



Annual Performance Plan 2021/22



ACCOUNTING AUTHORITY STATEMENT

The work of the South African National Space Agency (SANSA) during the 2020-2025 five-year term is to be guided by a vision of “An integrated National Space Capability that responds to socio-economic challenges in Africa by 2030”. This vision is critical for steering the Agency towards the achievement of its strategic outcomes and stimulating an enabling environment for the development of local space capacity through support interventions to the broader space sector.

The 2021-2022 period will be the second year of implementing the current SANSA strategy which has marked the beginning of a new trajectory for the Agency towards the following primary objectives as provided by the South African National Space Agency Act:

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

The development of the new SANSA strategy at a time when the global COVID-19 pandemic was threatening the economic stability of South Africa and the world at large, necessitated that the Agency should review its developmental approach in line with key priorities of government as outlined in the National Development Plan (NDP), 2019 – 2024 Medium-Term Strategic Framework (MTSF), Department of Science and Innovation (DSI) 2019 White Paper on Science, Technology and Innovation (STI), National Space Strategy (NSS), South African Earth Observation Systems Strategy (SAEOSS) and other relevant strategies and policies of government.

To this end, the 2020-2021 SANSA Annual Performance Plan was reviewed resulting in a reduced number of youth targeted to benefit from the Agency’s capacity building interventions during the financial year whilst budgetary constraints also led to significantly reduced expenditure for core projects in the broad space related industry. On the other hand, targets relating to the launch and commissioning of the ZaCube2 mission and the African Resource Management Constellation (ARMC) nanosatellite mission could not be pursued due to a lack of resources, while targeted progress on the AIT facility upgrade also had to be revised downwards from 20% to 10% as a result of budget cuts and contracting delays. Despite these challenges, however, SANSA remains committed to ensuring optimal growth and development of the space industry through research and infrastructure development in order to build adequate national space capacity that will enhance South Africa’s competitiveness in the global space sector.

Key priorities for the 2021-2022 financial year are therefore underpinned by the Agency’s agenda to transform the space industry in accordance with its strategic outcomes, national policy initiatives and priorities of the DSI. During this period SANSA will continue to work closely with government departments to ensure 80% of government departments and public entities are utilising space products and services by the end of the 5-year term of the implementation of SANSA’s strategy.

The Agency's performance targets for 2021-2022 remain conservatively aligned to the limited financial resource pool placed at SANSA's disposal through budgetary allocations. Strategic alliances with stakeholders across the country, continent and internationally will be central to resource mobilisation and developmental efforts so as to enable the Agency to deliver on its mandate, the National Space Strategy and the South African Earth Observation Systems Strategy.

Concerted efforts towards positioning the local space sector to deliver on a regional and continental space agenda in accordance with initiatives to formalise the SADC and African space programmes will also remain a priority.

The Board and Management of SANSA remain committed to repositioning SANSA to support a new growth trajectory for the sector through a more outcome – based approach as this would strengthen the Agency's capacity to develop the local space landscape and we acknowledge the continuous support of the Executive Authority in this regard.

To increase its impact in the local and African space sector, SANSA will strengthen collaborations with its end-user base, in order to maximise the use of space products and services across all tiers of government, both nationally and across the continent.

The SANSA Board endorses this 2021/2022 Annual Performance Plan and pledges its commitment towards ensuring the achievement of all planned key interventions for the financial year ahead.



Ms Xoliswa Kakana
Chairperson of the SANSA Board
(Accounting Authority)

ACCOUNTING OFFICER's STATEMENT

The South African National Space Agency (SANSA) Mission is
"To provide leadership in unlocking the potential of space for the advancement and benefit of humanity".

In accordance with this mission, SANSA will continue to pursue the following functions in line with its legislative mandate during the 2021-2022 financial period:

- Implement any space programme in line with the policy determined in terms of the Space Affairs Act;
- Advise the Minister on the development of national space science and technology strategies and programmes;
- Implement any national space science and technology strategy; and
- Acquire, assimilate and disseminate space satellite imagery for any organ of state.

As informed by the national 2019-2024 MTSF strategic priorities, the Agency has identified six key outcomes in its 2020-2025 Strategic Plan in order to move towards stimulating a capable and globally competitive South African space sector and these will be central to the implementation of this 2021-2022 Annual Performance Plan (APP):

- **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; and
- **Outcome 6:** Increased share of the global space operations market.

The Agency set a number of performance targets for the 2019-2020 financial year, all of which were achieved or exceeded, in a similar way to the 2018-2019 period. SANSA's consistency in terms of exceptional performance outcomes during the 2015-2020 five – year cycle, together with its unqualified external audit outcomes are demonstrative of a solid internal control environment and a stable organisation focused on its mandate of developing a capable local space sector.

To ensure SANSA becomes more responsive to the needs of the end users of space-related products and services, the Agency identified the following key interventions during the 2020-2021 financial year (i) a business model exercise, (ii) an organisational culture change initiative, and (iii) an Institutional Review, with a view of ensuring efficiencies, effectiveness and relevancy. These interventions are critical for positioning SANSA at the core of local space programmes, and will strengthen its capability to have a greater impact in terms of promoting the growth of the local space sector in the 2021-2022 financial year and beyond.

During the 2021-2022 financial year, key priorities will thus include the building of adequate space capacity; improvement of geospatial information; development of key infrastructure in support of the sector; and the provision of technical skills interventions, research capacity and knowledge management tools. The pursuit of Research and Development (R&D) programmes remains aligned to the White Paper on Science, Technology and Innovation, and strategic partnerships in the space sector will enhance SANSA's capacity to implement key programmes during the financial year.

Other key interventions such as space infrastructure development; support to students and interns through formalised training; facilitating the creation of products and applications to address society's needs and challenges; leveraging on national, African and international partnerships to ensure benefit for the South African space programme; as well as increasing the percentage of government departments and public entities that use geospatial information through space products and services will remain as key priorities for SANSA during 2021-2022.

As was the case during the 2020-2021 financial year, planning for the 2021-2022 performance cycle has been undertaken in the face of significant financial constraints for SANSA and the public service at large due to the impact of the COVID-19 pandemic. The Agency thus continues to focus on resource mobilisation so as to ensure optimal use of its limited resource pool for the benefit of the South African space sector.

The continued management focus on the rollout of identified key initiatives to transform SANSA into a high performing agency during the coming financial year will also develop the organisation into one that is more efficient, resilient, fit-for-purpose and capable of promoting a higher degree of development within the South African space sector.

The SANSA team will put the necessary measures in place for the achievement of performance targets as provided in this APP, and we rely on the usual support from the Board, Shareholder and other key stakeholders to make this goal a reality.



Dr Valanathan Munsami
Chief Executive Officer

OFFICIAL SIGN-OFF

It is hereby certified that this Annual Performance Plan:

- Was developed by the management of the South African National Space Agency (SANSA) under the guidance of the Department of Science and Innovation (DSI);
- Takes into account all relevant policies, legislation and other mandates for which SANSA is responsible; and
- Accurately reflects the outcomes and outputs which SANSA will endeavour to achieve over the period 2021 – 2022.

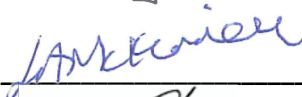
Ms Andiswa Mlisa
MD: Earth Observation

Signature: 

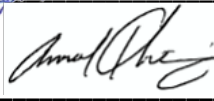
Mr Raoul Hodges
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ED: Space Programme

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Mr Daliwonga Bongoza
Chief Financial Officer and
Head Official Responsible for Planning

Signature: 

Dr Valanathan Munsami
Chief Executive Officer

Signature: 

Ms Xoliswa Kakana
Chairperson of SANSA Board
(Accounting Authority)

Signature: 

Approved by:
Dr Blade Nzimande, MP
Minister of Higher Education, Science
and Innovation
(Executive Authority)

Signature : 

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ACRONYMS

ABBREVIATION	MEANING
AfriGEO	African Region Group on Earth Observations
AIT	Assembly Integration and Testing Facility
APP	Annual Performance Plan
ARMC	African Resource Management Constellation
AU	African Union
BRICS	Brazil Russia India China and South Africa
CEOS	Committee on Earth Observation Satellites
COSPAR	Committee on Space Research
COVID-19	Coronavirus disease 2019
CSP	Corporate Support Programme
DESA	Digital Earth South Africa
DPME	Department of Planning Monitoring and Evaluation
DSI	Department of Science and Innovation
ED	Executive Director
EISCAT	European Incoherent Scatter Scientific Association
EO	Earth Observation
EODC	Earth observation Data Centre
EO	Earth Observation
ERRP	Economic Reconstruction and Recovery Plan
ESA	European Space Agency
GEO	Group on Earth Observations
GICs	Geomagnetically Induced Currents
GNSS	Global Navigation Satellite Services
GPS	Global Positioning System
HF	High Frequency
ICAO	International Civil Aviation Organisation
ICT	Information and Communications Technology
ISES	International Space Environment Service
LEO	Low Earth Orbit
MTEF	Medium Term Expenditure Framework
MD	Managing Director
MTSF	Medium Term Strategic Framework
NASSP	National Astronomy and Space Science Programme
NDP	National Development Plan
NRF	National Research Foundation
NSP	National Space Programme
NSS	National Space Strategy
OSR	Optical Space Research Laboratory
PPP	Public Private Partnerships
R&D	Research and Development
SADC	Southern African Development Community
SAEOSS	South African Earth Observation Systems Strategy
SANSA	South African National Space Agency
SCAR	Scientific Committee on Antarctic Research
SE	Space Engineering Programme
SMEs	Small to Medium Enterprises
SO	Space Operations
SS	Space Science
STEMI	Science, Technology, Engineering, Mathematics and Innovation
STI	Science Technology and Innovation
SuperDARN	Super Dual Auroral Radar Network
SWOT	Strengths, Weaknesses, Opportunities & Threats
the dtic	Department of Trade, Industry and Competition
TIDs	Technical Indicator Descriptions

KEY DELIVERABLES FOR THE YEAR

1. SANSA will deliver **6 high-impact products and services**.
2. SANSA will aim to achieve a **research productivity score of 1300**, which is a composite score based on publications, graduated students, research funding, and researcher rating achieved.
3. SANSA will provide **support to 50 students and interns** for studies in Earth Observation, Space Science, and Space Engineering.
4. SANSA will aim to generate **R69 million from both national and international space operations contracts**.
5. SANSA will **raise awareness of 21 125 youth**, through direct engagement.
6. If satellite programme funding is received, SANSA aims to continue to **out-source R10 million to the broader space industry** and **20% of the total contracted value to SMEs** through its various programmes.

PART A: OUR MANDATE

1 Updates to Relevant Legislative and Policy Mandates

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. It should also be noted that the Department of Trade, Industry and Competition (**the dtic**) is in the process of revoking and replacing the Space Affairs Act, which will only be realised in the next year or two.

2 Updates to Institutional Policies and Strategies

The institutional policies and strategies, as reflected in the 2020 - 2025 Strategic Plan, have not been changed and therefore remain relevant for the 2021/22 Financial Year. However, the SANSA Space Infrastructure Hub programme has been Gazetted as a Strategic Infrastructure Project (SIP) 22 and has been able to attract R4.47 billion of investor funding to strengthen the space value chain, but the process of securing these funds has not been concluded. Once these funds are secured, then this will warrant changes to the SANSA Strategic Plan and APPs for 2021/22 going forward.

3 Updates to Relevant Court Rulings

At the time of developing this SANSA Annual Performance Plan for 2021 – 2022, there were no relevant court rulings that would impact on the Agency's capability to deliver on its mandate as provided by the South African National Space Agency Act (Act No. 36 of 2008) to the extent possible given the resources at its disposal.

PART B: OUR STRATEGIC FOCUS

4 Updated Situational Analysis

The situational analysis as reflected in the SANSA 2020-2025 Strategic Plan, including the SWOT analysis, remains relevant for the 2021/22 financial year. However, the national restrictions related to the COVID-19 pandemic had an impact on the operations and delivery of certain Indicators and Targets. This has been factored into the Agency's operations in terms of reviewing and revising relevant indicators and targets.

4.1 Our Strategic Focus

This APP has been aligned to the financial resources available to SANSA for internal business operations and interventions aimed at providing broader support to the local space sector, which include the parliamentary grant, the revenues generated, and additional grants secured. Given the historic challenges relating to the Agency's ability to deliver fully on its mandate, focus during the 2021-2022 financial year will therefore remain on the mandate-based approach that has been adopted in the 2020-2025 five-year strategy to identify what is required of SANSA at a national level.

4.2 External Environment Analysis

Similar to other public and private sector institutions the Agency has been scathed to some extent by the impact of the COVID-19 pandemic, particularly during the extended lockdown period in the 2020-2021 financial year which affected delivery on a number of planned performance targets due to restricted contact with targeted beneficiaries.

To this end, considerations for the setting of targets for 2021-2022 have included the national lockdown restrictions that are still impacting contact - driven initiatives and are likely to result in a reduced number of beneficiaries from the Agency's capacity building interventions. Subsequent to the 11 January 2021 announcement by President Cyril Ramaphosa, regarding an adjusted alert level 3 lockdown COVID-19 pandemic restrictions; a number of SANSA activities such as public tours, and public lectures were halted in the final quarter of 2020-2021 to ensure compliance with lockdown restrictions. These measures were taken to protect the health and safety of the general public, learners, tourists as well as the employees and students at SANSA.

The Agency will continue to monitor the developments around COVID-19 and their impact on activities at the Hermanus and other SANSA facilities and public engagements are to be re-instated once the situation has stabilised. In addition to this, the Agency, continues to explore innovative mechanisms to leverage on increased use of technology in the delivery of its programmes as a means of mitigating any further negative effects of the pandemic on programmes aimed at supporting development of the national space sector in the 2021-2022 financial year.

South Africa's Economic Reconstruction and Recovery Plan (ERRP) serves as government's response to the adverse impact of the COVID-19 pandemic and SANSA's envisaged contribution towards ensuring delivery on this plan is summarised in Table 1 below.

ERRP Objectives	Links to SANSA Outcomes	SANSA Key Deliverables
1. To create jobs, primarily through aggressive infrastructure investment and mass employment programmes	Outcome 5: Appropriate infrastructure developed to support the local space sector	Prioritisation of infrastructure development through the following flagship projects: <ul style="list-style-type: none"> - Development of an operational Space Weather Centre - Development of Digital Earth South Africa - An upgraded Assembly Integration and Testing Facility (AIT) Facility
2. To reindustrialise our economy, focusing on growing small businesses	Outcome 2: Growth of the space sector through SANSA space related industry expenditure	<ul style="list-style-type: none"> - Small to Medium Enterprises to benefit from 20% of SANSA expenditure for core space projects
3. To accelerate economic reforms to unlock investment and growth	Outcome 4: SANSA re-positioned as a key enabler of government's space – related policies Outcome 6: Increased share of the global space operations market	<ul style="list-style-type: none"> - Enhanced benefit for the space programme through International, African and National partnerships (including collaboration with our BRICS partners) - Generation of income from space operations activities to promote growth of the local space sector
4. To fight crime and corruption	Outcome 4: SANSA re-positioned as a key enabler of government's space – related policies	<ul style="list-style-type: none"> - Initiatives to promote good governance and transform SANSA into a high performing Agency
5. To improve the capability of the state	Outcome 3: Increased human capacity for the implementation of key space initiatives	<ul style="list-style-type: none"> - Youth awareness and skills development initiatives - Creation of opportunities to enhance the national capability and expertise for the implementation of key space initiatives

Table 1: Alignment of SANSA Key Deliverables to ERRP Objectives

4.3 Internal Environment Analysis

The activities that have been prioritised in this APP are aligned to the 2020-2025 Strategic Plan with focus also remaining on efforts towards achieving the suite of aspirational initiatives that are intended to enhance alignment to the SANSA mandate and demonstrate the value that can be added by the Agency to the broader space sector industry.

