

2008



Having Global Impact as a Technical Woman: Information Technology Applied to the Developing World

Ruth Anderson (University of Washington),
Elizabeth Basha (CSAIL, MIT),
Melissa Ho (University of California, Berkeley),
Revi Sterling (ATLAS Institute, University of Colorado, Boulder)

Friday, October 3 - Session 7 , 1:30 – 2:30 pm



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Agenda

- What is ICTD?
- Elizabeth
- Melissa
- Revi
- Ruth
- How to get involved



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What is ICTD?

- Information and Communication Technologies for Development
- “applying computer technology in ways that are beneficial for society”



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Sistema de Alerta Temprana An Early Warning System for Flooding in Honduras

Elizabeth Basha

PhD Student, EECS

Massachusetts Institute of Technology

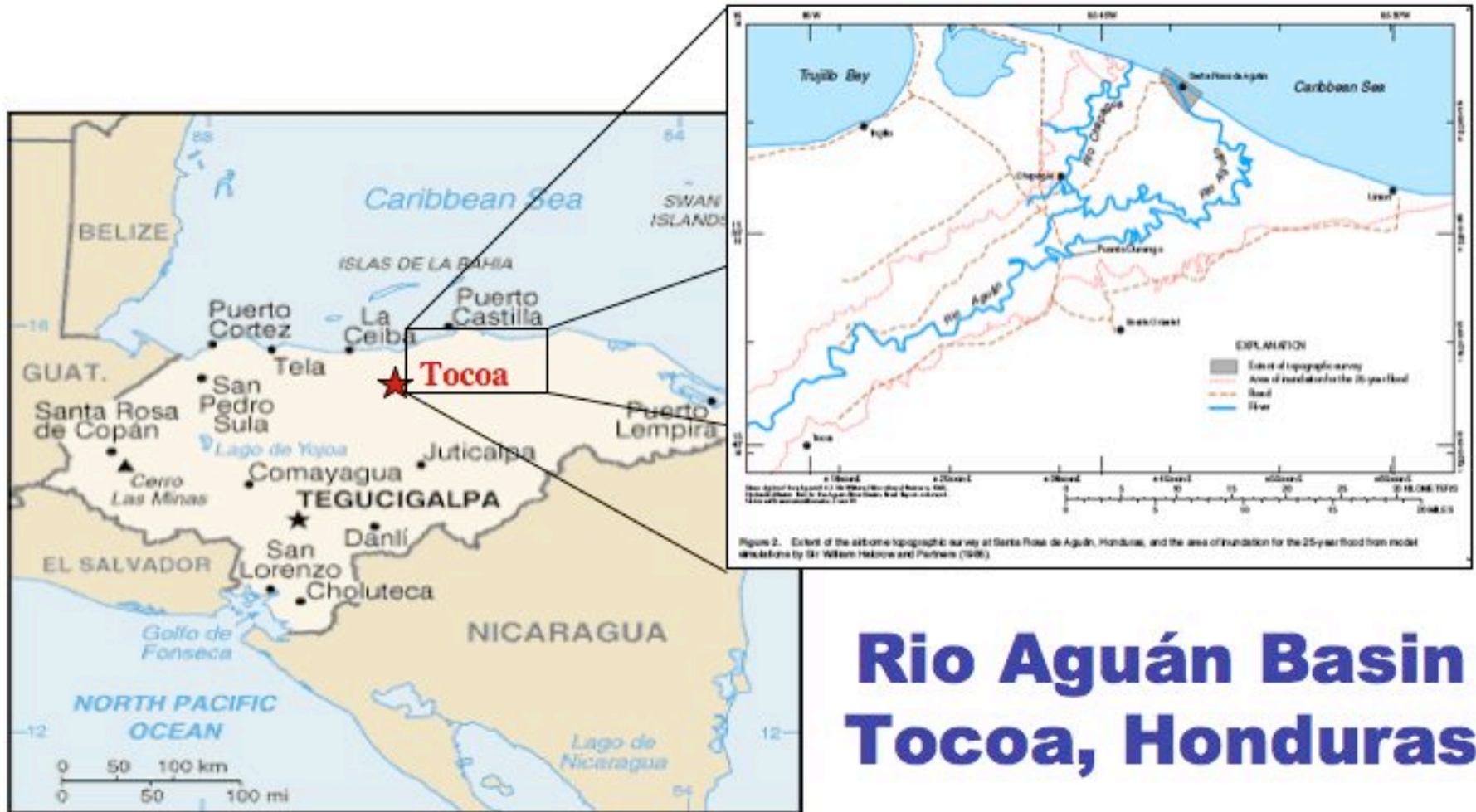


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Our Location: Honduras



Aguán Flooding: Hurricanes



Aguán Flooding: March '05



Aguán Flooding: Jan '06



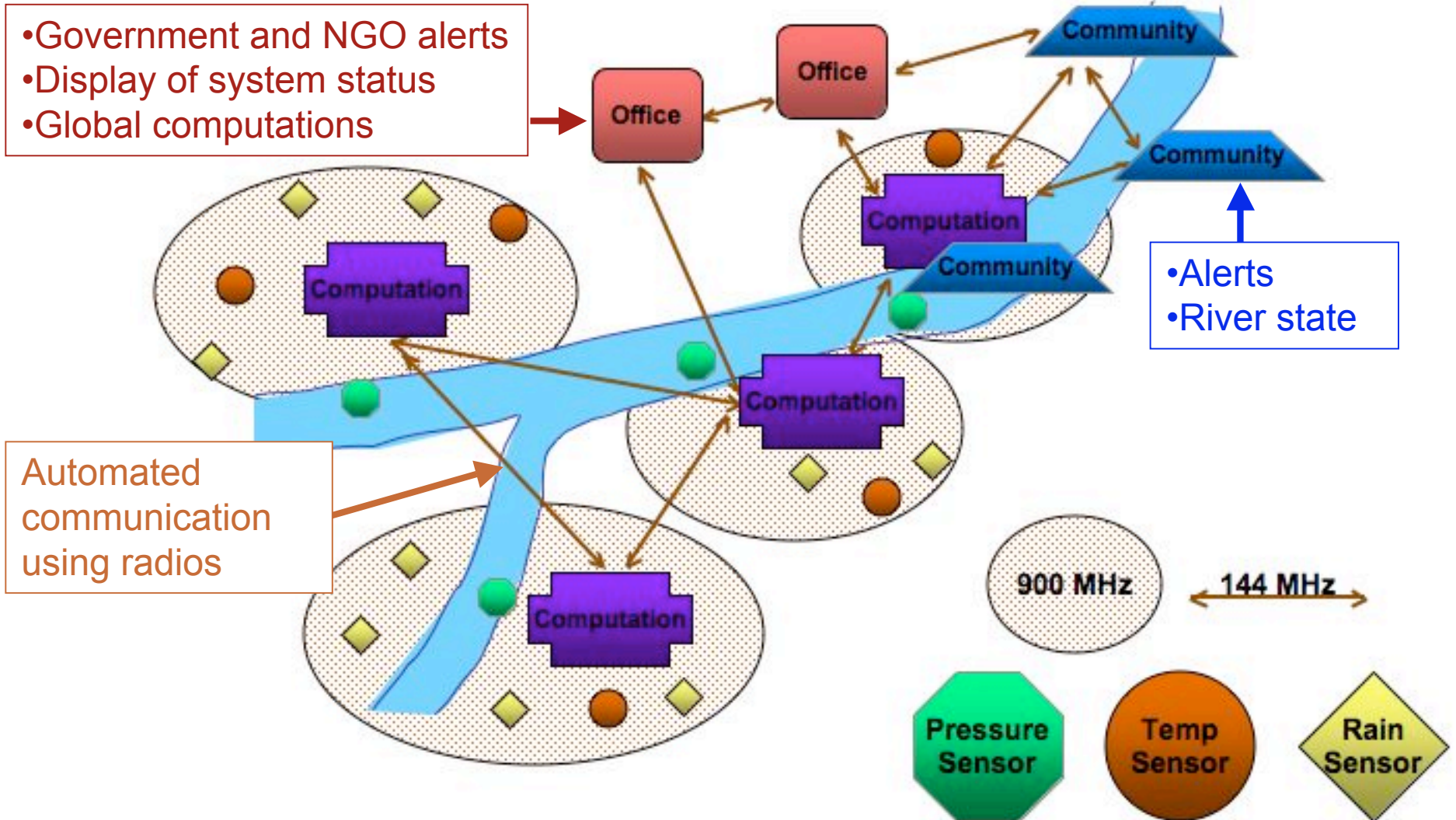
General Problem

- Want to warn people of flooding up to 24 hours in advance
- Need:
 - Prediction of event
 - Large geographic area
 - Low cost (and limited recurring cost)
 - Ability to adapt to socio-political changes

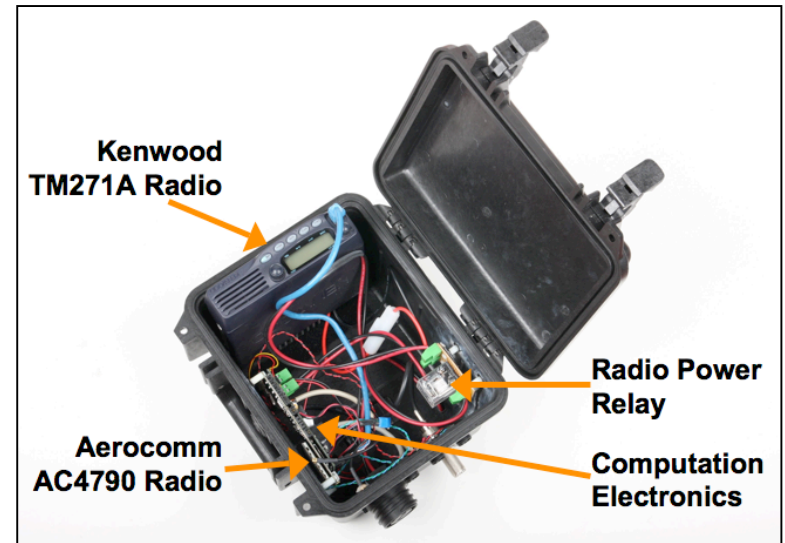
Solution?

