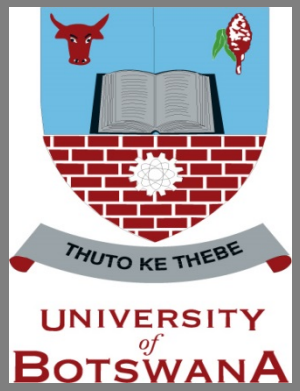


Developments in connected regional SADC Cyberinfrastructure [to Support Data Sharing & Open Science]

UBUNTUNET-CONNECT 2017, Addis Ababa, Ethiopia, 2nd – 3rd November 2017

Dr Tshiamo Motshegwa.
Department of Computer Science,
University of Botswana

About SADC


SOUTHERN AFRICAN DEVELOPMENT COMMUNITY
SADC
TOWARDS A COMMON FUTURE

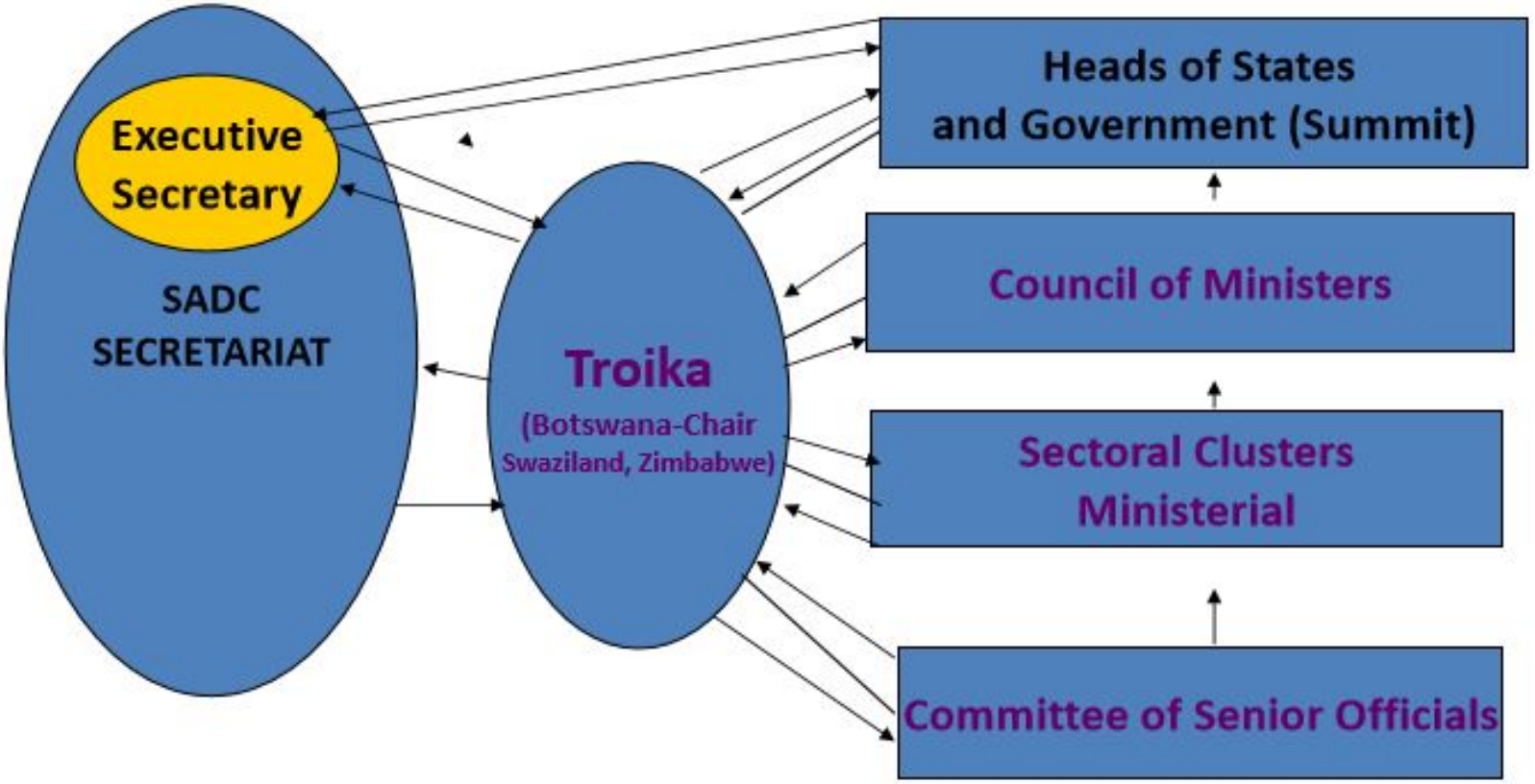
SADC 15 Members

SADC Common Agenda – Integration

Declaration & Treaty of SADC

- Promotion of sustainable and equitable socio-economic growth
  - Economic wellbeing
  - Improved standards of living and quality of life
  - Industriliazation (2014)
- Food Security, Land and Agriculture;
- Infrastructure and Services;
- Industry, trade, investment and Finance;
- Human Resources development, science and Technology;
- Natural Resources and environment;
- Social Welfare, information and culture; and
- Politics, diplomacy, international relations, peace and security

SADC Governance & Decision Making

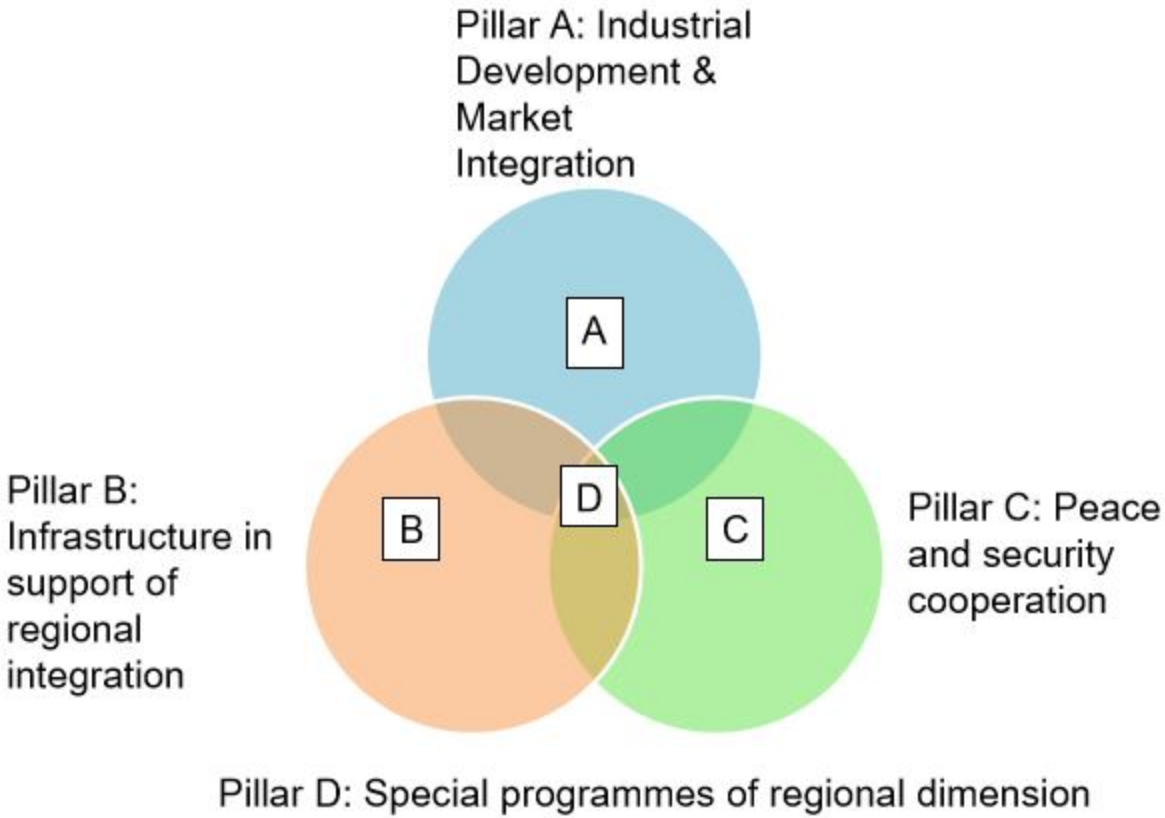


[Source: A.Morgan, SADC Secretariat -*1st East African Science, Technology & Innovation Regional Stakeholder Meeting 23 August 2016 Kigali, Rwanda*]

SADC Policy Framework

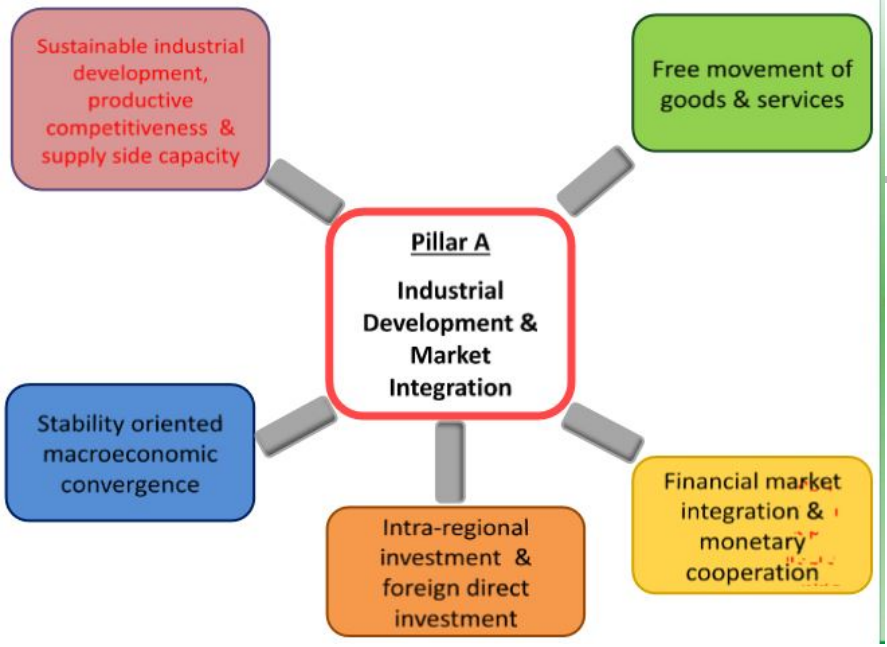
- SADC Treaty 1992
- Regional Indicative Strategic Development Plan (RISDP 2005-2020) - Strategic directions wrt. to programmes & activities
- Protocols e.g. SADC Protocol on STI 2008
- Strategies
  - Strategic Plan on STI 2015-2020
  - SADC Industrialisation Strategy and Roadmap 2015-2063
- Frameworks
  - SADC Cyber-Infrastructure Framework
  - SADC STI Climate Change Framework & Implementation Plan
- Programmes e.g. SADC IKS Policy Platform, SADC Research Innovation Management Capacity
- Drive towards SADC Vision 2050
- AU Vision 2063

The RISDP Priorities for 2015-2020

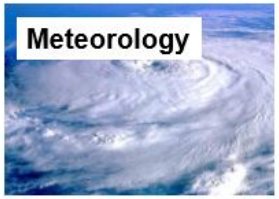


[Source: A.Morgan, SADC Secretariat -*1st East African Science, Technology & Innovation Regional Stakeholder Meeting 23 August 2016 Kigali, Rwanda*]

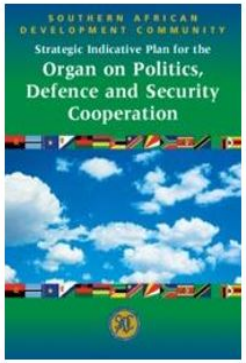
Priority A – Industrial Development and Market Integration:



Priority B – Infrastructure in support of regional integration:



