Information and Communications Technology for Development: Digital Divide

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Purpose of the Lectures

➢ We'd like to identify some guiding principles for working in ICT4D
  - Concepts and distinctions to use in carrying out research
  - Useful modes for thinking about case studies
➢ We'll be presenting some of them
➢ You should try to identify others.

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Outline

Digital Divide
How to bridge the Digital Divide
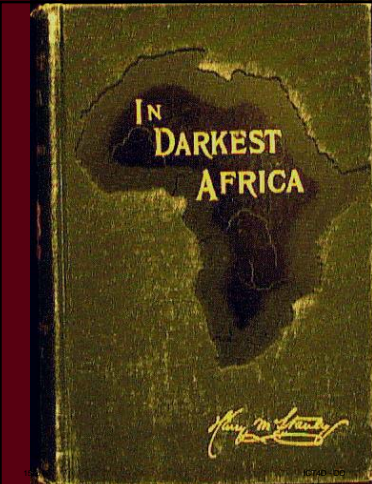Conclusion (Software Engineering ☺)

Potential

Characteristic of a *Developing Country* is the need for better and more equitable access to resources

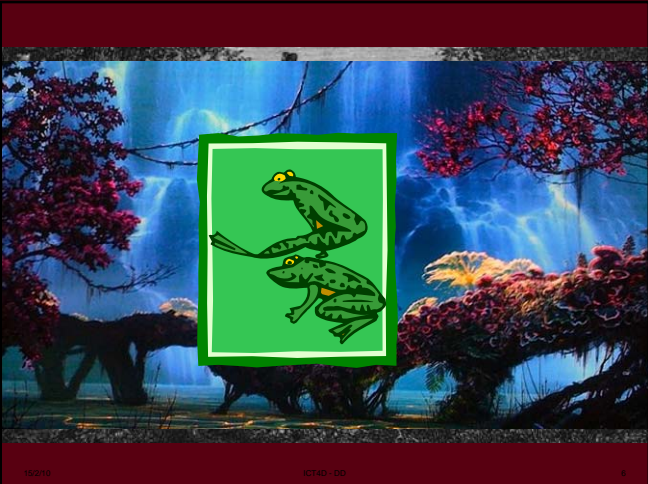Define an *Information Society* as the desired outcome of the information revolution sparked by ICT

Knowledge resources can potentially be distributed to the *have-nots* without taking away from the *haves*.

ICT can be used in a developing country to extend the distribution of scarce knowledge resources.

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IN DARKEST AFRICA

The privilege of historic backwardness – and such a privilege exists – permits, or rather compels, the adoption of whatever is ready in advance of any specified date, skipping a whole series of intermediate stages.
Leon Trotsky, 1932–3

Who Chooses the Goals?

Building an Information Society demands the formulation of clear goals for society

- Technology cannot be appropriately applied if what is appropriate is not known
- But whatever those societal goals, we can assume that ICT can provide a cost effective way of reaching *some* of those goals.