...Autonomous sensor network
and algorithms

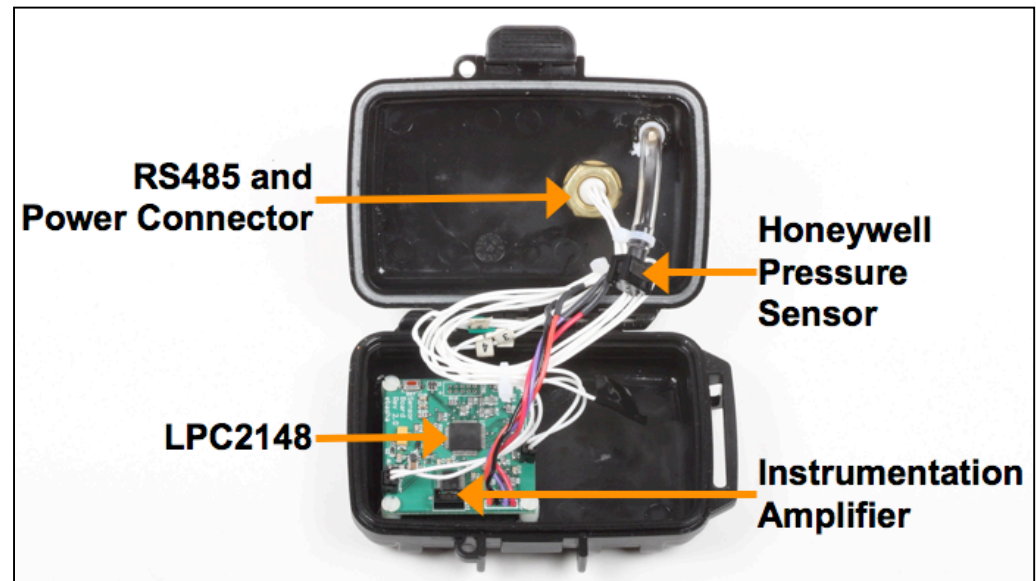
Our System: Overview



Communications



Sensing



Infrastructure



How Does This All Work?

- Started as a class: D-Lab
- Team Project: IDEAS Competition
- Individual Project: Public Service Center Fellowships
- Student Group: FloodSafe Honduras
- PhD Project: NSF, Microsoft Research, Xerox, Martin Fellows

Our Partnership

- Collaboration with the Fundación San Alonso Rodríguez (FSAR)
- FSAR initiated project



Student Involvement

- PhD Project
- MEng Project
- Undergraduate Research
- Senior Project
- Volunteer



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Some of My ICTD Projects...

Melissa R. Ho

PhD Candidate, School of Information
University of California, Berkeley



Richard C.
Blum Center for Developing Economies

Real-World Solutions to Combat Poverty



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Technology and Infrastructure for
Emerging Regions (TIER)
<http://tier.cs.berkeley.edu>

Ghana Consultation Network

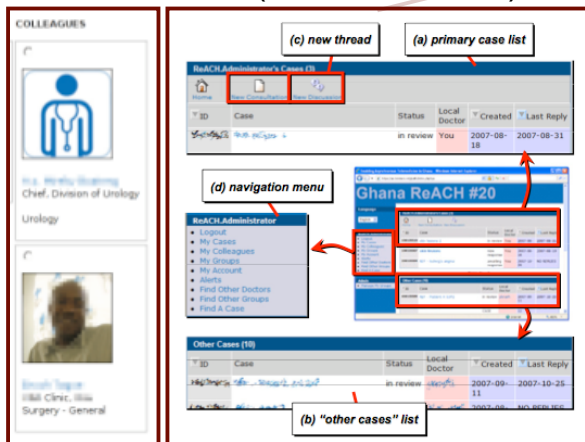
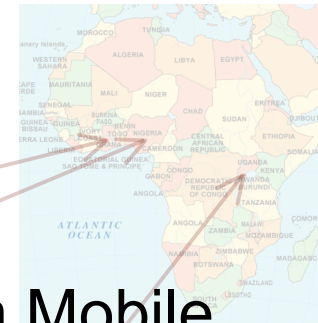
Rowena Luk (Amita Telemedicine)
Paul Aoki (Intel Research)

Women's Emergency Communication and Rural Electricity (WE CARE)

Laura Stachel (Public Health)
Hal Aronson (Solar Schoolhouse)

Claim Mobile

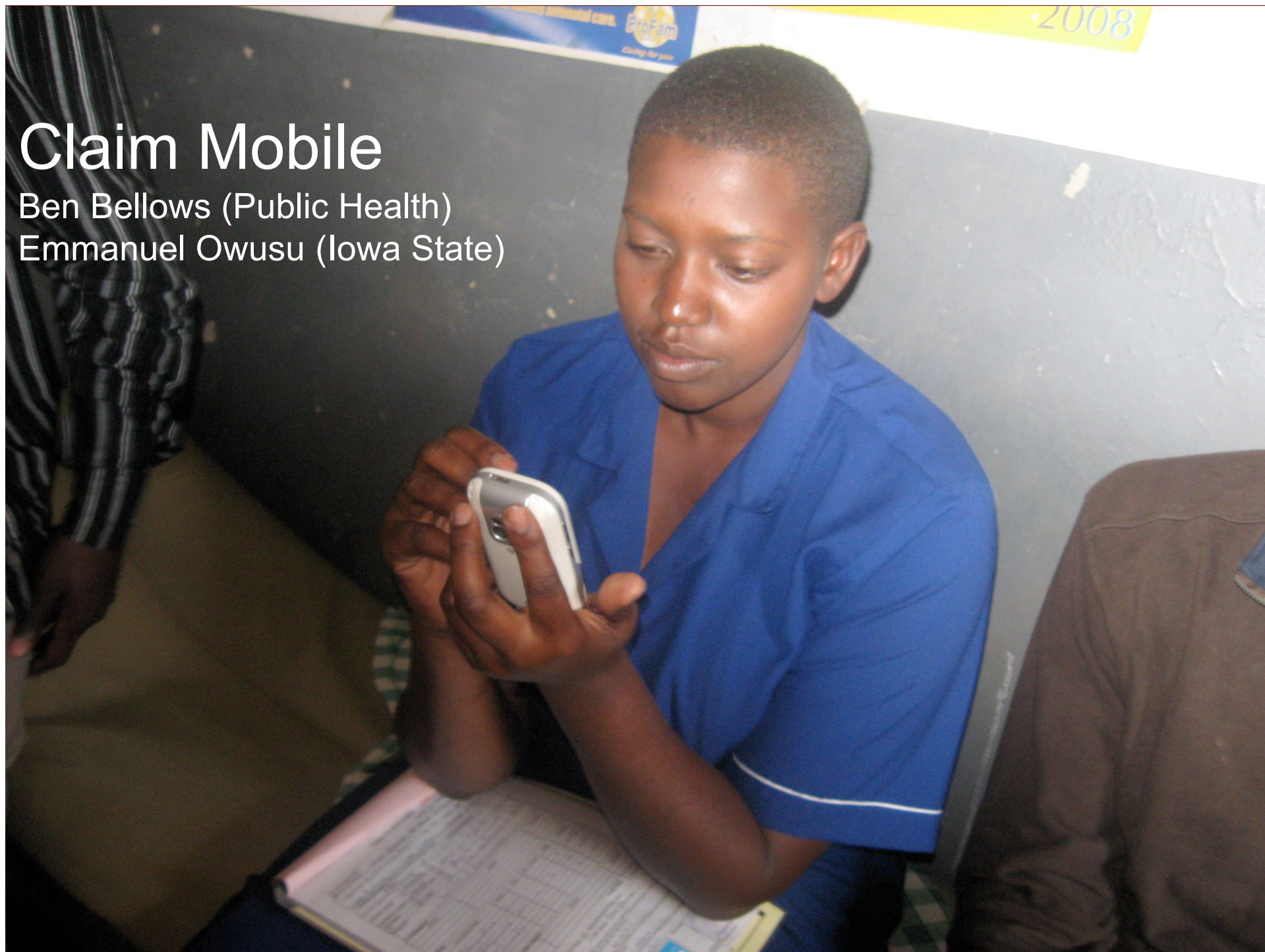
Ben Bellows (Public Health)
Emmanuel Owusu (Iowa State)



