



# A FRESH LOOK AT GLOBAL RESEARCH INFRASTRUCTURES

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- **Vision: how do research infrastructures enhance competitiveness of national systems of innovation - strategic South African perspective**
- **South Africa's research infrastructure strategy informed by national science and technology missions and the need to stimulate high-value industries, i.e. exploiting comparative advantage to inform research infrastructure policy choices:**
  - **Geographic - e.g. "Southern Skies"**
  - **Resource – e.g. biodiversity**
  - **Knowledge – e.g. deep mining in South Africa**
  - **"Misfortune" – e.g. diseases such as HIV-AIDS**

- **Concluding thoughts on a “fresh look” at global research infrastructure partnerships**
  - **Developing countries’ contributions**
  - **Determining preferred partnership modalities**

**Facilities, resources, and related services used by the scientific community for:**

- Conducting leading-edge research**
- Knowledge transmission, knowledge exchanges and knowledge preservation**

## **Characteristics**

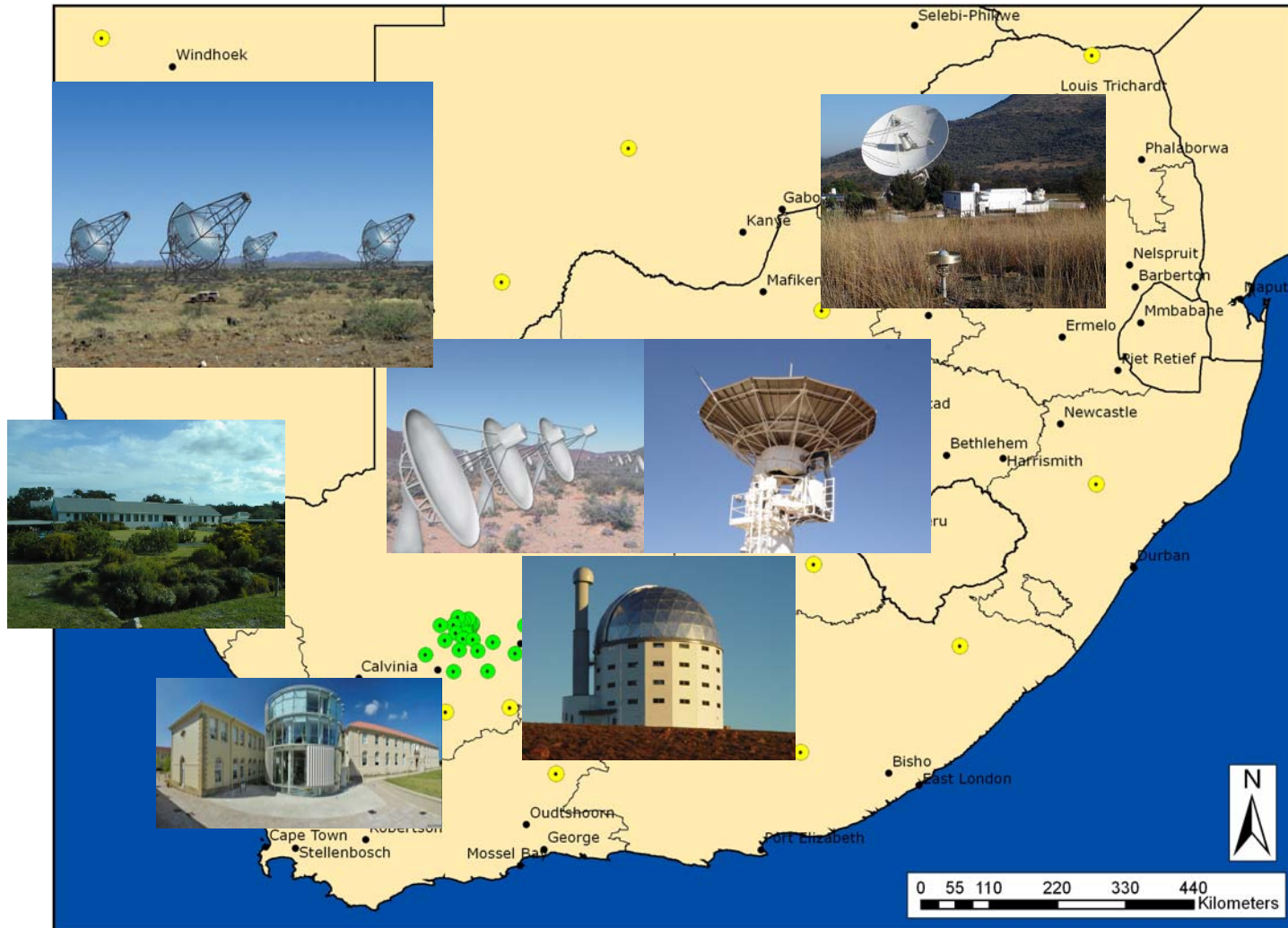
- Multi-user or multi-disciplinary**
- Involving large number of institutions or large number of science areas/discipline**
- Size and complexity of collaboration**
- Strategic support leading edge science**

