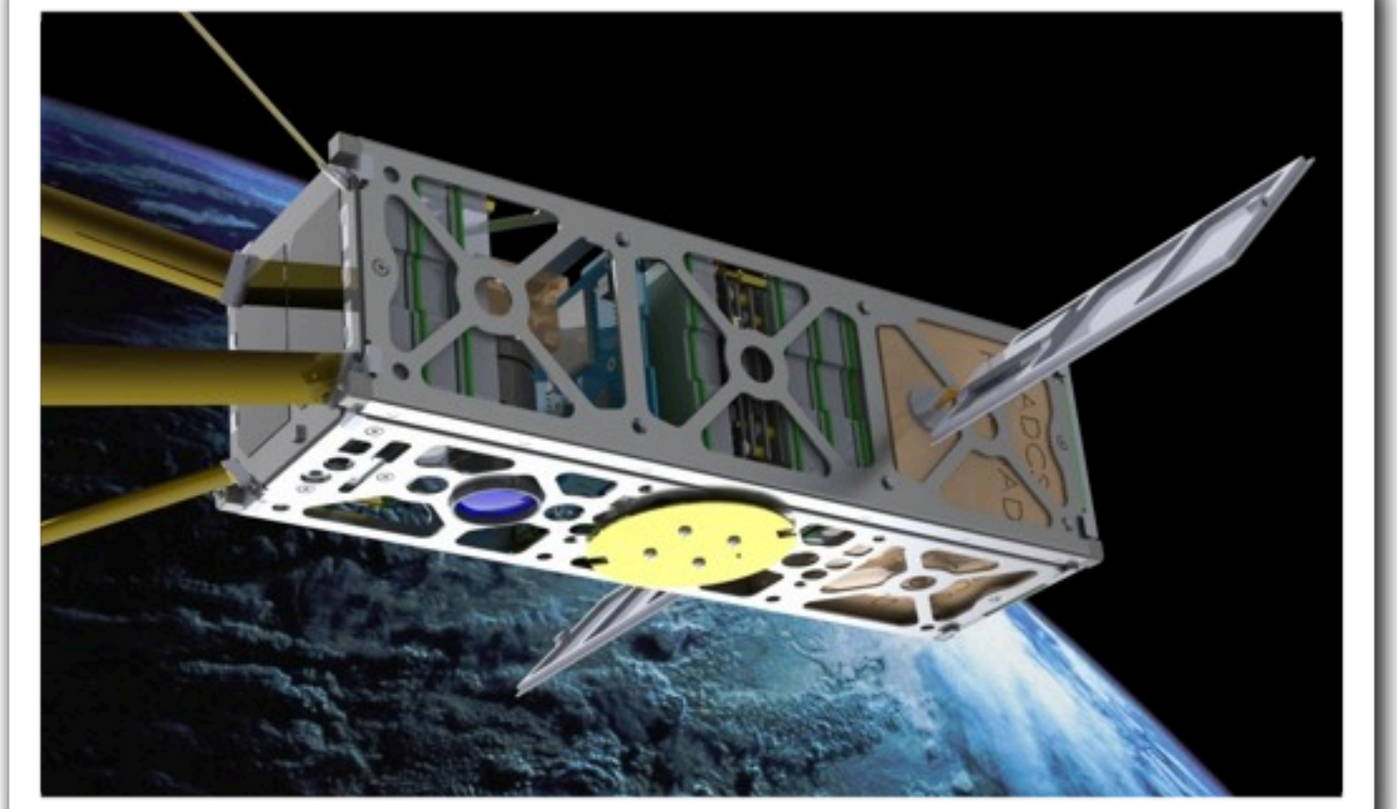


Nano Satellites Africa

A Collaborative Vehicle for Socio-Economic Development

The people making this happen

In only 32 months...

45 postgraduate students registered

South Africa, Lesotho, Namibia, Angola, Zimbabwe, Kenya, Nigeria, Uganda, Tanzania, Cameroon, DRC, Ghana, Ruanda, China

One nano satellite completed ZACUBE1

Another nano satellite under development

More than 6000 learners reached in community development programme

30 graduates over three years

10 engineers-in-training in professional development programme

... Academic Output ...

