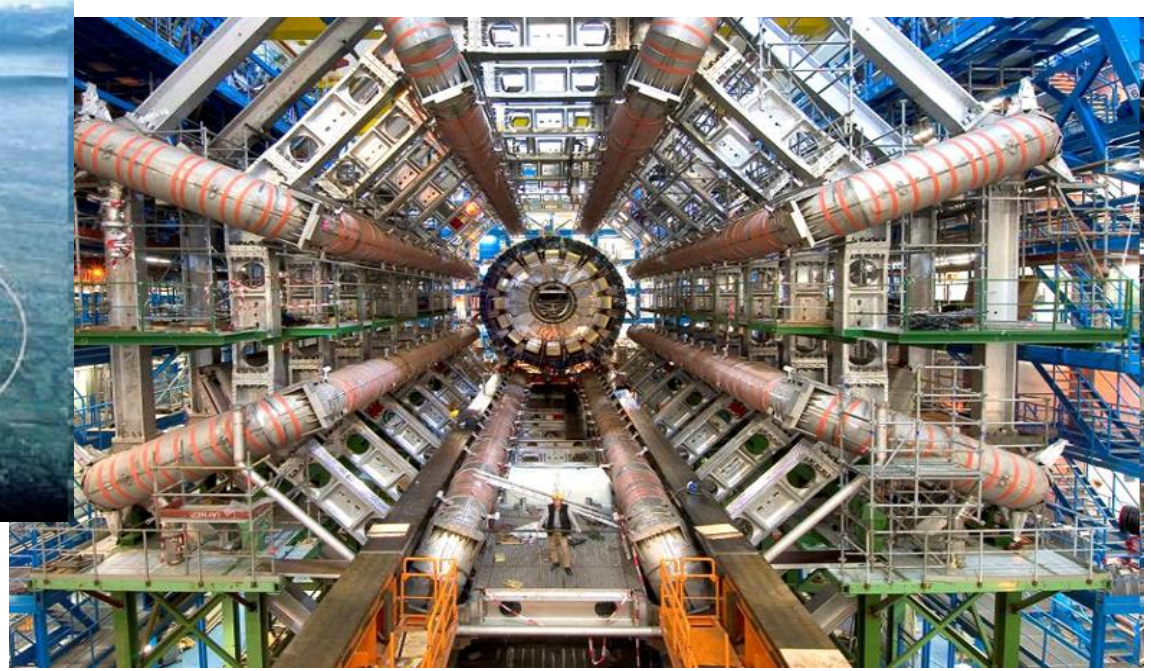
GLOBAL INFRASTRUCTURES: CATALYSTS FOR ENHANCEMENT OF SCIENCE, TECHNOLOGY AND INNOVATION IN SA