Such initiatives include:

- Broader support to the South African space sector, including extended support to small, medium enterprises;
- A bigger 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; and
- A greater focus on the African continent to tackle global challenges that transcend national boundaries, thus effectively contributing to the 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”.

PART C: MEASURING OUR PERFORMANCE

5 Institutional Programme Performance Information

The performance information for each of the SANSA Programmes is presented next.

5.1 Administration Programme

5.1.1 Purpose of the Administration Programme

The Administration Programme provides management, administrative and technical support at an Enterprise level across the organisation. This facilitates operational efficiency and cost-effective management, alignment with sound governance principles and the seamless integration and collaboration within the organisation. The focus of the Administration Programme is to ensure the Agency’s mandate is efficiently and effectively executed, a strong focus on new business development, effective engagement with key stakeholders, and the impactful communication and promotion of SANSA’s activities, are necessary. Such initiatives will help foster favourable support for the SANSA brand as well as increase the Agency’s brand value. The initiatives will also contribute positively towards the revenue growth of the Agency.

5.1.2 Programme Outputs

The core outputs of the Administration Programme are to:

1. Transform SANSA into a high performing Agency through effecting changes in our enterprise, financial and supply chain support functions; and
2. Raising the brand value of SANSA.

By so doing, the intended outcomes are to:

1. Ensure efficiencies in terms of our people, systems and processes; and
2. Raise the brand visibility of SANSA.

The net impact of these outcomes is to (i) ensure that the socio-economic priorities of the country are achieved in a cost effective and sustainable manner, and (ii) the value proposition of space is understood by all South Africans.

5.1.3 Outcomes, Outputs, Performance Indicators and Targets

Outcome	Outputs	Output Indicators	Annual Targets						
			Audited Performance			Estimated Performance	Medium-Term Targets		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
O4 SANSa re-positioned as a key enabler of government's space – related policies	O4.1.1 Initiatives to transform SANSa into a high performing Agency	O4.1.1.1 Number of initiatives to transform SANSa into a high performing Agency	-	-	-	4	2	-	-

Table 2: Administration Programme Outcomes, Outputs, Performance Indicators and Targets

5.1.4 Output Indicators: Annual and Quarterly Targets

Administration Programme				Quarterly Targets			
Outcome	Output	Output Indicators	Annual Target	Q1	Q2	Q3	Q4
O4 SANSa re-positioned as a key enabler of government's space – related policies	O4.1.1 Initiatives to transform SANSa into a high performing Agency	O4.1.1.1 Number of initiatives to transform SANSa into a high performing Agency	2	-	-	1	1
				-	-	Skills Audit	Workforce Plan

Table 3: Administration Programme Output Indicators, Annual and Quarterly Targets

5.1.5 Explanation of Planned Performance over the medium-term period

Financial Sustainability

To ensure the Agency's mandate is efficiently and effectively executed, a strong focus on new business development, effective engagement with key stakeholders, and the impactful communication and promotion of SANSA's activities, are necessary. Such initiatives will help foster favourable support for the SANSA brand as well as increase the Agency's brand value. The initiatives will also contribute positively towards the revenue growth of the Agency.

To move SANSA towards financial sustainability the following will be undertaken:

- A streamlined stakeholder engagement strategy will be developed and implemented;
- A communications protocol including policies and processes aligned to the organisation's communication strategy will be developed;
- Revenue enhancement strategies through new business development initiatives;
- Cost recovery mechanism for value added services provided; and
- Asset infrastructure investment and monitoring to ensure continued provision of value-added services.

High performance culture

The achievements of the SANSA outcomes require a high-performance organisation that is characterised by transformational leadership, sound human resource management, inclusive working environment culture, and operational and technological efficiency and effectiveness.

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

- Driving a high-performance culture through sound leadership, client / customer focus, stakeholder management and partnering, best practice business processes, and "living" the organisational values;
- Rolling out the new performance management and development system;
- Developing a workforce plan that demonstrates the skills requirements for the SANSA strategic framework;
- Building Management capability and skills;
- Optimising SANSA's business processes to ensure a continuous smooth workflow across units;
- Implementation of a new ICT strategy;
- Legal services delivered in accordance with service standards contained in the legal standards and procedural manual; and
- An effective and efficient compliance function that contributes to improved corporate governance.

5.1.6 Programme Resource Considerations

ADMINISTRATION PROGRAMME - REVENUE ESTIMATES

Administration	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019/20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
REVENUE											
Revenue from Non - Exchange Transactions		42 936 256	54 672 337	53 372 343	55 590 785	4 292 438	59 883 283	66 339 083	49 060 289	52 171 517	167 570 889
Operational Transfers		42 936 256	53 785 359	53 263 334	55 590 785	4 292 438	59 883 283	66 339 083	49 060 289	52 171 517	167 570 889
Parliamentary Grant		42 936 256	53 785 359	53 263 334	55 590 785	4 292 438	59 883 283	66 339 083	49 060 289	52 171 517	167 570 889
Ring fenced Grants		-	886 978	709 016	-	-	-	-	-	-	-
Post graduate student bursary support -NRF		-	886 978	-	-	-	-	-	-	-	-
Outreach Program (IAC and Science Advancement)		-	-	709 016	-	-	-	-	-	-	-
Grant Income - Outreach		-	-	-	-	-	-	-	-	-	-
Revenue from Exchange Transactions		9 780 880	6 329 475	6 215 765	2 217 784	14 366 685	327 939	2 705 038	2 834 943	2 959 681	8 499 722
Rendoring of Services		-	-	-	-	-	-	-	-	-	-
Contract Revenue - Public Sector		-	-	-	-	-	-	-	-	-	-
Contract Revenue - Private Sector		-	-	-	-	-	-	-	-	-	-
Contract Revenue - Foreign		-	-	-	-	-	-	-	-	-	-
Other Income		9 780 880	6 329 475	6 215 765	2 217 784	(1 289 785)	327 939	2 705 038	2 834 943	2 959 681	8 499 722
Interest Income		6 739 834	6 329 524	6 451 110	2 217 784	(1 289 785)	327 939	2 705 038	2 834 943	2 959 681	8 499 722
Other Income		3 041 046	-	356	-	-	-	-	-	-	-
Net Gains on Foreign exchange transactions		-	(48)	(235 701)	-	-	-	-	-	-	-
Commitments		-	-	-	-	16 256 470	16 256 470	-	-	-	-
Total Revenue		52 777 136	61 001 813	60 188 114	57 808 569	19 253 183	77 067 752	69 044 181	51 895 232	55 131 198	176 070 611

Table 4: Administration Programme Revenue Estimates

ADMINISTRATION PROGRAMME - EXPENDITURE ESTIMATES

Administration	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019/20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
Expenditure											
Employee Related Costs - CTC		31 122 189	33 767 594	31 516 577	33 331 842	2 956 973	36 288 815	33 020 087	32 868 559	32 868 559	38 757 205
Incentive Bonus Provision		-	-	-	2 275 763	(381 375)	1 294 388	2 751 674	2 739 047	2 739 047	8 229 767
Remote Location Allowance		-	-	-	-	-	-	-	-	-	-
Board Member Remuneration		1 170 199	1 002 124	887 898	977 271	25 000	1 002 271	813 116	977 271	977 271	2 767 658
Depreciation and Amortisation		839 371	905 425	1 632 313	-	-	-	-	-	-	-
Repairs and Maintenance		572 473	643 690	123 124	399 490	-	399 490	421 462	421 462	421 462	1 264 386
Grants and Subsidies Paid		354 000	48 000	-	-	-	-	-	-	-	-
Training Expenses		373 070	211 781	793 602	486 236	-	486 236	486 236	486 236	486 236	1 458 707
General Expenses		15 230 896	14 611 102	16 542 257	19 937 967	13 930 003	33 867 970	31 129 607	13 960 401	17 176 908	62 266 916
Net Losses on foreign exchange transactions		1 297	1 297	-	-	-	-	-	-	-	-
Loss on Disposal of Property, Plant and Equipment		30 219	18 353	114 388	-	-	-	-	-	-	-
Total Operating Expenditure		49 753 714	51 209 365	51 610 159	57 408 569	15 930 601	73 339 170	68 622 181	51 452 975	54 669 482	174 744 639
			51 671,37	51 610,16							
Surplus / (Deficit) for the year		3 023 422	9 792 447	8 577 955	400 000	3 328 582	3 728 582	422 000	442 256	461 715	1 325 972
Capital Expenditure		-	-	3 183 595	400 000	3 328 582	3 728 582	422 000	442 256	461 715	1 325 971
Buildings and other fixed structures		-	-	93 183,00	-	-	-	-	-	-	-
Machinery and equipment		-	-	109 939	400 000	628 582	1 028 582	422 000	442 256	461 715	1 325 971
Computer Equipment		-	-	435 466	-	-	-	-	-	-	-
Software and intangible assets		-	-	2 545 001	-	2 400 000	2 400 000	-	-	-	-
Vehicles		-	-	-	-	300 000	300 000	-	-	-	-
Satellite Development		-	-	-	-	-	-	-	-	-	-
Total Expenditure		49 753 714	51 209 365	54 793 754	57 808 569	19 259 183	77 067 752	69 044 181	51 895 231	55 131 198	176 070 610

Table 5: Administration Programme Expenditure Estimates

5.2 Earth Observation Programme

5.2.1 Purpose of Programme

The Earth Observation (EO) 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.

The programme's core function is the implementation of the SAEOSS which requires the contribution of all players in the EO value chain, which include academia, research councils, private sector and government departments and their entities, collectively forming the Earth Observation sector. International partnerships, through initiatives such as AfriGEO, ARMC, Group on Earth Observations (GEO), the Committee on Earth Observation Satellites (CEOS) and various bilateral and multi-lateral agreements, are required to stimulate the growth of local Earth observation capabilities.

The EO programme will use this coordination and facilitation role to position the South Africa EO sector as a regional nucleus for innovative space solutions. Critical to achieving this objective is broad stakeholder consultations to be realised through focused, systematic and tailored engagements. These "listening posts" include direct interaction with stakeholders, establishment and engagement with Communities of Practice, the annual Space for National Development symposium, EO interaction with ZASpace Inc (industry association), through various workshops and surveys.

5.2.2 Programme Outputs

The core outputs of the EO programme include:

- Maintaining a long-term archive of satellite data for national benefits that is essential for change detection for better understanding environmental change in time and space;
- Provision of state-of-the-art data infrastructure for the delivery of essential Earth observation services;
- Sector development through partnerships for learning (human capital development), growth, transformation, and competitiveness;
- Managing product and services to maturity to meet user information needs;
- Marketing Earth observations for understanding, creating, and delivering profitable value to customers; and
- Research, development and innovation to transact at the cutting edge of global knowledge.

The outcome of Earth observation lies in providing:

- Coordinated procurement of satellite data for government and its entities;
- World class operational EO Data infrastructure (i) enabling delivery of essential information products and services (ii) stimulating local industry and scientific development and (iii) ensuring the long-term retention of EO data;
- Fit for purpose and efficient products, services and decision support tools that can support the district development model; Agriculture and food security; Water resource management; Integrated spatial planning and land reform; Disaster management; Peace and security; Global change and Oceans and coastal zone management;
- Coordinated national EO research agenda;
- Understanding of the national and global marketplace and positioning South Africa to capture a market share;
- Organised, networked and coordinated sector;
- Inclusive, growing and increasingly competitive industry;

- Enriched public and youth understanding of Space Science and Science, Technology, Engineering, Mathematics and Innovation (STEMI);
- Skilled and informed sector; and
- National, continental and international partnerships informing growth.

5.2.3 Outcomes, Output Indicators and Annual Targets

Outcome	Outputs	Output Indicators	Annual Targets						
			Audited Performance			Estimated Performance	Medium-Term Targets		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
O1 Increased - space relevant knowledge that supports the developmental agenda.	O1.1.1 Increased percentage of government departments and public entities that are using space products and services	O1.1.1.1 Percentage of government departments and public entities that are using space products and services	-	-	-	30%	40%	50%	70%
	O1.2.1 Awareness and training interventions to key users of space-based products and services	O1.2.1.1 Number of awareness and training interventions to key users of space-based products and services	-	-	-	4	5	5	5
O2 Growth of the space sector through SANSA space related industry expenditure.	O2.1.1 Expenditure to SMEs for core space projects	O2.1.1.1 Percentage contract expenditure to SMEs for core space projects	-	-	-	20%	20%	20%	20%
O3 Increased human capacity for the implementation of key space initiatives.	O3.1.1 Increased youth awareness of science	O3.1.1.1 Number of youth directly engaged	10 362	16 497	25 648	2000	16 125	30 000	35 000
	O3.1.2 Support to students and interns	O3.2.1.1 Number of students and interns supported for formalised training	20	15	22	20	20	28	36
O4 SANSA re-positioned as a key enabler of government's space – related policies	O4.2.1 Significant benefit for the space programme through partnerships	O4.2.1.1 Number of activities initiated through formal International partnerships	-	-	-	-	5	5	5

Outcome	Outputs	Output Indicators	Annual Targets						
			Audited Performance			Estimated Performance	Medium-Term Targets		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
		O4.2.1.2 Number of activities initiated through formal African partnerships	-	-	-	-	5	6	7
		O4.2.1.3 Number of activities initiated through formal National partnerships	-	-	-	-	8	9	10
O5 Appropriate infrastructure developed to support the local space sector	O5.2.1 Development or upgrade of infrastructure	O5.2.1.1 Development of Digital Earth South Africa	-	-	-	Ingestion of SPOT archive	Ingestion of Landsat archive	Ingestion of additional (1) sensor	Ingestion of additional (1) sensor
O6 Increased share of the global space operations market	O6.2.1 Applications to address society's needs and challenges	O6.2.1.1 Number of products and applications	-	-	-	3	3	3	3
	O6.3.1 Increased national space research output	O6.3.1.1 The national research productivity score for space supported R&D	807	375	511	300	300	345	415

Table 6: Earth Observation Programme Outcomes, Outputs, Performance Indicators and Targets