## **Common denominator**

- The cost of purchasing, construction or maintenance is prohibitively high – thus need for GLOBAL PARTNERSHIPS**

- **Criteria for determining infrastructure priorities:**
  - **Maximizes benefits to as many of South Africa's missions as possible**
  - **Infrastructure that is under threat requiring immediate attention**
  - **Potential to leverage foreign investment**
- **International collaboration essential – science knows no boundaries**
  - **South African researchers accessing global facilities**
  - **Hosting global facilities in South Africa**

## Some research facilities in South Africa



## **The SALT model**

- **Consortium approach**

### **•The SKA**

- **A new global project**

### **•e-Infrastructures**

- **Cross-cutting impact**

### **•The African Laser Centre**

- **Virtual regional centre**

### **•MRMC**

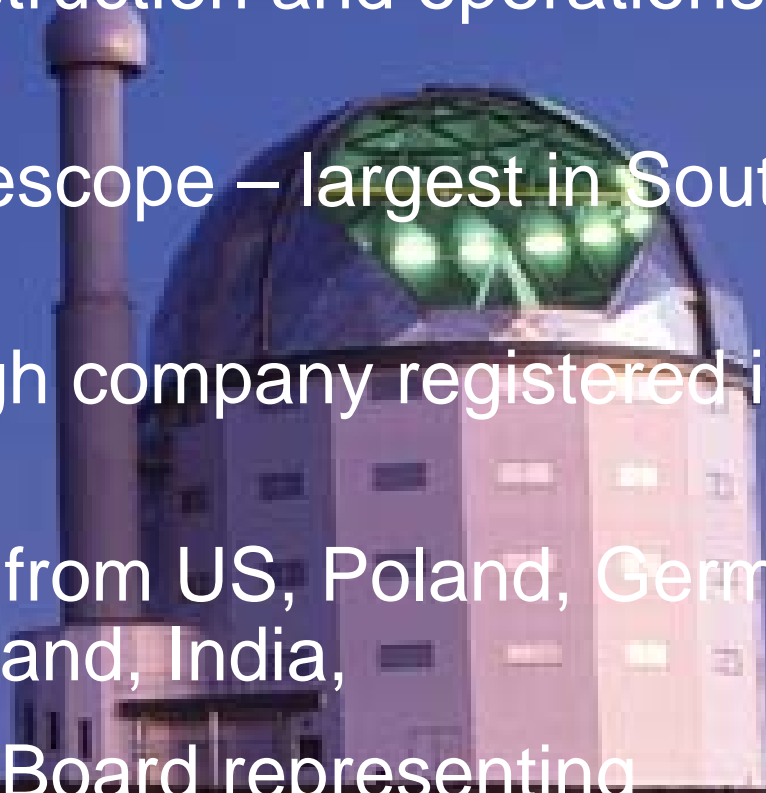
- **Public-private partnerships**

### **•The ICGEB**

- **Distributed international centres**

# Southern Africa Large Telescope (SALT)

- Based on US Hoby-Ebberley Telescope but improved design
- Cheaper construction and operations costs - \$40 million
- 10m class telescope – largest in Southern Hemisphere
- Owned through company registered in South Africa
- Shareholders from US, Poland, Germany, UK, New Zealand, India,
- Controlled by Board representing shareholders



# SALT SHAREHOLDING MODEL



National Research Foundation	34.4%
University of Wisconsin	15.5%
CAMK (Poland)	11.8%
Rutgers University	10.8%
Dartmouth College	9.4%
Goettingen University	4.9%
University of Canterbury (NZ)	4.1%
UK SALT Consortium	3.9%
University of North Carolina	3.1%
Carnegie - Mellon University	3.1%

*(Original shareholding 2000)*

