Developing HPC in Resource Constrained Environments: *From Challenges to Opportunities*

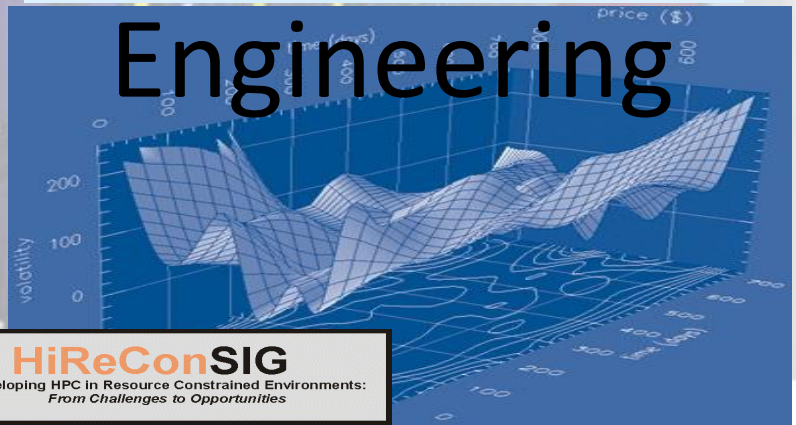
Computational research is critical to the development of innovations that improve the overall quality of society

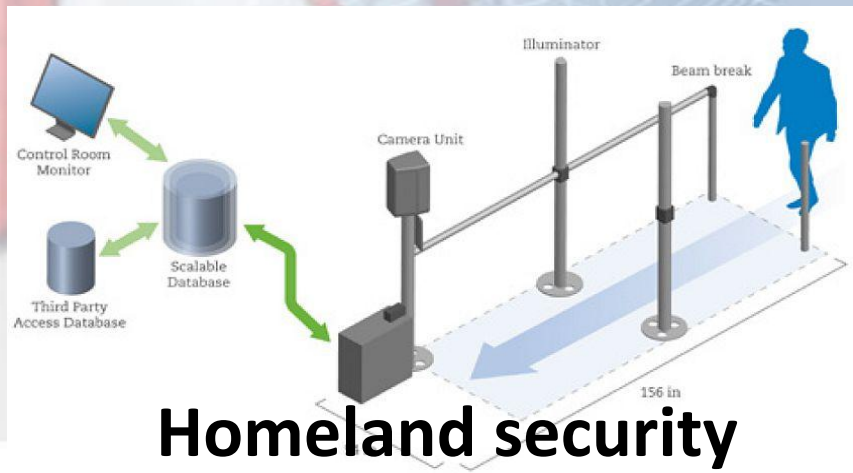
It has made enormous contribution to America's