5.2.4 Output Indicators: Annual and Quarterly Targets

Earth Observation Programme				Quarterly Targets			
Strategic Outcome	Output	Output Indicators	Annual Target	Q1	Q2	Q3	Q4
O1 Increased - space relevant knowledge that supports the developmental agenda.	O1.1.1 Increased percentage of government departments and public entities that are using space products and services	O1.1.1.1 Percentage of government departments and public entities that are using space products and services	40%	30%	35%	35%	40%
	O1.2.1 Awareness and training interventions to key users of space-based products and services	O1.2.1.1 Number of awareness and training interventions to key users of space-based products and services	5	1	1	2	1
O2 Growth of the space sector through SANSA space related industry expenditure.	O2.1.1 Expenditure to SMEs for core space projects	O2.1.1.1 Percentage contract expenditure to SMEs for core space projects	20%	-	-	-	20%
O3 Increased human capacity for the implementation of key space initiatives.	O3.1.1 Increased youth awareness of science	O3.1.1.1 Number of youth directly engaged	16 125	2 250	6 125	3 875	3 875
	O3.1.2 Support to students and interns	O3.2.1.1 Number of students and interns supported for formalised training	20	20	-	-	-
O4 SANSA re-positioned as a key enabler of government's space – related policies	O4.2.1 Significant benefit for the space programme through partnerships	O4.2.1.1 Number of activities initiated through formal International partnerships	5	2	-	1	2
		O4.2.1.2 Number of activities initiated through formal African partnerships	5	2	-	1	2
		O4.2.1.3 Number of activities initiated through formal National partnerships	8	4	-	2	2
O5 Appropriate infrastructure developed to support the local space sector	O5.2.1 Development of Digital Earth South Africa	O5.2.1.1 Development of Digital Earth South Africa	Ingestion of Landsat archive	-	-	-	100% ingestion

Earth Observation Programme				Quarterly Targets			
Strategic Outcome	Output	Output Indicators	Annual Target	Q1	Q2	Q3	Q4
O6 Increased share of the global space operations market	O6.2.1 Applications to address society's needs and challenges	O6.2.1.1 Number of products and applications Number of products and applications	3 (Data as a service offering / Earth observation products / Services to support decision making)	-	-	-	3
			Infrastructure as a service offering	-	-	-	1 Use case developed by users
	O6.3.1 Increased national space research output	O6.3.1.1 The national research productivity score for space supported R&D	300	-	150	-	150

Table 7: Earth Observation Programme Output Indicators, Annual and Quarterly Targets

5.2.5 Explanation of planned performance over the medium-term period

Address South Africa's challenges through space services and products

Application products and services

The Earth Observations programme will ensure the development and implementation of operational EO applications with high socio-economic benefit. It therefore focuses on the final destination of the space value-chain, i.e. products and services. These applications will be developed and implemented by collaboration between SANSA, research councils, universities, private sector and government departments and entities to ensure that the full suite of national capabilities are deployed.

Based on analysis of government priorities, understanding of existing broad user requirements and existing “low-hanging fruit” capability of the South African EO sector, the programme will initially focus on seven (7) application areas, namely:

- Agriculture and food security;
- Water resource management;
- Integrated spatial planning (incl. infrastructure monitoring) and land reform;
- Disaster management;
- Peace and security;
- Global change; and
- Oceans and coastal zone management (towards blue economy).

These application areas represent priorities that address a very wide range of societal benefits, for actual products and services, further definition of user requirements will be undertaken with the user communities, to ensure response to immediate needs and challenges.

Data Infrastructure for the delivery of essential Earth observation services

Earth Observation Infrastructure development (direct data reception, data processing, long term data archiving and data distribution) forms a critical backbone for the growth and competitiveness of the South African Earth observation programme. It is a unique system level value add that SANSA is able to provide, by virtue of its mandate, to the South African Earth observations community. Provision of such national level infrastructure is especially important for the efficient and effective delivery of data, value added products and services to unlock socio-economic impact, stimulate innovation, grow industry and access new markets.

An approach favoured by SANSA to realise this goal is the establishment of a High-Performance Computing Centre for operational Earth observations, enabled for Big Data processing and with the capacity to provide cloud-based services. Cloud computing and advanced machine learning will enable better scalability to accommodate information requirements beyond 2030, facilitate enhanced and ubiquitous access to space-based Earth observation data and services and promote a focused data analytics and data systems research programme.

The initial vehicle to achieve this ambition is through the development of a data cube, namely Digital Earth South Africa (DESA). DESA aims to optimise the existing SANSA Earth Observation Data Centre towards the delivery of a unique capability to process, interrogate, and present SANSA's portfolio of archived satellite imagery, dating as far back as 1972.

To meet the wide user demands, SANSA anticipates widening its sensor portfolio to increase its range of satellite data products to improve the diversity of its offerings at various spatial, spectral and temporal resolutions.

Lead high-impact collaborative R&D on a national scale

The future success of South Africa's Earth Observation ecosystem to innovate and transact is dependent on proactive and collaborative R&D to address knowledge gaps and create new knowledge throughout the Earth observations value chain. It is fundamental for South Africa to develop a coordinated national Earth observations research agenda that is facilitated by SANSA, overseen by a multi-stakeholder Research Advisory Group and implemented in collaboration with Universities, Science Councils, local Industry and the international community.

This research agenda must in the first instance span fundamental to applied research in Earth observations and be aimed at increasing South Africa's research output, contribution to global knowledge and intellectual property stocks across the Earth observation value chain. Secondly, the research agenda should be aimed at developing indigenous solutions that address both local and global challenges. Thirdly, the research agenda must be geared towards creating an innovative and competitive South African industry. An intentional connection between the researchers and entrepreneurs is to be established through the Space Cluster initiative.

Enhance the competitiveness of the South African space industry

Creating a sustained inclusive growth in the South African EO sector that is cognisant of transformation imperatives will require coordination amongst different stakeholders which is best achieved through a cluster approach. A coordinated approach, that specifically explores the research, development, and innovation ambitions of South Africa, will allow for strategic impact – currently, efforts are non-directed and therefore do not achieve defined national priorities. A variety of space clusters have been established across the world, with significant benefits for their host countries, creating tens of thousands of jobs, and spinning out numerous companies that have global coverage. The cluster approach will allow for a focused human capital development programme from learner to professional development and entrepreneurship, thereby building a truly indigenous space capability, in both the private and the public sectors, taking “South Africa to Africa and the world”.

Further, SANSA will lead the South African Earth Observation Open Innovation Challenge in collaboration with various partners in the industry development value chain as well as run a coordinated call for proposals under the national research, development and innovation fund to drive the development of fit for purpose products and services.

Develop national human capacity and ensure transformation

A vibrant human capital development programme that builds in existing capability will be implemented in 2021/22. A multi-pronged approach that includes funding of postgraduate students, short training courses, guest lecturing at universities, student co-supervision, internships and studentship programmes will be applied. Students from previously disadvantaged backgrounds are to be targeted in all the training and funding interventions. Professional development support will be provided through short training courses and direct engagements with professionals in the EO sector.

The Science Engagement services will be implemented within the context of the national space awareness programme with the purpose to stimulate space science and technology interest in the public and demonstrate the value STEMI plays in society. The target audience engaged is aligned with the eleven (11) identified segments of the public in the DSI's Science Engagement Framework intended to improve the coordination of and encourage science promotion, communication and engagement activities.

Develop active partnerships

SANSA will proactively collaborate with national and international partners across the Earth observation value chain to deliver on its strategic outcomes and improve the range and quality of its product and service to its clients. At a national level SANSA will partner and collaborate with institutions in the National System of Innovation such as research councils, universities and partners in the private and public sector. The new strategic focus on Africa provides SANSA with an opportunity to strengthen its collaborations through partnerships with African institutions such as NEPAD and the African Union (AU) Commission. Agency to Agency collaborations will be strengthened with agencies participating in the ARMC, CEOS, and BRICS Constellation Partnerships. SANSA will play a greater role in co-ordinating national Earth observation through GEO and AfriGEO. Partnerships will be actively pursued to increase the agency's impact in research and development, data supply, human capital development and stimulation of the space industry.

5.2.6 Programme Resource Considerations

EARTH OBSERVATION PROGRAMME - REVENUE ESTIMATES

Road	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019/20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
REVENUE											
Revenue from Non - Exchange Transactions		64 246 391	69 414 254	83 093 367	37 631 530	55 575 578	93 267 168	82 071 115	83 452 438	34 520 281	200 043 894
Operational Transfers		62 410 050	40 676 775	35 731 342	37 631 530	(3 434 300)	34 257 230	36 321 115	34 452 438	34 520 281	105 293 834
Parliamentary Grant		62 410 050	40 676 775	35 731 342	37 631 530	(3 434 300)	34 257 230	36 321 115	34 452 438	34 520 281	105 293 834
Ring fenced Grants		1 836 341	28 737 473	47 362 025	-	53 003 878	53 003 878	45 750 000	49 000 000	-	34 750 000
Post graduate student bursary support -DST		1630 500	-	-	-	-	-	-	-	-	-
Operation Phakisa - Ocean and Coast SAR data		146 441	28 737 473	27 367 105	-	652 487	652 487	-	-	-	-
Systems of Systems Secretariat		-	-	1 488 022	-	11 978	11 978	-	-	-	-
EO RDI Fund		-	-	700 000	-	16 300 000	16 300 000	16 000 000	20 000 000	-	36 000 000
EO Public Awareness		-	-	719 550	-	280 450	280 450	750 000	-	-	750 000
Def Grant -IASSTI For SA		-	-	636 673	-	10 931 741	10 931 741	-	-	-	-
EO Data & Infrastructure		-	-	16 450 675	-	28 769 835	28 769 835	29 000 000	29 000 000	-	58 000 000
Earth Observation Infrastructure - SAEOS implementation		-	-	-	-	1650 000	1650 000	-	-	-	-
NRF SAASTA - Cofimvaba science centre		-	-	-	-	50 000	50 000	-	-	-	-
and Innovation Programme for SA		-	-	-	-	363 327	363 327	-	-	-	-
Revenue from Exchange Transactions		12 016 736	16 877 410	12 388 361	15 436 000	(9 036 000)	6 400 000	8 336 000	6 386 000	6 386 000	22 368 000
Rendoring of Services		7 528 680	16 636 423	12 574 633	15 236 000	(9 086 000)	6 150 000	8 736 000	6 786 000	6 786 000	22 368 000
Contract Revenue - Public Sector		6 822 743	14 635 130	10 482 312	12 386 000	(8 386 000)	4 000 000	6 586 000	6 586 000	6 586 000	19 758 000
Contract Revenue - Private Sector		350 366	323 084	224 100	250 000	(50 000)	200 000	210 000	200 000	200 000	610 000
Contract Revenue - Foreign		355 572	1678 156	1868 281	2 000 000	(50 000)	1 950 000	2 000 000	-	-	2 000 000
Other Income		4 488 056	180 380	413 668	200 000	50 000	250 000	200 000	200 000	200 000	600 000
Interest Income		232 253	246 155	254 377	200 000	50 000	250 000	200 000	200 000	200 000	600 000
Other Income		4 255 802	7 430	176 716	-	-	-	-	-	-	-
Net Gain on Foreign exchange transactions		-	(72 604)	(17 425)	-	-	-	-	-	-	-
Commitments		-	-	-	-	35 445 412	35 445 412	-	-	-	-
Total Revenue		76 263 127	86 291 664	96 081 728	53 127 530	81 384 330	135 112 580	91 067 115	90 438 438	41 506 281	223 011 894

Table 8: Earth Observation Programme Revenue Estimates

EARTH OBSERVATION PROGRAMME - EXPENDITURE ESTIMATES

Road	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019/20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
Expenditure											
Employee Related Costs - CTC		23 230 115	22 645 100	20 347 134	25 839 276	(4 968 303)	20 870 973	23 617 038	23 686 864	23 580 734	70 884 756
Incentive Bonus Provision		-	-	-	2 027 322	(1 165 331)	862 531	1 053 520	1 058 396	1 965 066	5 677 582
Remote Location Allowance		-	-	-	-	-	-	-	-	-	-
Board Member Remuneration		-	-	-	-	-	-	-	-	-	-
Depreciation and Amortisation		8 574 752	7 787 341	1 057 210	-	-	-	-	-	-	-
Repairs and Maintenance		2 319 831	2 818 030	1 158 546	2 200 000	(765 671)	1 434 329	1 350 000	1 350 000	1 350 000	4 050 000
Finance Costs		-	-	-	-	-	-	-	-	-	-
Data Licence fees		34 451 213	28 737 479	37 362 760	16 553 355	20 269 257	36 822 612	37 130 401	36 243 568	10 136 243	83 630 218
Grants and Subsidies Paid		1 584 360	32 241	1 559 878	-	23 702 048	23 702 048	16 000 000	20 000 000	-	36 000 000
Antenna Infrastructure Services		-	-	703 333	-	-	-	-	-	-	-
Training Expenses		302 009	524 316	733 393	800 000	804 450	1 604 450	1 600 000	1 600 000	1 000 000	4 200 000
General Expenses		22 931 235	9 878 981	4 682 738	4 407 037	5 325 306	9 732 343	4 087 479	4 139 070	2 414 172	10 700 721
Net Losses on foreign exchange transactions		862 611	-	-	-	-	-	-	-	-	-
Irrecoverable Sundry Debtors		-	-	543 827	-	-	-	-	-	-	-
Loss on Disposal of Property, Plant and Equipment		1 702	-	48 037	-	-	-	-	-	-	-
Total Operating Expenditure		34 318 007	66 423 488	68 136 376	51 827 530	43 201 030	35 028 680	85 638 438	88 338 438	40 506 281	215 143 277
Surplus / (Deficit) for the year		(18 054 281)	19 868 176	27 884 752	1 300 000	38 783 300	40 083 300	5 368 617	1 500 000	1 000 000	7 868 617
Capital Expenditure		-	-	16 430 050	1 300 000	38 783 300	40 083 300	5 368 617	1 500 000	1 000 000	7 868 617
Buildings and other fixed structures		-	-	236 880	-	-	-	-	-	-	-
Computer Equipment		-	-	11 612 335	500 000	38 083 300	38 583 300	3 500 000,00	1 500 000,00	1 000 000,00	6 000 000,00
Software and intangible assets		-	-	4 640 175	-	-	-	1 868 617,34	-	-	1 868 617,34
Vehicles		-	-	-	800 000	(300 000)	500 000	-	-	-	-
Office furniture		-	-	-	-	1 000 000	1 000 000	-	-	-	-
Total Expenditure		34 318 007	66 423 488	84 687 026	53 127 530	81 384 330	135 112 580	31 067 115	30 438 438	41 506 281	223 011 895

Table 9: Earth Observation Programme Expenditure Estimates

5.3 Space Science Programme

5.3.1 Purpose of Programme

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

5.3.2 Programme Outputs

The core outputs of the SS Programme are:

- Installing and maintaining infrastructure for operational services and for R&D;
- Generation of knowledge to advance our understanding of the solar terrestrial environment;
- Development of products and services in accordance with the requirements of our clients;
- Development of human capital to advance the above and meet the skills need of the country;
- Advancement of science amongst the youth and the public;
- Development and maintenance of international partnerships; and
- Participation in international fora such as in the United Nations and International Civil Aviation Organisation (ICAO) related Committee meetings.