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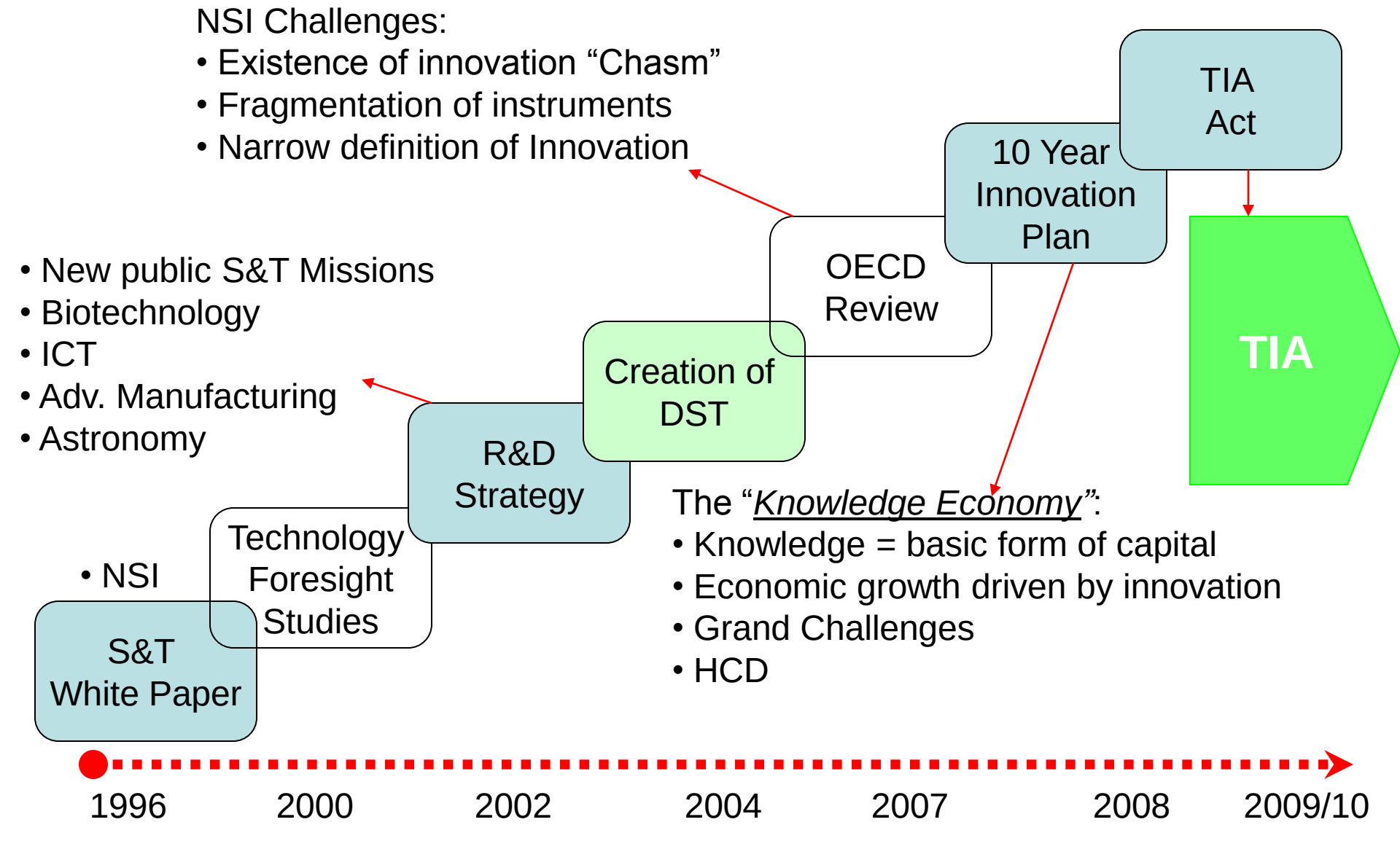
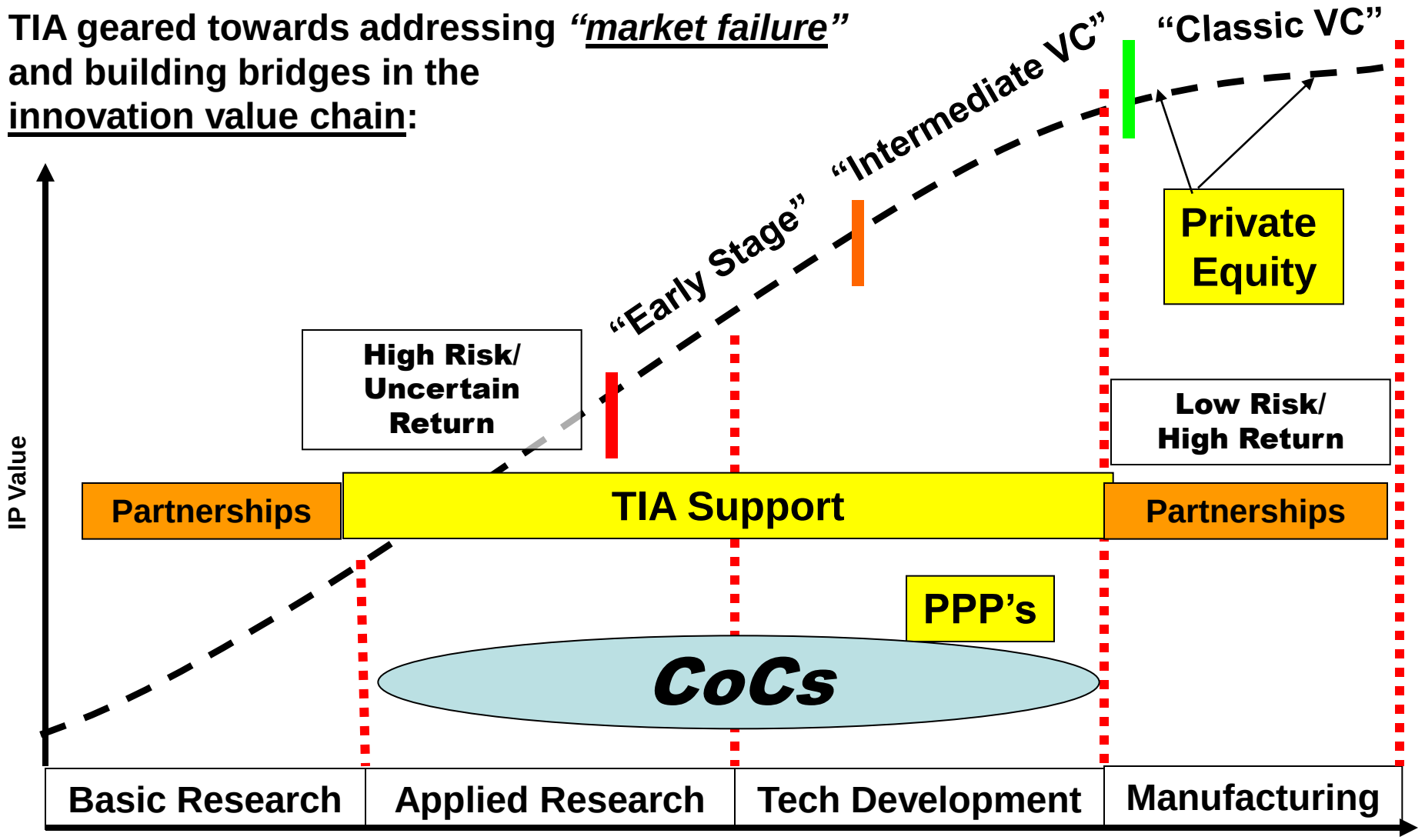
Contents

