Bridging the Digital Divide: Higher Education Networking Initiative in Bangladesh

Dr. Javed I. Khan
Department of Computer Science, Kent State University
Fulbright Senior Specialist Report
Fall 2005

A Presentation to 2006 Internet2 Member Meeting in Special Interest Group on Emerging Research & Education Networks (formerly Hard to Network Areas), April 25, 2006, Washington D.C.

Digital Divide

- Connection a new million people is more important that doubling an already astronomical bandwidth than another factor of 2. The later is child's play compared to the intellectual challenge offered by the former- by all senses-- as challenge of science and as a need for fundamental new technology and innovation.

- 92 countries have REN what about the others? There are types of digital divide.

- Is there is a pattern? perhaps- perhaps not!
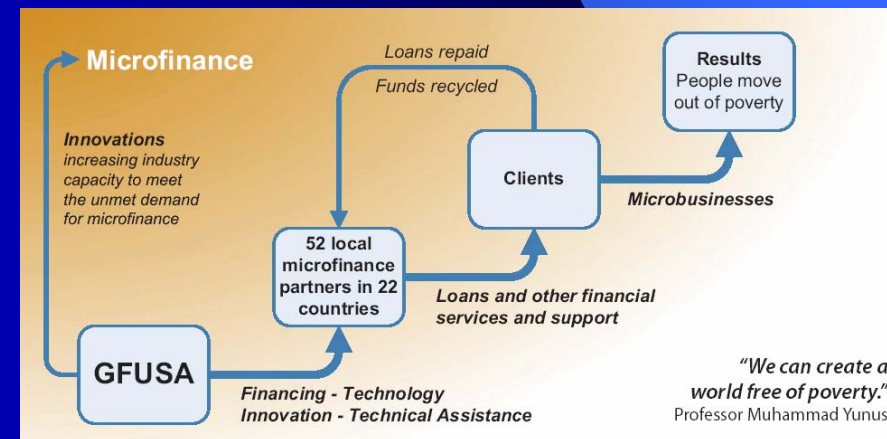
Policy Concern

- Traditional developmental funding agencies have shied away from funding higher education. Questionable policy when it comes to REN!

- Almost all development effort remain **inherently unstable and unsustainable** without the indigenous higher education community involvement.

Few Research Projects in Bangladesh

Can we afford to neglect?

Micro-Credit

- Community Engineering.

- Hot bed of cutting edge economic research in poverty elimination.

- Grameen Programs has been replicated in more than 100 countries touching the life of 100 million people worldwide.

- World Bank experts estimated that 500 million people benefited from these ideas from a total of three billion poor people.

- Armchair "economist" vs. practical results.

- Thousands of field researchers across 100 countries. Severe need to communicate for years to come.

Microfinance

Innovations increasing industry capacity to meet the unmet demand for microfinance

52 local microfinance partners in 22 countries

GFUSA

Financing - Technology Innovation - Technical Assistance

Loans repaid
Funds recycled

Loans and other financial services and support

Clients

Microbusinesses

Results
People move out of poverty

"We can create a world free of poverty."
Professor Muhammad Yunus

Mobile Phone for Social Improvement

- If you want to see how radically technology can change quality of life come to Bangladesh.

- Grameen Telecom facilitates a 'Village Phone' program, providing a mobile phone to villages without access to fixed land lines. This mobile phone is then cared for by a woman in the village, who charges for the use of the phone and pays a proportion back to Grameen Phone.

- As of April 2006, Grameen Phone is the largest mobile phone company in Bangladesh, with 6.4 million subscribers. Grameen Phone Foundation.

Village Phone Replication Manual, published by the UN ICT Task Force, to spur a global movement to provide access to communications for the world's rural poor. Our capital markets "white paper" shared learnings and strategies for attracting significant amounts of private capital to support the rapid expansion of microfinance. We are also working on an open source software solution, Mifos, to facilitate growth in the microfinance industry through scaleable and flexible data management systems.

Navigator for strong fiscal management. In addition, the Tech Museum of Innovation named GFUSA's Technology Center a 2004 Accenture Economic Development Award laureate.