Science

Industrial Competitiveness

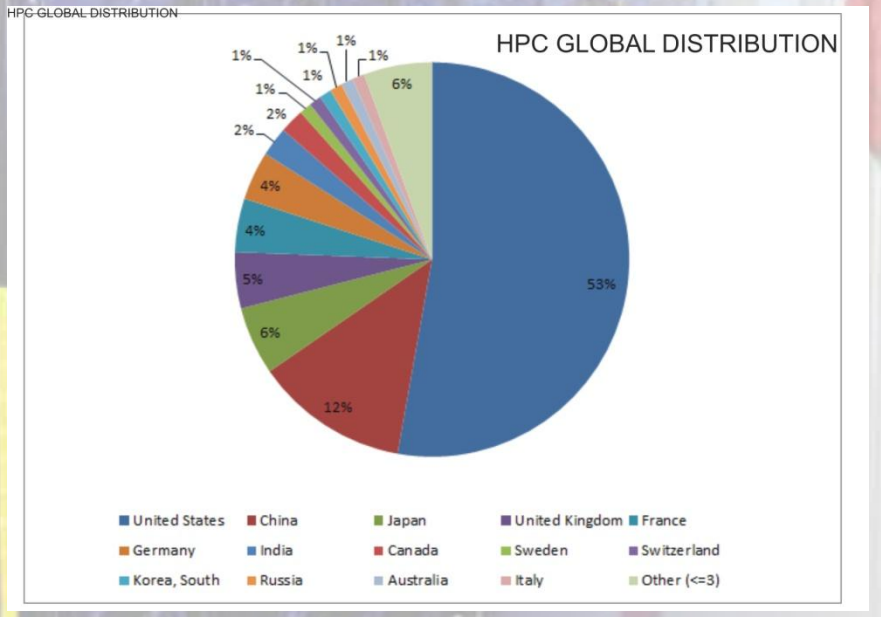
Engineering

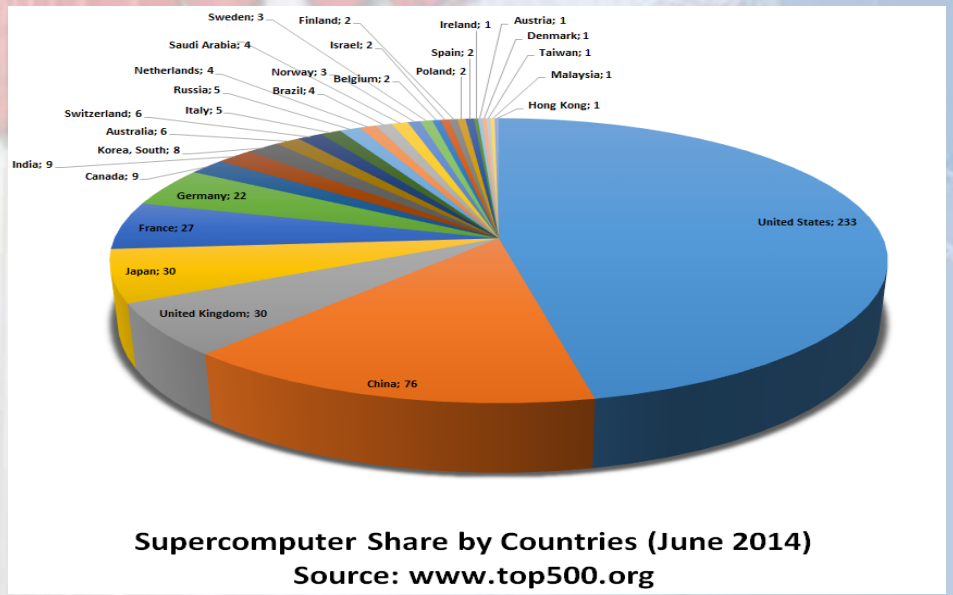




Homeland security

When properly applied in other regions of the world especially the underdeveloped regions where there is constraint in high performance computing resources





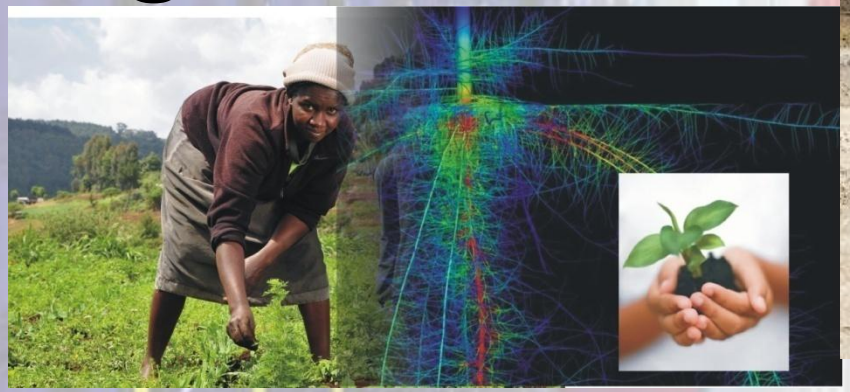
Supercomputer Share by Countries (June 2014)
Source: www.top500.org

Amidst other issues it will address problems particular to the region.

UNIVERSITY OF BENIN

Transportation

Agriculture



Environment

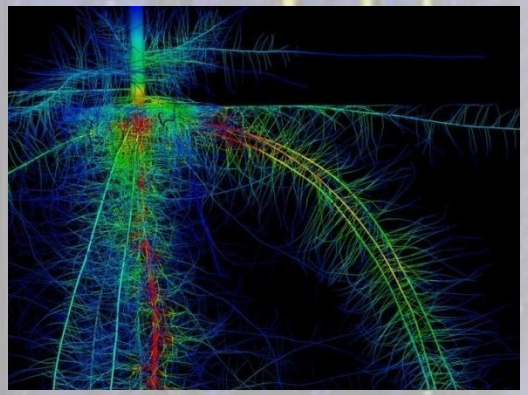
Health Care

HiReConSIG
Developing HPC in Resource Constrained Environments:
From Challenges to Opportunities

