SLIDE NOTES for 0810 CODATA_Barton.ppt

SLIDE 1
CODATA Conference, Oct 2008, Kiev

eGY-Africa: reducing the digital divide for science in Africa
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ABSTRACT
The digital divide is worse in Africa than in the rest of the world, the gap is growing, and in many sub-Saharan African countries the education and research sector suffers some of the worst deficiencies in access to the Internet. By contrast, it is widely acknowledged in policy statements from the African Union, the UN, and others that this very sector provides the key to meeting and sustaining Millenium Development Goals. Developed countries with effective cyber-capabilities wax eloquent about the equal benefits to rich and poor alike arising from the Information Revolution. This is but a dream for many (most?) scientists in African institutions; as the world of science becomes increasingly Internet-dependent, so they become increasingly isolated.

eGY-Africa is a bottom-up initiative by African scientists and their collaborators to try to reduce this digital divide by a campaign of advocacy for better institutional facilities. The present status of Internet services, problems, and plans are being mapped via a combination of a questionnaire-based survey and direct measurement of Internet performance (the PingER Project). Information is being gathered on policy statements and initiatives aimed at reducing the Digital Divide. eGY-Africa is establishing National groups of concerned scientists and engaging with those initiatives with related goals. The expectation is that informed opinion from the scientific community at the institutional, national, and international levels can be used to influence the decision makers and donors who are in a position to deliver better services.

SLIDE 2
Courtesy: Les Cottrell, modified slightly by C.Barton
THE DIGITAL DIVIDE
A Cartogram is a map or diagram showing geographical statistical information (Dorling 1995)... Cartograms differ from traditional maps as they use a variable other than area to derive the size of areal units on the map." http://www.geog.qmw.ac.uk/gbhgis/conference/cartogram.html
Cartograms are also referred to as "Distortion Maps", "Proportional Maps", "Diagrammatic Maps", and "Value-by-Area Maps". They are difficult to make and a large problem with this type of map is they easily become unrecognizable.
See http://answers.google.com/answers/threadview?id=199949

SLIDE 3Courtesy: Les Cottrell, Stanford Linear Accelerator Center. Text modified slightly by C.Barton.
Information taken from: www.arp.harvard.edu/**Africa**HigherEducation/Online.html

SLIDE4
孫子兵法 = Sunzi Bingfa = Sun Tsu's Military Strategy
Sun Tzu: The Art of War - 6th Century BC [Wikipedia 080910] (is this date correct?)
Information and knowledge about your enemy is the key to winning wars and avoiding losing them.
INFORMATION (Knowledge) = POWER
This is just as true today. The ready availability of information today poses special opportunities and challenges.
Modern ICT is revolutionising the way we communicate, obtain information, and share information

Head of WHO, when asked what is the key to dealing with humanitarian problems replied, “educate women”

RIGHT UPPER Broadband commmunication lnks. COLOUR = Bandwidth
RIGHT LOWER the Internet

SLIDE 5
CAPABILITY evolution
Step1 - email
Step2 - websites
Step3 - the machine-readable web

SLIDE 6
NEW DEMANDS ON SCIENCE
Need to integrate cross-disciplinary data for integrative science

SLIDE 7
Courtesy: Mark Parsons, Snow & Ice Data Center, Colorado
Vision is ready access to scientific data as simple as access to water. I.e., data access becomes a basic utility open to all.

SLIDE 8
Earth & Space Science Informatics (often just called geoinformatics) initiatives and organisational elements are growing up rapidly world-wide. Largely independently of each other. The latest one to be added is COSPAR, which has agreed in Montreal to establish a Panel for Informatics. IUGG recently established a Union Commission on Data & Information.

SLIDE 9
eGY is an evolutionary product of IGY, established to mark the 50-year anniversary of IGY
Other “InternationalYeqr” activities are planned for IGY+50: IPY, Planet Earth and IHY.

The fundamental themes of eGY are listed in black, and have been invoked by many bodies (nothing original in them, but all important)

The underlying principles on which these themes are based are embodied in the eGY “Declaration for a Geoscience Information Commons” - a statement of aspirations and principles of data stewardship that participants can sign

eGY can be used to develop codes of best practice; certification of compliance

Encouraging and facilitating the development of VIRTUAL OBSERVATORIES is a central function of eGY. The architecture of the Virtual Solar Observatory is shown. VOs (or VxOs) provide open access to distributed data, information, and services (computational, analytical, modelling, and visualisation). The names VO came from the space community; otyher communities use othyer names for systems with such characteristics.

A VO incorporates
- User interface
- Data access system
- Data management
- Assimilation into models (simulations)
- Visualisation

SLIDE 10
The information commons oncept.

FIGURE shows world communications networks, colour coded according to bandwidth
eGY philosophy: the Earth and space sciences and elsewhere, ready and open access to the vast and growing collections of cross-disciplinary digital information is the key to understanding and responding to complex Earth system phenomena that influence human survival.
We have a shared responsibility to create and implement strategies to realise the full potential of digital information and services for present and future generations.

