South African National Space Agency Technology Management

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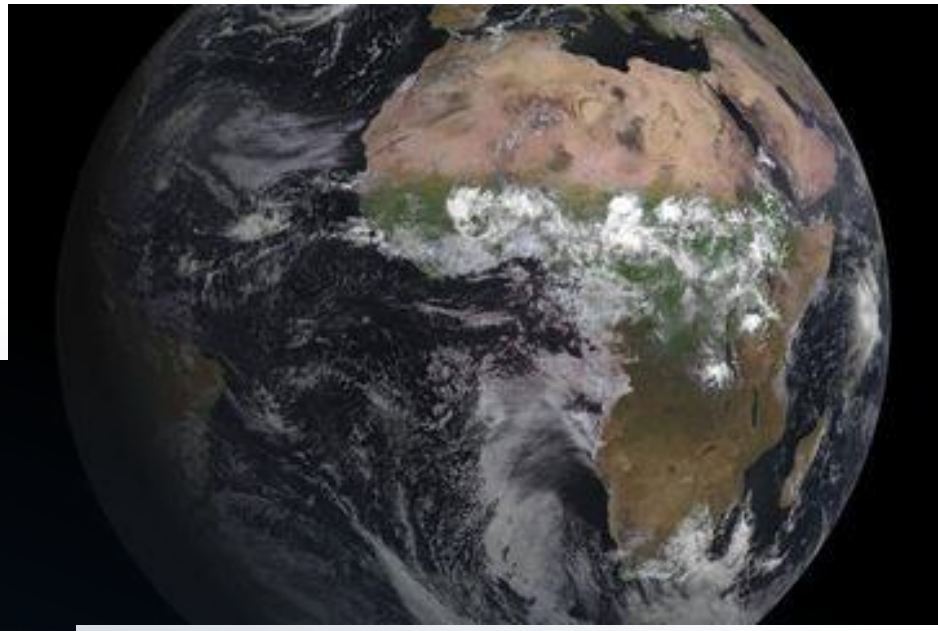
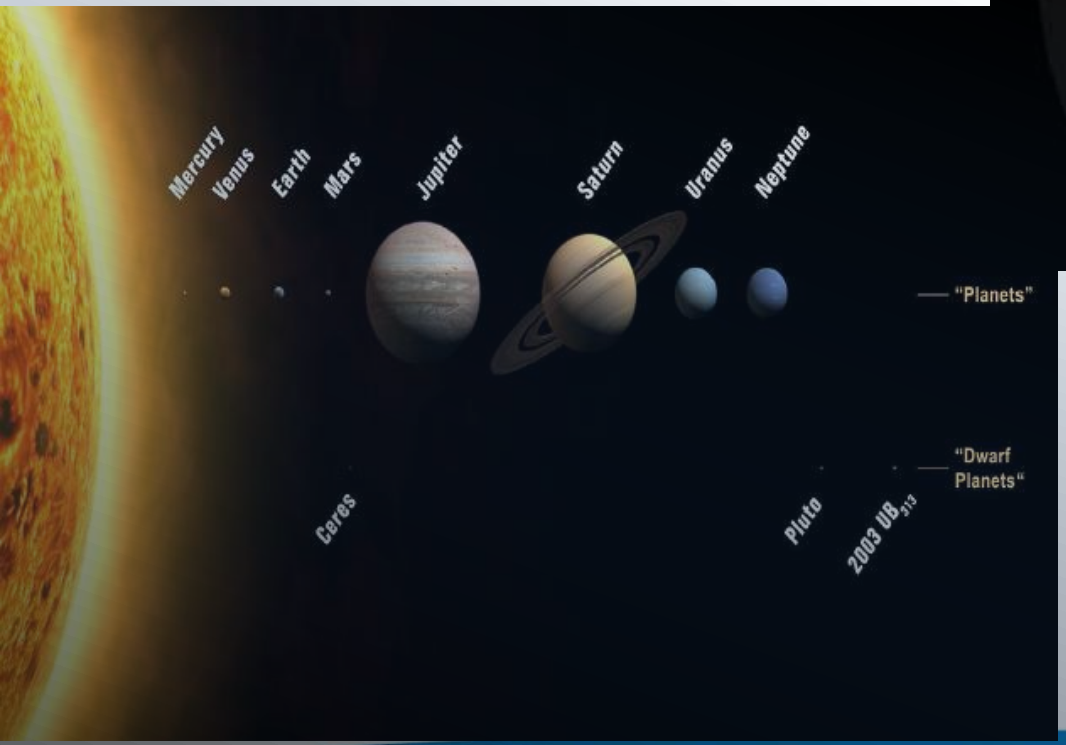
South African National Space Agency [SANSA]
11 December 2017

Space Exploration: Unforgettable Déjà Vu

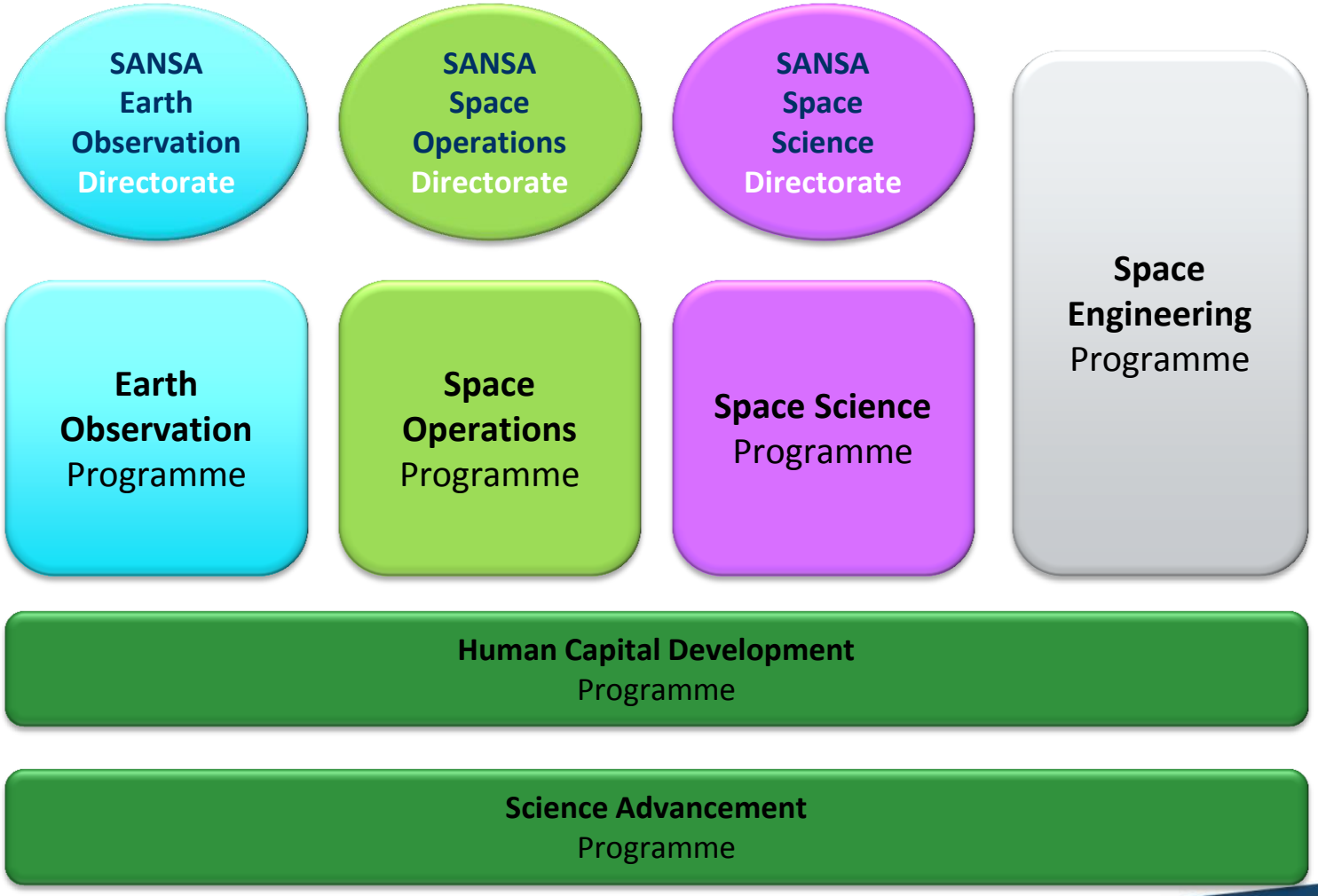
Earth, the Only Habitable Planet.. For now!!