HPC in Agriculture

UNIVERSITY OF BENIN

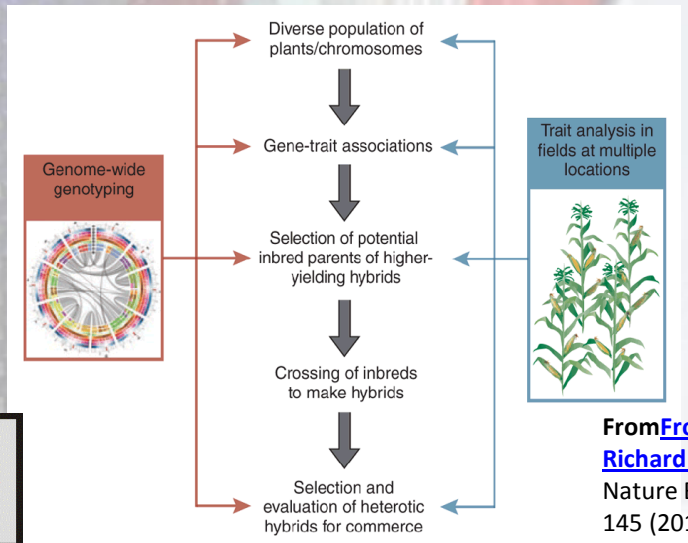
With computational support for high-quality research in areas of agriculture and biotechnology, research scientists will not have to wait for the natural production cycle to analyse various issues like quality of seed, produce, and weather pattern. But with HPC, the same can be done using simulation.



Roots simulation
Jonathan Lynch and his colleagues use computer modeling to simulate the roots of two of the world's most important staple crops: beans and corn. Computer modeling helps to pinpoint critical factors that are difficult to measure on real roots as they are growing in soil.
IMAGE: PENN STATE

HPC in Agriculture

With high performance computing, researchers can conduct leading- edge research into plant genetics to create improved varieties of seeds. This will support, management and analysis of massive amounts of molecular, plant, environmental and farm management data. This will in no small way improve product development decisions faster than those made by using traditional experiments and testing.



From[From genomics to crop breeding](#) Richard Flavell
Nature Biotechnology 28, 144–145 (2010) doi:10.1038/nbt0210-144

HPC in Agriculture

UNIVERSITY OF BENIN

High performance computing in agriculture will lead to the management, analysis and extrapolation of massive amounts of genetic and environmental data for prediction of new hybrid seed development.

Improved quality of current hybrid seeds under testing for possible commercialization

Quicker answers to research problems by an order of magnitude—from days and weeks to a matter of hours-–*HCL research in Agriculture*