Priority C – Peace and security cooperation



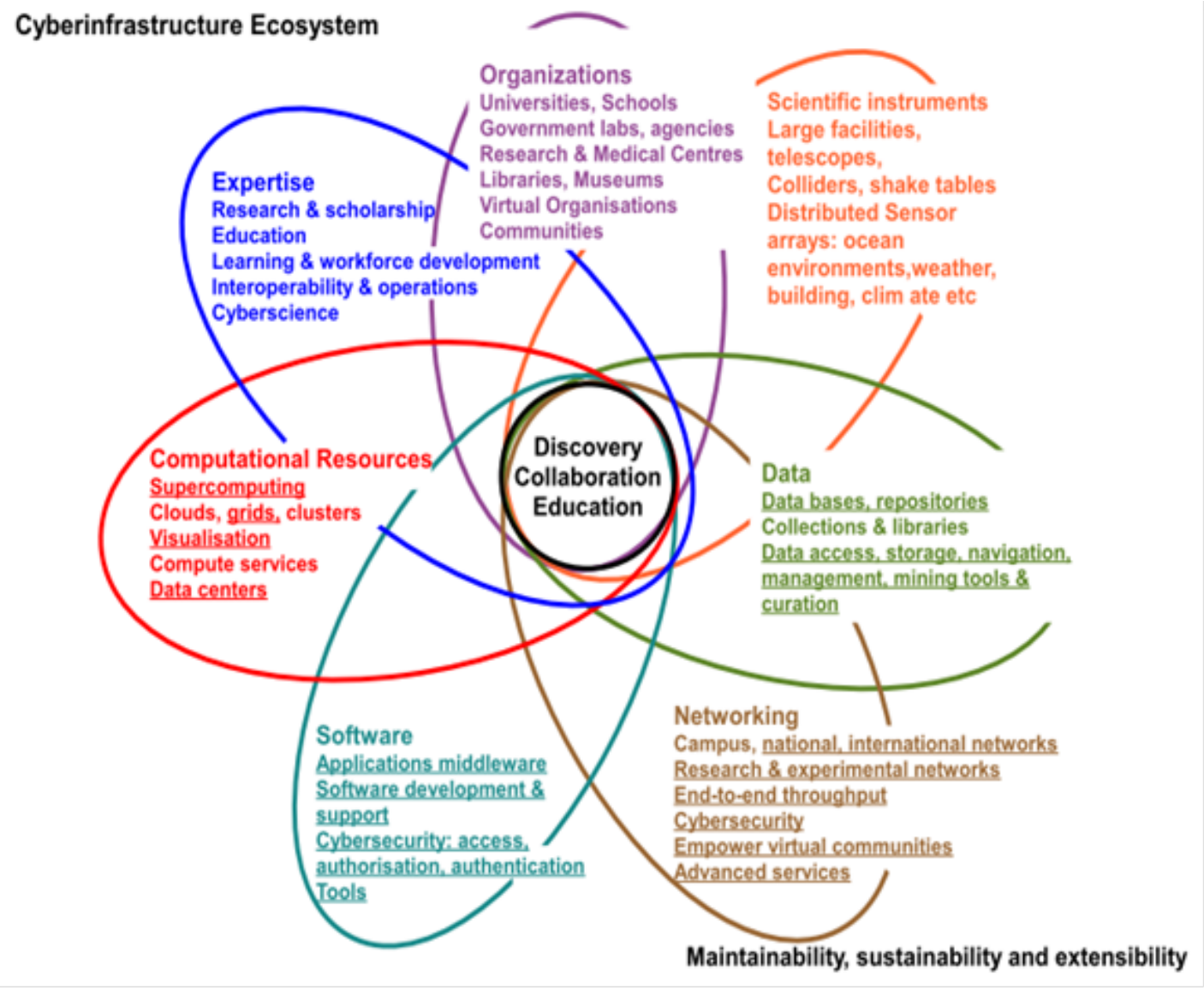
Pillar D – Special programmes of regional dimension:

Science, Technology and Innovation

SADC Cyberinfrastructure Framework

[SADC
member states & Working Group
Approved 30th June 2016 at Joint Meeting of Ministers of Education& Training
And Science & Technology]

Cyberinfrastructure Ecosystem



Examples - UK e-Infrastructure

Policy paper

e-infrastructure strategy: roadmap for developing advanced computing, data and networks

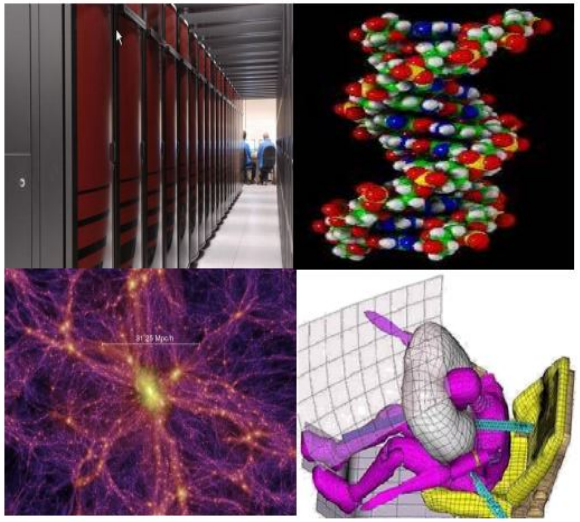
From: Department for Business, Innovation & Skills
Part of: Research and development and UK economic growth
Published: 4 January 2012

"e-Infrastructure refers to a combination and interworking of digitally-based technology (hardware and software), resources (data, services, digital libraries), communications (protocols, access rights and networks), and the people and organisational structures needed to support modern, internationally leading collaborative research be it in the arts and humanities or the sciences. This definition reflects a broader understanding of e-Infrastructure as defined in the report "Delivering the UK's e-Infrastructure for Research and Innovation."

[Research Councils UK]

A Strategic Vision for UK e-Infrastructure

A roadmap for the development and use of advanced computing, data and networks



European Vision

European Commission

HORIZON 2020

The EU Framework Programme for Research and Innovation

European Commission > Horizon 2020 > e-infrastructures

What is Horizon 2020? | Find Your area | How to Get funding? | News, Events & Publications | Projects

Sections navigation

- Excellent Science
- Research Infrastructures, including e-Infrastructures
- e-infrastructures
  - High-Performance Computing (HPC)

What is Horizon 2020

Find Your area

e-infrastructures

Article | Newsroom

By making every European researcher digital, e-infrastructures increase creativity and efficiency of research and bridge the divide between developed and less developed communities and regions.

The overarching aim of the e-infrastructure activities in Horizon 2020 is to achieve by 2020 a single and open European space for on-line research where researchers enjoy leading-edge, ubiquitous and reliable services for networking and computing, and seamless and open access to e-Science environments and global data resources.

To achieve this goal, support will be given to:

- global research and education networks providing advanced, standardised and scalable inter-domain services on-demand
- data, grid and cloud infrastructures providing access to any type of data as well as virtually unlimited data processing and preservation capacity
- an ecosystem of supercomputing facilities, advancing towards exascale
- a software and service infrastructure, achieving excellence in strategic application domains and HPC take-up by SMEs, e.g. for simulation and visualisation, and
- a globally interoperable, open and trusted infrastructure for scientific information.

Search

Related Horizon 2020 **calls**

Related Horizon 2020 **projects**

#H2020

Horizon 2020
@EU_H2020

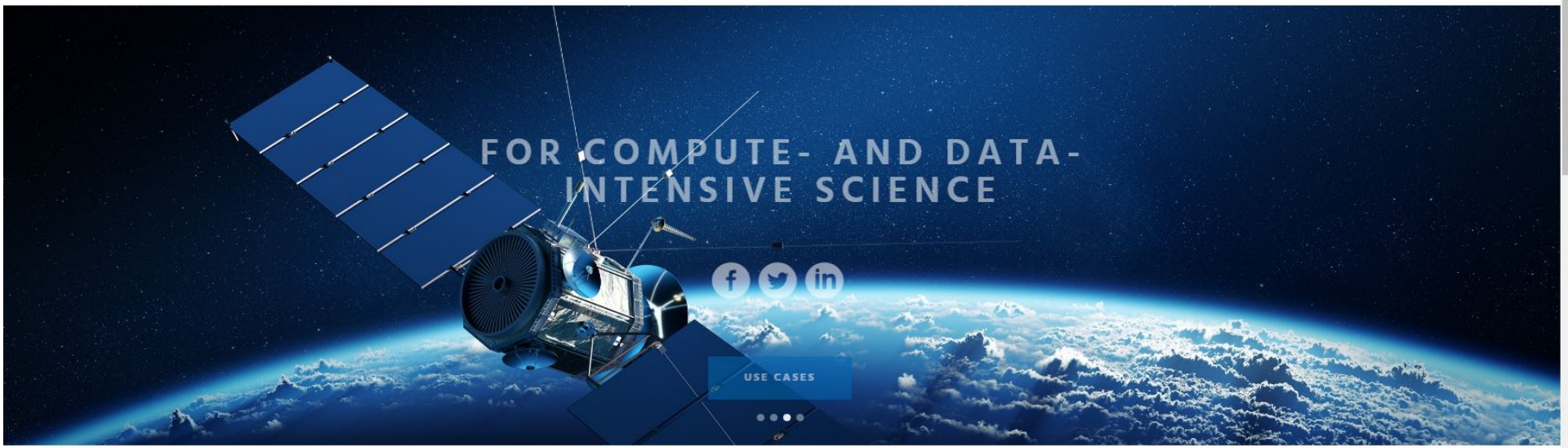
ICYMI: €30bn in #H2020 for innovative #start-ups #EU_EIC #digitisation #environment & #security europa.eu/rapid/press-re... #InvestEUresearch EU twitter.com/EU_H2020/sta

European EGI e-Infrastructure

EGI : advanced computing for research

EGI is a federated e-Infrastructure set up to provide advanced computing services for research and innovation.

The EGI e-infrastructure is publicly-funded and comprises almost 300 data centres and cloud providers spread across Europe and worldwide.



Services for research

EGI delivers advanced computing services to support scientists, multinational projects and research infrastructures.

DISCOVER THE SERVICES

Federation

EGI is a federation of 21 cloud providers and almost 300 data centres, spread across Europe and worldwide.

GET MORE INFORMATION

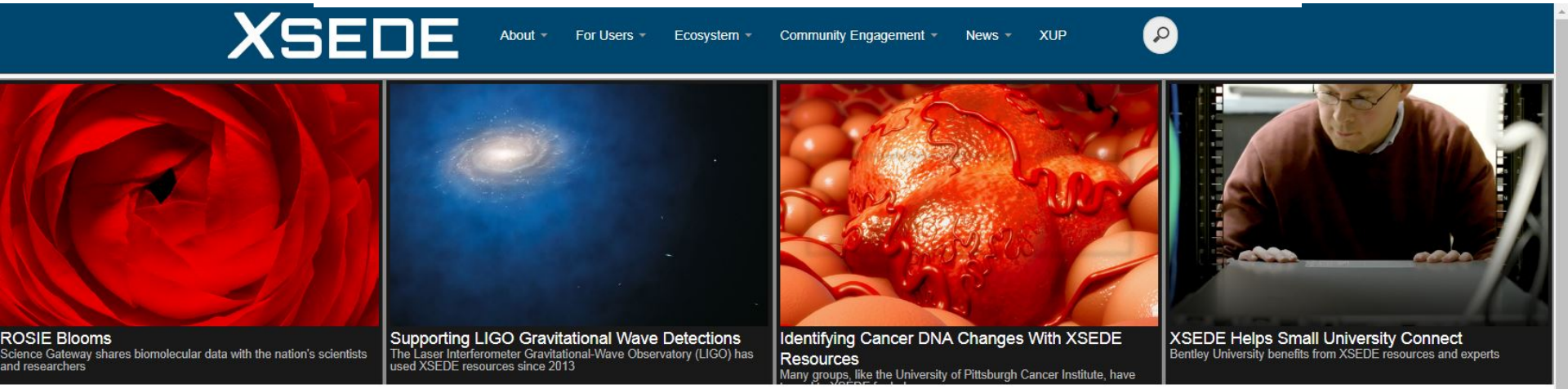
Open for business

EGI is committed to sharing the benefits of e-Infrastructure technology and services with industry, especially SMEs.

LET'S WORK TOGETHER

United States of America-XSEDE

XSEDE is a single virtual system that scientists can use to interactively share computing resources, data and expertise. People around the world use these resources and services — things like supercomputers, collections of data and new tools — to improve our planet.



XSEDE is a single virtual system that scientists can use to interactively share computing resources, data and expertise. People around the world use these resources and services — things like supercomputers, collections of data and new tools — to improve our planet.

- Getting Started Guide
- Science Success Stories
- Diversity and Inclusion Programs
- XSEDE's Project Documents

GET STARTED WITH XSEDE

Researchers
The National Science Foundation's eXtreme Digital (XD) program is making new infrastructure and next-generation digital services available to researchers and educators to handle the huge volumes of digital information

Service Providers
Service Providers - entities that make a resource visible and coordinated with the national cyberinfrastructure for benefit to the research community - are central to the function of XSEDE.