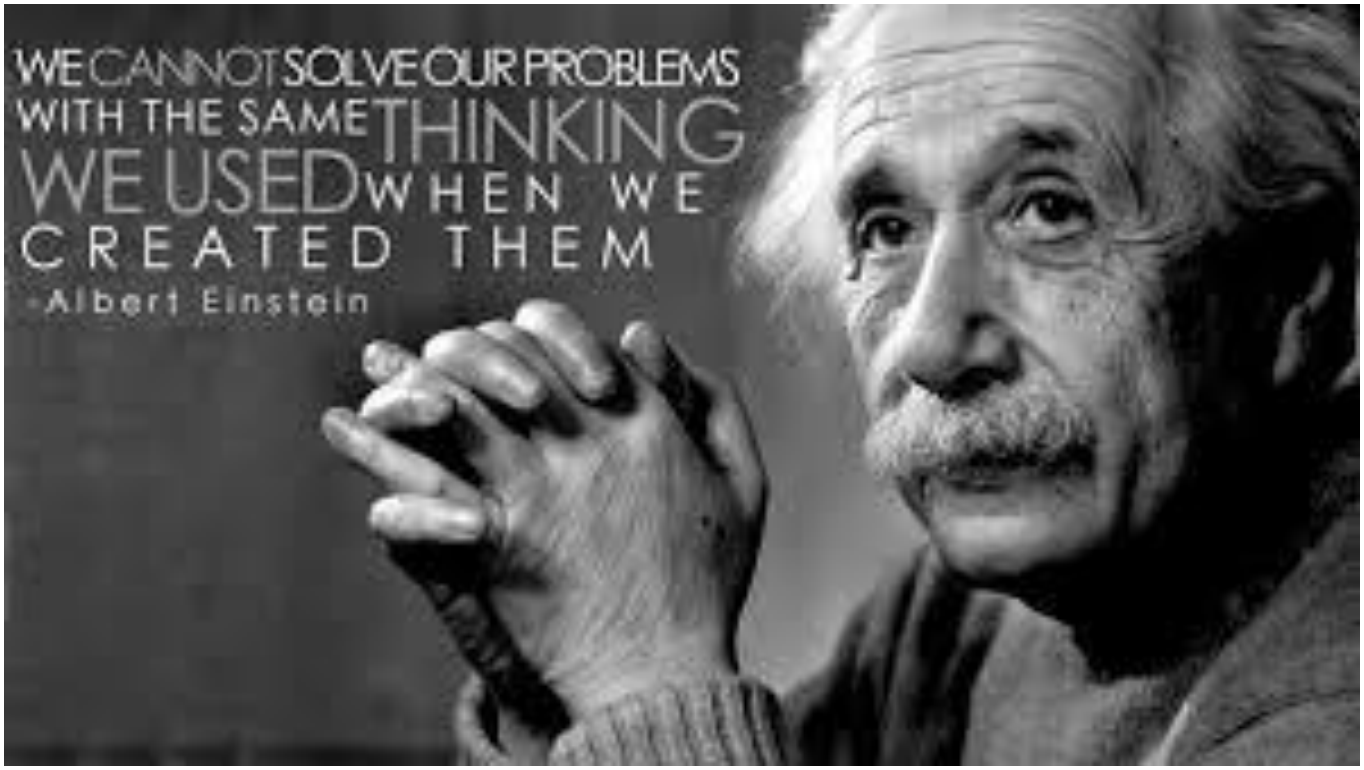




"We came all the way to explore the Moon, and the most important thing is that we discovered the Earth : Astronaut Bill Anders, Apollo 8"

