SOUTH AFRICAN NATIONAL SPACE AGENCY

SANSA Strategic Plan (2011/13-2013/14)

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

South African National Space Agency (SANSA)

Strategic plan (2011/13-2013/14)

February 2011
Official sign-off

It is hereby certified that this strategic plan was developed by the management of the South African National Space Agency (SANSA) under the guidance of the department of science & technology.

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Contents

Executive summary

South Africa's advances and ambitions in Space Science and technology warrant co-ordination, and as such the Department of Science and Technology (DST) has established the South African National Space Agency (SANSA) to implement this co-ordination driven by the department's national space strategy, as determined by the Minister.

SANSA's mandate revolves around promoting the peaceful use of 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 capital development outreach programmes and infrastructure development; and fostering international co-operation in space-related activities.

SANSA's operations will be guided by four thematic areas: Earth Observation, Space Operations, Space Science and space engineering. The thematic areas are to be launched as core mission directorates through a SANSA corporate office. Strategically through these directorates, SANSA will address service for societal benefit, Space Operations, Space Science, space engineering, human capital development, space awareness and public engagement, as well as foster international engagements and partnerships. As a public entity, SANSA is required to demonstrate how its programmes will contribute or support government's national priorities through the outcomes–based approach as derived from the medium term strategic framework (2009 - 2014). This form of accountability will ensure that SANSA lives by its slogan, ***"in service of humanity"***, by ensuring that South Africans benefit on a day-to-day and practical basis through the utilisation of Space Science and technology.

1. Vision

To be a leading contributor to the perpetual advancement of society through the benefits of Space Science and technology.

2. Mission

To use Space Science and technology to:

1. Enable the delivery of space-related services to the citizens of South Africa;
2. Support, guide and conduct research and development in Space Science and engineering and the practical application of the innovations they generate;
3. Stimulate interest in science and develop human capacity in space technologies in South Africa;
4. Nurture space-related partnerships to enhance South Africa's standing in the community of nations;
5. Grow South Africa's contribution to the global space value chain.

Our mission is succinctly captured in our motto: in service of humanity.

3. Legislative & other Mandates

3.1 Legislative mandate

The South African National Space Agency (SANSA) came into existence through the promulgation of the SANSA Act (Act 36 of 2008) on 3 December 2010 as a Schedule 3A public entity under the Department of Science and Technology (DST).

The legislative mandate of SANSA is to:

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

SANSA is broadly required to promote the peaceful use of space; foster international co-operation in space-related activities; facilitate the creation of an environment conducive to space technology industrial development. This will be achieved by fostering relevant research, and advancing our scientific and engineering capability through human capital development, outreach programmes and the development of infrastructure.

3.2 Strategic mandate

3.2.1 Ten year innovation plan

SANSA's strategic mandate is derived from the ten year innovation plan which identifies five grand challenges, including:

1. Farmer to Pharma;
2. Space Science & Technology;
3. Energy security;
4. Global change science;
5. Human and social dynamics.

3.2.2 National Space Strategy

SANSA also derives its strategic mandate from the national space strategy (NSS) that was approved by cabinet in 2008.

The goals of the National Space Strategy (NSS) are:

1. To capture a global market share for small to medium sized space systems in support of the establishment of a knowledge economy through fostering and promoting innovation and industrial competitiveness;
2. To empower better decision making through the integration of space based systems with ground based systems for proving the correct information products at the right time; and
3. To use Space Science and technology to develop applications for the provision of geospatial, telecommunications, timing and positioning products and services.

3.2.3 South African National Earth Observation Strategy (SAEOS)

SANSA will be a key contributor to the South African Earth Observation Strategy (SAEOS) whose primary objective is *"to co-ordinate the collection, assimilation and dissemination of Earth Observations, so that their full potential to support policy, decision-making, economic growth and sustainable development in South Africa can be realised."*

3.2.4 Other strategies

Various other national strategies have bearing on SANSA. These include the:

- White paper on science and technology;
- Human resources development strategy;
- Youth into science strategy;
- National research and development strategy.

4. Situational analysis

4.1 Performance environment

Figure 1: Implementation framework for National Space Strategy

The South African Government recognises the potential role of Space Science and technology to deliver on a wide spectrum of national priorities including environmental and resource management; urban planning and rural development; economic growth and global competitiveness; food security and health; job creation and poverty alleviation; human capital development; technology development and innovation; science advancement amongst the youth and public engagement in science; and fostering global partnerships. To this end, SANSA was established to ensure better co-ordination and attainment of the above objectives. In particular, the National Space Strategy outlines four thematic areas under which the South African space programme has to be pursued.

The four thematic areas are:

1. Earth Observation
2. Navigation
3. Space Science and exploration
4. Communication

In response to this, the service offering of SANSA includes the following:

4.1.1 Operational data services for societal benefit

SANSA provides geo-spatial data, value-added data products, information and services for the operational needs of the country. These services include:

1. ***Decision-making, Policy-making & Planning instruments:*** Government departments, decision-makers and policy-makers require data and value-added data products and services for a number of societal service delivery needs, policy formulation, decision-making, planning and development, conservation and

global sustainability, disaster forecasting, monitoring and mitigation. Typical areas of application include human settlement, environment & resource management, urban planning and rural development.

2. ***Agriculture & Food Security:*** Geo-spatial information for precision farming to allow for more intelligent utilisation of farming land; monitoring of plant conditions allowing for better crop yield forecasting; monitoring of grazing land utilisation ensuring better sustainability; overall planning of land utilisation.
3. ***Water Resource Management:*** Geo-spatial information for water quality and quantity monitoring; monitoring of water utilisation and the illegal diversion & utilisation of water resources.
4. ***Fire Monitoring:*** In conjunction with the CSIR, SANSA provides data for fire monitoring which is of benefit to farming, disaster management and electric power transmission by ESKOM.
5. ***Space Weather & GEO-Spatial Services:*** Collection and processing of geo-space data for the provision of various geo-space services and space weather services as a Regional Warning Centre (RWC) for the African region under the International Space Environment Service (ISES). These data products and services are primarily required for communication and navigation by, for example, the defence force, aerospace, navigation, and communication users. Other uses include mineral exploration by mining companies, and electric power distribution by power utilities.