Claim Mobile

Ben Bellows (Public Health)

Emmanuel Owusu (Iowa State)



Claim Mobile: from paper form... to phone

VMUS CLAIM FORM

Personal Information: Name, Date, Sex, Age, Gender, Marital Status, Religion, Education, Occupation, Address, Phone, Email, Fax, Mobile, Pager, Home, Work, Cell, Other.

Medical Information: Chief Complaint, History of Present Illness, Past Medical History, Allergies, Medications, Immunizations, Family History, Social History, Review of Systems.

Physical Examination: General, HEENT, Chest, Abdomen, Pelvic, Rectal, Genital, Skin, Neurological, Musculoskeletal, Laboratory, Microbiology, X-ray, Imaging, Pathology, Special Studies, Other.

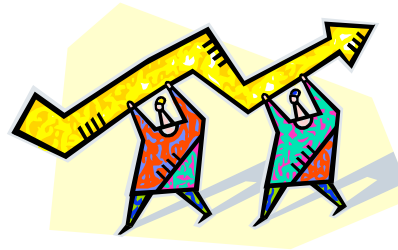
Diagnosis: ICD-9-CM, ICD-10-CM, ICD-9-CM-PCS, ICD-10-CM-PCS, ICD-9-CM-PCS-ICD-10-CM, ICD-10-CM-PCS-ICD-9-CM, ICD-9-CM-PCS-ICD-10-CM-PCS, ICD-10-CM-PCS-ICD-9-CM-PCS.

Prescription: Drug, Dose, Frequency, Route, Duration, Indication, Other.

Referral: Referring Physician, Referral Date, Referral Indication, Referral Facility, Referral Physician, Referral Address, Referral Phone, Referral Email, Referral Fax, Referral Mobile, Referral Pager, Referral Home, Referral Work, Referral Cell, Referral Other.

Signature: Physician, Date, Title, Institution, Address, Phone, Email, Fax, Mobile, Pager, Home, Work, Cell, Other.

Notes: ALL INFORMATION WILL BE HELD FOR PAYMENT CLAIM PURPOSES ONLY AND IS NOT TO BE USED FOR ANY OTHER PURPOSES. THIS INFORMATION WILL BE HELD FOR PAYMENT CLAIM PURPOSES ONLY AND IS NOT TO BE USED FOR ANY OTHER PURPOSES.



2: Medical Information

Name of Doctor: David Smith

Syndrome:

- Urethral Discharge
- Genital Ulcer
- Abnormal Vaginal Discharge
- Pelvic Inflammatory Disease (PID)
- Ophthalmia
- Inguinal Bubo
- Acute Scrotal Swelling
- Others

Symptom:

