnerships	
			M5.1.2 Number of active formal African partnerships	
			M5.1.3 Number of active formal national partnerships	
		S5.2 Develop and implement a Marketing Strategy	**M5.2.1** Percentage of government departments and public entities that use space products and services	
			M5.2.2 Number of awareness and training interventions to key users of space-based products and services	

Table 3: Programme 2 Performance Indicators, Targets and Achievements

	Audited actual performance 2018/2019	Audited actual performance 2019/2020	Annual target 2020/2021	Actual achievement 2020/2021	Deviation from planned target to actual achievement 2020/2021	Reasons for deviations
	Not applicable	Not applicable	Ingestion of SPOT archive	0% ingestion	Ingestion of SPOT archive not achieved	Delays due to data license and software contracts and ARD processing
	6	7	5	7	2	Partnership activities established during the year
	4	5	5	7	2	Partnership activities established and new opportunities
	9	13	8	12	4	New Partnership opportunities arose
	Not applicable	Not applicable	30%	30%	No variance	Annual target met
	Not applicable	Not applicable	4	5	1	Target exceeded due to additional awareness sessions held

STRATEGIC OUTCOME ORIENTED GOALS CONTINUED

Programme 3: Space science				
Strategic Goal (s)	**Strategic objective**	**Activities**	**Indicators**	
Goal 4 The development of requisite human capacity that is needed for the implementation of key space initiatives **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S1** To support the development of a critical mass of skills and expertise needed to give effect to national space initiatives	**S1.1** Increase youth awareness of science	**M1.1.1** Number of youth directly engaged	
		S1.2 Support students and interns	**M1.2.1** Number of students and interns supported for formalised training	
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 3** The generation of space relevant knowledge that supports the developmental Agenda **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S2** To expand and exploit our knowledge base for the development of essential services and products that respond to user needs	**S2.1** Lead and facilitate the creation of applications to address society's needs and challenges	**M2.1.1** Number of products and applications	
		S2.2 Increase the national space research output	**M2.2.1** The national research productivity score for space supported R&D	
Goal 2 The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S4** To build and host the appropriate infrastructure that will support the national space sector	**S4.2** Development or upgrade of infrastructure	**M4.2.1** A new operational space weather centre, as per an approved Business Case	
Goal 5 The positioning of SANSA as a key enabler of government's policy imperatives	**S5** Develop active partnerships	**S5.1** Leverage a significant benefit for the space programme through partnerships	**M5.1.1** Number of active formal overseas partnerships	
			M5.1.2 Number of active formal African partnerships	
			M5.1.3 Number of active formal national partnerships	
		S5.2 Develop and implement an organisational redesign and marketing initiatives	**M5.2.2** Number of awareness and training interventions to key users of space-based products and services	

Table 4: Programme 3 Performance Indicators, Targets and Achievements

	Audited actual performance 2018/2019	Audited actual performance 2019/2020	Annual target 2020/2021	Actual achievement 2020/2021	Deviation from planned target to actual achievement 2020/2021	Reasons for deviations
	7 840	10 858	2000	277	(1 723)	Delayed re-opening of schools as well as the reduction in available contact time for external entities
	28	25	21	25	4	Target exceeded due to additional interns supported
	Not applicable	Not applicable	2	2	No variance	Annual target met
	Not applicable	Not applicable	Space weather products and services	Space weather products and services	No variance	Annual target met
	Not applicable	Not applicable	Magnetic technology products and services	Magnetic Technology products and services	No variance	Annual target met
	1 460	1 254	1 000	1 337	337	Target exceeded due to numerous publications, a graduate student, and a rating renewal
	Not applicable	Not applicable	20%	42.8%	22.8%	The project progressed well in 6 of the 7 sub-projects, with most deadlines having been met
	8	13	3	5	2	Target exceeded due to additional partnerships pursued
	4	5	3	8	5	Target exceeded due to additional partnerships pursued
	6	10	3	7	4	Target exceeded due to additional partnerships pursued
	Not applicable	Not applicable	3	4	1	Target exceeded due to additional awareness sessions held

STRATEGIC OUTCOME ORIENTED GOALS CONTINUED

Programme 4: Space operations				
Strategic Goal (s)	**Strategic objective**	**Activities**	**Indicators**	
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 3** The generation of space relevant knowledge that supports the developmental Agenda **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S2** To expand and exploit our knowledge base for the development of essential services and products that respond to user needs	**S2.1** Lead and facilitate the creation of high-impact applications to address society's needs and challenges	**M2.1.1** Number of products and applications	
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 2** The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S3** To develop, grow and transform the indigenous space industry that is responsive to local needs and is globally positioned	**S3.1** Generate greater benefit for the space programme through space operations activities	**M3.1.1** Successful satellite pass monitoring rate for Earth Observation	
			M3.1.2 Total income generated from space operations activities	

Table 5: Programme 4 Performance Indicators, Targets and Achievements

	Audited actual performance 2018/2019	Audited actual performance 2019/2020	Annual target 2020/2021	Actual achievement 2020/2021	Deviation from planned target to actual achievement 2020/2021	Reasons for deviations
	Not applicable	1	1	2	1	Target exceeded due to additional products provided to clients
	99.78%	99.37%	98%	99.35%	1.35%	Annual target was exceeded due to favourable proficiency scores
	R80 million	R100.07 million	R68 million	R75.65 million	R7.65 million	Annual target exceeded due to additional income generation

STRATEGIC OUTCOME ORIENTED GOALS CONTINUED

Programme 5: Space Engineering				
Strategic Goal (s)	**Strategic objective**	**Activities**	**Indicators**	
Goal 4 The development of requisite human capacity that is needed for the implementation of key space initiatives **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S1** To support the development of a critical mass of skills and expertise needed to give effect to national space initiatives	**S1.2** Support students and interns	**M1.2.1** Number of students and interns supported for formalised training	
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 2** The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S3** To develop, grow and transform the indigenous space industry that is responsive to local needs and is globally positioned	**S3.2** Grow the local space industry	**M3.2.1** A total contract expenditure of 20% to SMEs for core space projects	
			M3.2.2 The total contract expenditure to the broad space related industry for core space projects	
Goal 2 The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S4** To build and host the appropriate infrastructure that will support the national space sector	**S4.2** Development or upgrade of infrastructure	**M4.1.3** An upgraded AIT Facility	
Goal 5 The positioning of SANSA as a key enabler of government's policy imperatives	**S5** Develop active partnerships	**S5.1** Leverage a significant benefit for the space programme through partnerships	**M5.1.1** Number of active formal overseas partnerships	
			M5.1.2 Number of active formal African partnerships	
			M5.1.3 Number of active formal national partnerships	

Table 6: Programme 5 Performance Indicators, Targets and Achievements

	Audited actual performance 2018/2019	Audited actual performance 2019/2020	Annual target 2020/2021	Actual Achievement 2020/2021	Deviation from planned target to actual achievement 2020/2021	Reasons for deviations
	9	7	9	9	No variance	Annual target met
	R13 million	Not applicable	20% (Measure changed to percentage spend)	0%	(20%)	No SME expenditure due to pending Houwteq facility ownership resolution
	R0	Not applicable	R10 million	R1.99 million	(R8.01 million)	Low expenditure due to pending Houwteq facility ownership resolution
	Not applicable	Not applicable	10%	0% AIT project delayed	(10%)	Pending Houwteq facility ownership resolution
	Not applicable	2	1	1	No variance	Annual target met
	Not applicable	1	1	0	(1)	ARMC 2 postponed: possibility to commence in the new financial year
	Not applicable	2	1	1	No variance	Annual target met

Strategy to overcome areas of non-achievement

To mitigate challenges related to limited physical contact with targeted youth engagement beneficiaries during the 2020/21 financial year, the agency put measures in place to leverage on alternatives such as increased use of technology as a way of ensuring planned initiatives for the 2021/22 financial year are realised. Although it presents a wide range of opportunities, this however, comes with its own challenges in certain areas as some of the country's schools are still confronted by inadequate broadband access, lack of appropriate Information and Communications Technology (ICT) infrastructure, as well as limited access to digital tools.

Other issues that impacted performance achievements for the year were related to dependencies such as external stakeholder collaborations (such as in the case of the AIT facility) and contracting challenges all of which were beyond SANSA's span of control and unfortunately remained unresolved by financial year-end. Engagements with key stakeholders to resolve these matters remain high on the radar of the SANSA Board and Management.

Reporting on the Institutional Response to the COVID-19 Pandemic

SANSA did not receive any government allocation or other funding targeted for relief packages and broader support in response to the COVID-19 pandemic during the financial year under review.

CONSOLIDATED 2020/2021 PERFORMANCE INFORMATION

Table 7 below provides a consolidated view of the planned key performance indicators and targets for the year with 14 of the 17 annual targets (i.e., 82%) having been achieved as at the end of the financial year.

Strategic Goal (s)	Strategic objective	Key performance indicator/measure	Target	Actual	Variance	Reason for variance
Goal 4 The development of requisite human capacity that is needed for the implementation of key space initiatives **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S1** To support the development of a critical mass of skills and expertise needed to give effect to national space initiatives.	**M1.1.1** Number of youths directly engaged	4 000	2 937	(1 063)	Target was not met due to the delayed re-opening of schools and reductions in the available learner contact time for external entities.
		M1.2.1 Number of students and interns supported for formalised training	50	60	10	Annual was exceeded due to additional support provided to students and interns.
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 3** The generation of space relevant knowledge that supports the developmental Agenda **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S2** To expand and exploit our knowledge base for the development of essential services and products that respond to user needs.	**M2.1.1** Number of products and applications	6	7	1	Annual target was exceeded due to provision of additional products.
		M2.2.1 The national research productivity score for space supported R&D	1 300	1 904.44	604.44	Annual target was exceeded due to numerous publications, graduated students, and a rating renewal.

Strategic Goal (s)	Strategic objective	Key performance indicator/measure	Target	Actual	Variance	Reason for variance
Goal 1 The development of a suite of space application products and services that directly respond to user needs **Goal 2** The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S3** To develop, grow and transform the indigenous space industry that is responsive to local needs and is globally positioned.	**M3.1.1** Successful satellite pass monitoring rate for Earth Observation	98%	99.35%	1.35%	Annual target was exceeded due to favourable proficiency scores.
		M3.1.2 Total income generated from space operations activities	R68m	R75.65m	R7.65m	Annual target was exceeded due to additional income generated.
		M3.2.1 The total contract expenditure to SMEs for core space projects	20%	51%	31%	Annual target was exceeded due to projects rolled out during the financial year.
		M3.2.2 The total contract expenditure to the broad space related industry for core space projects	R10 million	R13.68 million	R3.68 million	Annual target was exceeded due to various projects aimed at developing the broad space related industry.
Goal 2 The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services **Goal 5** The positioning of SANSA as a key enabler of government's policy imperatives	**S4** To build and host the appropriate infrastructure that will support the national space sector.	**M4.2.1** A new operational space weather centre, as per an approved Business Case	20%	42.8%	22.8%	Annual target was exceeded due to good progress in 6 of the 7 sub-projects and deadlines having been met.
		M4.2.2 Development of Digital Earth South Africa	Ingestion of SPOT archive	All SPOT 6/7 imagery extracted and ingested for processing to ARD	Ingestion of SPOT archive not achieved	Annual target was not met due to delays related to data license and software contracts and ARD processing.
		M4.2.3 An upgraded AIT Facility	10%	Project delayed	(10%)	No progress was made due to the pending Houwteq facility ownership resolution.

Strategic Goal (s)	Strategic objective	Key performance indicator/measure	Target	Actual	Variance	Reason for variance
Goal 5 The positioning of SANSA as a key enabler of government's policy imperatives	**S5** Develop active partnerships.	**M5.1.1** Number of active formal overseas partnerships	9	13	4	Annual target was exceeded due to partnership activities initiated during the financial year.
		M5.1.2 Number of active formal African partnerships	9	15	6	Annual target was exceeded due to additional partnership initiatives pursued and new opportunities.
		M5.1.3 Number of active formal national partnerships	12	20	8	Annual target was exceeded due to new partnership opportunities.
		M5.2.1 Percentage of government departments and public entities that use geospatial information using space products and services	30%	30%	No variance	Annual target met.
		M5.2.2 Number of awareness and training interventions to key users of space-based products and services	7	9	2	Annual target was exceeded due to new awareness and training opportunities.
	S5 Develop active partnerships and implement changes	**M5.2.3** Number of initiatives to transform SANSA into a high performing Agency	4	4	No variance	Annual target met.

Table 7: Consolidated Annual Performance –31 March 2021

INSTITUTIONAL PROGRAMME PERFORMANCE INFORMATION

PROGRAMME 1: ADMINISTRATION

The Administration Programme provides management, administrative and technical support at an Enterprise level across the Agency. This facilitates operational efficiency and cost-effective management, alignment with sound governance principles and the seamless integration and collaboration within SANSA.

Organisational focus areas for the financial year under review included the development and implementation of initiatives aimed at transforming SANSA into a high performing Agency. To this end the following strategies have been developed/reviewed:

- Human Resources Strategy
- Communications Strategy
- Marketing and Business Development Strategy
- Business Model and Macro Structure

Key 2020/21 activities and achievements related to Programme 1 are outlined in Part: D of this annual report.

PROGRAMME 2: EARTH OBSERVATION

The Earth Observation Programme is responsible for the development and promotion of Earth observations products for socio-economic development and improved livelihoods in South Africa and the African continent.

The objective is to collect, assimilate and disseminate Earth observation data and products to support South Africa's policymaking and implementation for socio-economic growth through areas that include food security, water resource management, integrated spatial planning and land reform, disaster management, peace and security, oceans economy and global change.

Programme 2: Key activities/achievements for the 2020/2021 financial year

During the 2020/21 financial year 30% of 54 public entities were serviced through the capabilities of the Earth Observation Data Centre (EODC) to enable research and development and towards a capable state through the use and distribution of satellite data and products. A summary of the serviced entities is captured in the Table 8 and Figure 37 below.

The EODC enables the discovery and ordering of the data through the Online Catalogue and the dissemination of the data and products through the File Transfer Protocol (FTP) site.

Deliverables	Indicators of impact	Impact
EODC and South African Earth Observation Systems Strategy (SAEOSS) Portal further development and operationalisation	Number of universities, research councils and students accessing satellite data towards research productivity and human capital development.	Higher education: 11
		Research councils: 2
		Students: 19 (and 8 lectures with accounts to they share with their students)
	Number of government users (from all three spheres) accessing satellite data towards a capable State.	National: 10
		Provincial: 3
		Metropolitan: 2
		District municipalities: 1
		Local: 5
		Entities: 10
Research, Development, and Innovation Fund (RDIF)	Number of companies supported towards industry stimulation for growth.	Small, medium and micro enterprise (SMME): 1
	Number of innovative products supported towards research productivity and capable state.	Mzansi-Amanzi –National Water Quantity Information Service
	Number of government policies and or projects (from all three spheres) supported towards a capable State.	National: 1
	Number of students supported towards human capital development.	None

Table 8: Project Deliverables and Impact

INSTITUTIONAL PROGRAMME PERFORMANCE INFORMATION CONTINUED

Impact through Government Institutions

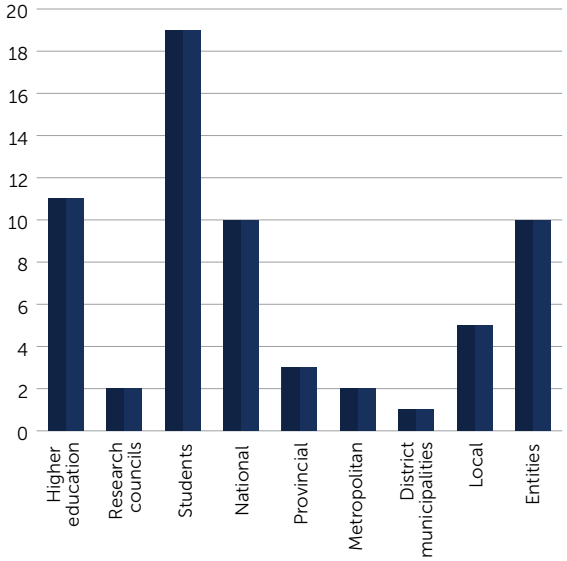


Figure 37: EODC upgrade contribution towards building a capable state

In addition to general distribution of data and products to students, the support is at times directly aligned to the student research projects. In the 2020/21 financial year SANSA provided support to fifteen research projects including one Post Doctorate, four PhD, six MSc and two honours students.

Universities	Level	Research topic from supervisor's letter
North West University	Honours	Characterising Urban Biodiversity in Mahikeng using SPOT
	MSc	The effect of fire suppression in Mafikeng Game Reserve on the vegetation.
	Honours	Detecting and Characterising Urban Vegetation Parcels in Mahikeng Using Satellite Imagery
	PHD	Towards an environmental sustainability framework of informal settlements
University of Venda	MSc	Mapping the common reed Phragmites australis in Nylsvley Wetland
University of Pretoria		Broad study to better understand and describe the relationship between the craton wide Thabazimbi Murchison Lineament (TML), the Bushveld Igneous Complex (BIC) and the various sedimentary sequences that outcrop between these two prominent features
Cape Peninsula University of Technology		Remote Sensing and GIS COVID-19 vulnerability assessments
University of Kwa-Zulu Natal	MSc	Assessing Soil Erosion Prone Areas in UMzimvubu Catchment Area Using Spatial Technology
University of Debreceni	PHD	Machine Learning for Gully Feature Extraction Based on a Pan-Sharpened Multispectral Image: Multiclass vs Binary Approach
Rhodes University	MSc	The Significance of Sacred Status in Maintaining Forest Condition and Integrity". Looking at sacred forests and whether they can be used as a tool for biodiversity conservation
University Of Fort Hare	MSc	Enhancing adaptive capacities of farmers to climate change-driven rainfall variabilities by modelling soil moisture patterns in Raymond Mhlaba Local Municipality, Eastern Cape Province, South Africa"
WITS	PHD	Modelling the impact of African elephant (Loxodonta Africana) on woody vegetation in Venetia-Limpopo Nature Reserve using remote sensing techniques.
WITS	PHD	Exploring the potential of geospatial tools to understand an arabiensis population dynamics: Steps towards the application of mosquito sterile insect technique program in South Africa
University of the Western Cape	Post Doctoral	investigating the dynamics of mangroves located in urban and rural environments across South Africa,
Nelson Mandela University	MSc	Investigating the Effects of Land Degradation and the Effectiveness of Rehabilitation Efforts in an Open Cast Mine Using Multi-Sensor Remotely Sensed Data and Machine Learning Techniques

Table 9: Support provided to students through the data infrastructure services of SANSA

Supporting decision making and decision support tools

Investments in the EODC, NEOFrontiers (formerly referred to as RDIF) and Acquisition of Synthetic Aperture Radar (SAR) Data led to the development of or supported the implementation of several tools that government deployed for evidenced based decision making. These include:

The new NEOFrontiers Research Programme: Developing National Earth Observation capabilities

NEOFrontiers is the new SANSA programme to lead the national research agenda in Earth observation, underpinned by DSI RDIF funding. The first round of calls for the NEOFrontiers research programme, with a total budget of R21m over three years, was issued by the NRF in February 2021, and closed in May 2021. Five calls were issued on:

- Innovative Earth Observation Approaches to Sustainable Urban and Rural Development
- Development of new High Resolution Water Quality Observation Capabilities for Coastal and Estuarine Systems
- Artificial Intelligence and Earth Observation: Roadmap to Establish Cross-Sector Value and Approaches
- Earth Observation and Disruptive Economics: Developing Smart Tools for Value Enhancement for Small Scale Food Production
- Development of New Hyperspectral Capabilities across Terrestrial, Aquatic and Atmospheric Domains

OCIMS vessel tracking for the Department of Environmental Affairs

Large area maritime monitoring is an essential part of maintaining many countries sustainable development goals. While numerous off-the-shelf solutions exist, a few developing countries realised the value of developing these solutions and capabilities themselves. South Africa's national OCIMS provides for the development of world-class decision-making tools which utilise remote sensing and other sources of maritime data.

Through Operation Phakisa, SANSA provides Synthetic Aperture Radar data to the National OCIMS Integrated Vessel Tracking (IVT)-DeST so that the tool can intelligently monitor ships and pollution in near-real time to provide this information directly to users. Many of the SAR-derived marine applications are mature and several tools are available to provide value-added products.

Since 2018, SANSA has systematically delivered more the 3500 SAR images, covering more than 90% of the South African Exclusive Economic Zones (EEZs) each week. These images are delivered to end users, such as OCIMS IVT, within an hour which together with transponder data identify matched vessels and dark targets.

The remaining 10% is covered through ad-hoc tasking requests, which includes emergency tasking capabilities. SAR imagery has proven useful in highlighting possible oil spills and hundreds of ships that were not seen using transponder systems and thus provides a better picture of South Africa's Ocean Economy. RadarSat 2 SAR data was also used by the National Disaster Management Centre for post cyclone Eloise response.

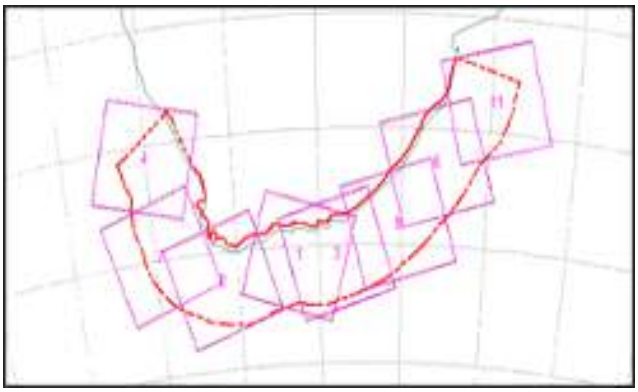


Figure 38: Weekly SAR Data Coverage from RadarSAT 2 of South African EEZ

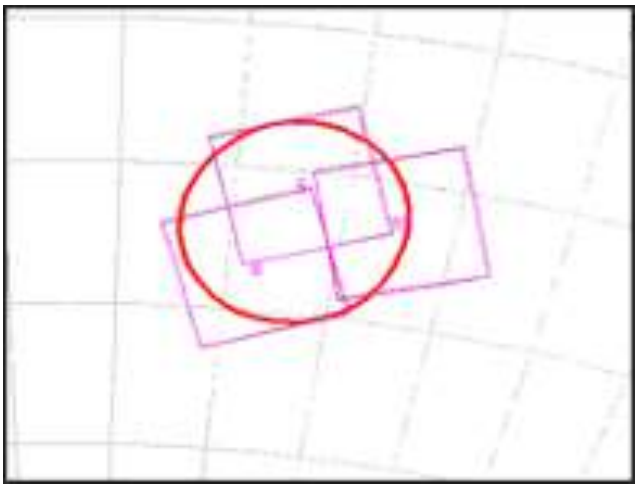


Figure 39: Weekly SAR Data Coverage from RadarSAT 2 Coverage of Marion and Prince Edward Islands

Mapping informal settlement growth patterns (Department of Human Settlements)

South Africa is urbanising more rapidly than other developing countries with more than 64% of the population living in urban areas. More than 15% of South Africa's population live in eight metropolitan cities. Unfortunately, urbanisation in South Africa is resulting in an overload of the current infrastructure and services and thus the proliferation of informal settlements. Informal settlements are characterised by inadequate housing and services, lack of security of tenure and are usually located in environmental high-risk areas. Traditional methods of capturing information on informal settlements such as surveys and censuses are time-consuming and resource-intensive and due to the dynamic nature of informal settlements, this results in outdated or incomplete data used in decision making.

Remote sensing technology provides an opportunity to map and monitor human settlement developments including informal settlements over a larger geographic area more frequently. The data provided by this technology can be used to support planning and targeted surveys while reducing delays in project implementation. The National Department of Human Settlements has been working with SANSA in the development of human settlement products and services to help create situational awareness on the characteristics of settlements, environmental conditions, and access to the services. This capability will further be enhanced through the NEOFrontiers Support Action 2020/1: Sustainable Development Goal (SDG) 11 Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient, and sustainable.

Vegetation Condition Index (VCI) to Support the National Integrated Water Information System (NIWIS) Drought Status Information (Department of Water and Sanitation)

The Department of Water and Sanitation (DWS) is mandated by the National Water Act No. 36 of 1998 and the Water Services Act No. 108 of 1997 to provide useful water-related information to decision-makers and water practitioners. It has thus established data and information management systems for decision-makers to address the management, use, development, conservation, protection, and control of the South African water resources. Furthermore, in response to the mandate from the National Water Resource Strategy (NWRS) 2nd edition, the DWS has developed a Data Management Strategy for Water and Sanitation for the RSA. The objectives of the NWRS are to develop and implement methods and procedures to strengthen data governance, data life cycle management (standard operating procedures), data acquisition and management systems as well as collaboration amongst stakeholders in the water and sanitation sectors. One of the recommendations in the Data Management Strategy is that an investigation on the use of remote sensing data in water data management must be done.

The National Integrated Water Information System provides integrated monthly drought status information based on the Multi-Criteria Decision Analysis using rainfall, streamflow, dam levels, and groundwater. The Standardised Precipitation Index (SPI) from Agricultural Research Council (ARC) is currently being used to support the system's information requirements. SANSA has provided, on an operational basis, VCI information to DWS using imagery obtained from SANSA's EODC. The system can be accessed from:

https://www.dws.gov.za/niwis2/DroughtStatusManagement/DroughtStatusOverview

Water volume (Department of Water and Sanitation)

Monthly water quantity data from the Mzansi-Amanzi National Water Quantity Information Service is currently being distributed to the Department of Water and Sanitation (Report at Annexure F). Water quantity information is also publicly available from the https://www.water-southafrica.co.za/portal. Interest to use the data has also been received from Umgeni Water, the Inkomati-Usuthu Catchment Management Agency, SANBI, the Western Cape Government and Institute for Natural Resources on behalf of the Water Research Commission. The water volume data was procured from the private sector in line with SANSA's mandate to develop South Africa's Earth observation industry.

mzansiAmanzi

A MONTHLY outlook of Water in South Africa

Figure 40: Monthly water volume data available to all users from Mzansi-Amanzi National Water Quantity Information Service portal, https://www.water-southafrica.co.za/

Supporting fire investigations and Illegal Irrigation Investigations

A fire investigation is based on the use of remote sensing to determine where and when a fire started, the spread thereof and the extent of destruction caused by the fire. Fire investigations are often used as evidence for insurance claims or disputed claims which often result in court cases. In 2020/2021 SANSA produced 35 fire reports and 11 fire maps for external clients. SANSA supported one client as an expert witness in a court case.