9 peer reviewed journal papers

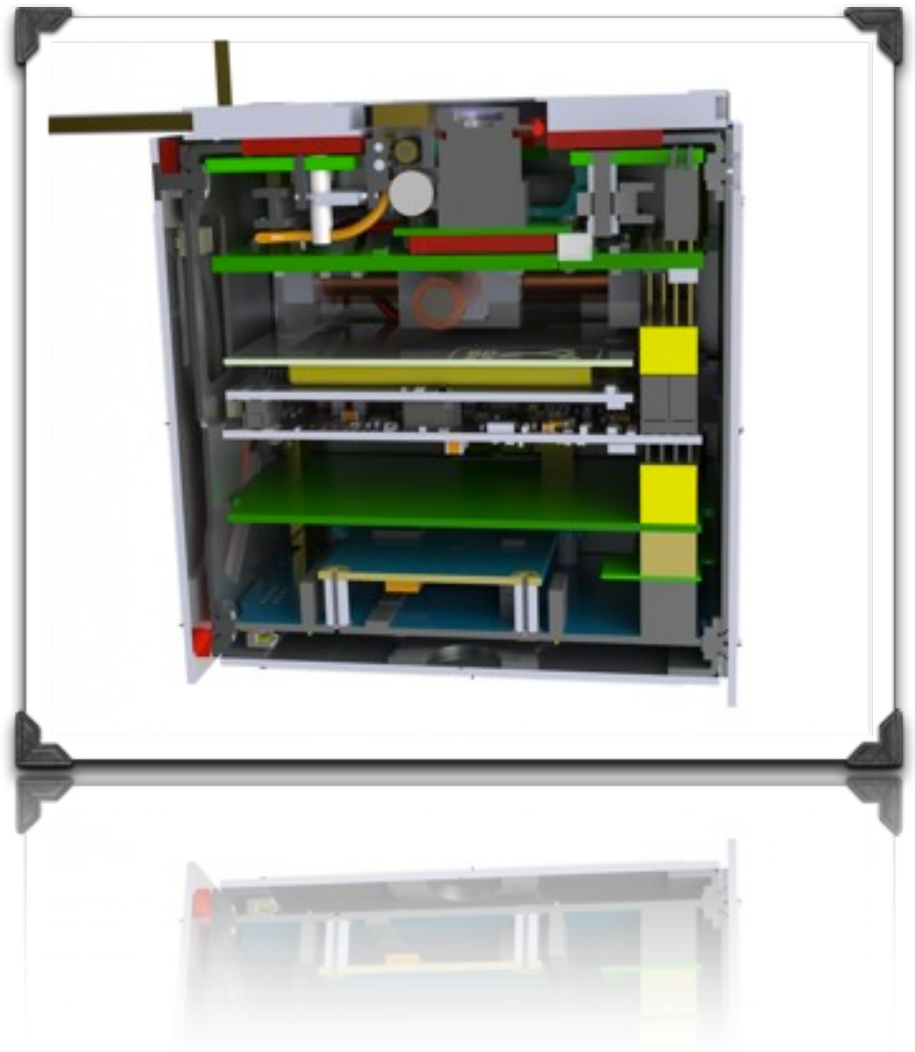
40 peer reviewed conference papers

21 invited conference presentation

... Science and Technology Output ...