- **SET Policy Landscape**
- **Infrastructure and the ‘Knowledge Triangle’**
- **The Impact of Infrastructure**
- **SA: Infrastructures & HCD Instruments for International Collaboration**
- **What can developing countries offer to global partnerships?**
- **SA/CERN Cooperation: Benefits for SA**
- **Conclusions**

SET Policy Landscape

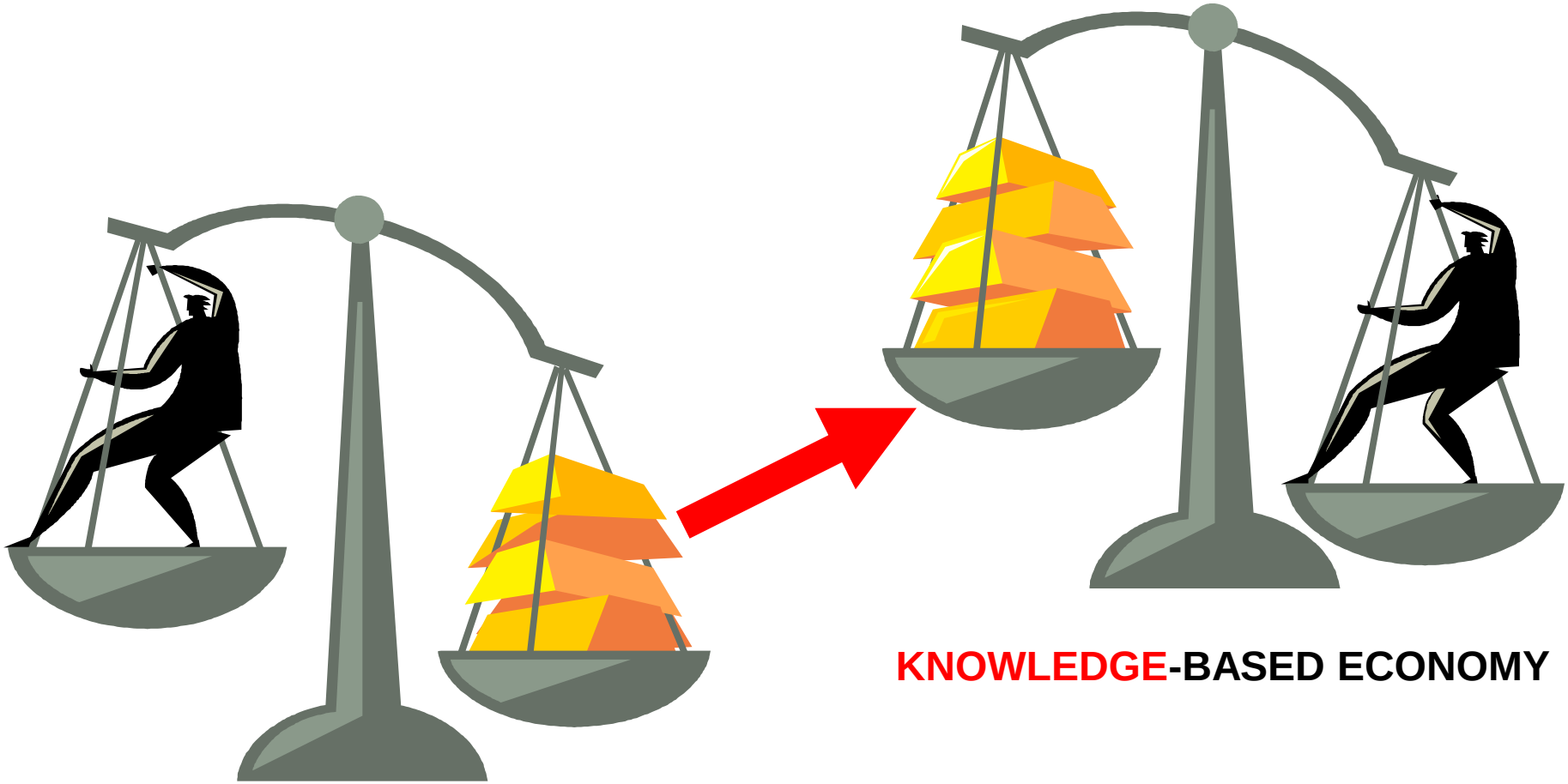