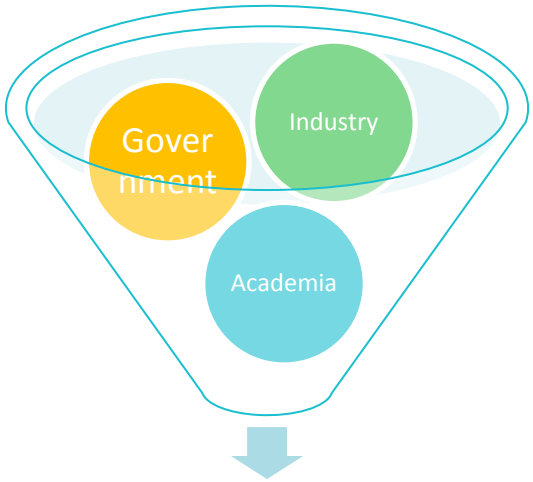
SANSA PROGRAMMES





How can we use Space to deal with our Socio-Economic challengers

Technology Management Process



Coordination of Space related activities

Technology feasibility

Sansa Strategy

Technology Roadmaps

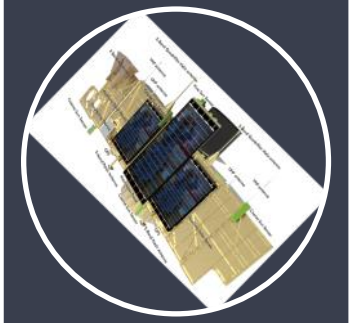
Technology Programs

Technology Development

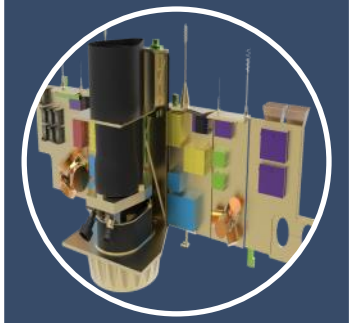
Grow Space Industry

Coordinate Missions

Technology Programs

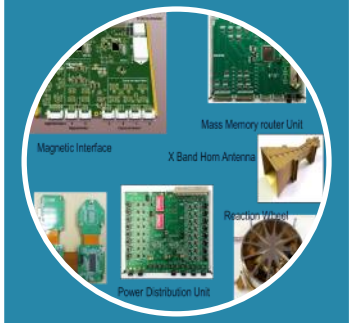


Materials / Structures

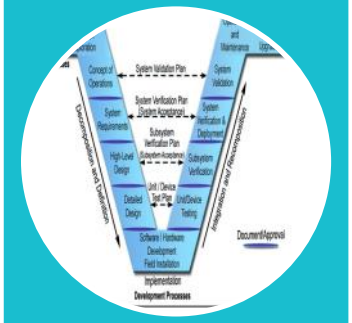


Payloads/ Optics , Sensors design

Ground and Launch Systems



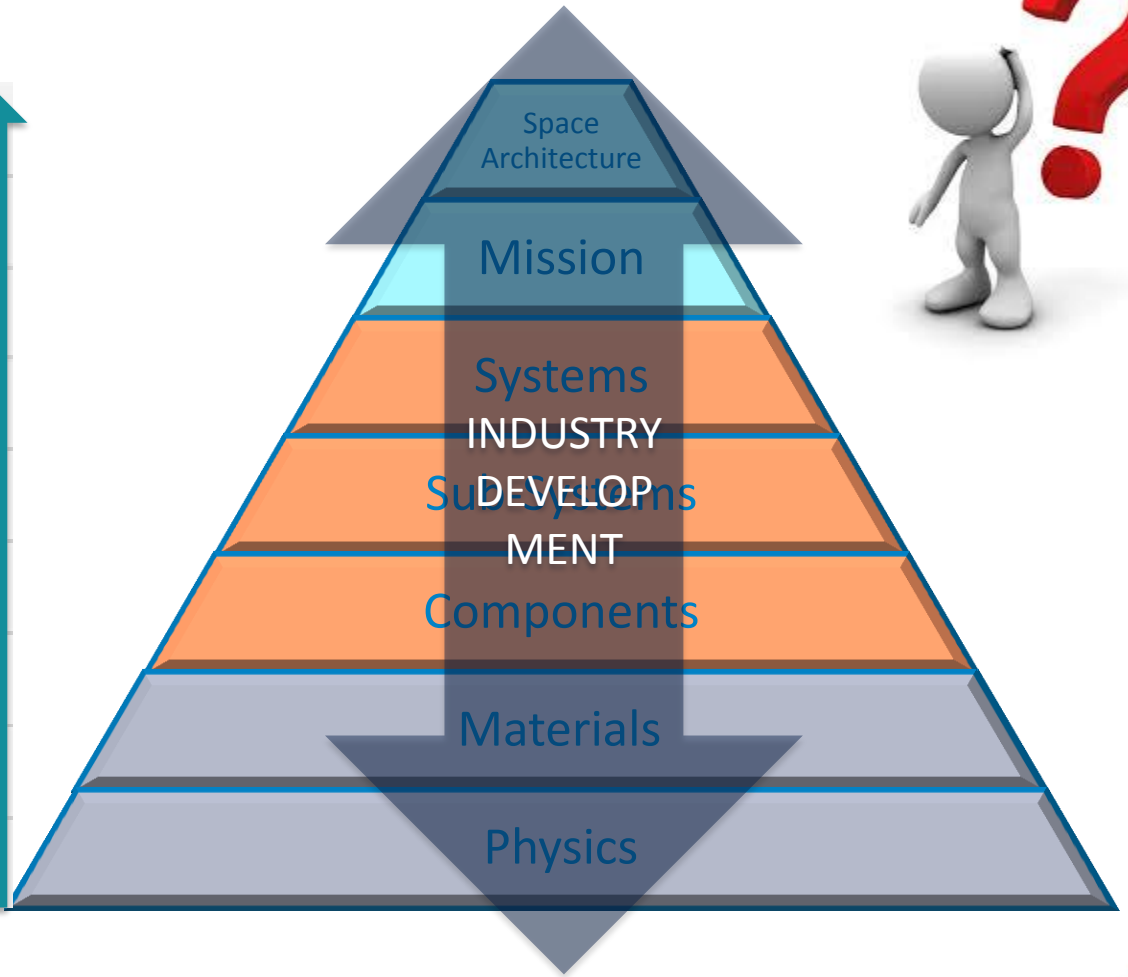
Communication System



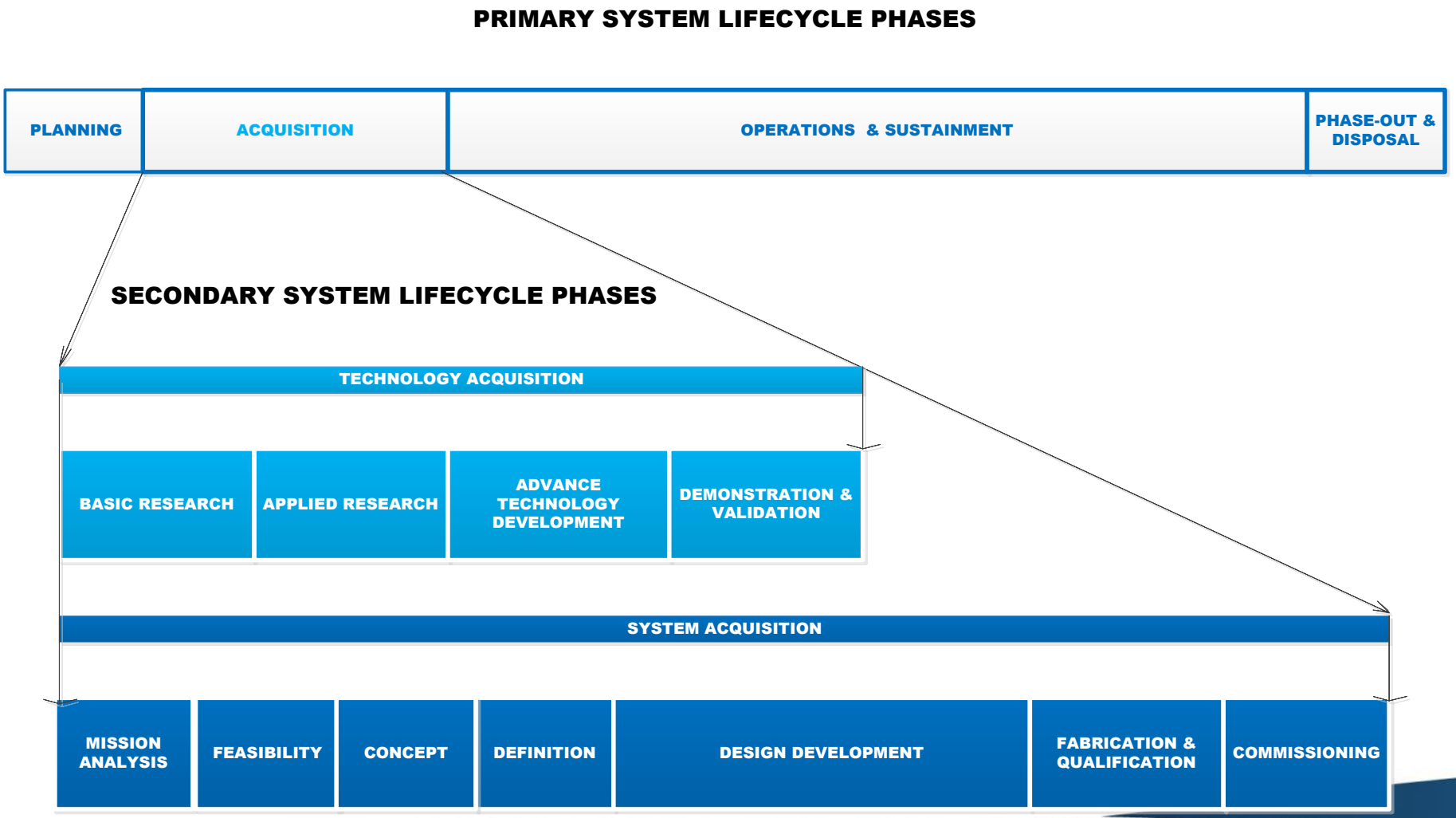
System Engineering