NEWS AND EVENTS

CIPRES: One facet in bold NSF vision
The CIPRES science gateway: A NSF investment launching thousands of scientific publications with...
View »

Dance With Algos
XSEDE resources help researchers create human-like movement
View »

HPC for all at XSEDE16 Conference
The first five years of the NSF-funded XSEDE project culminated in an exciting and enlightening...
View »

UK e-Infrastructure Investment

~£160M of funding covering 6 strands

- Skills and training
- High capacity network
- Data storage and curation
- ***Advanced software development (£30M + £7.5M)***
- Security and resilience
- HPC hardware
  - National facilities (ARCHER)
  - Distributed facilities (e.g. DiRAC)

[Source Science and Technology Facilities Council]

Components of a CI

- **National Research Networks** - Specialized broadband infrastructure networks and service providers for education, research and innovation ,
- **Computational Resources** - Ranging from HPC to other computing capabilities ,
- **Data** - tools and facilities (including repositories) to enable sharing and efficient datadriven discoveries, technologies and innovations,
- **Policies** - To enable optimal establishment and utilization of cyber-infrastructure, generation, analysis, transport as well as stewardship of information, and
- **Human Capital** - To make effective use of the Cyberinfrastructure.

Vision & Goals

- Vision –
  - An education, research and innovation environment that provides for human capital development and shared access to unique or distributed facilities to impact socio economic development in the SADC region and promote knowledge based economy
  - Adding value to Scientific Programmes by fostering partnerships and collaborations by developing regional cyberinfrastructure networks through interconnecting HPC centers, Scientists and Research on regional priority challenges
- Goals
  - Promote high quality education, research and innovation
  - Build cyberinfrastructure capacity
  - Promote cyberinfrastructure Commons (An environment to share education, research and innovation resources),
  - Accelerate Technology transfer, commercialization and industrialization in SADC

Impact of a CI

- **National Bedrock of Digital age, Digital transformation, knowledge economy and Digital economies by virtue of impact on**
  - e-Education/Leaning, E-Health, e-Gov,e-Agriculture
- **Regional Integration**
  - Collaboration using CI
  - Using CI for sectorial collaboration, e.g. energy, education, health
  - Impact on industrialization , e.g. industry 4.0
  - Technology Transfer, commercialization as a consequence of research and education advances
- **Spectrum of other consequences**
  - Citizen Science
  - Digital and Nationally shared information repositories vs libraries
  - Disciplines previously untouched by eScience/eResearch
  - Social media effect in social science, applications e.g. disaster recovery
  - Data Sharing, advancing Open Data ,Open multidisciplinary Research

Alignment

- AU Agenda 2063 – The Africa we want
- STISA 2024 – Science Technology Innovation Strategy for Africa, 2024
- SADC Treaty
- SADC Protocol in Science, Technology & Innovation
- RISDP Revised 2015 – Revised Indicative Strategic Development Plan
- SADC Strategic Plan on STI (2015-2020)
- RIDMP- Regional Infrastructure Development Master Plan - Digital SADC 2027
- SADC Industrialization Strategy (2015 -2063)
- ALL Botswana ICT and RSTI Policy and Strategy instruments

Alignment

Revised Regional Indicative Strategic Development Plan, RISDP

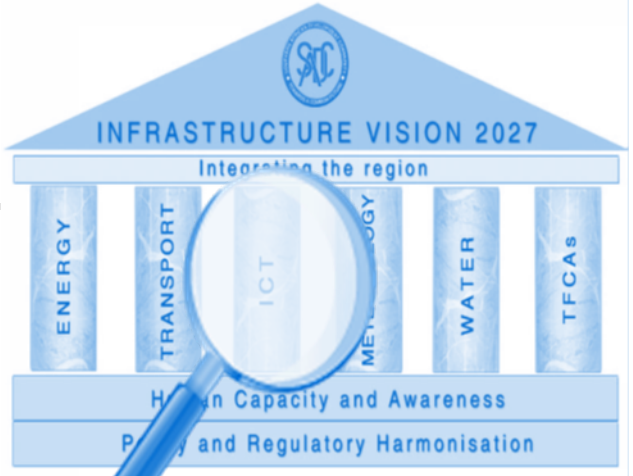
Industrialization Strategy and Roadmap

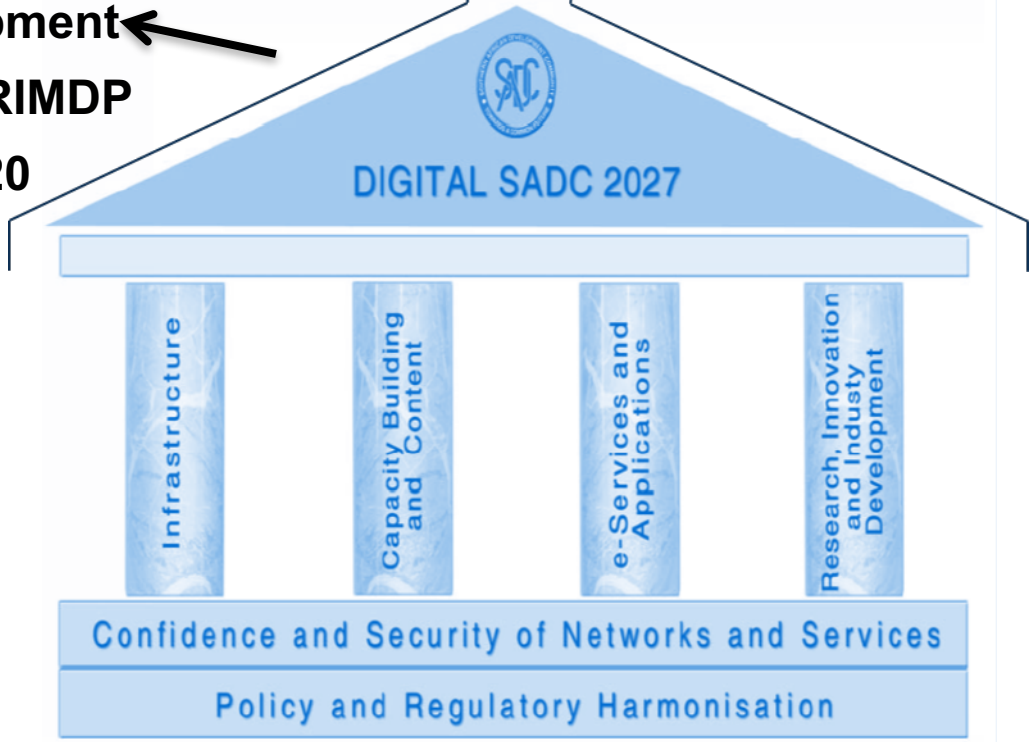
SADC CI Framework

Regional infrastructure Development Master Plan, RIMDP

SADC Strategic Plan on STI 2015 - 2020

Protocol on STI





[Image Source] – Digital SADC 2027 & Communications Regulators Association of Southern Africa, CRASA,Presentation ,Antony Chigaazira

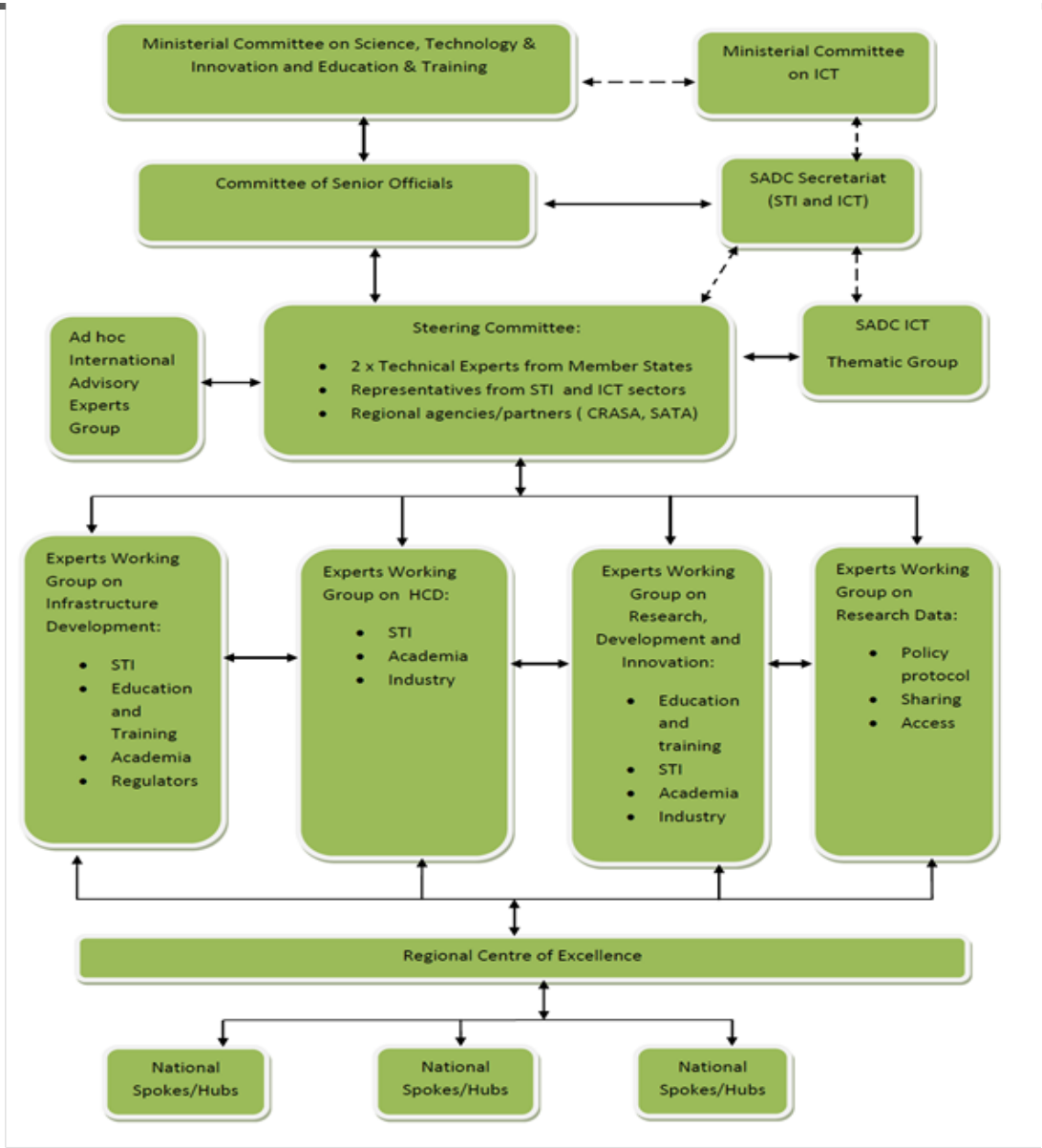
Focus Areas and Resourcing

- Policy/Strategy Dev , institutionalization, implementation support
  - e.g SADC to develop Model Policy to be institutionalized by member states to create conducive environment for promotion of CI
- Education, Research & Development and Innovation
  - Support existing and new Centers of Excellence and provide tools
  - CI Support for research by promoting collaborations and supporting flagship projects
- Human Capital Development
  - Create a pool of CI experts
  - Train beneficiaries to fully exploit services, by incorporating mainstream elements of CI in Higher Education Curriculum and promoting e-Readiness for beneficiaries

Focus areas & Resourcing

- Infrastructure Development
  - Infrastructure Sustainability (lifecycle management), establishment of RENs, HPC centers
  - Establish trusted data repositories that are regionally interferederated
  - Internationally benchmarked policies and standards for data stewardship
  - Open access, sharing and interoperability
- Resource Mobilization, Communication, Awareness & Advocacy;
- Strategic Partnerships

Institutional Framework



Implementation of CI

Part I – High Performance Computing Infrastructure

The SADC HPC ecosystem Project

Situational Analysis - HPC

- 2011 SADC Survey on HPC landscape in member States
  - Needs analysis in terms of industries and availability and access to research communities
  - Highlighted sectors of Engineering, education, energy; Socio economic issues as climate change, health, knowledge sharing, mining, indigenous medicine
- Region had strategic partnerships with international HPC institutions to facilitate acquisition and deployment of HPC equipment for initial systems
  - Texas Advanced Computing center (TACC), Cambridge HPCS,International Center For Theoretical Physics (ICTP) and STEM TREK
- Summary of responses from member state indicated that members at various stages of development

Objectives

- To seed and set up a High Performance Computing facilities in the region to support and promote multidisciplinary research in data and compute intensive domains
- To support training and teaching and curriculum enhancements in Computational Sciences, Distributed Systems, Parallel Programming, Machine Learning , Datascience.
- To support existing data and compute intensive projects in the universities
- To motivate countries to develop HPC and part of their National Intergated Cyberinfrastructure.