CHARITY NAVIGATOR
Four Star Charity

"The world's poorest, mostly women, have proven that they can lift themselves from poverty if given the opportunity."
Alex Counts, President, GFUSA

Rice Research

- Bangladesh Rice Research Institute (BRRI) is an extensive chain of research facilities. It has so far developed 31 varieties that covers 52 percent of the rice area and 70 percent of the total rice production in Bangladesh.

- Identified 175 insects and 31 diseases of rice. Developed varietal resistance, chemical and cultural control practices which are environmental friendly

- Developed irrigation water saving technologies. Appropriate compaction and sand-cement morter reduce water losses by about 40 percent. Supplemental irrigation at the critical crop growth stages increase yields up to 50 percent and reduces the negative effect of drought.

- BRRI retunred 36 to 38 (Gill 1983, Dey and Evenson 1992, Mustafi 1997) dollars per dollar spent.

- BRRI breeding lines have also been released in the world during 1975 including Myanmar, Vietnam, India, Nepal, China, Bhutan, Burundi, Burkina Faso, Gambia, Ghana, Kenya, Sierra leone.

- A major contributor to IRRI's Rice Knowledge Bank. One of the first and most comprehensive digital rice-production library containing an ever-increasing wealth of information on training and rice production for grass root farmers.

Finalist 2006
Stockholm Challenge
www.stockholmchallenge.se

Rice Knowledge Bank
The leading repository for rice-related extension and training materials

ICCDRB

- Originally established as the Cholera Research Laboratory in 1960, today the Centre's work encompasses a full spectrum of issues related to child health, infectious disease and vaccine sciences, reproductive health, nutrition, population sciences, health systems research, safe water, HIV/AIDS and poverty and health.

- Today it remains the only international health research institution based in a developing country.
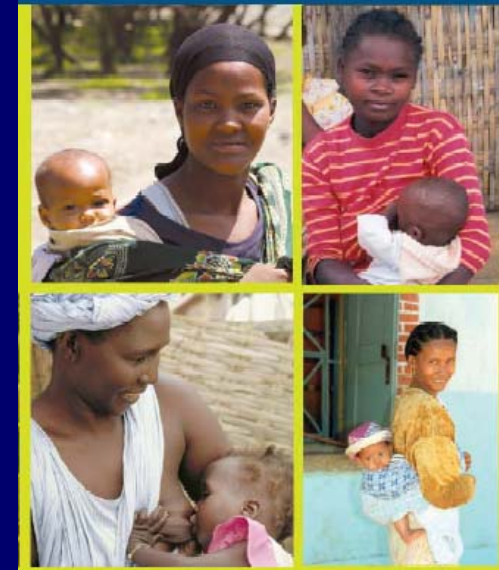
Mega Universities

- A New brand of universities with 100,000+ enrollment

    - Allama Iqbal. Open University. Islamabad. Pakistan.
    - Anadolu University. Turkey.
    - Bangladesh Open University.
    - Centre National d'Enseignement a Distance. France.
    - China TV University System. Probably the oldest mega-university, with more than 500,000 currently enrolled, and the only one that is almost entirely telecourse-based.
    - Indira Gandhi National Open University. India. With an enrollment of more than 750,000, IGNOU recently underwent a dramatic expansion of distance offerings, largely by creating 40 FM radio stations for course delivery.
    - Korea National Open University. South Korea. This country has recently unveiled a plan to roll out high-speed online connections to 10 million citizens by the end of 2002, 70% of its homes.
    - The Open University. United Kingdom. Although it closed its United States Open University in June 2002, the Open University continues to partner with the University of Maryland and may add additional schools.

Other Notable Resources

- Flood impact, management.

- Impact of global warming, sea level change research.

- Disaster management (offered team for Katrina after math).