4.1.2 Research & development services & platform

SANSA provides geo-spatial data, value-added data products, information and services to R&D institutions and tertiary educational institutions. This is to serve the intellectual, technological and innovation needs of the country and to contribute to the global data and knowledge fabric. These services include

1. ***Data Procurement & Acquisition:*** The co-ordinated procurement and acquisition of geo-spatial data for national research and development needs. This is achieved by leveraging SANSA's ground station infrastructure, geo-spatial/space weather observing network, existing partnerships and contracts, and buying power for maximum benefit.
2. ***Low-level Data Processing, Archiving and Distribution:*** The acquired data is pre-processed, archived in SANSA's systems and distributed to various stakeholders nationally and internationally.
3. ***R&D Platform Provision:*** SANSA develops and maintains a cutting-edge and capital intensive research and development platform that is easily accessible to researchers, students and other trainees for R&D purposes.
4. ***Research & Development:*** SANSA collaboratively conducts basic and applied research and development to continually contribute to the creation and utilisation of new knowledge as a bed-rock for technology development and innovation as South Africa strives to transform from a largely resource-based economy to a knowledge-based economy.

4.1.3 Human capital development & the advancement of science amongst the youth & public

1. ***Human Capital Development Programmes:*** SANSA financially supports human capital development and runs a number of human capital programmes including post-graduate training in collaboration with universities and R&D institutions; internship and mentorship programmes; personnel in-service training in partnership with government agencies and other stakeholders. These take various forms including joint projects, co-supervision arrangements, access to facilities and data, short-term courses, and shared-teaching arrangements.
2. ***Science Advancement Amongst the Youth:*** In order to address the country's skills needs in the Science, Engineering & Technology (SET) domain, SANSA uses the mysteries and the technical novelties associated with space as a vehicle to stimulate interest in SET. This is achieved through school outreach programmes, learner visits to SANSA facilities, and educator programmes.
3. ***Public Engagement***: SANSA uses Space Science and technology as a vehicle to uplift the scientific literacy of the general public. This is crucial in stimulating greater public participation in addressing global challenges facing humanity today including global change, environmental sustainability, food security. A scientifically aware population will also play a key role in encouraging more youth participation in science and in assisting the youth with challenges in SET subjects. Public engagement takes the form of public lectures and public media channels.

4.1.4 Promotion of South Africa's space industry and economic network

1. ***Space Operations for the Space Industry:*** SANSA uses its ground station for various space operation activities including launch support and early orbit support, in-orbit testing, satellite life-cycle support and satellite mission control for the local and international space industry and governments.
2. ***Positioning, Navigation & Timing Services:*** Using Space-based augmentation system (SBAS) to improve satellite navigation in the country and to use satellites for precise positioning and timing. Precise positioning and timing are very important for a number of applications of socio-economic benefit including safety of life missions.
3. ***Promotion of Industry Participation:*** SANSA promotes the participation of industry in its programmes through the promotion of local technology development, the advancement of know-how and technology transfer. This is largely achieved through SANSA's international partnerships, the promotion of export and import channels for South African industry, and the alignment of SANSA's programmes with other technology and industry strategies e.g. The Advanced Manufacturing Technology Strategy.

4.1.5 Promotion of South Africa as a global space citizen

1. ***Development And Maintenance Of Strategic Partnerships:*** SANSA develops and maintains strategic international partnerships with developing countries in the IBSA framework, BRICS framework, with European countries and the Americas.
2. ***Active Participation in Global Bodies:*** SANSA maintains an active participation in global strategic bodies like the Global Earth Observation System of Systems (GEOSS), Committee on Earth Observation Satellites (CEOS), International Space Environment Service (ISES), International Real-time Magnetic Observatory Network (INTERMAGNET).

4.2. Organisational environment

SANSA has been formed through the consolidation of the existing public space institutions, namely, the CSIR Satellite Applications Centre, the Hermanus Magnetic Observatory of the NRF. The Houwteq Satellite Assembly Integration and Test facility of DENEL is also earmarked to be incorporated into SANSA.

Structurally, SANSA has a corporate office and four directorates, namely:

. SANSA Earth Observation (currently under SANSA Space Operations)
. SANSA Space Operations
. SANSA Space Science
. SANSA Space Engineering (awaiting resolution of transfer of Houwteq facility)