Flight ready
August 2011

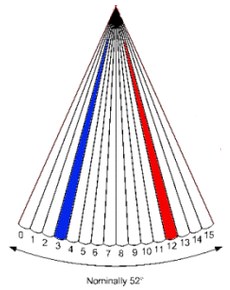
Development time
10 months



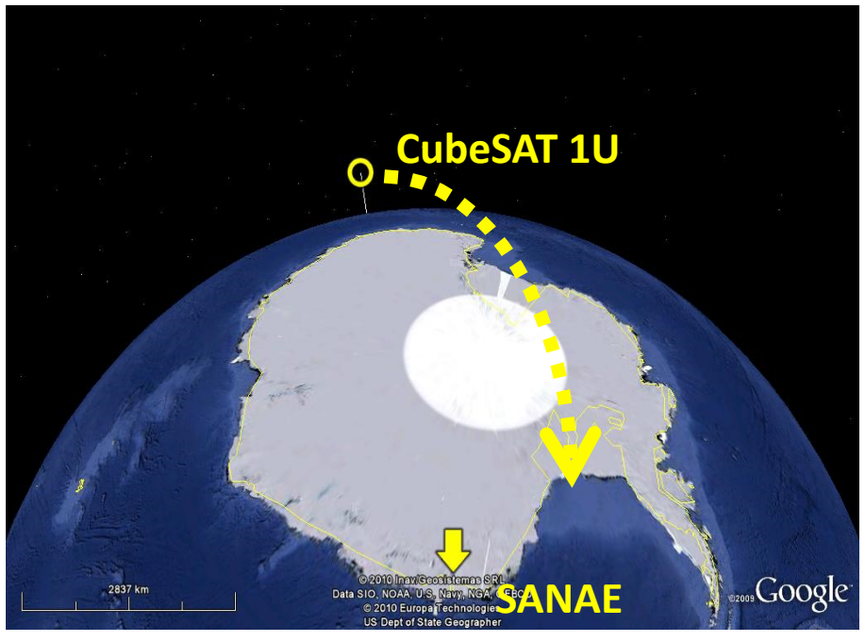
Space Weather
payload

ZACUBE01
Our 1U CubeSat Mission

Our CubeSat programme



Characterizing the SuperDARN Field-of-View

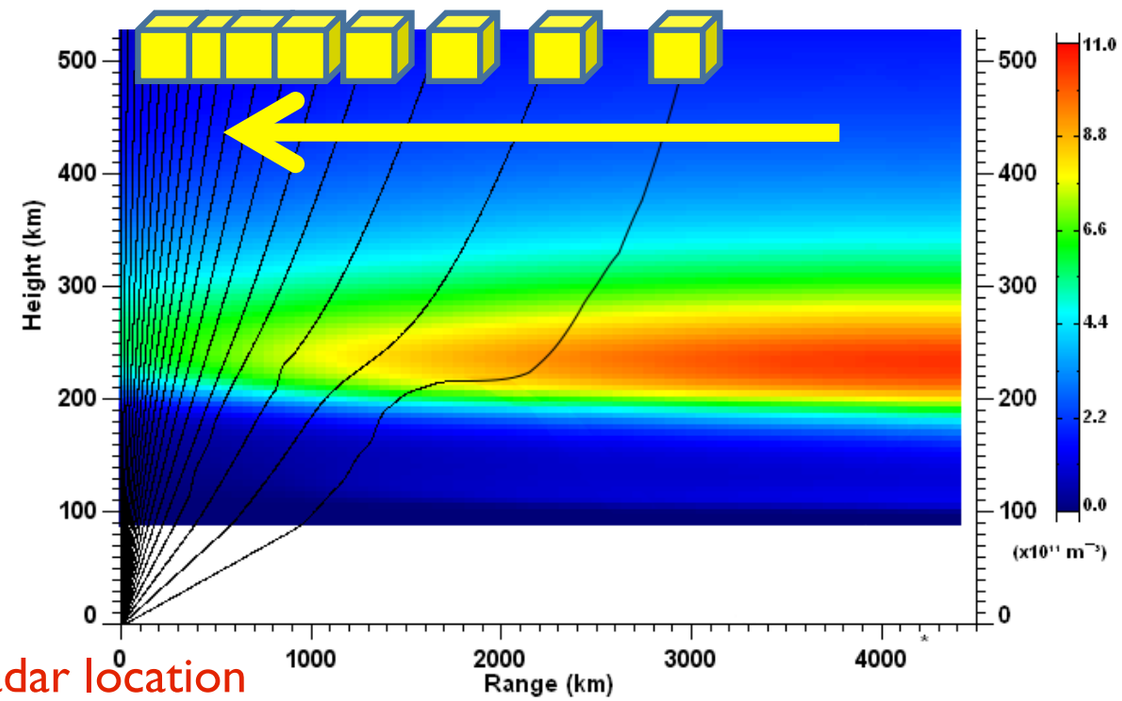


SuperDARN

SuperDARN is an international collaboration of HF radars in the polar regions that measure interactions between the solar wind and the Earth's magnetic field

As the Cube passes through the FoV of the radar it will emit a 14MHz signal that will be received by the radar.

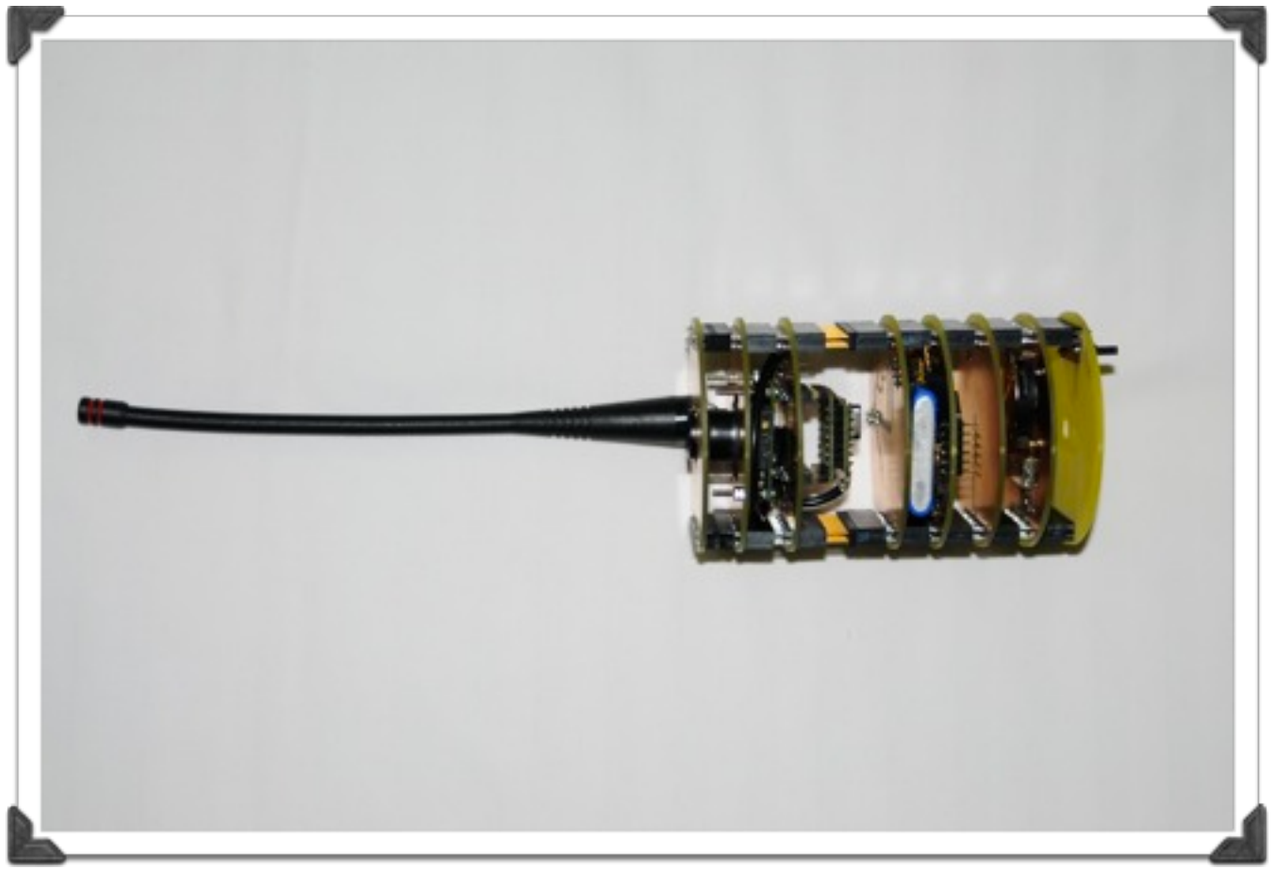
This signal will allow an accurate characterization of the angle of arrival capabilities of the radar