TIA geared towards addressing *"market failure"* and building bridges in the innovation value chain:



The TIA will focus its financial and non-financial offerings along the *innovation chasm*, and will operate with the required flexibility across the innovation value chain through partnerships

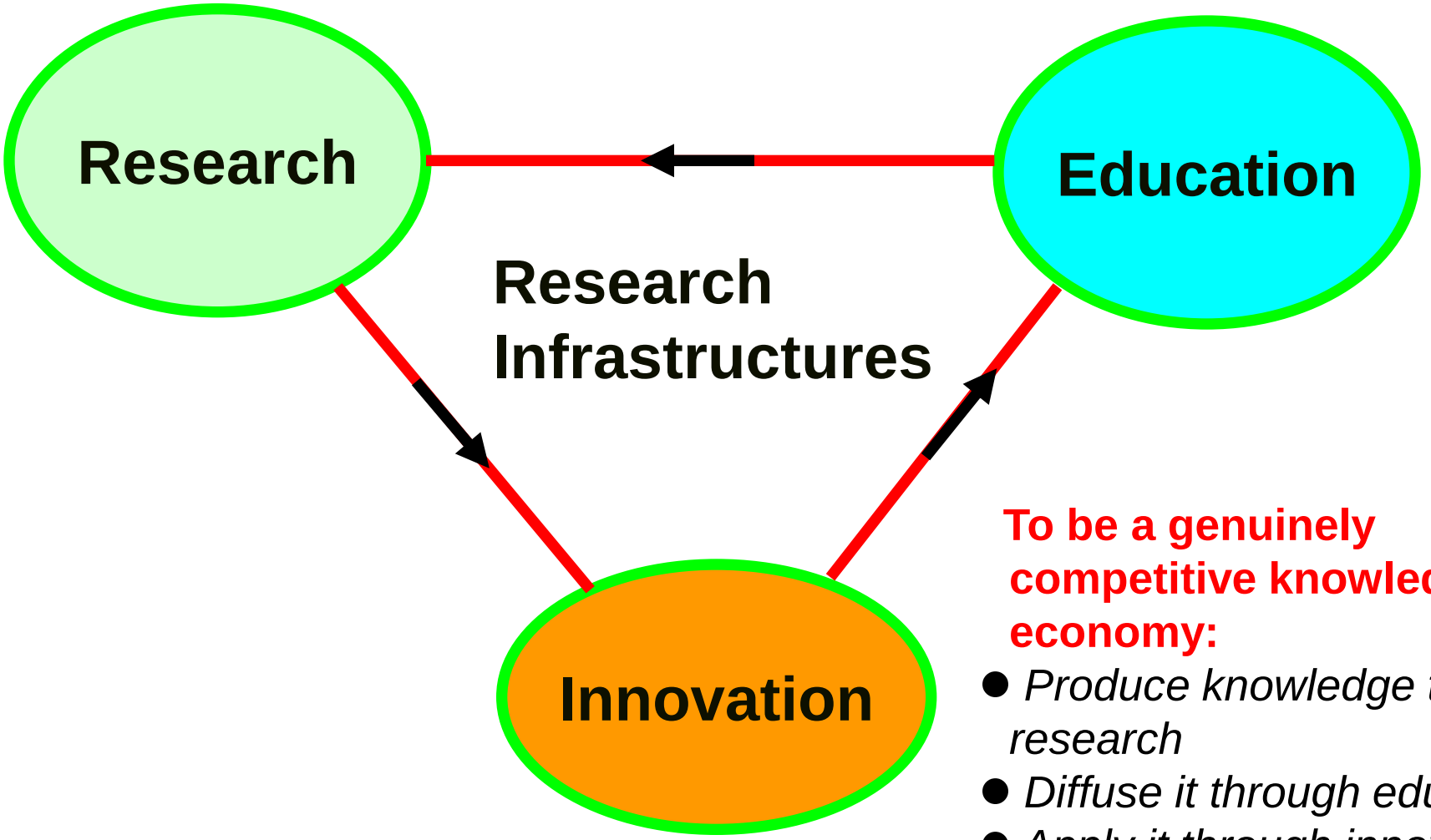
Innovation focus: Towards a Knowledge Economy