An irrigation investigation is based on the Water Act of 1998 and provides evidence to support legal processes at the water tribunal. In 2020/2021 SANSA produced eight irrigation reports. SANSA supported one client as an expert witness in a court case for illegal irrigation.

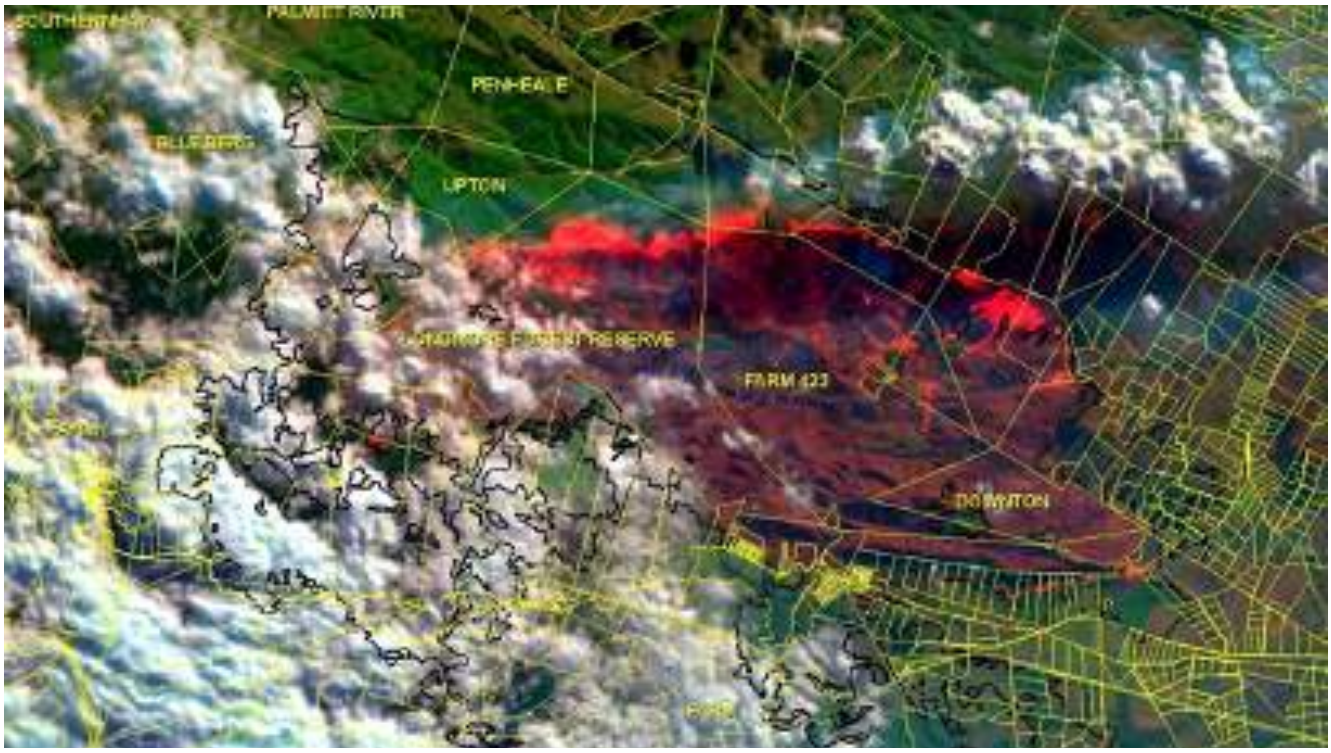


Figure 41: Landsat 8 image of 8 June 2017 indicating active fire during the Longmore Forest fire event in the Eastern Cape fire.

Figure 42: GEO Week 2020 keynote speakers includes DSI and SANSA Executives

In conjunction with ZASpace, SANSA organised the Virtual Industry Track during GEO Week 2020. A total of 400 global registrations were received with 346 active delegates over the duration of the two-day event. The objectives of the industry track included:

- To create a platform that will allow the local and international markets the ability to network and build multinational relationships.
- To educate and inspire the industry with a core focus on Earth observation technology that is being used to address and solve real problems.
- To represent the South African geospatial and Earth observation industry on a global level to create multinational partnerships.

The GEO Week 2020 Industry Track was a huge success with delegates from over 40 countries in attendance and 1 387 session views. The SANSA Board Chair and Executive team participated in several sessions, with an example of one shown in Figure 42 above.

During 2020/2021 the SAWIDRA-RARS antennae was installed at SANSA and acceptance tests completed. SAWIDRA-RARS is an African Development Bank Funded and African Centre for Meteorological Applications for Development (ACMAD) led continental project to access weather data from polar orbiting weather satellites. The data is used in developing global numerical weather forecasting models employed by weather services such as SAWS to develop regional and national short to medium term weather forecasts that, amongst others are used to mitigate weather related disasters.

Figure 43: SAWIDRA RARS Antenna and processing system installed at SANSA

The SANSA reception station is one of four established on the continent and is part of a global network of similar stations. Other stations were established in Gabon, Niger, and Kenya by the South Korean Company, Soletop. Software for the operations of SAWIDRA RARS was provided by the South African Company Pink Matter.

PROGRAMME 3: SPACE SCIENCE

The Space Science Programme leads multi-disciplinary space science research and development. Key functions include, fundamental and applied space science research, the support of space-facilitated science through science data acquisition, coordination and management of scientific data ground segments, provision of space weather and other geo-space and magnetic technology products and services.

These products and services are provided on a commercial and private basis to the defence, maritime, communications, aviation, and energy sectors. The programme also provides leadership in post-graduate science and engineering student training as well as science advancement including both learner and educator science support.

Programme 3: Key activities/ achievements for the 2020/2021 financial year

24-Hour Regional Space Weather Centre

By the end of the 2020/21 financial year, SANSA's Space Weather Project achieved 42.8% progress against its target of a 20% completion. This is a significant achievement for the seven sub-projects that makes up the Space Weather Project.

A milestone event was the visit by the Minister for Higher Education, Science and Innovation, Dr Blade Nzimande during the ground-breaking ceremony for the 24-Hour Regional Space Weather Centre on Tuesday 9 March 2021. In his speech at the ceremony, Nzimande applauded SANSA for its innovative approach to the global challenge of Space Weather.

Other VIP guests included the Overstrand Executive Mayor, Alderman Dudley Coetzee, the Director-General of the DSI Dr Phil Mjwara, the SANSA Board Chair, Ms Xoliswa Kakana, and the SANSA CEO, Dr Val Munsami. Minister Nzimande also took a tour of the Hermanus Facility, met some of the team members, and held a media briefing in the Space Weather Centre. The event generated substantial positive media coverage for SANSA in the broadcast, print and digital media platforms.

SANSA awarded a tender for the construction of the new buildings related to this project on the Hermanus site and construction of the new buildings commenced in April 2021.

Figure 44: Minister of Higher Education, Science and Innovation, Dr Blade Nzimande, turned the soil for the new Space Weather Centre at a ground-breaking ceremony on 9 March 2021. Below: An architect's impression of the new Space Weather Centre

SANSA finalised the appointment of the SARChi Research Chair in Space Weather, Dr Martin Snow, who will be pioneering the field of solar physics in South Africa.

SANSA also participated in several international fora directly related to the space weather project including the International Civil Aviation Organisation (ICAO) Met Panel Space Weather Centre Coordination Group on Space Weather meetings, the Third Meeting of African Regional ICAO (APIRG) Infrastructure and Information Management Sub-Group and the Pan European Consortium for African Space weather User Services (PECASUS) meetings. These meetings are critical to ensuring that consistent globally recognised mechanisms are put in place for providing the required space weather information to the aviation sector, and that awareness of the requirements for space weather information is created within the African Region.

SANSA accepted an invitation to become a member of the global designated centre PECASUS. The membership allows SANSA to be part of the global solution while retaining South Africa's status as a regional centre. SANSA has been attending bi-weekly virtual PECASUS meetings and has recently signed the PECASUS Consortium agreement. It should be noted that the PECASUS acronym has now changed to Partnership of Excellence for Civil Aviation Space Weather User Services.

Product and services development for the Space Weather Project is showing promising progress, especially for the GNSS impact area with the completion of AfriTEC, an African forecasting model for Total Electron Content (TEC). This is one of five new products that have been developed within the research environment and are being validated and refined for transition from research to operations.

A total of 28 products and services have been defined within the entire project. The different stages of the Research to Operations process have been defined with three main environments identified: Research-and-Development, Demonstration-and-Testing and In-house Approvals-and-Pilot Run. An additional environment has been included to manage and respond to client needs and feedback. This is important for establishing a reliable service that depends on the products developed. The Research to Operations and Release Procedure and Process is about 50% complete. A verification and validation project has commenced and will be focused on in 2021.

PARTNERSHIPS

SANSA connects with key aviation stakeholders in the African region

SANSA was invited to attend the Third Meeting of the Infrastructure and Information Management Sub Group of the ICAO African Planning and Implementation Regional Group (APIRG). This represented an important opportunity within the journey to providing a regional space weather information service to the aviation sector as it was the first time SANSA was invited to present to the wider African aviation community. Just over 200 participants attended representing all the African countries. A conclusion from the meeting was that the ICAO African Regional Office would set up a space weather project led by SANSA with African state representation that would provide a platform for creating awareness and engaging on space weather matters that are important to aviation.

Local Government helps to champion SANSA's cause

SANSA's Space Science facility is located within the Overstrand Municipality in the Western Cape. The municipality is an important strategic stakeholder for SANSA as it can play a pivotal role in ensuring adequate protection and support for the infrastructure and business of SANSA Hermanus. During the second quarter, the Executive Mayor of the Overstrand and several councillors, visited the facility to discuss SANSA's expansion plans and the need for protection of the site. The visit was highly successful, and several follow-on visits are planned for the 2021/2022 financial year. During quarter three, the Deputy Mayor of the Overstrand, together with several of the Overstrand councillors, visited SANSA Hermanus as a follow-up to the Mayor's visit. The councillors gathered all the information needed to promote and support the facility at municipal level.

Figure 45: Deputy Mayor of the Overstrand, Elnora Gillion with several local councillors visited SANSA to discuss the municipality's ongoing support to keep the SANSA Hermanus facility protected.

SCIENCE ENGAGEMENT

SANSA designed and created gender-friendly videos containing grades 7 –12 Physical Science material to encourage interest amongst learners in Physical Science and expose them to different career opportunities in science and engineering. The project was funded by the South African Institute of Physics under its Women in Physics in South Africa (WiPiSA) flagship programme. The videos are a compilation of different Physical Science experiments performed by the SANSA team that demonstrate and explain concepts that the learners have learnt in the classroom, in addition to giving examples of their real-world applications. The demonstrators also give a brief overview of themselves, how they got to where they are today and highlight different career opportunities in STEM that require Physical Science. The aim is to stimulate the learners' interest in Physical Science and to make

the physics curricula more gender-friendly by including young female physicists performing experiments in a fun and friendly manner as schools do not always have all necessary equipment for learners to perform the experiments.

Figure 46: A demonstration by Dr Tshimangadzo Matamba and Dr Rendani Nndanganeni

PROGRAMME 4: SPACE OPERATIONS

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

Programme 4: Key activities/ achievements for the 2020/2021 financial year

KSAT Project

SANSA entered a partnership with KSAT Global for implementation and hosting of one of One Web's Satellite Network Portals (SNP) at the SANSA ground station in Hartebeesthoek (HBK). The project was halted due to the national lockdown restrictions in response to the COVID-19 pandemic. Once the lockdown restrictions were relaxed to level 4, the team resumed work on the project. During this time, progress was made in ensuring the deadlines were met in line with the targeted completion date. However, the project experienced disruption due to One Web claiming bankruptcy. During November 2020 One Web was bought and the Chapter 11 process call was thus lifted. Following lengthy negotiations SANSA resumed work and the project is in its final stages of completion and awaiting the antennas to arrive for the final installation. The next phase of the project is the completion of the Site Infrastructure Acceptance Test (ISAT) including submittal of As-Built Site Design Package.

Figure 47: Project Site

Figure 48: Project handover to SANSA by project engineers

SANSA-FRQ 50HZ ELECTRICAL POWER CONVERSION PROJECT

This year saw history being made at SANSA Space Operations site. The station had for the past 60 years been using the American standard for its power grid. This was due to the early years of NASA and its equipment legacy. The project implementation took a little less than a year. On 18 January 2021, the seamless switchover happened, and the station is running successfully on 50Hz.

The success of the project was due to meticulous planning, buying, internal and stakeholder communications, supplier timing, and all other factors to ensure this smooth transition without inconveniencing stakeholders and avoiding negative impacts of the COVID-19 pandemic. The initial phase of the project involved the testing of all antennas and their respective equipment, to ensure compatibility for 50Hz. Thereafter the system was designed ratified, and the procurement process was initiated. Further to this SANSA is also procuring a new back-up generator to further sustainability of the existing Euro Diesel system.

This will then ensure that the complete electrical reticulation system has been upgraded for the future generation and Business Continuity of the organisation.

Figure 49: Installation of U –Bus Transformer

SPACE OPERATIONS CONFERENCE (SPACEOPS 2021)

In 2018, SANSA won the bid to host the 16th International Space Operations conference (Spaceops2020), which was to be held in May 2020 at the Cape Town International Convention Centre. Unfortunately, the conference was postponed due to restrictions related to the COVID-19 pandemic which affected the whole world.

After the exploration of alternative methods of hosting the conference during the pandemic, it was decided that the conference be held virtually, and this led to SpaceOps2020 being transformed into a SpaceOps2021-Virtual Edition. This was a historic moment in the Space Operations industry, as the planned conference was a first ever virtual SpaceOps conference which was then scheduled to take place in May 2021. The conference was free to all registered delegates, providing everyone who is involved in space and space operations an opportunity to participate in the conference and this also brings with it a unique opportunity to reach far greater participant numbers across the world.

Figure 50: International Conference on Space Operations

NAVIGATION

SANSA was approached by the Air Traffic and Navigation Services (ATNS) to support them in their roadmap for navigation as required by the Department of Transport. This is an activity that also informs the Satellite-Based Augmentation System (SBAS) activity in the Space Infrastructure Hub.

The proposed open service SBAS could as an output from this study be evolved into a Solar (SoL) System. ATNS has also requested assistance in approaching the Galileo Supervisory Authority (GSA) to also provide input to the process. The long-standing relationship with the GSA as forged under South Africa-EC space dialogue will help significantly in this process.

EUTELSAT EARTH STATION VERIFICATION AND ACCEPTANCE TESTS (ESVA)

A new agreement was reached with Eutelsat via an intermediary (A1 Telekom in Austria) to re-start the process of doing Earth Station Verification and Acceptance Tests (ESVA) for clients of Eutelsat from HBK. The new software was developed using the state-of-the-art vector signal transceiver at SANSA for data acquisition. The first new test was held in February and additional tests are already lined up. Improvement of the system is ongoing.

LAUNCHES SUPPORTED IN 2020/21

Support	Completion date	Support days	Type	Customer
MMS FEB	16/2/2021	1 DAY	LEOP	USN
TURKSAT-5A	15/1/2021	8 DAYS	TOSS	INTELSAT
F9 TURKSAT-5A	8/1/2020	1 DAY	LAUNCH	KSAT
MMS DECEMBER	26/12/2020	5 DAYS	LEOP	USN
SXM-7	21/12/2020	8 DAYS	TOSS	INTELSAT
MELCO-R1	18/12/2020	19 DAYS	TOSS	TELESAT
F9 SMX-7	13/12/2020	1 DAY	LAUNCH	KSAT
F9 SENTINEL 6	21/11/2020	1 DAY	LAUNCH	KSAT
G-30 IOT KA	2/10/2020	18 DAYS	IOT	INTELSAT
G-30 IOT KU	29/9/2020	13 DAYS	IOT	INTELSAT
GALAXY-30	28/8/2020	13 DAYS	TOSS	INTELSAT
BB4A	29/7/2020	14 DAYS	EOR	INTELSAT
KM1	23/7/2020	4 DAYS	TOSS	INTELSAT
F9 ANASIS-2	20/7/2020	1 DAY	LAUNCH	KSAT
MMS (JUNE)	16/6/2020	1 DAY	LEOP	USN
MMS (MAY)	19/5/2020	1 DAY	LEOP	USN

Table 10: 2020/21 launches

SANSA supported 16 launches and Internet of things (IOT) in the financial year. There has been a steady decline in this past year which could be ascribed to COVID-19. The launches that have taken place have been long standing items. Industry information suggests that this would pick up in the forthcoming years.

PROGRAMME 5: SPACE ENGINEERING

The Space Engineering Programme leads systems engineering and project management excellence and drives a small satellite development programme in South Africa in partnership with external contractors, Research and Development (R&D) institutions and private sector partners. The programme conducts satellite and sub-systems analysis that leads the technical side of the space programme project management, human capital development in space engineering as well as facilitates private space industry partnerships.

Programme 5: Key activities/ achievements for the 2020/2021 financial year

The potential for sustained growth of the space sector over the long-term through blended financing is contingent upon the successful implementation and demonstrated impacts of the SIH over the short to medium term. SANSA is establishing the required skills for acquisition management and system engineering philosophies through capacitating an in-house engineering programme to oversee and ensure that the high-level engineering requirements of the space value chain are met.

An effective in-house space engineering programme will ensure a stable South African space industry that drives skills development and delivers innovative solutions and technologies to South Africa, Africa, and other international markets. The Space Engineering Capacitation Plan is a blueprint of the capacity and expertise that is required within SANSA to ensure a viable and sustainable space programme which was approved by the Board.

Republic of South Africa (RSA) Launch Capability Feasibility Study

The Space Engineering team was appointed to the Launch Capability Task Team established by the DSI to conduct a Launch Capability Feasibility Study for South Africa and report back to the DSI Executive Committee (EXCO). The Task Team was appointed to:

1. Quantify the economic and social value of SST in South Africa (SA).
2. Identify the emerging market opportunities for launching services.
3. Describe the potential of SST to develop and preserve skilled workforce.

4. Make recommendation on how launching can further be leveraged for access to space to benefit and contribute to the broader government challenges of poverty, inequality, and unemployment.

To realise the task, the DSI proposed three sub-groups:

1. Infrastructure and Technology;
2. Economics and Global Markets; and
3. Security and Regulatory frameworks.

The Task Team first phase report was completed in March as scheduled, and the DSI EXCO has subsequently approved the second phase of the study.

Subsequent to the completion of the Phase I of the RSA Launching Capability Feasibility Study commissioned by the DSI, the Space Program Division as part of the Launch Capability Task Team participated in Phase II of the study. The main objective of the Phase 2 feasibility study was to:

1. Determine potential global market opportunities.
2. Demonstrate technology localisation and industrial transformation.
3. Establish launch requirements.
4. Generate concept designs for both the launch vehicle, suborbital sounding rocket.
5. Infrastructural upgrades needed to support the facilities for launch.

The key drivers of the assessment were independent access to space, geopolitical advantage, localisation, transformation, and industrialisation in support of the country's economic recovery plan. The outcome of the Phase II study was also expected to more accurately cost a holistic implementation plan that includes catalysing industrialisation and capacity building opportunities. The team participated in both the Technical and Regulatory Sub-Groups of the Task Team. SANSA led the Space Launch Industry Technology capability audit by soliciting the required information through a Request for Information (RFI) process, analysis of the data and compilation of the audit report, which was incorporated in the final Phase II assessment report which was presented to the DSI in February 2021.

MARINE DOMAIN AWARENESS SATELLITE (MDSAT) CONSTELLATION

The MDASat constellation is being built by CPUT with the goal of supporting Marine Domain Awareness (MDA) in support of Operation Phakisa. The Phakisa "MDASat" constellation will provide international maritime communications services, which will initially include the Automatic Identification System (AIS) standard. This mini constellation will pave the way for more advanced technologies to be flown on future nanosatellite missions, such as the evolving VHF Data Exchange System (VDES) standard.

The main goal of the MDASat constellation is to provide South Africa with sovereign control over its AIS (and eventually VDES) maritime data, at reduced data cost and improved access.

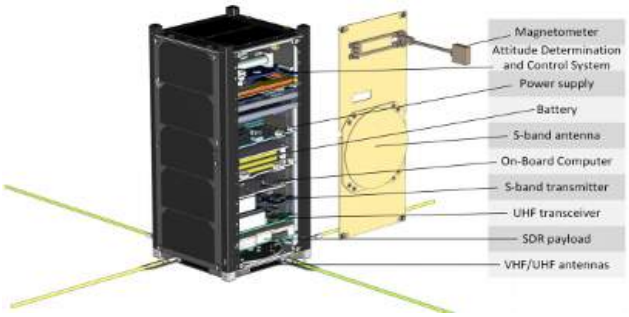


Figure 51: Satellite concept design

Two important milestones were reached in 2020/21. The first being the Critical Design Review (CDR), held virtually on 9 October 2020. SANSA assisted in defining the CDR data pack, advising on the review process and in reviewing the documentation submitted for the CDR data pack. The reviewers agreed that the CDR was successful, however dependent on a few action items that have since been satisfactorily by the project team.

The latest milestone was reached when the Qualification Model had successfully passed environmental testing in mid-February 2021, ushering in the next step of the project which is the build of the final flight models (3 x 2U's) that will constitute the constellation (see figure 52 below). The launch date for the MDASat constellation is planned for the second quarter of the next financial year, however due to the impact of COVID-19 on the launching industry this date may be pushed toward November or December 2021.

Figure 52: The MDASat Flight Models

CONCURRENT DESIGN/ ENGINEERING FACILITY (CD/EF)

The Concurrent Design Facility project kicked off in the first quarter of 2020/21, and it was initially envisaged to be completed within a 6 –9-month period. However, as COVID-19 spread, the project was delayed, which allowed more time for refining the concept and greater planning.

There are five stages to establishing the CDF and these are listed below:

1. Requirement's development
2. Facility Design and specifications development
3. Procurement
4. Installation
5. System Verification and Commissioning

The operationalisation of the CDF will rely on system performance metrics and operational processes. Many of these processes will require supporting documentation from suppliers to be included in planning of system maintenance, upgrades and modifications, obsolescence management and disposal processes.

Due to the wealth of knowledge and experience in CDF establishment and operations, the Space Engineering team has looked to the European Space Agency (ESA) for guidance in the planning, implementation, and operationalisation of the CDF. This includes the formulation of requirements and specifications, facility design, system verification and supporting documentation for operations and training.

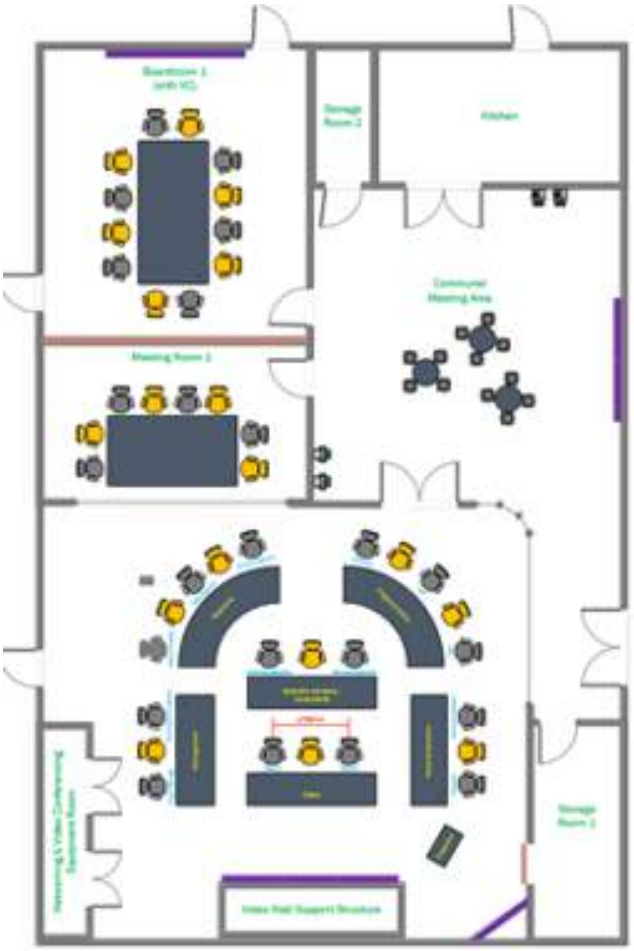


Figure 53: Conceptual layout for the CDF at SANSA Pretoria office

The collaboration with ESA will take place in the following phases:

- **Phase 1:** Initial scoping, specifications development and refining CDF concepts
- **Phase 2:** Training in collaboration with ESA
- **Phase 3:** Operationalise facility
- **Phase 4:** Collaboration between ESA and SANSA on joint missions

Phase 1 has been completed and SANSA awaits confirmation of the appointment of a suitable contractor (by ESA) to provide the required support services. Furthermore, the first batch of Concurrent Design training is scheduled to take place from 31 May 2021 –02 June 2021, where SANSA will be able to participate in the next Concurrent Design study sessions conducted by ESA. SANSA has been allocated space for 3-5 delegates.

COFIMVABA SCIENCE CENTRE

The contract between the Agency and the DSI for the development of a space-themed exhibit that showcases SANSA, and the local space industry was concluded in mid-2019. The exhibit was initially planned to be handed over to the Science Centre in mid-2020. However due to the impact of COVID-19 on local and global manufacturing, logistics and supply chains the project had been delayed, with the expected handover scheduled to take place in June 2021. SANSA's contribution has two areas – a Space Operations simulator, and a "static display" area. The Space Operations simulator will be housed in a space with CPUT.

Figure 54: Exhibit floor plan showing Area 1 and Area 2 of the exhibit

The project team visited the centre in December 2020 and the position and floor space was secured (refer to Figures 55 and 56 below).

Figure 55: Entrance to the Science Centre, still under construction in December 2020

Figure 56: A view of the Science Centre from the parking lot (December 2020)

The procurement process for the electronic and Information Technology (IT) equipment was concluded by the end of January 2021, this makes up the bulk (approximately 65%) of the budget.

The first shipment of equipment was delivered at the beginning of April 2021 and transported to the Science Centre by SAASTA. The final shipment is expected to be received in the 2021/22 financial year and it will be delivered by the supplier directly to the Science Centre in Cofimvaba, where a SANSA representative will take receipt of the goods and manage the installation of the equipment on site. Once the delivery schedule is confirmed, detailed planning of the installation, testing and commissioning will commence.