... Intellectual Property Output ...

Market opportunities provided by industry partners

Afri-CanSats designed and manufactured by the F'SATI team



S-Band and UHF transceiver by end of 2012

S-Band Transmitter (QPSK 2Mbps) and patch antenna

Technology developed by F'SATI team
Marketing & distribution by Industry Partner

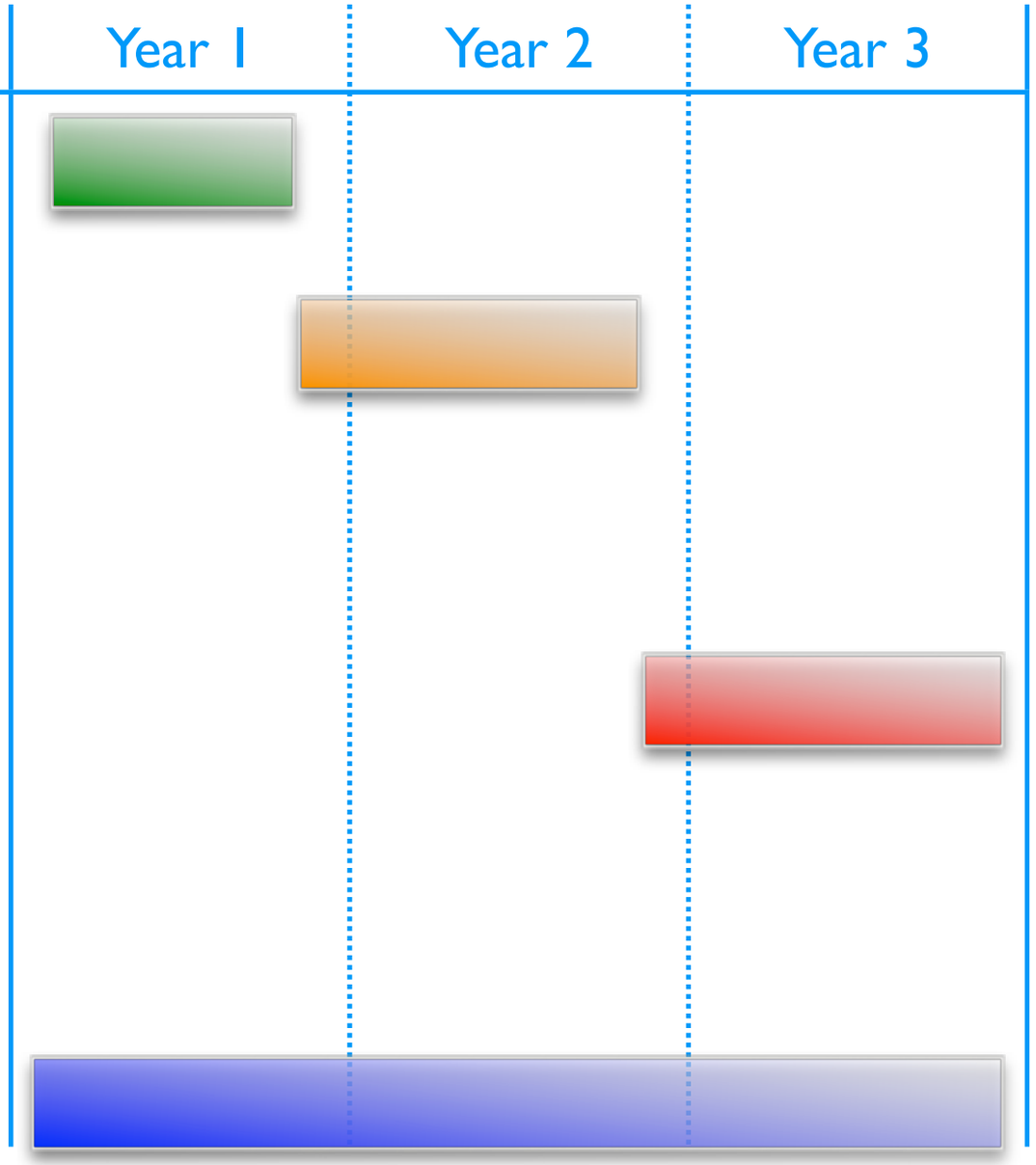
The F'SATI programme

- Institute launched at CPUT on 28 February 2008
- Nano-Satellite programme launched 9 November 2009
- Dual Masters
- Dual Doctorate