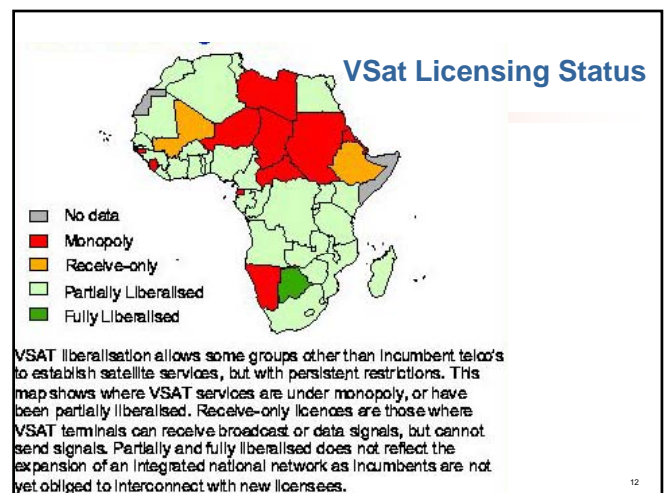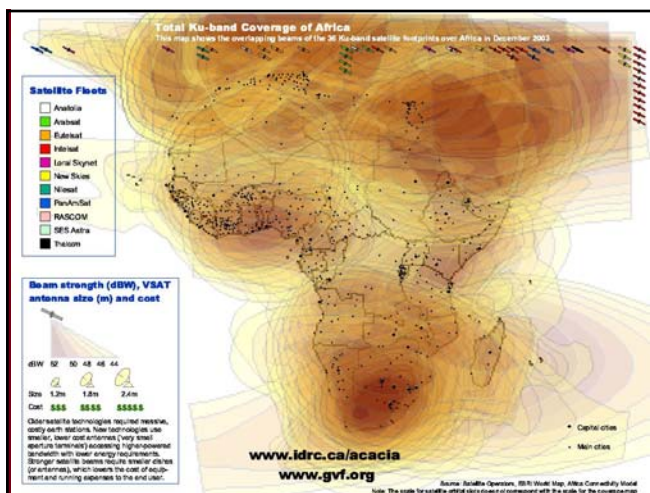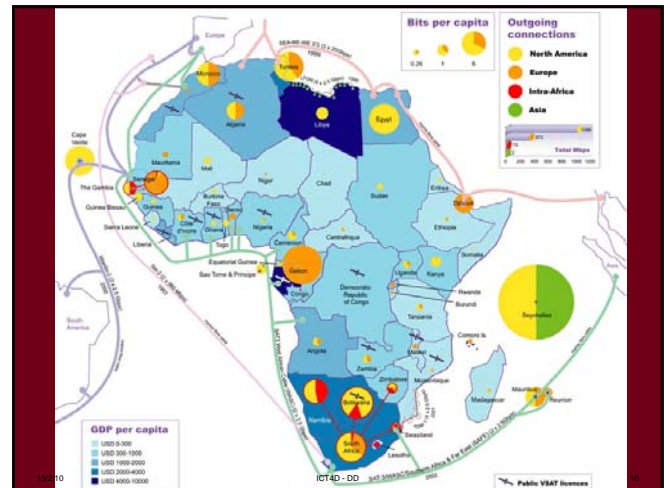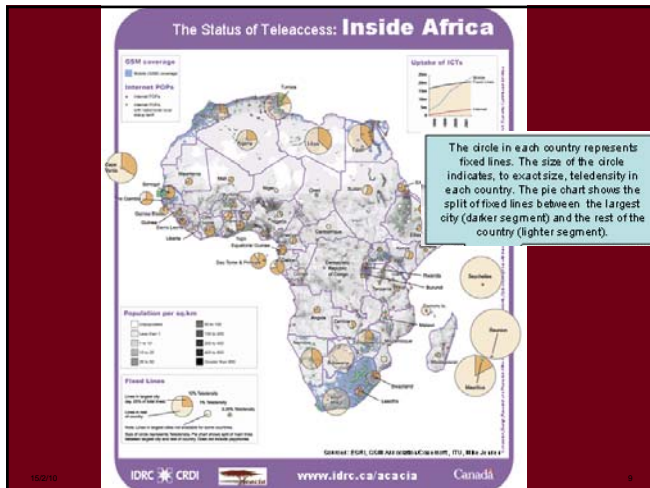15/2/10 — ICT4D - DD

What is the Digital Divide?

The disparities in the penetration of the Information Society

- disparities in the access and use of ICT
- it is the growing gap between those who have access to the Information Society and those who are deprived of such access

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Slide: Regulator

Regulator

- ICASA
  - Licensing telecommunications, postal and broadcasting service providers,
  - monitoring compliance of licensees,
  - developing policy,
  - managing the frequency spectrum and
  - protecting consumers within the communications environment.
- "Universal Service"
- "Universal Access"