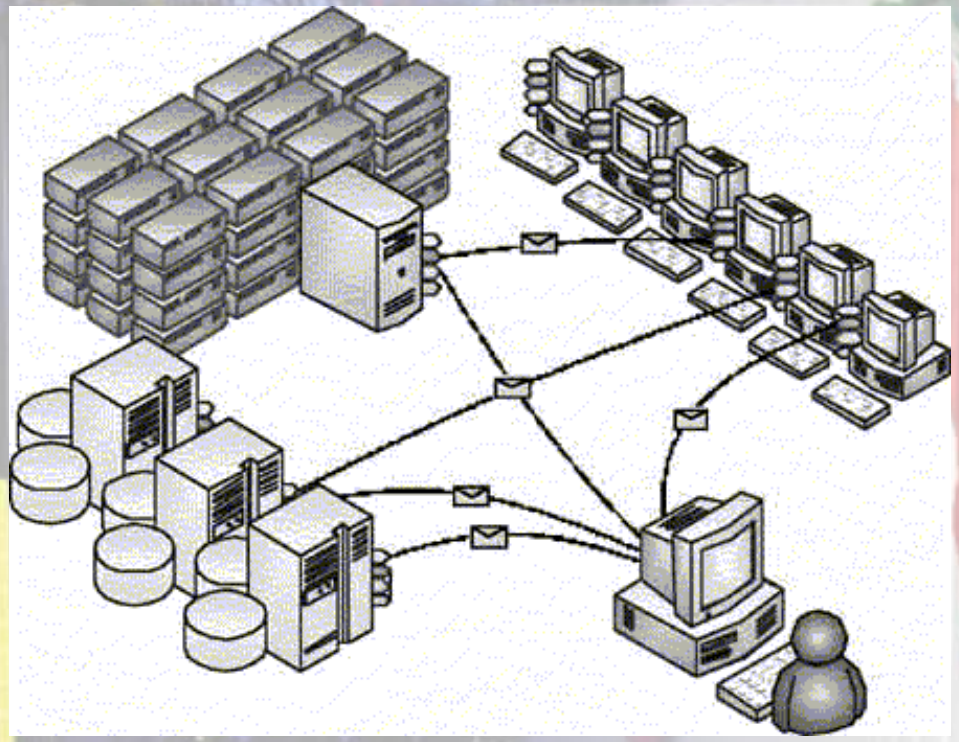
HPC in Agriculture

UNIVERSITY OF BENIN

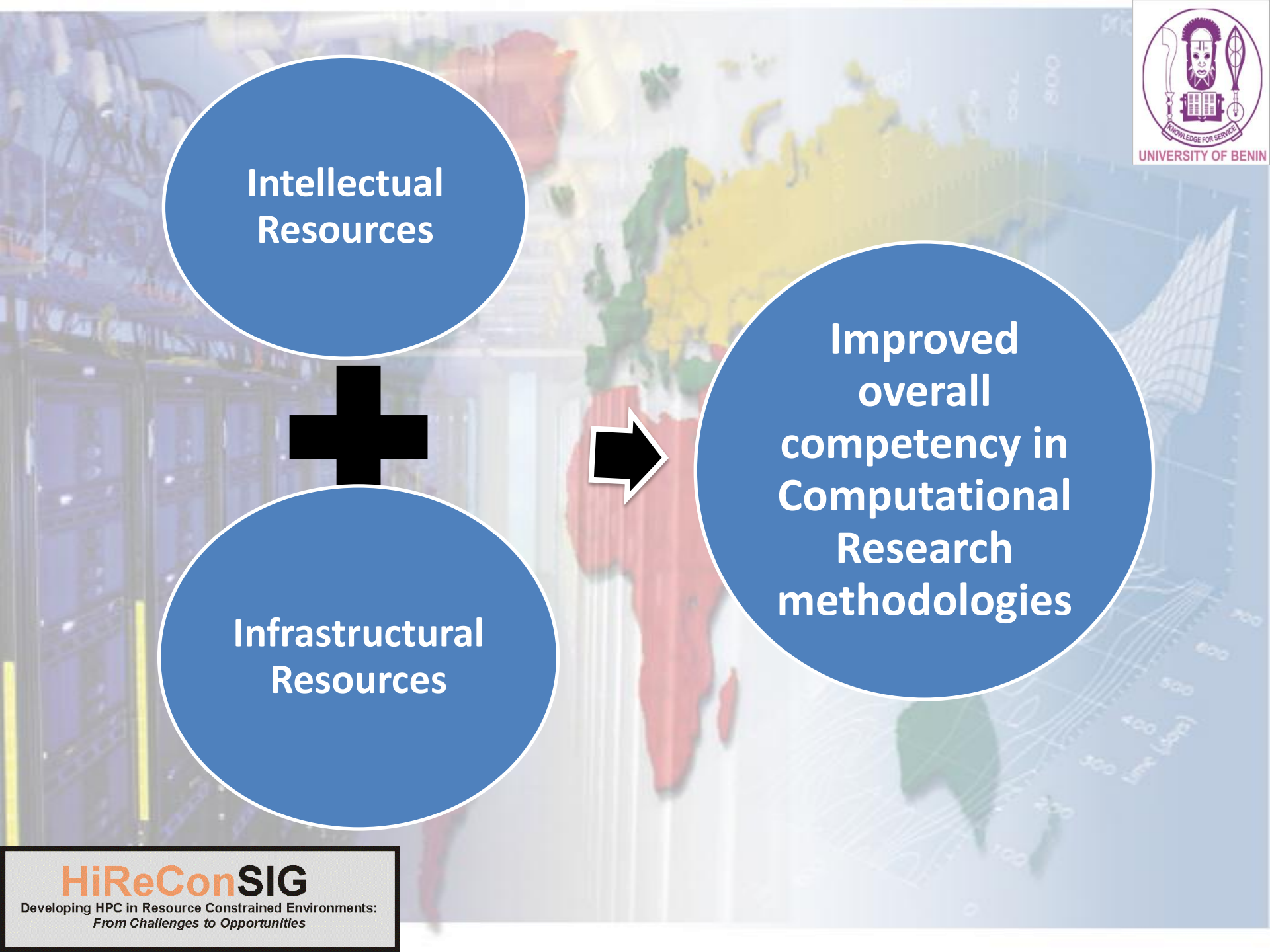
"This will lead to the development of superior varieties seeds, the right fertilisers, and will help various other processes to enhance agricultural productivity on sustainable basis. This will help the scientific community to meet food security challenges in the country,"- ***Anil Rai, principal scientist, Indian Agricultural Statistics Research Institute, New Delhi.***