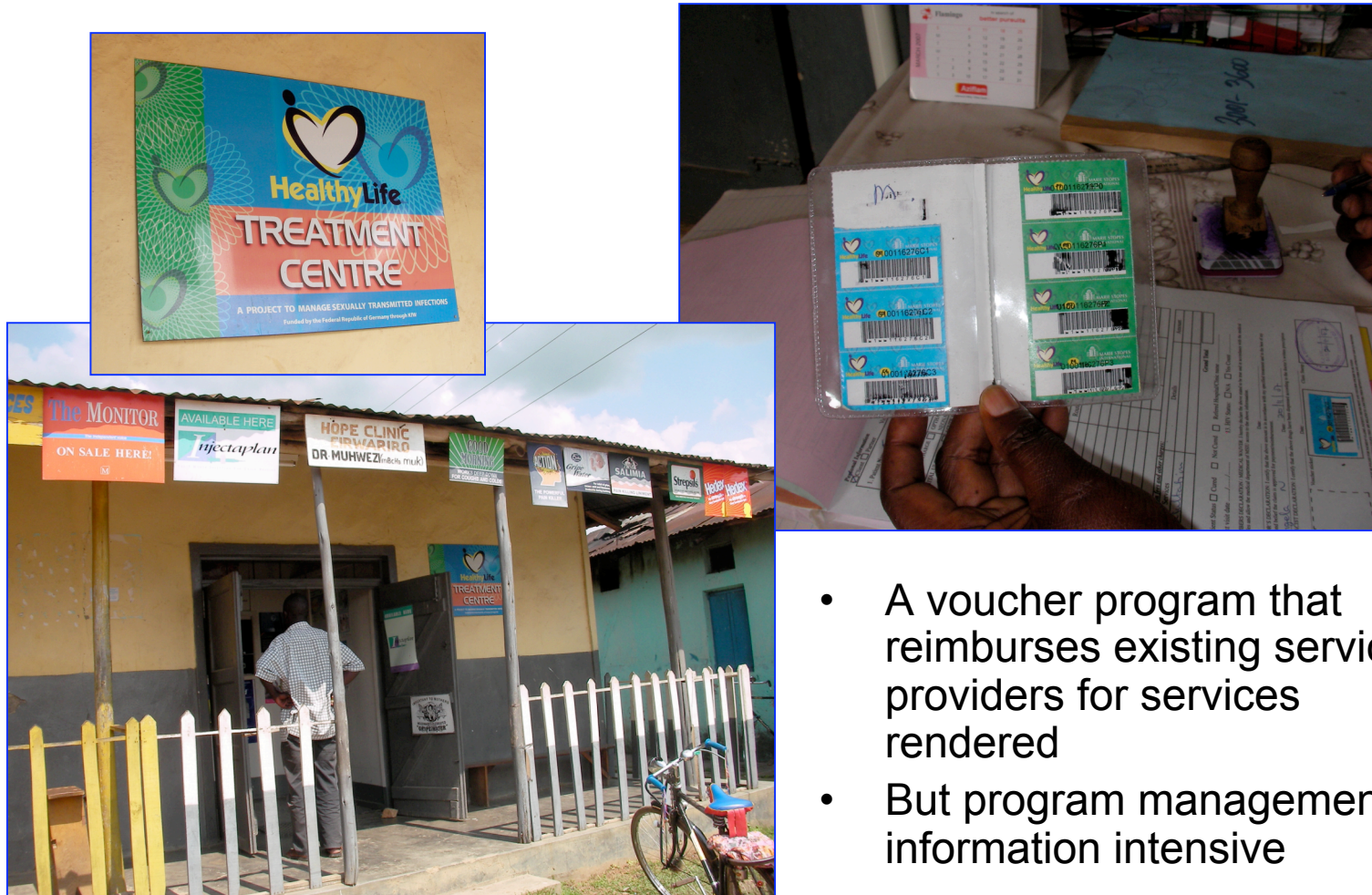
- Pus from Urethra
- Vesicles or Ulcerations
- History or recurrence of vesicles/ulcerations
- Mucopurulent Cervical Discharge
- Cervical Contact Bleeding

Back



- Using mobile phones as a platform for facilitating information management
 - Dynamic, self-verifying forms
 - GPRS-based form submission and approval
 - Phone-based clinic data management
 - Improved communications loop

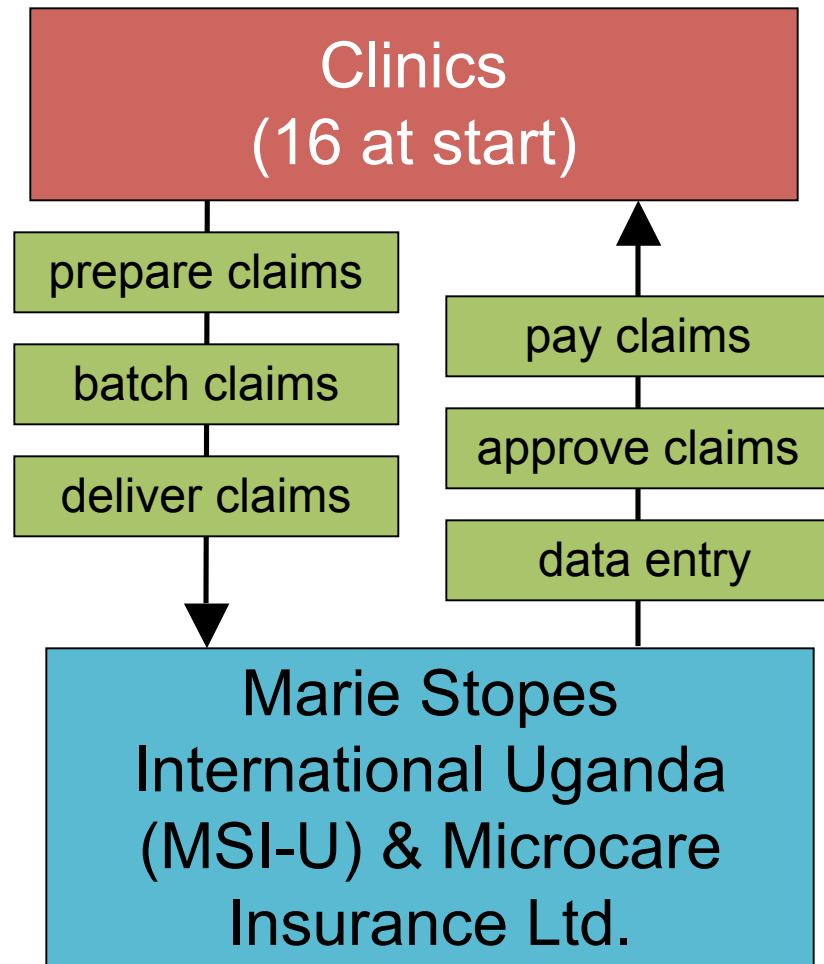
HealthyLife: Output-Based Aid



- A voucher program that reimburses existing service providers for services rendered
- But program management is information intensive

