Information and Communications Technology for Development: Digital Divide

Edwin Blake
<edwin@cs.uct.ac.za>

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.

Outline

- 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.

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

ICT for Development
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.

What is the Digital Divide?

The disparities in the penetration of the Information Society:

- It is the growing gap between those who have access to the Information Society and those who are deprived of such access.
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"

Telecommunication Regulatory Environment Assessment

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<tr>
<th>Highly Inefficient</th>
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International Internet Bandwidth

- EU Standards

% Mobile Coverage

- EU Standards
  - Not available for part 2 year
  - Mobile population covered
    - Not available
    - 0 - 95
    - 96 - 99
    - 100%
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.

Consequences of the Digital Divide

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

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

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]
Software Development for Development

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

![](image1)

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

![](image2)

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

![](image3)

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

![](image4)
**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

**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

**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

**Conclusion: FOSS4DEV**

- 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 FOSS4DEV

**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

**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
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