SLIDE 11
GOVERNMENT COMMITMENT
Adama Samassékou. President WSIS PrepCom, Geneva 2004
eGY is consistent with efforts by the UN, ICSU, and others to create an Information Society for the common good.
Explain information commons
Agricultural commons
Demise of the agricultural commons
Information commons
We are entering the information era - driven by our remarkable ability to share information
Earth Observation Summits spawned GEO and the commitment by many countires (60?) to cooperate to produce GEOSS.

SLIDE 12
International policy and principles are predicated on access to the Internet.

SLIDE 13
SCID's vivion of an ideal data system for ICSU.

The statement is a worthy goal, but much depends on what you interpret "provide" to mean. If it means "allow" (serve data & products), then achievement is relatively easy but the DD remains. If, on the other hand, it means make it possible for scientists etc. in poorer countries to access scientific data & products, then the challenge is much greater.

SLIDE 14
Courtesy: Les Cottrell, SLAC National Accelerator Laboratory, USA

PingER – Ping End-to-end Reporting - measures round-trip time, loss, jitter, and reachability.

Started in 1994 by Les Cottrell

At first, a single monitoring host at SLAC was measuring about 40 sites. The PingER project now has 44 monitoring hosts in 22 countries that send pings to more than 700 sites in 159 countries.

> PingER uses a common Internet data packet, the ping - a tool that comes packaged with every computer. One computer, acting as a "monitoring host," sends a ping to a remote computer, which then sends it back. The round-trip time reveals the connection speed between the computers, including the time it takes the remote host to process the ping.

The PingER project sends 10 pings every 30 minutes to each remote site. Long round-trip times indicate congestion or poor routing. In very congested traffic, packets may be lost in transit. Remote hosts may also show variable performance, doing well in processing some packets and poorly with others. If no packets at all come back, the remote host may be down.

Data are analyzed and stored at SLAC and Fermilab, and the results are made publicly available.

SLIDE 15
Courtesy: Les Cottrell, SLAC National Accelerator Laboratory, USA
PingER results.

SLIDE 16

Courtesy: Les Cottrell, SLAC National Accelerator Laboratory, USA

Africa has the poorest capability and the gap is widening progressively. (= The Digital Dvide Problem.)

We can derive an estimate of the TCP throughput from our loss and RTT measurements. These estimates are only rough since the losses experienced by TCP[1] are different from those measured by ping, also PingER only sends about 14,400 pings a month between a monitoring host / remote host pair so one cannot see monthly losses of < 0.1% such as are often experienced on today's high quality paths. In ad dition the RTTs on high quality paths are approaching the limits of the speed of light in a fiber, so further improvement is difficult. None-the-less, especially for poorer quality paths, combining loss and RTT into a single metric is very useful. Fig. 8 shows the derived TCP throughputs measured from SLAC to the world's major regions, in some cases going back for the last 11 years. Similar plots (not shown here) are seen for the data measured from CERN in Geneva, Switzerland thus indicating that the effect is not just an anomaly associated with the measurements being from the U.S. The data for several of the developing countries only extends back for about five years and can vary greatly from month to month, so some care must be taken in interpreting the long term trends. With this caveat, it can be seen that links between the more developed regions including the U.S. and Canada, E. Asia and Europe are much better than elsewhere (3 - 10 times more throughput achievable). Regions such as Russia, S.E. Asia, S.E. Europe and Latin America appear to be 3-6 years behind. Russia and S.E. Asia are catching up slowly. However, Africa, S. Asia and C. Asia are 8-10 years behind and even worse appear to be falling further behind due to slow growth. Sites in many countries have less bandwidth than a residence in developed countries (typical residential DSL or cable bandwidths are of the order of a few hundred megabits/sec). Looking forward ten years to 2015, if the current rates of progress continue, then performance from N. America to Africa will be 1000 time worse than to Europe, to S. Asia and C. Asia will be 100 times worse than to Europe.

[1] TCP deliberately provokes loss as part of its congestion detection algorithm.

SLIDE 17

eGY-Africa is eGY's effort to reducing the digital divide

The goal is to secure better internet access for scientists and educators in African Universities and similar institutions

Our weapon is words (advocacy, naming and shaming, identifying compliance with policy, …)

Our function is to

- raise awareness of the present status
- problems and successes that exist and the cost-benefit of better access
- provide a focus and strengthen the ability of scientists and others to respond
- influence policy and decisions

The Executive grew out of eGY and IHY.

Sponsor = IUGG (currently - more support is needed

SLIDE 18

eGY-Africa program.

Strong emphasis on working with and strengthening existing agencies and programs that share the objective of reducing th digital divide.

- Set up an organisational infrastructure for eGY-Africa, Secretariat, etc. (lever off eGY and IHY)
- Set up National groups (use existing networks/groups when possible)
- Website, newsletter, conference presentations, articles (to share information and raise awareness)
- Measure Internet performance (PinGER Project)
- Survey present status, problems, and benefits (Questionaire)
- Collate policy statements - international, African, national, institutional
- 2009 Workshop (jointly with others?). Possibly 2010

- Work with related programs CODATA, UN-GAID eSDDC, IAP, ICTP, INASP, UN-ECA, …

UN-GAID = UN Global Alliance for ICT and Development http://www.un-gaid.org/
eSDDC – UN-GAID Global Alliance for Enhancing Access to and Application of Scientific Data in Developing Countries http://www.un-gaid.org/en/node/165

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