South Asia

Table-2 REN & HEI in South Asia [6,8]			
Country	**HEI**	**REN**	**DLC**
India	320 (university only)	ERNET	YES
Pakistan	110	PERN	YES
Bangladesh	104		
Myanmar	50	E-EDUCATION WAN	
Sri Lanka	27	LEARN	YES
Afghanistan	18		
Nepal	5		
Bhutan	1		
Maldives	0		

Universities

Students Distribution in HEIs
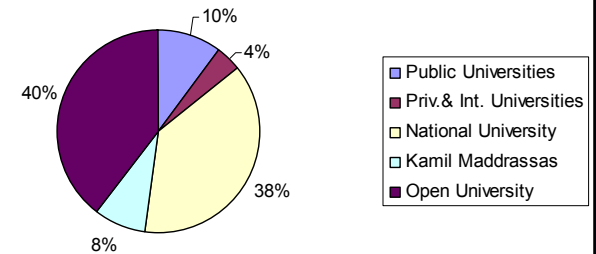
| Types	Institutions	Students
Table-3 Various Types of HEIs in Bangladesh		
Public Universities [1]	19	112,327
Private & International Universities [1]	54	46,080
Public Medical & Dental Colleges [2]	14	
Private Medical & Dental Colleges	17	
Total Conventional R&D Universities	**104**	**158407**
National University Public & Private Colleges [1]	1596	416,646
Other Collages Affiliated with Public Universities [1]	1548	
Kamil Maddrassas [2]	147	92,000
Open University (National, Regional & Local Centers) [2]	1013	437,489
Planned Public Universities [1]	9	
Total	**4417**	**1104542**

BERNET Initiatives

- Bangladesh Education and Research Network (BERNET) proposed in 1997 and connected 2 with radio-links and 5 more universities with dialup links.

- Fell apart soon!

- BUET acquired its own VSAT and DU got BTTB as ISP.

Fig: Organization of BERNET (using Radio Link).
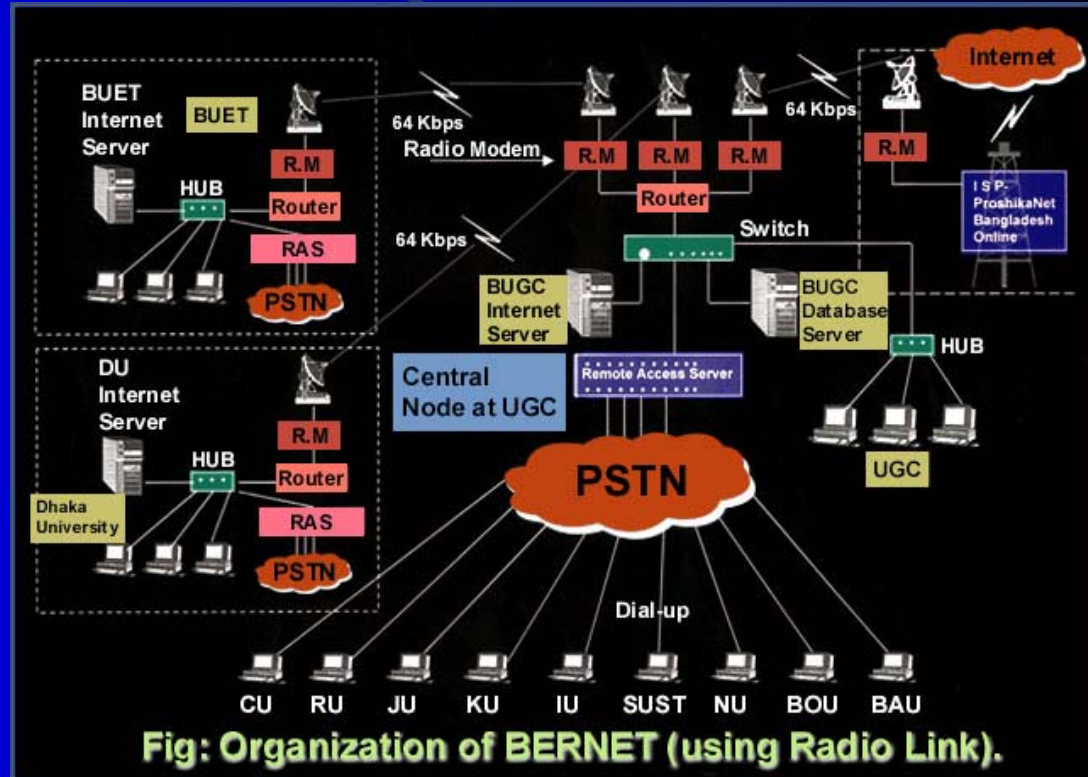
University Connectivity

- There were two past efforts to form multi-institutional education/research network. Back in 1997 UGC initiated the Bangladesh Education and Research Network (BERNET).