The outcomes expected from realising these outputs are:

- Creation of new knowledge; developing knowledge economy; providing foundation for enhancement of understanding and development of applications;
- Contribution to safety and security through the provision of magnetic information for the region that is utilised in mapping applications;
- Maintaining a world class facility that provides unique infrastructure to the nation - contributing to government priorities, knowledge economy, space industry, and regional reach;
- Provision of a national southern oceans and polar regions platform that facilitates new science, new applications, and paves the way for improved space weather products and services. This in turn will impact the ability to provide early warnings that then allow for mitigation measures to be put in place; and
- Human capital development and science advancement in space science related fields.

5.3.3 Outcomes, Output Indicators and Annual Targets

Outcome	Outputs	Output Indicators	Annual Targets						
			Audited Performance			Estimated Performance	Medium-Term Targets		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
O1 Increased - space relevant knowledge that supports the developmental agenda.	O1.2.1 Awareness and training interventions to key users of space-based products and services	O1.2.1.1 Number of awareness and training interventions to key users of space-based products and services	-	-	-	3	3	3	3
O3 Increased human capacity for the implementation of key space initiatives.	O3.1.1 Increased youth awareness of science	O3.1.1.1 Number of youth directly engaged	7679	7840	10858	2000	5 000	7250	7500
	O3.2.1 Support to students and interns	O3.2.1.1 Number of students and interns supported for formalised training	37	28	25	21	21	28	36
O4 SANSa re-positioned as a key enabler of government's space – related policies	O4.2.1 Significant benefit for the space programme through partnerships	O4.2.1.1 Number of activities initiated through formal International partnerships	-	-	-	-	3	3	3
		O4.2.1.2 Number of activities initiated through formal African partnerships	-	-	-	-	3	3	3

Outcome	Outputs	Output Indicators	Annual Targets						
			Audited Performance			Estimated Performance	Medium-Term Targets		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
		O4.2.1.3 Number of activities initiated through formal National partnerships	-	-	-	-	3	3	3
O5 Appropriate infrastructure developed to support the local space sector	O5.1.1 Proportional progress towards an operational space weather centre	O5.1.1.1 Percentage progress towards a new operational space weather centre, as per an approved Business Case	-	-	-	20%	70%	100%	Operational Space Weather Centre
O6 Increased share of the global space operations market	O6.2.1 Applications to address society's needs and challenges	O6.2.1.1 Number of products and applications	-	-	-	2	2	2	2
	O6.3.1 Increased national space research output	O6.3.1.1 The national research productivity score for space supported R&D	886	1460	1254	1000	1000	1155	1385

Table 10: Space Science Programme Outcomes, Output Indicators and Targets

5.3.4 Output Indicators: Annual and Quarterly Targets

Space Science Programme				Quarterly Targets			
Strategic Outcome	Output	Output Indicators	Annual Target	Q1	Q2	Q3	Q4
O1 Increased - space relevant knowledge that supports the developmental agenda.	O1.2.1 Awareness and training interventions to key users of space-based products and services	O1.2.1.1 Number of awareness and training interventions to key users of space-based products and services	3	1	1	-	1
O3 Increased human capacity for the implementation of key space initiatives.	O3.1.1 Increased youth awareness of science	O3.1.1.1 Number of youth directly engaged	5 000	100	250	2 000	2 650
	O3.2.1 Support students to and interns	O3.2.1.1 Number of students and interns supported for formalised training	21	21	-	-	-
O4 SANSa re-positioned as a key enabler of government's space – related policies	O4.2.1 Significant benefit for the space programme through partnerships	O4.2.1.1 Number of activities initiated through formal International partnerships	3	1	-	1	1
		O4.2.1.2 Number of activities initiated through formal African partnerships	3	1	-	1	1

Space Science Programme				Quarterly Targets			
Strategic Outcome	Output	Output Indicators	Annual Target	Q1	Q2	Q3	Q4
		O4.2.1.3 Number of activities initiated through formal National partnerships	3	1	-	1	1
O5 Appropriate infrastructure developed to support the local space sector	O5.1.1 Proportional progress towards an operational space weather centre	O5.1.1.1 Percentage progress towards a new operational space weather centre, as per an approved Business Case	70%	-	-	-	70%
O6 Increased share of the global space operations market	O6.2.1 Applications to address society's needs and challenges	O6.2.1.1 Number of products and applications	2 (Space Weather / Magnetic Technology products and services as per client requirements)	-	-	-	2
	O6.3.1 Increased national space research output	O6.3.1.1 The national research productivity score for space supported R&D	1000	300	150	250	300

Table 11: Space Science Programme Output Indicators, Annual and Quarterly Targets

5.3.5 Explanation of planned performance over the medium-term period

Address South Africa's challenges through space services and products

Space Weather Services

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

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

- (d) *Satellite-based communication:* Radio signals propagating from satellites to the Earth through the ionosphere can be disrupted by space weather events. This could, in turn, cause interruptions to radio communication from satellites such as voice, video, weather, avionics and satellite provided internet data.
- (e) *HF-based communication:* The extent to which radio signals within the High Frequency (HF) band travelling through the ionosphere are refracted, attenuated and absorbed is dependent on the geomagnetic conditions in space, which in turn depends on space weather conditions. Adverse space weather may lead to HF radio communication blackout, both ground to ground, and ground to air, which affects the defence, aviation, and amateur radio sectors.
- (f) *Aviation:* Space weather impacts on aviation can include effects such as disruption in HF communications, satellite navigation system errors, and avionics reliability. In addition, space weather events can increase radiation levels on-board planes, particularly long-haul flights because they fly at higher altitudes. The aviation industry require space weather products that assist with flight planning, and the ICAO have implemented regulations including space weather information in all flight plans. SANSA has received designation as the aviation space weather information provider for Africa and is in the process of assisting the aviation sector in space weather preparedness.

SANSA operates the Space Weather Regional Warning Centre for Africa, which forms part of the International Space Environment Service (ISES). SANSA's Space Weather Centre provides an important service to the nation by monitoring the sun and its activity to provide information, early warnings and forecasts on space weather conditions. Space weather and related geospace products and services are required primarily for communication and navigation systems, in the defence, aeronautics, aviation, navigation and communication sectors. SANSA currently provides daily (working day) space weather updates and early warnings, and an on-call service for clients as well as space weather training courses to improve utilisation of the provided information. The SANSA Space Weather Centre has a mobile SMS and email warning system to facilitate emergency warnings. Client specific web based services are also provided to ensure that the different sectors receive the information in the most appropriate format for their usage. Priorities for 2021/22 include:

- Further improvements to the space weather product and service portfolio;
- Continued delivery of products and services to the defence and energy sector;
- Enhancement of capability to meet the ICAO requirements for the provision of space weather information to the aviation sector;
- Verification of space weather forecasts and predictions; and
- Research into appropriate space weather related products and services.

Magnetic Technology Services

SANSA operates a magnetically clean facility that includes a large three axis Helmholtz coil system and a Non-magnetic temperature chamber among other specialised magnetic technology related equipment. The facility provides an important service to the nation and clients in both the space and non-space sectors through the provision of electric and magnetic navigation ground support, magnetic field modelling, and other magnetic technology services such as landing compass calibrations, and magnetic sensor sourcing and integration. In addition, SANSA provides much needed onsite training and development to both private and defence users.

SANSA's magnetic technology services are primarily provided to the defence, navigation and aviation sectors. Priorities for 2021/22 include:

- Continued support to the defence, aviation and maritime sectors;
- Enhanced provision of magnetic related services to the space industry;
- An increased focus on magnetic sensor integration; and
- The provision of magnetic technology services to the national and international space community.

Lead high-impact collaborative R&D on a national scale

Conduct space science research and create new knowledge and a better understanding of the universe and the near-Earth space environment. SANSA operates a wide and multi-faceted geo-space observational network in the southern African region extending to Antarctica and the Atlantic Islands. This provides a geo-space laboratory for the country to conduct cutting-edge research on the near-Earth space environment, and to lead the quest for innovative solutions and new science.

SANSA also provides research leadership for the nation through publication in high-impact journals, success in both national and international research proposals, and the ratings of its researchers. Priorities for 2021/22 include the induction of the new Research Chair in Solar Physics to expand the research knowledge areas in support of operational space weather; and the collaboration with national academic partners in space weather related research projects.

Develop national human capacity and ensure transformation

Science advancement will focus more on the southern provinces working together with the other SANSA programmes that focus on the more northern parts of the country. The SANSA Science Centre and the Mobile Lab will form the primary instruments for learner and educator engagement. Student training will be pursued through targeted funding, assisted supervision, the provision of relevant space-related projects, university partnerships and collaboration with the National Astronomy and Space Science Programme (NASSP). The Space Science Programme will continue to lead the student development programme for SANSA.

Develop active partnerships

Global partnerships with ISES, INTERMAGNET, European Incoherent Scatter Scientific Association (EISCAT), Super Dual Auroral Radar Network (SuperDARN), Committee on Space Research (COSPAR), Scientific Committee on Antarctic Research (SCAR) and various space agencies/entities will be strengthened, and stronger participation in international research proposals will be pursued. SANSA's strength as a gateway to Africa and Antarctica will be leveraged to ensure collaboration and participation in international projects for national researchers and engineers. The SANSA Geophysical Instrumentation Network, Optical Space Research Laboratory (OSR) and Antarctic and Islands Programmes will be the main vehicles for these partnerships. SANSA is also a sought-after host for international researchers and students, and through existing partnerships many visitors are hosted each year on specific research projects. The partnership with the International Space Weather Camp and the University of Michigan student research programmes will continue. In addition, through the space weather and research projects SANSA will continue to partner with African and International institutions to grow the knowledge base for the country and the region.

5.3.6 Programme Resource Considerations

SPACE SCIENCE PROGRAMME - REVENUE ESTIMATES

Rasd	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019 /20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
REVENUE											
Revenue from Non - Exchange Transactions		33 835 193	37 443 186	46 453 422	63 102 652	12 303 638	82 012 343	78 687 948	53 324 708	52 067 337	130 680 653
Operational Transfers		25 819 634	27 774 293	33 117 037	34 333 543	(616 702)	34 316 841	41 684 378	34 301 534	31 334 231	108 580 263
Parliamentary Grant		25 819 634	27 774 293	33 117 037	34 333 543	(616 702)	34 316 841	41 684 378	34 301 534	31 334 231	108 580 263
Ring fenced Grants		8 015 505	9 674 833	13 336 385	34 163 103	13 526 400	47 635 508	37 003 570	25 023 114	20 073 706	82 100 330
Post graduate student bursary support - NRF		1184 000	784 000	801 000	185 500	65 333	250 833	407 026	208 428	-	615 454
Post graduate student bursary support - DST		1840 832	3 075 014	4 034 811	2 250 000	2 265 000	4 515 000	2 700 000	2 528 100	-	5 228 100
Research Grants		4 330 673	5 815 879	7 073 437	6 333 042	426 433	6 759 481	1 160 635	1 650 000	-	2 810 635
Space Weather Centre - DST		-	-	1 421 077	25 400 567	10 763 628	36 170 134	32 735 849	20 636 586	20 073 706	73 446 141
Revenue from Exchange Transactions		10 336 193	10 683 386	10 807 208	9 068 135	74 333	9 143 134	9 068 135	10 183 024	10 780 141	30 037 353
Rendoring of Services		10 303 336	9 258 368	3 356 361	8 768 135	(388 219)	8 379 376	8 768 135	9 851 344	10 422 836	23 042 975
Contract Revenue - Public Sector		8 574 432	7 733 838	7 433 223	7 803 135	(468 735)	7 334 400	7 803 135	8 767 670	9 383 056	25 353 321
Contract Revenue - Private Sector		553 586	511 647	666 314	465 000	(88 014)	376 387	465 000	522 474	742 025	1 729 439
Contract Revenue - Foreign		1 175 378	1 012 823	1 251 418	500 000	168 530	668 530	500 000	561 800	237 754	1 353 554
Other Income		686 203	1 425 018	1 450 247	300 000	463 218	763 218	300 000	337 080	357 305	334 385
Interest Income		312 800	537 446	1 004 347	-	360 432	360 432	-	-	-	-
Other Income		373 403	787 572	624 352	300 000	102 725	402 725	300 000	337 080	357 305	334 385
Net Gains on Foreign exchange transactions		-	34 615	(173 053)	-	-	-	-	-	-	-
Commitments		-	-	-	-	8 553 019	8 553 019	-	-	-	-
Total Revenue		44 831 338	48 132 571	57 260 630	78 170 847	21 537 715	99 708 562	87 756 143	70 113 732	62 848 138	220 718 013

Table 12: Space Science Programme Revenue Estimates

SPACE SCIENCE PROGRAMME - EXPENDITURE ESTIMATES

Rasd	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019 /20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
Expenditure											
Employee Related Costs - CTC		24 332 468	25 638 717	30 887 763	41 804 003	(7 487 543)	34 316 459	40 779 033	39 813 223	39 813 223	120 405 437
Incentive Bonus Provision		-	-	-	2 808 851	(1 134 830)	1 613 362	2 230 348	2 616 802	2 616 802	7 463 352
Depreciation and Amortisation		5 116 028	4 630 168	6 213 382	-	-	-	-	-	-	-
Repairs and Maintenance		1 435 642	1 632 535	1 867 060	2 731 856	5 838 443	8 630 238	7 087 710	5 543 544	2 344 126	15 581 380
Finance Costs		-	105	-	-	-	-	-	-	-	-
Grants and Subsidies Paid		2 636 628	4 556 325	5 320 677	2 681 544	3 006 600	5 688 143	3 180 000	2 736 528	-	5 916 528
Training Expenses		175 114	380 705	233 811	333 080	(233 470)	633 610	825 000	265 000	280 300	1 370 300
General Expenses		7 631 602	7 549 338	9 687 343	18 842 814	(6 036 973)	12 745 840	17 031 437	14 360 576	13 233 081	45 285 154
Net Losses on foreign exchange transactions		(40 236)	81 281	-	-	174 350	174 350	-	-	-	-
Irrecoverable Sundry Debtors		-	-	50 144	-	-	-	-	-	-	-
Loss on Disposal of Property, Plant and Equipment		59 647	71 236	182 030	-	-	-	-	-	-	-
Total Operating Expenditure		41 466 833	44 601 070	54 502 815	63 922 146	(6 058 883)	63 863 263	71 133 534	65 341 673	58 348 138	136 023 411
Principal/Agent Transfers		-	-	-	-	-	-	-	-	-	-
AIT facilities/Industry Upgrades/Incentives		-	-	-	-	-	-	-	-	-	-
Operation Phakisa - CPUT		-	-	-	-	-	-	-	-	-	-
Other		-	-	-	-	-	-	-	-	-	-
Surplus / (Deficit) for the year		3 364 505	3 531 501	2 757 814	8 248 700	27 536 539	35 845 293	16 622 543	4 172 053	3 300 000	24 634 602
Capital Expenditure		6 435 408	4 633 883	6 743 370	8 248 700	27 536 539	35 845 293	16 622 543	4 172 053	3 300 000	24 634 602
Buildings and other fixed structures		-	-	-	-	22 364 658	22 364 658	-	-	-	-
Machinery and equipment		6 435 408	2 710 228	2 880 845	3 327 200	2 477 852	5 805 053	11 385 048,53	2 352 351,00	3 400 000,00	17 737 333,53
Computer Equipment		-	1 933 383	2 373 271	3 321 500	343 088	4 870 588	3 637 500,00	1 319 102,00	500 000,00	5 456 602,00
Software and intangible assets		-	55 678	148 626	1 000 000	385 000	1 385 000	1 000 000,00	500 000,00	-	1 500 000,00
Vehicles		-	-	740 623	-	220 000	220 000	-	-	-	-
Total Expenditure		47 902 241	49 234 953	61 246 185	78 170 847	21 537 716	99 708 562	87 756 143	70 113 732	62 848 138	220 718 013

Table 13: Space Science Programme Expenditure Estimates

5.4 Space Operations Programme

5.4.1 Purpose of Programme

The Space Operations (SO) 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.