Our Programme Structure

- Academic Programme
  - Course work
- Applied research project
  - Satellite sub-systems
  - Individual focus
  - Some project exposure
- Professional development
  - Engineers in training & Internships
  - Working on FM CubeSat
  - Project teams

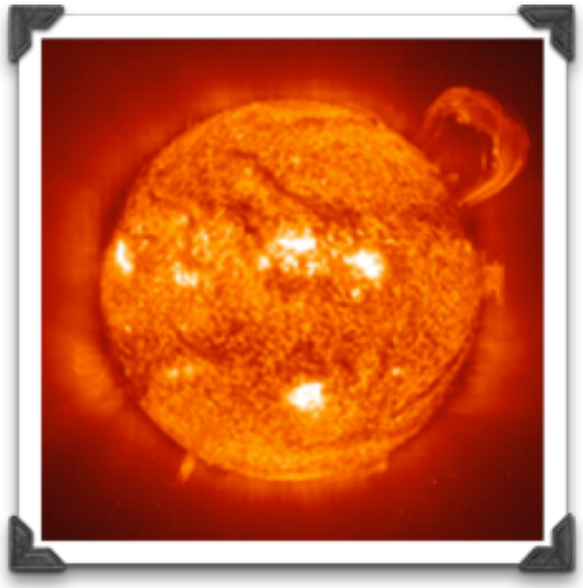
- Community Engagement



Academic Programme

Areas of Specialization:

- Satellite Systems Engineering: Communications
- Satellite Systems Engineering: Power Systems
- Satellite Computer and Software Systems
- Space Weather



Key elements: National alignment

Technology Development & Innovation

Farmer to Pharma

Space Science

Energy

Climate Change

Human & Social Science

Human Capital

(Centres of Excellence, SA Research chairs initiative, professional development program, etc.)

Knowledge Infrastructure

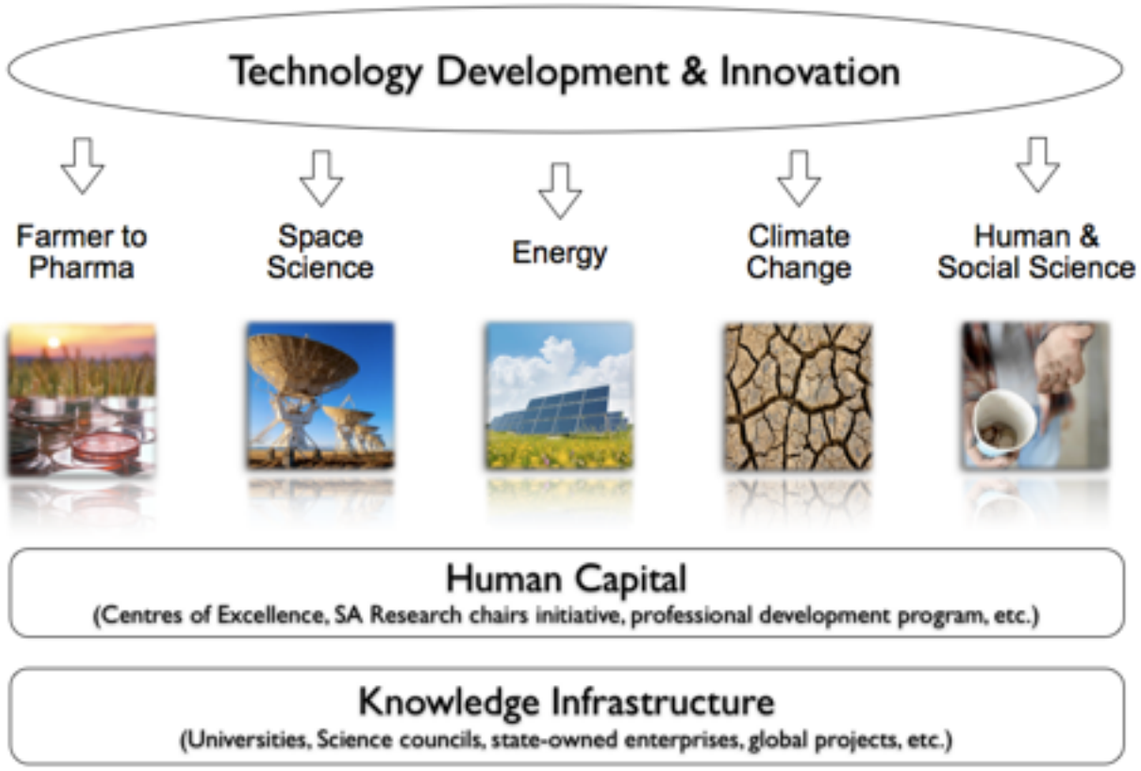
(Universities, Science councils, state-owned enterprises, global projects, etc.)