- In 1998 another initiative called BANSLINK tried to connect libraries of some science and technology based universities and research institutions. Unfortunately, both failed.

- A 2005 survey reveals 38 of the 52 private and 9 out of the 21 public universities- roughly half of the universities, have internet connectivity.

- VSAT in 3 universities (.5-2 Mbps) to ASIA SAT. Three universities have fiber campus backbones.

- For three years UGC has a plan in table to provide internet access to the 19 public universities via regular ISPs- though it is still in wait 128KKps- 512 Kbps)

Applications

- Faculty and graduate students have email from university. Undergraduates don't have. They are yahoo customers.

- Universities have web-face. Most private universities have course-management systems. (At least two local SW companies are developing local systems).

- None of the public universities have DL. Private universities provides access to jstore, etc.

- 3-4 private universities have video conferencing facilities.

R&D Institutions

Table-4 Advanced Research Institutions (ARI)	
Type of R&D Institutions	**Number**
Research Institute/Center-Agriculture	15
Research Institute/Center-Biology	7
Research Institute/Center-Energy	5
Research Institute/Center-Engineering	14
Research Institute/Center-Medical	15
Research Institute/Center-Weather	2
Research Academy	3
ARI Admintrative Centers	10
Collections-Major Library (Non-University)	7
Collections-Museum	8
Other Institutes & Centers	6
Total	**92**

South Asian University Libraries

| Table 1.1 Some National University Libraries Around South Asia			
Institution	Books	Serials	DL
Jauharlal Nehru University, India	500,000	800	Yes
Bombay University, India	700,000	n/a	Yes
Chepauk Library, Madras University, India	509,263	642	Yes
Calcutta University, India	800,000	795	Yes
Punjub University, Pakistan	442,300	N/A	Yes
LUMS, Pakistan	52,000	325	Yes
Quaid-i-Azam University, Pakistan	195,000	276	Yes
University of Colombo, Sri Lanka	400,000	970	Yes
Tribhuvan University, Nepal	n/a	n/a	No
Royal University of Bhuttan	n/a	n/a	No
University of Malaya Library, Malaysia	1,239,749	3631	Yes
Maldives has no University	x	x	x
Dhaka University	5,500,000	250	No
Bangladesh Agriculture University	182,000	200	No

Books & Libraries

- The libraries are completely at lost in the face of journal and text book pricing.

- The serial unit cost has increased by 188% between 1982 and 2004 at 2.5 times faster than the CPI inflation index. Western research university libraries kept up by doubling their budget [2]. But, in Bangladesh the universities simply dropped their subscriptions. For example, BAU reportedly dropped the number of titles from 700 to 200 between 1974 and 2005.

- None of the public (larger) universities have digital library access (3 projects underway).

- None could even afford the relatively low cost IEEE/ ACM type professional organization owned journals/ proceedings.

Collections in the Public Universities
(all but 2 have 10,000+ records)

Collection in Private University Libraries
(with 5000+ records)
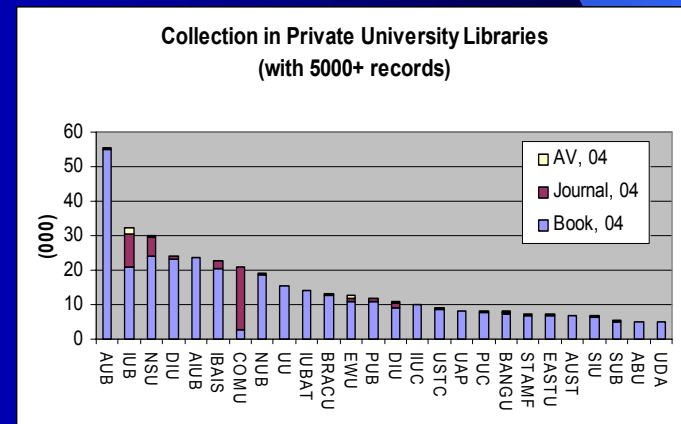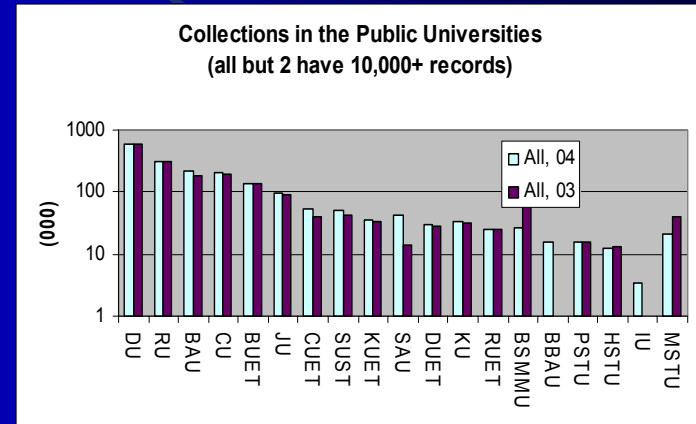
Fiber