5.4.2 Programme Outputs

The core outputs of the SO Programme are as follows:

- Hosted infrastructure services to foreign and local clients;
- Telemetry, tracking and command of satellite platforms;
- Launch support; and
- Downloading of Earth observation data during satellite passes.

The outcomes expected from realising these outputs are:

- Creation of a wider revenue base through locally hosted infrastructure by attracting a larger pool of local and international stakeholders, which ensures more relevance in the global space community;
- Assurance of a quality service in line with international standards that helps maintain relevance in the global space industry value chain as a whole; and
- Ensuring that we optimise the return on investment on hosted infrastructure thus promoting the growth and sustainability of SANSA and in addition promoting the retention of high-end skills.

5.4.3 Outcomes, Output Indicators and Annual Targets

Outcome	Outputs	Output Indicators	Annual Targets						
			Audited Performance			Estimated Performance	Medium-Term Targets		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
O6 Increased share of the global space operations market	O6.1.1 Income generated from space operations activities	O6.1.1.1 Total income generated from space operations activities	R86 million	R80 million	R100 million	R68 million	R69 million	R70 million	R72 million
	O6.2.1 Applications to address society's needs and challenges	O6.2.1.1 Number of products and applications	-	-	-	1	1	1	1
	O6.4 Greater benefit for the space programme through space operations activities	O6.4.1.1 Successful satellite pass monitoring rate for Earth Observation	98%	99.78%	99.37%	98%	98%	98%	98%

Table 14: Space Operations Programme Outcomes, Output Indicators and Targets

5.4.4 Output Indicators: Annual and Quarterly Targets

Space Operations Programme				Quarterly Targets			
Strategic Outcome	Output	Output Indicators	Annual Target	Q1	Q2	Q3	Q4
O6 Increased share of the global space operations market	O6.1.1 Rand value of income generated from space operations activities	O6.1.1.1 Total income generated from space operations activities	R69 million	R17 million	R17 million	R17 million	R18 million
	O6.2.1 Applications to address society's needs and challenges	O6.2.1.1 Number of products and applications (Space Operations products and applications)	1	-	-	-	1
	O6.4.1 Greater benefit for the space programme through space operations activities	O6.4.1.1 Successful satellite pass monitoring rate for Earth Observation	98%	98%	98%	98%	98%

Table 15: Space Operations Programme Output Indicators, Annual and Quarterly Targets

5.4.4 Explanation of planned performance over the medium-term period

Enhance the competitiveness of the South African space industry

Earth Observation Support

A proportion of SANSA's space operations activities with respect to daily passes of Low Earth Orbit (LEO) satellites are devoted to data acquisition for SANSA's Earth Observation Programme. A total of 5 150 satellite passes are forecast for the year for Earth observation with a targeted success pass acquisition of 98%. The intention is to automate the process in the future. This would lead the organisation to be more efficient enabling it to maintain the current success rate.

Teleport hosting

SANSA Space operations will concentrate on developing its infrastructure in order to enable it to host teleport like services. This will entail Space operations to enhance its sustainability and provide a redundant fibre link to a central hub in SA.

Satellite support

The directorate also provides satellite support to various clients on a commercial basis, generating a significant income stream for SANSA. Global market surveys predict satellite activity to increase from about 77 launches per annum (2000-2009) to about 120 launches per annum (2010-2019). In line with this, there is an anticipated increase in SANSA's satellite launch and general orbital support business.

5.4.5 Programme Resource Considerations

SPACE OPERATIONS PROGRAMME - REVENUE ESTIMATES

Read	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019/20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
REVENUE											
Revenue from Non - Exchange Transactions		-	15 739 573		16 424 630	(289 953)	16 134 677	19 538 656	15 026 834	15 056 458	49 682 008
Operational Transfers		-	15 739 573	15 573 291	16 424 630	(289 953)	16 134 677	19 538 656	15 026 834	15 056 458	49 682 008
Parliamentary Grant		-	15 739 573	15 573 291	16 424 630	(289 953)	16 134 677	19 538 656	15 026 834	15 056 458	49 682 008
Revenue from Exchange Transactions		83 828 439	67 084 350	84 503 725	54 936 714	4 268 003	59 204 717	58 123 628	59 748 301	63 342 737	181 214 666
Rendoring of Services		67 835 133	64 461 263	82 252 830	54 859 870	3 418 003	58 277 873	58 042 558	59 662 772	63 252 077	180 957 407
Contract Revenue - Public Sector		6 185 263	5 563 388	5 903 708	5 707 015	-	5 707 015	5 887 043	6 076 373	6 441 531	18 405 607
Contract Revenue - Private Sector		3 348 040	3 403 337	4 851 228	4 798 038	-	4 798 038	5 037 398	5 289 358	5 616 835	15 944 851
Contract Revenue - Foreign		58 301 830	49 494 538	71 437 834	44 354 816	3 418 003	47 772 819	47 117 517	48 295 841	51 193 531	146 606 949
Other Income		15 393 366	2 623 687	2 250 895	76 844	850 000	326 844	81 070	85 529	90 660	257 259
Interest Income		1 025 646	635 636	1 065 887	-	-	-	-	-	-	-
Other Income		14 367 720	280 712	303 002	76 844	850 000	326 844	81 070	85 529	90 660	257 259
Net gain on Foreign exchange transaction		-	1 647 279	882 006	-	-	-	-	-	-	-
Commitments		-	-	-	-	43 443 607	43 443 607	-	-	-	-
Total Revenue		83 828 439	82 884 523	84 503 725	71 361 343	47 427 657	118 789 000	77 722 284	74 775 195	78 339 195	230 836 674

Table 16: Space Operations Programme Revenue Estimates

SPACE OPERATIONS PROGRAMME - EXPENDITURE ESTIMATES

Read	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019/20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
Expenditure											
Employee Related Costs - CTC		31 748 543	33 648 336	37 864 522	35 962 355	(289 953)	35 962 355	35 862 460	35 330 422	36 124 528	107 977 409
Incentive Bonus Provision		-	-	-	2 711 777	-	2 421 824	2 388 538	2 399 202	3 010 377	8 398 117
Remote Location Allowance		-	-	-	4 363 834	-	4 363 834	4 582 026	4 801 363	5 032 457	14 416 446
Board Member Remuneration		-	-	-	-	-	-	-	-	-	-
Depreciation and Amortisation		10 806 151	14 133 409	13 367 260	-	-	-	-	-	-	-
Repairs and Maintenance		6 145 540	5 747 305	5 767 560	4 472 809	4 726 325	9 199 134	4 310 941	2 971 397	3 114 024	10 336 362
Antenna Infrastructure Services		3 270 436	2 383 232	6 659 253	-	5 392 575	5 392 575	-	-	-	-
Training Expenses		361 806	251 001	387 320	339 103	1 036 022	1 489 125	412 758	433 336	455 065	1 301 219
General Expenses		19 153 402	19 078 907	19 868 403	23 456 865	14 389 045	38 445 910	25 336 350	26 552 435	27 827 009	79 715 855
Net Losses on foreign exchange transactions		1 037 373	-	-	-	-	-	-	-	-	-
Irrecoverable Sundry Debtors		-	-	4 870 326	-	-	-	-	-	-	-
Loss on Disposal of Property, Plant and Equipment		4 540	670 404	105 882	-	-	-	-	-	-	-
Total Operating Expenditure		72 533 850	76 513 855	88 891 726	71 361 343	25 914 014	97 275 357	73 493 073	73 748 875	75 563 460	222 805 408
Surplus / (Deficit) for the year		11 294 649	6 370 668	(4 388 001)	0	21 513 643	21 513 643	4 229 211	1 026 319	2 835 735	8 091 265
Capital Expenditure		23 130 248	12 146 542	13 346 028	-	21 513 643	21 513 643	4 229 211	1 026 319	2 835 735	8 091 265
Buildings and other fixed structures		-	-	-	-	-	-	-	-	-	-
Machinery and equipment		23 130 248	12 146 542	8 206 788	-	10 500 000	10 500 000	4 229 210,53	-	2 835 735,00	4 229 210,53
Computer Equipment		-	-	5 624 386	-	10 463 643	10 463 643	-	1 026 319,31	-	3 862 054,31
Software and intangible assets		-	-	114 854	-	500 000	500 000	-	-	-	-
Office furniture		-	-	-	-	50 000	50 000	-	-	-	-
Satellite Development		-	-	-	-	-	-	-	-	-	-
Total Expenditure		95 664 098	88 660 397	102 837 754	71 361 343	47 427 657	118 789 000	77 722 284	74 775 195	78 339 195	230 836 673

Table 17: Space Operations Programme Expenditure Estimates

5.5 Space Engineering Programme

5.5.1 Purpose of Programme

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

5.5.2 Programme Outputs

The core outputs of the SE Programme are:

- Creation of direct jobs in the space industry;
- Mission development and support for micro-satellites;
- Mission development and support for nanosatellites; and
- The upgrade and maintenance of key infrastructure.

The outcomes expected from realising these outputs are:

- Provision of space-based solutions using satellite platforms specifically designed to meet local and regional requirements, but also stimulating the development of the local satellite development industry through the satellite build programme;
- The use of cost-effective satellite platforms for the creation of new knowledge and the development of new and unique solutions for scientific applications and addressing key user requirements, for example, Oceans Phakisa; and
- Facilities modernised to international standards that promote industry development and are positioned for use by local, regional and international users.

5.5.3 Outcomes, Output Indicators and Annual Targets

Outcome	Outputs	Output Indicators	Annual Targets						
			Audited Performance			Estimated Performance	Medium-Term Targets		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
O2 Growth of the space sector through SANSA space related industry expenditure.	O2.1.1 Expenditure to SMEs for core space projects	O2.1.1.1 Percentage contract expenditure to SMEs for core space projects	-	-	-	20%	20%	20%	20%
	O2.2.1 SANSA space related industry expenditure.	O2.2.1.1 The total contract expenditure to the broad space related industry for core space projects	R78 million	R0 million (Programme placed on hold)	-	R10 million	R10 million	R61 million	R67 million
O3 Increased human capacity for the implementation of key space initiatives.	O3.2.1 Number of students and interns supported for formalised training	O3.2.1.1 Support to students and interns	-	9	7	9	9	14	18

Outcome	Outputs	Output Indicators	Annual Targets						
			Audited Performance			Estimated Performance	Medium-Term Targets		
			2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
O4 SANSa re-positioned as a key enabler of government's space – related policies	O4.2.1 Significant benefit for the space programme through partnerships	O4.2.1.1 Number of activities initiated through formal International partnerships	-	-	-	-	1	1	1
		O4.2.1.2 Number of activities initiated through formal African partnerships	-	-	-	-	1	1	1
		O4.2.1.3 Number of activities initiated through formal National partnerships	-	-	-	-	1	1	1
O5 Appropriate infrastructure developed to support the local space sector	O5.3.1 An upgraded AIT Facility	O5.3.1.1 Progress towards an upgraded AIT Facility	-	-	-	Project delayed by COVID-19 and Houwteq ownership issues.	Revised project schedule and implementation plan	50%	100%

Table 18: Space Engineering Programme Outcomes, Output Indicators and Targets

5.5.4 Output Indicators: Annual and Quarterly Targets

Space Engineering Programme				Quarterly Targets			
Strategic Outcome	Output	Output Indicators	Annual Target	Q1	Q2	Q3	Q4
O2 Growth of the space sector through SANSa space related industry expenditure.	O2.1.1 Expenditure to SMEs for core space projects	O2.1.1.1 Percentage contract expenditure to SMEs for core space projects	20%	-	-	-	20% of total contracted value
	O2.2.1 SANSa space related industry expenditure	O2.2.1.1 The total contract expenditure to the broad space related industry for core space projects	R10 million	-	-	-	R10 million
O3 Increased human capacity for the implementation of key space initiatives.	O3.2.1 Support to students and interns	O3.2.1.1 Number of students and interns supported for formalised training	9	9	-	-	-

Space Engineering Programme				Quarterly Targets			
Strategic Outcome	Output	Output Indicators	Annual Target	Q1	Q2	Q3	Q4
O4 SANSa re-positioned as a key enabler of government's space – related policies	O4.2.1 Significant benefit for the space programme through partnerships	O4.2.1.1 Number of activities initiated through formal International partnerships	1	-	-	-	1
		O4.2.1.2 Number of activities initiated through formal African partnerships	1	-	-	-	1
		O4.2.1.3 Number of activities initiated through formal National partnerships	1	-	-	-	1
O5 Appropriate infrastructure developed to support the local space sector	O5.3.1 An upgraded AIT Facility	O5.3.1.1 Progress towards an upgraded AIT Facility	Revised project schedule and implementation plan	-	Contracting: Houwteq ownership process completed	Revised project schedule and implementation plan	-

Table 19: Space Engineering Programme Output Indicators, Annual and Quarterly Targets

5.5.5 Explanation of planned performance over the medium-term period

Develop national human capacity and ensure transformation

South Africa has the capability to be a leader in Africa to support its space technology requirements. The local market is limited; therefore, these solutions need to meet the broader needs of the African market and beyond. Critical to the development of the local South African Space Sector would be spinoffs from government programmes to create competitive products and services that can penetrate the African market, through leveraging our current relationships and low cost high quality products to meet the international market requirements. In order to ensure the local market grows, SANSa needs to address all the shortcomings within the current Space programme. Only through effective planning and coordinated implementation of a long-term Space Programme, can substantial growth in the industry be achieved.

Enhance the competitiveness of the South African Space industry

Jobs Supported

An important intervention in ensuring an effective satellite engineering capability within the local space sector, is the critical need for strengthening SANSa's internal space engineering capacity. A formal structure representing the full ambit of capabilities required to effectively oversee and manage the space engineering component of the space value chain needs to be put in place with immediate effect. This intervention must therefore ensure that the appropriate systems and processes are in place to support the broader acquisition management, systems engineering, and programme management functions needed for a SANSa Space Engineering Programme. In addition, a plan for training and skills development will need to be implemented to build the requisite expertise required for a satellite engineering programme, especially given that our current cohort of engineers have not been involved in a full mission development experience. This will further support the growth of the local Space Industry with effective implementation of the Space programme.

Satellite Development

In alignment with the National Space Programme (NSP), Space engineering supports the development of space systems to meet the broader user requirements for operational and scientific requirements of the country. The characteristics of the missions will largely be in the areas of Earth observation, marine, communication and science.