Claims Submission Bottlenecks

- Common errors
 - Written errors
 - Invalid client-partner use
 - Invalid treatment
- Submission delays
 - Batched claims
 - Transportation (\$ + time)
- Processing delays
 - Data entry
 - Medical & technical review
 - Reconciling partial payments and rejections
 - Payment



Research Questions

1. How do actors in the Uganda OBA project renegotiate formal and informal social processes around the introduction of mobile devices in the claims management process?
 - a) What are formal and informal social processes currently used by the actors to manage information?
 - b) How do these current processes reflect social dynamics and accommodate structural and institutional context?
 - c) How do actors renegotiate social dynamics reflected by the current processes in the context of the new system?
 - d) How do processes around the new system reflect social dynamics and accommodate structural and institutional context?
2. How does one use the deployment of a new technology as a vehicle for understanding social and technical change?

Service Provider Perspectives

I don't know. I don't know how we are performing. I don't know how we are faring. And of course my staffs are also complaining. They are overworked, they don't get any benefit from the project, and of course it takes a lot of time... They need to be motivated as individuals. All that will depend on - are we making any profits?



Timely processing
7 days: 2/12
14-15 days: 7/12
30 days: 2/12

12/12 own a mobile phone

4/12 have computer training

3/12 have not gotten feedback

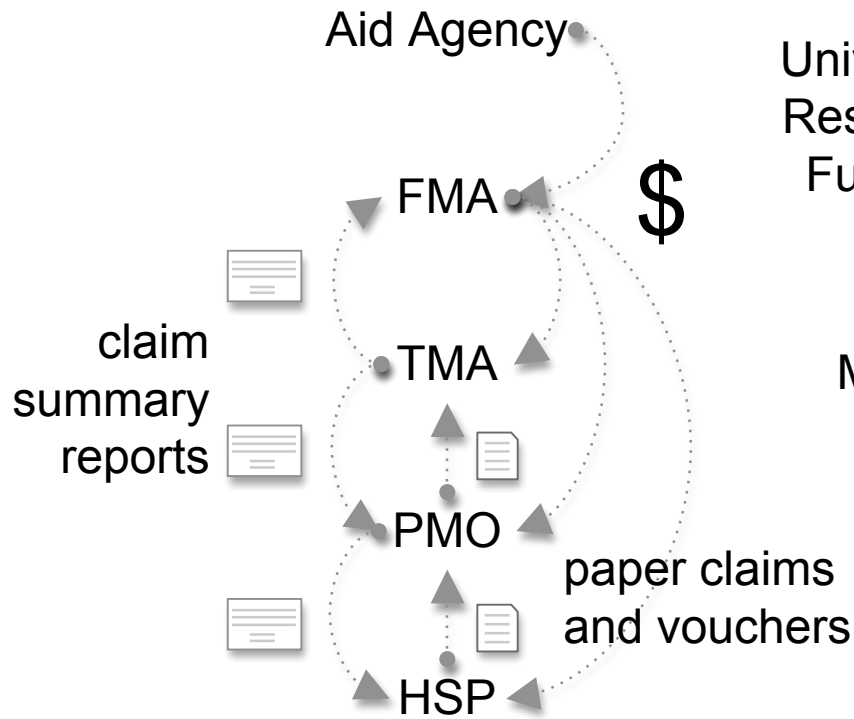
11/12 complete claims forms during consultation

4/12 don't know how many claims have been rejected

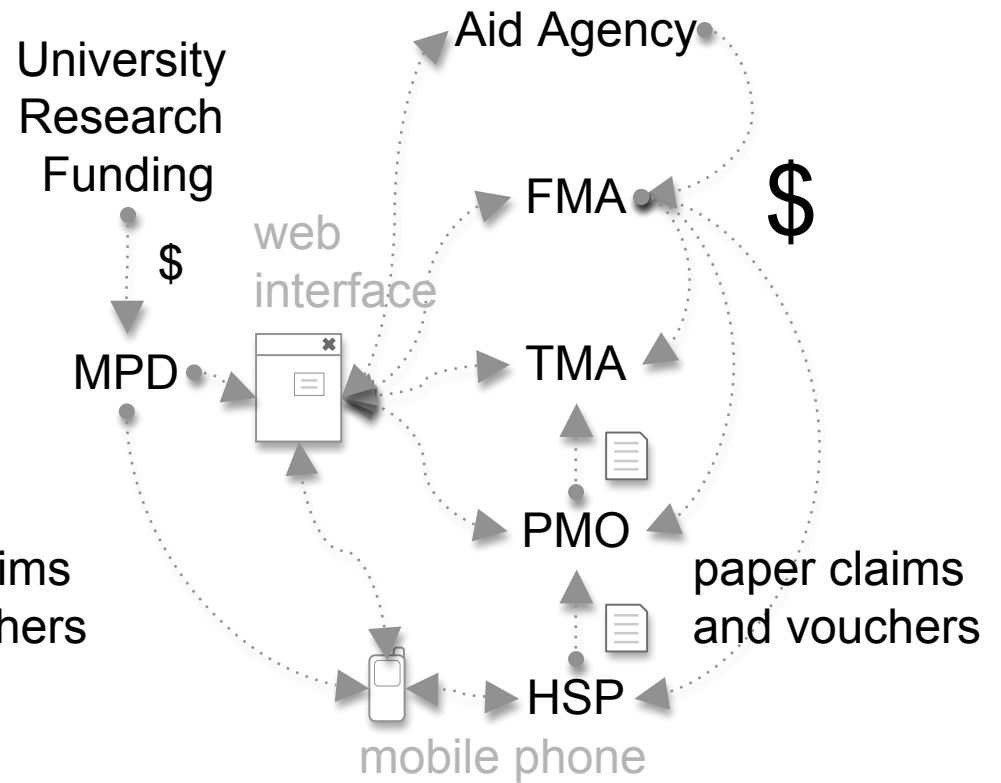
Providers travel up to 3.5 hours to submit claim forms