- Bangladesh National Railway- has approximately 1,800-km STM-4 (622 Mbps) optical fiber touching over 300 of the 454 rail stations reaching most corners of the country. Only 25-40% capacity is currently being used by Grameen Phone [13].

- Telephone and Telegraph Board (BTTB) has 1365 km STM-14/4/1 (2.488 Gbps/622Mbps/155 Mbps) of Optical Fiber. BTTB is running 9 Internet PoPs. Service reaches all 64 districts and 164 Upazillas.

- In capital Dhaka, BTTB is building an STM-16 all fiber ring [14].

- A third nationwide 1200 km fiber system touching all the existing power stations and grid sub-stations is now being installed by the Power Grid Company (PGCB). PGCB expects to use only 5-10% capacity and sell 90%.
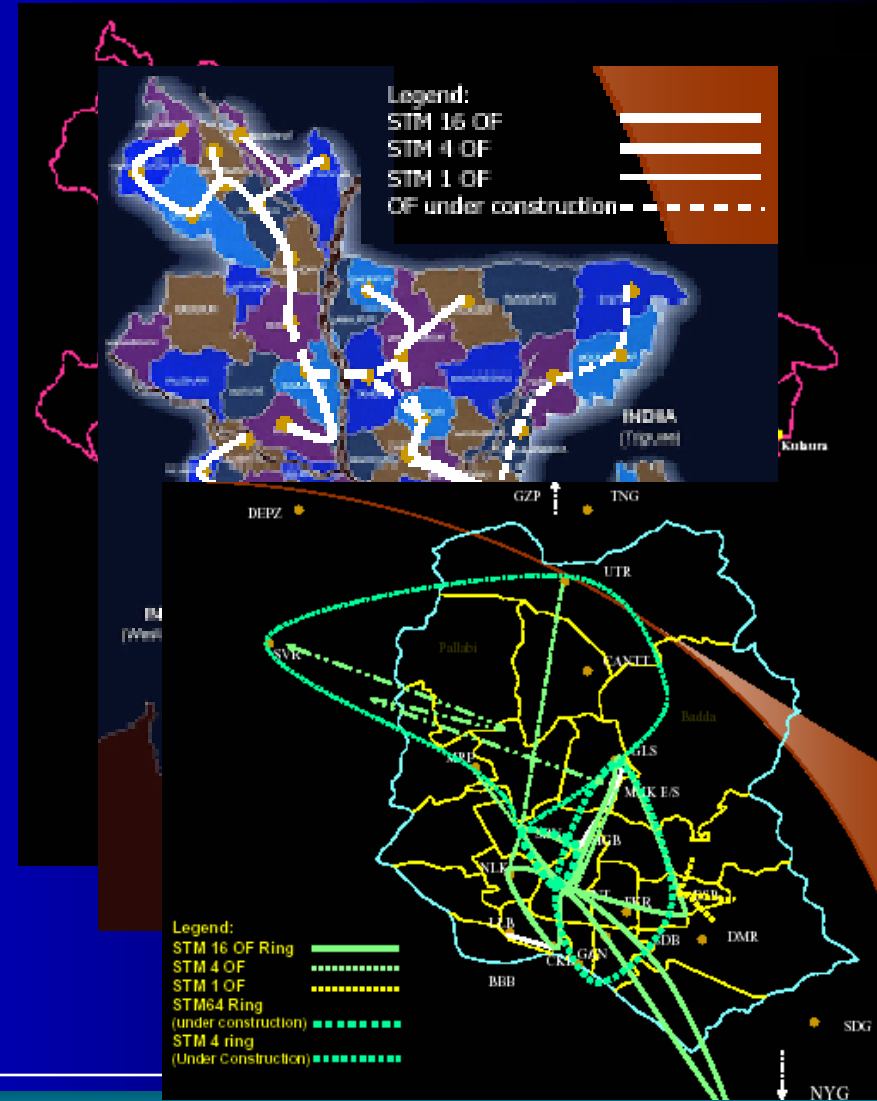
Hundred's of rivers crisscross the landscape. Fiber is challenging.