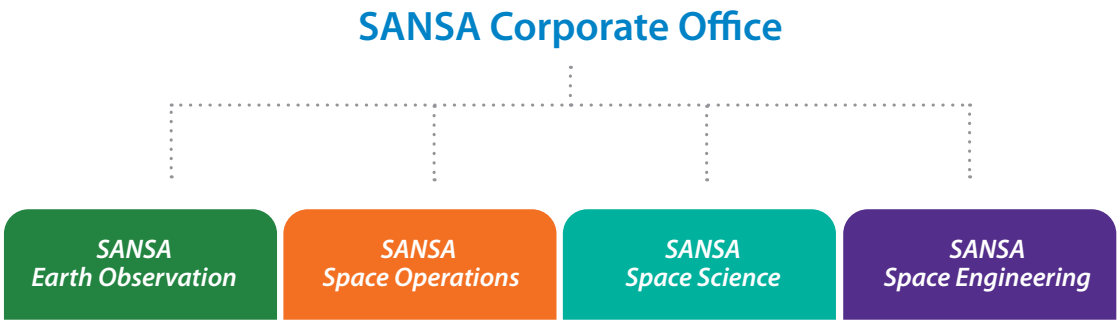
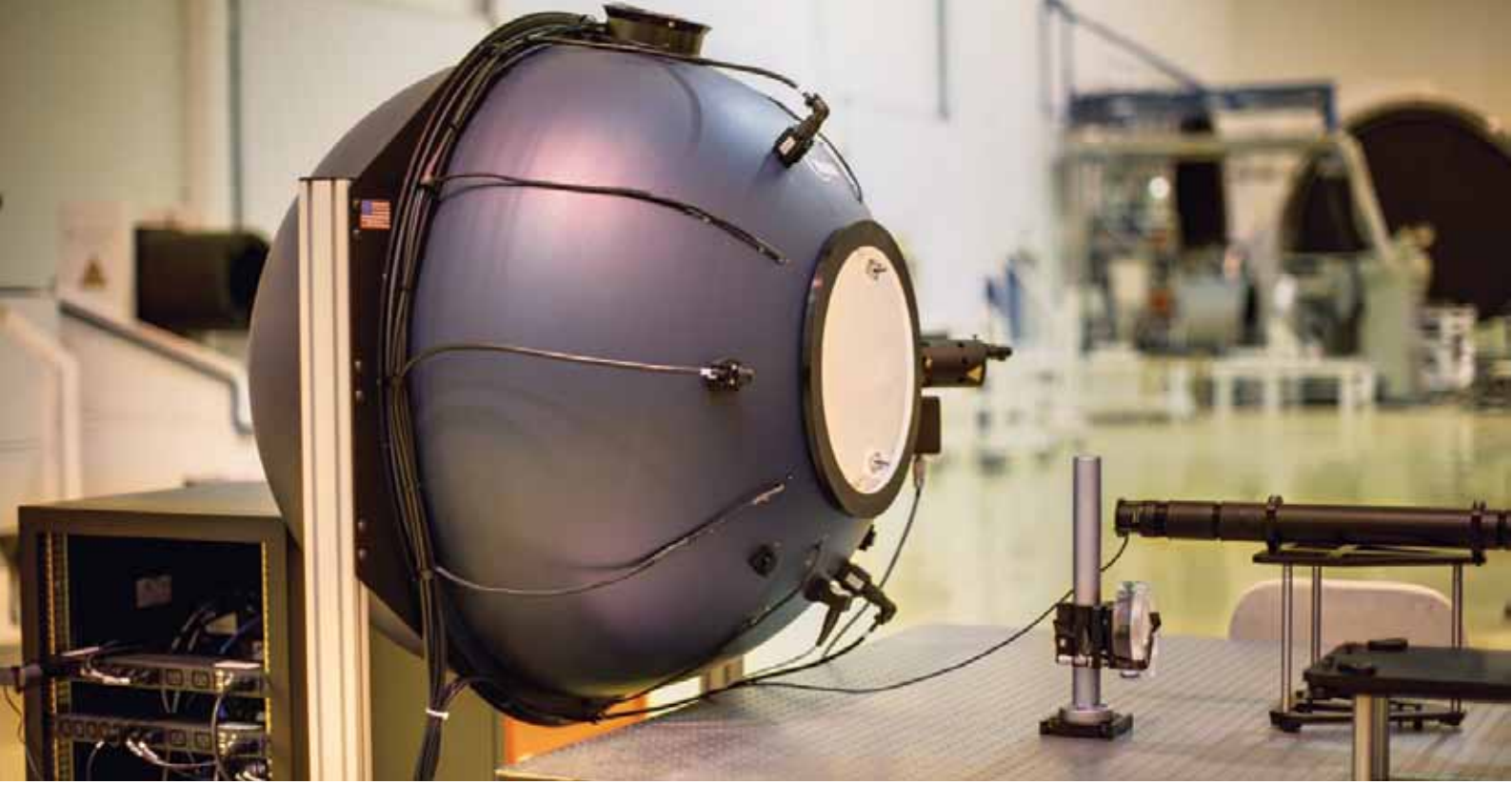


Figure 2: SANSA Corporate Structure

The key responsibilities, roles and functions of the corporate office and directorates are outlined in detail below

SANSA Corporate Office: The headquarters of SANSA with executive management houses core support services including:



- Finance;
- Human Resources;
- Governance, Legal, Planning & Monitoring;
- Information & Communications Technology;
- Communication & Science Advancement;
- Occupational Health and Safety.

SANSA Earth Observations directorate provides the agency with leadership and management of:

- EO Data Collection, Archiving & Distribution;
- EO Sensor Portfolio Management;
- EO R&D Platform And Enabling Support Provision;
- Satellite Image Processing And Correction;
- Human Capital Development;
- Science Advancement;
- Contribution to Sensor & Satellite Design and/or Development;
- EO Local & International Partner Engagement.

SANSA Space Operations leads Space Operations for SANSA. Key functions and roles:

- EO data acquisition and data mirror storage;
- Lead SANSA's Ground Segment Support;
- TT&C;
- Launch Support;
- In-Orbit Testing;
- Satellite Mission Control;
- Navigation & Other Space Applications;
- Human Capital Development;
- Science Advancement;
- Contribution to Sensor & Satellite Design and/or Development;
- International Commercial Business.

SANSA Space Science leads multi-disciplinary Space Science for SANSA. Key functions & roles:

- Basic & Applied Space Science Research
- Support Space-Facilitated Science Through Data Acquisition
- Co-ordinate/Administer Scientific Data Ground Segment
- Provide Space Weather and other Geo-Space Services and Products
- Lead Science Student Research Training
- Drive Strong National and International Collaborations
- Primary Science Advancement and Learner/ Educator Support Centre for SANSA
- Contribution Space Weather Services During Sensor & Satellite Design and/or Development

SANSA Space Engineering leads the systems engineering and project management of the design and development of SANSA satellite systems and sub-

systems in partnership with the primary contractor, R&D institutions, and private sector partners. Maintain and grow strategic facilities that are required for the assembly, test and integration of Satellites and Satellite Sub-systems and payloads. Key functions and roles:

- Satellite and sub-system requirements analysis;
- Satellite assembly, integration and testing (AIT) facility and related competence;
- Lead the technical side of the space mission project management;
- Lead space engineering technology & systems HCD;
- Strong collaborations with space systems universities satellite launch investigations;
- Lead sponsor and facilitator of private space industry partnerships;
- Provide space systems platform for external partners;
- Science advancement.