TRL Levels for Space System

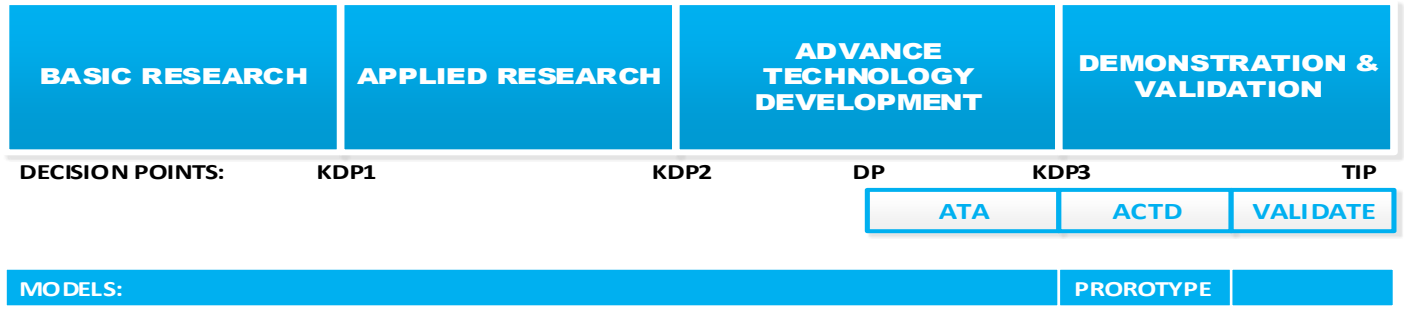
TRL		
	9	Commercialized
	8	Pre-production
	7	Field Test
	6	Prototype
	5	Bench / Lab Testing
	4	Detailed Design
	3	Preliminary Design
	2	Conceptual Design
	1	Basic Concept



Life Cycle Project



Space technology and Innovation Management



Government/ Research Councils

Private Investors/Venture Capital

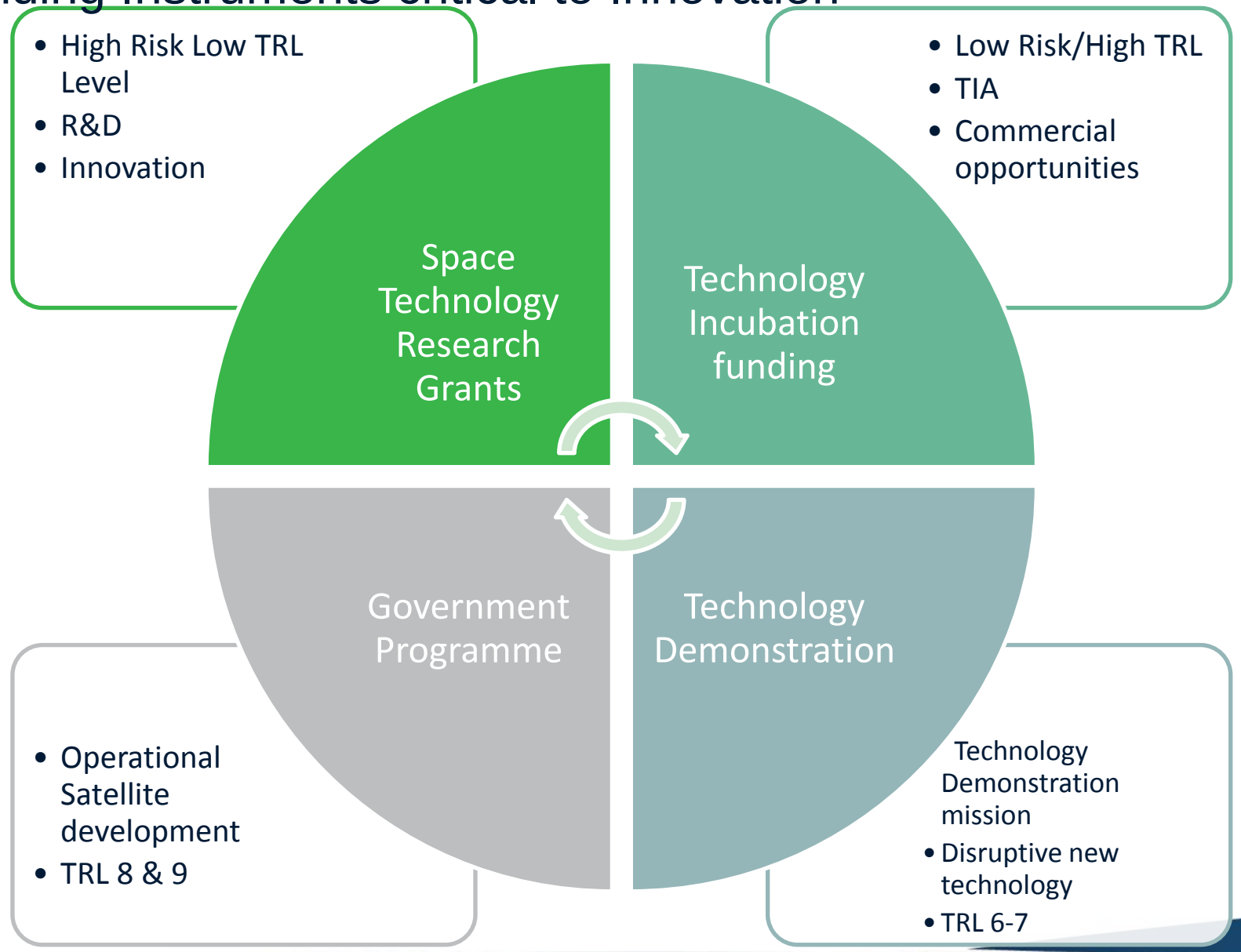
Corporate R&D

Sales Revenue ROI

- new jobs, new industry
- investing in the businesses/industries of the future
- developing the skills for the future

- competitive advantage
- sophisticated consumers
- fill product pipeline
- understand competitor's products
- corporate image
- better prepared for the future ..