Project Relevance & Impact

- The facilities envisaged evolve into a nodes as part of Regional SADC regional cyber Infrastructure under the regional Cyber-infrastructure collaborative framework and form an African Research Cloud.
- To develop capacity and human capital development in HPC and transferable Datascience skills in general and specific to global projects like SKA, AVN and H3Africa etc
- Instrument for data and compute intensive National priority projects in Health, Environment, Energy and Agriculture
- To facilitate acceleration of innovation and technology transfer

Capacity Partners – SA CHPC

CHPC
CENTRE FOR HIGH PERFORMANCE COMPUTING

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

CSIR
our future through science

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CHPC CONFERENCE 2017

3-7 December 2017

Pretoria

17-10-2017 FIRING UP THE CONTINENT

The year 1994 marked a much-anticipated turning point in South Africa's history...read more in the HPC Year Book on page 6

READ MORE

10-10-2017 CSIR AND SA WEATHER SERVICES PARTNER

29-08-2017 CHPC SUPERCOMPUTER FINDS NEW HOME IN GHANA

22-06-2017 SOUTH AFRICA TAKES SECOND PRIZE AT THE 2017 INTERNATIONAL STUDENT CLUSTER COMPETITION

TRAINING & WORKSHOPS

Upcoming workshops

Cambridge HPCS

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HPC News

More news stories >

Related organizations

Centre for Scientific Computing

Feedback

UIS welcomes feedback from across Cambridge on topics such as opportunities for future services, and how current offerings can be improved. Please email feedback@uis.cam.ac.uk.

Follow @UniCamIT 824 followers

June 2017 Top500 List

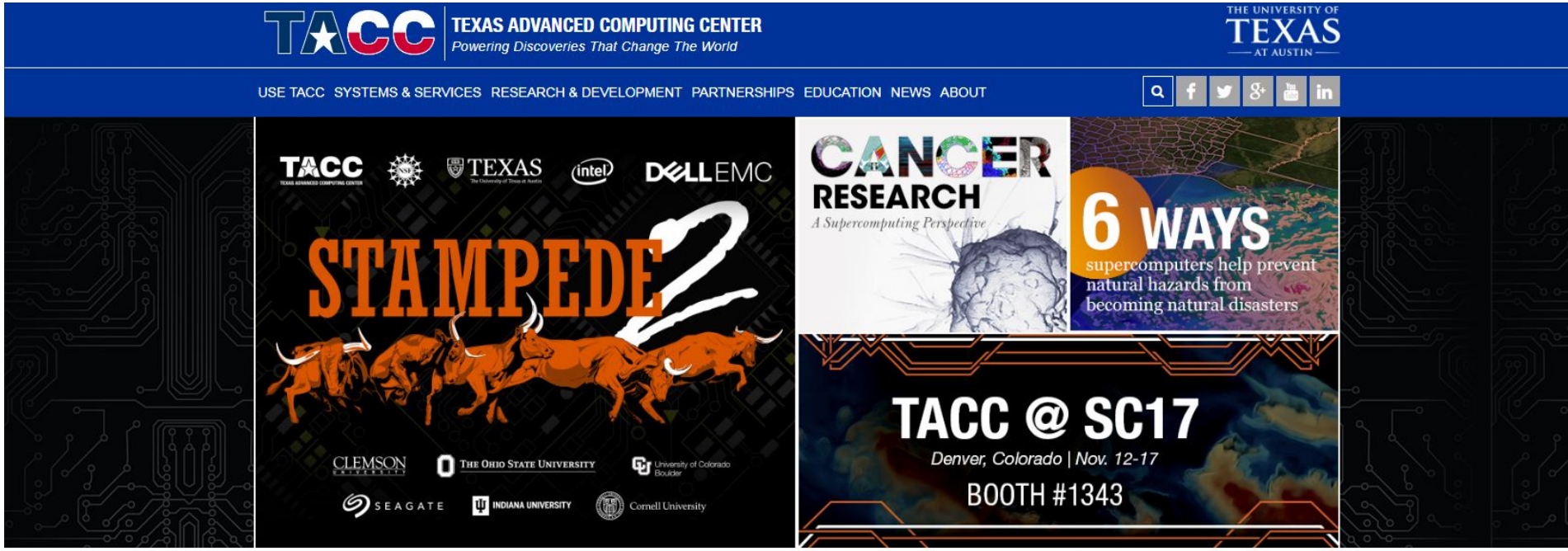
The June 2017 Top500 list of the 500 most powerful commercially available computer systems features the new Cambridge Wilkes2 GPU cluster at position 100 with 1.19 PFlops and the Peta4-KNL Phi cluster in position 404 with 508.9 TFlops.

UIS Jobs

Business Analyst (Fixed Term)

Oct 23, 2017

TACC – University Of Texas



WHAT IS TACC?

The Texas Advanced Computing Center (TACC) designs and operates some of the world's most powerful computing resources. The center's mission is to enable discoveries that advance science and society through the application of advanced computing technologies.

RIGHT NOW AT TACC

UPDATES EVERY 10 MINUTES

196 RESEARCH PROJECTS

WANT TO GET

HOW CAN TACC HELP?

RESEARCHERS

We help you determine which computing, analytics, storage, visualization and cloud technologies will solve your most challenging problems.

INDUSTRY PARTNERS

Our STAR program helps you understand how advanced computing can make your company more productive, competitive, and successful.

TACC Ranger Voyage Story

TACC TEXAS ADVANCED COMPUTING CENTER
Powering Discoveries That Change The World

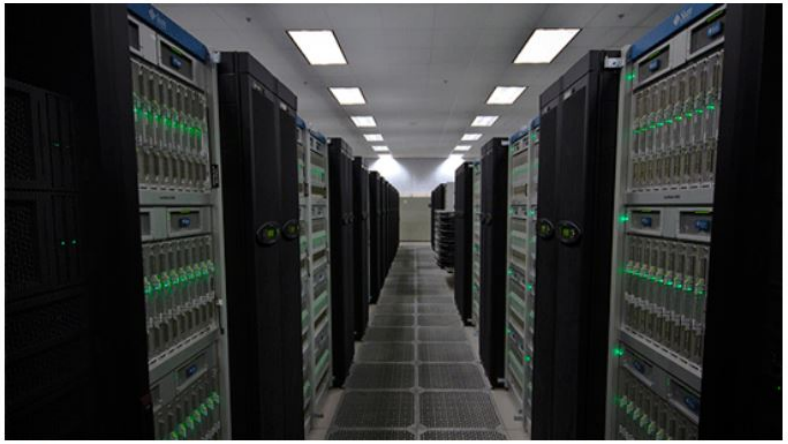
THE UNIVERSITY OF TEXAS AT AUSTIN

USE TACC SYSTEMS & SERVICES RESEARCH & DEVELOPMENT PARTNERSHIPS EDUCATION NEWS ABOUT

RANGER SUPERCOMPUTER BEGINS NEW LIFE

First NSF "Path to Petascale" system makes global journey to Africa

Published on July 14, 2014 by Jorge Salazar



For all the money and effort poured into supercomputers, their life spans can be brutally short – on average about four years. So, what happens to one of the world's greatest supercomputers when it reaches retirement age?

If it's the Texas Advanced Computer Center's (TACC) Ranger supercomputer, it continues making an impact in the world. If the system could talk, it might proclaim, "There is life after retirement!"

"Ranger was the first supercomputer in open science to approach the petascale mark," said Happy Sithole (pronounced 'see-toll-yah'), director of the Center for High Performance Computing (CHPC) in Cape Town, South Africa. "Now, it is starting projects that are important in building high performance computing in Africa."

In 2013, after five years as one of the National Science Foundation's (NSF)

NEWS CATEGORIES

- Press Releases
- Feature Stories
- Podcasts
- Multimedia
- TACC In The News

STORY HIGHLIGHTS

TACC's Ranger supercomputer was the first of the National Science Foundation's 'Path to Petascale' systems, leaving an important science and innovation legacy.

After five years as a flagship production system, Ranger is starting its new life in Africa on projects important to building the profile of high performance computing (HPC) on the continent.

Collaborations built on the Ranger gift from TACC are already forming between the Center for High Performance Computing in South Africa and researchers at several universities across the region.

RELATED STORIES

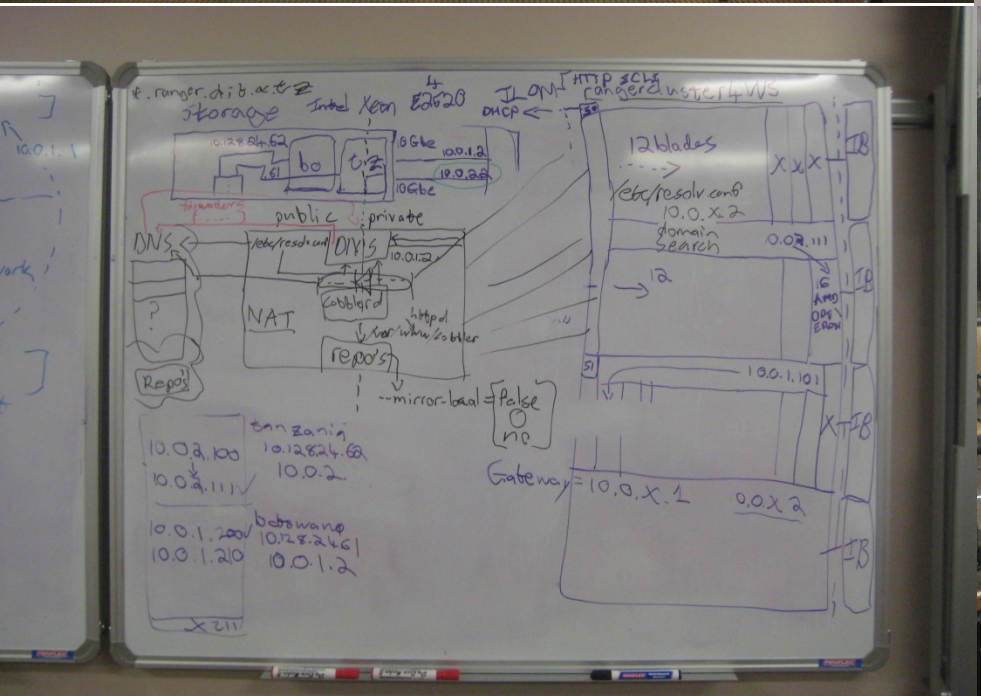
DAN C. STANZIONE JR. NAMED NEW EXECUTIVE DIRECTOR FOR

HPC Ecosystems Project v1 RANGER PROJECT

- 20 Racks of Ranger delivered to South Africa
  - Eleven distributed within South Africa
  - Six distributed REGINALL
    - **Each Rack 1040kg (560kg unpopulated) & consumed 22.5kW**
- Prototype set-up (1+1) made available for demonstration at CHPC & to support training initiatives

University Of Botswana

CHPC Workshop For Botswana & Tanzania






HPC On Common Ground @SC16 was facilitated by STEM-Trek Nonprofit, and was financially supported by a U.S. National Science Foundation grant (1657644), plus in-kind and cash donations from donors and friends.

Thank you!!!