USAASA
UNIVERSAL SERVICE AND
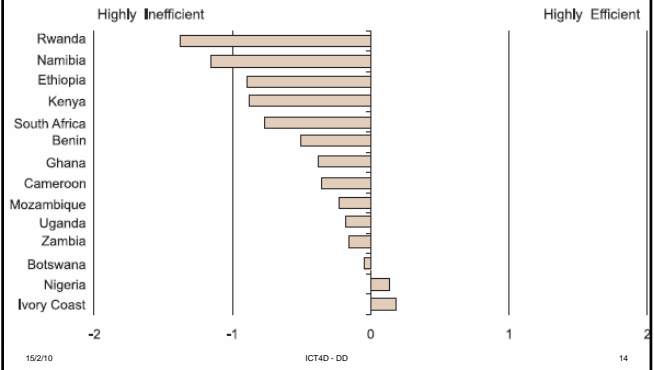ACCESS AGENCY OF SOUTH AFRICA

Please note that the Universal Service and Access Agency of South Africa's website is currently under construction. For further information, please use the following contact information:

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Slide: Telecommunication Regulatory Environment Assessment
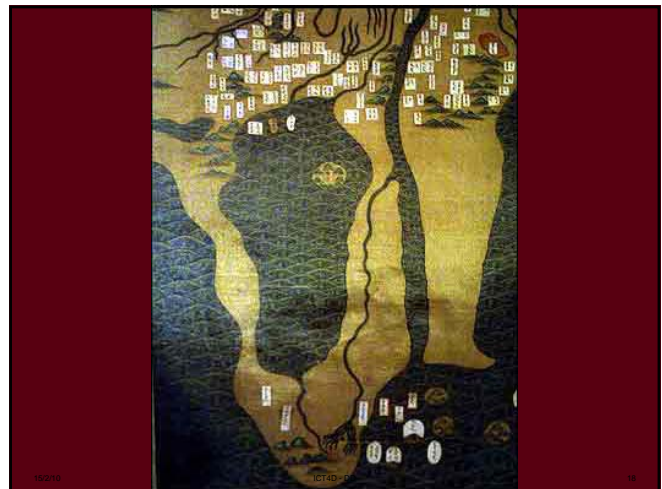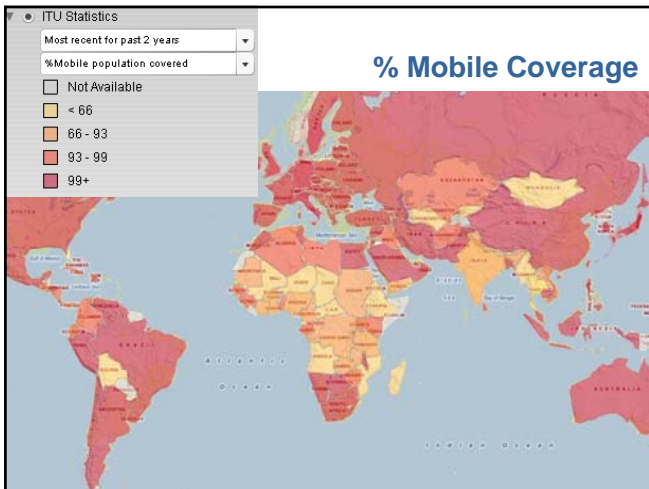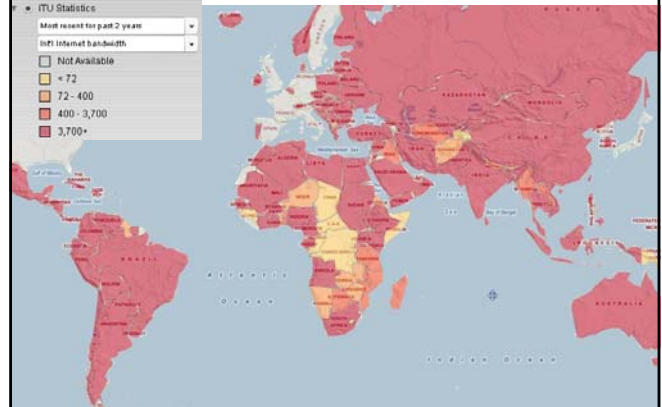
Telecommunication Regulatory Environment Assessment

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Slide: International Internet Bandwidth

International Internet Bandwidth

Slide: % Mobile Coverage

% Mobile Coverage

What Causes the Digital Divide?

- Mirrors and exacerbates existing disparities:
  - gaps in education (for example, illiteracy)
  - personal handicap
  - location (rural-urban)
  - gender
  - race
  - income level
- The South African Digital Divide grows out of our history of division and historical backlogs for large groups of people:
  - a particular South African version of colonial history.
- The Digital Divide also arises from global circumstances which apply to all developing countries.