RESOURCE-BASED ECONOMY

KNOWLEDGE-BASED ECONOMY

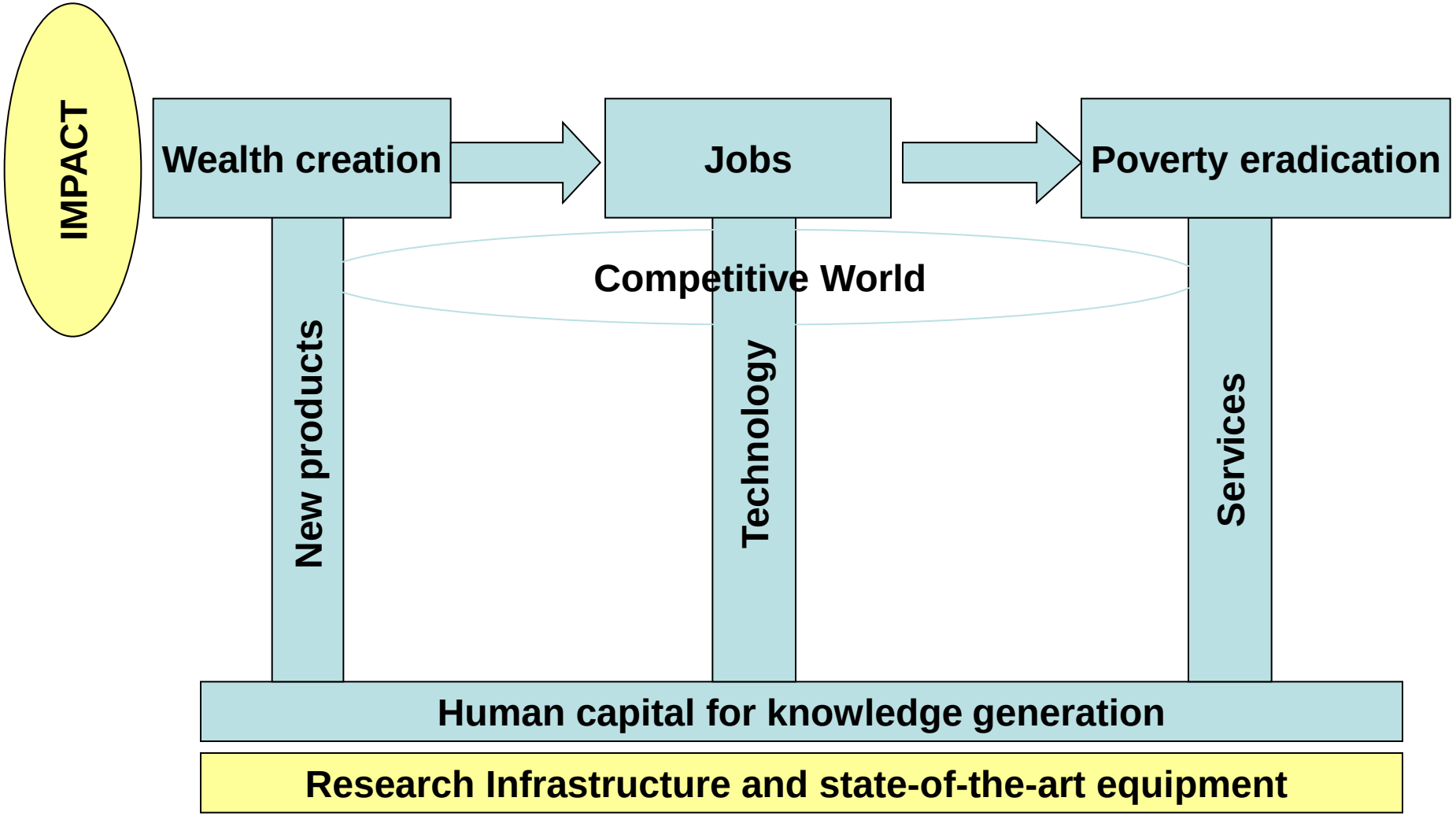
Research Infrastructures: Knowledge Triangle



To be a genuinely competitive knowledge economy:

- *Produce knowledge through research*
- *Diffuse it through education*
- *Apply it through innovation.*