LINKING PERFORMANCE WITH PROGRAMME BUDGETS

	2019/20 Financial year (R'000)			2020/21 Financial year (R'000)		
Programme	**Budget**	**Actual**	**(Over)/under expenditure**	**Budget**	**Actual**	**(Over)/under expenditure**
Programme 1: Administration	65 234	51 438	13 797	**73 339**	**60 331**	**13 009**
Programme 2: Earth Observation	74 519	68 197	6 322	**95 029**	**66 139**	**28 890**
Programme 3: Space Science	58 502	54 503	3 999	**63 863**	**50 227**	**13 636**
Programme 4: Space Operations	85 063	88 892	(3 829)	**97 275**	**82 153**	**15 123**
Programme 5: Space Engineering	5 779	5 779	0	**4 665**	**4 253**	**413**
Total (R'000)	289 097	268 808	27 947	**334 172**	**263 102**	**71 070**

Table 11: Linking performance with budgets

The actual expenditure for the period under review was less than anticipated and this was mainly attributable due to slower spending patterns related to the lockdown restriction emanating from the Covid-19 pandemic. In the 2019/20 financial year, the Space Operations expenditure budget was exceeded by R3.8 million, due to additional contracts for launches which generated additional revenue for the Agency. A key contributor to the 2020/21 expenditure pattern reflected in Table 11 above was an amount of R28 million in unspent the ring-fenced grants for the Earth Observations programme and spending is expected to accelerate in the 2021/22 financial year.

REVENUE INFORMATION

	2019/20 Financial year (R'000)			2020/21 Financial year (R'000)		
Revenue sources	**Estimate**	**Actual amount collected**	**Over)/under) collection**	**Estimate**	**Actual amount collected**	**(Over)/under) collection**
Contract income: Public	22 503	23 825	(1 322)	**17 041**	**18 005**	**(964)**
Contract income: Private	4 631	5 742	(1 110)	**5 375**	**5 605**	**(230)**
Contract income: Foreign	54 253	74 618	(20 364)	**50 391**	**52 032**	**(1 640)**
Other income	5 473.832	10 028	(4 554)	**2 868**	**6 123**	**(3 255)**
Total (R'000)	86 861	114 212	(27 351)	**75 676**	**81 765**	**(6 089)**

Table 12: Revenue information

In the 2019/20 financial year the total revenue budgeted was exceeded by R27 million with R20 million from foreign income. This was due to unsecure launch income earned by Space Operations from Intelsat, AMOS, and the Indian Space Research Organisation. Though the 2020/21 budget was exceeded by R6 million, this was a 77% decrease from the prior year due to the Covid-19 pandemic effects. Other income, representing the interest earned on the positive bank balance and ring-fenced grants contributed to R3 million of the variance.

CAPITAL INVESTMENT

CAPITAL INVESTMENT, MAINTENANCE AND ASSET MANAGEMENT PLAN

SANSA has policies which assists in ensuring that resources are effectively and efficiently managed. The Asset Management Policy is aligned with proper management of assets system and its reporting. Resources are monitored through maintenance plans to safeguard their optimal contribution to the entity's economy.

During the financial year under review, several key infrastructure projects estimated at R4.47 billion were identified by SANSA and these are related to the development of the Space Infrastructure Hub (SIH). Another key project undertaken by the Agency during the reporting period is the establishment of a Regional 24-hour Space Weather Centre which was at 42.8% completion at the end of the financial marking a historic achievement for SANSA. Construction of the Space Weather Centre building is envisaged to be completed by the end of the year 2022.

High-level overview: 2020/21 key infrastructure projects	Pipeline projects
Space Infrastructure Hub (SIH)	• Extension of the student residence in SANSA Hermanus facilities
Regional 24-hour Space Weather Centre	• High technology ICT infrastructure for Space Weather • Solar telescope installation

Table 13: Overview – Capital Investment

Proposals will also be submitted for the following large infrastructure projects:

- Extension of the student residence in SANSA Hermanus facilities
- High technology ICT infrastructure for Space Weather
- Solar telescope installation

Part C
GOVERNANCE

GOVERNANCE

INTRODUCTION

SANSA was established in terms of the SANSA Act (Act 36 of 2008, as amended), and forms part of the portfolio of entities reporting to the Department of Higher Education, Science, and Innovation. The Agency is governed by the PFMA 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 2020 adopted principles of the King Report on Governance (King IV Report) where feasible.

PORTFOLIO COMMITTEES

Parliament exercises its role through evaluating the performance of public entities by interrogating their annual financial statements and other relevant documentations which are required to be tabled, in addition to any other documentation tabled from time to time.

The Standing Committee on Public Accounts reviews the annual financial statements and the audit reports issued by the external auditor.

The Portfolio Committee on Higher Education, Science and Technology exercises oversight over the service delivery performance of public entities and, as such, reviews the non-financial information contained in the annual reports of public entities. The Portfolio Committee is concerned with service delivery and enhancing economic growth. SANSA furthermore presents the Agency's strategic plan and annual performance plans to the Portfolio Committee.

EXECUTIVE AUTHORITY

Oversight by the Executive Authority, being the Minister of Higher Education, Science and Innovation, rests by and large on the prescripts of the PFMA. The PFMA governs and provides oversight authority to the Executive Authority. The Executive Authority has the power to appoint and dismiss the Board of a public entity and must ensure that members of the Board have the necessary skills and experience to guide the public entity.

SANSA presents the annual report, strategic plan and annual performance plans to the Minister of Higher Education, Science and Innovation. During the year under review SANSA has submitted quarterly reports to the Department of Higher Education, Science, and Innovation, in addition with further submissions made for reporting and concurrence purposes.

THE BOARD AS AN ACCOUNTING AUTHORITY

The Board is the Accounting Authority in terms of the PFMA and reports to the Minister of Higher Education, Science, and Innovation. 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 of the Board

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; and
- Establishing or disbanding the Agency's organisational divisions, as appropriate, after consultation with the Minister.

Composition of the Board

As of 31 March 2021, the Board consisted of twelve non-executive members and the CEO as an ex officio member of the Board.

In terms of the SANSA Act, Board members are appointed for a term not exceeding four years and may be appointed for one further term thereafter. The Minister appointed the current Board members with effect from 1 September 2018. During the current reporting period, a Member, Mr Simphiwe Hamilton, resigned from the SANSA Board effective from 20 November 2020. Please refer to the tables below for further information on the SANSA Board.

Board members as at 31 March 2021

Name	Designation (in terms of the Public Entity Board structure)	Date appointed	Date resigned	Qualifications	
Ms Xoliswa Kakana	Board Chairperson	1/9/2018	–	BSc (Maths and Applied Science); MSc (Electronic Engineering); MBA; MS, Global Leadership, and Innovation Programme; Master's in Public Administration	
Dr Ashley Naidoo	Board Member	1/9/2014 reappointed 1/9/2018	–	BSc (Paed), Bsc (Hons); MSc (Marine Zoology) PhD (Ocean Governance)	
Prof Azwinndini Muronga	Board Member	1/9/2018	–	PhD (Physics); MSc (Physics); BSc (Mathematics and Physics); University Education Diploma	
Mr Eugene Jansen	Board Member	1/9/2014 reappointed 1/9/2018	–	MSc (Eng), BEng (Electronic Engineering); MBA	
Adv Ikho Kealotswe-Matlou	Board Member	1/9/2018	–	LLB; LLM	
Ms Innocentia Pule	Board Member and Audit and Risk Committee Chairperson	8/6/2016 reappointed 1/9/2018	–	CA(SA); GEDP; TGM	
Mr Johan Prinsloo	Board Member and Strategy and Investment Committee Chairperson	1/9/2014 reappointed 1/9/2018	–	BEng (Electronic Engineering)	
Ms Lumka Msibi	Board Member	1/9/2018	–	BSc (Aeronautical Engineering)	
Ms Mariam Paul	Board Member	1/9/2018	–	MIng (Electrical and Electronics); B Tech (Electrical and Electronics) MBA	
Ms Mbali Mfeka	Board Member	1/9/2014 reappointed 0/9/2018	–	BCom (Hons); MBL; MDP; GEDP	
Ms Nomfuneko Majaja	Board Member and HR, Social and Ethics Committee Chairperson	1/9/2018	–	BCom (Hons); MA (Development Econ)	
Mr Simphiwe Hamilton	Board Member	1/9/2014 reappointed 1/9/2018	15/11/2020	B Mil, a B Mil Hons (Politics) and an MDA (RMCS –UK)	
Mr Willie van Biljon	Board Member	1/9/2014 reappointed 1/9/2018	–	BSc Eng (Mech), M Eng (Mech)	
Dr Val Munsami	Chief Executive Officer and ex officio Board Member	1/1/2017	–	PhD (Physics), MBL	

Table 14: Composition of the Board

	Area of expertise	Active directorships outside SANSA	Other committees as at 31 March 2021
	Innovation and technology service and business development	ICT-Works (Pty) Ltd; University of Johannesburg (Council Member); ZACR –ZA Central Registry (NPC)	Board Chairs Committee
	Environment, Ocean Science and Governance	–	Audit and Risk Committee
	Physics and education	–	Strategy and Investment Committee
	Technology and investment	VAV Investment Holdings (Pty) Ltd; Stone Three Communications (Pty) Ltd; Acorn Private Equity (Pty) Ltd; Halotype Investments (Pty) Ltd; PPO Serve (Pty) Ltd	Audit and Risk Committee; Strategy and Investment Committee
	Space law		Human Resources, Social and Ethics Committee
	Finance	M-Care Operating Holdings (Pty) Ltd; M-Care Property Holdings (Pty) Ltd; OneLogix Group Ltd; Excellerate Holdings; Mwaloni Holdings	Audit and Risk Committee Board Chairs Committee
	Satellite and communications technology	–	Strategy and Investment Committee Board Chairs
	Aerospace engineering	–	Strategy and Investment Committee
	Telecommunications and technology	–	Human Resources, Social and Ethics Committee; Strategy and Investment Committee
	Finance	Gammatec NDT Suppliers SOC Ltd	Audit and Risk Committee
	Government, legal and compliance (including space affairs and special economic zones)	Ubuntu's Guest House; Poz Perfect Pampering	Human Resources, Social and Ethics Committee
	Aerospace and maritime defence	AMD; NPC; SA Air Force Reserve Council; CAV; JASC (Consultative and Advisory); AMD Export Council; NDIC; Zalisa Investments (Pty) Ltd	Audit and Risk Committee
	Aerospace engineering and business development	–	Human Resources, Social and Ethics Committee
		–	Strategy and Investment Committee

SANSA BOARD MEMBERS


Ms Xoliswa Kakana


Prof Azwindini Muronga


Ms Innocentia Pule


Dr Ashley Naidoo


Mr Eugene Jansen


Ms Mbali Mfeka


Adv Ikho Kealotswe-Matlou


Mr Johan Prinsloo


Ms Nomfuneko Majaja


Ms Lumka Msibi


Mr Simphiwe Hamilton


Mr Willie van Biljon


Ms Mariam Paul

BOARD MEETINGS AND ATTENDANCE

Meetings held by the Board and attendance by members during the twelve months ended 31 March 2021 is reflected in the table below:

	Meetings held								
Member	**29 Jun 2020**	**30 Jul 2020**	**28 Sep 2020**	**26 Oct 2020**	**27 Nov 2020**	**15 Dec 2020**	**21 Jan 2021**	**26 Feb 2021**	**26 Mar 2021**
A Muronga	Y	Y	Y	Y	Y	X	Y	Y	Y
A Naidoo	X	Y	Y	X	Y	Y	X	Y	Y
E Jansen	Y	Y	Y	Y	Y	Y	Y	Y	Y
I Kealotswe-Matlou	Y	Y	Y	X	Y	Y	Y	Y	Y
I Pule	Y	X	Y	Y	Y	X	Y	Y	Y
J Prinsloo	Y	Y	Y	X	Y	Y	Y	Y	Y
L Msibi	Y	Y	Y	Y	Y	X	Y	Y	Y
M Mfeka	X	Y	Y	Y	X	Y	X	Y	Y
M Paul	Y	Y	Y	Y	Y	Y	Y	Y	Y
N Majaja	Y	X	Y	Y	Y	Y	Y	Y	Y
S Hamilton	Y	Y	X	Y	–	–	–	–	–
W van Biljon	Y	Y	Y	Y	Y	Y	Y	Y	Y
X Kakana	Y	Y	Y	Y	Y	Y	Y	Y	Y
V Munsami	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table 15: Board meeting attendance Y –Present X –Apology –Not a member

BOARD COMMITTEES

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

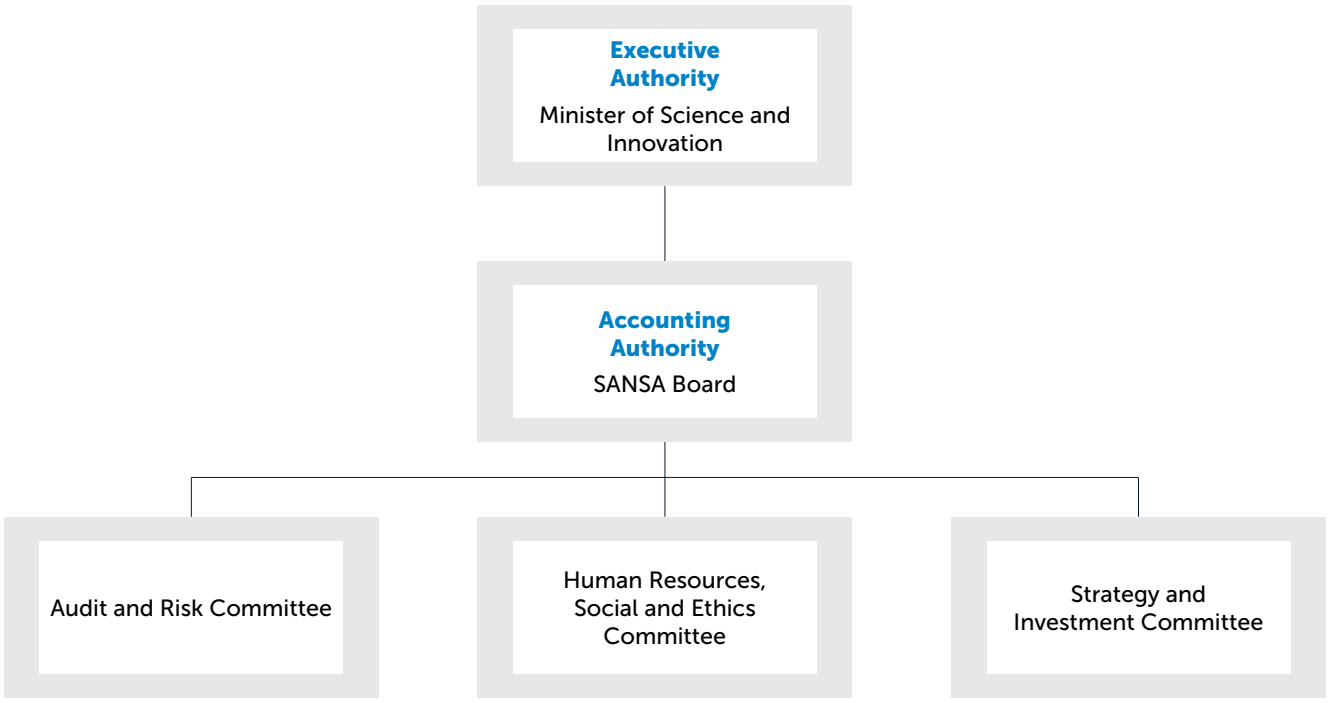


Figure 57: Board and standing committees' structure

AUDIT AND RISK COMMITTEE

The establishment of the Audit and Risk Committee complies with Sections 76(4)(d) and 77 of the PFMA and Section 3 of the National Treasury Regulations. As at 31 March 2021, the Committee consisted of four non-executive members and the Committee Chairperson was Ms Innocentia Pule, as indicated in Table 16 below. During the period under review Mr Hamilton resigned as a Board Member with effect from 15 November 2020 and ceased to be a member of the Committee.

The Audit and Risk Committee provides independent oversight over:

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

AUDIT AND RISK COMMITTEE MEMBERS AND MEETING ATTENDANCE

The Audit and Risk Committee convened fifteen meetings during the twelve months ended 31 March 2021. Attendance of these meetings is shown in the table below.

	Meetings held									Special meetings held					
Member	**6 May 2020**	**17 Jul 2020**	**14 Aug 2020**	**25 Sep 2020**	**14 Oct 2020**	**19 Oct 2020**	**14 Jan 2021**	**12 Feb 2021**	**10 Mar 2021**	**20 May 2020**	**10 Jun 2020**	**25 Jun 2020**	**2 Sep 2020**	**16 Nov 2020**	**24 Mar 2021**
A Naidoo	Y	Y	Y	Y	Y	Y	X	Y	Y	Y	X	X	Y	Y	Y
E Jansen	Y	Y	Y	Y	Y	X	Y	Y	Y	Y	Y	Y	Y	Y	Y
I Pule	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	X	Y	Y	Y	X
M Mfeka	Y	Y	Y	X	Y	X	Y	Y	Y	Y	Y	Y	X	Y	Y
S Hamilton	Y	Y	Y	Y	Y	Y	–	–	–	Y	Y	X	Y	–	–

Table 16: Meeting attendance

Legend: Y –Present X –Apology –Not a member

HUMAN RESOURCES, SOCIAL AND ETHICS COMMITTEE

The Human Resources, Social and Ethics Committee consisted of four non-executive Members and the Executive Director: Enterprise Services as an ex-officio member as at 31 March 2021. Ms Nomfuneko Majaja served as Chairperson of the Committee during the period under review.

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; and
- Oversee human resource-related issues, including employee benefits, succession planning, organisational design, and talent management.

Human Resources, Social and Ethics Committee Members and Meeting Attendance

During the 12-month period ended 31 March 2021, the Committee convened five meetings. The Members' attendance is shown in the table below.

	Meeting held				
Member	**1/7/2020**	**10/9/2020**	**15/10/2020**	**8/2/2021**	**16/3/2021**
I Kealotswe-Matlou	Y	Y	Y	Y	Y
N Majaja	Y	Y	Y	Y	Y
M Paul	Y	Y	Y	Y	Y
W van Biljon	Y	Y	Y	Y	Y
A Slavin	Y	Y	Y	Y	X

Table 17: Meeting attendance

Legend: Y –Present X –Apology

STRATEGY AND INVESTMENT COMMITTEE

As at 31 March 2021, the Strategy and Investment Committee consisted of five non-executive Members, the Chief Executive Officer (CEO) and Chief Financial Officer (CFO) as executive Members. As ex-officio Board Member, the CEO held voting rights while the CFO did not have any voting rights. Mr Johan Prinsloo served as the Committee Chairperson during the period of review.

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; and
- Ensure relevant resourcing of SANSA's strategic initiatives.

STRATEGY AND INVESTMENT COMMITTEE MEMBERS AND MEETING ATTENDANCE

During the 12-month period ended 31 March 2021, the Committee convened eight meetings. The Committee members and attendance are as shown in the table below.

	Meeting held							
Member	**6 May 2020**	**14 Aug 2020**	**8 Sep 2020**	**13 Oct 2020**	**19 Oct 2020**	**13 Jan 2021**	**10 Feb 2021**	**15 Mar 2021**
A Muronga	Y	Y	Y	Y	Y	Y	Y	X
E Jansen	Y	Y	Y	Y	X	Y	Y	Y
J Prinsloo	Y	Y	Y	Y	Y	Y	Y	Y
L Msibi	Y	Y	Y	Y	Y	Y	Y	Y
M Paul	Y	Y	Y	Y	Y	Y	Y	Y
V Munsami	Y	X	Y	Y	Y	Y	Y	Y
B Pono	Y	Y	X	X	X	X	X	X
D Bongoza	X	X	X	Y	Y	Y	Y	Y
I Pule*			Y					
N Majaja*			Y					

Table 18: Committee membership and attendance

Legend: Y –Present X –Apology

* Ms Pule and Ms Majaja attended a portion of the meeting held on 8 September 2020 as invitees.

REMUNERATION OF BOARD MEMBERS

Board Member remuneration is aligned with National Treasury guidelines as set out in 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 furthermore 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).

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.

THE EXECUTIVE COMMITTEE

SANSA EXECUTIVE MANAGEMENT

Dr Valanathan Munsami:
CEO

MS Bulelwa Pono:
CFO

Mr Amal Kathri:
ED Space Programme

Ms Ann Slavin:
ED Enterprise Services

Dr Lee-Anne McKinnell:
MD Space Science

Ms Andiswa Mlisa:
MD Earth Observation

Mr Raoul Hodges:
MD Space Operations

Ms Lorraine Harrison:
Board Secretary

Mr Daliwonga Bongoza: Interim CFO
(with effect from October 2020)

THE ROLE OF THE 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. The Executive Committee includes the CEO, CFO, Executive Directors: Enterprise Services and Space Programme, the Managing Directors: Earth Observation, Space Science and Space Operations and the Board Secretary.

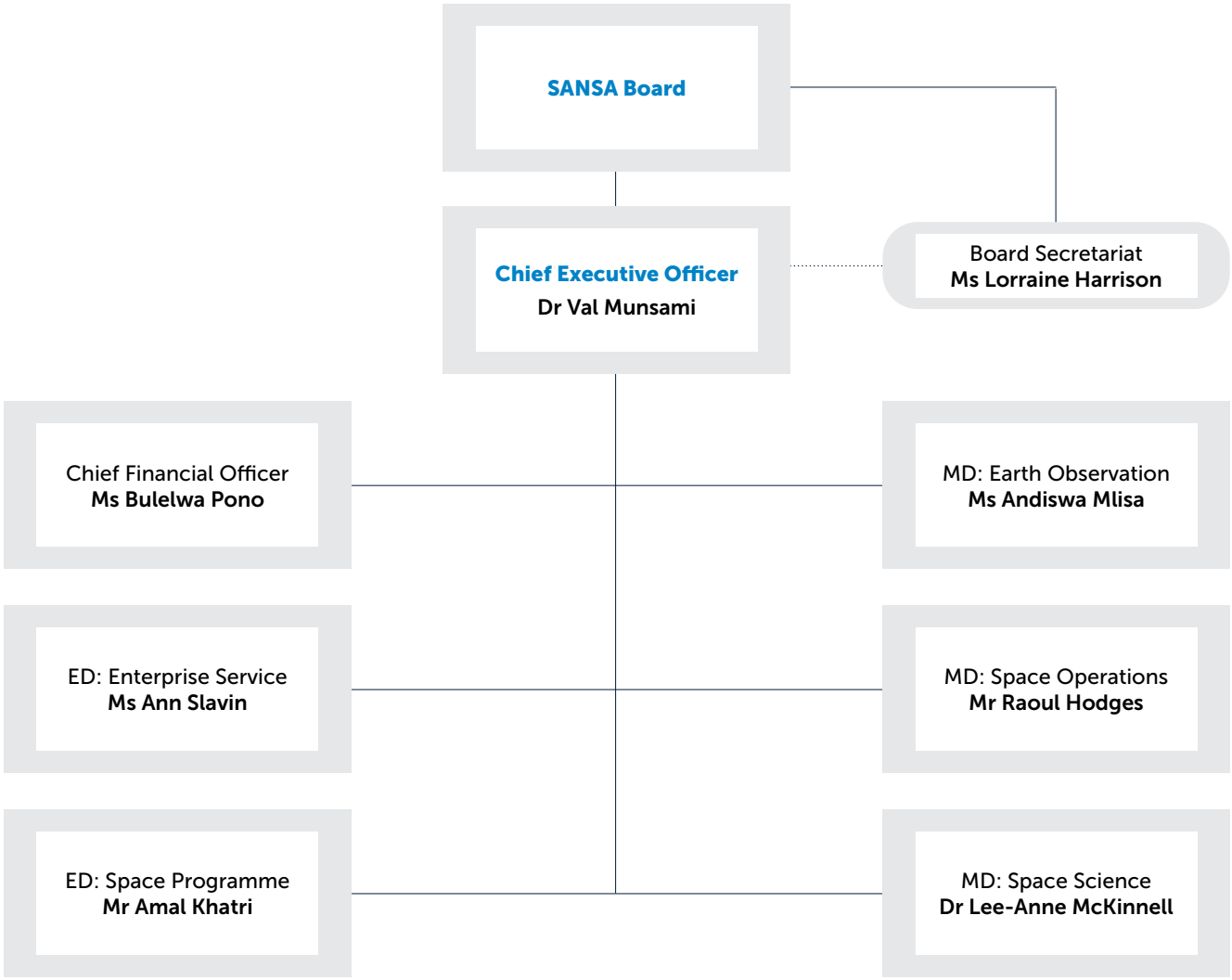


Figure 58: SANSA Executive Structure

RISK MANAGEMENT

RISK MANAGEMENT STRATEGY

The SANSA Strategic Risk Register assists management to manage key strategic risks that could affect the organisation, continuously monitor the likelihood of such risks materialising as well as their potential impact on the achievement of the organisations' strategic objectives and performance targets.

The Audit and Risk Committee is the sub-committee of the Board that is tasked with the crucial responsibility of providing an objective independent view of SANSA's internal controls and advising management on the organisational risk management strategy, systems, and mitigation of risks.

The entity conducts regular risk assessments to monitor the effectiveness of its risk management strategy and to identify any emerging risks. Quarterly performance reporting to the Audit and Risk Committee, Board and Shareholder also provides an overview of the SANSA overall risk management system and progress relating to implemented mitigations to ensure risks are maintained at acceptable levels.

Enterprise Risk 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 which is aligned to ISO31000. In line with the integrated risk management methodology, risks are continuously reviewed with a focus on effectiveness of controls. Regular risk assessments on both operational risk and strategic risk registers are conducted on a continuous basis to embed risk management principles within SANSA. An ERM Plan for the organisation is updated and presented to the Board annually. Management has continued with the monitoring of risks as identified during the financial year under review despite COVID-19-related disruptions. Table 19 below highlights the residual risk exposure of the key risks identified.