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Consequences of the Digital Divide

Reflected in computer systems with
- cultural bias in the applications and contents
- poor digital infrastructure
- inappropriate computer equipment

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Aspects of the Digital Divide

Global Digital Divide (international): The global disparity between those countries at the forefront of the Information Economy and the developing countries.
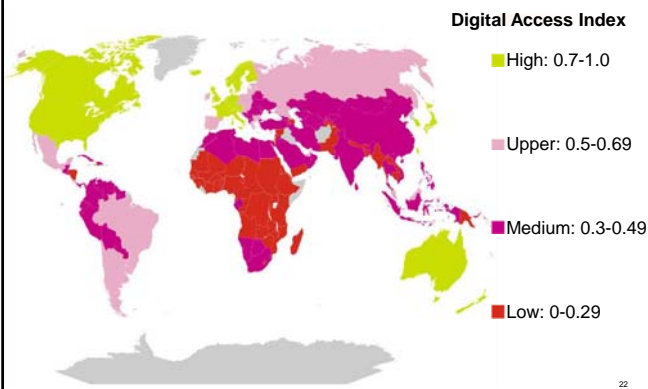
Local Digital Divide (domestic): This refers to the disparities between groups in a particular country

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Global Map of Digital Inclusion

Digital Access Index

- High: 0.7-1.0
- Upper: 0.5-0.69
- Medium: 0.3-0.49
- Low: 0-0.29

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Statistics

- Consider the ICT disparities between developed and developing countries, e.g. between United States and South Africa
- Access to PCs
  - United States, 65.89% of inhabitants
  - South Africa, 7.26% of inhabitants
- Internet usage:
  - United States, 55.13% of inhabitants
  - South Africa, 6.82% of inhabitants
- [taken from World Telecommunication Indicators, issued by International Telecommunications Union, December 2003]

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GSM Worldwide

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Software Development for Development

How do we develop software for rural and disadvantaged communities in the developing world?

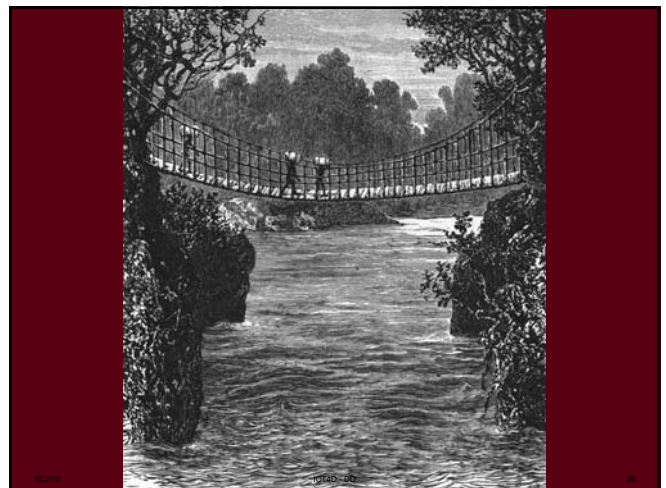- poor roads
- overstretched facilities
- underdeveloped telecommunications infrastructure
- lack of clean water and sanitation
- widely scattered population
- unreliable electricity supply

How to bridge the Digital Divide?

- studies and proposed solutions
  - highlighting the problem and
  - suggesting answers
- on-the-ground initiatives
  - providing sustainable solutions in under-serviced communities
- policy reform
  - government policy needs to change to make ICT more accessible

Failure: Telecentres

- Government and Business have setup a number of telecentres
  - computers labs with phone and fax facilities
  - particularly in the rural areas
- Faced with number of problems
  - lack of adequate security
  - lack of technical support
  - lack of appropriately skilled staff
- Telecentres have largely not served their purpose