Key elements: National alignment

10 Year innovation plan aims to achieve by 2018:

-Increase SET (Science Engineering Technology) higher education students to 35% (28% in 2005)

-Graduate more than 3,000 SET PhD students/year (561 in 2005)



-Independent earth observation high-resolution satellite data available for all of Africa from a constellation of satellites designed and manufactured in Africa

Key elements: An immersed environment

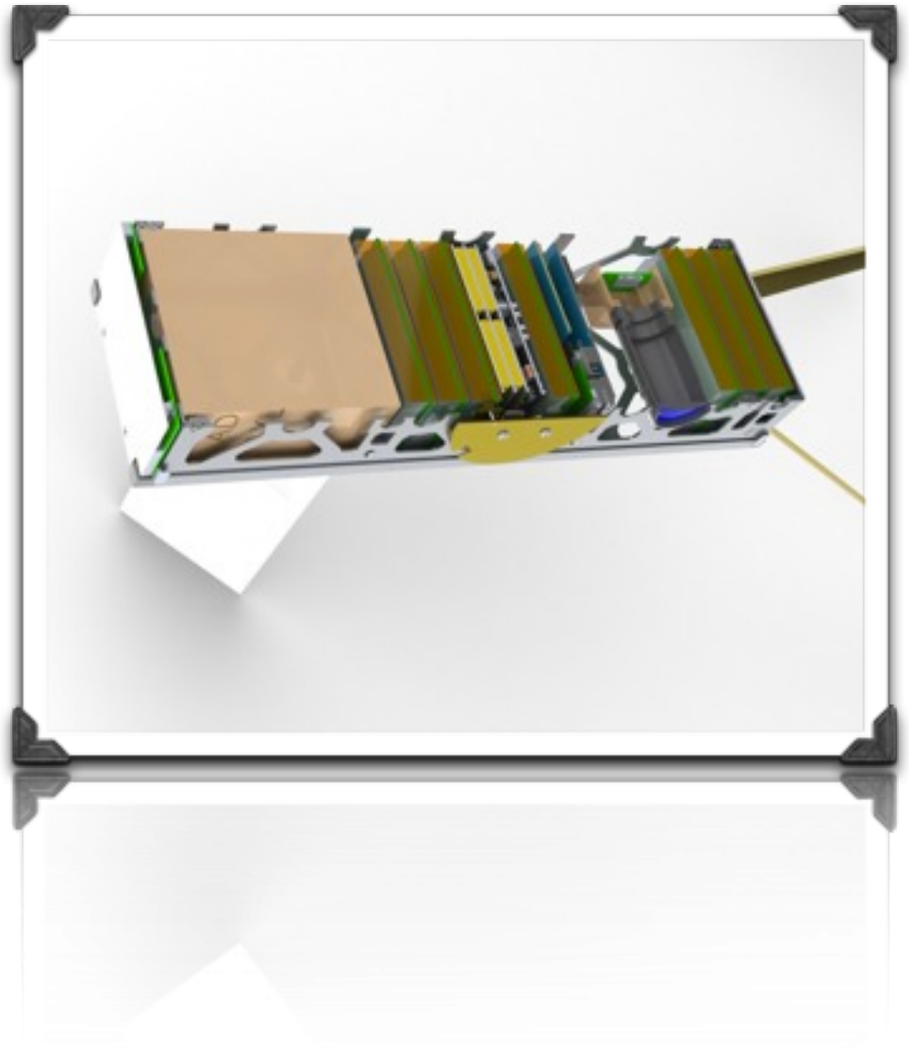
200m^2 of FM integration of which 20m^2 class 100k clean room

Over 1m Euro invested in test and prototyping equipment and infrastructure

Our Facilities in 1000m^2 dedicated building

Key elements: roadmap of missions

Engineering Model to be presented at IAC 2011 in Cape Town



Technology demonstrator

Amateur and Science payloads

Our flagship 3U CubeSat mission

- allowing the next phase of students an opportunity to work on a real mission -

Key elements: From Schools to Higher Education

Key elements: From Schools to Higher Education

National Space Science awareness initiatives

CubeSat demonstration – our 3U model in the foreground

Eager learners – the future space cadets

Afri-Cansats exhibit

The successful launch of our first Afri-Cansat – secret payload

Afri-Cansat launch vehicle separation

Key elements: partnerships

Government: Financial & Institutional support

NRF is the primary research support agency

National Research Foundation | RISA Research and Innovation Support and Advancement

The SA government has a master plan to drive Human Resource Development

Key elements: partnerships

Government: Financial & Institutional support

science and technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

DST has developed a 10 year Innovation Plan with Five Grand Challenges that includes Space Science and Technology