4.3 Strategic planning process

The development of this strategy involved consultation with the Department of Science and Technology; several workshop sessions with the SANSA directorates; a board strategic workshop and several board planning meetings.

5. Strategic outcome oriented goals

5.1 SANSA's value proposition

SANSA has a five point value proposition as outlined below:

Societal capital

SANSA contributes to the improvement of the quality of the lives of South Africans in a sustained and conserved environment through the use of Space Science and technology for day-to-day societal benefits. This will entail prioritising programmes and projects that would facilitate the service delivery objectives of the country in its various forms, towards a conserved environment and better decision making.

Human capital

SANSA trains and develops South Africans in key areas of national importance, promote the uptake and appreciation of science by our youth, and improve the overall scientific literacy and engagement of our populace. This is very important if the country is to address the current skills shortages and the increasing demands of advanced expertise for our growing economy.

Figure 3: Five Point Value Proposition

Intellectual and technological capital

SANSA uses Space Science and technology as a vehicle to increase South Africa's intellectual capital, advanced technology capital and our countries global new knowledge share. This is an absolute necessity and a cornerstone if South Africa is to create and sustain a vibrant national Space Science and technology programme that responds to the changing needs of humanity, increases our global space market share, increases our global competitiveness and creates a larger measure of self-dependence in the space arena and be among the leading innovators.

Economic capital

SANSA provides South Africa with the necessary space applications that are increasingly permeating and driving successful economies around the world. This increases the country's global competitiveness, enhance efficient logistics and cost effective means of production, trading and distribution.

Global capital

SANSA is the primary point of contact and face of South Africa in the global space arena and a vehicle for strategically positioning the country amongst the community of space faring nations. Space activities, by their nature, rely on international partnerships, therefore global partnerships and international engagements are transversal, threading all activities within the agency, its programmes and functional areas.

5.2 SANSA's value target audience

SANSA stakeholders who will benefit from our value creation include:

- various government departments and agencies who use space related data, information and technology for service delivery e.g. Agriculture, water, energy, minerals;
- public and private clients/industries who use space related technology and data and information for their products and services;
- research councils, national research facilities and universities who conduct research, offer services and develop technologies; space related industries; international partners and clients;
- the youth, general public and policy-makers whose lives are affected in one way or another by space related activities;
- global partners and clientele.

5.3 SANSA's goals

SANSA has five strategic goals, namely:

Goal 1: World-class & efficient services and societal benefits (Societal Capital).

Goal 2: Cutting-edge research, development, innovation, technology & applications (Intellectual Capital).

Goal 3: Effective development of human capital, transformation and science advancement (Human Capital).

Goal 4: Globally competitive national space industry (Economic Capital).

Goal 5: Make South Africa a recognised global space citizen (Global Capital).

5.3.1 Alignment of SANSA goals with National Space Strategy goals

The alignment of the SANSA goals to the National Space goals is reflected in Table 1:

National Space Goals	**Goal 1:** To capture a global market share for small to medium-sized space systems in support of the establishment of a knowledge economy through fostering and promoting innovation and industrial competitiveness.	**Goal 2:** To empower better decision making through the integration of space-based systems with ground-based systems for proving the correct information products at the right time.	**Goal 3:** To use Space Science and technology to develop applications for the provision of geospatial, telecommunication, timing and positioning products and services.
SANSA Goals			
Goal 1: World-class & efficient services and societal benefits (Societal Capital)	. Intellectual/Technology capital platforms that create new knowledge & foster innovation . Space systems and Operations platforms and services	. Societal capital platforms & services . Timely, accurate, detailed & easily accessible data, value-added data services & products . Space based decision making tools . Needs driven space systems . Observational infrastructure & global networks . Enabling Space Operations	. Space Operations services . R&D in space applications . Applied Space Science services
Goal 2: Cutting-edge research, development, innovation, technology & applications (Intellectual Capital)	. R&D in space systems engineering, Space Science . Knowledge creation in Space Science & technology	R&D in EO, GIS, geo-informatics, image/ signal processing	R&D in navigation, space weather, telemetry tracking & command (TT&C), Space Operations, mission control
Goal 3: Effective development of human capital, transformation and science advancement (Human Capital)	HCD in space engineering and Space Science	HCD in EO, GIS, geo-informatics, data/ image processing etc	HCD is Space Science & engineering
Goal 4: Globally competitive national space industry (Economic Capital)	. Industrial stimulation through projects . Promotion of local industry through international partnerships	Industry participation in sensor development and satellite system development	Creating enabling space applications platform that could benefit industry
Goal 5: Make South Africa a recognised global space citizen (Global Capital)	Competitive space systems development	. Active participant in EO and Space Science technology forums . Contributing to global initiatives	Part of global space applications networks e.g. EGNOS

Table 1: Alignment of SANSA Strategic Goals with National Space Goals

5.3.2 SANSA's contribution to national outcomes

Government has developed the outcomes based approach to ensure that planning results in the improvement of the lives of citizens rather than just the carrying out of functions. In this context Government has developed 12 national outcomes. SANSA directly contributes to 11 of the 12 outcomes in one form or the other. We do not contribute directly to outcome 12 (an efficient, effective and development oriented public service and an empowered fair and inclusive citizenship). However, by providing services to the public sector, we indirectly enable public servants to be efficient & effective.