Significant barriers prevent the application of high performance computing due to resource-constraints

Effective computational research requires access to modern high performance computing resources.



msdn.microsoft.com: by imageIntegrating enterprise resources in order to meet the high-performance requirements of applications



UNIVERSITY OF BENIN

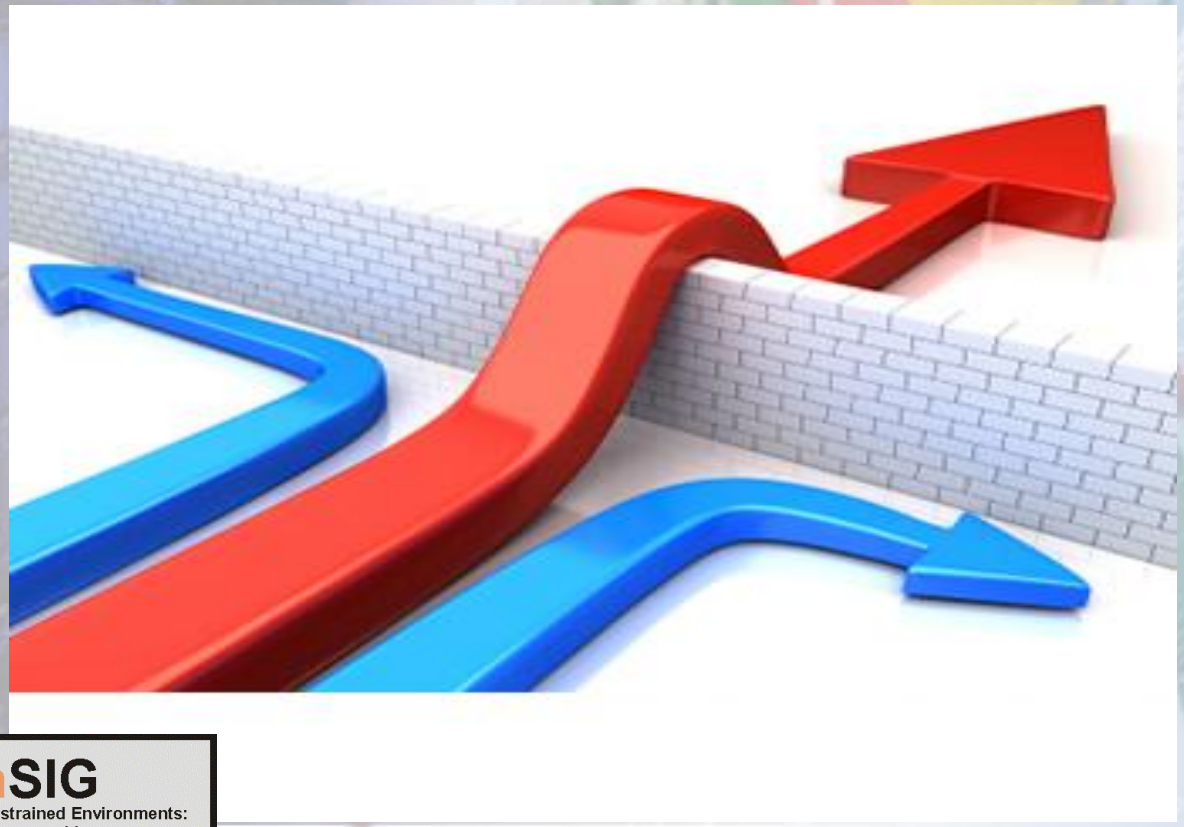
HiReConSIG
Developing HPC in Resource Constrained Environments:
From Challenges to Opportunities