**SHAREHOLDING = ACCESS TO FACILITIES**

# SKA



<b>Estimated construction cost</b>	<b>€1.5 Billion</b>
<b>First open access foreseen-phased</b>	<b>2014-2022</b>

- **Square Kilometre Array**
- **Global collaboration to build world's largest telescope – ESFRI project**
- **South Africa and Australia shortlisted for sites**
- **South African site involves other African countries**

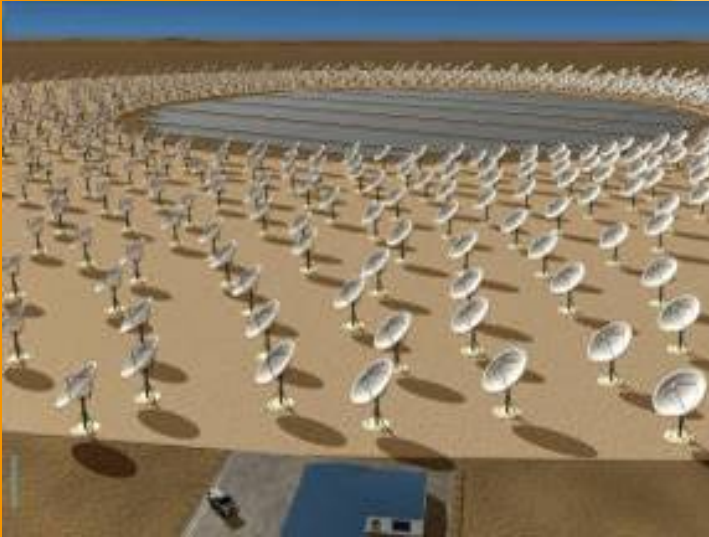
# SKA

**South Africa also  
active in  
technology  
development**



- **MeerKAT demonstrator (2% of SKA) funded at €85 million to date**
- **CASPER collaboration with Berkeley to develop signal processing boards**
- **CONRAD software collaboration with CSIRO Australia**
- **South Africa playing leading role in several work packages of FP7 PREPSKA preparatory action**

# SKA



**South Africa not just a site – active collaboration and supporting capacity-building**

- 50 PhD and MSc students dedicated on SKA - Many from other African countries
- Training young engineers and scientists
- “Mission driven innovation” – industry actively involved
- Leveraging socio-economic benefits from research infrastructure development to support poverty alleviation

[www.skatelescope.org](http://www.skatelescope.org)

# E-Infrastructures – maximizing impact

- **Establishment of South African National Research Network (SANReN) and Centre for High Performance Computing (CHPC) as core cyber infrastructure necessary for South African National System of Innovation**
- **SANReN is a special high-speed network connecting research and academic institutions across the country and globally**
- **SANReN – critical gateway to international R&D cooperation:**
  - **Interim connection to Geant via Tenet network**
  - **In 2008 major new international connectivity via new InfraCo initiative**