Funding Instruments critical to Innovation



Government Role

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

- A Country **Champion** in Space at Cabinet level
- Space Policy directly aligned for **commercial growth**
- Approved **fully funded** Space Programme
  - All Space related organizations should benefit
  - Financial / Non-financial support for start-up through government incentives
  - Creating opportunities for downstream Markets
- Attracting the **best talent** on a ambitious yet manageable Space programme
- South African Government to lead Trade delegation to various countries **with full support** for collaboration and joint ventures
- Utilizing government funding for **Technology Demonstrators**

the dti
Department:
Trade and Industry
REPUBLIC OF SOUTH AFRICA

Space Agency Role

- Well resourced **Mission office** within Space agency
- Developing Technology **incubators** for strategic opportunities
- Capital Lending Model for Start-ups utilizing currently accessible **funding sources**
- Extending the current industries opportunities in space related technologies
- Creating **synergy** between various space organizations in the country
- Administer **grant funding** for technology development
- Developing **partnerships** with potential stakeholders

Academia Role

- Creating **research opportunities** within universities to support the Space Programme
- HCD (Undergraduate , Masters , Phd)
- **Training Programme** in Space Engineering
- Developing a National Space **Science advancement** and outreach programme
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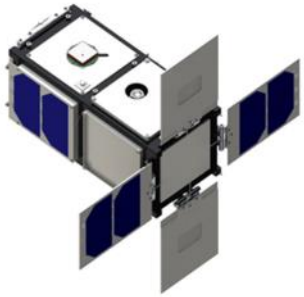
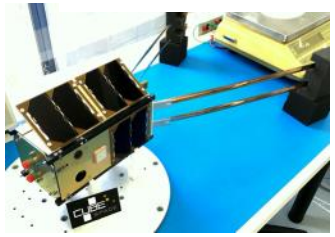


UNIVERSITEIT STELLENBOSCH UNIVERSITY

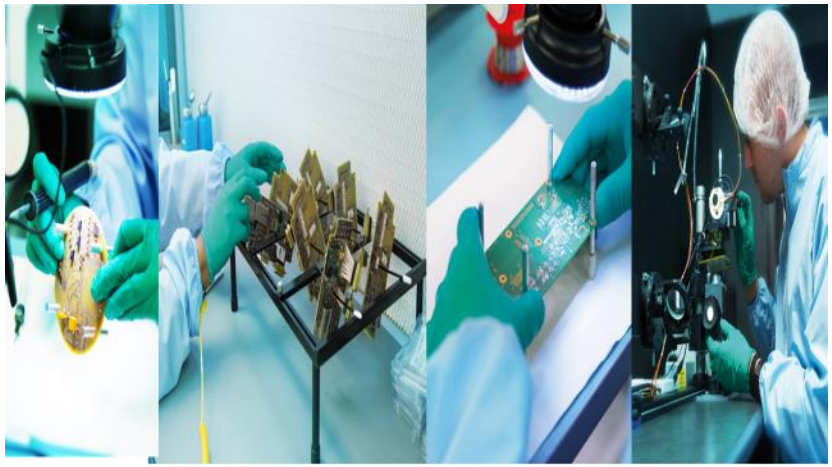
CUBE SPACE

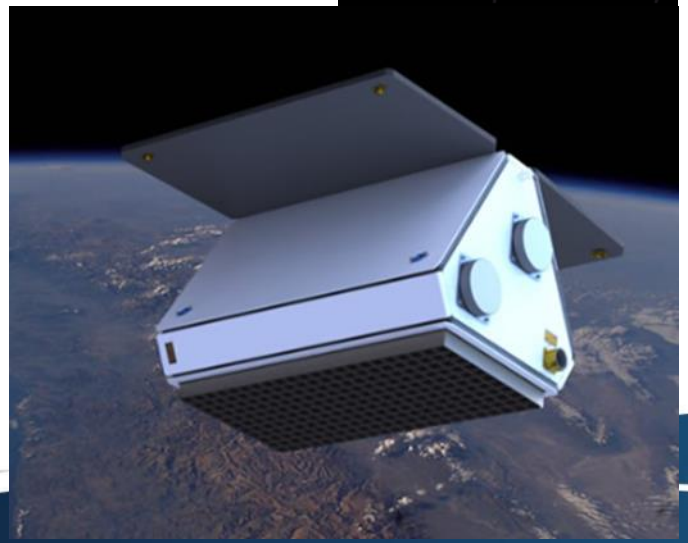


Cape Peninsula University of Technology

Industry Role

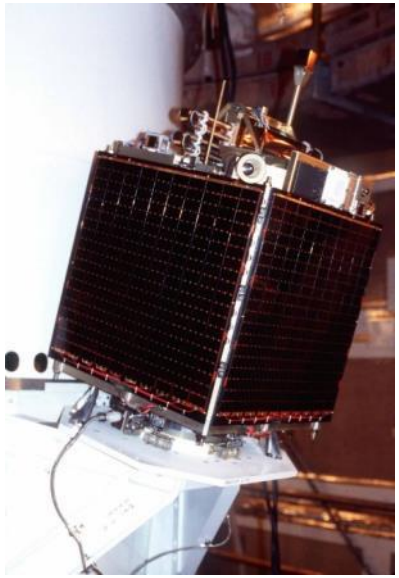
- Provide Input **into National Space Strategy**
- Develop new **innovative products** to compete with the broader market
- Develop **skills and capability** to support organizational strategy
- Provide **leadership** within areas of specialization



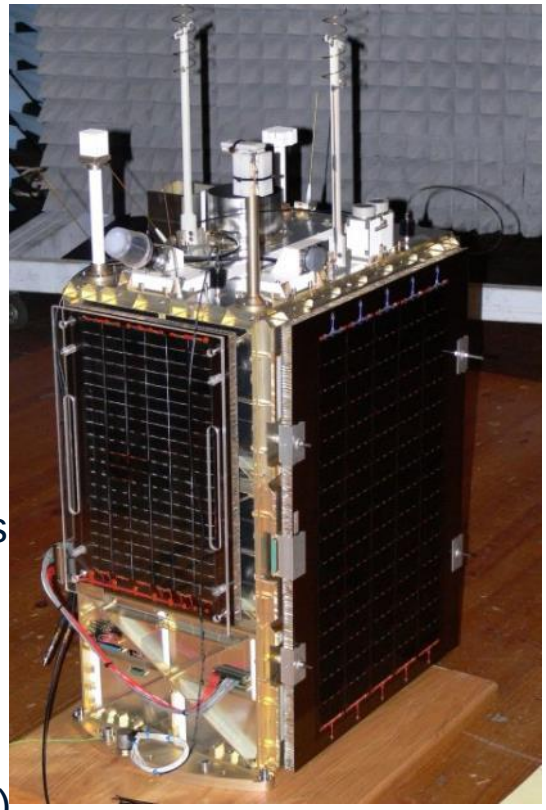


Space Engineering Heritage

SUNSAT-1



- Graduate student project
- Over 100 students 1992-2001
- 2 years, last contact in January 2001 (possible battery failure)