STEM TREK

CRAY

Google

Center for High-Performance Computing
@ the University of Utah

SADC-TACC Workshop@TACC

19 Southern African scholars attend workshop at TACC – Source Stem-Trek

SADC Delegates @ SC'15

US/Pan-African Workshop: HPC On Common Ground @ SC16

Upcoming - URISC@ SC'17 – Understanding Risk in Shared Cyberecosystems

HPC ECOSYSTEMS GLOBAL MAP (2017-10+)

HPC ECOSYSTEMS PROJECT – Donations

TACC Ranger

C6100

Cambridge

Ecosystem Hardware & Sites

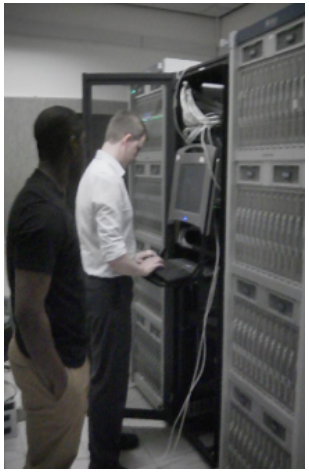
- "Cambridge"
  - Dell M1000e
  - 192C; 576GB; ~2TB
- "Ranger"
  - Sun Blade 6048 series
  - 192C;384GB; 8GB CompactFlash
  - Rack total: 768C, 1536GB*

    *** can make this double (1+1 config.)**
- "C6100"
  - Dell C6100 (Westmere)

  288C; 864GB; ~24TB

- South Africa
  - South African Universities
    - North West University (**NWU**) *
    - University of Fort Hare (**UFH**)
    - University of KwaZulu-Natal (**UKZN**)
    - University of Witwatersrand (**Wits**)
    - University of Venda (**Univen**)
    - *Stellenbosch*
    - *Sol Plaatjie University*
- Other countries
  - University of Antananarivo (**IOGA**) *
  - University of Botswana (**2+2**)*
  - NUST (Namibia) (**1+0**)
  - UNAM (Namibia) (**1+0**)
  - ZAMREN (Zambia) (**1+1**)
  - University of Mauritius (**1+1**)
  - Ghana (1+0)
  - *Kenya, Mozambique* **

Regional Deployments



University of Botswana

- SysAdmin workshop
  - 30 people
  - +USA (SC'16+OCG)
- Projects
  - Environmental
  - Chemistry
  - Biology
  - Engineering
  - Postgrad + U/G plans

Namibia

- SysAdmin workshop (Feb '17)
  - 31 users (UNAM)
  - 14 users (NUST)
  - +USA (SC'16+OCG)

UBCS-CHPC HPC System Admin Training (Botswana) + Other Sites

Stories : Badisa@CERN – Stem-Trek

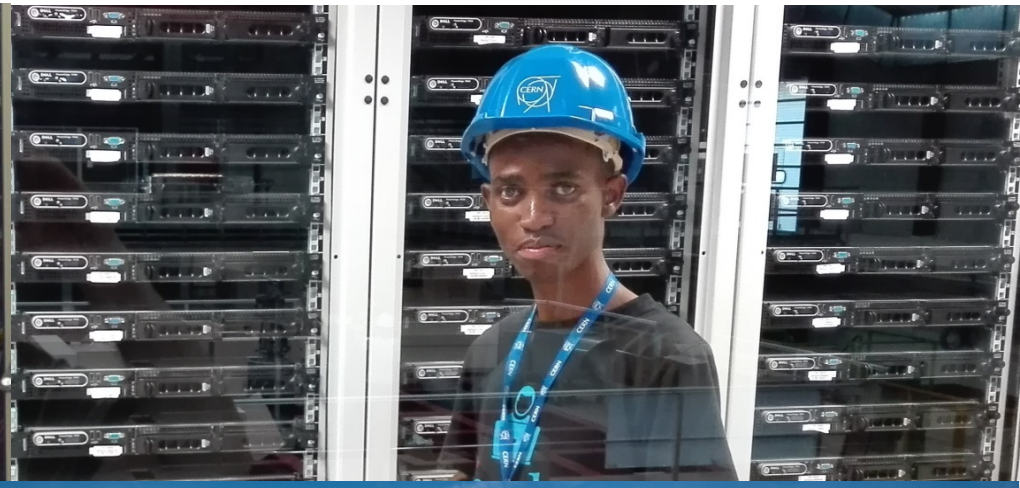
- 2016 South African CHPC Winter School &
- 7th Center for HPC Scientific Programming School at the Hartebeesthoek Radio Astronomy Observatory

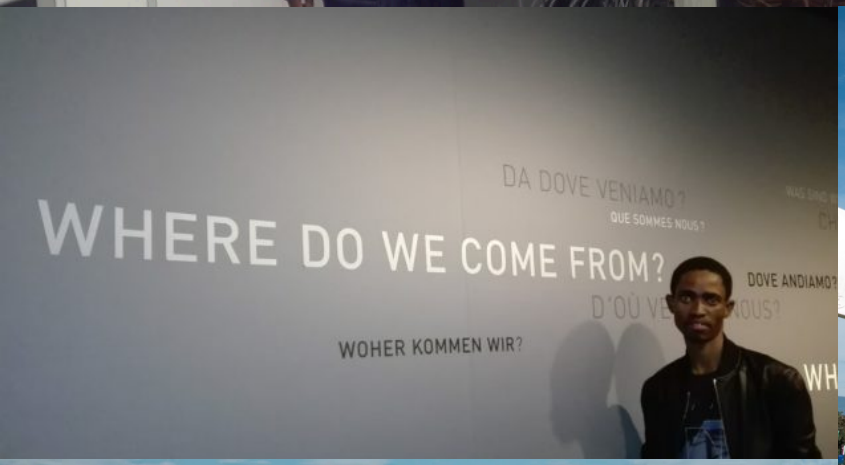
STEM-Trekker Badisa Mosesane ,University of Botswana, Computer Science Student to Attend CERN Summer Student Program. Sponsored by CERN & Cray

Badisa Mosesane, an undergraduate student who studies computer science at the University of Botswana in Gaborone, will soon join other students from developing nations around the world in Geneva, Switzerland to participate in the European Organization for Nuclear Research (CERN) Summer Student Program.

Each year, advanced undergraduate and beginning graduate students from developing countries who study physics, computing and engineering are encouraged to apply—and it's very competitive! In 2016, 137 students from 60 countries were represented and more than 1,000 have participated since the program began in 2003.

Stories : Badisa@CERN – Stem-Trek





Vision ?

Progress to date – Example Utilisation (Botswana)

- **Bioinformatics** : TB, HIV and Drug resistance project, 4 PhD Students from Biological Sciences Dep't CafGEN, H3Africa Project (Prof Mpoloka)
- **Atmospheric Physics**: Atmospheric Physics projects, 2 Research Staff from Physics Dep't (Prof Adedoyin)
- **Computational Chemistry** : Royal Society Computational Chemistry, Catalysis & Biofuels project, 3 PhD Students from Chemistry Dep't (Prof Oyentunji)
- **Engineering**: Computational Fluid Dynamics, Turbine Blade design project, 4 PhD students from Mechanical Engineering Dep't (Prof Motsumi)
- **Computer Science** - Natural Language processing : Speech Recognition project, 2 Research Staff from Computer Science Dep't (Prof Ayelew)
- **Teaching & Training** - Distributed Systems, Parallel Programming, Machine Learning, Datascience Teaching to students from Computer Science Dep't, and HPC workshop: 46 students and attendees

Challenges & Resource Needs (e.g. Botswana)

- No resources and budget to facilitate mobility of staff and students for mobilisation, training, capacity building, networking and collaboration meetings and events Nationally, Regionally and Internationally – relying on partners and collaborators
- No budget and resources to fund strategic flagship projects on data and compute intensive problems of National and regional themes – relying on donor funds
- No comprehensive University strategy or funding for computational research and data infrastructure

Challenges & Resource Needs

- No hardware replacement cycle plan and sustainable system upgrades to support users – Relying on Hardware donation from donor partners
- Immediate Needs:
  - Inadequate storage support for current usage (nee 1 PB + vs 50TB)
  - Robust Research Data back-up – Currently None
  - cooling solution (currently 2 racks running vs 4)
  - No uninterruptible power supply (UPS) in the event of power failure
  - Additional RAM memory for applications like Bio-informatics and genomics
  - Need for equipped Training Lab for Workshops
  - Resources to facilitate mobility of staff and students for training, capacity building and networking

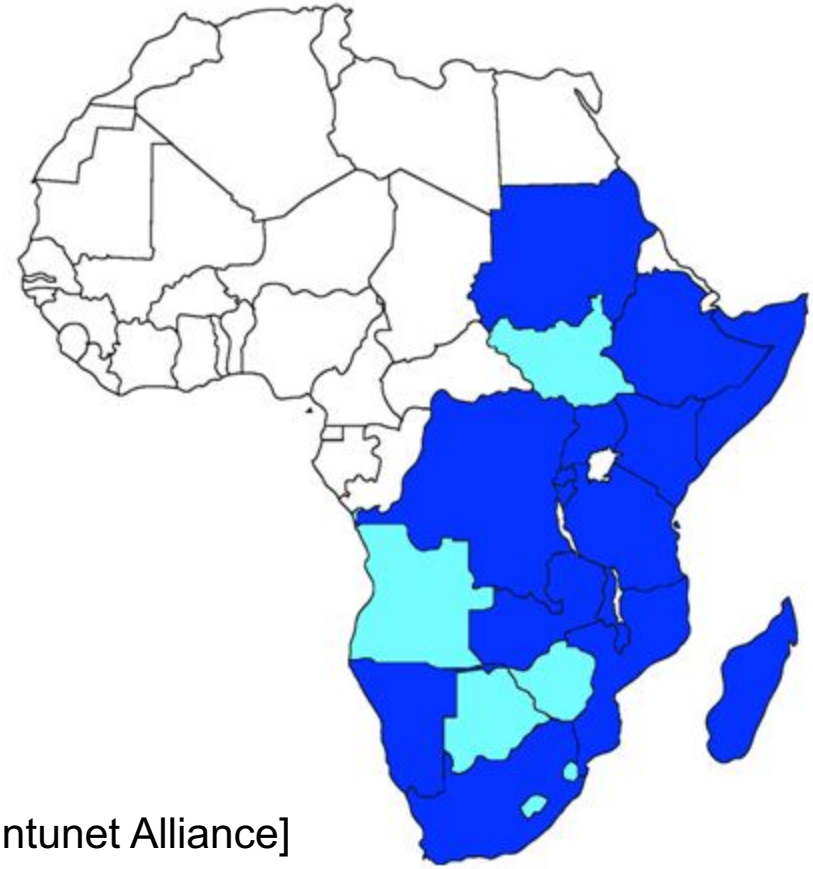
Implementation of CI-Research and Educational Networks

What is Ubuntunet Alliance?

- The regional Research and Education Network of Eastern and Southern Africa

(ESA) region

- NRENs from 15 countries
  - TERNET, Tanzania
  - Eb@le, DRC
  - EthERNet, Ethiopia
  - iRENALA, Madagascar
  - KENET, Kenya
  - MAREN, Malawi
  - MoRENet, Mozambique
  - XNet, Namibia
  - RwEdNet, Rwanda
  - SomaliREN, Somalia
  - SudREN, Sudan
  - TENET, South Africa
  - RENU, Uganda
  - ZAMREN, Zambia
  - BERNET, Burundi



[Source: Ubuntunet Alliance]

- Operates **UbuntuNet**, the data network interconnecting member NRENs

GÉANT UbuntuNet Alliance WACREN ASREN AfricaConnect2

Progress to date – Mature NRENS

- UbuntuNet Alliance as the internationally recognized Regional Research and Education Network for Southern and East Africa
- Regional RENS (RRENs) support NRENs in establishing infrastructure and service capabilities
- Ubuntu Alliance current SADC countries include DRC, Madagascar, Malawi, Mozambique, Namibia, South Africa, Tanzania and Zambia
- Two mature NRENS in SADC – South Africa (Combined capabilities of SANReN + TENET) & Zambian ZAMREN
- Several fledgling NRENs evolving, e.g. Mozambique MoREnet & Tanzania's TENET
- UbuntuNET and mature RENs support nascent RENS