Objective number	Risk number	Risk description	Control adequacy	Movement –Residual risk			
				Q1	Q2	Q3	Q4
S1.1; S2.1; S3.1; S4.1; S4.2; S5.1	1	Catastrophic failure of infrastructure (SANSA's and suppliers).	Partially effective	▶	▶	▶	▶
All	2	Inability to secure funding (Parliamentary Grant, loans, etc.) required to meet the current and future needs of SANSA.	Effective	▶	▼	▼	▼
S4.2	3	Based on the current build-status of EO-Sat1, the project could be stopped, and the funds (R340.8 million) spent to date could be classified as fruitless and wasteful expenditure.	Partially effective	▲	▲	▶	▶
All	4	Limited ability to attract, retain and afford the full skills-set required by SANSA to deliver on its strategy.	Effective	▶	▶	▼	▼
All	5	Inability to deliver on SANSA mandate –Business Model and Organisational Design.	Effective	▶	▼	▼	▼

Table 19: Residual risk exposure –financial year-ended 31 March 2021

Movement in residual risk exposure legend:

- ▶ No change in the residual risk exposure, since the last quarter
- ▲ The residual risk exposure has increased, since the last quarter
- ▼ The residual risk exposure has decreased, since the last quarter

INTERNAL CONTROLS

INTERNAL AUDIT

The objective of the Internal Audit function is to provide an independent, objective assurance and consulting services designed to add value and improve SANSA's operations. It assists SANSA to accomplish its objective by bringing a systematic disciplined approach to evaluate and improve the effectiveness of the risk management, internal controls, and governance processes.

Internal Audit through engagements with internal stakeholders (SANSA Management), Audit and Risk committee (ARC) and the external audit developed a comprehensive three year rolling plan, incorporating an annual plan that was approved by the ARC. Internal Audit has executed risk-based audit assignments as per audit plan. Included in areas audited are the Quarterly Performance Information verifications, Financial Management, Supply Chain Management, Asset Management, Human Resources Management, Information Technology, Governance Audit, Risk validation and follow-up audit (External and Internal Audit Reports). Internal Audit provides recommendations to management with regards to internal controls, risk management and governance processes. A follow-up on agreed management actions is performed quarterly. Progress on implementation of corrective action is further monitored by the Executive committee and ARC. The unit reports quarterly to the ARC on progress against the approved audit plan.

COMPLIANCE

Governance priorities for SANSA are centred on promoting a culture of sound internal controls, policies, and procedures that reach far beyond mere legal compliance. The development and implementation of effective risk management and compliance systems to drive the achievement of the entity's strategic goals and objectives, and a continued focus on compliance with all applicable laws was key. Good progress was observed on several environmental compliance fronts during the reporting period, as SANSA continued to implement planned Safety, Health, Environment, and Quality (SHEQ) management activities. Such activities entailed the effective identification and mitigation of SHEQ risks through ensuring ongoing SHEQ compliance, training, and certification.

The SANSA Space Operations facility has been officially certified for ISO 45001:2015 and implemented an Integrated Management System (IMS) that incorporates ISO 9001:2015, ISO 45001:2015 and ISO 14001:2015. The system aims to integrate all governance-related processes and systems elements thus ensuring agility, efficiency in decision making and improving customer experience by ensuring consistency in service delivery. The Space Science Programme is also aiming to achieve ISO 9001: 2015 certification for its products and services in 2021 with significant strides having been made over the past two years to prepare and set up systems for ensuring the required certification is attained.

FRAUD AND CORRUPTION

There were no reported cases on the National Anti-Corruption Hotline (NACH) for the period under review. Priorities for the 2021/22 financial year include a refresher training that will be scheduled to create employee awareness on the NACH processes relating to instances where fraud cases have been reported, escalated to SANSA, investigations, and final outcomes. The training will emphasise to employees the importance of whistleblowing whilst remaining anonymous.

MINIMISING CONFLICT OF INTEREST

SANSA currently has the following Supply Chain Management (SCM) Committees: Bid Specification, Bid Evaluation and Bid Adjudication Committee. Members serving in these committees are required to declare in writing the extent of their conflict of interest prior to commencement of the meeting. Depending on the nature of the conflict of interest, members can either continue participating in the bid discussion or recuse themselves from participating in the discussion.

To strengthen the internal controls, all bid committee members including SCM officials must complete the code of conduct and annually all staff members must declare their interest.

B-BBEE COMPLIANCE PERFORMANCE INFORMATION

The table below has been completed in accordance with the compliance requirements as required by the B-BBEE Act and as determined by the dtic. SANSA is currently focused on improving its levels of compliance with the set criteria and the implementation of all relevant measures to comply remains a priority.

Has the Public Entity applied any relevant Code of Good Practice (B-BBEE Certificate Levels 1 – 8) with regards to the following:		
Criteria	**Response Yes/No**	**Discussion (SANSA responses/measures taken to comply)**
Determining qualification criteria for the issuing of licences, concessions or other authorisations in respect of economic activity in terms of any law?	No	This requirement is not aligned to the SANSA legislative mandate
Developing and implementing a preferential procurement policy?	Yes	The entity's SCM Policy has been aligned to requirements of the Preferential Procurement Policy Framework Act (PPPFA)
Determining qualification criteria for the sale of state-owned enterprises?	No	This requirement is not aligned to the SANSA legislative mandate
Developing criteria for entering into partnerships with the private sector?	No	SANSA utilises the criteria provided in Treasury Regulation 16 which has been aligned to the SCM Policy
Determining criteria for the awarding of incentives, grants and investment schemes in support of Broad Based Black Economic Empowerment?	No	Entity is busy with the B-BBEE improvement project which include the policy that will contain criteria for the awarding of incentives, grants, and investment schemes in support of Broad Based Black Economic Empowerment

Table 20: SANSA B-BBEE compliance

HEALTH, SAFETY AND ENVIRONMENTAL ISSUES

Safety and health

Stringent health and safety measures are being closely monitored to minimise unsafe occurrences throughout the organisation. During this reporting period, SANSA continued to implement planned SHEQ management activities. These activities entailed the effective identification and mitigation of SHEQ risks through ensuring ongoing SHEQ compliance, training, and certification. SHEQ monthly meetings were held, and all compliance measures are up-to-date.

To intensify compliance levels, an initiative was taken by SHEQ to have a holistic site inspection every quarter which will allow leadership to assess SHE Representatives competency levels as they have received training and to intensify their responsibilities as well the impact SHE inspections have on the overall implementation of safety in the organisation.

SOCIAL RESPONSIBILITY

Broad Based Black Economic Empowerment

SANSA is committed to economic transformation that brings about meaningful Broad-Based Black Economic Empowerment (B-BBEE). The SANSA Senior Management together with SCM have developed a set of proposed targets in line with the revised Codes of Good Practice to improve SANSA's performance against the B-BBEE codes.

AUDIT AND RISK COMMITTEE REPORT

We hereby present our report for the financial year ended 31 March 2021.

AUDIT AND RISK RESPONSIBILITY

The purpose of the SANSA Audit and Risk Committee is to assist the Board in fulfilling its oversight responsibility on the system of internal financial control, the governance of risk, internal and external audit functions and SANSA's processes for monitoring statutory and regulatory compliance.

The Audit and Risk Committee adopted its formal Terms of Reference in its Audit and Risk Charter, which are updated annually and approved by the Board. During the past financial year, the Committee has carried out its duties in accordance with its terms of reference, the Public Finance Management Act, the National Treasury Regulations 3.1.13 and King IV report on Corporate Governance.

COMMITTEE MEMBERS AND ATTENDANCE

The Audit and Risk Committee consists of the members as stated on page 78 of this report. In accordance with its approved Terms of Reference, the Committee convened at least four meetings during the year under review. The meetings and schedule of attendance is shown on page 78 of this report.

The Chief Executive Officer, Chief Financial Officer, senior executives and management of SANSA, and representatives of the external and internal auditors attend the Committee meetings by invitation. The Committee also periodically meets separately with external auditors and internal auditors. The internal and external auditors have unrestricted access to the Audit and Risk Committee.

The Chairperson of the Committee reports to the Board, after each Committee meeting, on the key issues which have been raised and discussed by the Committee.

COMMITTEE EVALUATION

An internal evaluation of the effectiveness of the Committee was conducted together with the overall review of the Board and other Board Committees. The results of the evaluation were discussed by the Committee. In accordance with the findings, it was concluded that the Committee continues to operate effectively and identified areas that required enhancement for the next financial year.

EXTERNAL AUDITORS

In execution of its statutory duties during the past financial year, the Audit and Risk Committee:

- Determined the fees to be paid to external auditors as disclosed in Note 25.
- Determined the terms of engagement with external auditors.
- Supported the reappointment of Nexia SAB&T in terms of section 4(3) of the Public Audit Act, which was duly approved by the Board and authorised by the AGSA.

Based on processes followed and assurances received, nothing has come to our attention with regard to the independence of the external auditors.

RISK MANAGEMENT

The Committee has received assurances that SANSA has risk management processes focused on identifying, assessing, managing, and monitoring significant risks across all operations. This has been in place for the year under review and up to the date of approval of the Annual Financial Statements.

INTERNAL AUDIT

The Internal Audit Unit is responsible for evaluating the control environment and assisting the Audit and Risk Committee to fulfil its responsibilities. The Internal Audit unit has been operating satisfactorily and successfully completed its approved annual plan for the 2020/2021 financial year. The function has remained effective and independent of the management function.

The Internal Audit unit aligned its audit coverage in line with the SANSA identified risks, management requests and Committee guidance. The Committee approved the Internal Audit Charter and the three-year rolling strategic plan inclusive of a one-year operational audit plan. The Audit and Risk Committee is satisfied as to the effectiveness of the internal audit function during the year and that the internal audit activity has addressed the risks pertinent to SANSA.

In addition, the committee has:

- Evaluated the independence, effectiveness and performance of the internal audit function and compliance with its mandate.
- Satisfied itself that the internal audit function has the necessary resources, budget, standing and authority within SANSA to enable it to discharge its functions.
- Encouraged co-operation between external and internal audit.

The internal audit manager reported functionally to the Audit and Risk Committee and had unrestricted access to the Committee Chairperson.

THE EFFECTIVENESS OF INTERNAL CONTROLS

The Audit and Risk Committee has reviewed:

- The effectiveness of the entity's internal financial control systems, including receiving assurance from management, internal audit, and external audit.
- Significant issues raised by the internal and external audit process, including the manner in which they were/are being resolved.

Based on the processes and assurance obtained, we believe that the significant internal financial controls that were in place were effective.

However, internal controls with regards to proper recordkeeping, processing and reconciling control, compliance and the implementation of audit action plans require significant improvement. Management has indicated that these controls are being addressed currently by way of instilling financial discipline with regards to monthly reconciliations, proper recordkeeping of all transactions, improved communication and review of controls and systems to identify and improve on deficiencies.

The Committee had limited oversight over IT Governance due to lack of human resources in the Agency, however the matter is being addressed by ensuring that IT is adequately capacitated.

The Committee notes that some issues are now identified and remain open for the second consecutive year, and this has been highlighted for specific intervention at the Board and with Executive management.

FINANCE FUNCTION

Mr Bongoza was appointed as the interim Chief Financial Officer following the resignation of Ms Bulelwa Pono from SANSA effective 31 August 2020. A process of recruitment for a permanent CFO is underway. The committee is concerned with the expertise and adequacy of resources within the finance function, especially given the late submission of the Annual Financial Statements. This matter is being investigated to fully understand the extend of the underlying challenges, to allow management to put mitigating measures to avoid a recurrence of this compliance requirement.

In making these assessments, the committee obtained feedback from management as well as from both external and internal audit.

GOING CONCERN

The Committee concurs with the Executive Management that the adoption of the going concern premise in the preparation of the Annual Financial Statements is appropriate.

EVALUATION OF THE 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 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 has evaluated the Annual Financial Statements for the year ended 31 March 2021 and, based on the information provided, the Committee considers that it complies, in all material respects apart from the late submission of the Annual Financial Statements, with the requirements of the various Acts and Accounting Standards governing disclosure and reporting on the Annual Financial Statements.

AUDITORS' REPORT

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.

ANNUAL REPORT

Based on processes and assurances obtained, we recommend the Annual Report to the Board for approval.

Ms Innocentia Pule
Chairperson of the Audit and Risk Committee

Part D

HUMAN RESOURCES MANAGEMENT

OVERVIEW OF SANSA HUMAN RESOURCE MATTERS

HUMAN RESOURCE PRIORITIES FOR THE 2020/21 FINANCIAL YEAR

HR overview

The COVID-19 pandemic has radically changed the way we work and changed expectations in terms of the manner in which institutions operate. The 2020/21 financial year has been a unique and very demanding year due to the National Lockdown announced by the President which necessitated a risk adjusted strategy for economic activity. On 1 May 2020, the country moved to the Alert Level 4 COVID-19 risk level, signifying the end of the most stringent lockdown measures taken. That had implications for all sectors of society and SANSA needed to conform to the government requirements in this regard. SANSA needed to act fast and ensure that all the necessary precautionary measures were taken to avoid any risks. An HR COVID-19 Action plan was developed. The plan provided guidance and procedures to follow during the crisis. The plan was designed based on the risk levels and reviewed regularly to align to the Government's alert levels, restrictions and directives as required. All decisions were made with the health and safety of employees, their families, and the community in mind, and with the best-available guidance provided by the South African Government.

All employees were segmented according to their risk levels and profiles and a rotational work from home schedule was introduced. All SANSA worksites are disinfected and fumigated on quarterly basis. All required Personal Protective Equipment was procured for employees at all sites to ensure that employees have all the necessary tools to perform their duties under safe working conditions. Not all SANSA employees had returned to the office on a full-time basis as at year-end due to COVID-19 protocols and the available office space capacity.

Despite the adjustments to the "new normal" focus areas for HR included the development and implementation of initiatives aimed at transforming SANSA into a high performing Agency. To this end the following strategies have been developed/ reviewed:

- Human Resources Strategy
- Business Model and Macro Structure

All the above were aimed at steering SANSA in the right direction in terms of it becoming a more fit-for-purpose Agency that can deliver on the 2020-2025 strategic outcomes in alignment with the Africa-centric strategic focus. The Human Resources Management Strategic Plan 2020-2025 is focusing on initiatives that are designed to: (i) enhance the effectiveness of planning and implementation of programmes, (ii) remain responsive to change, and (iii) to provide a mechanism to enable SANSA programmes to work seamlessly to contribute to the attainment of SANSA's mandate. The SIH project presents an opportunity to fully meet SANSA's mandate.

ORGANISATIONAL DEVELOPMENT

As the outcome of the executive team development programme initiated in 2020, the organisational culture change, business model and the macro structure projects were commissioned. Some of the important focus areas for the executive development were the implementation of quality circles, organisational storytelling, based on appreciative enquiry principles, the development of service level agreements for SANSA support services, stakeholder analysis, internal branding drive, development of a story board defining SANSA's culture and a review of the current induction and onboarding practices. These are on-going initiatives to move SANSA to be a value-driven and mission-led organisation. To this end, the current set of values will be reviewed, to instil a more appropriate set of values that will drive the right behaviours across the organisation. One of the initiatives is the development of the SANSA Employee Value Proposition (EVP) based on the following pillars:

- **Compensation and benefits** –the importance of fair pay and incentives alongside the increasing importance of non-financial benefits;
- **Work environment** –the promise of positive work conditions with a sense of personal achievement, recognition and a healthy work-life balance;
- **Career** –the promise of job security, progression, career development and continuous feedback; and
- **Culture** –an inclusive culture with a sense of social responsibility, management style, team spirit and unity behind the Agency's vision and values.

Salary parity exercise

Employers should always monitor their income differentials to ensure that these do not contribute to unfair discrimination. This requires a comparison of jobs as well as a job evaluation system that is objective, rational and applied consistently to all job functions.

SANSA has embarked on a job grading and salary parity exercise. This exercise has never been done since SANSA's inception in 2011, jobs have been graded as and when required or when a new position is created. There have also been several changes in the organisation over time and the job done by individuals have either changed or increased.

It is therefore important to ensure that the jobs within SANSA are analysed, profiled, and graded correctly. The salaries being offered for these positions must be internally consistent as per "equal pay for work of equal value principle "and in line with the external market.

WORKFORCE PLANNING FRAMEWORK AND STRATEGIES TO RECRUIT, RETAIN AND DEVELOP A SKILLED AND CAPABLE WORKFORCE

Talent management

SANSA's Talent Management Framework was developed to facilitate and promote the achievement of business objectives and is premised on a set of integrated organisational HR processes designed to attract, develop, motivate, and retain productive, engaged employees. SANSA's Talent management processes make sure that the organisation has sufficient supply of talented employees to meet the organisational goals. This aspect is important for SANSA, especially in the wake of the ever-changing business environmental factors such as political, social, and economic factors, and due to the COVID-19 pandemic.

The new SANSA strategic plan 2020-2025 brings with it new skills set requirements. For this purpose, a skills audit exercise is planned and will also enable the development of a workforce and employment equity plan that will address the transformation agenda. It is therefore critical that all planned talent management initiatives are not implemented in isolation, but in support of the new business model and strategy. As a result of the new business focus, SANSA's Talent Management Framework will need to be reviewed to ensure alignment with the new business model, and the implementation of other key integrated HR processes, such as Employment Equity (EE), Broad-Based Black Economic Empowerment (B-BBEE), Work Skills Plan (WSP), Recruitment and Retention Plans.

Career development

SANSA has implemented Career Discussions which form part of the Mid-Year Performance Review process. Through these formal career discussions employees now can discuss their respective career aspirations and may request nomination to be part of the SANSA talent pool. SANSA has also introduced career ladders for researchers to provide them with growth opportunities, while developing their expertise, gaining experience, and growing their profiles. Researchers are afforded a robust and transparent process to measure their progression and reward their career advancement from junior (candidate researchers) to senior levels (principal and chief researcher levels). The aim of the career ladder is to set guidelines that allow career progression and to address a general inability to attract and retain highly talented employees.

Skills development and training

Employee skills development and capacitation initiatives continue to be a priority for the Agency. It is one of the HR strategic goals to deliver effective and impactful learning and development initiatives.

Youth development: volunteers and job shadowing

One of SANSA's strategic goals is the effective development of human capital. SANSA believes that developing the youth will ultimately contribute to the development of human capital for the country. Youth development initiatives are aimed at addressing the youth unemployment challenge, targeting unemployed graduates for volunteering opportunities and leaners for job shadowing. The funding of Volunteers through the South African Agency for Science and Technology Advancement (SAASTA) grants was on hold at the end of the year and impacted this initiative.

Internships and in-service trainees

Due to restrictions related to the COVID pandemic, the in-service trainees and interns did not have sufficient physical exposure to their mentors and colleagues to gain more in-depth experience. Their contracts were therefore extended for a further period of 12 months to enable them to gain more hands-on work experience. During the year of reporting SANSA hosted a total number of 17 interns including students.

EMPLOYEE PERFORMANCE MANAGEMENT FRAMEWORK

Performance management

The Agency is going through a massive growth due to the recent investment funding. To fulfil the objectives of the investors the organisation must be performing optimally and provide returns on the investments. An effective performance management system creates a shared understanding about what is to be achieved, how it is to be achieved; and the implications where it is not achieved. Performance Management should also involve the training and development of employees. As we move in this new direction, different and new skill sets are needed. One of the key priorities for the financial year under review was to ensure an effective and efficient performance management system that provides for growth, accountability, and recognition.

EMPLOYEE WELLNESS PROGRAMME

Careways (SANSA's wellness partner) reported there has been an increase in the uptake of Wellness Support Programs in the year of reporting, 40% compared to last year's 20%. These included face to face counselling and telephonic counselling, legal advice, and trauma interventions. This increase is not a surprise looking at how difficult this year was for all SANSA employees.

HUMAN RESOURCE POLICY DEVELOPMENT

The HR policy review project was halted due to the finalisation of the new SANSA business model. A need was recognised for allowing this process to conclude and ensure all SANSA Policies, Processes and Procedures align to the new business model. The HR policies review process is envisaged to resume in the 2021/22 financial year.

KEY HIGHLIGHTS/ACHIEVEMENTS FOR THE YEAR

The approval of the new SANSA business model and the macro structure sets the tone for all planned HR interventions to be implemented in the coming year. The approved Human Resources Strategy for 2020-2025 sets out the strategic direction of the SANSA Human Resource function, which is to be reviewed and implemented through annual plans. The aim of the Plan is to ensure that the Agency's remains focused on delivering professional and enabling HR services that are aligned to the strategic priorities, as outlined in the SANSA strategic Plan for the 2020-2025 five-year term.

SANSA's registration with the Public Services Sector Education and Training Authority (PSETA), the approval of the first submission of the Workplace Skills Plan (WSP) for 2020-2021 together with the Annual Training Report were some of the highlights for the period under review. More so given the positive impact expected on the SANSA B-BBEE score.

OVERVIEW OF KEY CHALLENGES

SAGE Enterprise Resource Planning (ERP) System

SANSA is currently implementing a stand-alone SAGE 300 People module due to the phasing out the HR module from SAGE X3. As at financial year-end the Agency was in the process of stabilising the outstanding issues and upgrading various modules in preparation and support of the new business model. This will protect the developments that SANSA has made to date and further upgrades have been planned for the new financial year to move migrate from Version9 to Version12. This will bring further enhancements and latest technology with a cloud ready ERP system.

Human Resource goals/future plans

Organisational alignment and culture remain a key focus for SANSA. For the Agency to succeed and be sustainable there is a critical need for strategic alignment which should be viewed as not only aligning the human resources but also other resources within SANSA. The new business model/ organisational design will provide direction to the planned initiatives e.g., skills audit in terms of understanding what type of skills the organisation needs now and, in the future, to fulfil its mandate.

The development of the change management plans for SANSA is critical in addressing some of the challenges highlighted in the HR Strategy. Specific actions have been identified in the 2021/22 HR plans to support the achievement of SANSA's outcomes and objectives and these include the following:

- Conducting a Skills Audit
- Development of a Workforce Plan
- Implementation of a Change Management Programme
- A review of the Talent Management Framework
- A review of the Employment Equity (EE) Plan
- A review of HR policies, processes, and procedures
- Continuous Employee Learning and Development

HUMAN RESOURCE OVERSIGHT STATISTICS

PERSONNEL COST BY PROGRAMME

Programme	Total expenditure for the entity (R'000)	Personnel expenditure (R'000)	Personnel expenditure as a % of total expenditure	Number of employees	Average personnel cost per employee (R'000)
Programme 1: Administration Programme 3: Space Engineering	64 354 114	42 190 397	66	48	878 967
Programme 2: Earth Observation	66 521 395	18 456 472	28	22	838 931
Programme 3: Space Science	50 227 443	31 978 847	64	66	484 528
Programme 4: Space Operations	81 999 068	39 949 468	49	57	700 868
Total	263 102 020	132 575 184	50	193	686 918

Table 21: Personnel cost by programme

PERSONNEL COST BY SALARY BAND

Level	Personnel expenditure (R'000)	% of personnel expenditure to total personnel cost	Number of employees	Average personnel cost per employee (R'000)
Top management	2 412 998	2.03	1	2 412 998
Senior management	9 234 227	7.76	6	1 539 038
Professional qualified	49 679 951	41.76	57	871 578
Skilled	51 478 523	43.27	97	530 706
Semi-skilled	5 615 574	4.72	27	207 984
Unskilled	548 797	0.46	5	109 760
Total	118 970 070	100	193	616 425

Table 22: Personnel cost by salary band

PERFORMANCE REWARDS

Level	Performance rewards (R'000)	Total personnel expenditure (R'000)	% of performance rewards to total personnel expenditure
Top management	0	2 412 998	–
Senior management	–	9 234 227	–
Professional qualified	946 428	49 679 951	0.80
Skilled	2 094 244	51 478 523	1.76
Semi-skilled	144 852	5 615 574	0.12
Unskilled	0	548 797	–
Total	3 185 524	118 970 070	2.68

Table 23: Performance rewards

TRAINING COSTS

Programme	Total personnel expenditure (R'000)	Total training expenditure (R'000)	Training expenditure as a % of personnel total expenditure	Number of employees trained	Average training cost per employee (R'000)
Programme 1: Administration and Programme 5: Space Engineering	42 190 397	841 460	2	48	7 474
Programme 2: Earth Observation	18 456 472	485 925	3	22	22 087
Programme 3: Space Science	31 978 847	308 460	1	66	4 674
Programme 4: Space Operations	39 949 468	395 347	1	57	6 936
Total	132 575 184	2 031 192	1.5	193	6 671

Table 24: Training costs

EMPLOYMENT AND VACANCIES PER PROGRAMME

Programme	2019/20 number of employees	2020/21 approved posts	2020/21 number of employees	2020/21 vacancies	% of vacancies
Programme 1: Administration	36	52	43	14	27
Programme 2: Earth Observation	22	46	22	24	52
Programme 3: Space Science	58	78	66	12	15
Programme 4: Space Operations	58	58	57	1	2
Programme 3: Space Engineering	5	41	5	36	88
Total	179	275	193	87	32

Table 25: Employment and vacancies per programme

EMPLOYMENT AND VACANCIES PER EMPLOYEE LEVEL

Level	2019/20 number of employees	2020/21 approved posts	2020/21 number of employees	2020/21 vacancies	% of vacancies
Top management	1	1	1	–	–
Senior management	6	6	6	–	–
Professional qualified	52	129	57	72	56
Skilled	97	110	97	13	12
Semi-skilled	23	29	27	2	7
Unskilled	0	0	5	–	–
Total	179	275	193	87	32

Table 26: Employment and vacancies per employee level

EMPLOYMENT CHANGES

Level	Employment at beginning of 2020/21 financial year	Appointments	Terminations	Employment at end of the 2020/21 financial year
Top management	1	0	0	1
Senior management	6	1	1	6
Professional qualified	51	12	6	57
Skilled	96	8	7	97
Semi-skilled	23	4	0	27
Unskilled	3	5	3	5
Total	180	30	17	193

Table 27: Employment changes

There were 30 appointments made during the financial year while the Agency had 17 terminations from different occupational levels, including retirement, resignations, and contract terminations. The vacancy rate increased as new positions were introduced and approved in preparation for the SIH and associated projects across different SANSA Programmes. More recruitment is expected in the new financial year; however, this will be done in alignment with the available financial resources.