82 kg Microsatellite

510 km 9 am/pm sun-synchronous orbit
6.25 m GSD Imaging in 6 spectral bands

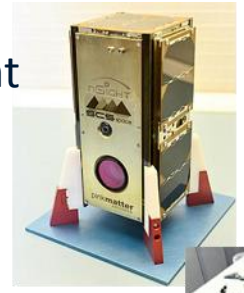
5 University experiments

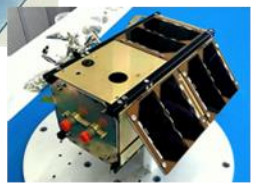
Very low frequency radio waves (UKZN)
Forced vibrating string (NMMU)
Software defined radio (SU)
Space radiation experiment (SU)
Amateur Radio transponder (SA AMSAT)

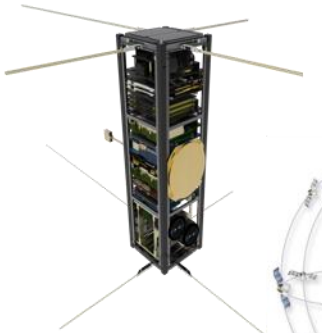
Launch date 17th September 2009

African Technology for future CubeSat Missions

nSight







Operation Phakisa

QB50

ZACUBE-2 launch

2009 2011 2013 2015 2017 2019 2021

University CubeSat Programme

ZACUBE-1 launch

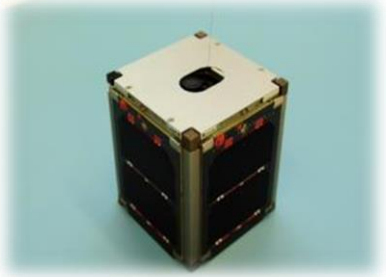
QB50 **ZA-AeroSat** & **nSight** launch

MDASat constellation

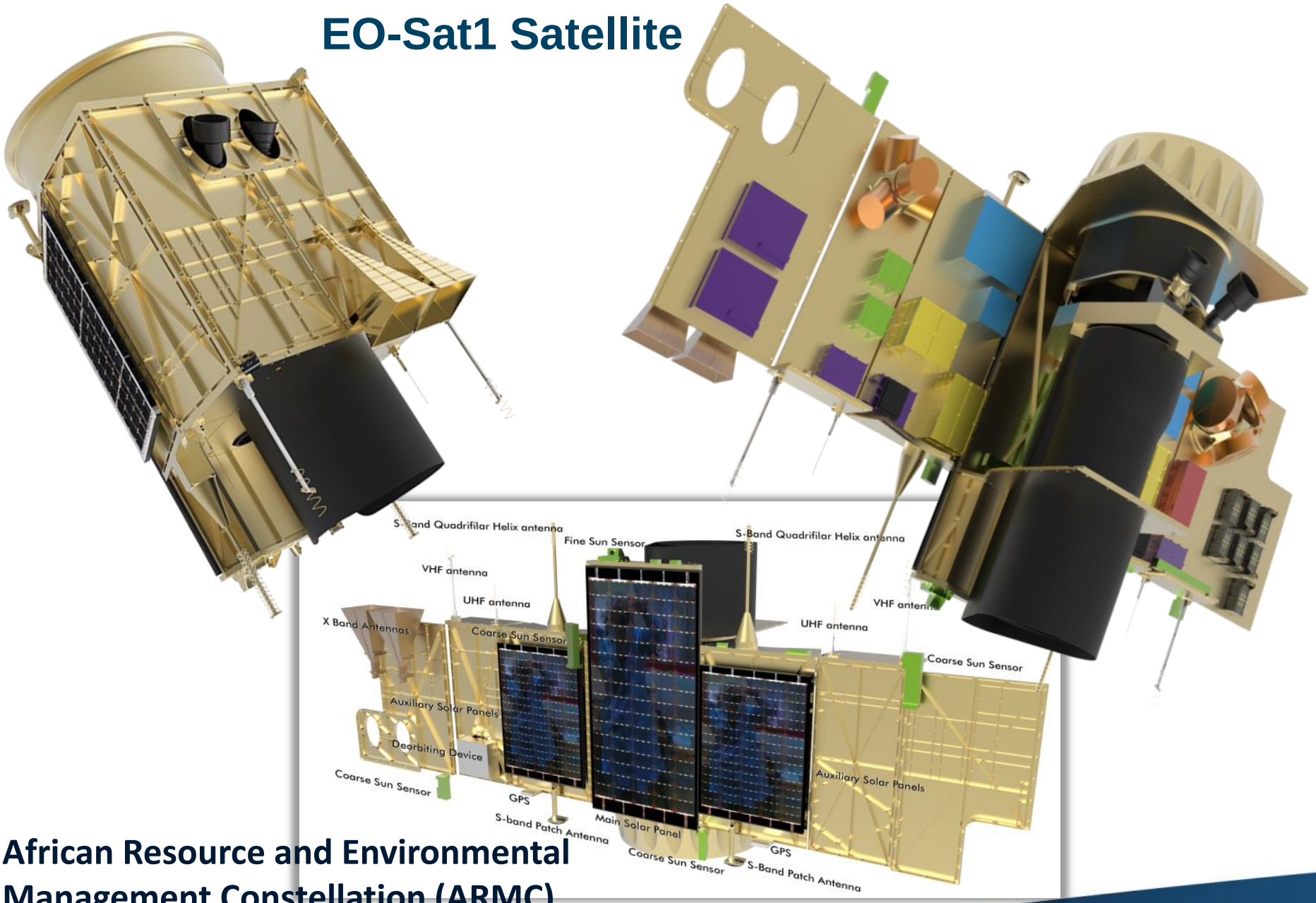
FireSat constellation

CubeSat missions

- Creation of **an enabling environment** in support of CubeSat missions
- Ensure availability of and access to testing **facilities**
- **Human capital development** (student development and professional development)
- Technology development
- **Research** outputs
- ZA-CUBE01, ZA-CUBE02, QB50
- Provider of **sub-systems**