The SA government has a master plan to drive Human Resource Development

Key elements: partnerships

Government: Financial & Institutional support

DTI is the custodian of the SA National Space Policy

the dti
Department:
Trade and Industry
REPUBLIC OF SOUTH AFRICA

The SA government has a master plan to drive Human Resource Development

Key elements: partnerships

Government: Financial & Institutional support

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

DST and DHET are responsible for building skills base in Science and Technology

The SA government has a master plan to drive Human Resource Development

Key elements: partnerships

Government: Financial & Institutional support

National Research Foundation | RISA Research and Innovation Support and Advancement

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

the dti
Department:
Trade and Industry
REPUBLIC OF SOUTH AFRICA

higher education & training
Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

sansa
SOUTH AFRICAN NATIONAL SPACE AGENCY

The SA government has a master plan to drive Human Resource Development

Key elements: partnerships

Academia: leveraging competencies & mobility of knowledge

ESIEE ENGINEERING

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Tshwane University of Technology

We empower people

groupe cesi

Joint degrees, research collaboration, student exchange

Key elements: partnerships

Industry: Industrialization of IP and employer

Chambre de commerce et d'industrie de Paris

Market knowledge, technology transfer, industry experience

Key elements: partnerships

Industry: Industrialization of IP and employer

Market knowledge, technology transfer, industry experience

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Market knowledge, technology transfer, industry experience

Key elements: partnerships

Industry: Industrialization of IP and employer

Market knowledge, technology transfer, industry experience

Evolutionary network

Expanding the Academic network

University of Florida

Ghana Atomic Energy Commission

Nairobi University (Kenya)