REASON FOR EMPLOYEES LEAVING

Reason	**Number of employees**	**% of total number of employees leaving**
Death	–	–
Resignation	10	5
Dismissal	–	–
Retirement	1	0.5
Ill health	–	–
Contract expiry	6	3
Other	–	–
Total	17	9

Table 28: Reason for employees leaving

LABOUR RELATIONS –MISCONDUCT AND DISCIPLINARY ACTION

Nature of disciplinary action	**Number**
Verbal warning	–
Written warning	–
Final written warning	–
Dismissal	–

Table 29: Labour relations –Misconduct and disciplinary action

EMPLOYMENT EQUITY STATUS

Occupational levels	Male				Female				Persons with disabilities		Total
	A	C	I	W	A	C	I	W	Male	Female	
Top management	0	0	1	0	0	0	0	0	0	0	1
Senior management	1	0	1	1	1	0	0	2	0	0	6
Professional qualified	9	2	5	19	14	0	2	5	1	0	57
Skilled	35	5	4	10	29	4	1	9	0	0	97
Semi-skilled	10	2	0	1	10	4	0	0	0	0	27
Unskilled/interns	2	0	0	0	3	0	0	0	0	0	5
Total	57	9	11	31	57	8	3	16	1	0	193

Table 30: Employment equity status

The Department of Labour proposed Sectorial Equity Targets to ensure that sectors implement EE requirements and transform accordingly. This Department highlighted that the sector in general has not made much progress to transform with regards to designated categories of employees at different occupational levels. The female representation within the Science, Engineering and Technology job categories (SET) was also not at the desired level in the period under review as females are still underrepresented. This is not just a SANSA challenge, but a national challenge caused by insufficient specialised skills amongst employable females. The Agency submitted a response to the proposed targets which are in line with the SANSA EE targets with respect to adequate representation in terms of race and gender in line with the organisational and national transformation objectives.

Part E

FINANCIAL INFORMATION

REPORT OF THE EXTERNAL AUDITOR

Independent Auditor's Report to Parliament on the South African National Space Agency

Report on the audit of the financial statements

Opinion

1. We have audited the financial statements of the South African National Space Agency set out on pages 100 to 154, which comprise the statement of financial position as at 31 March 2021, statement of financial performance, statement of changes in net assets and cash flow statement and statement of comparison of budget information with actual information for the year ended, as well as the notes to the financial statements, including a summary of significant accounting policies.

2. 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 2021, and its financial performance and cash flows for the year then ended in accordance with South African Standards of Generally Recognised Accounting Practice (GRAP) and the requirements of the Public Finance Management Act of South Africa, 1999 (Act No.1 of 1999) (PFMA).

Basis for opinion

3. 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.

4. We are independent of the public entity in accordance with Independent Regulatory Board for Auditors' *Code of Professional Conduct for Auditors* (IRBA Code) and other independence requirements applicable to performing audits of 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 corresponding sections of the *International Ethics Standards Board for Accountants' International Code of Ethics for Professional Accountants (Including International Independence Standards)*.

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

Responsibilities of accounting authority for the financial statements

6. The board, which constitutes the accounting authority is responsible for the preparation and fair presentation of the financial statements in accordance with SA Standards of 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.

7. In preparing the financial statements, the accounting authority is responsible for assessing the 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 entity or to cease operations, or has no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

8. 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 aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

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

Report on the audit of the annual performance report

Introduction and scope

10. In accordance with the Public Audit Act of South Africa of 2004 (PAA) and the general notice issued in terms thereof, we have a responsibility to report on the usefulness and reliability of the reported performance information against predetermined objectives for selected strategic goals presented in the annual performance report. We performed procedures to identify material findings but not to gather evidence to express assurance.

11. Our procedures address the usefulness and reliability of 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 included in the planning documents. Our procedures do not examine whether the actions taken by the public entity enabled service delivery. Our procedures do not extend to any disclosures or assertions relating to the extent of achievements in the current year or planned performance strategies and information in respect of future periods that may be included as part of the reported performance information. Accordingly, our findings do not extend to these matters.

12. 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 strategic goal presented in the annual performance report of the entity for the year ended 31 March 2021:

Strategic goal	Pages in the annual performance report
Goal 2: The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services	50 – 52

13. 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

14. We did not raise any material findings on the usefulness and reliability of the reported performance information for the following strategic goal:

- **Goal 2:** The building of core space infrastructure, both ground and space based, that will enable the delivery of essential space services

Other matter

15. We draw attention to the matter below. Our opinion is not modified in respect of this matter.

Achievement of planned targets

16. Refer to the annual performance report on pages 50 to 52 for information on the achievement of planned targets for the year and explanations provided for the under/over achievement of targets.

Report on the audit of compliance with legislation

Introduction and scope

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

18. The material findings on compliance with specific matters in key legislations are as follows:

Annual financial statements

19. The financial statements were not submitted for auditing within the prescribed period after the end of financial year, as required by section 55(1)(c)(i) of the PFMA.

20. The financial statements submitted for auditing were not prepared in accordance with the prescribed financial reporting framework as required by section 55(1) (b) of the PFMA. There were material misstatements in the submitted financial statements regarding the Receivables from exchange transactions (comparative figures), Revenue: Rendering of services (comparative figures), the impairment expense (current year) and the related disclosable items. The entity subsequently corrected the financial statements, resulting in an unqualified audit opinion being issued.

Other information

21. The accounting authority is responsible for the other information. The other information comprises the information included in the annual report, which includes the accounting authority's reports and the audit committee's report. The other information does not include the financial statements, the auditor's report and the selected strategic goal presented in the annual performance report that have been specifically reported in this auditor's report.

22. 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.

23. 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 strategic goal presented in the annual performance report, or our knowledge obtained in the audit, or otherwise appears to be materially misstated.

24. If based on the work we have performed, we conclude that there is a material misstatement in this other information, we are required to report that fact. I have nothing to report in this regard.

Internal control deficiencies

25. We considered internal control relevant to our audit of the financial statements, reported performance information and compliance with applicable legislation; however, our objective was not to express any form of assurance on it. The matters reported below are limited to the significant internal control deficiencies that resulted in the non-compliance findings.

26. Management did not adequately implement proper record keeping in a timely manner to ensure that complete, relevant, and accurate information was available to support financial reporting, which resulted in the financial statements not been submitted for audit purposes within two months after the financial year-end, and material misstatements been identified by the auditors, which were subsequently corrected by management.

Other reports

27. We draw attention to the following engagement conducted by various parties that have or could potentially have an impact on the public entity's financial statements, reported performance information and compliance with applicable legislation and other 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

28. 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 2020 to 31 December 2020 and was issued to the South African National Space Agency management on the 14 June 2021.

Auditor tenure

29. We report that Nexia SAB&T has been the auditor of the South African National Space Agency for 4 years.

Nexia SAB&T
Per: A Darmalingam
Director
Registered Auditor

25 August 2021

119 Witch-Hazel Avenue
Highveld Technopark
Centurion

Annexure – Auditor's responsibility for the audit

1. 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 strategic goals and on the entity's compliance with respect to the selected subject matters.

Financial statements

2. In addition to our responsibility for the audit of the financial statements as described in this 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 in order 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 Board, which constitutes the accounting authority.

   - Conclude on the appropriateness of the Board, which constitutes 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 relating to events or conditions that may cast significant doubt on the ability of South African National Space Agency's 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 my opinion on the financial statements. Our conclusions are based on the information available to me at the date of this auditor's report. However, future events or conditions may cause an entity to cease operating as a going concern.

   - Evaluate the overall presentation, structure, and content of the financial statements, including the disclosures, and determine whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

Communication with those charged with governance

3. 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.

4. 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, actions taken to eliminate threats or safeguards applied.

STATEMENT OF FINANCIAL POSITION

As at 31 March 2021

	Note	2021 R	2020 R
ASSETS			
Current assets		**286 915 597**	242 379 452
Cash and cash equivalents	5	**261 845 641**	203 019 904
Receivables from exchange transactions	6	**24 663 464**	38 930 233
Inventory	7	**406 492**	429 315
Non-current assets		**480 223 046**	489 481 486
Property, plant and equipment	8	**464 908 381**	473 732 757
Intangible assets	9	**15 314 665**	15 748 729
Total assets		**767 138 643**	731 860 938
LIABILITIES			
Current liabilities		**138 095 338**	122 251 902
Trade and other payables from exchange transactions	10	**25 951 086**	23 377 712
Provisions	11	**10 774 988**	8 543 939
Committed conditional grant liability	12	**101 201 546**	90 330 251
Operating lease liability	14	**167 718**	–
Total liabilities		**138 095 338**	122 251 902
NET ASSETS		**629 043 305**	609 609 035
Accumulated surplus		**629 043 305**	609 609 035
Total net assets		**629 043 305**	609 609 035

STATEMENT OF FINANCIAL PERFORMANCE

For the year ended 31 March 2021

	Note	2021 R	2020 R
REVENUE			
Revenue from non-exchange transactions			
Transfers and subsidies received	13.01	**200 771 668**	205 252 897
Revenue from exchange transactions			
Interest income	15	**4 421 044**	8 776 320
Rendering of services	16	**75 641 739**	102 884 483
Other income	17	**1 701 946**	801 425
Net gains on foreign exchange transactions	26	**–**	449 827
Total revenue		**282 536 397**	318 164 952
EXPENDITURE			
Employee and employee related costs	18	**130 543 992**	125 100 689
Board member remuneration	19	**810 044**	887 900
Depreciation and amortisation	20	**24 138 519**	22 297 020
Repairs and maintenance	8.1	**10 653 754**	8 916 292
Data licence fees	21	**29 314 713**	37 362 760
Student bursaries and research grants paid	22	**7 318 282**	6 880 555
Antenna infrastructure services	23	**4 131 869**	7 362 586
Training expenses	24	**2 031 192**	2 180 774
General expenses	25	**49 375 150**	51 456 505
Net losses on foreign exchange transactions	26	**1 410 961**	–
Net losses on disposal of property, plant and equipment		**194 024**	450 397
Irrecoverable sundry debtors	28.1	**–**	50 144
Impairment of accounts receivable	28.2	**3 179 627**	5 345 386
Total expenditure		**263 102 127**	268 291 008
SURPLUS FOR THE YEAR		**19 434 270**	49 873 944

STATEMENT OF CHANGES IN NET ASSETS

For the year ended 31 March 2021

Description	Note	Accumulated surplus R	Total R
2020			
Balance at 1 April 2019		526 355 781	526 355 781
Land recognition	8.3	33 379 310	33 379 310
Restated Surplus		49 873 943	49 873 943
Surplus for the year as previously reported		51 104 576	51 104 576
Prior year error on Rendering of Services		(1 300 000)	(1 300 000)
Prior year error on Impairment of Accounts Receivable		69 367	69 367
Restated balance as at March 2020		609 609 035	609 609 035
2021			
Balance at 1 April 2020		**609 609 035**	**609 609 035**
Surplus for the year		**19 434 270**	**19 434 270**
Balance at 31 March 2021		**629 043 305**	**629 043 304**

CASH FLOW STATEMENT

For the year ended 31 March 2021

	Note	2021 R	2020 R
CASH FLOWS FROM OPERATING ACTIVITIES			
Receipts			
Transfers and subsidies	13.02	**209 250 250**	251 267 974
Sales of goods and services		**88 830 704**	94 994 250
Interest income	15	**4 421 044**	8 776 320
Other receipts	17	**1 701 946**	801 425
Payments			
Employee costs		**(122 713 583)**	(111 610 367)
Suppliers		**(107 894 313)**	(122 168 939)
NET CASH FLOWS FROM OPERATING ACTIVITIES	27	**73 596 049**	122 060 664
Cash flows from investing activities			
Acquisition of property, plant and equipment	8	**(13 697 396)**	(32 914 388)
Proceeds on sale of fixed assets		**370 359**	208 442
Acquisition of intangible assets	9	**(1 443 275)**	(7 448 656)
NET CASH FLOWS (USED IN) INVESTING ACTIVITIES		**(14 770 311)**	(40 154 602)
NET INCREASE IN CASH AND CASH EQUIVALENTS		**58 825 737**	81 906 062
Cash and cash equivalents at the beginning of the year		**203 019 904**	121 113 842
Cash and cash equivalents at the end of the year	5	**261 845 641**	203 019 904

STATEMENT OF COMPARISON OF BUDGET AND ACTUAL AMOUNTS

For the year ended 31 March 2021

	Note	Original budget 2020/21 R	Revised budget 2020/21 R	Actual amounts on a comparable basis 2020/21 R	Difference 2020/21 R
REVENUE					
Revenue from non-exchange transactions		192 267 188	294 739 994	186 981 497	(107 758 497)
Operational transfers		151 924 000	149 242 000	149 242 000	–
Ring fenced transfers	4.3.1	31 574 646	133 972 680	24 954 000	(109 018 680)
Research grants		6 333 042	6 759 481	7 385 497	626 016
Post graduate student bursary support	4.3.2	2 435 500	4 765 833	5 400 000	634 167
Revenue from exchange transactions	4.3.3	78 864 065	72 807 849	75 641 740	2 833 890
Contract income: public		26 496 210	17 041 415	18 005 285	963 870
Contract income: private		5 513 038	5 375 025	5 604 879	229 854
Contract income: foreign		46 854 816	50 391 409	52 031 576	1 640 166
Other income	4.3.4	2 794 628	2 868 060	6 122 990	3 254 930
Prior years surplus retained		–	103 719 884	103 719 884	–
Total revenue		273 925 881	474 135 788	372 466 112	(101 669 678)
EXPENDITURE					
Current payments					
Employee and employee related costs	4.3.5	157 213 815	141 762 600	130 543 992	11 218 608
Board member remuneration		977 271	1 002 271	810 044	192 227
Depreciation and amortisation			–	24 138 519	(24 138 519)
Repairs and maintenance	4.3.6	9 864 155	19 663 252	10 653 754	9 009 498
Data licence fees	4.3.7	16 553 356	36 822 614	29 314 713	7 507 900
Student bursaries and research grants paid	4.3.8	2 815 233	29 523 881	7 318 282	22 205 599
Antenna infrastructure services	4.3.9	–	5 392 575	4 131 869	1 260 706
Training expenses	4.3.10	3 258 419	4 859 421	2 031 192	2 828 229
General expenses	4.3.11	67 120 853	94 970 194	49 375 150	45 595 044
Net losses on foreign exchange transactions			174 950	1 410 961	(1 236 011)
Net losses on disposal of property, plant and equipment		–	–	194 024	(194 024)
Impairment of receivables		–	–	3 179 627	(3 179 627)
		257 803 101	334 171 758	263 102 127	71 069 631
Payments for capital assets					
Machinery and equipment	4.3.12	3 727 200	17 297 277	4 866 293	12 430 984
Software and intangible assets	4.3.12	1 000 000	4 385 000	1 443 275	2 941 725
Vehicles	4.3.12	800 000	1 020 000	–	1 020 000
Buildings and other fixed structures	4.3.13	–	33 464 658	1 928 806	31 535 852
AIT facility	4.3.14	4 704 676	38 754 676	1 990 192	36 764 484
Computer equipment	4.3.12	4 421 500	43 954 488	4 912 105	39 042 383
Satellite development	4.3.15	1 469 403	1 087 931	–	1 087 931
		16 122 779	139 964 030	15 140 672	124 823 358
Total expenditure		273 925 881	474 135 788	278 242 799	195 892 989
Surplus/deficit		–	–	94 223 313	94 223 311

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	109 363 985	–	–	109 363 987
Basis differences	(35 767 936)	–	(14 770 311)	(50 538 248)
Actual amount in cash flow statement	73 596 049	–	(14 770 311)	58 825 737

NOTES TO THE FINANCIAL STATEMENTS

For the year ended 31 March 2021

1. 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 within the framework of national government.
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 Innovation
Board members	Appointed 1 September 2018 Ms X Kakana (Chairman of the Board) Mr S Hamilton (Resigned November 2020) Mr E Jansen Ms N Majaja (Chairman of Human Resources, Social and Ethics Committee) Adv I Kealotswe-Matlou Ms M Matooane (Resigned) Ms M Mfeka Ms L Msibi Dr V Munsami (Chief Executive Officer) Prof. A Muronga Mr A Naidoo Mr J Prinsloo (Chairman of Strategy and Investment Committee) Ms M Paul Ms I Pule (Chairman of Audit and Risk Committee) Mr W Van Biljon
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	Nexia SAB&T (012) 682 8800 119 Witch-Hazel Avenue Highveld Technopak, Centurion

ACCOUNTING POLICIES

For the year ended 31 March 2021

2. 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.

2.1 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.

2.2 Critical judgements, estimations and assumptions

2.2.1 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.

2.2.2 Judgements and estimations

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: Significant accounting policies, which have been consistently applied, are disclosed below. Details of any changes in accounting policies are explained in the relevant policy:

Determination of adequacy of leave pay provision The leave pay provision is based on actual days leave due to employees at their rate of remuneration. Remuneration increases take effect annually at the beginning of the financial year. In determining the provision, itis assumed that no leave will be forfeited. The assumption is based on past history

Determination of useful lives for property, plant and equipment In determining the useful lives of items of property, plant and equipment, consideration is given to the physical condition and the depreciation period of replacing the assets. The assets that exceeded the industry norms useful lives are re-assessed for physical condition and the estimated remaining useful lives for future use is assessed.

2.2.3 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 2.7.2 on Financial Assets Classification and Accounting Policy 2.7.3 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.

2.2.4 Impairment of financial assets

Accounting Policy 2.7.5 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.

2.2.5 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.

2.2.6 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.

2.2.7 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.

2. BASIS OF PRESENTATION (CONTINUED)

2.2 Critical judgements, estimations and assumptions (continued)

2.2.8 Revenue recognition

Accounting Policy 2.9.2 on Revenue from Exchange Transactions and Accounting Policy 2.9.3 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 and prior year is appropriate.

2.3 Offsetting

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

2.3.1 Comparative Figures

Prior period comparative information has been presented in the current financial year. Where necessary, comparative figures have been adjusted to conform to changes in presentation in the current year.

2.4 Standards, amendments to standards and interpretations issued but not yet effective

Standard number	Standard name	Effective date (if applicable)
GRAP 25	Employee Benefits	No effective date yet
GRAP 104	Financial instruments	No effective date yet
iGRAP 7	Limit on a defined benefit asset minimum funding requirements and their interaction	No effective date yet

GRAP 25 – Employee benefits

The objective of this Standard is to prescribe the accounting and disclosure requirements for employee benefits when an entity prepares financial statements. The implementation of the statement will be applicable to SANSA and the financial impact is still being assessed.

GRAP 104 – Financial instruments

The objective of this Standard is to establish principles for recognising, measuring, presenting and disclosing financial instruments. This standard will have an impact on SANSA and the financial impact is still being assessed.

iGRAP 7 – Limit on a defined benefit asset minimum funding requirements and their interaction

This interpretation applies to all post-employment defined benefits and other long term employee defined benefits, this will be applicable to SANSA and the financial impact is still being assessed.

2.5 Property, plant and equipment

2.5.1 Initial recognition and subsequent measurement

Property, plant and equipment are measured at cost, net of accumulated depreciation and/or accumulated impairment losses. 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 are 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.

2.5.2 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. The estimated useful lives are reviewed at the end of each reporting period, with the effect of any changes in estimate accounted for on a prospective basis. 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

(b) Freehold buildings

SANSA identified the following major components of buildings:

- Buildings; and
- Alterations and other fixtures.

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

- Buildings 15 – 50 years ; and
- Alterations and other fixtures 14 – 15 year.

(c) Equipment and motor vehicles

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

- Office furniture 5 – 10 years;
- Motor vehicles 1 – 30 years;
- Computer equipment 1 – 40 years ;
- Research equipment & Laboratory 2 – 30 years;
- Plant and machinery 2 – 30 years;
- Office equipment 3 – 30 years; and
- Exhibits 1 – 20 years.

2. BASIS OF PRESENTATION (CONTINUED)

2.5 Property, plant and equipment (continued)

2.5.2 Depreciation (continued)

(d) Leasehold improvements 5 – 20 years These improvements are depreciated over the shorter of the contract period or the useful lives of the assets.

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

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

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.

2.5.3 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 internal service delivery purposes.

2.6 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
- 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 recognised in surplus or deficit when it is incurred.

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

- it is technically feasible to complete the asset so that it will be available for use or sale;
- there is an intention to complete and use or sell it;
- there is an ability to use or sell it
- it will generate probable future economic benefits
- there are available technical, financial and other resources to complete the development and to use or sell the asset; and
- the expenditure attributable to the asset during its development can be used reliably.

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 amortisation 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 amortisation 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 –10 years; and
- Intellectual Property: 1 –40 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.

2.7 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.

2.7.1 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.

2.7.2 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 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
Cash and cash equivalents	Financial instruments at amortised cost
Receivables from exchange transactions	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 and other receivables consists of amounts due by customers, deposits, and other debtors.

2.7.3 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

2. BASIS OF PRESENTATION (CONTINUED)

2.7 Financial instruments (continued)

2.7.4 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.

2.7.5 Impairment of financial assets

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). The loss on financial assets is determined as a difference between the carrying amount and the present value of the estimated future cash flow.

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. 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.

2.7.6 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.

2.7.7 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.

2.8 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; and
- 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.

2.9 Revenue recognition

2.9.1 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.

2.9.2 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.

2.9.2.1 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.

2. BASIS OF PRESENTATION (CONTINUED)

2.9 Revenue recognition (continued)

2.9.2 Revenue from exchange transactions (continued)

2.9.2.2 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.

2.9.3 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 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.

2.9.3.1 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.

2.9.3.2 Measurement

Revenue from a non-exchange transaction shall be measured at the amount of the increase in net assets recognised by the entity.

When, as a result of a non-exchange transaction, an entity recognises an asset, it also recognises revenue equivalent to the amount of the asset measured at its value as at the date of acquisition, unless it is also required to recognise a liability. Where a liability is required to be recognised it will be measured as at the best estimate of the amount required to settle the obligation at reporting date, and the amount of the increase in the net assets, if any, recognised as revenue. When a liability is subsequently reduced, because the taxable event occurs or a condition is satisfied, the amount of the reduction in the liability will be recognised as revenue.

2.10 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.

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

2.11 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.

2.12 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. Events after the reporting date that are classified as non-adjusting events have been disclosed in the notes to the Annual Financial Statements.

2.13 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.

2.14 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:

- 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.

2. BASIS OF PRESENTATION (CONTINUED)

2.15 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. A contingent liability can also arise as a result of a present obligation that arises from past events but which is not recognised as a liability either because it is not probable that an outflow of resources embodying economic benefits will be required to settle the obligation or the amount of the obligation cannot be measured with sufficient reliability. Contingent assets represent possible assets that arise 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. Contingent assets and contingent liabilities are not recognised. Contingencies are disclosed in the notes to the annual financial statements.

2.16 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 Performance.

2.17 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.

2.18 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.

2.19 Employee benefits

2.19.1 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.

2.20 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.

2.21 Inventory

The entity uses the weighted average costing method 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.

2.22 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 FINANCIAL STATEMENTS

For the year ended 31 March 2021

3. SEGMENT INFORMATION

3.1 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 programmes.

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.

3.2

	Corporate and Space Engineering R	Earth Observation R	Space Operations R	Space Science R	Eliminations R	Total R
2021						
REVENUE						
Revenue from non-exchange transactions						
Transfers and subsidies received	66 523 384	64 429 083	16 134 677	53 684 524	–	200 771 668
Revenue from exchange transactions						
Interest income	2 911 075	132 346	1 052 536	325 087	–	4 421 044
Rendering of services	–	4 607 740	62 189 849	8 844 150	–	75 641 739
Other income	865 552	500 620	358 582	130 664	(153 473)	1 701 946
Total revenue	70 300 012	69 669 789	79 735 644	62 984 425	(153 473)	282 536 397
EXPENDITURE						
Employee related costs	41 348 937	17 970 547	39 641 008	31 583 500	–	130 543 992
Board member remuneration	810 044	–	–	–	–	810 044
Depreciation and amortisation	1 317 070	3 087 556	14 505 409	5 228 485	–	24 138 519
Repairs and maintenance	582 533	2 255 925	5 773 416	2 041 880	–	10 653 754
Data licence fees	–	29 314 713	–	–	–	29 314 713
Student bursaries and research grants paid	–	2 685 465	–	4 632 817	–	7 318 282
Antenna infrastructure services	–	–	4 131 869	–	–	4 131 869
Training expenses	841 460	485 925	308 460	395 347	–	2 031 192
General expenses	19 842 663	2 277 453	21 238 875	6 169 633	(153 473)	49 375 150
Net losses on foreign exchange transactions	(65 485)	27 253	1 382 216	66 977	–	1 410 961
Net losses on disposal of property, plant and equipment	59 588	–	25 630	108 805	–	194 024
Impairment of accounts receivable	–	8 033 970	(4 854 342)	–	–	3 179 627
Total expenditure	64 736 810	66 138 805	82 152 541	50 227 443	(153 474)	263 102 127
Surplus (deficit) for the year	5 563 201	3 530 984	(2 416 897)	12 756 982	–	19 434 270
ASSETS						
Non-current –segment assets	325 785 164	22 260 279	100 879 937	31 297 667	–	480 223 046
Current –segment assets	160 103 602	6 262 473	67 231 578	53 317 944	–	286 915 598
Total segment assets	485 888 766	28 522 752	168 111 515	84 615 611	–	767 138 644
LIABILITIES						
Non-current segment liabilities						
Current segment liabilities	(73 062 912)	(18 715 004)	(5 823 840)	(40 493 583)	–	(138 095 338)
Total segment liabilities	(73 062 912)	(18 715 004)	(5 823 840)	(40 493 583)	–	(138 095 338)
Capital expenditure	2 006 717	5 212 315	2 700 359	5 221 280	–	15 140 672
Non-cash items excluding depreciation						
Accrued expenses	3 327 995	3 640 504	1 999 961	1 419 010	–	10 387 470
Deferred revenue	–	12 593 443	–	484 184	–	13 077 627

3. SEGMENT INFORMATION CONTINUED

3.2

	Corporate and Space Engineering R	Earth Observation R	Space Operations R	Space Science R	Eliminations R	Total R
2020						
REVENUE						
Revenue from non-exchange transactions						
Transfers and subsidies received	60 132 817	83 093 367	15 573 291	46 453 422	–	205 252 897
Revenue from exchange transactions						
Interest income	6 451 110	254 377	1 065 886	1 004 947	–	8 776 320
Restated rendering of services	–	11 274 693	82 252 829	9 356 961	–	102 884 483
Rendering of services as previously reported	–	12 574 693	82 252 829	9 356 961	–	104 184 483
Prior year error on rendering of services	–	(1 300 000)	–	–	–	(1 300 000)
Other income	356	176 716	303 003	624 352	(303 002)	801 425
Net gains on foreign exchange transactions	(235 701)	(17 425)	882 006	(179 053)	–	449 827
Total revenue	66 348 582	94 781 727	100 077 016	57 260 630	(303 002)	318 164 952
EXPENDITURE						
Employee and employee related costs	36 001 263	20 347 134	37 864 522	30 887 769	–	125 100 689
Board member remuneration	887 900	–	–	–	–	887 900
Depreciation and amortisation	1 659 168	1 057 210	13 367 260	6 213 382	–	22 297 020
Repairs and maintenance	123 126	1 158 546	5 767 560	1 867 060	–	8 916 292
Data licence fees	–	37 362 760	–	–	–	37 362 760
Student bursaries and research grants paid	–	1 559 878	–	5 320 677	–	6 880 555
Antenna infrastructure services	–	703 333	6 659 253	–	–	7 362 586
Training expenses	765 650	733 393	387 920	293 811	–	2 180 774
General expenses	17 520 363	4 682 798	19 868 403	9 687 943	(303 002)	51 456 505
Net losses on disposal of property, plant and equipment	114 388	48 097	105 882	182 030	–	450 397
Irrecoverable sundry debtors	–	–	–	50 144		50 144
Impairment of accounts receivable restated	–	474 460	4 870 926	–	–	5 345 386
Impairment of accounts receivable as previously reported	–	543 827	4 870 926	–	–	5 414 753
Prior year error on impairment of accounts receivable	–	(69 367)	–	–	–	(69 367)
Total expenditure	57 071 859	68 127 608	88 891 726	54 502 816	(303 002)	268 291 008

	Corporate and Space Engineering R	Earth Observation R	Space Operations R	Space Science R	Eliminations R	Total R
Surplus (deficit) for the year restated	9 276 722	26 654 119	11 185 289	2 757 813	–	49 873 943
Surplus (deficit) for the year as previously reported	9 276 722	27 884 752	11 185 289	2 757 813	–	51 104 576
Prior year error on rendering of services	–	(1 230 633)	–	–	–	(1 230 633)
ASSETS						
Non-current – segment assets	325 384 844	20 135 520	112 642 559	31 318 563	–	489 481 486
Current – segment assets restated	148 034 490	11 585 034	53 366 018	29 393 910	–	242 379 452
Current – segment assets previously reported	148 034 490	12 815 667	53 366 018	29 393 910	–	243 610 085
Prior year error on trade debtors	–	(1 230 633)	–	–		(1 230 633)
Total segment assets	473 419 333	31 720 554	166 008 577	60 712 473	–	731 860 938
LIABILITIES						
Non-current segment liabilities						–
Current segment liabilities[1]	(71 315 576)	(13 995 724)	(10 113 790)	(26 826 811)	–	(122 251 901)
Total segment liabilities	(71 315 576)	(13 995 724)	(10 113 790)	(26 826 811)	–	(122 251 901)
Capital expenditure	3 183 595	16 490 050	13 946 028	6 743 370	–	40 363 043
Non-cash items excluding depreciation						
Accrued expenses	160 137	868 135	4 895 762	1 703 241	–	7 627 275
Deferred revenue	–	8 279 854	193 455	493 013	–	8 966 321

1. Directorate liabilities exclude intercompany balances which are eliminated on consolidation of the different directorates.