SANSA Goals	*National Government Outcome*	*SANSA's Contribution*
Goal 1: World-class & efficient services and societal benefits (Societal capital)	Improved quality of basic education	Imagery of educational planning
	A long and healthy life for all South Africans	Health surveillance & cross-border health risk; pollution monitoring
	Vibrant, equitable and sustainable rural communities with food security for all	Rural development & planning; agricultural monitoring
	Sustainable human settlements and improved quality of household life.	Human settlements planning
	A responsive, accountable, effective and efficient local government system	Municipality and local government planning
	Environmental assets and natural resources that are well protected and continually enhanced.	Environmental monitoring
Goal 2: Cutting-edge research, development, innovation, technology & applications (Intellectual capital)	Decent employment through inclusive economic growth	Knowledge creation, technology development & innovation
	A skilled and capable workforce to support an inclusive growth path	Skills development
Goal 3: Effective development of human capital, transformation and science advancement (Human capital)	Decent employment through inclusive economic growth	Student & personnel training
	A skilled and capable workforce to support an inclusive growth path	Student & personnel training
Goal 4: Globally competitive national space industry (Economic capital)	Decent employment through inclusive economic growth	Stimulation of space industry
	A skilled and capable workforce to support an inclusive growth path	Skills development
	An efficient, competitive and responsive economic infrastructure network	Economic infrastructure e.g. space navigation & communication
Goal 5: Make South Africa a recognised global space citizen (Global capital)	Create a better South Africa and contribute to a better and safer Africa and World	Global partnerships, collaborations, projects

6. SANSA's strategic programmes

6.1 Six key SANSA programmes

6.1.1 Human capital development

The Department of Science and Technology, as articulated in its Strategic Plan and in the National Space Strategy, has set key performance indicators that SANSA must fulfil regarding human capital development. These include SANSA initiating and producing, through partnerships with local existing higher education institutes, science and research councils and international organisations, graduates at the Bachelor, Honours, MSc and PhD level in Space Science & technology. Human Capital Development is identified as one of the corporate strategic goals and will be implemented within all the functional directorates as well as through corporate led initiatives. Of particular importance corporate leadership will be required for SANSA to attain its goals and vision.

The biggest challenge will be to ensure that SANSA has a representative staff profile particularly in the professional and technical areas. In addition to competitive open market recruitment efforts, SANSA will use its HCD programmes to address employment equity targets. SANSA, as a responsible corporate citizen, has a duty and an obligation to contribute to the national objective of an increased knowledge worker society and is expected to annually report on this to the Labour Department.

6.1.2 Science advancement and public engagement

The most notable long-term return on investment in the Space Science and technology is the creation of opportunities that instil in our youth the recognition and motivation that they, too, can play a role in future scientific and technological breakthrough. Capturing the hearts and minds of the youth to pursue scientific and technological studies and careers is the single largest sustainable economic multiplier for a country, especially amongst developing nations. Science advancement is another cross-cutting goal of SANSA that has to be driven by all functional units of SANSA and the corporate office.

6.1.3 Earth Observation

Globally Earth Observation has taken unprecedented importance and there is an increased focus and expenditure on Earth System monitoring activities. These efforts are led by various international bodies like the Group on Earth Observations (GEO) of which South Africa is co-chair, the Global Earth Observation System of Systems (GEOSS), and Committee on Earth Observation Satellites (CEOS). The common theme for all these activities is to globally co-ordinate Earth Observation efforts with the primary objective of benefiting humanity in a sustained and earth-friendly manner as the world strives to attain the Millennium Development Goals (MDGS) by 2015.

GEOSS has nine societal benefit themes, and the SA Earth Observation Strategy (SAEOS) is the South African response

to the GEOSS. SANSA, as one of the implementing agencies of SAEOS will fulfil the strategic objectives through the SANSA Earth Observation directorate.

Earth Observation has numerous applications that are of societal benefit. These include resource and environmental monitoring; urban planning and rural development; disaster forecasting, monitoring and mitigation; agriculture and food security; defence, safety and health monitoring. Therefore the services provided by SANSA benefit government departments, decision-makers and policy-makers.

6.1.4 Space Operations

To benefit fully from national and international space systems SANSA operates a satellite ground station for various space operation activities including launch support and early orbit support, in-orbit testing, satellite life-cycle support and satellite mission control for the local and international space industry and governments. The primary objective of these operations is to service the Earth Observation interest of South Africa.

The SANSA Space Operations directorate is the primary driver for SANSA's Space Operations and also pursues other space applications including satellite based navigation augmentation. This directorate will remain located in Hartebeesthoek and will be initially co-located with the SANSA Earth Observation directorate under one Managing Director.

6.1.5 Space Science

The Science & Technology White Paper states,

"Human wonder and curiosity and the ability to recognise serendipitous discovery account for much of scientific progress. ... It is important that fundamental research activity not be regarded as impractical, because it is the preserver of standards without which, in the long term, the applied sciences will also die."

SANSA recognises this and wants the SANSA Space Science directorate to be the central pillar in driving this endeavour within SANSA. Further, the long-term sustainability of the South African space programme and the increase in our market share of global space-technology and competitiveness are strongly dependent on the continued creation of new knowledge as a bedrock for space technology development, innovation and services. Without home-grown basic Space Science research and knowledge capital, South Africa will continually be an importer of space know-how and will not reach its optimum innovative and competitive capacity and self-reliance. Together with the SANSA Earth Observation directorate, this is a central pillar for human capital development, science advancement and public engagement.

The SANSA Space Science directorate will be the primary driver for Space Science under SANSA, and will play a leading role in basic and applied Space Science research, human capacity development, science advancement and public engagement.

6.1.6 Space engineering

Humanity is increasingly becoming reliant on space systems and sub-systems for a wide spectrum of social benefits and economic endeavours. Space is recognized by industrialized nations as an essential and strategic tool to meet social, economic, and foreign policy objectives. Accordingly, many governments around the world are increasing their investments in space activities, looking for increased consolidation and the advancement of their space capabilities. An increasing number of countries are now involved in the peaceful development and use of space with a large number of satellites expected to be launched in the next ten years. Two-thirds of these satellite projects will serve government programs in Earth Observation and Space Science and exploration while most of the commercial investments will remain related to satellite communications.