The Impact of Global Infrastructures



Research Infrastructures:

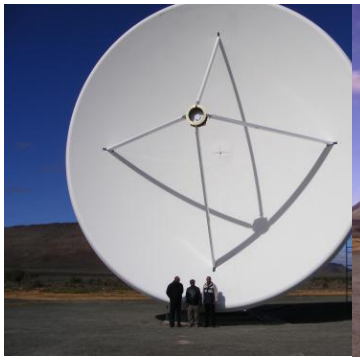
Delivering highly skilled people to the labour market

Improving the performance of existing businesses

Economic Impact

Creating new businesses

Improving public policy and public services



Attracting R&D investment from global business

DIUS 'Economic Impact Framework' – May 2007

Cross-cutting Global Research Infrastructure

- **E-infrastructure**: high performance computing for modeling, prototyping; broad bandwidth networks for high-speed data transmission; data storage and management
- **Global Earth Observation Systems**: to generate data in biodiversity, climate change, earth science, population and health data
- **Space Science and Technology Systems**: satellite imagery and earth-sensing for public health and infectious disease control
- **Global Health Infrastructure**: effective and affordable access to prevention, treatment and control of communicable diseases; global surveillance and alert; monitoring; international health regulation

enabling science through cybertechnology

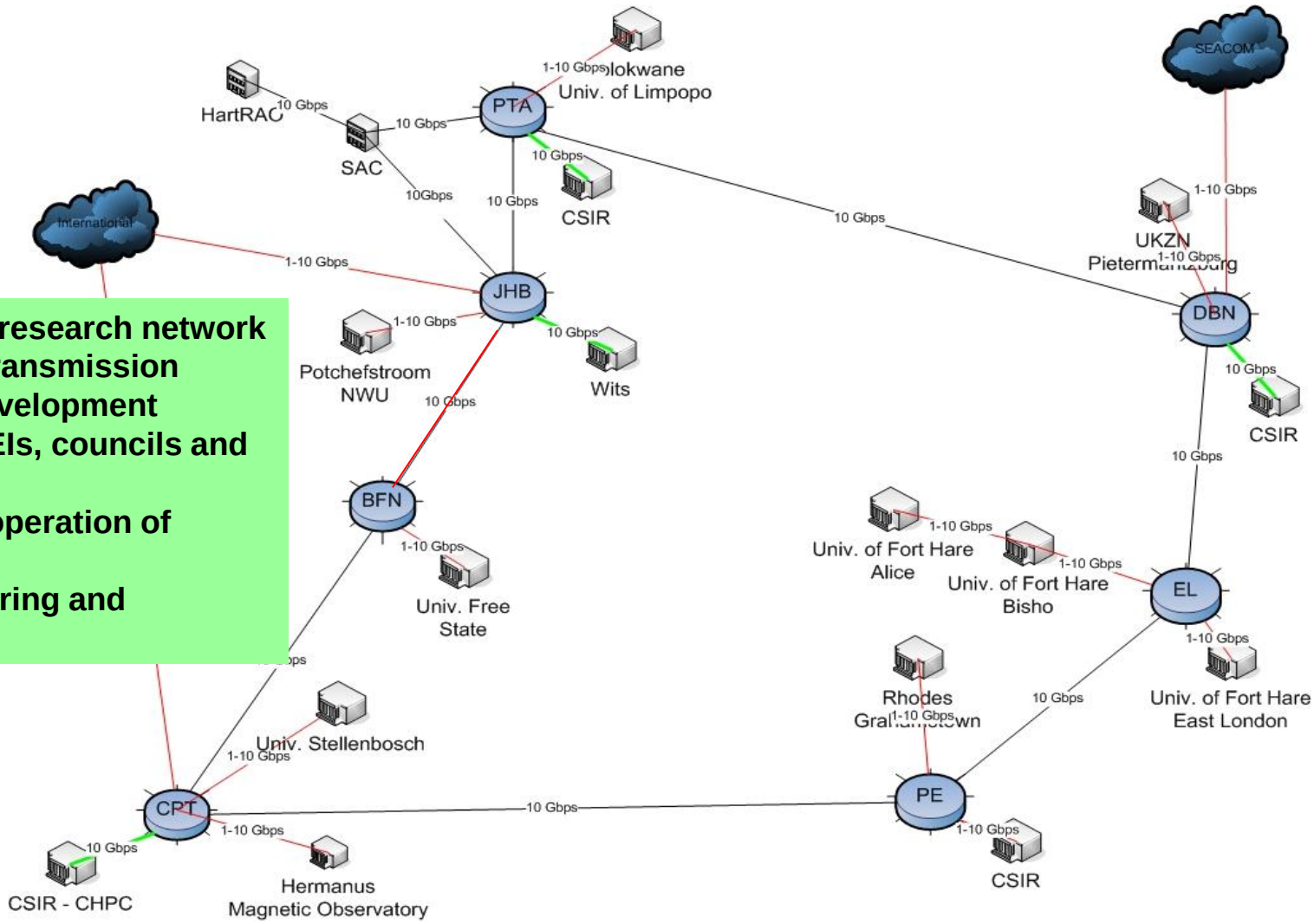
CHPC
CENTRE FOR HIGH PERFORMANCE COMPUTING

The backbone of an emerging E-infrastructure and Grid Computing in South Africa:

- **The Centre for High Performance Computing**
- **The South African National Research Network**
- **Very Large Database and Management System**

SANReN National Network

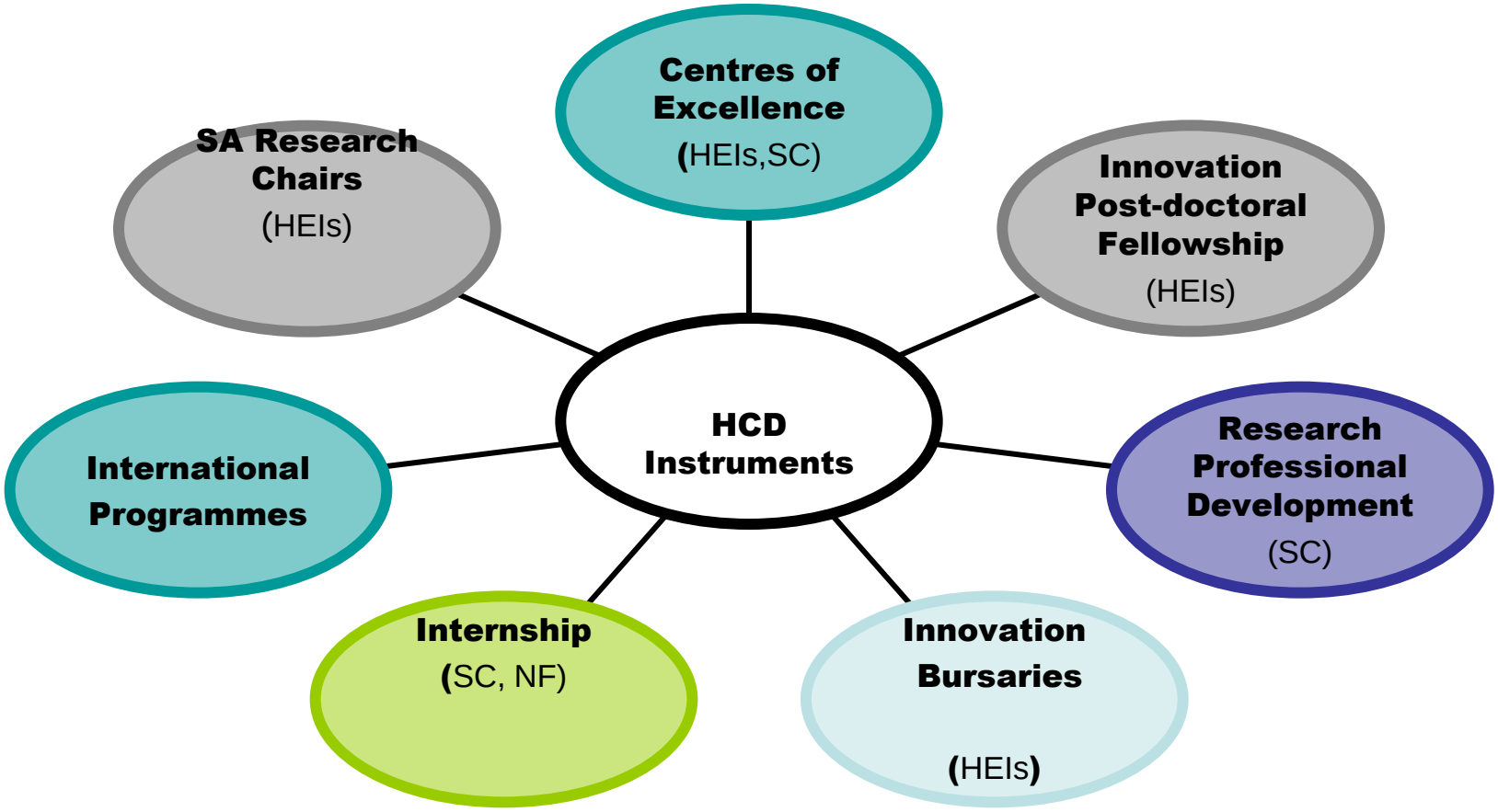
- **A high bandwidth research network**
- **High speed data transmission**
- **Human Capital Development**
- **Connectivity to HEIs, councils and schools**
- **Facilitate remote operation of instruments**
- **Facilitate data sharing and collaboration**