## One Laptop Per Child (OLPC)

- Initiative of Nicholas Negroponte, Professor at MIT
- Attempt to produce and distribute an affordable laptop which can be distributed to children in developing countries
- Allows children access to knowledge and opportunities to "explore, experiment and express themselves"
- Runs a customised distribution of Linux
- Too early to tell if this is going to work
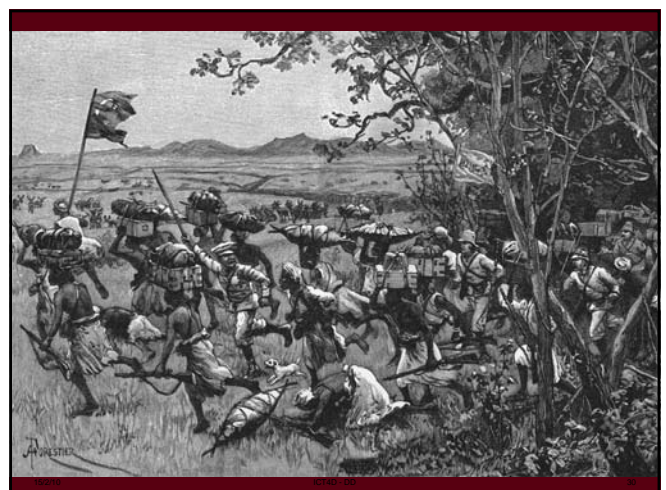
Questions

- Does the developing world not have more pressing needs?
  - housing, healthcare, food security, climate change
- Should developing world always try to catch up to the latest ICT?
  - should it choose appropriate technologies?
- Is ICT a panacea, or does it have some role or no role to play at all?
  - need an informed approach

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Technologies

A few technologies make ICT more accessible:
- Wireless networks
  - doesn't require physical landlines
- Mobile devices - cellphones and PDAs (Personal Digital Assistants)
  - less expensive and easier to use than PCs
- Voice over IP (VoIP)
  - doesn't require sophisticated telecommunications infrastructure
- Open Source Software
  - Cost-effective and can be customised to local needs

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Conclusion: Disruptive Technologies

Do you need this in your life?
  or "Beware of Geeks Bearing Gifts"

The role of a Computer Scientist is to adapt technologies to the users and their situation.
  - That's your job
  - that's why ICT4D needs you

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Conclusion: FOSS$_4$DEV

- Creating Free and Open Source Software for Development requires the methods and skills that we advocate.
- FOSS depends on access to source-code
  - need local Software Engineering skills to use and modify code appropriately
- Significant lock-in to proprietary software in the developing world due to a lack of skills in exploiting FOSS
  - Bridges.org: "Specific software applications that could make computers more useful to local communities — such as putting ICT to work to improve healthcare and education, and designed with cultural factors in mind — are still missing"
- We must address such issues and take ownership of FOSS$_4$DEV

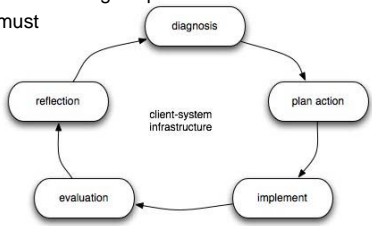15/2/10   ICT4D - DD   34

Community-Based Computer Science

- Ubuntu based Computer Science??
- Software Engineering (SE) as a profession has to change to emphasize the social and economic needs of local communities.
  - Ethics focussed on dealing with development priorities.
- IT professionals have to accept a new interdisciplinary approach to SE
  - co-development of applications in a socially sensitive fashion
  - projects are difficult to manage!
- Universities & NGO's: design and implement new approaches to using technology to support local communities in developing countries

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Critical Action Research

- Facilitating change by facilitating action
- Cyclical software development: participatory design + prototype evaluation.
- Flaws
  - users don't appreciate technological possibilities
  - software designers must bridge cultural gaps

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Software Engineering for Development

- *Socially Aware Software Engineering* methodology.
  - Basis of Critical Action Research: facilitating change in a community through facilitating action
  - Participatory Design require the end user to participate in the software design process
    - Flaw 1: user community knows about technological possibilities
    - Flaw 2: software designers can bridge cultural and linguistic gaps
- The technological requirements exist within a complex web of other needs, relationships and societal obligations
- Our tentative solution:
  - Local "interpreters" or champions who can bridge the gaps
    - Act as our *intermediaries* into the communities
  - Carry out iterative development cycles incorporating aspects of participatory design and user-centred HCI into SE

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