That we have challenges does not mean we have problems

Our challenges becomes problems, when we lack the capacity to solve them

UNIVERSITY OF BENIN

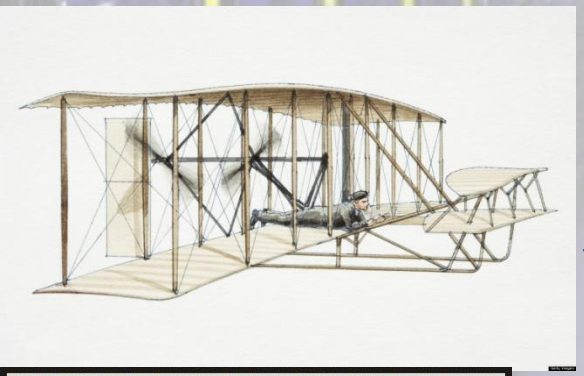
No matter how big a challenge is, there is always a corresponding solution to meet it



Every Challenge becomes an opportunity for development, when capacity is built to solve it

UNIVERSITY OF BENIN

“Challenges are gifts that allow us a chance to enhance our lives, not to worsen them”-huffpost



UNIVERSITY OF BENIN
KNOWLEDGE FOR SERVICE

PD CONCEPT

Positive deviance (PD) is an approach to behavioral and social change based on the observation that in any community, there are people whose uncommon but successful behaviors or strategies enable them to find better solutions to a problem than their peers, despite facing similar challenges and having no extra resources or knowledge than their peers. These individuals are referred to as positive deviants.

Source: From Wikipedia, the free encyclopedia

PD CONCEPT

The Positive Deviance approach is an asset-based, problem-solving, and community-driven approach that enables the community to discover these successful behaviors and strategies and develop a plan of action to promote their adoption by all concerned.

Source: http://www.positivedeviance.org/

PD CONCEPT

STEM∞TREK

Global, grassroots, and going places!

Travel and professional development for science, technology, engineering, and mathematics scholars.

CHPC
CENTRE FOR HIGH PERFORMANCE COMPUTING

providing world-class HPC that enables cutting-edge research:

The Square Kilometre Array (SKA)

HiReConSIG
High Performance Computing in Resource Constrained Environments
SPECIAL INTEREST GROUP

UNIVERSITY OF BENIN
KNOWLEDGE FOR SERVICE

PD PRINCIPLES

UNIVERSITY OF BENIN

Positive deviance is a strength-based approach which is applied to problems requiring behavior and social change. It is based on the following principles:

Communities self-organize and have the human resources and social assets to solve an agreed-upon problem.

Collective intelligence. Intelligence and know-how is not concentrated in the leadership of a community alone or in external experts but is distributed throughout the community.

Sustainability as the cornerstone of the approach. The PD approach enables the community or organization to seek and discover sustainable solutions to a given problem.

It is easier to change behavior by practicing it rather than knowing about it. “It is easier to act your way into a new way of thinking than think your way into a new way of acting”.

UNIVERSITY OF BENIN

"Partnership is the operative word, between academic institutions both in Africa and abroad, between universities and the private sector, and with new investment partners in Asia and Latin America"

Makhtar Diop, the World Bank's Vice President for Africa

ROAD MAP FOR HiReConSIG

Discussion Driven

Collaborate:

SIG-Become mission targeted

Formal Recognition

-----Needs a face: website

----- Needs a Forum

----- Needs Evangelist

-----Institutional and Organizational Membership.

THANK YOU

Richard Barrett:
Center for Computing Research
Sandia National Laboratories
Albuquerque, NM 87185

Linda Akli:
Assistant Director, Training Education & Outreach
SURA

Jeanine Cook:
SC14 Student Volunteer Program
Chair

Elizabeth Leake:
Founder and President – STEM-Trek

Yashema Mack:
SC14 Student Volunteer Program
Deputy-Chair

Happy Sithole:
Director at CSIR –CHPC
South Africa

SC14 Student Volunteer Team