It is strategically important for South Africa to develop its own satellite system development capabilities in order to be self-reliant. Further, this provides a development platform for unique technologies and related skills, to develop a technology base and intellectual collateral for domestic industry, and promote advanced manufacturing technology initiatives.

The SANSA space engineering directorate will manage and lead the technical co-ordination of space system and sub-system development on behalf of SANSA and also provide a complete functional facility for space system assembly, integration and testing (AIT) for national and regional use. This role will be fulfilled through the upgrade of the current Houwteq facility, and will remain located near Grabouw in the Western Cape.

6.2 Strategic objectives

The implementation of the above six programmes will be driven by the SANSA Corporate Office, SANSA Earth Observation directorate, SANSA Space Operations directorate, SANSA Space Science directorate, and the SANSA Space Engineering directorate.

Outlined below are the strategic objectives that will be pursued by SANSA in pursuance of SANSA's goals.

6.2.1 SANSA Corporate Office strategic objectives

SANSA Goal	*SANSA Corporate Office Objective*	*Inputs*	*Activities*	*Outputs*	*Outcomes*	*3 Year Targets*
Goal 1: World-class & efficient services and societal benefits (Societal Capital)	Efficient management, administration & governance	•Personnel •Policies •Systems & processes •Strategies	•Management, administration & governance •Planning, monitoring, evaluation & reporting	•Policies & governance framework •Strategies & Performance Plans •Performance reports	Good corporate governance & the attainment of SANSA's mandate	Fully functional SANSA with all management, administrative, governance & strategic instruments
Goal 2: Cutting-edge research, development, innovation, technology & applications (Intellectual Capital)	Efficient management, administration & governance	•Personnel •Policies •Systems & processes •Strategies	•Management, administration & governance •Planning, monitoring, evaluation & reporting	•Policies & governance framework •Strategies & Performance Plans •Performance reports	Good corporate governance & the attainment of SANSA's mandate	Fully functional SANSA with all management, administrative, governance & strategic instruments
Goal 3: Effective development of human capital, transformation and science advancement (Human Capital)	Efficient management, administration & governance	•Personnel •Policies •Systems & processes •Strategies	•Management, administration & governance •Planning, monitoring, evaluation & reporting •Human capital development •Science advancement.	•Policies & governance framework •Strategies & Performance Plans •Performance reports •Skilled staff •Increased science awareness	Good corporate governance & the attainment of SANSA's mandate	Fully functional SANSA with all management, administrative, governance & strategic instruments
Goal 4: Globally competitive national space industry (Economic Capital)	Create a conducive environment for space industry growth	Personnel	Stakeholder engagement	SANSA-industry partnerships	Good corporate governance & the attainment of SANSA's mandate	Fully functional SANSA with all management, administrative, governance & strategic instruments
Goal 5: Make South Africa a recognised global space citizen (Global Capital)	Develop and maintain international partnerships	Personnel	International liaison, engagement & negotiation	Multi-lateral partnerships & agreements	Good corporate governance & the attainment of SANSA's mandate	Fully functional SANSA with all management, administrative, governance & strategic instruments

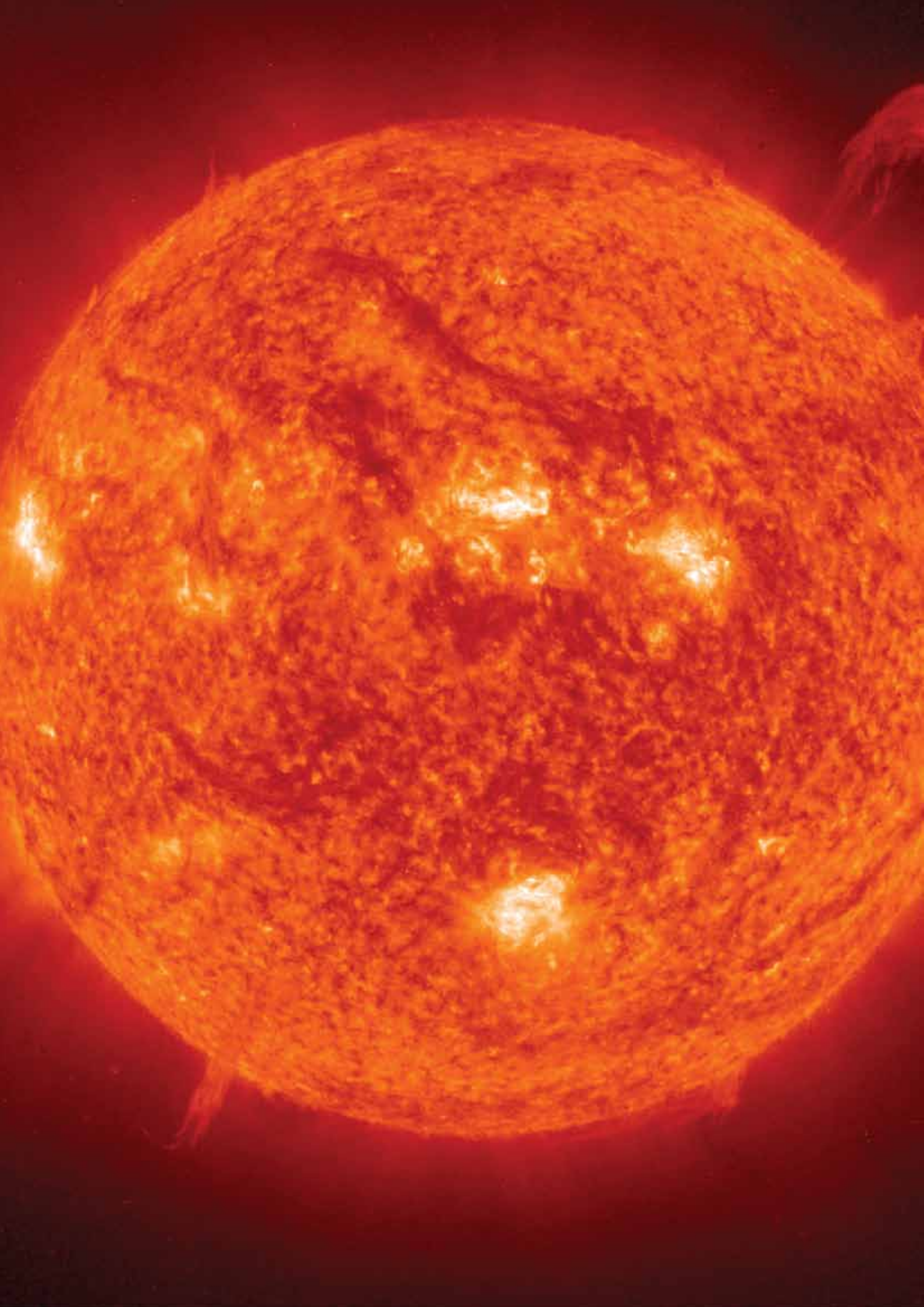
Table 3: SANSA Earth Observation directorate Goals