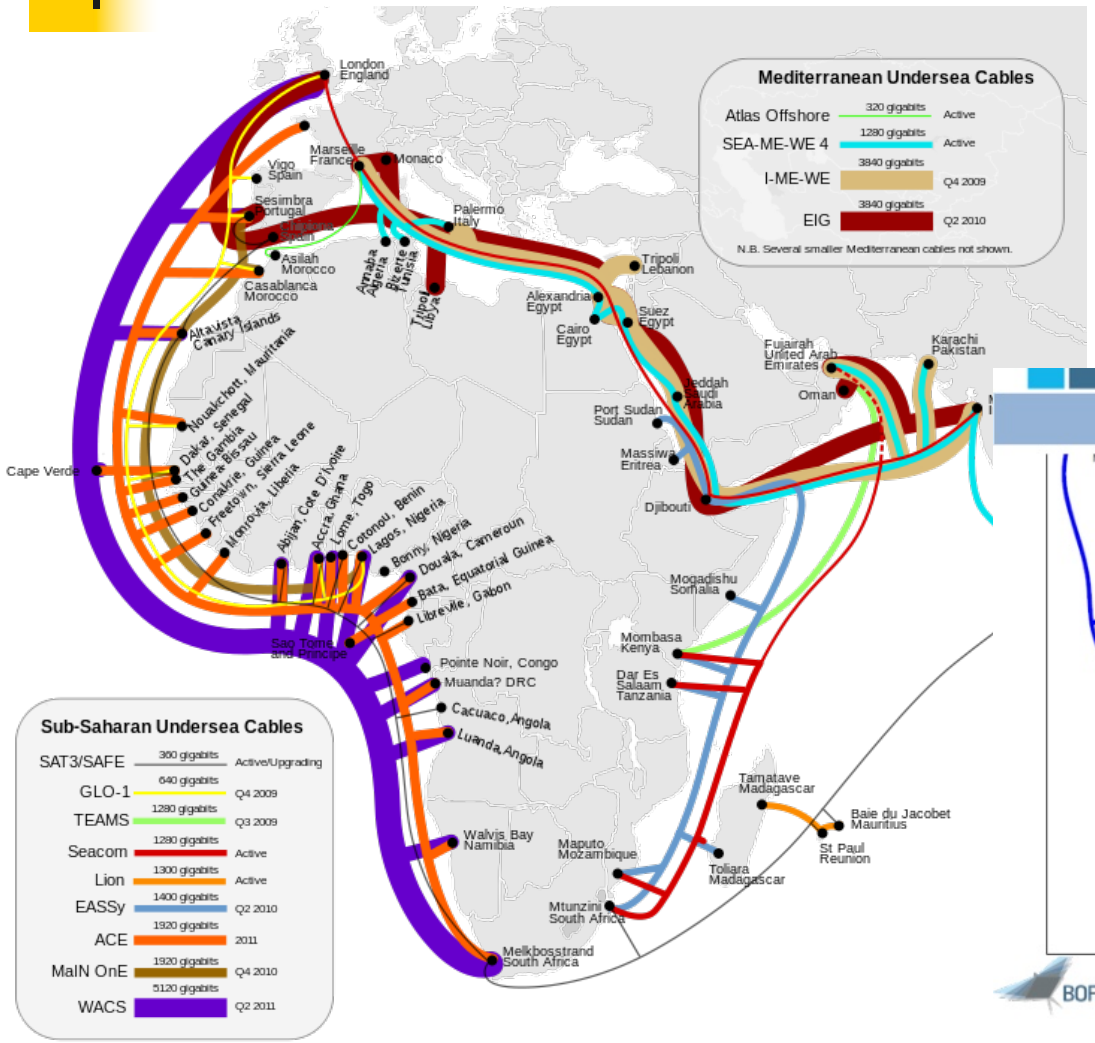
Progress to date – Non Existent NRENS (Botswana)

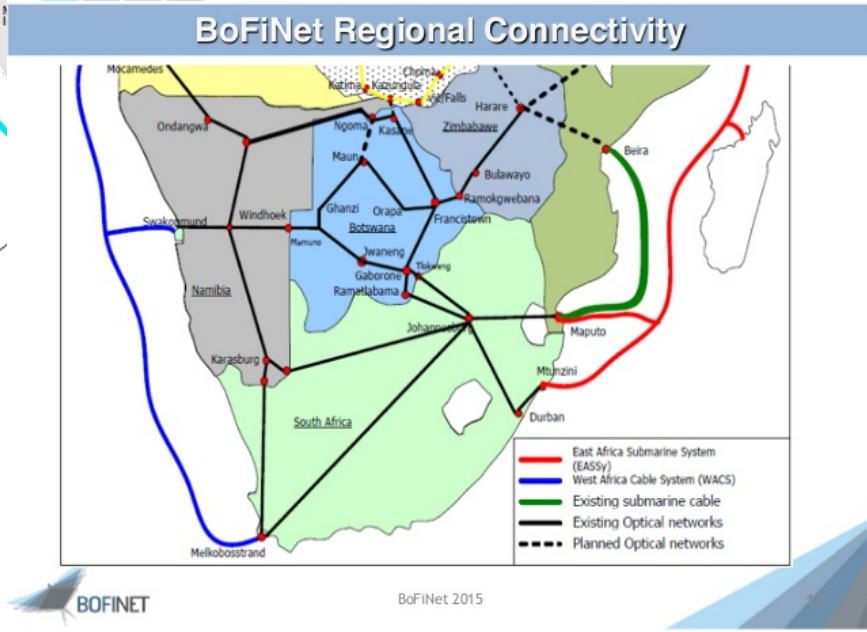
- Botswana REN Committee setup
- Some Interaction with UbuntuNET Alliance
- Company setup
- Constitution
- Terms Of Reference
- Project before ministerial reconfiguration- Ministry portfolio now and coordination? Way Forward
  - Need for dedicated coordinating person appointed
  - To accelerate Engagement of UbuntuNet Alliance for assistance and AfricaConnect II

Proposed Flagship projects

- Botswana Research Network (BotsREN/BotswanaREN)
- Goal – To develop A National Research and Education Network (NREN) - a specialised wide area network service provider dedicated to supporting the needs of the research and education communities in Botswana
- Alignment & Collaboration
  - Botswana Broadband Strategy.
  - Botswana ICT and RSTI Policy framework
  - South Africa TENET/SANREN?
  - UbuntuNET Alliance?
  - AfricanConnect II?

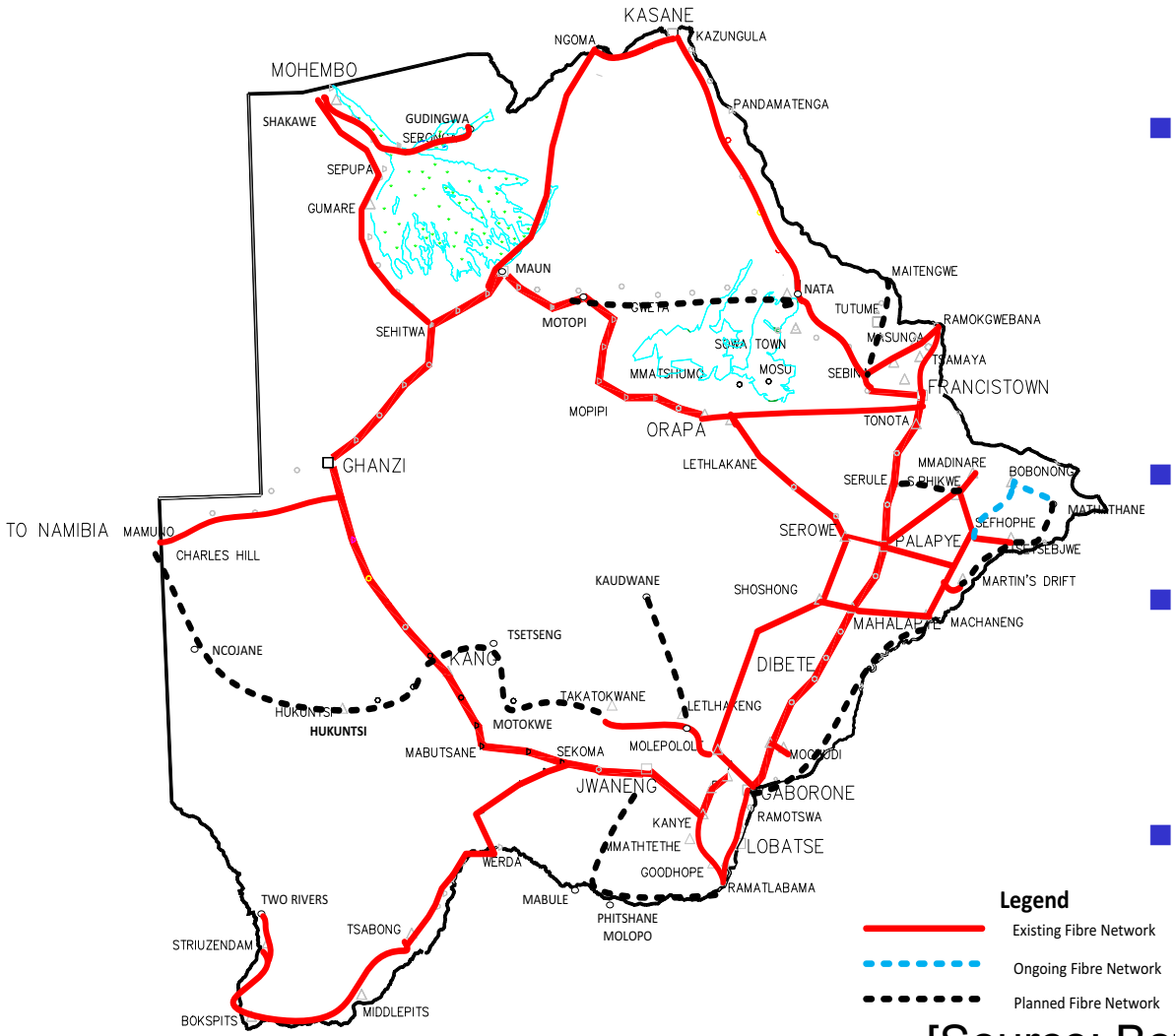
Botswana Connectivity





National Fibre Backbone Network

Coverage



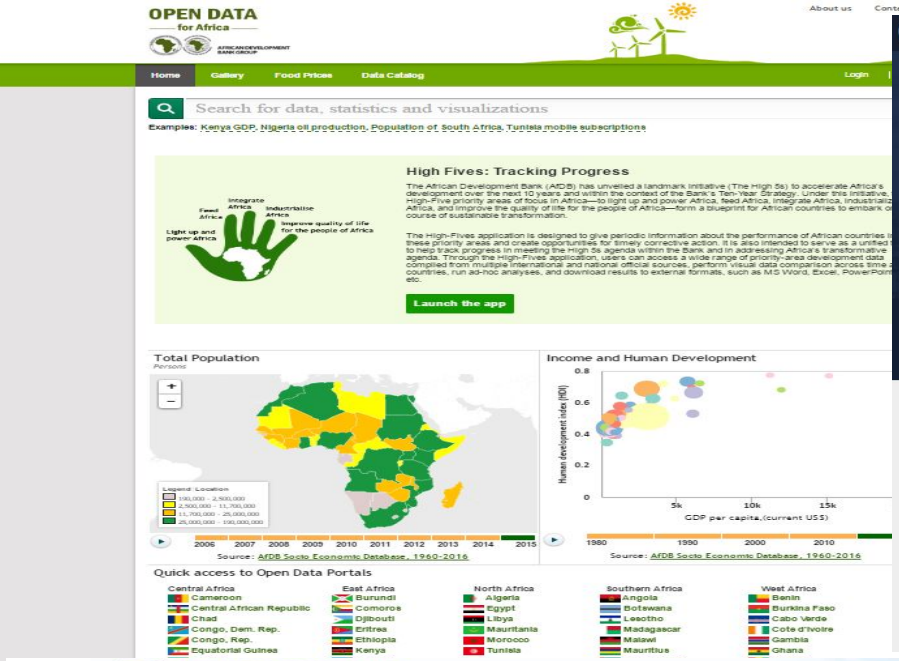
- BoFiNet has recently invested heavily in the national backbone infrastructure development since 2014.
- Over 8000km fibre cable deployed.
- Mainly DWDM equipment used, offering 40 wavelengths of 10Gb each capacity
- 152 localities connected to fibre network.