ITHEMBA PARTICLE THERAPY CENTRE

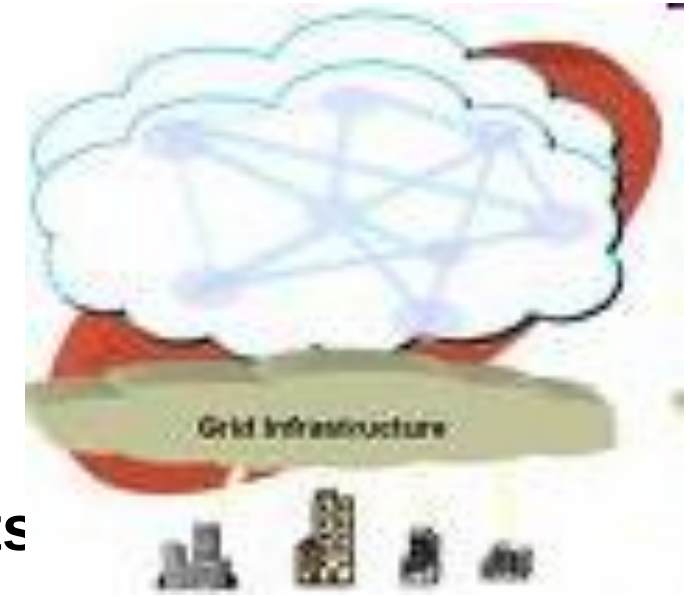
- Proposed Centre will provide Southern Africa (and Africa) with cost-effective specialized cancer treatments currently not available on continent
- A facility with a comprehensive suite of the most advanced proton and neutron treatment and radiation diagnostic equipment and imaging facilities
- iTPTC will become a Centre of Expertise for Telemedicine consultation; major research and treatment centre of excellence in Radiation Oncology

Human Capital Development Opportunities



SA/CERN & Global Infrastructures: Areas for Collaboration Cooperation (1)

- **Human Capital Development**
  - **High-energy and Nuclear Physics**
  - **Accelerator Science**
  - **Hadron Therapy**
  - **E-Infrastructure**
- **Development of E-infrastructure**
  - **Grid Computing**
  - **High Performance Computing**
  - **Data Management**
- **Technology Development: instruments**



SA/CERN & Global Infrastructures: Areas for Collaboration (2)

- **Roll-out of the Optical (SALT) and Radio Astronomy (Meerkat and SKA) programmes:**

  - SKA: 250x entire volume of data currently of Internet; data transmission at 800Tbps, and computers to operate at speed 1000x faster than today's fastest computer

- **To address Global Challenges: Environment, Health, Food, Energy, etc.**

  Example: International Centre for Genetic Engineering and Biotechnology ICGEB: South Africa (Cape Town: Institute of Infectious Diseases and Molecular Medicine) - to develop vaccines and new drugs; pooling expertise to advance knowledge

- **Regional and International Cooperation in e-Sciences**
- **Enhance SA's innovation efforts to respond to the national challenges**
- **For remote instrumentation**



Towards a sustainable Grid Computing Network



Benefits of a Sustainable Grid Computing Network

- **Multi-model seasonal climate forecasts:**

  - Dynamic modelling to better understand evolving regional climate, changing nature of climate variability and extreme events, sensitivity of climate to land cover change

- **Coupled ocean-atmosphere system**

  - Numerical modelling to address flood and storm damage from tropical cyclones, air pollution, large-scale fires associated with adverse weather

- **Modelling to predict the pattern of infectious disease spread within population**

What can developing countries offer to global partnerships?

- Comparative advantage:
  - 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
- Global inclusiveness – needed to address global problems – e.g. climate change
- Leveraging socio-economic impact of research infrastructures – advance fight against poverty – global sustainable development agenda
- Science for Peace (SESAME example)

Conclusions

- **The Global Infrastructures are key platforms for new knowledge generation and international collaboration**
- **Key derived benefits are Human Capital Development, E-infrastructure Development, Technology Development**
- **A sustainable Grid Computing network allows researchers to share: computing power, data, storage space, and instruments regardless of physical location**
- **Grid computing could be used to address the ICT Challenges identified in the DST ten-year innovation strategy**
- In general, Global Infrastructures could be used as catalysts for enhancement of science, technology and innovation in SA

THANK YOU