The NSP provides direction for the requirements of space technologies. A critical role for space engineering is to engage users on the specification of the satellite. Due to the dynamic nature of satellite requirements these often change and are managed independently.

The Space Engineering Programme will define missions which, where possible, will include various payloads for different sectors. It is envisaged through systematic approach satellites will be developed to meet the key areas of environmental resources management, health, safety and security, and innovation and economic growth. The space programme is also critical for planning and identifying resources skills required by various entities to support government initiatives.

The Concurrent Design/Engineering Facility (CDF/CEF) is being established with the scope to provide a mission design environment for the conceptual design of new space missions applied to pre-phase acquisition assessment studies where concurrent engineering principles are applied. This provides for a more effective organisation of existing mission analysis and design tools with human resources and a generic approach to capture corporate knowledge for further reuse.

The following are the key areas of focus:

- For any new mission, engineering is involved from feasibility through to integration and commissioning;
- Lead the proposal evaluation team to ensure Mission Requirements Document (MRD) and Technical Requirements Specification (TRS);
- Space Programme Division (SPD) Programme Management / Contract management;
- System Engineering Part of Preliminary Design Review (PDRs) etc. and Verification and Validation Teams Technical compliance;
- System Engineering meeting potential users and compiles User Requirements Specification (URS);
- Implement the NSP: engineering can determine the feasibility and requirements for future missions;
- Establish partnerships with African space agencies/partners: Reach out to our ARMC partners for information, knowledge and System Engineering experience sharing;
- Build Space System Engineering communities with African and International partners;
- Establish better contact with potential Level 5 players and the System Engineering, to start preparing for future missions such as GEO Comms Geostationary Communications Satellite, Low Earth Orbiting Satellite Aperture Radar (LEO SAR), LEO Defence;
- Mission pre-studies on the above missions at level 6 at least 1-2 years before the formal launch of such a project;
- Present papers at local conferences on the work being done at SANSA in Space Engineering, such as the International Council on Systems Engineering (INCOSE) Conference; and
- Address what Space Operations and SPD System Engineering does (telecoms and navigation satellites).

Facility development

In order to embark on providing space systems to government, facilities become crucial in the implementation of the plan. Having the ownership of Houwteq, SANSA will be able to provide AIT services to the South African space, automotive, and defence industries, designed to incentivise the growth of those industries. An added benefit is that through this AIT activity, SANSA will build stronger relationships with stakeholders, and be more intuitive to their needs and aspirations. The two core areas of development will be in assembly integration testing and calibration and validation. Given recent developments in which Denel have opted to exit the space industry, there is a consideration to transfer the Houwteq and Denel Spaceteq capabilities to SANSA.

This consideration requires a formal process to be followed in which the justification and long-term sustainability of these capabilities can be motivated for and indeed secured. Should the preconditions for a sustainable satellite engineering programme be confirmed, SANSA will absorb the Houwteq facilities. The Agency will invest in the upgrade of the facility to support Space Missions for the country and also the local Space economy.

Contracting value to private SME space industry

SANSA's mandate, as prescribed in the SANSA Act (Act No. 36 of 2008), is to stimulate the South African space industry. Therefore, SANSA will ensure that its contracting efforts are tailored to stimulate the private industry for the benefit of the country. This will entail setting clear private company outsourcing targets. The industries to be targeted are both in the space technology development sectors and the Earth observation value-adding services.

5.5.6 Programme Resource Considerations

SPACE ENGINEERING PROGRAMME - REVENUE ESTIMATES

Road	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019 /20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
REVENUE											
Revenue from Non - Exchange Transactions		77 872 936	2 561 992	6 160 468	13 457 531	29 384 985	43 442 516	75 249 769	28 997 725	29 320 452	133 567 346
Operational Transfers		-	-	5 778 996	7 283 452	(2 633 543)	4 649 909	17 339 769	7 313 725	7 554 452	32 207 946
Parliamentary Grant		-	-	5 778 996	7 283 452	(2 633 543)	4 649 909	17 339 769	7 313 725	7 554 452	32 207 946
Ring fenced Grants		77 872 936	2 561 992	381 472	6 174 079	32 618 528	38 792 607	57 910 000	21 684 000	21 766 000	101 360 000
Post graduate student bursary support -DST		1 339 804	-	-	-	-	-	-	-	-	-
AIT Facilities		1 820 854	-	-	4 704 676	19 000 000	23 704 676	37 000 000	21 684 000	21 766 000	80 450 000
Concurrent Design Facility		-	-	-	-	14 000 000	14 000 000	20 910 000	-	-	20 910 000
Implementation of the Intra Africa Space Science, Technology and Innovation Programme for SA		-	-	-	-	-	-	-	-	-	-
Satellite Development Programme		74 712 278	2 561 992	381 472	1 469 403	(381 472)	1 087 931	-	-	-	-
Principal/Agent Transfers		8 258 803	-	-	-	-	-	-	-	-	-
Operation Physics - CPUT		8 258 803	-	-	-	-	-	-	-	-	-
Accumulated surplus roll over		-	-	-	-	15 377	15 377	-	-	-	-
Total Revenue		86 131 739	2 561 992	6 160 468	13 457 531	30 000 362	43 457 893	75 249 769	28 997 725	29 320 452	133 567 346

Table 20: Space Engineering Programme Revenue Estimates

SPACE ENGINEERING PROGRAMME - EXPENDITURE ESTIMATES

Road	Note	Audited Outcomes	Audited Outcomes	Audited Outcomes	Original Budget	Adjustment	Revised Budget	Medium Term Expenditure Framework			Total MTEF
		2017/18	2018/19	2019 /20	2020/21	2020/21	2020/21	2021/22	2022/23	2023/24	
Expenditure											
Employee Related Costs - CTC		-	-	4 484 687	5 750 797	(2 191 547)	3 559 249	16 006 245	5 738 083	5 738 083	27 482 411
Incentive Bonus Provision		-	-	-	336 795	(128 579)	208 216	470 435	478 174	478 174	1 426 782
Depreciation and Amortization		-	-	26 855	-	-	-	-	-	-	-
Grants and Subsidies Paid		985 805	-	-	133 690	-	133 690	141 043	147 813	147 813	436 668
Training Expenses		14 375	-	-	586 000	-	586 000	-	-	-	-
General Expenses		1 315 189	-	381 472	476 171	(238 040)	178 131	722 047	349 656	349 656	2 621 358
Net Losses on foreign exchange transactions		-	-	-	-	-	-	-	-	-	-
Loss on Disposal of Property, Plant and Equipment		-	-	-	-	-	-	-	-	-	-
Total Operating Expenditure		2 315 368	-	4 893 014	7 283 452	(2 618 166)	4 665 286	17 339 769	7 313 725	7 313 725	31 967 219
Principal/Agent Transfers		8 258 803	-	-	-	-	-	-	-	-	-
Operation Physics - CPUT		8 258 803	-	-	-	-	-	-	-	-	-
Surplus / (Deficit) for the year		83 816 371	2 561 992	1 267 454	6 174 079	32 618 528	38 792 607	57 910 000	21 684 000	22 006 727	101 600 727
Capital Expenditure		76 533 132	2 557 984	-	6 174 079	32 618 528	38 792 607	57 910 000	21 684 000	22 006 727	101 600 727
Buildings and other fixed structures		-	-	-	-	-	-	-	-	240 727,24	240 727,24
Computer Equipment		-	-	-	-	-	-	-	-	21 766 000,00	21 766 000,00
AIT Facility		1 820 854	-	-	4 704 676	19 000 000	23 704 676	37 000 000,00	21 684 000,00	21 766 000,00	80 450 000,00
Concurrent Design Facility*		-	-	-	-	14 000 000	14 000 000	20 910 000,00	-	-	20 910 000,00
ARMC Nanosatellite constellation		-	-	-	-	-	-	-	-	-	-
Satellite Development Programme		74 712 278	2 557 984	-	1 469 403	(381 472)	1 087 931	-	-	-	-
Total Expenditure		87 107 303	2 557 984	4 893 014	13 457 531	30 000 362	43 457 893	75 249 769	28 997 725	29 320 452	133 567 346

Table 21: Space Engineering Programme Expenditure Estimates

6 Consolidated Performance Outcomes

2020 / 2025 Outcomes and Targets										
				Annual Targets						
Outcomes	Outputs	Output Indicators	Strategic Plan Five – Year Targets	Audited Performance			Estimated Performance	Medium-Term Targets		
				2017/18	2018/19	2019/20		2020/21	2021/22	2022/23
O1 Increased - space relevant knowledge that supports the developmental agenda.	O1.1.1 Increased percentage of government departments and public entities that are using space products and services	O1.1.1.1 Percentage of government departments and public entities that are using space products and services	80%	-	-	-	30%	40%	50%	70%
	O1.2.1 Awareness and training interventions to key users of space-based products and services	O1.2.1.1 Number of awareness and training interventions to key users of space-based products and services		-	-	-	4	5	5	5
O2 Growth of the space sector through SANSA space related	O2.1.1 Expenditure to SMEs for core space projects	O2.1.1.1 Percentage contract expenditure to SMEs for core space projects	20%	-	-	-	20%	20%	20%	20%

2020 / 2025 Outcomes and Targets										
Outcomes	Outputs	Output Indicators	Strategic Plan Five – Year Targets	Annual Targets					Medium-Term Targets	
				Audited Performance		Estimated Performance	2020/21	2021/22	2022/23	2023/24
				2017/18	2018/19					
industry expenditure.	O2.2.1 SANSa space related industry expenditure.	O2.2.1.1 The total contract expenditure to the broad space related industry for core space projects	R266 million	R78 million	R0 million (Programme placed on hold)	–	R10 million	R10 million	R61 million	R67 million
O3 Increased human capacity for the implementation of key space initiatives.	O3.1.1 Increased youth awareness of science O3.1.2 Support to students and interns	O3.1.1.1 Number of youth directly engaged O3.2.1.1 Number of students and interns supported for formalised training	151 100	18 041	24 337	36 506	4 000	21 125	37 250	42 500
O4 SANSa re-positioned as a key enabler of government's space – related policies	O4.1.1 Initiatives to transform SANSa into a high performing Agency	O4.1.1.1 Number of initiatives to transform SANSa into a high performing Agency	6	-	-	54	50	50	70	90
				-	-	-	4	2	-	-

2020 / 2025 Outcomes and Targets										
				Annual Targets						
Outcomes	Outputs	Output Indicators	Strategic Plan Five – Year Targets	Audited Performance			Estimated Performance	Medium-Term Targets		
				2017/18	2018/19	2019/20		2021/22	2022/23	2023/24
O4 SANSa re-positioned as a key enabler of government’s space – related policies	O4.2.1 Significant benefit for the space programme through partnerships	O4.2.1.1 Number of activities initiated through formal International partnerships	50	-	-	-	-	9	9	9
		O4.2.1.2 Number of activities initiated through formal African partnerships		-	-	-	9	10	11	
		O4.2.1.3 Number of activities initiated through formal National partnerships		-	-	-	12	13	13	
O5 Appropriate infrastructure developed to support the local space sector	O5.1.1 Proportional progress towards an operational space weather centre	O5.1.1.1 Percentage progress towards a new operational space weather centre, as per an approved Business Case	An operational space weather centre developed by 2025.	-	-	-	20%	70%	100%	Operational Space Weather Centre

2020 / 2025 Outcomes and Targets										
Outcomes	Outputs	Output Indicators	Strategic Plan Five – Year Targets	Annual Targets						
				Audited Performance			Estimated Performance	Medium-Term Targets		
				2017/18	2018/19	2019/20		2020/21	2021/22	2022/23
O5 Appropriate infrastructure developed to support the local space sector	O5.2.1 Development or upgrade of infrastructure	O5.2.1.1 Development of Digital Earth South Africa	Proportional progress towards an operational Digital Earth South Africa	-	-	-	Ingestion of SPOT archive	Ingestion of Landsat archive	Ingestion of additional (1) sensor	Ingestion of additional (1) sensor
	O5.3.1 An upgraded AIT Facility	O5.3.1.1 Progress towards an upgraded AIT Facility	AIT facility upgraded as per approved plan by March 2025	-	-	-	Project delayed by COVID-19 and Houwteq ownership issues	Revised project schedule and implementation plan	50%	100%
O6 Increased share of the global space operations market	O6.1.1 Income generated from space operations activities	O6.1.1.1 Total income generated from space operations activities	R352 million	R86 million	R80 million	R100 million	R68 million	R69 million	R70 million	R72 million
	O6.2.1 Applications to address society's needs and challenges	O6.2.1.1 Number of products and applications	7 operational space-related applications by March 2025	-	-	-	6	6	6	7

2020 / 2025 Outcomes and Targets										
				Annual Targets						
Outcomes	Outputs	Output Indicators	Strategic Plan Five – Year Targets	Audited Performance			Estimated Performance	Medium-Term Targets		
				2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
O6 Increased share of the global space operations market	O6.3.1 Increased national space research output	O6.3.1.1 The national research productivity score for space supported R&D	2 000	1 693	1 835	1 765	1 300	1 300	1 500	1 800
	O6.4 Greater benefit for the programme through space operations activities	O6.4.1.1 Successful satellite pass monitoring rate for Earth Observation	Successful satellite pass monitoring maintained at a rate of 98% by March 2025	98%	99.78%	99.37%	98%	98%	98%	98%

Table 22: Consolidated Performance Outcomes and MTEF Targets

7 Updated Key Risks

The Strategic Risks as articulated in the 2020-2025 SANSA Strategic Plan have been updated as outlined in Table 23 below.

Risk Description	Root Causes	Consequences	Control Actions
Reduced ability to create awareness amongst the youth to maintain and/or grow the pipeline.	<ul style="list-style-type: none"> • Impact ongoing on COVID – 19 Pandemic. • Change in platforms of science festival and schools to virtual • Lack of data and internet infrastructure availability in some schools. • Reduced ability to conduct in person visitations in schools and SANSA centres. • Reduction by school on the allowable contact (physical and virtual) with learners. • Limitation on inter-provincial travel (COVID–19 Disaster Management Measures). • Reluctance of SANSA employees to travel and conduct the face to face awareness sessions due to the pandemic • Delays caused by transition to provide online awareness trainings. 	<ul style="list-style-type: none"> • Reduction in the growth pipeline. • Interruption on the momentum to create awareness and continued increase of pipeline. • The awareness (teachers and the public) of SANSA and the role it plays is indirectly reduced. 	<ul style="list-style-type: none"> • Development of eLearning for virtual training. • Facilitate access to and/ or management of data offering by mobile operators. • Strengthen relationships/ partnerships with provincial educational partners where applicable.
Significant reduction in the number of postgraduate students and interns that can be supported with effect from the 2021 and outer academic years	<ul style="list-style-type: none"> • Changes in academic calendars due to COVID-19 (extension of the 2020 academic year and delays in start of 2021 academic year and increased emotional stress experienced by students) • Delays in graduation/ finalization of degree years. • Students supported in 2020 academic year will require extended financial support in the 2021 calendar year. • University internal administration - Delayed acceptance of students due to processes delays because of COVID-19. 	<ul style="list-style-type: none"> • Delayed intake of master's and honours students. • Increase in funding required to support the extended academic years. • Increase student dropout rate (financial loss for SANSA) 	<ul style="list-style-type: none"> • Engagement with funding sources to secure funding extension.
Drastic reduction in requirements for space-based products and services	<ul style="list-style-type: none"> • Loss of skills and technical experience. • Inadequate Knowledge Management. • Lack of critical mass in key technical areas (single point of failure, skills residing with a particular employee and leaves the organization). • Lack of coaching and mentoring. • Lack of customer centric focus. • Change in customer requirements due to budget constraints (customer cancel contracts). • Long lead times (5-8 years) to build relationships with customers. • Lack of Marketing focus within SANSA. 	<ul style="list-style-type: none"> • Loss of current and future streams of revenue and contracts. • Loss of organizational reputation. • Loss of potential investments and creation of partnerships with space based suppliers. • Loss of technical capability. 	<ul style="list-style-type: none"> • Knowledge management required for robust (unpack Review the Talent management framework to focus on embedding coaching and mentoring. • Review of ICT Strategy to ensure alignment with business model. • Ensure that the change management and culture initiatives adequately address the requirements of the organization to shift from current state to a commercial mindset. • Develop marketing collateral for products and services. • Development of the industry framework.