3.3 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. SEGMENT INFORMATION CONTINUED

3.4 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

	2021 R	2020 R
Revenue from non-exchange transactions		
Gauteng Province		
Corporate and Space Engineering	**66 523 384**	60 132 817
Earth Observation	**64 429 083**	83 093 367
Space Operations	**16 134 677**	15 573 291
	147 087 144	158 799 475
Western Cape Province		
Space Science	**53 684 524**	46 453 422
Total revenue from non-exchange transactions	**200 771 668**	205 252 897
Revenue from exchange transactions		
Gauteng Province		
Corporate	**3 776 627**	6 215 765
Earth Observation (prior year restated)	**5 240 706**	11 688 360
Earth Observation as previously reported	–	12 988 360
Earth Observation prior year error	–	(1 300 000)
Space Operations	**63 447 495**	84 200 723
	72 464 828	102 104 847
Western Cape Province		
Space Science	**9 299 902**	10 807 208
Total revenue from exchange transactions	**81 764 730**	112 912 055
Segment expenditure		
Gauteng Province		
Corporate	**64 736 810**	56 768 857
Earth Observation (prior year restated)	**65 985 333**	68 127 608
Earth Observation as previously reported	–	68 670 832
Earth Observation prior year error	–	(543 224)
Space Operations	**82 152 541**	88 891 726
	212 874 684	213 788 191
Western Cape Province		
Space Science	**50 227 443**	54 502 816
Total segment expenditure	**263 102 127**	268 291 007
Non-current segment assets		
Gauteng Province		
Corporate	**325 785 164**	325 384 844
Earth Observation	**22 260 279**	20 135 520
Space Operations	**100 879 937**	112 642 559
	448 925 379	458 162 923
Western Cape Province		
Space Science	**31 297 667**	31 318 563
Total non-current segment assets	**480 223 046**	489 481 486

	2021 R	2020 R
Current segment assets		
Gauteng Province		
Corporate	**160 103 602**	148 034 490
Earth Observation (prior year restated)	**6 262 473**	11 585 034
Earth Observation as previously reported	–	12 815 667
Earth Observation prior year error	–	(1 230 633)
Space Operations	**67 231 578**	53 366 018
	233 597 653	212 985 542
Western Cape Province		
Space Science	**53 317 944**	29 393 910
Total current segment assets	**286 915 598**	242 379 452

4. STATEMENT OF COMPARISON 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 an accrual basis

4.2 The approved budget covers the fiscal period from 1 April 2020 to 31 March 2021. The Statement of Comparison of Budget and Actual Amounts is prepared using actual amounts as reported on the statement of financial performance on a comparable basis to the original and/or revised budget. The original budget is approved together with the annual performance plan prior to the start of the financial year, whilst the revised budget is an adjustment to the budget six months after the financial year.

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

4.3.1 The unfavourable variance of R109 million represents top up funding on Space Weather Centre and AIT facilities Projects that were not received from DSI due to delayed expenditure on this projects. Space Weather Centre expenditure was negatively impacted by unanticipated long procurement lead times, whilst AIT facilities project under Space Engineering was delays as it requires Ministerial intervention. The remaining balance is as a result of Earth Observations committed grants, although the funds were released by DSI at the end of 2020/21 financial year the amount only reflected in the SANSA bank account in the new financial year and could not be recognised as 2020/21 receipts.

4.3.2 The favourable R0.634 million is as a result of more funding being received to fund student studies in various universities and Postgraduate and PhD Level.

4.3.3 The favourable R2.833 million is as a result of a combination of higher recoveries on electricity usage by a customer in Space Operations as well as the anticipated budget cuts in the public sector due to COVID -19 pandemic did not materialise.

4.3.4 There is a favourable variance of R3.254 million when compared to budget of other income. The current year other income budget was lower than the prior year budget due to the anticipated budget cuts which resulted with high bank balances through out the year due to slow spending. The impact of the COVID-19 pandemic in particular the hard lock in Quarter 1 of the financial year, had caused a back log in our procurement processes which resulted in slow spending than initially anticipated.

4.3.5 There is a favourable variance of R11.2 million on employee cost due to unfilled vacant positions and higher staff turnover rates.

4.3.6 There is a variance of R9 million on repairs and maintenance costs mainly from Space Operations. Not sufficient revenue was generated to undertake the planned maintenance fully in the period.

4. STATEMENT OF COMPARISON OF BUDGET AND ACTUAL AMOUNTS

4.3.7 The data licence fees has a variance of R7.507 million due to expenditure that did not materialised relating to Digital Globe reseller agreement that is still under discussion

4.3.8 Spending is behind budget by R22.206 million mainly due to Earth Observations research grants where work is behind as a result of the COVID-19 pandemic, however R17 million is currently committed as at year end.

4.3.9 Antenna infrastructure services relate to client hosted infrastructure and the facilitation of civil works and the antenna bases for a customer that was negatively affected by the COVID-19 pandemic at the end of the 2019/20 financial year and was provided for as indicating that the amount due was not recoverable. Spending on the project was slowed down to manage cash flows until the none recoverable customer's financial position improves and or until Space Operations attracts a new customer who is interested in utilising the infrastructure. Costs for the project are recovered from contract revenue.

4.3.10 The variance is R2.828 million is as a result of slow spending as training courses were either cancelled and or cheaper than anticipated as training platforms moved to virtual meetings which are less expensive, due to impact of the COVID-19 pandemic.

4.3.11 Savings of R46.954 million is as a result of general slow spending due to impact of the lock down on SANSA's procurement plans. During midterm budget adjustment additional R27.8 million from surplus commitment was brought forward. The delays caused by the lock down that occurred in the 2020/21 financial year resulted in a backlog and SANSA was unable to catch up with the backlog.

4.3.12 Capital expenditure was negatively affected by the backlog that was caused by the COVID-19 pandemic, during the midterm budget adjustment additional R123.8 million from the surplus commitment was brought forward. There were delays in some of the spending as a result of lock down restrictions.

4.3.13 The variance of R31.535 million on the Space Weather project was mainly due to unanticipated long procurement lead times due to the value of the project. Majority of the spending relating to construction of the building has been committed and construction is to resume in the new financial year.

4.3.14 The variance of R36.764 million on the Assembly Integration and Test (AIT), is as a result of delays caused by contractual process in sourcing an international specialists to assist with the specification for this project. An MOU was signed with the European Space Agency and procurement processes are to resume in the new financial year.

4.3.15 There is a variance of R1 million due to the satellite build project was not funded during the current year and was placed on hold until funding to complete the satellite is secured.

	2021 R	2020 R
5. CASH AND CASH EQUIVALENTS		
Cash and cash equivalents	**261 845 641**	203 019 904
Total cash and cash equivalents	**261 845 641**	203 019 904
5.1 Analysis of cash and cash equivalents balance		
Cash in bank for operational requirements[1]	**160 635 238**	112 680 963
Cash in bank held for committed conditional grants[3]	**101 201 546**	90 330 255
Cash in bank main account[2]	**27 729 208**	18 047 155
Cash in bank ring fenced grants	**73 472 338**	72 283 100
Total cash in bank accounts	**261 836 784**	203 011 218
5.2 Cash on hand		
Cash on hand	**8 857**	8 686
Total cash on hand	**8 857**	8 686
Total cash and cash equivalents	**261 845 641**	203 019 904

1. Cash held for operational requirements represents cash to be utilised to settle trade and other payables, provisions and commitments when the obligations are due.
2. Cash held in the SANSA main account, Ring fenced grants are received through the main account, R27 729 million (2020: R18 047 million) was still not yet transferred to the ring fenced account at year end.
3. Cash in the bank held for committed conditional grants detailed in Note 13.

6. RECEIVABLES FROM EXCHANGE TRANSACTIONS

	2021 R	2020 R
Trade receivables (prior year restated)	**17 924 854**	31 113 818
Trade receivables as previously sated	**–**	32 344 451
Prior year error on trade receivables	**–**	(1 230 633)
Other receivables	**6 738 610**	7 816 415
	24 663 464	38 930 233

6.1 Trade receivables

	Gross	Allowance for impairment	Net
As at 31 March 2021			
Trade debtors	**25 997 910**	**(8 073 057)**	**17 924 854**
Total	**25 997 910**	**(8 073 057)**	**17 924 854**
As at 31 March 2020			
Restated trade debtors	36 459 204	(5 345 386)	31 113 818
Trade debtors as previous reported	37 759 204	(5 414 753)	32 344 451
Prior year error on debtors	(1 300 000)	69 367	(1 230 633)
Total	36 459 204	(5 345 386)	31 113 818

6. RECEIVABLES FROM EXCHANGE TRANSACTIONS CONTINUED

6.1 Trade receivables (continued)

6.1.1 Ageing of trade receivables

	2021 R	2020 R
Current		
0 – 30 days (prior year restated)	**16 270 140**	22 291 264
0 – 30 days (prior year as previously reported)	**–**	23 591 264
Prior year error	**–**	(1 300 000)
Past due		
31 – 60 Days	**1 101 487**	9 479 924
61 – 90 Days	**156 283**	–
91 – 120 days (prior year restated)	**8 470 000**	4 688 016
91 – 120 days (prior year as previously reported)	**8 470 000**	4 688 016
Prior year error	**–**	–
Total	**25 997 910**	36 459 204

6.1.2 Reconciliation for the allowance of impairment

Impairment reconciliation		
Opening balance	**(5 345 386)**	–
Exchange rate differences	**(449)**	–
Impairment allowance for the year	**(8 072 608)**	–
Impairment losses for the year (prior year restated)	**–**	(5 345 386)
Impairment losses for the year as previously reported	**–**	(5 414 753)
Prior year error on Impairment losses for the year	**–**	69 367
Reversal of impairment allowance	**5 345 385**	–
Closing balance	**(8 073 058)**	(5 345 386)

In determining the ability to recover debtors, the allowance for impairment of trade receivables has been made for debtors balances outstanding for longer than their normal payment terms. Included in the reversal of R5.3 million is an amounts of R4.8 million owed by a debtor in Space Operations (SO) that was recovered in the current year after the customer was rescued after subsequently filing for bankruptcy due to COVID-19. The remainder of the balance comprises of slow paying debtors which are still active. The impairment allowance for the year of R8 million mainly comprises of the provision of R8.4 million for Stats SA. There was no impairment balance at the beginning of the financial year 2019/20.

Trade customers – current	**16 270 140**	22 291 264

6.1.3 Trade receivables – fully performing

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:

6.1.4 Trade receivables – past due and not impaired

Trade receivables that are outside their normal payment terms are considered to be a range of 30 to 60 days past due, depending on customers terms. 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:

	2021 R	2020 R
Trade customers – past due	**9 727 770**	14 167 940
Allowance for impairment	**(8 073 058)**	(5 345 386)
Trade customers – past due and not impaired	**1 654 712**	8 822 554
Receivables from local debtors (prior year restated)	**10 940 072**	10 436 196
Receivables from local debtors (prior year as previously reported)	**–**	11 736 196
Prior year error on rendering of services	**–**	(1 300 000)
Receivables from international debtors	**15 057 838**	26 023 008
Total trade debtors	**25 997 910**	36 459 204
Past due		
31 – 60 days	**1 101 487**	9 479 924
61 – 90 days	**156 283**	–
91 – 120 days	**8 470 000**	4 688 016
Total	**9 727 770**	14 167 940

6.2 Other receivables

	Gross	Allowance for impairment	Net
As at 31 March 2021			
Prepaid expenses[1]	**4 117 040**	**–**	**4 117 040**
Deposits[2]	**2 573 421**	**–**	**2 573 421**
Other debtors	**48 150**	**–**	**48 150**
Total	**6 738 610**	**–**	**6 738 610**
As at 31 March 2020			
Prepaid expenses	5 250 185	–	5 250 185
Deposits	2 509 181	–	2 509 181
Other debtors	57 049	–	57 049
Total	7 816 415	–	7 816 415

1. Prepaid expenses consist of advance payments on projects with such contractual arrangements.
2. 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. RECEIVABLES FROM EXCHANGE TRANSACTIONS CONTINUED

6.3 Credit quality of trade and other receivables

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

Other receivables consist of deposits paid to suppliers. Other receivables are non-interest bearing and their recovery is based on contractual arrangements with specific suppliers, such as delivery of services or the end of a contractual arrangement where an upfront deposit is required. The maximum exposure to credit risk at the reporting date is the carrying amount of other receivables.

Any allowance for impairment on trade and other receivables exists predominantly due to the possibility that these debts will not be recovered. Management assesses these debtors per directorate grouping where the customer shows signs of none recoverability. The debtors are disclosed as an allowance for impairment under trade customers.

6.4 Fair value of trade and other receivables

Management considers the carrying amounts of financial assets recorded at amortised cost in the financial statements to approximate their fair values on 31 March 2021, as a result of the short-term maturity of these assets and liabilities.

6.5 Classification of financial assets

The Financial Assets of the entity are classified as follows:

		Carrying amount	
Financial assets	Classification	**2021 R**	2020 R
Cash and cash equivalents			
Cash and cash equivalents	At amortised cost	**261 845 641**	203 019 904
Trade receivables			
Restated trade debtors	At amortised cost	**25 997 910**	36 459 204
Trade debtors as previously reported		**–**	37 759 204
Prior year error on debtors		**–**	(1 300 000)
Other receivables		**2 621 571**	2 566 230
Deposits	At amortised cost	**2 573 421**	2 509 181
Other debtors	At amortised cost	**48 150**	57 049

6.7 Prior year adjustment

The comparative amount(s) relating to the Statement of Financial Performance have been restated as follows:

Revenue from exchange transactions	2020 R
Rendering of services restated	102 884 483
Rendering of services as previously reported	104 184 483
Net effect on restatement of prior year revenue from exchange transactions	(1 300 000)
Impairment losses for the year (prior year restated)	
Impairment loss prior year restated	5 345 386
Impairment losses as previously reported	5 414 753
Net effect on restatement of prior year impairment losses	(69 367)
Net effect on restatement of prior year surplus (refer to restated note 6 and 16)	(1 230 633)

The comparative amount(s) relating to the Statement of Financial Position have been restated as follows:

As at 31 March 2020	Gross	Allowance for impairment	Net
Restated trade debtors	36 459 204	(5 095 580)	31 363 624
Trade debtors as previous reported	37 759 204	(5 131 947)	32 627 257
Prior year error on debtors	(1 300 000)	36 367	(1 263 633)
Net effect on restatement of prior year period error on the Statement of Financial Position			(1 263 633)
The comparative amount(s) relating to the Statement of changes in Net Assets has/have been restated as follows:			
Restatement of prior accumulated surplus			(1 263 633)

Due to service dispute on the Statistics SA account, segment revenue from exchange transaction for Earth Observations for the year ended 31 March was overstated by R1.3 million and segment expenditure was over stated by R69 367. The error also impacted on Trade Receivables, Segment Expenditure and Surplus thus decreasing the Net Asset Value of SANSA by R1.2 million. The error has been corrected by restating the affected segment information line item for the prior year. For further disclosure on the error is set out in note 16.

7. INVENTORY

	2021 R	2020 R
Fuel	**406 492**	429 315
Total inventory	**406 492**	429 315

There were no inventories pledged as securities for liabilities.

8. PROPERTY, PLANT AND EQUIPMENT

Description	Land R	Leasehold improve-ments R	WIP leasehold Improve-ments R	Buildings R	WIP buildings R	Plant and machinery R	Research equipment R
31 March 2021							
Carrying values at 1 April 2020	**37 687 010**	**208 550**	**236 880**	**10 333 559**	**–**	**65 805 225**	**6 574 591**
Cost	**37 687 010**	**2 001 045**	**236 880**	**13 876 324**	**–**	**129 405 056**	**23 890 965**
Accumulated depreciation	**–**	**(1 792 495)**	**–**	**(3 542 765)**	**–**	**(63 599 831)**	**(17 316 373)**
Acquisitions	**–**	**–**	**–**	**–**	**1 928 806**	**2 324 182**	**1 798 592**
Acquisitions at cost	**–**	**–**	**–**	**–**		**2 324 182**	**1 798 592**
Under construction	**–**	**–**	**–**	**–**	**1 928 806**	**–**	**–**
Depreciation	**–**	**(27 525)**		**(420 488)**		**(10 907 229)**	**(1 939 939)**
Disposals	**–**	**(68 407)**	**–**	**–**	**–**	**17 607**	**(7 874)**
Disposals at cost	**–**	**(93 189)**	**–**	**–**	**–**	**(11 727)**	**(52 043)**
Accumulated depreciation	**–**	**24 782**	**–**	**–**	**–**	**29 333**	**44 169**
Carrying values at 31 March 2021	**37 687 011**	**112 618**	**236 880**	**9 913 072**	**1 928 806**	**57 239 784**	**6 425 370**
Cost	**37 687 011**	**1 907 856**	**236 880**	**13 876 324**	**1 928 806**	**131 717 511**	**25 637 514**
Completed assets	**37 687 011**	**1 907 856**		**13 876 324**		**131 717 511**	**25 637 514**
Under construction	**–**	**–**	**236 880**	**–**	**1 928 806**	**–**	**–**
Accumulated depreciation	**–**	**(1 795 238)**	**–**	**(3 963 252)**	**–**	**(74 477 727)**	**(19 212 144)**

	Vehicles R	Office equipment R	Furniture and fittings R	Computer equipment R	WIP computer equipment R	Exhibits R	Work in progress plant and machinery R	Laboratory equipment R	Total R
	3 974 437	1 564 301	2 433 694	20 056 292	8 597 297	774 931	314 296 947	1 189 045	473 732 760
	7 807 562	5 792 735	6 444 054	49 846 544	8 597 297	1 541 069	314 296 947	3 149 843	604 573 332
	(3 833 125)	(4 228 434)	(4 010 361)	(29 790 252)	–	(766 138)	–	(1 960 798)	(130 840 571)
	–	107 157	254 903	3 162 105	1 750 000	–	1 990 192	381 460	13 697 396
	–	107 157	254 903	3 162 105	1 750 000	–	–	381 460	9 778 398
	–	–	–	–			1 990 192	–	3 918 998
	(414 295)	(349 761)	(506 745)	(7 239 408)		(193 558)		(291 495)	(22 290 441)
	(4 235)	(4 612)	665	(161 456)	–	–	88	(3 111)	(231 335)
	–	(55 781)	(83 158)	(1 495 285)	–	–	88	(9 685)	(1 800 780)
	(4 235)	51 169	83 823	1 333 829	–	–	–	6 574	1 569 444
	3 555 908	1 317 086	2 182 515	15 817 534	10 347 297	581 373	316 287 227	1 275 899	464 908 381
	7 807 563	5 844 112	6 615 798	51 513 364	10 347 297	1 541 069	316 287 227	3 521 618	616 469 950
	7 807 563	5 844 112	6 615 798	51 513 364		1 541 069		3 521 618	287 669 739
	–	–	–	–	10 347 297	–	316 287 227	–	328 800 210
	(4 251 654)	(4 527 026)	(4 433 283)	(35 695 831)	–	(959 696)	–	(2 245 719)	(151 561 569)

8. PROPERTY, PLANT AND EQUIPMENT CONTINUED

Description	Land R	Leasehold improve-ments R	WIP leasehold Improve-ments R	Buildings R	WIP buildings R	Plant and machinery R	Research equipment R
31 March 2020							
Carrying values at 1 April 2019	4 307 700	178 171	–	10 754 046	–	64 799 399	7 334 987
Cost	4 307 700	1 907 856	–	13 876 324		118 552 213	22 342 261
Accumulated depreciation:	–	(1 729 685)	–	(3 122 278)	–	(53 752 814)	(15 007 274)
Accumulated depreciation	–	(1 729 685)	–	(3 122 278)	–	(53 752 814)	(15 007 273)
Acquisitions	33 379 310	93 189	236 880	–	–	8 612 534	1 604 195
Acquisitions at cost	33 379 310	93 189	–	–	–	8 612 534	1 604 195
Capital under Construction – Additions	–	–	236 880	–	–	–	–
Restated depreciation	–	(62 810)	–	(420 488)	–	(9 849 775)	(2 373 262)
Depreciation		(62 810)	–	(420 488)	–	(9 849 775)	(2 373 262)
	–	–	–	–	–	2 243 916	12 802
Transfers-in between asset classes	–	–	–	–	–	2 243 916	12 802
Transfers-out between asset classes	–	–	–	–	–	–	–
Carrying value of disposals:	–	–	–	–	–	(851)	(4 131)
Cost of disposed asset	–	–	–	–	–	(3 607)	(68 293)
Accumulated depreciation	–	–	–	–	–	2 757	64 162
Carrying values at 31 March 2020	37 687 010	208 550	236 880	10 333 558	–	65 805 225	6 574 592
Cost	37 687 010	2 001 045	236 880	13 876 324	–	129 405 056	23 890 965
Completed assets	37 687 010	2 001 045	–	13 876 324	–	129 405 056	23 890 965
Under construction	–	–	236 880	–	–	–	–
Accumulated depreciation	–	(1 792 495)	–	(3 542 764)	–	(63 599 831)	(17 316 373)

8.1 Repairs and maintenance

	Buildings R	Computer software R	Plant and machinery R
2021	**2 602 990**	**2 673 802**	**4 338 849**
2020	2 788 199	1 084 646	3 851 387

Vehicles R	Office equipment R	Furniture and fittings R	Computer equipment R	WIP computer equipment R	Exhibits R	Work in progress plant and machinery R	Laboratory equipment R	Total R
4 099 766	2 327 636	2 969 553	13 339 952	–	1 029 562	316 491 956	1 398 847	429 031 577
7 515 990	6 143 196	6 514 640	40 145 368	–	1 390 879	316 491 956	3 325 222	542 513 606
(3 416 224)	(3 815 560)	(3 545 086)	(26 805 416)	–	(361 317)	–	(1 926 375)	(113 482 028)
(3 416 224)	(3 815 560)	(3 545 086)	(26 805 416)	–	(361 317)	–	(1 926 375)	(113 482 028)
740 629	76 042	244 287	12 097 195	8 597 297	150 190	56 969	404 982	66 293 699
740 629	76 042	244 287	12 097 195	–	150 190	–	404 982	57 402 554
–	–	–	–	8 597 297	–	56 969	–	8 891 146
(521 367)	(785 525)	(730 420)	(5 275 849)	–	(404 821)	–	(509 365)	(20 933 682)
(521 367)	(785 525)	(730 419)	(5 275 849)	–	(404 821)	–	(509 365)	(20 933 682)
–	–	–	(4 740)	–	–	(2 251 978)	–	–
–	–	–	(4 740)	–	–	–	–	2 251 978
–	–	–	–	–	–	(2 251 978)	–	(2 251 978)
(344 590)	(53 852)	(49 729)	(100 266)	–	–	–	(105 422)	(658 841)
(449 056)	(426 503)	(314 873)	(2 391 279)	–	–	–	(580 361)	(4 233 972)
104 466	372 651	265 144	2 291 013	–	–	–	474 939	3 575 131
3 974 437	1 564 301	2 433 693	20 056 293	8 597 297	774 931	314 296 947	1 189 041	473 732 757
7 807 562	5 792 735	6 444 054	49 846 544	8 597 297	1 541 069	314 296 947	3 149 843	604 573 331
7 807 562	5 792 735	6 444 054	49 846 544	–	1 541 069	–	3 149 843	281 442 207
–	–	–	–	8 597 297	–	314 296 947	–	323 131 124
(3 833 125)	(4 228 434)	(4 010 361)	(29 790 252)	–	(766 137)	–	(1 960 798)	(130 840 571)

Research equipment R	Vehicles R	Office equipment R	Furniture and fittings R	Computer equipment R	Laboratory equipment R	Total R
430 431	**52 424**	**8 438**	**161 831**	**281 469**	**103 520**	**10 653 754**
171 461	173 201	–	96 654	749 749	995	8 916 292

8. PROPERTY, PLANT AND EQUIPMENT CONTINUED

	2021 R	2020 R
8.2 Work in progress		
Work in progress consists of:		
Leasehold improvements (Earth Observation offices – Innovation Hub)	**236 880**	236 880
Computer equipment (DESA Project)	**10 347 297**	8 597 297
Buildings (Space Weather Centre – Hermanus)	**1 928 806**	–
Plant and machinery (Satellite development)	**316 287 227**	314 296 947
	328 800 210	323 131 124

Impairment assessment on satellite development project

The satellite development project commenced in 2015 to build and launch an earth observation satellite to provide satellite imagery to all state institutions. The project was funded by the Department of Science and Innovation(DSI), through annual ring fenced transfers. This was 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 Africa, at the same time development test equipment and assembly integration and test facilities also needed an upgrade in order to perform quality tests during development stages and pre-qualification for launching. Due to funding constraints, the project was placed on hold for the past three years. An independent project review was commissioned to assess the status of the project and provide recommendations. The DSI has indicated commitment to secure funding for the satellite project to completion. In addition, an allocation was received during the year to upgrade the assembly, integration and test facilities to enable qualification tests of the instrument to the next phase of the satellite development. Based on the above developments, no impairment provision was raised on the work in progress value of the satellite build project.