International Connectivity

- At the moment the entire data communication is via 34 official ASIASAT and INTELSAT. It is officially believed that total outgoing Internet capacity is only 50 Mbps [14]!

- However, this situation changes with the debut of the country's first International submarine cable SEAMEWE4. It has landed in November of 2005.

- BTTB owns its 10 Gbps capacity (7.04%). BTTB estimates, until 2010 only 20% of its capacity will be used.

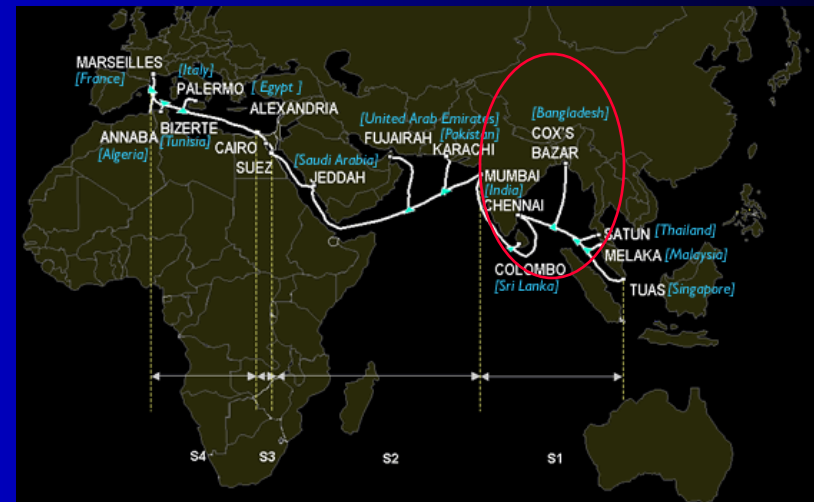- BREN can potentially meet its requirement of 155-622 Mbps from these cable systems.

Table-5 Projected Usage of Cable Bandwidth [3]		
Applications	Existing Use 2005	Projected Use 2010
Internet Bandwidth	50 Mbps	500 Mbps
Voice Circuits	150 Mbps	1 Gbps
Multi Media		200 Mbps
Other New Application		100 Mbps
Call Center Type		100 Mbps
Total		2 Gbps
BREN (25% of unused capacity)		622 Mbps

- Cable lands at Cox's Bazar

- The BTTB Backbone ends at Chittagong.

Some Recent Activities

- SEA-ME-WE4 connects 10 Gbps link (November 2005)

- New National Higher Education Policy Includes REN and DL as a target (Dec 2005).

- No major professional body faculty or engineering organizations (including local chapters of IEEE) are found advocating ICT .But, the two librarian's associations are active and has formed informal collaboration with India and also advocating DL including presenting white papers to govt. (February 2006).

- Now an indigenous "consortium" for REN and DL is in the forming by invitation of University Grants Commission UGC (March 2006).

Status Summary

- Digital Divide and ICT
  - Consortium is a new concept (huge self organization challenge)
  - Universities technology are always 10-15 years back technologically.
  - Policy is 10-20 years behind.
  - ICT "communication" is supposed to reduce this Gap.
  - But how do you get ICT in place??

- Infrastructure
  - Some Fibers are there to start backbone immediately.
  - Some type of wireless can be used to provide instant access links
  - '50' well trained network engineers to do the stitching is missing.
  - No excess fund (USD $80-100 million for 19 universities)

- Positive
  - No legacy problem.
  - Very little technical and financial seeding can have magnified impact.

REN and Extent of Digital Divide?