Risk Description	Root Causes	Consequences	Control Actions
Significant decline in the generation and dissemination of new knowledge.	<ul style="list-style-type: none"> Reduced opportunities and limited budget available for national research funding. Complexities and restrictions in obtaining international funding. Movement restrictions imposed by National lockdown in response to COVID-19. Delays in student completion and graduation resulting in delays intake. Due to long lead time in the processing of peer review publications. Complex and time-consuming processes for rating researchers with limited incentives. Reductions on the number of conferences/workshops held. Virtual conferences/ workshop does not provide the same impact and return on effort compared to in person conferences/workshops. 	<ul style="list-style-type: none"> Demotivated students and researchers. Reduced attendance at workshops and conferences, resulting in reduced visibility of SANSA. Delays in publication of results and reducing the SANSA competitive edge in the industry. No SANSA rated researchers 	<ul style="list-style-type: none"> Review and update the travel policy to include the payment process of virtual attendance of workshops. Approval of researcher career ladder. Review of the external bursary policy to allow for the provision of data allowances.
No availability or erratic data delivery to EO and poor TT&C services locally and globally	<ul style="list-style-type: none"> The PFMA does not facilitate long planning (i.e. 50 years planning cycle) for the space industry. Delayed recapitalisation of equipment. (EO – to maintain the industry norm of 98%). Declined in employee morale and motivation. Future lockdowns in response to COVID-19. Failure and/or poor maintenance of critical equipment (both SANSA and other Government organisations). 	<ul style="list-style-type: none"> Loss of organizational reputation. Demotivated employees. Inability to produce earth observation products and services Financial losses. Loss of competitive edge locally and regionally. Loss of global reputation for space operation. 	<ul style="list-style-type: none"> Continuous engagements with National Treasury regarding the PFMA implication on Space Operations.
Failure to meet contractual obligations for international and local stakeholders.	<ul style="list-style-type: none"> The process of rolling over surplus funds is cumbersome, complex and the approval is uncertain. Increasing competition from external players. Inability to retain surplus funds for unplanned maintenance (emergency breakdowns). 	<ul style="list-style-type: none"> Loss of revenue. Loss of competitive edge in the space sector. Loss of organizational reputation. Inability to secure long sustainable contracts. 	<ul style="list-style-type: none"> Continuous improvement on international and local visibility. Continuous engagements with National Treasury regarding the PFMA implication in Space Operations – possibility to of Government to redefine SANSA position in terms of PFMA. Continuously seek process to automate and streamline systems.

Risk Description	Root Causes	Consequences	Control Actions
Inability to absorb new and innovative skills generated through a "pipeline".	<ul style="list-style-type: none"> • Lack of implementation of Space industry development framework. • Lack of entrepreneur/ business incubation within the space cluster. • Short-term funding commitments (2-3 years), limits the growth of space industry (acceptable period = 10 years). 	<ul style="list-style-type: none"> • Lack of growth and stimulation of the space industry within South Africa. • South Africa will lose reputation and competitive advantage in the space industry. • Decline and/or stagnation of growth of the local space industry. • Lost skills will be absorbed by international space industry. 	<ul style="list-style-type: none"> • Review the Space Industry development framework (to include the development of entrepreneur/business incubation). • Development, approval and implementation plan for the Space Industry development framework.
South Africa's inability to develop its own unique capability in Space Systems and provide the user data as required by the various stakeholders.	<ul style="list-style-type: none"> • Lack of funding for the full satellite mission (design, build, launch, commission, & operation and maintenance). • Lack of internal capacity and resources to effectively execute the Programme are limited to budget constraints on the programme. 	<ul style="list-style-type: none"> • The current build of EO-Sat1 can be scrapped. • Loss of materialisation of the IP, for future builds and commercial purposes. • Closure of companies that operate in satellite development. • Worldwide loss of reputation and trust on the part of SANSA and the DSI. (i.e. perception that SANSA and DSI cannot successfully execute a project of this size and nature). 	<ul style="list-style-type: none"> • Finalisation and approval of the Space Engineering Strategy and implementation plan. • Detailed risk assessment for the EOSat1 based on the current status of the programme. • Submission to the Minister of Science and Innovation on proposals for the completion of EO-Sat1. • Negotiate an upfront commitment with the DSI for full funding for the full mission which includes all space segments as part of the acquisition.
Fractured incoherent development (reactive responses on opportunistic basis as opposed to targeted proactive development.	<ul style="list-style-type: none"> • Lack of sector-specific strategic development plan focusing on targeted growth areas. • Lack of clear strategy and implementation plan for inter-agency leverage. 	<ul style="list-style-type: none"> • Loss of reputation. • Inability to execute the full space programme. • Sustainability of SANSA could be put at risk. 	<ul style="list-style-type: none"> • Create and maintain inter-agency dialogue. Establishment/evolution of collaborative initiatives.
Sub-optimal relationships with industry & national stakeholders, disadvantaging SANSA.	<ul style="list-style-type: none"> • Lack of clarity on SANSA's changing mandate and national role with respect to internal capabilities vs. driving external capability development. 	<ul style="list-style-type: none"> • Compromised ability to realise full value and sustainability of SANSA moving forward. • Loss of advantageous edge to develop advanced space sector. • Loss of reputation. 	<ul style="list-style-type: none"> • Clearer marketing and promotional initiatives emphasising SANSA's role in driving external national capability development. • Internal workshoping on building internal and external facing SANSA narratives • Subsequent Communications Strategy and external workshoping around SANSA narratives.

Table 23: Updated Key Risks

8 Infrastructure Projects

The key infrastructure projects relate to the Space Science, Earth Observation and Space Engineering Programmes. These infrastructure projects are captured in Table 24 below, together with the expected outcomes of these projects.

Infrastructure Element	Sub-Elements	Specific Objective	Expected Outcomes
Space Weather Centre	Knowledge Generation of the Space Environment	To exploit our knowledge base for the development of essential services and products that assist in evidence-based decision making and supports the safety of our citizens	Providing customer centric products and services to assist in the mitigation of the potential risk to technology (as well as the economy) from adverse space weather.
	Space Science over the Southern Oceans and Polar Regions	To exploit our knowledge base for the development of essential services and products that assist in evidence-based decision making and supports the safety of our citizens	Provision of a national southern oceans and polar regions platform that facilitates new science, new applications, and paves the way for improved space weather products and services. This in turn will improve the ability to provide early warnings that then allow for mitigation measures to be put in place.
	Applied Electromagnetic Technology	To exploit our knowledge base for the development of essential services and products that assist in evidence-based decision making and supports the safety of our citizens	Contribution to the nation's safety and security as the majority of these product offerings are for the defence and aviation industry. Also, the provision of space related services to non-space applications provides value from space to the nation.
	African Instrumentation Network	To build and host the appropriate infrastructure that will support the national development imperatives	Provision of an African geophysical platform that facilitates new science, new applications, and paves the way for participation in regional and international partnerships. Growing the scientific database over Africa, and providing support as the gateway to Africa. Full participation in the African space strategy.
Earth Observation Infrastructure	Data and Infrastructure	To build and host the appropriate infrastructure that will support the national development imperatives	Raw data that is transformed into information and embedded into value added products and services, to support user needs. An improved infrastructure platform that is readily available for the storage, archiving, processing and dissemination of data, and also for use by the Earth observation community for the development of innovative products and services.
	Development of National Base Maps	To exploit our knowledge base for the development of essential services and products that assist in evidence-based decision making and supports the safety of our citizens	Raw data transformed into fundamental geospatial data sets that are used as input in a variety of services and products for use by key decision makers.
	Coordination of the Development of Products and Services	To develop, grow and transform the indigenous space industry that is responsive to local needs and that is globally positioned	Coordinated and streamlined development of products and services by the local Earth observation sector that responds to national priorities.
Satellite Infrastructure	Space Missions	To build and host the appropriate infrastructure that will support the national development imperatives	The provision of space based solutions using satellite platforms specifically designed to meet local and regional requirements, but also stimulating the development of the local satellite development industry through the satellite build programme.
	Industry Development	To develop, grow and transform the indigenous space industry that is responsive to local needs and that is globally positioned	A local satellite industry that is economically transformed thus ensuring equitable sharing of returns on investment made by government to the local satellite industry.
	Facility Development	To build and host the appropriate infrastructure that will support the national development imperatives	Facilities that are modernised to international standards that promotes industry development and positioned for use by local, regional and international users.

Table 24: Infrastructure Projects

9 District Delivery Model

The suite of products and services that will be coordinated and developed by SANSA will find relevance and value at the local district and municipality levels. During the course of implementing this APP, SANSA will actively seek funding to ensure local uptake of the relevant products and services at a local community level.

10 Public Entities

The South African National Space Agency does not have any Public Entities.

11 Public – Private Partnerships (PPPs)

There are no PPPs related to the APP period.

PART D: TECHNICAL INDICATOR DESCRIPTIONS (TIDs)

O1.1.1.1 Percentage of government departments and public entities that are using space products and services

O1.2.1.1 Number of awareness and training interventions to key users of space-based products and services

O2.1.1.1 Percentage total contract expenditure to SMEs for core space projects

O2.2.1.1 The total contract expenditure to the broad space related industry for core space projects

O3.1.1.1 Number of youth directly engaged

O3.2.1.1 Number of students and interns supported for formalised training

O4.1.1.1 Number of initiatives to transform SANSA into a high performing Agency

O4.2.1.1 Number of activities initiated through formal International partnerships

O4.2.1.2 Number of activities initiated through formal African partnerships

O4.2.1.3 Number of activities initiated through formal National partnerships

O5.1.1.1 Percentage progress towards a new operational space weather centre, as per an approved Business Case

O5.2.1.1 Development of Digital Earth South Africa

O5.3.1.1 Progress towards an upgraded AIT Facility

O6.1.1.1 Total income generated from space operations activities

O6.2.1.1 Number of products and applications

O6.3.1.1 The national research productivity score for space supported R&D

O6.4.1.1 Successful satellite pass monitoring rate for Earth Observation

DPME GUIDELINES ON TIDs

Indicator Title	Title of the indicator verbatim as given in the Programme Plan
Definition	Meaning of the indicator: Provides a brief explanation of what the indicator is, with enough detail to give a general understanding of the indicator. Explanation of technical terms used in the indicator.
Source/collection of data	Where the information is collected from: 1. A description of what source documentation or information is used as a basis for actual performance achievements. 2. A description where this source documentation or information originates from – by indicating name of responsible unit, person, etc.
Method of calculation or assessment	Describes clearly and specifically how the indicator is calculated. • How performance is calculated (quantitative). • How performance is assessed (qualitative).
Means of Verification / Validation	Describes clearly and specifically how the indicator is verified/validated. The portfolio of evidence required to verify validity of data.
Assumptions:	Factors accepted as true and certain to happen without proof.
Disaggregation of beneficiaries (where applicable)	<ul style="list-style-type: none"> • Target for women. • Target for youth. • Target for people with disabilities.
Spatial transformation (where applicable)	<ul style="list-style-type: none"> • Contribution to spatial transformation priorities. • Description of spatial impact.
Calculation type	Identifies whether the reported performance is cumulative, or non-cumulative: <ul style="list-style-type: none"> • Cumulative (year-end); • Cumulative (year-to-date); or • Non-cumulative.
Reporting cycle	Identifies if an indicator is reported quarterly, annually or bi-annually.
Desired Performance	Information about whether performance that is higher or lower than targeted performance is desirable.
Indicator responsibility	Who is responsible for managing or reporting on the indicator?

Indicator title	01.1.1.1 Percentage of government departments and public entities using space products and services
Definition	The measurement of the usage of space data and value-added products by government (all three spheres) and its entities.
Source/collection of data	<p>Reports that document provision of data and value-add products to government and its entities, including appropriate statistics. This information may include some or all of the following:</p> <ul style="list-style-type: none"> • Stakeholder registry; • Data and product distribution statistics; • Online access of data and products; • Industry contracts/agreement to deliver services/product; • Confirmed orders for services/products; and • Reports on use and impact.
Method of calculation or assessment	A brief qualitative report of the organs of states that use using services/products that have been delivered to which government stakeholders will be used as the products/services are not a simple statistical/numerical activity. The report will also contain how the impactful product/service was determined for this indicator.
Means of Validation / Verification	Sample testing some of the assertions in the Organs of State using Space Products/Service Report against some of the validation material e.g. data transmission logs, client acceptance signatures, contract registers, progress report.
Assumptions	Availability of space products and services that meet client needs.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Across South Africa.
Calculation type	Cumulative and progressive throughout the year.
Reporting cycle	Quarterly
Desired Performance	40% of government departments and public entities using space products and services.
Indicator Responsibility	MD: Earth Observation

Indicator title	01.2.1.1 Number of awareness and training interventions to key users of space products and services
Definition	The indicator is designed to measure the marketing of space products and services to key users.
Source/collection of data	Tracking of awareness and training interventions, including the users reached.
Method of calculation or assessment	A spreadsheet will be maintained indicating the users reached, the awareness or training interventions undertaken, and the related products and services. Attendance registers will be kept as a record. Where applicable, written confirmation of remote / virtual training sessions.
Means of Validation / Verification	Records are signed off on a quarterly basis.
Assumptions	Participation of targeted beneficiaries.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Target to align with identified SANSA spatial transformation priorities across South Africa.
Calculation type	Cumulative
Reporting cycle	Quarterly
Desired Performance	8 awareness and training interventions to key users of space products and services.
Indicator Responsibility	MD: Earth Observation / MD: Space Science

Indicator title	O2.1.1.1 Percentage total contract expenditure to SMEs for core space projects
Definition	<p>This measures the extent to which SANSA is supporting SMEs through its core space projects.</p> <p>The indicator measures the contract value that is outsourced to Small to Medium Enterprises (SMEs) for all SANSA programmes including EO, SS, SO and SE programmes. This should not include consultancy expenditure for general support initiatives. Data license fees will also be an exception and are not to be considered in calculation of the SME contract values. Key considerations will be supplier turnover of no more than R50m and employees not exceeding 250.</p>
Source/collection of data	Internal contracts / purchase orders and related invoices for core space projects.
Method of calculation or assessment	Rand value of invoices relating to SANSA expenditure divided by the rand value of those invoices outsourced to SMEs.
Means of Validation / Verification	Invoices and SCM reports reflecting supplier expenditure on outsourced services.
Assumptions	Availability of SANSA funds to be expended on Programmes under its control.
Disaggregation of Beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Non-cumulative.
Reporting cycle	Annually.
Desired Performance	20% of contract values to benefit SMEs.
Indicator Responsibility	MD: Earth Observation / MD: Space Engineering.