6.2.2 SANSA Earth Observation Objectives

SANSA Goal	*SANSA Earth Observation Objectives*	*Inputs*	*Activities*	*Outputs*	*National Outcomes Contribution*	*3 Year Targets*
Goal 1: World-class & efficient services and societal benefits (Societal Capital)	Offer efficient EO services for national and international benefit and a sustained environment	•Personnel •Satellite sensor portfolio •Data infrastructure	•Data collection •Data distribution •Data processing •Value-added services	•EO data stock •Space based EO data products, value-added data products & services •Decision making tools for policy and decision makers	2, 3, 7, 8, 9, 10	Full implementation of the NSS & the SAEOS Development & implementation of a SANSA Earth Observation Strategy
Goal 2: Cutting-edge research, development, innovation, technology & applications (Intellectual Capital)	Conduct cutting-edge research, development and innovation to continually improve SANSA's EO offering	•Personnel •Satellite sensor portfolio •Data infrastructure	•Provide data for R&D purposes •Collaborative projects with R&D and tertiary institutions •Continual R&D of internal processed	New and innovative data/image/signal processing techniques	5	Improved data storage & processing techniques Effective R&D framework
Goal 3: Effective development of human capital, transformation and science advancement (Human Capital)	Development of human capital in EO related science and engineering & advance science amongst the youth and the public	•Financial support •EO resources	•Provision of data for student training •Collaborative student training •Internship training •Science advancement	•Skilled students •Skilled workers •Science advancement programmes •Public engagement programmes	4, 5	Structured and funded HCD programme Greater space awareness
Goal 4: Globally competitive national space industry (Economic Capital)	Provide services that stimulate industry growth and participation in EO	•Personnel •Satellite sensor portfolio •Data infrastructure	Collaborative projects with industry	Value-added services	4	Active SANSA EO-industry partnership framework
Goal 5: Make South Africa a recognised global space citizen (Global Capital)	Establish and maintain effective and mutually beneficial international partnerships in line with national strategic alignment	•Personnel •Satellite sensor portfolio •Data infrastructure	•Develop & maintain active international partnerships	•Membership of international organization of strategic importance •Beneficial multi-national agreements, partnerships & projects •High impact contribution to global initiatives •Fulfilling SA'S Earth Observations contributions to signed conventions and other commitments	11	Strong and effective international partnerships

6.2.3 SANSA Space Operations Strategic Objectives

SANSA Goal	*SANSA Space Operations Objectives*	*Inputs*	*Activities*	*Outputs*	*National Outcomes Contribution*	*3 Year Targets*
Goal 1: World-class & efficient services and societal benefits (Societal Capital)	Offer efficient, cost effective globally competitive Space Operations and applications for societal benefit and global market	•Personnel •Satellite ground infrastructure	•TT&C support for SANSA Earth Observation directorate • Space Operations services for global market •Satellite based navigation augmentation	•Data acquisition for EO • Space Operations services	2, 3, 7, 8, 9, 10	Full implementation of the NSS & the SAEOS Development & implementation of a SANSA Space Operations Strategy
Goal 2: Cutting-edge research, development, innovation, technology & applications (Intellectual Capital)	Focused and needs driven applied research, development and innovation in key Space Operations and applications areas	•Personnel •Satellite sensor portfolio •Data infrastructure	•Continual R&D of Space Operations processes	•New and innovative Space Operations techniques •Navigation augmentation network for SA.	5	Effective R&D framework Efficient Space Operations. Navigation augmentation system for SA
Goal 3: Effective development of human capital, transformation and science advancement (Human Capital)	Focused HCD in Space Operations and application primarily for internal resourcing	•Financial support • Space Operations resources	•Internship training •Science advancement	•Skilled employees •Science advancement programmes •Public engagement programmes	4, 5	Structured and funded HCD programme
Goal 4: Globally competitive national space industry (Economic Capital)	Maintaining a strong interface between Space Operations & industry	•Personnel •Satellite sensor portfolio •Data infrastructure	Collaborative projects with industry	•Value-added services •Navigation applications	4, 6	Active SANSA EO-industry partnership framework
Goal 5: Make South Africa a recognised global space citizen (Global Capital)	Establish and maintain effective and mutually beneficial international partnerships and customer relations in line with national strategic alignment	•Personnel •Satellite sensor portfolio •Data infrastructure	Develop & maintain active international partnerships	Ground station services to the local & international community	11	Strong and effective international partnerships