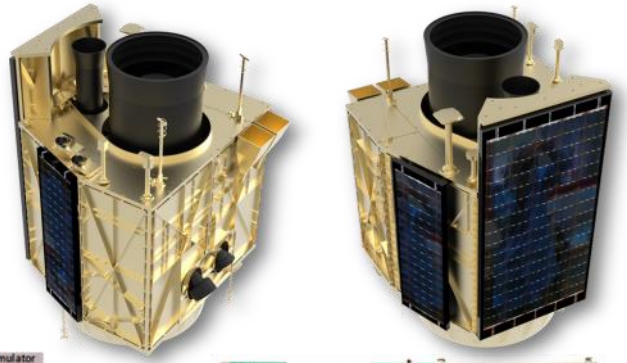
EO-Sat1 Satellite

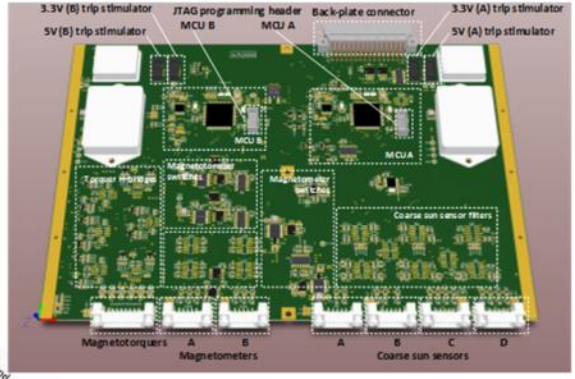


African Resource and Environmental Management Constellation (ARMC)

Industry Development

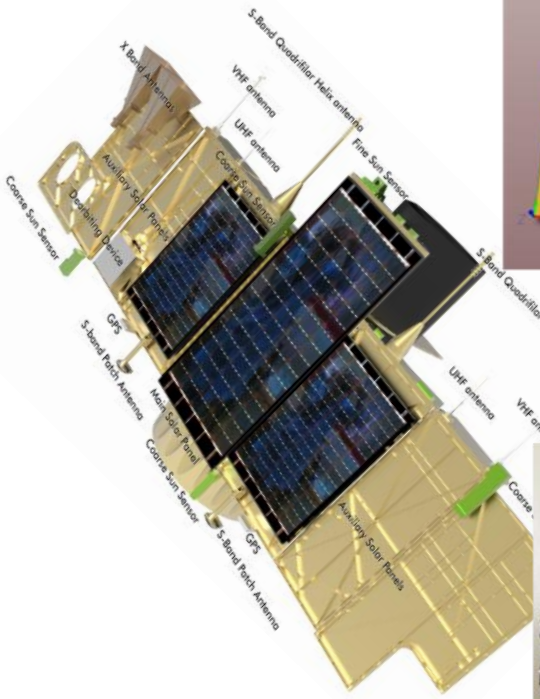
- Development of long term Space programme
- Technology Road Maps
- AIT facilities planning





Magnetic Interface

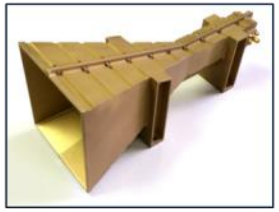
Mass Memory router Unit



Star Tracker Unit

Power Distribution Unit

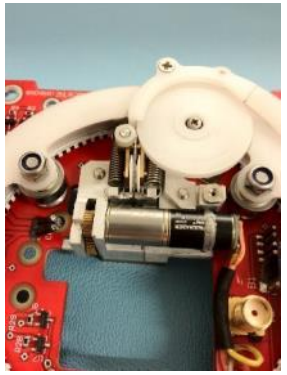
X Band Horn Antenna



Reaction Wheel

Space Engineering
Technology impact

- Solar energy
- Low energy design
- Miniaturisation
- Control systems
- Robust control software.
- High strength materials
- Optical technology
- Optronic technology
- High speed manufacturing
- Microwave design
- Machining specialist materials



Stem outreach Programme for Space Engineering

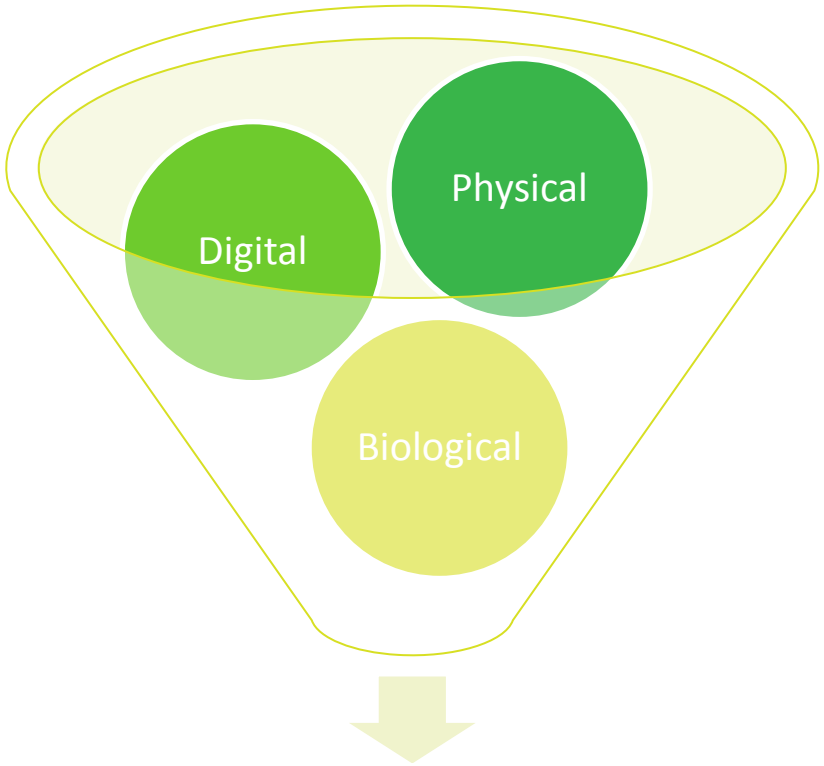
- To create awareness and excitement about STEM in high school learners. 3000 Students at a cost $10/Student
- inspire our youth to become the future scientists and engineers in the South African / African Space industry
- To create a pipeline of potential bursary candidates for tertiary studies and career development ensuring capacity to sustain our future in science, technology and innovation.