- Estimated 92 Countries have REN

- Estimated 23-27 have ongoing initiative (including New Zealand!)

- What about the others- at least there are two types of digital divide?

- Traditional developmental funding agencies have shied away from funding higher education. Questionable policy when it comes to REN!

- Almost all development effort remain **inherently unstable and unsustainable** without the indigenous higher education community involvement.

- It is impossible to bridge the digital divide without mending the ICT divide of their higher education institutions.

A Peer-to-Peer Consortia Approach to Technical Collaborations
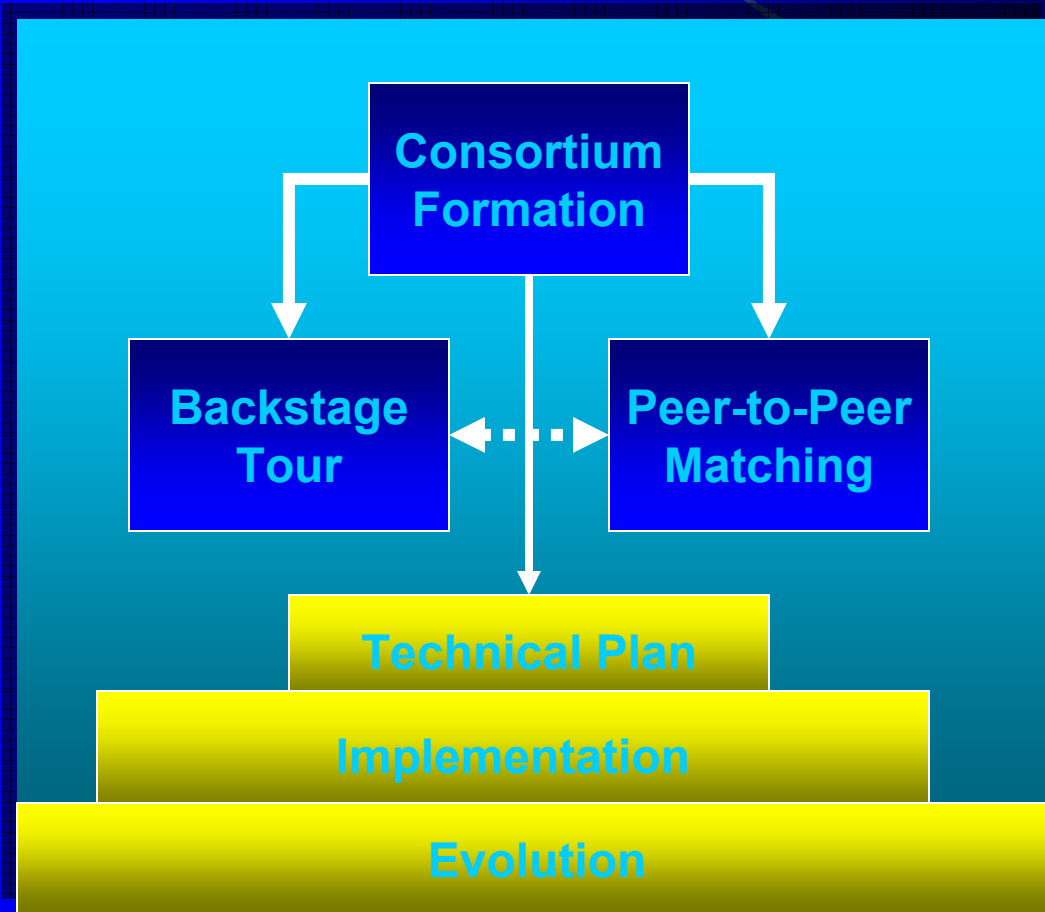
Thanks!

"In the long course of history, having people who understand your thought is much greater security than another submarine."
-J William Fulbright

- Connection a new million is more important that doubling the bandwidth by another factor of 2 (is it not cliché?). This applies for both internal as well as international digital divide.

- Comment? javed@kent.edu
- Bangladesh Survey Reports:
    - http://www.medianet.kent.edu/techreports/TR2006-02-01-UGC-REN-K.pdf
    - http://www.medianet.kent.edu/techreports/TR2006-02-01-UGC-DLC-K.pdf