6.2.4 SANSA Space Science Strategic Objectives

SANSA Goal	*SANSA Space Science Objectives*	*Inputs*	*Activities*	*Outputs*	*National Outcomes Contribution*	*3 Year Targets*
Goal 1: World-class & efficient services and societal benefits (Societal Capital)	Offer a state-of-the-art research platform and applied science service platform	•Personnel •Geo-space observational network •Data infrastructure •Technology infrastructure	•Data collection •Data distribution •Data processing •Value-added services	•Geo-space & space weather services •Applied science & technology services	3, 5	Full implementation of the NSS Development & implementation of a SANSA Space Science Strategy
Goal 2: Cutting-edge research, development, innovation, technology & applications (Intellectual Capital)	Conduct cutting-edge research, development and innovation	•Personnel •Geo-space observational network •Data infrastructure •Technology infrastructure	•Provide data for R&D purposes •Collaborative projects with R&D and tertiary institutions •Continual R&D of internal processes	•Knowledge outputs •Geo-space & space weather services •Applied science & technology services	3, 5	Effective R&D framework High impact factor research
Goal 3: Effective development of human capital, transformation and science advancement (Human Capital)	Development of human capital in Space Science and science advancement	•Financial support •Personnel •Geo-space observational network •Data infrastructure	•Provision of data for student training •Collaborative student training •Internship training •Science advancement	•Skilled students •Skilled workers •Science advancement programmes •Public engagement programmes	4, 5	Structured and funded HCD programmes
Goal 4: Globally competitive national space industry (Economic Capital)	Active role in South Africa's satellite system and sub-system development	•Personnel •Geo-space observational network •Data infrastructure •Technology infrastructure	•Collaborative projects with other SANSA directorates •Development of satellite sub-systems e.g. satellite orientation magnetometers	Value-added services	5	Active SANSA EO-industry partnership framework
Goal 5: Make South Africa a recognised global space citizen (Global Capital)	Establish and maintain effective and mutually beneficial international partnerships in line with national strategic alignment	Personnel	Develop & maintain active international partnerships	•Membership of international organization of strategic importance •Beneficial multi-national agreements, partnerships & projects •High impact contribution to global initiatives	11	Strong and effective international partnerships & collaborations

6.2.5 SANSA Space Engineering Strategic Objectives

SANSA Goal	*SANSA Space Engineering Objectives*	*Inputs*	*Activities*	*Outputs*	*National Outcomes Contribution*	*3 Year Targets*
Goal 1: World-class & efficient services and societal benefits (Societal Capital)	Offer a state-of-the-art satellite assembly, integration and testing (AIT) platform and services	•Personnel •AIT facilities	Satellite system & sub-system design & development	Assembled, integrated & tested systems & sub-systems	2, 3, 7, 8, 9, 10	Full AIT service platform Development & implementation of a SANSA Space Engineering Strategy & Satellite Programme Strategy
Goal 2: Cutting-edge research, development, innovation, technology & applications (Intellectual Capital)	Technical co-ordination of satellite system and sub-system development on behalf of SANSA	•Personnel •AIT facilities	•Project management and systems engineering • Satellite system & sub-system R&D	•Technology outputs •Knowledge outputs	5	Effective R&D framework for AIT
Goal 3: Effective development of human capital, transformation and science advancement (Human Capital)	Focused HCD in space engineering in partnership with space systems, universities and other partners	Personnel AIT facilities	•Provision of facilities for student training •Collaborative student training •Internship training •Science advancement	•Skilled students •Skilled workers •Science advancement programmes •Public engagement programmes	4, 5	Structured and funded HCD programmes
Goal 4: Globally competitive national space industry (Economic Capital)	Promotion of a conducive environment for industrial/private involvement in satellite system and sub-system development	•Personnel •AIT facilities	•Coordinate SANSA-industry interface in satellite engineering •Collaborative projects with other SANSA directorates	Value-added services	4	Active SANSA-industry partnership framework
Goal 5: Make South Africa a recognised global space citizen (Global Capital)	Establish and maintain effective and mutually beneficial international partnerships and customer relations in line with national strategic alignment	•Personnel •AIT facilities Personnel	Develop & maintain active international partnerships	Provide AIT services	11	Strong and effective international client-base, partnerships

7. Conclusion

The dual launch of the National Space Strategy and the South African National Space Agency (SANSA) on 9th December 2010 signalled South Africa's giant leap into Space Science and technology – a new era ***in service of humanity***. An era in which all South Africans fully benefit from the utilisation of Space Science and technology to advance all facets of human endeavour, aspiration and hope. SANSA will deliver on a wide spectrum of national priorities including environmental and resource management; urban planning and rural development; economic growth and global competitiveness; food security and health; job creation and poverty alleviation; human capital development; technology development and innovation; science advancement amongst the youth and public engagement in science; and fostering global partnerships.

8. Acronyms

Acronym	Definition
AIT	Assembly, Integration and Testing
ARMC	African Resource Management Constellation
BRICSA	Brazil Russia India China and South Africa
CBERS	China Brazil Earth Resources Satellite
CEOS	Committee on Earth Observation Satellites
CoC(s)	Centre(s) of Competence
CoEs	Centres of Excellence
CSIR	Council for Science and Industrial Research
DST	Department of Science and Technology
EGNOS	European Geostationary Navigation Overlay Service
EO	Earth Observation
EODC	Earth Observation Data Centre
FP7	Seventh Framework Programme for Research and Technological Development
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GIS	Geographic Information System
HCD	Human Capital Development
HMO	Hermanus Magnetic Observatory
IBSA	India Brazil & South Africa
INTERMAGNET	International Real-time Magnetic Observatory Network
ISES	International Space Environment Service
ITU	International Telecommunications Union
KHTT	Know How & Technology Transfer
MDGs	Millennium Development Goals
NRF	National Research Foundation
NSI	National System of Innovation
NSS	National Space Strategy
R&D	Research and Development
RF	Radio Frequency
RWC	Regional Warning Centre
SAEOS	South African Earth Observation Strategy
SAMA	South Atlantic Magnetic Anomaly
SANSA	South African National Space Agency
SBAS	Space-based augmentation system
SET	Science, Engineering & Technology
SOEs	State Owned Enterprises
TT&C	Telemetry Tracking and Command
TYIP	Ten-Year National Innovation Plan

Created by Rogue Brand Agency, March 2011