

CSE 477, Winter/Spring 2009

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Announcements

- CSE 590f seminar
 - Wednesday, 4pm, CSE 403
 - UW Speakers on Technology for the Developing World
 - 1/7/09: Gaetano Borriello

Design Studio

Date	Topic	Speaker	References	Notes
1/6/2009	Overview Presentation	Richard Anderson		
1/13/2009	Student Project Ideas I			
1/20/2009	Student Project Ideas II			
1/27/2009	Group Formation			
2/3/2009	Design Process	Joyojeet Pal		
2/10/2009	Iterative Design for the Developing World	Joyojeet Pal		
2/17/2009	Group Meetings			
2/24/2009	Presentations for Critique			
3/3/2009	Group Meetings			
3/10/2009	Group Meetings			
3/13/2009	Poster Presentations			Tentative

CSE 477 Projects, 2008

[\[uw-cse\]/education/courses/cse477/08sp/projectwebs/](http://uw-cse/education/courses/cse477/08sp/projectwebs/)









Computing and the Developing World

CSEP 590B, Spring 2008
Lecture 1
Richard Anderson

Problem Domains

- Health
- Education
- Livelihood

Global Health Challenges

- Basic Health Care
 - Life Expectancy: Zambia 43 yrs, Germany 79 yrs
 - Infant Mortality: Niger 109, Italy 5
- Control of Major Diseases
 - HIV/Aids: Namibia 20%, Canada 0.3%
 - Malaria: 500M infections, 2M deaths per year
- Improved Health Practices
 - 1.1 B people lack access to safe drinking water

Education

- Literacy Rates
 - Mali 19%, Pakistan 49%, Laos 69%
- School Attendance, Primary Enrolment
 - Somalia 17%, Sudan 60%, Congo 88%,
 - India 116%, Rwanda 120%, Cambodia 134%
- Teacher Absenteeism
- Language Study
- Vocational Training

Livelihood

- “The reason most poor people are poor is because they don’t have enough money”
- 180 Million Smallholder Farmers in Sub-Saharan Africa earning under 1\$ a day
- Costs of being poor
 - Many goods more expensive for poor
- In Africa the informal sector accounts for 20% of the GDP and employs 60% of the urban workforce

UN Millennium Development Goals

- Eradicate extreme poverty and hunger
- Achieve universal primary education
- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development

Key themes in Computing for the Developing World

Resource Constraints / Cost Realism

- Defining nature of the domain is bound on cost
- Economics are fundamental

Electrical and physical infrastructure

- “The utility of the computers is diminished by the lack of power”
- Off the grid
- Irregular availability of power
- Poor quality power

Different Usage Models

- Don’t expect usage models will be the same as in the developed world
- Mediated use of technology
 - Involving people in solutions is important
 - Labor often readily available

Hostile PC Infrastructure

- Every flash drive in Africa is infected by viruses. WHY???
- Computing Realities
 - Poor computing practices
 - Older hardware
 - Software of dubious provenance
 - Difficulty of getting updates

Sustainability

- Upkeep and business model
- Potential to Scale
 - Can project be replicated to address problems on a large scale
 - Additional issues occur when thinking big

CSE 590F Computing and the Developing World

Creating a research agenda
Problem Inventory


Problem identification

- Identify key problems by sector
- What would a solution achieve
- What role might ICT have in the solution

Sectors

A. Education	I. Transportation
B. Medicine	J. Environment
C. Agriculture	K.
D. Finance	L.
E. Government	M.
F. Entertainment	N.
G. Family	O.
H. Goods and services	P.

Education




Problem:

Solution metric:

ICT Role:

Medicine




Problem:

Solution metric:

ICT Role:

Agriculture




Problem:

Solution metric:

ICT Role:

Finance




Problem:

Solution metric:

ICT Role:

Government



Problem:

Solution metric:

ICT Role:

Entertainment



Problem:

Solution metric:

ICT Role:

Family



Problem:

Solution metric:

ICT Role:

Goods and Services



Problem:

Solution metric:

ICT Role:

Transportation



Problem:

Solution metric:

ICT Role:

Environment



Problem:

Solution metric:

ICT Role:

Winter 2007 Inventory I

- Medicine
 - Medical Record Keeping
 - Logistics of Drug Delivery
 - Out of pocket payments / insurance
 - Availability of Medicine
 - Patient Compliance
 - Isolation of Rural Health Care Worker

Winter 2007 Inventory II

- Education
 - Migration of educated to other regions
 - Lack of modern infrastructure (books)
- Governance
 - Reducing bureaucracy (reducing cost of services)
 - Trustworthy Elections
 - Reducing corruption

Winter 2007 Inventory III

- Agriculture
 - Farmer price information (buying and selling)
 - Advertising to promote products
- Goods and services
 - Distribution of medicines to rural clinics
- Women's Issues
 - Availability of health information
 - Empowerment
 - Family planning

Winter 2007 Inventory

- Finance
 - Increasing Trust in Transactions
 - Reduce loan turn around
 - Credit ratings
- Environment
 - Waste management
 - Water purification
 - Monitoring Environment
 - Making companies accountable
 - Preserving wildlife
 - Preventing poaching

Project Idea Pitches

- Two (or at most three ppt slides)
- Components
 - Basic problem that is being addressed
 - Overview of technological solution
 - Technologies that are involved
 - What would be built
 - Major challenges
 - How it would be evaluated

Video Testimonials

- Problem: Village women end up in urban prostitutions after migrating to cities. Provide a mechanism for giving villages more information about urban migration. (Suggested by an Indian Social Worker)
- Technology solution – digital video of interviews, which are then replayed in village
 - Facilitator based or privately

Video Testimonials

- Technologies: Digital Video, Editing, Video Transmission, Replay
- Challenges
 - Technology : low cost (especially replay)
 - UI: Editing videos, replay by illiterate users
 - Social: handling sensitive topics
- What to build
 - Emphasize editing or replay
- Evaluation
 - Feedback from social workers

Robust Record Keeping

- Problem: Keeping records when people don't have unique identifiers, and information is poor (for example, people don't know their birthdates, names are inconsistent, spelling is not available)
- Solution: Collect a range of information (e.g., relationships), develop algorithms for approximate matching of identities

Robust Record Keeping

- Technologies: Approximate matching in networks, possible Android implementation
- Challenges
 - Developing robust algorithms, designing interview, UI for mobile field use
- What to build
 - Interview system and database for maintaining identity, Android implementation
- Evaluation
 - Feedback from IHME, Comcare Project

Every flash drive in Africa is infected with viruses

- Problem: Wide spread computer viruses in an environment with limited internet connectivity, pirated software and no updates
- Solution: Transport mechanisms for virus updates via flash drives
- Technology: Anti virus technology, high latency networking

Anti virus software

- Challenges
 - Legacy software, understanding threats, many generations of systems, avoiding creating new threats
- What to build
 - Prototype system that allows virus updates to be propagated via flash drives
- Evaluation
 - Data collected from Africa