8.3 Land

	2021 R	2020 R
Recognition of Land as at 1 April 2019	**33 379 310**	33 379 310

Key Judgements and assumptions

During the establishment of SANSA in 2010, the Hartebeeshoek facility was acquired from the CSIR through a business transfer agreement. The transfer included the perpetual right of use of the farm at Hartebeeshoek which is legally registered under the National Government. In applying the recently issued standard iGRAP 18 on Recognition and Derecognition of Land, the standard directs that an entity should assess whether there are indicators of control of land such as legal ownership and/or right to direct access to land and to restrict and deny others of access to land. In applying this principle, SANSA had uninterrupted use of the farm and controls the economic activity on the land through the Space Operations programme. The facility is also a National Key point and SANSA has the right to grant or deny access to the premises, therefore a conclusion was reached to recognise the value of the land as an asset.

To determine the cost of the land for recognition in Property, Plant and Equipment, a valuation of the land was performed by Marsh Risk Consulting in March 2020 and the aggregated value of R 36 300 000 as at 31 March 2020 was obtained. The valuation assessment was discounted to a value for recognition on 1 April 2019.

Details of property description and registered owner

Property Description	Remaining Extent of the Farm Hartebeesthoek No. 502,
Registration Division	JQ, Province of Gauteng
Title Deed Number	T7347/1948
Registered Owner	National Government of the Republic of South Africa
Extent	434.8105Ha
Property Description	Portion 1 the Farm Hartebeesthoek No. 502, Registration
Registration Division	JQ, Province of Gauteng
Title Deed Number	T29540/1962
Registered Owner	Republiek van Suid-Afrika
Extent	485.4252Ha
Property Description	Portion 2 of the Farm Hartebeesthoek No. 502,
Registration Division	JQ, Province of Gauteng
Title Deed Number	T850/1961
Registered Owner	National Government of the Republic of South Africa
Extent	719.4869Ha
Property Description	Portion 3 of the Farm Hartebeesthoek No. 502,
Registration Division	JQ, Province of Gauteng
Title Deed Number	T29441/1962
Registered Owner	National Government of the Republic of South Africa
Extent	1 104.4931Ha

8.4 Assets given as security

No assets were given as security.

	2021 R	2020 R
8.5 Insurance pay-outs received	**39 568**	28 669

During the year a total amount of R0.0396 million (2020:R0.028 million) was received as insurance pay out for assets that were either damaged or stolen as follows: Computer equipment R0.0396 million (2020: R0.028 million)

8.6 Change in estimate

Property plant and equipment

During 2021 we conducted an operation efficiency review of all asset classes which resulted in change in the expected usage in all assets class. Due to budgetary constraints and challenges to replace assets with technical complexities it has not been possible to replace all aging infrastructure. In terms of the requirements of GRAP 17 the useful lives of all asset items were reviewed by management at year end. The remaining useful live expectations of some asset items differed from previous estimates. This resulted in a revision of some of the previous estimates which was accounted for as a change in accounting estimate. The effect of this revision is a decrease in the depreciation charges for the current period of R6.7 million.

8. PROPERTY, PLANT AND EQUIPMENT CONTINUED

8.6 Change in estimate (continued)

Property plant and equipment (continued)

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

	Value derived using the original estimate R	Value derived using amended estimate R	Value impact of change in estimate R
Computer equipment	4 372 362	943 214	3 429 148
Computer software	117 914	33 592	84 322
Exhibits	423 993	114 062	309 931
Laboratory equipment	663 735	137 812	525 923
Office equipment	180 671	29 141	151 530
Office furniture	232 381	29 967	202 414
Lease improvement	115 557	40 313	75 245
Plant and machinery	468 663	31 801	436 863
Research equipment	1 200 692	201 768	998 924
Vehicles	675 190	172 873	502 318
	8 451 159	1 734 542	6 716 617

	2021 R	2020 R
9. INTANGIBLE ASSETS		
At cost less accumulated amortisation and accumulated impairment losses.	15 314 665	15 748 729

The entity does not have internally generated intangible assets.

9.1 Reconciliation of carrying value of intangible assets

	Work in progress computer software	Intellectual property	Computer software	Total
31 March 2021				
Carrying value at 1 April 2020	4 640 175	139 805	10 968 749	15 748 729
Cost	4 640 175	2 822 660	42 401 791	49 864 626
Accumulated impairment	–	(1 440 000)	–	(1 440 000)
Accumulated amortisation	–	(1 242 855)	(31 433 042)	(32 675 897)
Acquisitions	–	–	1 443 275	1 443 275
Cost	–	–	1 443 275	1 443 275
Disposals	–	–	(26 862)	(26 862)
Cost of disposed asset	–	–	(106 557)	(106 557)
Accumulated amortisation of disposed asset	–	–	79 695	79 695
Amortisation				
Amortisation during the year	–	(31 697)	(1 818 780)	(1 850 477)
Carrying value at 31 March 2021	4 640 175	108 108	10 566 381	15 314 665
Cost	4 640 175	2 822 660	43 738 509	51 201 344
Accumulated impairment	–	(1 440 000)	–	(1 440 000)
Accumulated amortisation	–	(1 274 552)	(33 172 128)	(34 446 679)

9.2 Reconciliation of carrying value of intangible assets

	Work in progress computer software	Intellectual property	Computer software	Total
31 March 2020				
Carrying values at 1 April 2019	–	166 660	9 573 896	9 740 557
Cost	–	2 822 660	44 635 167	47 457 827
Accumulated impairment	–	(1 440 000)	–	(1 440 000)
Restated Accumulated depreciation	–	(1 216 000)	(35 061 271)	(36 277 271)
Prior amortisation error correction	–	–	(692 855)	(692 855)
Accumulated amortisation	–	–	(28 926 439)	(28 926 439)
Acquisitions	4 640 175	–	2 808 481	7 448 656
Cost	4 640 175	–	2 808 481	7 448 656
Capitalised	–	–		–
Disposals	–	–	(77 144)	(77 144)
Cost of disposed asset	–	–	(5 041 857)	(5 041 857)
Accumulated amortisation of disposed asset	–	–	4 964 713	4 964 713
Amortisation				
Amortisation during the year	–	(26 855)	(1 336 482)	(1 363 338)
Carrying values at 31 March 2020	4 640 175	139 805	10 968 749	15 748 729
Cost	4 640 175	2 822 660	42 401 791	49 864 626
Accumulated impairment	–	(1 440 000)	–	(1 440 000)
Accumulated amortisation	–	(1 242 855)	(31 433 042)	(32 675 897)

	2021 R	2020 R
Work in progress – Intangible assets		
Work in progress on intangible assets consists of the following asset classes:		
Computer Software – Earth Observation Data Infrastructure	**4 640 175**	4 640 175

The intangible asset is part of the computer equipment WIP and as a result no expenditure was incurred for the software. This was planned and the asset completion time is three years. No amount for research and development expenses were recognised during the period. No intangible assets were pledged as security for liabilities.

10. TRADE AND OTHER PAYABLES FROM EXCHANGE TRANSACTIONS

Trade creditors	**1 615 666**	6 576 781
Other creditors	**870 324**	207 334
Income received in advance[1]	**13 077 627**	8 966 321
Accrued expenses	**3 277 025**	2 268 720
Accrued leave[2]	**6 634 996**	4 946 383
Accrued board fees	**117 397**	76 939
Accrual for 13th cheque savings	**358 052**	335 234
Total creditors	**25 951 086**	23 377 712

1. Income received in advance consists of prepayments from customers of R13 million (2020:R8.9 million).
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 25 leave days.

10. TRADE AND OTHER PAYABLES FROM EXCHANGE TRANSACTIONS CONTINUED

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	Amount 2021 R	2020 R
Trade and other payables			
Trade creditors	At amortised cost	**1 615 666**	6 576 781
Other creditors	At amortised cost	**870 324**	207 334
Accrued expenses	At amortised cost	**10 387 470**	7 627 276

11. PROVISIONS

	2021 R	2020 R
Performance bonus provision	**10 774 988**	8 543 939
Total provisions	**10 774 988**	8 543 939
Reconciliation of movement in provisions		
Balance at beginning of year	**8 543 939**	8 242 115
Reversal of prior year contribution not yet paid out	**(5 316 031)**	(247 263)
Contributions to provision	**8 508 274**	8 543 939
Performance bonus not paid out 2019/20[1]	**2 253 464**	–
Performance bonus pay out for 2019/20	**(3 214 658)**	(7 994 851)
Balance at end of year	**10 774 988**	8 543 939

The bonus provision represents the estimated liability in respect of performance bonuses payable to employees. Performance bonuses are not guaranteed and are based on the assessed performance of the entity as well as employees performance for the financial year ending 31 March 2021.

The Board approved the payment of FY2019/20 incentive bonuses for 64% of the bonus pool to qualifying staff members. The payment to the management cohort is under dispute and is therefore included in the bonus provision.

	2021 R	2020 R
12. COMMITTED CONDITIONAL GRANT LIABILITY		
Transfer payment from executive authority	**99 893 042**	89 471 986
Transfer payment from other departments/entities	**1 308 503**	858 265
Total committed conditional grant liability	**101 201 546**	90 330 251
Committed conditional grant liability is made up of amounts not yet spent on ring fenced transfers for projects as follows:		
Satellite development programme (Note 13.1.1)	**1 114 275**	1 087 929
Operation Phakisa – Earth observation SAR data acquisition (Note 13.1.2)	**–**	–
Assembly, integration and test facilities upgrade (Note 13.1.3)	**36 627 447**	37 704 676
Earth Observation Data Center-EO Ring fence grant (Note 13.1.4)	**–**	12 581 742
Earth Observation Data Center (Note 13.1.5)	**8 696 210**	–
South African Earth Observation System of Systems (SAEOSS) Portal (Note13.1.6)	**1 690 079**	–
Post graduate student bursary support programme (Note 13.2)	**4 330 629**	2 562 961
Research and human capital development grants (Note 13.3)	**1 308 503**	858 265
South African Earth Observation Strategy Implementation (Note 13.4)	**1 512 350**	11 978
Earth Observation Research and Innovation Fund (RDI) (Note 13.5)	**14 267 636**	16 300 000
Earth Observation Public Awareness (Note 13.6)	**287 241**	280 450
Implementation of the Intra Africa Space Science Technology and Innovation Programme (IASSTI) (Note 13.7)	**1 118 767**	363 327
Space Weather Operational Centre (Note 13.8)	**30 248 407**	18 578 923
	101 201 546	90 330 251
Refer to Note 13 for a full reconciliation of movement in ring fenced grants.		
13.01 Transfers and subsidies received		
Operational transfers	**149 242 000**	143 464 000
Baseline allocation	**149 242 000**	143 464 000
Ring fenced transfers	**51 529 668**	61 788 897
Conditions met – transferred to revenue (Notes 13.1; 13.2; 13.3; 13.4:13.5;13.6;13.7;13.8;)	**51 529 668**	61 788 897
Total transfers and subsidies received	**200 771 668**	205 252 897
13.02 Cash transfers and subsidies received		
Operational transfers	**149 242 000**	143 464 000
Baseline allocation	**149 242 000**	143 464 000
Ring fenced transfers	**60 008 250**	107 803 974
Current year cash receipts (Notes 13.1; 13.2; 13.3; 13.4:13.5;13.6;13.7;13.8;)	**60 008 250**	107 803 974
Total transfers and subsidies received	**209 250 250**	251 267 974
13.1 Reconciliation of movement in ring fenced grants – Satellite programme		
Balance unspent at beginning of year	**51 374 347**	25 008 598
Separate disclosure of balance unspent at beginning of year		
Reallocation of funds	**–**	4 600 000
Current year receipts	**24 954 000**	65 965 000
Conditions met –transferred to revenue	**(29 506 521)**	(44 199 250)
Interest capitalised	**1 306 185**	
Conditions still to be met –remain in liabilities	**48 128 012**	51 374 347

The satellite programme funding agreement includes five projects funded by the Department of Science and Innovation (DSI). The various funds received over the years were consolidated onto the satellite funding agreement in 2016/17 which contains the specific deliverable for projects outlined below:

	2021 R	2020 R
13.1 Reconciliation of movement in ring fenced grants – Satellite programme (continued)		
13.1.1 Satellite development programme – EOSAT 1		
Balance unspent at beginning of year	**1 087 929**	1 469 401
Current year receipts		–
Interest capitalised	**26 346**	
Conditions met – transferred to revenue	**–**	(381 472)
Conditions still to be met – remain in liabilities	**1 114 275**	1 087 929
The satellite development project is a multi year project funded through transfers from the DSI. Denel Dynamics was appointed as the main contractor for the development of the satellite. The project was placed on hold in the 2018/19 financial year pending the sourcing of additional funding to complete the project.		
13.1.2 Operation Phakisa – Earth Observation SAR data acquisition		
Balance unspent at beginning of year	**–**	3 367 105
Current year receipts	**24 954 000**	19 400 000
Interest capitalised	**86 945**	–
Reallocation from South African Earth Observation Strategy Implementation		4 600 000
Conditions met – transferred to revenue	**(25 040 945)**	(27 367 105)
Conditions still to be met – remain in liabilities	**–**	–
13.1.3 Assembly, integration and test facilities		
Balance unspent at beginning of year	**37 704 676**	4 704 676
Current year receipts	**–**	33 000 000
Interest capitalised	**912 964**	
Conditions met – transferred to revenue	**(1 990 192)**	–
Conditions still to be met – remain in liabilities	**36 627 447**	37 704 676
13.1.4 Earth Observation Data Center – (EO Ring fence grant)		
Balance unspent at beginning of year	**12 581 742**	15 467 416
Current year receipts	**–**	13 565 000
Interest capitalised	**–**	–
Reallocation to Earth Observation Data Centre	**(10 931 741)**	–
Reallocation to SAEOSS Portal	**(1 650 000)**	
Conditions met – transferred to revenue	**–**	(16 450 674)
Conditions still to be met – remain in liabilities	**–**	12 581 742
This grant is for the upgrade of the Earth Observation Data Center (EODC) to support the Earth Observation sensors and to acquire high resolution satellite imagery aimed at meeting current user requirements.		
13.1.5 Earth Observation Data Center		
Balance unspent at beginning of year	**–**	–
Current year receipts	**–**	–
Transfer from Earth Observation Data Centre	**10 931 741**	
Interest capitalised	**239 852**	–
Conditions met – transferred to revenue	**(2 475 384)**	–
Conditions still to be met – remain in liabilities	**8 696 210**	–
13.1.6 South African Earth Observation System of Systems (SAEOSS) Portal		
Balance unspent at beginning of year	**–**	–
Current year receipts	**–**	–
Transfer from Earth Observation Data Centre	**1 650 000**	
Interest capitalised	**40 079**	–
Conditions met – transferred to revenue	**–**	–

	2021 R	2020 R
Conditions still to be met – remain in liabilities	**1 690 079**	–

13.2 Post graduate student bursary support programme

Balance unspent at beginning of year	**2 562 961**	2 067 772
Current year receipts	**5 400 000**	4 500 000
Current year refunds	**130 000**	30 000
Interest capitalised	**13 809**	
Conditions met – transferred to revenue	**(3 776 141)**	(4 034 811)
Conditions still to be met – remain in liabilities	**4 330 629**	2 562 961

13.3 Research grants

Balance unspent at beginning of year	**858 265**	1 999 788
Current year receipts	**7 385 497**	6 738 974
Interest capitalised		–
Current year refunds	**–**	–
Refunds to Funders	**(231 247)**	
Conditions met – transferred to revenue	**(6 704 012)**	(7 880 497)
Conditions still to be met – remain in liabilities	**1 308 503**	858 265

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), SAASTA, the European Commission and Rhodes University by particular researchers after successful application to a competitive programme. Some of the grants were purely mobility grants. Most of the grants are multiple year awards and are on-going until the project is completed.

13.4 South African Earth Observation Strategy Implementation

Balance unspent at beginning of year	**11 978**	14 500 000
Current year receipts	**1 500 000**	600 000
Interest capitalised	**372**	–
Transfer to Earth Observation SAR data acquisition	**–**	(4 600 000)
Transfer to Earth Observation Research and Innovation Fund	**–**	(7 000 000)
Transfer to Earth Observation Public Awareness	**–**	(1 000 000)
Transfer to Implementation of the Intra Africa Space Science Technology and Innovation Programme	**–**	(1 000 000)
Conditions met – transferred to revenue	**–**	(1 338 022)
Management fee – transferred to revenue	**–**	(150 000)
Conditions still to be met – remain in liabilities	**1 512 350**	11 978

13.5 Earth Observation Research Development and Innovation Fund (RDI)

Balance unspent at beginning of year	**16 300 000**	–
Transfer from South African Earth Observation Strategy Implementation	**–**	7 000 000
Current year receipts	**–**	10 000 000
Interest capitalised	**370 906**	
Conditions met – transferred to revenue	**–**	–
Management fee – transferred to revenue	**(2 403 270)**	(700 000)
Conditions still to be met – remain in liabilities	**14 267 636**	16 300 000

13.6 Earth Observation Public Awareness

Balance unspent at beginning of year	**280 450**	–
Transfer from South African Earth Observation Strategy Implementation	**–**	1 000 000
Current year receipts	**–**	–
Interest capitalised	**6 791**	
Conditions met – transferred to revenue	**–**	(619 550)
Management fee – transferred to revenue	**–**	(100 000)

	2021 R	2020 R
Conditions still to be met – remain in liabilities	**287 241**	280 450

13.7 Implementation of the Intra Africa Space Science Technology and Innovation Programme (IASSTI)

Balance unspent at beginning of year	**363 327**	–
Transfer from South African Earth Observation Strategy Implementation	**–**	1 000 000
Current year receipts	**1 000 000**	–
Interest capitalised	**7 634**	
Conditions met – transferred to revenue	**(252 194)**	(536 673)
Management fee – transferred to revenue	**–**	(100 000)
Conditions still to be met – remain in liabilities	**1 118 767**	363 327

13.8 Space Weather Operational Centre

Balance unspent at beginning of year	**18 578 923**	–
Current year receipts	**20 000 000**	20 000 000
Interest capitalised	**557 015**	
Conditions met – transferred to revenue	**(8 887 531)**	(1 421 077)
Management fee – transferred to revenue	**–**	–
Conditions still to be met – remain in liabilities	**30 248 407**	18 578 923

14. OPERATING LEASE LIABILITY

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

Balance at beginning of year	**–**	146 077
Operating lease liability movement	**167 718**	(146 077)
Total operating lease liability	**167 718**	–

The prior year end lease with Innovation Hub for the Corporate Offices, Space Engineering and Earth Observations ended on 31 March 2020. A new operating lease with Innovation Hub was signed for a further period of 30 months effective 1 April 2020.

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 one year	**4 432 395**	74 303
Buildings	**4 348 240**	–
Office equipment	**84 155**	74 303
Two to five years	**2 282 826**	84 155
Buildings	**2 282 826**	–
Office equipment	**–**	84 155
Total operating lease arrangements	**6 715 221**	158 458

The entity has operating lease agreements for the following classes of assets, which are only significant collectively:
- Buildings: for the rental of office space
- Office Equipment: for the rental of copier machines

The lease agreement for the building is for a period of two years and six months with escalation fee of 5% annually, the amounts are paid on a monthly basis.

15. INTEREST INCOME

Total interest earned from bank accounts	**6 683 757**	8 776 320
Interest earned on committed grant funding capitalised	**(2 262 713)**	–
Interest earned on operational funding in bank accounts	**4 421 044**	8 776 320

The interest bearing on the ring-fenced grant was capitalised in the current year as per the instruction from the funder

	2021 R	2020 R
16. RENDERING OF SERVICES		
Services to local public entities (2020 restated)	**18 005 285**	22 525 249
Services to local public entities as previously reported	**–**	23 825 249
Prior year error on rendering of services	**–**	(1 300 000)
Services to local private entities	**5 604 879**	5 741 641
Services to foreign clients	**52 031 576**	74 617 593
	75 641 739	102 884 483
17. OTHER INCOME		
Sundry income	**13 761**	16 075
Conference hosting fees	**–**	132 900
Rent received	**289 538**	447 208
Discount received	**–**	1 225
Insurance pay-out	**39 568**	28 669
Expense recovery	**1 359 079**	175 348
Total other income	**1 701 946**	801 425
18. EMPLOYEE AND EMPLOYEE RELATED COSTS		
Basic salary	**104 332 439**	103 643 668
Contractors and temp	**11 255 853**	6 210 765
Remote location allowance	**3 892 974**	3 562 619
Data and cell allowance	**1 663 866**	527 611
Performance bonuses current year adjustment	**5 478 574**	8 422 562
Overtime	**960 389**	1 222 534
Employee related costs – salaries	**2 959 896**	1 510 932
Total employee related costs	**130 543 992**	125 100 689
Remuneration of key management personnel of SANSA during the year:		
Remuneration of the Chief Executive Officer: Dr V Munsami		
Annual remuneration	**2 398 238**	2 273 211
Performance bonus	**–**	154 511
Cellphones allowance	**14 760**	19 680
Total	**2 412 998**	2 447 402
Remuneration of the Chief Financial Officer: Ms B Pono (Resigned August 2020)		
Annual remuneration	**732 265**	1 757 436
Performance bonus	**–**	146 837
Cellphones allowance	**6 150**	8 820
Leave pay out	**168 958**	–
Total	**907 373**	1 913 093
Remuneration of the Interim Chief Financial Officer: Mr D Bongoza (Appointed October 2020)		
Annual remuneration	**927 047**	–
Performance bonus	**–**	–
Cellphones allowance	**15 450**	–
Total	**942 497**	–

	2021 R	2020 R
18. EMPLOYEE AND EMPLOYEE RELATED COSTS CONTINUED		
Remuneration of the Executive Director Space Programme: Mr A Khatri		
Annual remuneration	**1 696 334**	1 607 957
Performance bonus	**–**	127 812
Cellphones allowance	**14 760**	8 820
Total	**1 711 094**	1 744 589
Remuneration of the Managing Director Space Operations: Mr R Hodges		
Annual remuneration	**1 602 988**	1 504 519
Performance bonus	**–**	119 367
Car and travel allowance	**69 325**	66 969
Cellphones allowance	**14 760**	12 010
Back pay	**–**	13 785
Total	**1 687 073**	1 716 650
Remuneration of the Managing Director Earth Observation: Ms A Mlisa		
Annual remuneration	**1 534 696**	1 441 481
Performance bonus	**–**	107 961
Cellphones allowance	**14 760**	8 820
Back pay		13 207
Awards	**16 000**	–
Total	**1 565 456**	1 571 469
Remuneration of the Managing Director Space Science: Dr L McKinnell		
Annual remuneration	**1 529 155**	1 436 277
Performance bonus	**–**	116 287
Cellphones allowance	**14 760**	8 820
Back pay	**–**	13 160
Awards	**6 000**	–
Total	**1 549 915**	1 574 544
Remuneration of the Executive Director Corporate Services: Ms Ann Slavin		
Annual remuneration	**1 752 361**	1 661 006
Performance bonus	**–**	128 294
Cellphones allowance	**14 760**	8 820
	1 767 121	1 798 120

19. BOARD MEMBER REMUNERATION

	Meeting fees		Reimbursive	
	Paid out R	Accrued R	claims R	Total R
2021				
Independent Non-executive Chairman of the Board				
Ms X Kakana	**91 728**	**13 940**		**105 668**
Independent Non-executive members				
Mr LS Hamilton (Resigned)	**36 491**			**36 491**
Mr E Jansen	**96 372**	**8 256**		**104 628**
Ms M Mfeka[2]	**–**	**47 501**		**47 501**
Mr J Prinsloo	**88 805**	**11 010**	**1 121**	**100 935**
Mr WJ van Biljon	**72 734**	**7 338**		**80 072**
Mr A Naidoo[1]	**–**		**–**	**–**
Ms IM Pule	**85 586**	**7 338**		**92 924**
Ms N Majaja[1]	**–**		**–**	**–**
Adv. I Kealotswe-Matlou	**68 838**	**7 338**		**76 176**
Ms L Msibi	**77 553**	**7 338**		**84 891**
Prof. A Muronga	**73 422**	**7 338**		**80 760**
Ms M Paul[1]	**–**	**–**	**–**	**–**
Total Board members remuneration	**691 527**	**117 397**	**1 121**	**810 044**

	Meeting fees		Reimbursive claims		
	Paid out	Accrued	Paid out	Accrued	Total
2020					
Independent Non-executive Chairman of the Board					
Ms X Kakana	104 544		5 452		109 996
Independent Non-Executive members					
Mr LS Hamilton	46 338		785		47 123
Mr E Jansen	122 270		4 334		126 604
Ms M Mfeka[2]		75 687		955	76 642
Mr J Prinsloo	107 123		8 173		115 296
Mr WJ van Biljon	56 880		2 763		59 643
Mr A Naidoo[1]	–		–		–
Ms IM Pule	97 716		4 711		102 427
Ms N Majaja[1]	–		526	91	617
Adv. I Kealotswe-Matlou	78 894		1 017		79 911
Ms L Msibi	96 336		819		97 155
Prof. A Muronga	72 486		–		72 486
Ms M Paul[1]	–		–		–
Total Board members remuneration	782 587	75 687	28 580	1 046	887 900

1. Appointed as representative of the state.
2. Ms Mfeka has not been remunerated since her reappointment on the SANSA board effective 1 September 2018. Ms Mfeka's previous appointment letter included a clause stipulating that although Ms Mfeka was a full time employee for another state-owned entity, she was entitled to the payment of fees for attendance of meetings and meeting preparation. Ms Mfeka's reappointment letter effective 1 September 2018 is silent on whether meeting attendance and meeting preparation fees are payable. In order for SANSA to process Ms Mfeka's Board fees, the National Treasury requires SANSA to be in possession of confirmation that Ms Mfeka is appointed to the SANSA Board in her personal capacity and does not represent her employer, a state-owned entity. SANSA has not yet received such a document, Ms Mfeka runs the risk of losing a portion of her fees at the end of the next financial year as the fees earned during 2019 will prescribe in accordance to common law principles.