4th Industrial Revolution

Advance Sensor

Industrial Internet

Complex Cloud Computing



Additive Manufacturing

Big Data

Analytics

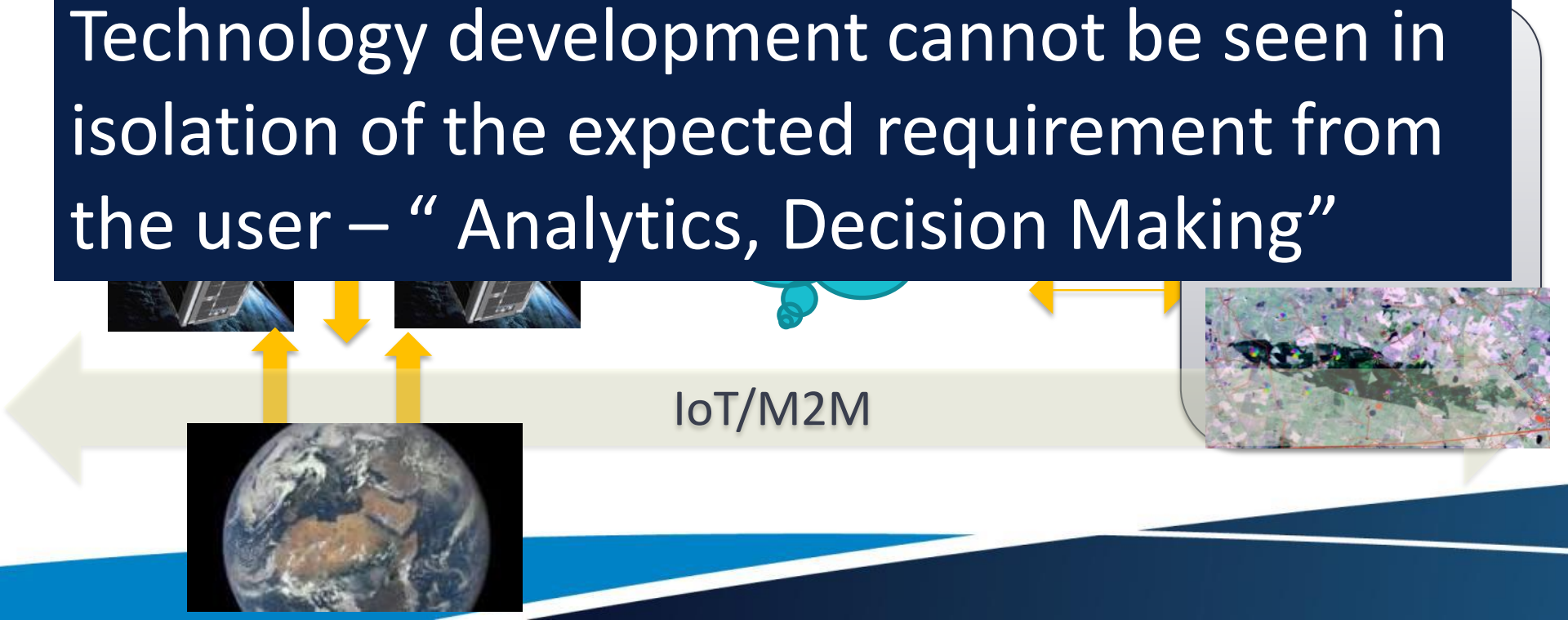
Convergence of Technology

Technology connected

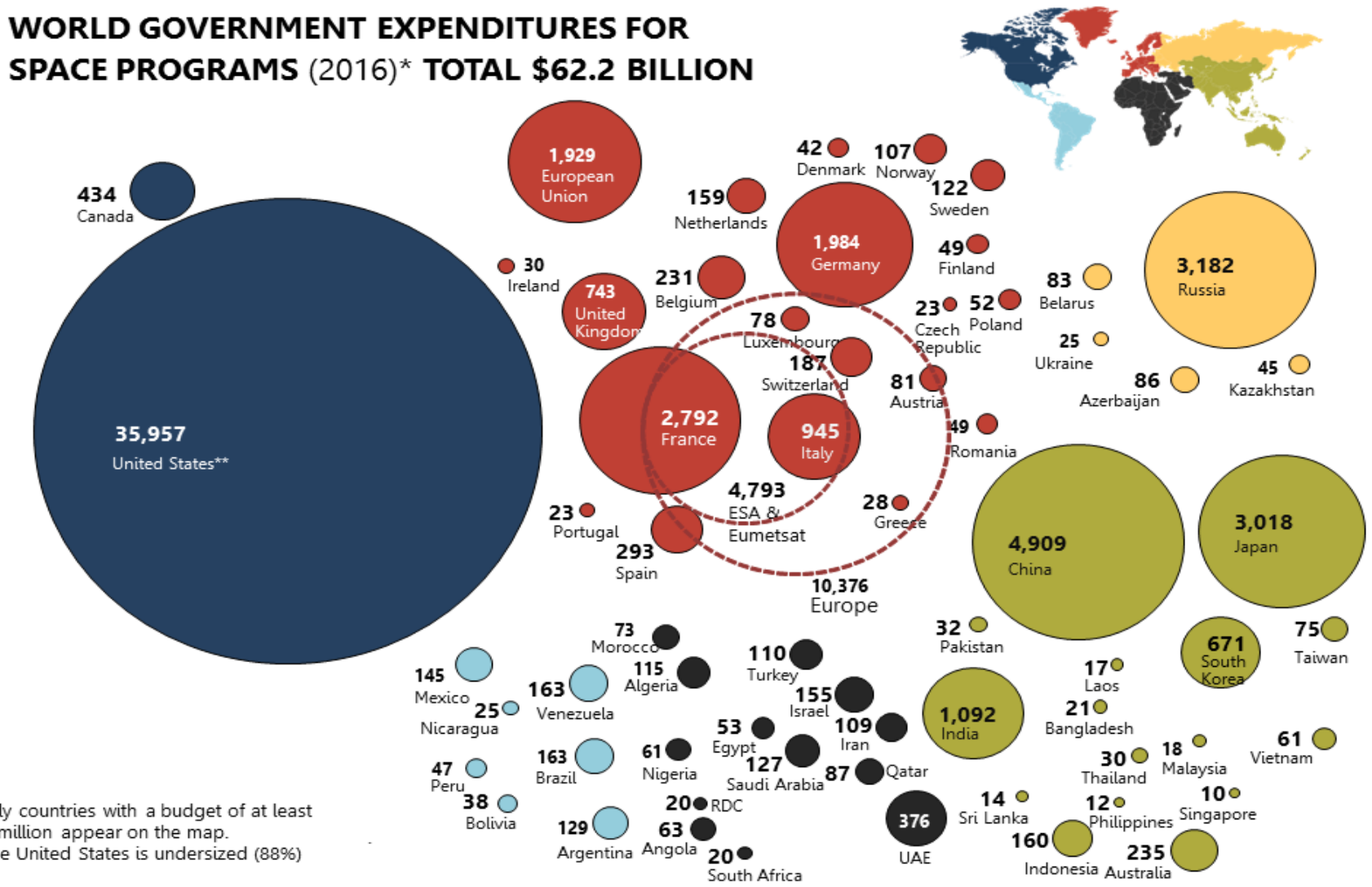
Managing integrated Technology System

- Real time regional awareness – Disasters , Population Growth , Predictability models

Technology development cannot be seen in isolation of the expected requirement from the user – “ Analytics, Decision Making”



Africa needs to invest in Space



Fundamental to achieving technology development

Vision Capability Political Will Strategic partnership

sansa
SOUTH AFRICAN NATIONAL
SPACE AGENCY

http://www.sansa.org.za