Indicator title	O2.2.1.1The total contract expenditure to the broad space related industry for core space projects
Definition	The indicator measures the contract value that is outsourced to Small to Medium Enterprises (SMEs) and big industry players. (This should not include consultancy expenditure for general support initiatives).
Source/collection of data	Internal contracts and invoices and where available auditable reports from affected companies.
Method of calculation or assessment	This would be the rand value total of all the contractual expenditure to the broad space related industry for core space projects.
Means of Validation / Verification	Invoices: The Contracts Manager will compare his figures against those held by Finance before releasing his numbers to the quarterly report.
Assumptions	Availability of SANSA funds to be expended on Programmes under its control.
Disaggregation of Beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Non-cumulative.
Reporting cycle	Annually
Desired Performance	R10 million total contract expenditure to the broad space related industry for core space projects.
Indicator Responsibility	MD: Space Engineering

Indicator Title	03.1.1.1 Number of youth directly engaged
Definition	This refers to the number of young people engaged directly through some specific activity (e.g. visit by learners to a SANSA facility, learner workshop/lesson, SANSA visit to a school) and will exclude a count of young people who visit SANSA stands at exhibits.
Source/collection of data	Hard copies of attendance register of activities. PDF of attendance registers and summary. Other relevant reports or written confirmations to be utilised where virtual sessions were held.
Method of calculation or assessment	Manual calculation of the quantitative number of youth beneficiaries.
Means of Verification / Validation	Signed-off attendance registers. Other relevant reports or written confirmations to be utilised where virtual sessions were held.
Assumptions:	Participation of targeted beneficiaries.
Disaggregation of beneficiaries (where applicable)	Target for youth.
Spatial transformation (where applicable)	Target to align with identified SANSA spatial transformation priorities across South Africa.
Calculation type	Cumulative performance.
Reporting cycle	Quarterly.
Desired Performance	21 125 youth directly engaged by SANSA.
Indicator responsibility	MD: Earth Observation / MD: Space Science

Indicator Title	O3.2.1.1 The Number of students and interns supported for formalised training
Definition	The total number of students currently linked and supported by SANSA through bursaries, or supervised. SANSA employees who are supported under any SANSA staff development scheme should not be counted. Further this excludes short courses and focuses on students that are registered for some formal training for a degree, diploma, or certificate within the South African National Qualification Framework.
Source/collection of data	Contracts and student agreements and student records. Proof of supervision engagement.
Method of calculation or assessment	Manual head count. Since the academic year and financial year are different – students are added in the quarter in which they joined SANSA for that financial year. That is, students have to be counted once per financial annum in the quarter in which they joined or began to be supported by SANSA. To simplify students will not be counted in quarter 4, however, all supported students will be counted in quarter 1 (April) for the new financial and academic year.
Means of Verification / Validation	Contracts and student agreements, proof of student supervision contracts/register are available.
Assumptions:	Participation of targeted beneficiaries.
Disaggregation of beneficiaries (where applicable)	Beneficiaries may include youth, women and persons with disability as appropriate.
Spatial transformation (where applicable)	Not applicable.
Calculation type	Non- Cumulative performance.
Reporting cycle	Annually
Desired Performance	50 students and interns supported for formalised training.
Indicator responsibility	MD: Earth Observation / MD: Space Engineering / MD: Space Science

Indicator Title	04.1.1.1 Number of initiatives to transform SANSA into a high performing agency
Definition	This indicator provides the interventions needed to improve the performance of SANSA.
Source/collection of data	The EXCO approved Skills Audit and Workforce Plan initiatives concluded as per the respective work/project plans.
Method of calculation or assessment	Submission of EXCO approved Skills Audit and Workforce Plan.
Means of Verification / Validation	Interventions presented to and approved by EXCO.
Assumptions:	Availability of internal capacity.
Disaggregation of beneficiaries (where applicable)	Not Applicable.
Spatial transformation (where applicable)	Not Applicable.
Calculation type	Non-Cumulative.
Reporting cycle	Bi-annually.
Desired Performance	2 initiatives developed to improve the performance of SANSA (Skills Audit and Workforce Plan).
Indicator responsibility	ED: Enterprise Services

Indicator title	O4.2.1.1 Number of activities initiated through formal International partnerships
Definition	This indicator establishes the number of new projects / activities with existing International partners or the establishment of projects through new International partnerships. In the case of SANSA, partnerships include any associations, collaborations and/ or mutual agreements wherein the Agency works with external stakeholders to achieve a common goal.
Source/collection of data	Tracking of actual new projects implemented with existing partners or new projects with new partners.
Method of calculation or assessment	Each new project title will be recorded together with the new activities engaged in per quarter.
Means of Validation / Verification	Partnership reports are signed off on a quarterly basis.
Assumptions	Stakeholder engagement and collaboration.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Cumulative.
Reporting cycle	Tri – Annually.
Desired Performance	9 new activities / projects through formal International partnerships.
Indicator Responsibility	MD: Earth Observation / MD: Space Science / MD: Space Engineering.

Indicator title	O4.2.1.2 Number of activities initiated through formal African partnerships
Definition	This indicator establishes the number of new projects/ activities with existing African partners or the establishment of projects through new African partnerships. In the case of SANSA, partnerships include any associations, collaborations and / or mutual agreements wherein the Agency works with external stakeholders to achieve a common goal.
Source/collection of data	Tracking of actual new projects implemented with existing partners or new projects with new partners.
Method of calculation or assessment	Each new project title will be recorded together with the new activities engaged in per quarter.
Means of Validation / Verification	Partnership reports are signed off on a quarterly basis.
Assumptions	Stakeholder engagement and collaboration.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Cumulative
Reporting cycle	Tri – Annually.
Desired Performance	9 new activities / projects through formal African partnerships.
Indicator Responsibility	MD: Earth Observation / MD: Space Science / MD: Space Engineering.

Indicator title	O4.2.1.3 Number of activities initiated through formal National partnerships
Definition	This indicator establishes the number of new projects / activities with existing National partners or the establishment of projects through new National partnerships. In the case of SANSA, partnerships include any associations, collaborations and / or mutual agreements wherein the Agency works with external stakeholders to achieve a common goal.
Source/collection of data	Tracking of actual new projects implemented with existing partners or new projects with new partners.
Method of calculation or assessment	Each new project title will be recorded together with the new activities engaged in per quarter.
Means of Validation / Verification	Partnership reports are signed off on a quarterly basis.
Assumptions	Stakeholder engagement and collaboration.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Cumulative.
Reporting cycle	Tri – Annually.
Desired	12 new activities / projects through formal National partnerships.
Indicator Responsibility	MD: Earth Observation / MD: Space Science / MD: Space Engineering.

Indicator title	O5.1.1.1 Percentage progress towards a new operational space weather centre, as per an approved Business Case
Definition	This indicator shows progress towards achieving the aim of a 24/7 operational space weather centre.
Source/collection of data	Quarterly reports are prepared on the project progress against the approved business case. Tracking of progress against key milestones.
Method of calculation or assessment	Compare the project progress with the project action plan and calculate a percentage based on the estimate progress towards the final goal.
Means of Validation / Verification	Comparison of latest project schedule against the original project schedule and approved business case.
Assumptions	Project schedule and milestones not affected by external factors that limits the accuracy. Existence of project implementation capacity.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Non-cumulative.
Reporting cycle	Annually.
Desired Performance	70% progress towards a new operational space weather centre.
Indicator Responsibility	MD: Space Science.

Indicator title	05.2.1.1 Development of Digital Earth South Africa
Definition	Provision of progress towards the development of an operational data cube platform, namely, Digital Earth South Africa.
Source/collection of data	Quarterly reports prepared on the project progress against the project concept document.
Method of calculation or assessment	Tracking of progress (in percentage) against the project action plan.
Means of Validation / Verification	Comparison of the current project schedule against original project action plan.
Assumptions	Sampling of use cases to be provided.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Non-Cumulative.
Reporting cycle	Annually.
Desired Performance	100% Ingestion of Landsat archive.
Indicator Responsibility	MD: Earth Observation.

Indicator title	05.3.1.1 Progress towards an upgraded AIT facility
Definition	The AIT facility upgrade is to support the Space Industry. The current facility will undergo various areas of improvement to support the development of Satellites.
Source/collection of data	As per project plan on the upgrade of the AIT facility.
Method of calculation or assessment	Progress report on completion of Houwteq ownership processes by Quarter 2. A Board approved revised project schedule and implementation plan by end of the Quarter 3.
Means of Validation / Verification	Comparison of latest project progress against the project schedule and approved business case.
Assumptions	Availability of capacity. Project schedule and milestones not affected by external factors that limit the accuracy.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Non-cumulative.
Reporting cycle	Bi – Annually.
Desired Performance	Revised project schedule and implementation plan by end of the 2021/22 financial year.
Indicator Responsibility	MD: Space Engineering.

Indicator title	O6.1.1.1 Total income generated from space operations activities
Definition	This measures the revenue generation capacity of the Space Operations activities. The income generated by the Space Operations Programme for the financial year, includes all forms of income e.g. inter-company contractual revenue, external contracts, ring fenced grant income.
Source/collection of data	This information is based on signed contracts and the actual financial transactions on the financial system and reported numbers on the financial statements.
Method of calculation or assessment	This would be the total rand value of all the contractual revenue generated under the space operations programme.
Means of Validation / Verification	Contracts with the clients and invoices.
Assumptions	Stakeholder engagement and collaboration.
Disaggregation of Beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Reporting cycle	Quarterly.
Desired Performance	A total income of R69 million generated by year-end.
Indicator Responsibility	ED: Space Programme

Indicator title	O6.2.1.1 Number of products and applications
Definition	The number of products/services (PS) delivered within any one of the following PS areas, (i) PS1-Data as a Service, (ii) PS2 – Remote sensing products, (iii) PS3 – Infrastructure as a Service, (iv) PS4 - Magnetic technology services, (v) PS5 – Space Weather Services, and (vi) PS6 - Space Operation products and applications.
Source/collection of data	<p>Reports that document what has been achieved or produced including appropriate statistics for each product. Some of the specifics may include some or all of the following:</p> <p>PS1 – Data as a Service</p> <ul style="list-style-type: none"> • Data collected (sensor portfolio); • Contracts and active agreements on data access; • Data distributed including online data access • Data request and distribution statistics; and • Report on use and impact. <p>PS2 – Remote Sensing Products</p> <ul style="list-style-type: none"> • Confirmed orders for services/products; • Frequency of production or publication of base remote sensing and fundamental data products; • Industry contracts/agreement to deliver services/product; and • Report on use and impact. <p>PS3 – Infrastructure as a Service</p> <ul style="list-style-type: none"> • Use cases built on Digital Earth South Africa; • Confirmed orders for services/products; and • Report on use and impact. <p>PS4 – Magnetic Technology Services</p> <ul style="list-style-type: none"> • Calibration Services Sheets; and • Report on uptake, use and impact. <p>PS5 - Space Weather Services</p> <ul style="list-style-type: none"> • Client Progress Reports, if applicable; and • Report detailing uptake, use and impact. <p>PS6 - Space Operation Products and Applications</p> <ul style="list-style-type: none"> • Progress reports on products / services to clients in the local and global space community; and • Report on use and impact.
Method of calculation or assessment	A brief qualitative report of the services/products that have been delivered will be used as the products/services are not a simple statistical/numerical activity. The report will also contain how the impactful product/service was determined for this indicator.
Means of Validation / Verifications	Sample testing some of the assertions in the Product/Service report against some of the validation material e.g. data transmission logs, client acceptance signatures, contract registers, progress reports.
Assumptions	Meaningful activities that can be validated.
Disaggregate of Beneficiaries (where applicable)	Not applicable.
Calculation type	Cumulative and progressive throughout the year.
Reporting cycle	Quarterly.
Desired Performance	6 products / applications developed.
Indicator Responsibility	MD: Earth Observation / MD: Space Science / ED: Space Programme.

Indicator title	O6.3.1.1 The national research productivity score for space supported R&D
Definition	The research productivity score for R&D. This is meant to demonstrate SANSA's research output and is an indicator of research output, quality, impact and relevance.
Source/collection of data	<p>This productivity score is based on a function of research funding sourced + publications (journals, books, reports, proceedings) + students graduated + research rating status.</p> <p>Data sources to include:</p> <ol style="list-style-type: none"> 1. Published papers in PDF and hard copy available. For books Front pages available in pdf. 2. Grant funding listed in grant award registers, and award letters available – also available from finance system as grant income received, copy of register from NRF system indicating payments received for that year up to end of quarter. Only grant funding for research projects or grant holder linked student funding should be included – no independent student (PDP) or post doc or science engagement funding. 3. Students graduated – list is maintained with PDF copies of Degree certificates or award letters. 4. Research rating status – determined by rating award letters.
Method of calculation or assessment	Composite function as described in “determination of research productivity score” document.
Means of Validation / Verification	<ul style="list-style-type: none"> ▪ Count the hard copies of publications and books; ▪ Verify that evidence exists for all aspects included in the formula; and ▪ Verify excel sheet with calculation.
Assumptions	Availability of required data on key to be scored and reported.
Disaggregation of beneficiaries	Not applicable.
Spatial Transformation	Not applicable.
Calculation type	Non-cumulative.
Reporting cycle	Quarterly.
Desired Performance	A national research productivity score of 1300 achieved.
Indicator Responsibility	MD: Earth Observation / MD: Space Science

Indicator title	06.4.1.1 Successful satellite pass monitoring rate for Earth Observation
Definition	The measurement of the rate of success in downloading SANSA EO data measured in proportional time achieved. To measure the success rate of the SANSA Space Operations in supporting SANSA Earth Observation. It also shows the impact of SANSA's space operations activities to EO.
Source/collection of data	1. Data acquired is calculated minutes of a pass or a fraction thereof. 2. Data losses are calculated in minutes or fractions thereof. 3. Operational workload is calculated in passes per day.
Method of calculation or assessment	Systematic count of minutes of data captured and demodulated (in percentage format).
Means of Validation / Verification	SO verifies with EO on quantity (minutes) and quality of data acquired.
Assumptions	Availability of required data.
Disaggregation of beneficiaries	Not Applicable.
Spatial Transformation	Not Applicable.
Calculation type	Non-cumulative.
Reporting cycle	Quarterly.
Desired Performance	98% Satellite Pass Monitoring Rate achieved.
Indicator Responsibility	ED: Space Programme