	2021 R	2020 R
20. DEPRECIATION AND AMORTISATION		
Depreciation: property, plant and equipment	**22 290 442**	20 933 682
Amortisation: intangible assets	**1 848 077**	1 363 338
Total depreciation and amortisation	**24 138 519**	22 297 020
21. DATA LICENCE FEES		
Data licence fees	**29 314 713**	37 362 760
Total data licence fees	**29 314 713**	37 362 760
Data licence fees are paid for access to various satellites for downloading earth observation satellite imagery.		
22. STUDENT BURSARIES AND RESEARCH GRANTS PAID		
Bursaries to students	**4 182 252**	4 735 561
Research and development	**3 136 030**	2 144 994
Total grants and subsidies paid	**7 318 282**	6 880 555
23. ANTENNA INFRASTRUCTURE SERVICES		
Antenna infrastructure services	**4 131 869**	7 362 586
Total antenna infrastructure services	**4 131 869**	7 362 586
Antenna infrastructure services relate to client hosted infrastructure and the facilitation of civil works and antenna bases for customers, Project costs are recovered from contract revenue.		
24. TRAINING EXPENSES		
Staff training	**1 363 542**	739 446
Staff bursaries	**542 801**	84 524
Board member training	**124 850**	1 356 804
Total training expenses	**2 031 192**	2 180 774
Staff training and bursaries is expenditure incurred on various short courses and funding for various recognised qualification at tertiary institutions		
25. GENERAL EXPENSES		
Electricity	**8 621 909**	8 934 881
Travel and accommodation	**837 727**	8 141 412
Other general expenses	**7 063 089**	6 418 570
Rent and lease charges	**4 638 090**	4 264 096
License fees	**4 832 177**	3 158 087
Data and internet services	**4 335 592**	4 187 724
Insurance	**2 394 344**	2 000 396
Advertising and marketing	**1 343 341**	2 078 541
External audit fees	**1 205 860**	1 134 421
Security	**1 712 796**	1 404 764
Consulting fees	**5 603 988**	2 302 947
Telephone cost	**324 035**	956 724
Fuel and oil	**1 014 645**	925 710
Conferences and seminars	**3 805 041**	3 496 594
Printing and stationery	**189 862**	454 984
Transport costs	**23 953**	381 811
Consumables	**196 804**	257 756
Bank charges	**163 553**	197 989
Entertainment	**15 611**	37 749
Legal costs	**249 100**	242 549
Internal audit fees	**803 632**	478 799
	49 375 150	51 456 505

	2021 R	2020 R
26. NET GAINS AND LOSSES ON FOREIGN EXCHANGE TRANSACTIONS		
Gains in foreign exchange transactions	**4 426 136**	2 124 797
Gains in net foreign exchange – realised	**4 426 136**	990 480
Gains/loss in net foreign exchange – unrealised	**–**	1 134 317
Losses in foreign exchange transactions	**(5 837 097)**	(1 674 970)
(Losses) in net foreign exchange – realised	**(4 876 498)**	(1 674 970)
(Losses) in net foreign exchange – unrealised	**(960 598)**	–
	(5 837 097)	(1 674 970)
Net gains/losses on foreign exchange transactions	**(1 410 961)**	449 827
27. NET CASH FLOWS FROM OPERATING ACTIVITIES		
Surplus for the year	**19 434 270**	49 873 944
Surplus for the year as previously reported	**–**	51 104 576
Prior year error on rendering of services	**–**	(1 300 000)
Prior year error on impairment of accounts receivable	**–**	69 367
Adjustment for:		
Depreciation and amortisation	**24 138 519**	22 297 020
Net losses on disposal of property, plant and equipment	**194 024**	450 397
Net (gains)/losses on foreign exchange transactions	**1 410 961**	(1 134 317)
Irrecoverable sundry debtors	**–**	50 144
Impairment losses for the year (prior year restated)	**3 179 627**	5 345 386
Impairment losses for the year previously reported	**–**	5 414 753
Prior year error on impairment loss	**–**	(69 367)
Other non-cash items[1]	**(1 494 597)**	166 757
Lease smoothing	**167 718**	(146 077)
Increase in provisions relating to employee costs	**3 919 661**	995 788
Discount received	**–**	(1 225)
Operating surplus before working capital changes	**50 950 184**	77 897 816
Increase in inventory	**(22 823)**	(139 679)
Decrease/(increase) in receivables from exchange transactions	**5 157 920**	(8 584 770)
Decrease/(increase) in other receivables	**1 077 805**	694 540
Increase in grant liabilities	**10 871 295**	46 045 070
Increase in trade and other payables	**5 561 667**	6 147 687
Cash flow from operating activities	**73 596 049**	122 060 664

1. The balance is mainly made up R1,4 million which represents inter-directorate debtors and creditors that did not meet the recognition criteria as liabilities as the amount will not result in the inflow/outflow of economic benefits from SANSA.

	2021 R	2020 R
28. IMPAIRMENT AND WRITE OFF OF ACCOUNTS RECEIVABLE		
	–	50 144
28.1 Irrecoverable sundry debtors	–	50 144
28.2 Receivables from exchange transactions		
Impairment losses for the year (prior year restated)	**8 073 057**	5 345 386
Impairment losses for the year previously reported	–	5 414 753
Impairment loss	**8 073 057**	(69 367)
(Reversal)/recognition of impairment allowance	**(4 893 430)**	–
	3 179 627	5 345 386

29. IRREGULAR EXPENDITURE

Reconciliation of irregular expenditure:		
Opening balance	**92 100**	–
Irregular expenditure relating to the prior year	**135 575**	–
Irregular expenditure relating to the current year	**290 018**	92 100
Less: Condoned or written off by relevant authority	–	–
Total	**517 693**	92 100

During 2020/21, no fruitless and wasteful expenditure was incurred.

Details of irregular expenditure (2021)		**2021 R**	2020 R
Preferential procurement policy	**Outcome of investigation**		
Sourcing of services without prior approval.	This case was concluded that it is irregular expenditure. However, due to the fact that funds have not been recovered and or no disciplinary hearing has taken place the case cannot be condoned.	**92 100**	92 100
Incorrect use of service provider, due to incorrect appointment into the Recruitment Panel.	The transaction is irregular. The supplier that received an award, was incorrectly awarded due to human error during the evaluation of the tender. SANSA did not suffer financial loss and there was no fruitless and wasteful expenditure noted on this transaction, all services incurred were required by the organisation.	**135 575**	
Incorrect use of service provider, due to incorrect appointment into the Recruitment Panel.	The transaction is irregular. The supplier that received an award, was incorrectly awarded due to human error during the evaluation of the tender. SANSA did not suffer financial loss and there was no fruitless and wasteful expenditure noted on this transaction, all services incurred were required by the organisation.	**290 018**	
		517 693	92 100

30. COMMITMENTS FOR EXPENDITURE

	2021	2020
Capital commitments		
– Approved and contracted for:	**50 174 917**	13 542 358
Property, plant and equipment	**50 174 917**	13 542 358
Intangible assets	**–**	–
– Approved but not yet contracted for:	**575 457**	660 000
Property, plant and equipment	**575 457**	660 000
Total capital and expenditure commitments	**50 750 374**	14 202 358
This expenditure will be financed from:		
Contract revenue and transfers	**50 750 374**	14 202 358
	50 750 374	14 202 358

31. EMPLOYER RETIREMENT BENEFIT INFORMATION

The only obligation of the entity with respect to the retirement benefit plans is to pay over the specified contributions to the pension fund.

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.

32. RELATED PARTY TRANSACTIONS

South African National Space Agency (SANSA) has been established by the Department of Science and Innovation (DSI) in terms of the South African National Space Agency Act No.36 of 2008. SANSA is listed as a schedule 3A Public entity in terms of the Public Finance Management Act, and is ultimately controlled by the National Executive.

32.1 Related persons: Executive authority

The Minister of the Department of Science and Innovation is the Executive Authority of SANSA.

32.2 Related persons: Accounting authority

The Executive Authority (DSI) appoints the Accounting Authority to oversight governance and operations of SANSA. The Accounting Authority is constituted by a Board of Directors appointed by the Minister of Science and Innovation.

Refer to Note 1 for the composition of the SANSA Board of Directors and to Note 19 for Board Fees paid.

32.3 Related persons: Key management

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

Chief Executive Officer – Dr V Munsami (Ex-officio member of the Board)

Chief Financial Officer – Ms B Pono (Resigned 31 August 2020)

Interim Chief Financial Officer – Mr Daliwonga Bongoza (Appointed 1 October 2020)

Executive Director Space Programme – Mr A Khatri

Executive Director Enterprise Services – Ms A Slavin

Managing Director Space Science – Dr L McKinnell

Managing Director Space Operations – Mr R Hodges

Managing Director Earth Observations – A Mlisa

Refer to Note 18 for details on remuneration of key management.

32. RELATED PARTY TRANSACTIONS

32.4 Related entities: Entities within National Government

SANSA is a schedule 3A National Public Entity and is ultimately controlled by the National Executive. It is therefore related to all other entities within National Government.

32.5 Related party transactions

SANSA receives transfers from the Department of Science and Innovation for its administrative functions. In addition, SANSA received ring fenced transfers from the DSI for various projects. Refer to Notes 13 for details of transfers from the DSI and Note 13 for details of payables and/or commitments from the DSI.

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 13.3.

Transactions with related parties within national government were in terms of 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.

Related party transactions: Revenue and receivables

	2021		2020	
	R	R	R	R
Entity name	**Revenue**	**Receivables**	Revenue	Receivables
Department of Science and Innovation	**194 067 656**	**–**	197 372 400	–
National Research Foundation	**7 545 331**	**–**	7 880 497	–
	201 612 987	**–**	205 252 897	-

Related party relationships: Purchases and payables

	2021		2020	
	R	R	R	R
Entity name	**Purchase**	**Payables**	Purchases	Payables
Department of Science and Innovation	**–**	**99 893 042**		89 471 986
National Research Foundation	**–**	**1 252 574**	–	2 401 884
	–	**101 145 616**	–	91 873 870

33. 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 Innovation has supported the application 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 was 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. The case is still pending.

34. IN-KIND DONATIONS AND ASSISTANCE

No material donations were received during the year under review.

35. EVENTS AFTER THE REPORTING DATE

There were no subsequent events that occurred after reporting date.

36. 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. SANSA has received its allocated transfers for the first and second quarter of the 2021/22 financial year and is able to meet its operational requirements and financial obligations as they fall due.

37. 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.

	2021 R	2020 R
37.1 The carrying amounts of financial liabilities at reporting date was:		
Trade and other payables	**12 873 460**	14 411 391
	12 873 460	14 411 391

These exclude income received in advance

37. FINANCIAL RISK MANAGEMENT OBJECTIVES AND POLICIES CONTINUED

37.2 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 2021			
ASSETS			
Receivables from exchange transactions	**–**	**24 663 464**	**24 663 464**
Cash and cash equivalents	**261 836 784**	**8 857**	**261 845 641**
LIABILITIES			
Trade and other payables	**–**	**(25 951 086)**	**(25 951 086)**
Net financial assets/(liabilities)	**261 836 784**	**(1 278 765)**	**260 558 019**
31 March 2020			
ASSETS			
Receivables from exchange transactions restated	–	30 912 189	30 912 189
Receivables from exchange transactions previously reported	–	40 160 866	40 160 866
Prior year error on receivables from exchange transactions restated	–	(9 248 677)	(9 248 677)
Cash and cash equivalents	203 011 220	8 686	203 019 906
LIABILITIES			
Trade and other payables	–	(23 377 712)	(23 377 712)
Net financial assets/(liabilities) restated	203 011 220	7 543 166	210 554 381
Net financial assets/(liabilities) as previously reported	–	16 791 843	219 803 061
Prior year error net financial assets/(liabilities) restated	–	(9 248 677)	(9 248 677)

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	2021 R	2020 R
External investments			
Bank balances	Financial assets at amortised cost	**261 836 784**	203 011 218
Cash floats	Financial assets at amortised cost	**8 857**	8 686
		261 845 641	203 019 905
Interest received		**4 421 044**	8 776 320

Financial assets	Classification	2021	2020
Interest rate	%	**1.7**	4.3
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	**2 618 456**	2 030 199
Effect of change in interest rate	%	**(1)**	(1)
Effect of change in interest rate	Rand value	**(2 618 456)**	(2 030 199)

37.4 Liquidity risk

The entity prevents liquidity risk by maintaining adequate banking facilities and by receiving contributions annually in the form of transfers and subsidies.

The following are the contractual maturities of financial liabilities, including interest payments and excluding the impact of netting agreements for the entity:

	Carrying amount R'000	Contractual cash flows: 1 month or less R'000
2021		
Non-derivative financial liabilities		
Trade and other payables	**12 873 460**	**13 416 325**
	12 873 460	**13 416 325**
2020		
Non-derivative financial liabilities		
Trade and other payables	14 411 391	14 411 391
	14 411 391	14 411 391

37. FINANCIAL RISK MANAGEMENT OBJECTIVES AND POLICIES CONTINUED

37.5 Market 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 transactions. Bad debts identified are written off as they occur. 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.

The entity's exposure to foreign currency risk was as follows:

	ZAR	GBP	EURO	USD
31 March 2021				
Receivables from exchange transactions	**2 922 028**	**–**	**19 617**	**990 795**
Trade payables	**(12 871 222)**	**(112)**	**–**	**–**
Gross exposure	**(9 949 194)**	**(112)**	**19 617**	**990 795**

	ZAR	EURO	USD
31 March 2020			
Receivables from exchange transactions	11 624 287	16 684	1 366 924
Trade payables	(4 079 097)	(16 280)	(122 803)
Gross exposure	7 545 190	404	1 244 122

The following significant exchange rates applied during the year:

	2021	2020
Year-end spot rate		
Euro	**17.40**	19.53
GBP	**20.17**	22.07
USD	**14.73**	17.75
Euro	**34 134**	789
GBP	**(226)**	–
USD		
USD	**1 459 440**	2 208 328
Total	**1 493 348**	2 209 116

Sensitivity analysis

A 10% strengthening of the rand against the following currencies at 31 March 2021 would have decreased profit or loss by the amounts shown above. This analysis assumes that all other variables remain constant.

37.6 Credit risk

The entity does not have any significant credit risk exposure to any single counterparty.

The amounts below best represents the entity's maximum exposure to credit risk.

	2021	2020
Financial assets		
Bank balances	**261 845 641**	203 019 904
Receivables from Exchange Transactions	**20 546 424**	33 680 048
	282 392 066	236 699 952

Part F

KNOWLEDGE DISSEMINATION

KNOWLEDGE DISSEMINATION HIGHLIGHTS

SANSA reported another exceptional year on its scientific outputs for 2020/21. SANSA researchers produced a total of 44 peer reviewed publications in high impact journals covering the broad fields of space science and Earth observation. The top 10, ranked by journal impact factor, are given in Table 31. Key highlights from the publications are also provided. SANSA is proud of the international recognition received by its researchers.

During 2020/21, two SANSA researchers received ratings from the National Research Foundation (NRF). Dr Michael Kosch retained his rating of B2 indicating sustainable considerable international recognition for the high quality and impact of recent research outputs. Dr Lerato Shikwambana received a Y2 rating indicating a young researcher who has the potential to establish himself as a researcher based on the past five years of research outputs.

SANSA exceeded its target in 2020/21 for research productivity with an overall productivity score of 1904,44 This score is made up of research publications scored according to authorship and impact factor, graduated students, conference proceedings and technical reports, and research funding received.

Top 10 journal publications ranked by impact factor:

No.	Title	Journal	Impact factor	SANSA authors	Highlights
1.	Trend analysis and first-time observations of sulphur dioxide and nitrogen dioxide in South Africa using TROPOMI/ Sentinel-5 P data.	International Journal of Applied Earth Observation and Geoinformation	4.65	Shikwambana L	The study reports on the spatial distribution of SO_2 and NO_2 South Africa using for the first time Sentinel 5P/TROPOMI sensor. The study further analysed long term trends of SO_2, NO_2 and SO_4 in Mpumalanga, Gauteng, and Limpopo provinces. The increasing trend of SO_2 over the years is attributed to the increasing demand in electricity, aging power stations and the low quality of coal used.
2.	Assessment of the Characteristics of Recent Major Wildfires in the USA, Australia, and Brazil in 2018–2019 Using Multi-Source Satellite Products.	Remote Sensing	4.5	Mahlatse K Shikwambana L	This study analysed the characteristics of the recent (2018–2019) wildfires in the USA, Brazil, and Australia using Multi-source data. Various patterns in the distribution of fires, intensity and burned area at the three sites were found, associated with various vegetation compositions, prevailing meteorological and environmental conditions, and anthropogenic activities. Across all sites, Fires clustered and burned intensely and widely over forests, shrublands and croplands (especially in Brazil). This study contributes to a better understanding of wildfires in various regions and the underlying environmental and meteorological causal factors, towards better wildfire disaster management strategies and habitat-specific firefighting.

No.	Title	Journal	Impact factor	SANSA authors	Highlights
3.	A new technique for investigating dust charging in the PMSE source region	Geophysical Research Letters	4.5	Kosch MJ	It is now well-established that using a ground-based high-power high-frequency pump will significantly raise the electron temperature within the Polar Mesospheric Summer Echo (PMSE) layer. PMSE is Bragg scatter from charged icy dust layers around 85km altitude, which are created by a combination of meteor ablation and increased moisture in the mesopause region due to climate change. The charge state of the dust is a balance between diffusion and dust charging, both of which depend on electron temperature. Raising the electron temperature causes the PMSE to reduce or disappear. In the past this has been done crudely by using the HF pump at full power only. By regulating the pump power with fine control, combined with a numerical model simulation of the temporal evolution of the PMSE, we are able to uniquely estimate the dust density, dust particle size and average dust charge state within the PMSE layer.
4.	Investigating the Long-Range Transport of Aerosol Plumes Following the Amazon Fires (August 2019): A Multi-Instrumental Approach from Ground-Based and Satellite Observations.	Remote Sensing	4.5	Shikwambana L	An investigation of the Amazon biomass burning (BB) episode that occurred during August 2019 and made the international headlines. The research looked at the transport of BB aerosols. The increase in Rossby wave activity during the 2019 austral winter the Southern Hemisphere may have contributed to increasing the efficiency of large-scale transport of BB aerosol plumes.
5.	A new auroral phenomenon, the anti-black aurora.	Nature Scientific Reports	3.998	Nel AE Kosch MJ	The characteristic energy of black and anti-black aurora pairs were determined using dual radar and optical methods. It was found that the paired phenomenon always drifts with the same average speed in an easterly direction. From the first dual-wavelength optical observations of the phenomenon it was shown that the anti-black and black auroras have a higher and lower mean energy, respectively, of the precipitating electrons compared to the diffuse background.

KNOWLEDGE DISSEMINATION HIGHLIGHTS CONTINUED

No.	Title	Journal	Impact factor	SANSA authors	Highlights
6.	Storm-time modeling of the African regional ionospheric total electron content using artificial neural networks.	Space Weather	3.58	Habarulema JB Matamba TM	Storm-time modelling of the African regional ionospheric total electron content using artificial neural networks: This paper dealt with the development of total electron content model over the African region during geomagnetically disturbed conditions for the first time. It is based on GPS observations from 2000-2018 and utilised over 250 GPS locations over the African continent and surroundings. To increase data coverage over areas without ground-based instrumentation including oceans, we made use of radio occultation data during 2008-2018. The model forms an integral component of the space weather product already displayed in the Space Weather Centre.
7.	Geomagnetic pulsations driving geomagnetically induced currents.	Space Weather	3.58	Heyns MJ Lotz SI	Geomagnetically induced currents (GIC) are anomalous currents that flow in power grids and can cause significant infrastructure damage. Previously it was thought that intense GIC was only possible due to broadband perturbations of the geomagnetic field. In this work we show that low frequency pulsations of the geomagnetic field do in fact drive significant GIC at magnitudes comparable to other storm-time effects. We show that the power grid acts as an antenna and pulsations "receiving" these pulsations in the form of oscillating GIC. Understanding the effectiveness of these pulsations and including them in GIC modelling is vital for protection of the grounded power networks we rely on.
8.	Assimilation of Sparse Continuous Near-Earth Weather Measurements by NECTAR Model Morphing	Space Weather	3.58	Habarulema JB	Assimilation of Sparse Continuous Near-Earth Weather Measurements by NECTAR Model Morphing: This work described the data assimilation process of global ionosonde data into a climatological model using the Non-Linear Error Compensation Technique with Associative Restoration (NECTAR). Usually, models are uniform in space and time while direct measurements are non-continuous at all locations. Data assimilation involves "putting data" on top of the model to improve its performance. The application of NECTAR showed that spatial interpolation of ionospheric parameters can be improved on nowcasting basis for near space weather applications.

No.	Title	Journal	Impact factor	SANSA authors	Highlights
9.	Data Driven Transfer Functions and Transmission Network Parameters for GIC Modelling.	Electrical Power Systems Research	3.211	Heyns MJ Lotz SI Cilliers PJ	Typical GIC modelling needs large, accurate data sets to model the interaction between the geomagnetic field, the induced electric field, and the current induced in various parts of the power grid. In this work we introduce a novel method that produces results in the form of statistical distributions of network parameters (instead of single values). This enables us to utilise sparse data sets in a novel manner to: (i) achieve accurate error estimates; and (ii) improve on the accuracy of other existing methods. Furthermore, modelled networks can be locally characterised and probed without any further network knowledge. Merging the network parameters and geoelectric field estimation, a transfer function is derived which offers an alternative approach to assessing transformer exposure to GICs.
10.	The mini-neutron monitor: a new approach in neutron monitor design.	Journal of Space Weather and Space Climate	3.095	Nndanganeni R	Neutron monitor (NM) data plays a crucial role in quantifying the radiation risk and effects of cosmic rays for e.g., air and space travel. This paper discusses a smaller and cost-effective version of the traditional NM, the mini-NM. These monitors can be deployed with ease, even to extremely remote locations, where they operate in a semi-autonomous fashion. We believe that the mini-NM, therefore, offers the opportunity to increase the sensitivity and expand the coverage of the existing NM network, making this network more suitable to near-real-time monitoring for space weather applications. In this paper, we present the technical details of the mini-NM's design and operation and present a summary of the initial tests and science result. The mini-NMs stations have produced valuable data and scientific insights, especially at polar regions and high altitudes where the mini-NM count rates are comparable to full-scale sea-level NMs. We firmly believe that this trend will continue, and, in the future, a world-wide network of mini NMs will co-exist with the current network of NMs, especially covering current observational gaps (e.g., the sparse coverage over the Southern Hemisphere including African and South America). The mini-NMs are much more cost-effective to construct and operate than traditional NMs, providing an intriguing possibility to also retrofit older stations that were decommission in the past due to financial constraints with low maintenance mini-Nms.

Table 31: Top 10 journal publications ranked by impact factor

JOURNAL ARTICLE LISTING

1. Abiriga, F., Amabayo, E.B., Jurua, E., and Cilliers, P.J., Statistical characterisation of equatorial plasma bubbles over East Africa, Journal of Atmospheric and Solar-Terrestrial Physics, 200, 105197, https://doi.org/10.1016/j.jastp.2020.105197, 2020.
2. Abuelezz, O.A., Cilliers, P.J, Mahrous, A.M., Yassen, A.M., and Youssef, M., A proposed method for improving the IRI2016 model by means of Swarm over the American Sector during the event of 5-11 September 2017, Advances in Space Research, doi: https://doi.org/10.1016/j.asr.2021.01.031, 2021.
3. Abuelezz, O. A., Mahrous, A. M., Cilliers, P.J., Fleury, R., Youssef, M., Nedal, M., and Yassen, A.M. Neural Network Prediction of the Topside Electron Content over the Euro-African Sector derived from SWARM Measurements, Advances in Space Research, Volume 67, Issue 4, Pages 1191-1209, https://doi.org/10.1016/j.asr.2020.11.009, 2021.
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8. Dugassa, T., Habarulema, J.B. and Nigussie, N. Equatorial and low-latitude ionospheric TEC response to CIR-driven storms at different longitude sectors, Advances in Space Research, https://doi.org/10.1016/j.asr.2020.07.003, 2020.
9. Du Toit Strauss, R., Poluianov, S., van der Merwe, C., Krüger, H., Diedericks, C., Krüger, H., Usoskin, I., Heber, B., Nndanganeni, R., Blanco-Ávalos, J., García-Tejedor, I., Herbst, K., Caballero-Lopez, R., Moloto, K., Lara, A., Walter, M., Giday, N.M. and Traversi, R. The mini-neutron monitor: a new approach in neutron monitor design. Journal of Space Weather and Space Climate, 10, 39, https://doi.org/10.1051/swsc/2020038, 2020.
10. Fagundes, P. R., Pezzopane, M., Habarulema, J.B., Venkatesh, K., Dias, M.A.L., Tardelli, A., de Abreu, A.J., Pillat, V.G., Pignalberi, A., Bolzan, M.J.A., Ribeiro, B.A.G., Vieira, F., Raulin, J.P., Denardini, C.M., Arcanjo, M.O. and Semala G.K. Ionospheric disturbances in a large area of the terrestrial globe by two strong solar flares of September 6, 2017, the strongest space weather events in the last decade, Advances in Space Research, https://doi.org/10.1016/j.asr.2020.06.032, 2020.
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