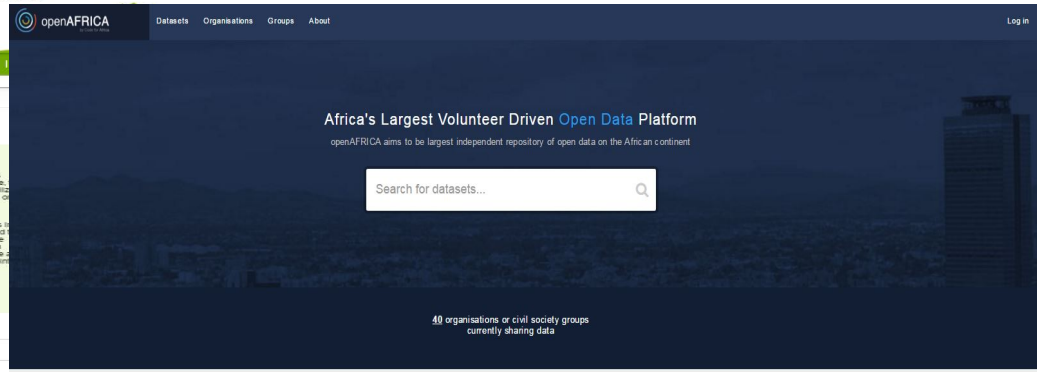
[Source: Botswana Fibre Network - BoFinet

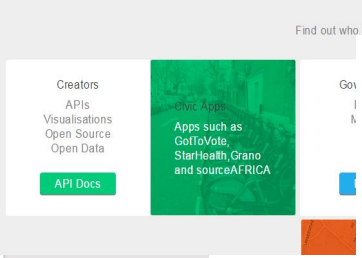
Implementation of CI- Human Capital Development – HPC, Data and Data science Training

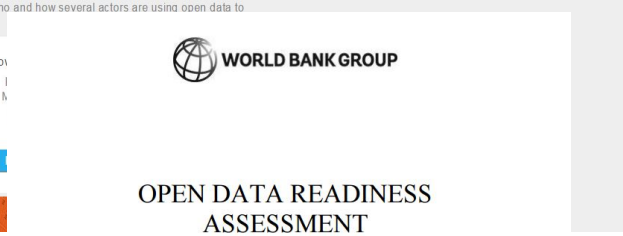
Situational Analysis -Data

- Developments in SADC member States with regard to data, e.g.. e-government projects, data centers, open data and open government initiatives
- South Africa's DIRISA as a component of its NICIS
- The Open Data Platform for Africa
- from African Development Bank (AfDB) to boost access to quality data necessary for managing & monitoring development results including SDGs and African Action Plan 2063
- The Africa Data Concensus – Strategy for implementing data revolution in Africa
- Create new statistical landscape, open up field of data production and dissemination to state and non state actors
- Adopted in 2015 at HLC on Data Revolution
- Action plan will be guided by UNECA,AUC, AfDB, UNDP etc. in collaboration with PPP institutions and Civil society organizations





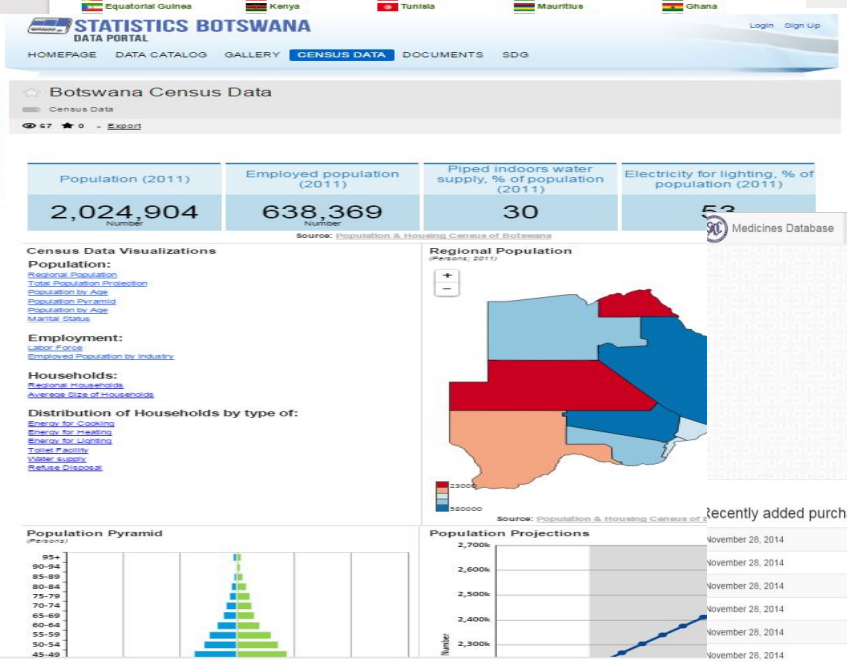


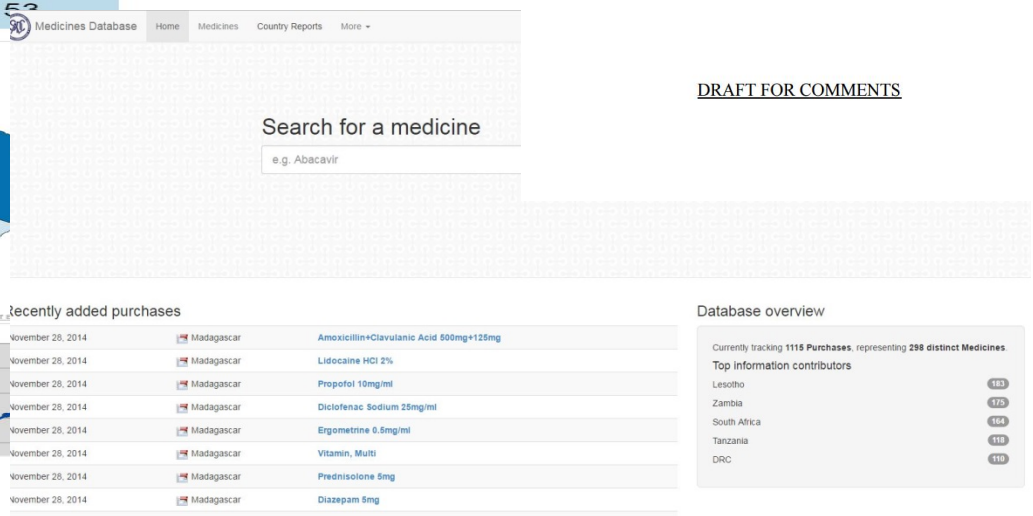


OPEN DATA READINESS ASSESSMENT

Prepared for the
Government of Botswana

DRAFT FOR COMMENTS





CODATA RDA

SEARCH DATA ALLIANCE

The Abdus Salam
International Centre
for Theoretical Physics

STEM TREK

TACC

TEXAS ADVANCED COMPUTING CENTER

DATA CARPENTRY

UNIVERSITY OF CAMBRIDGE

software carpentry

CHPC

CENTRE FOR HIGH PERFORMANCE COMPUTING

National Research Foundation

ASSAf

ACADEMY OF SCIENCE OF SOUTH AFRICA

CODATA-RDA Datascience Schools@ICTP

The Abdus Salam International Centre for Theoretical Physics
www.ictp.it

The CODATA-RDA School of Research Data Science

1 - 12 August 2016

The Abdus Salam International Centre for Theoretical Physics, in collaboration with CODATA, RDA and TWAS, is organising a short course in the data science approaches and skills that are essential for 21st century research. The CODATA-RDA Research Data Science Summer School will be held at the ICTP, Trieste, Italy from 1st to 12th August 2016.

The ever-accelerating volume and variety of data being generated is having a huge impact on a wide variety of research disciplines, from the sciences to the humanities. The international, collective ability to create, share and analyse vast quantities of data is having a profound, transformative effect. This 'Data Revolution' offers great opportunities for students with modern data skills, both in conducting their research and in entering a jobs market where those skills are in demand.

Contemporary research – particularly when addressing the most significant, transdisciplinary research challenges – cannot be done effectively without a range of skills relating to data. This includes the principles and practice of Open Science and research data management and curation, the use of a range of data platforms and infrastructures, large scale analysis, statistics, visualisation and modelling techniques, software development and annotation and more. We define 'Research Data Science' as the ensemble of these skills.

The school will provide students with an introduction to the 'Research Data Science' skills necessary for modern research. In particular, students will engage with the following topics:

- Software Carpentry,
- Data Carpentry,
- Open Research Data
- Analysis,
- Visualisation,
- Computational Infrastructures

The mode of learning will be based on lectures plus extensive hands-on experience gained in labs with tutor support.

PARTICIPATION
Scientists and students from all countries that are members of the United Nations, UNESCO or IAEA may attend the workshop. The workshop will be conducted in English. Students are expected to have a basic understanding of Statistics, namely how to compute summary statistics such as means, variances and hypothesis tests. Students and post-doctoral scientists from developed countries are welcome to attend although the main purpose of the workshop is to help early-stage graduate students from developing countries. Limited funds are available for participants who are nationals of, and working in, a developing country and who attend the entire workshop. Otherwise travel and subsistence expenses of the participants should be borne by the participant, their institution or a third party grant. Candidates are expected to make every effort to secure (full or partial) support for their travel. There is no registration fee.

HOW TO APPLY FOR PARTICIPATION:
An Online Application Form can be accessed through the Workshop website:

http://indico.ictp.it/event/7658/

Once in the website, comprehensive instructions will guide you step- by-step on how to fill out and submit the Application Form.

ACTIVITY SECRETARIAT:

E-mail: smr2876@ictp.it
ICTP Home Page: http://www.ictp.it
Phone: +39 040.2240544 Telefax: +39 040.22407544

Organisers

Andrew Harrison
University of Essex/RDA
Hugh Shanahan
Royal Holloway, University of London/RDA
Simon Hodson
CODATA (ICSU Committee on Data for Science and Technology)
Romain Murenzi
(TWAS)

Local Organisers

Ivan Girotto
(ICTP)
Clement Onime
(ICTP)

Invited teaching teams

Software Carpentry,
Data Carpentry,
The Digital Curation Centre
Colin Gillespie
(University of Newcastle)
Andy South
Jan Aerts
(University of Leuven)
Tim Head
(EPFL)
Roger Barlow
(University of Huddersfield)

DEADLINE FOR REQUESTING PARTICIPATION

18 April 2016

The online registration form and more information can be found at
http://indico.ictp.it/event/7658/

The CODATA-RDA Research Data Science Summer School and Applied Workshops

10 - 21 July 2017 and 24 - 28 July 2017
Trieste, Italy

Further information:
School: http://indico.ictp.it/event/7974/
Workshop: http://indico.ictp.it/event/8170/
E-mail School: smr3130@ictp0ictp.it
E-mail Workshop: smr3170@ictp0ictp.it

The Summer School (10-21 July 2017) will focus on growing competence in accessing, analyzing, visualising, and publishing data. It is open to participants from all disciplines and/or background from the sciences to humanities. Three applied workshops (24-28 July 2017) focus on Extreme sources of data; Bioinformatics; IoT/Big Data Analytics.

Description:

- Summer School: principles and practice of Open Science; research data management and curation; use of a range of research compute infrastructures; large scale analysis, statistics, visualisation and modeling techniques; automation and scripting.
- Workshop on extreme sources of data: Introduction to ATLAS Open Data Platforms/Tools , tutorials and CERN LHC.
- Workshop on bioinformatics: computational methods for the management and analysis of genomic and sequencing data.
- Workshop on IoT/Big Data Analytics: Big Data tools and technology; real time event processing; low latency query; analyzing social media and customer sentiment.

How to apply:

Online application:
School: http://indico.ictp.it/event/7974/
Workshop: http://indico.ictp.it/event/8170/

Female scientists are encouraged to apply.

Grants:

A limited number of grants are available to support the attendance of selected participants, with priority given to participants from developing countries. There is no registration fee.

Directors:

B. ACHARYA, ICTP
T. ATTWOOD, University of Manchester
L. BORTOLUSSI, University of Trieste
A. HARRISON, University of Essex
M. HASSAN, TWAS
S. HODSON, CODATA
A. POLICRITI, University of Udine
R. GIRICK, Indiana University
H. SHANAHAN, Royal Holloway University of London
J. SHIERS, CERN
U. SINGH, ICTP
A. VAN DER WALT, Tolarity LTD
C. VAN GELDER, Dutch Techcentre for Life Sciences

Local Organizers:

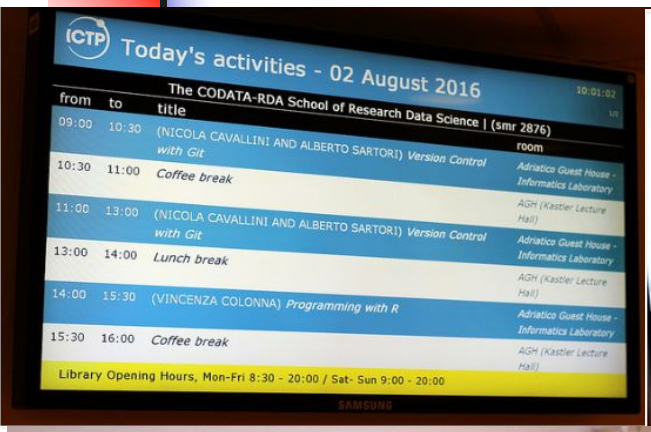
I. GIROTTO, ICTP
C. ONIME, ICTP
N. ZENNARO, ICTP