- **Phase One:**
  - **Cosmology**
  - **Oceanography and climate change**
  - **Materials modelling**
- **Phase Two:**
  - **Grid computing with CERN**
  - **Bioinformatics and link to ICGEB**

## UbuntuNet Alliance

Alliance of established and emerging national research and education networks in Africa

Vision: establish high-speed gigabyte connectivity between African research organisations



- **The ALC is a virtual research facility to promote research and training programmes at major laser research user facilities in Africa**
- **Facilitate knowledge and technology transfer to industry**
- **Promote collaboration among laser researchers throughout and between African laser institutions and their international counterparts**
- **Enhances the efforts of any other laser-driven initiatives in Africa**
- **Reverse the brain drain of researchers from the African continent**

- **A world-class treatment, research and training facility for South Africa and Africa in partnership with national and international partners**
- **Establishment of a Comprehensive Radiation Therapy Centre**
  - **Proton Therapy – dedicated 2230 MeV cyclotron**
  - **Neutron Therapy**
  - **Photon Therapy (Linac/s, IMRT)**
  - **CT MRI Imaging and Diagnostic Facilities including PET**
  - **30 bed hospital + patient support facility**
  - **Now in the process of setting up a 100 bed facility through a public-private partnership**

- **Training facilities for young oncologists, radiographers and medical physicists**
- **International researchers of the highest calibre will be attracted to the centre**
- **South Africa's ability to be an active player in the global healthcare market**

## International Centre for Genetic Engineering and Biotechnology (ICGEB)

- **Aim**: Component will contribute to the Africa's Development Agenda and fight poverty by:
  - Combating priority diseases (e.g. Malaria, Tuberculosis, HIV/AIDS)
  - Addressing food security challenges through plant biotechnology
- **Governance Model**: Research priorities to be determined by an African Advisory Board made up of African ICGEB Member states + NEPAD Biosciences office.
- **Network**: The component utilizes existing expertise in the 12 African Affiliate Centres and the expertise of the ICGEB campuses in India and Italy

- €4 million for start-up committed by SA Government (3 research groups)
- Goal: 7 research groups by 2010 - leveraging G8 Gleneagles Summit's (2005) stated support
- Support needed to enhance the financial viability and sustainable functioning, i.e. activities such as:
  - Research
  - Capacity development
    - Fellowships
    - Workshops
    - Training courses
  - Equipments
  - Laboratory Consumables



- **Their own unique scientific expertise, based for example on comparative advantages**
- **Participation ensures global inclusiveness and promotes sustainable development agenda – concerted global effort needed for example to address climate change**
- **Involvement leverages socio-economic impact of research infrastructures – e.g. advance fight against poverty, and promoting global cohesion and security**

# Which partnership model is best?

- **One size does not fit all...depends on the nature of research infrastructure and contributions of consortia members**
- **Partnerships should exploit synergy with other funding and cooperation instruments, e.g. development cooperation funding for research infrastructures located in developing countries**
- **Partnerships should mean REAL participation by all partners**
- **Above all the partnership model should maximise impact & relevance of the infrastructure – and ensure its sustainability**

- **Global partnerships key to acquisition of global research infrastructure in developing countries**
  - **Sharing of risk, expertise, human capacity development essential**
- **e-Infrastructure has a major role in connecting researchers globally**
  - **Connectivity to Research Networks such as GEANT, improved computing power, etc.**

**A winning  
partnership:  
2006  
Descartes  
Prize for  
Research**



**Brings together scientists from  
Germany, France, the UK, Ireland,  
Poland, the Czech Republic,  
Armenia, South Africa and Namibia  
working with EU support**



# Thank You

**Research infrastructure in South Africa:**

**<http://www.dst.gov.za>**

**South Africa's S&T cooperation with  
Europe:**

**<http://www.esastap.org.za>**