California Polytechnic State University

UNIVERSITY OF ZAMBIA

Mbarara University of S&T, Uganda

University of Zambia, Zambia

Ghana Telecom University College

Polytechnic of Namibia

North Carolina A&T State University

University of Buea, Cameroon

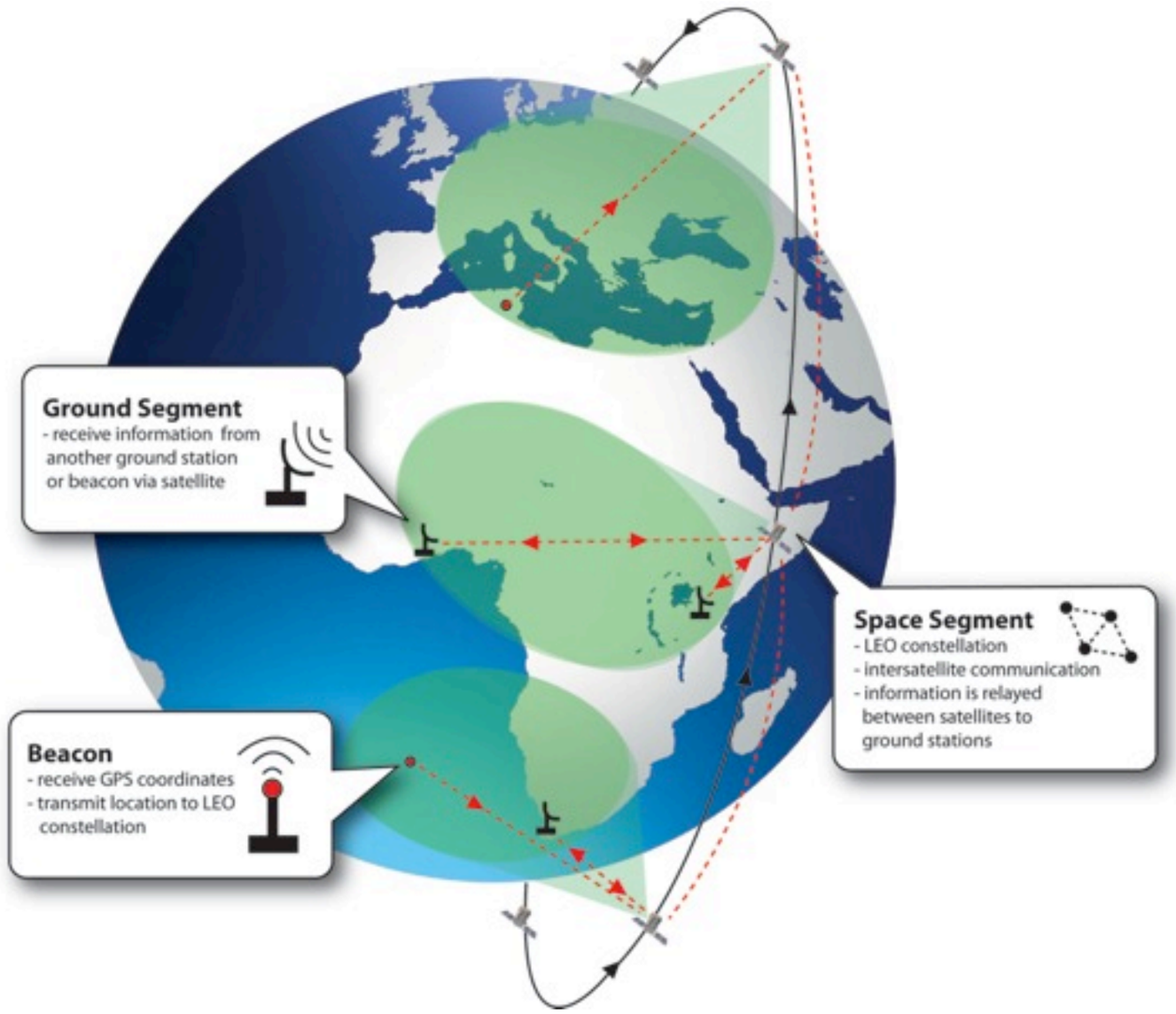
Challenges to collaborative programmes

1. Attaining government buy-in
   - Alignment with national strategy
   - Academia can drive the agenda
   - Show the socio-economic benefit
2. Limited or no local resources
   - Causes inequitable geographic distribution of technology and knowledge base
   - Mobility is therefore necessary
3. Local seeding of expertise
   - Empowerment of local champions to drive initiatives
   - Grow your own timber

Addressing these challenges

1. There is a continent wide endorsement of (space) science and technology
   - African Ministerial Conference on Science and Technology (AMCOST)
   - Pan-African University
   - African Resource Management Constellation (ARMC)
   - Existing regional clusters (UNOOSA) and space agencies and directorates

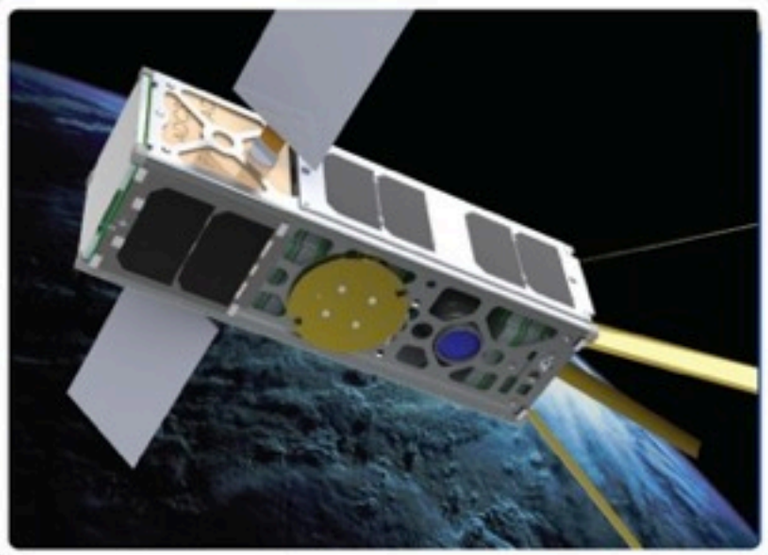
2. Collaborative projects
   - Regional clusters of excellence
   - Network on the ground: Ground Stations and Afri-CanSats
   - Network in space: nano-satellites
   - Linking with global networks

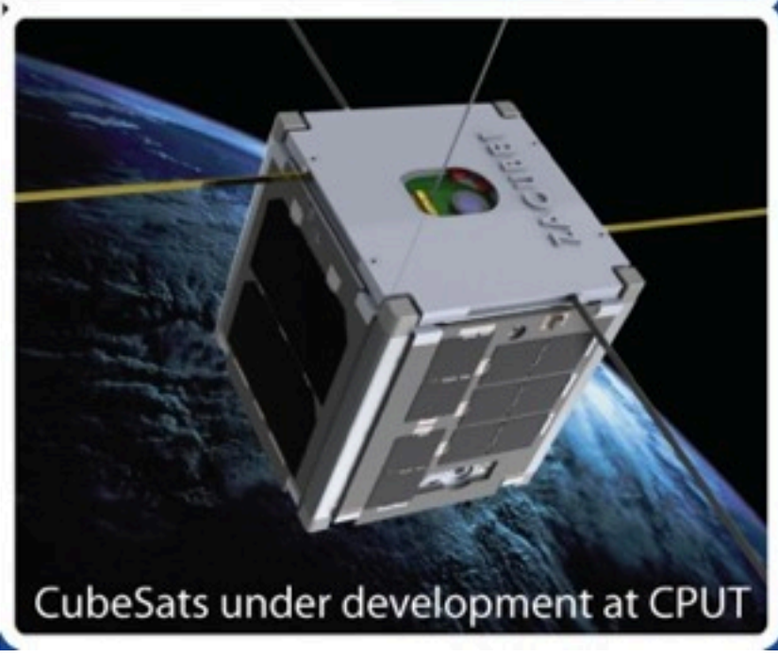


1ST INTERNATIONAL AFRICAN CubeSat WORKSHOP 2011

30 September to 2 October 2011

Cape Peninsula University of Technology,
Cape Town, South Africa





CubeSats under development at CPUT

CubeSat applications towards sustainable socio-economic development

Thematic areas:
- Value proposition and business opportunities
- Missions
- STEM education and awareness

Sessions:
- Nano-sat workshop hosted by IAF
- Posters
- 'Soap box'
- Hands-on demonstration

Field trip to National Satellite Integration Facilities

Social function / African hospitality!

fsati@cput.ac.za
www.cput.ac.za/fsati

Cape Peninsula University of Technology