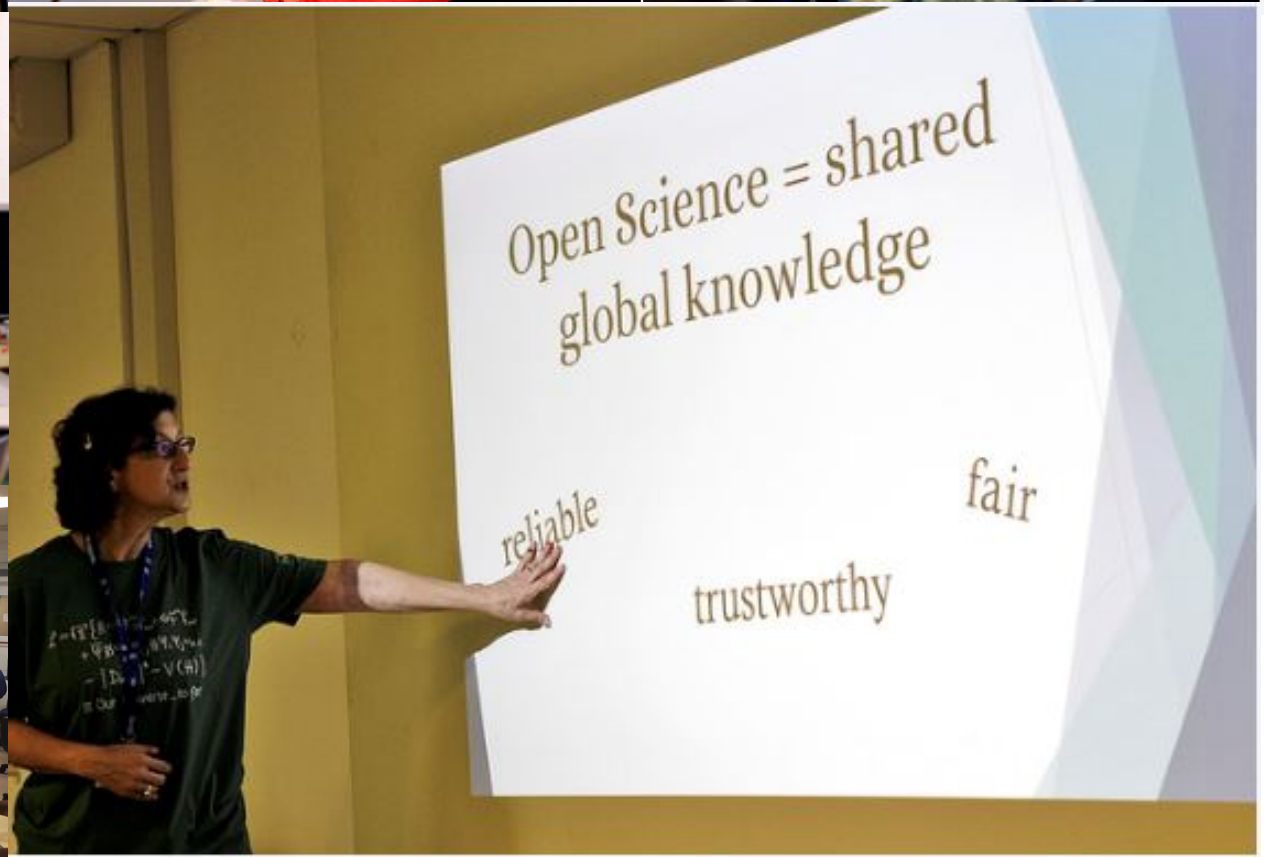
Deadline:

25 April 2017

The Abdus Salam International Centre for Theoretical Physics
www.ictp.it
Strada Costiera 11, 34151 Trieste, Italy

[2016 School -Image Source : CODATA]





The Abdus Salam
International Centre
for Theoretical Physics

United Nations Educational, Scientific and Cultural Organization

IAEA
International Atomic Energy Agency

The CODATA-RDA Research Data Science Summer School

9 - 21 July 2017

Miramare, Trieste - Italy

CODATA ISU

RDA RESEARCH DATA ALLIANCE

twas

SPRINGER NATURE

SCIENTIFIC DATA

egi

Open Science Grid

EUDAT

EDISON building the data science profession

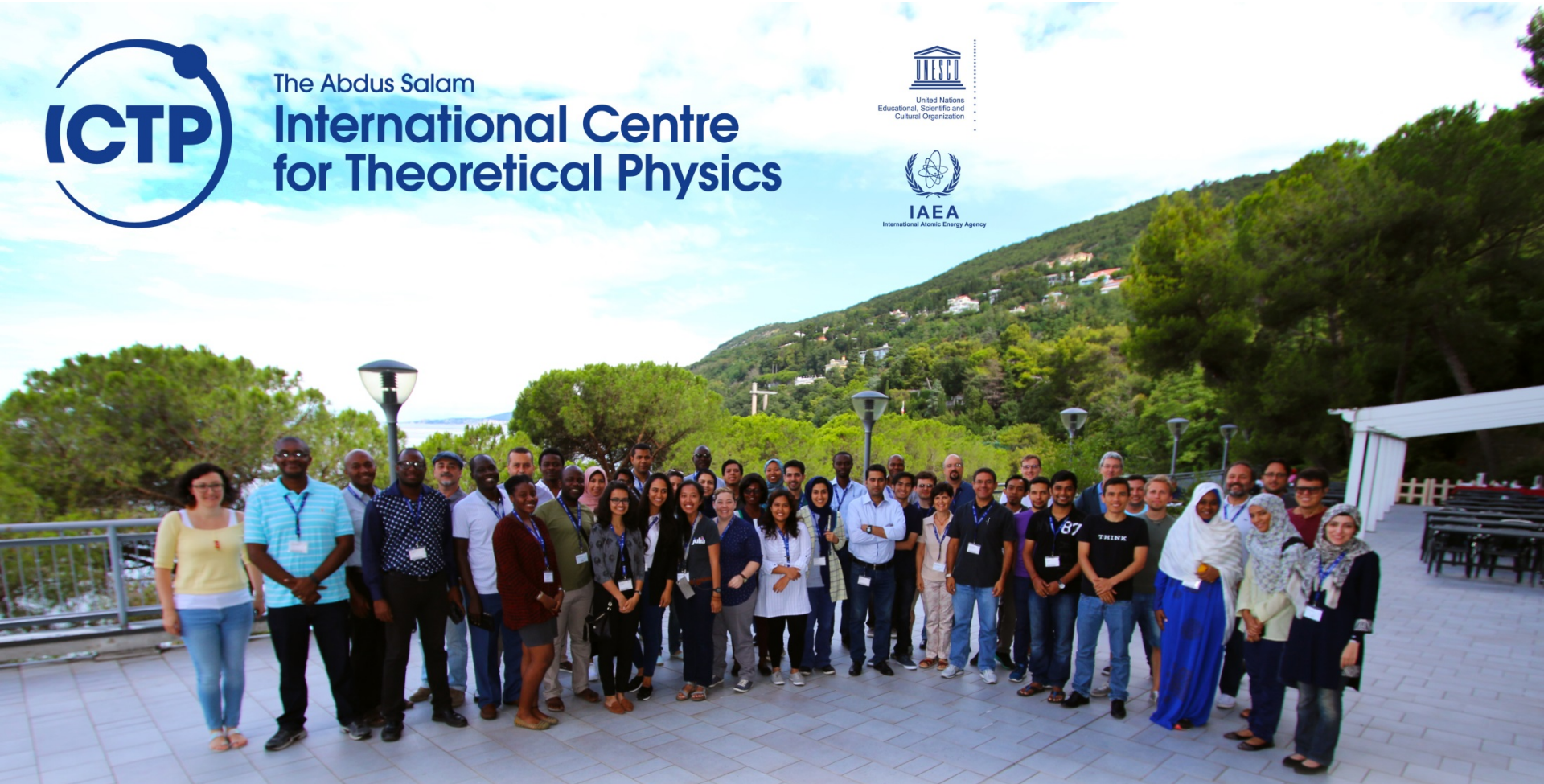
THE UNIVERSITY of EDINBURGH

GODAN Global Open Data for Agriculture & Nutrition

The Abdus Salam
International Centre
for Theoretical Physics

United Nations
Educational, Scientific and
Cultural Organization

IAEA
International Atomic Energy Agency



The CODATA-RDA Research Data Science Applied workshops on Extreme sources of data, Bioinformatics and IoT/Big-Data Analytics

24 - 28 July 2017, Miramare - Trieste, Italy

ICSU CODATA

RDA
RESEARCH DATA ALLIANCE

GODAN
Global Open Data
for Agriculture & Nutrition

twas


software
carpentry

Capacity Building Events

- Events for 2017
  - African Open Science Platform (AOSP) and Research Data Alliance (RDA) Workshop as part of the 14th General Conference of the AAU, Ghana, 5-8 June 2017, Accra, Ghana
  - University of Mauritius Software Carpentry, Jul 19-21, 2017
  - CODATA-RDA Research Data Science Applied workshops on Extreme sources of data, Bioinformatics and IoT/Big-Data Analytics – 24th -28th July 2017
  - SADC Ecosystems Workshop Wits University – 26th to 30th June 2017
  - RS-DfID Chem4energy Research SADC HPC Ecosystems 31st July to 4th August, 2017
  - The Second International Conference on the Internet, Cyber Security and Information Systems (ICICIS) 2017, 14th – 16th August, Sandton, Johannesburg,
  - International Workshop on Open Data for Sustainable Development Goals in Developing Countries, Antananarivo, Madagascar, 5-6 September 2017

Upcoming Events

- Events for 2017/2018
  - Software Carpentry and Data Carpentry Instructor Training, North-West University, October 9-11, 2017
  - University Of Botswana Software Carpentry and Data Carpentry , 23rd to 24th October 2017
  - Botswana Open Data Open Science National Forum, 30 to 31st October 2017
  - Supercomputing Conference SC17 & URISC@SC17: Cybersecurity Workshop, November 11-16, 2017, Denver, Colorado
  - UbuntuNet-Connect is the Annual Conference, 2-3 November 2017, Addis Ababa, Ethiopia
  - CODATA-RDA School of Research Data Science which will be held at ICTP-SAIFR, Sao Paolo, Brazil, 4-15 December 2017
  - International Conference On Internet, Cybersecurity and Information Systems - ICICIS 2018 Conference, Kasane, Botswana

Upcoming Events

Proposed Flagship projects (Botswana)

- Botswana Institutional Research Data Repositories
- Goal – To develop a research data repository to facilitate open data and open science and develop model institutional data policies
- Alignment & Collaboration
  - SADC Cyberinfrastructure Framework
  - African Open Science Platform (AOSP)
  - Botswana Open Data Open Science (ODOS)
  - Botswana ICT and RSTI Policy framework
  - Academy of Science of South Africa
  - Botswana Academy of Sciences

Example Initiatives (Botswana)

- Botswana Open Data Open Science (ODOS)
- Goal – To facilitate conversations on data in Botswana and amongst Botswana stakeholders
- Alignment & Collaboration
  - Government and Botswana Data Stakeholders
  - SADC Cyberinfrastructure Framework
  - African Open Science Platform (AOSP)
  - Botswana ICT and RSTI Policy framework
  - South Africa DIRISA
  - CODATA and RDA
  - Academy of Science of South Africa
  - Botswana Academy of Sciences

Progress to date

- ADHOC Steering Committee setup
- Terms Of Reference of the Committee defined
- Engagment with African Open Science Platform
- Stakeholder CEO briefing and Committee endorsement done
- Planning the Botswana National Data Forum
  - Data Legislation, Governance and Policy
  - Coordinated Research Data Cyberinfrastructure
  - Data Awareness and Capacity Building
  - Data Innovation and Data for Development
- Submitted strong proposal for international Data Week 2018

Challenges & Resource Needs

- No legislation and policy framework regarding Data – eg. Institutional Data Policies, Data Governance structures etc.
- No Coordinated Research Data Infrastructure
- No resources and budget to facilitate mobility of staff and students for mobilisation, training, capacity building, networking and collaboration meetings and events Nationally, Regionally and Internationally – relying on partners and collaborators
- No budget and resources to fund strategic flagship projects on data and compute intensive problems of National and Regional themes

Summary

- Research collaborations can be enhanced by substantial and intensification investments to create multiple foci in a multipolar scientific world
- Political support underpinnings and research strategies and coordination are also important in enhancing collaborations
- Regional collaborations are typically around resource sharing and expertise
- Development of robust CI can also greatly enhance research collaborations
- SADC is working towards a shared regional CI through a proposed Framework
- Such a Framework could be extendible to the continen

Summary

- Data is an integral part of CI
- CI promotes data sharing through defined policies that enable optimal establishment and utilization of cyber-infrastructure; generation, analysis, transport as well as stewardship of information
- As part of infrastructure development element of CIs, trusted data repositories that are regionally inter-federated can be established, together with Internationally benchmarked policies and standards for data stewardship
- Open access, sharing and interoperability are also key considerations