Re-negotiating social processes

Current



Claim Mobile



Claim Mobile: HealthyLife Claim Form

VMUS Claim Form No. 19003 **Patient Name:** ██████████ | **Age:** 23 | **Gender:** Male
Voucher No. 020006289P0 **Village:** Kakyeka | **Parish:** | **Sub county:** Kamukuzi | **County:** MM

Client Partner Visit Type: **First Consultation**
 Visit Date: 22/Aug/2008 Visit Time: 16:00

Medical Information

Service Provider: FAMILY PLANNING ASSOCIATION OF, Staff: ██████████
 Syndrome(s): Others:
 Clinical Examination: H/O unprotected sex 7/7. C/O painful micturation 3/7. no visible discharge
 Additional: Next Visit Date: 01/Sep/2008 | Cured Not Cured
 Diagnosis: Gonorrhea

Investigations

Service	Result	Amount
Wet Prep/Gram Stain	Wet Prep Findings: Gram -ve cocci+++, Intracellular Diplococci+++,	3000

Drugs

Prescribed drug	Route	Freq	No of days	Total pills	Amount	Actions
Syringe and Needle, 1		1	1	1	200	delete
Ceftriazone, 1g	Parenteral	1	1	1	5500	delete

Charges

Consultation 5000 Ush	Laboratory 3000 Ush	Drugs 5700 Ush	Expected Total 13700 Ush
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Annotations

Claims Status: Quarantined

Date	Sender	Message	Variance
03/Sep/2008 07:25	joseph	Partial: Next date of visit: wrong or not filled in (QC13) Note: Claims status changed from Unsubmitted (1) to Under Administrative Review (3).	0
03/Sep/2008 07:25	joseph	Note: Claims status changed from Under Administrative Review (3) to Preliminary Approval (Awaiting Voucher) (4).	0
03/Sep/2008 07:26	joseph	Partial: Wrong voucher attachment/interchanged vouchers on followup visits (QC14) Note: Voucher attached is for C3, not C0 Claims status changed from Preliminary Approval (Awaiting Voucher) (4) to Quarantined (5).	0
03/Sep/2008 07:27	joseph	Partial: Wrong consultation fees (QC11) Note: No consultation allowed with follow-up (as indicated by c3 voucher)	5000
Total Variance			0 USh
Adjusted Total			13700 USh

Add Annotation

Sender: melissa
 Quarantine Code: None
 Rejection Reasons: None
 Claim Status: Quarantined
 Note:
 Variance:

basic
claim
data

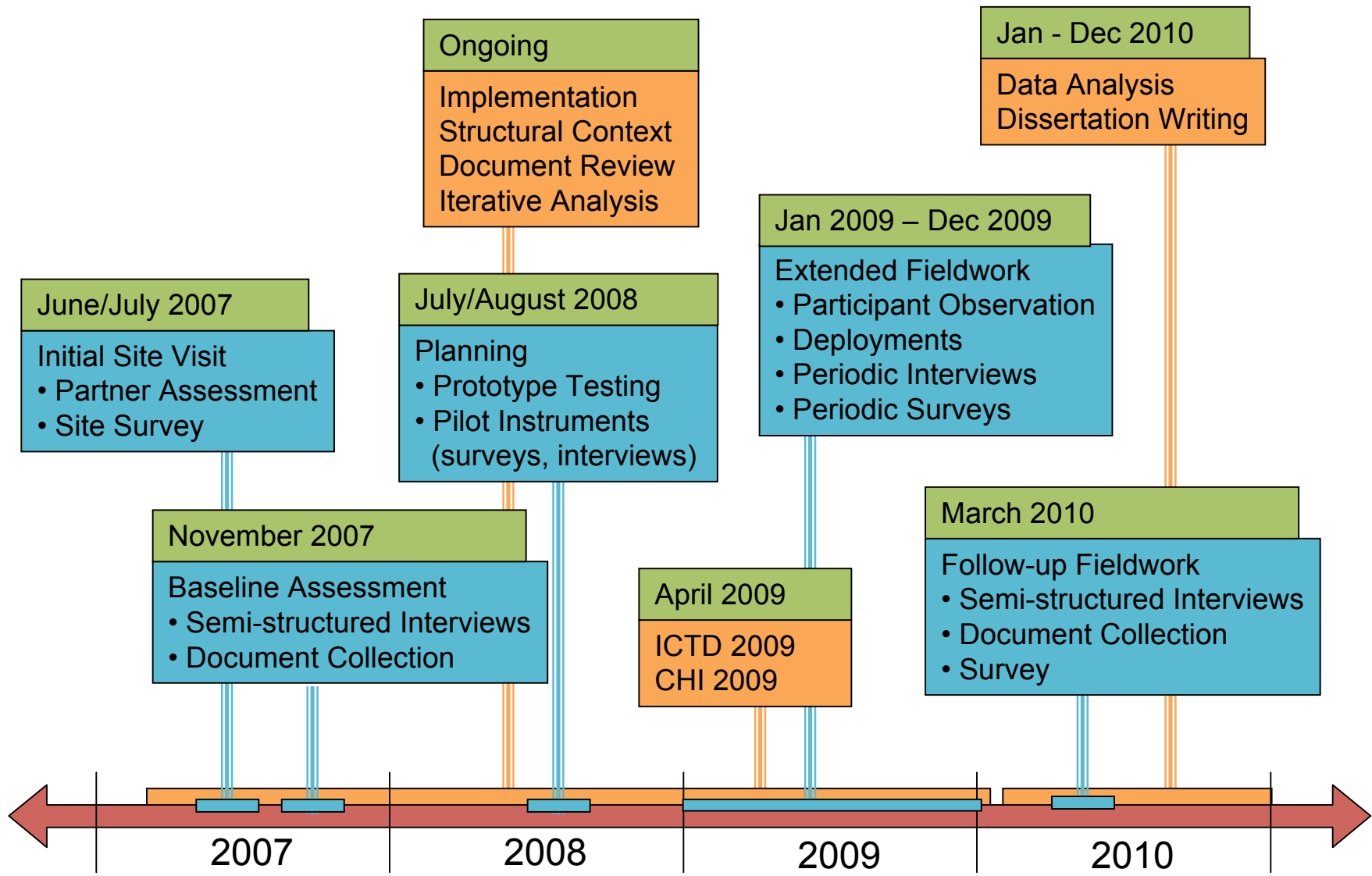
messages

update
statuses

prices from
database
figures

a
warning
with no
penalty

Timeline



1. Role Model Opportunity

Would you like to share your passion and experience with technology, science, and engineering with girls? We are looking for role models for Techbridge, an after-school program in technology, science, and engineering for girls. A program of Chabot Space & Science Center, Techbridge serves girls in grades 5-12 at school sites in Oakland and surrounding communities in the Bay area.

Role models get involved by visiting Techbridge after-school programs and/or facilitating field trips at their worksites. We provide a 2-hour training along with follow-up support and resources that will help you develop an interactive lesson that is meaningful to the girls.

Our fall role model training is scheduled for Saturday, October 25, from 9-11 AM at 7700 Edgewater Drive, Suite 214, in Oakland.

To reserve a space in this role model training, please RSVP to Meg Shimizu, at MShimizu@ChabotSpace.org or 510.777.9170 ext 305.

2. Solar Installation Opportunity

If you are interested in learning about solar energy and want to give back to your community, join GRID Alternatives as we make the benefits of solar power accessible to low-income families. All of our work benefits low-income families and is accomplished through a community effort using volunteers like you. You do not need to have any prior experience or special skills in order to volunteer. All you need to do is complete a volunteer application (see below), attend one of our mandatory training sessions and RSVP to reserve a spot on a workday(s). Training and workday dates are listed below. The training will cover the basics of electricity and solar power, solar design, financial analysis of solar, as well as the actual nuts and bolts of the installation process, with a focus on safety. Once you have been trained, you can volunteer as often as you like without attending additional training sessions.

We can only accommodate a limited number of volunteers on the installation days, so please RSVP promptly to this email if you want to be guaranteed a spot on the installation.

Additionally, if you know someone else who might be interested in participating, feel free to forward this on.

VOLUNTEER TRAINING SESSIONS

Attendance at one of our volunteer training sessions is mandatory. If you have previously attended a training, you do not need to attend another.

Thursday, October 23rd, 6:30pm – Oakland

SOLAR INSTALLATION WORKDAYS

Volunteer for one or more days, it's your choice. You do not need to volunteer for consecutive days. All workdays begin at 8:30am and finish up around 4:30pm. Specific addresses will be provided after you've RSVP'd.

Saturday, October 25 - Redwood City

Saturday and Sunday, - November 1st and 2nd - East Palo Alto

Thursday and Friday, October 16th and 17th - Redwood City

Come to the
2008 TIER Workshop!
(it's free and there will be food)

Friday and Saturday
October 17-18, 2008
University of California, Berkeley

Keynote Speaker:
Prof. Tim Unwin, UNESCO Chair in ICT4D

<http://tier.cs.berkeley.edu/wiki/Workshop:2008>
(please rsvp online if you are coming)

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The AIR project – development through gender equity

Revi Sterling

PhD Candidate, ATLAS Institute
University of Colorado - Boulder



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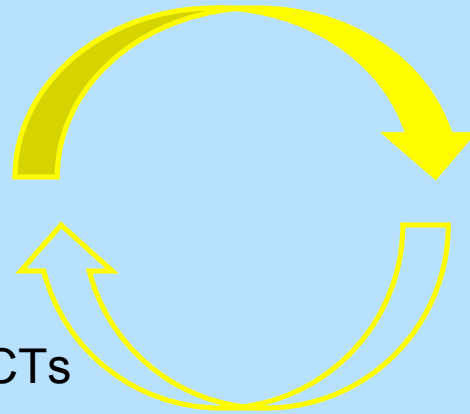
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The Ugly Reality

- Women key to sustainable community development (qual + quant)
- UN: access to ICT as the third most important issue facing women globally (poverty + VAW)
- Tech progress not equal to social progress
- Barriers to tech pose even greater problems for women – cost, literacy, time, safety, culture, perceived relevance
- Billions spent annually on failed ICTD projects
- Can't sustain if not gender equitable

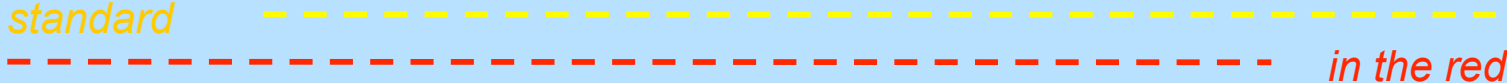
**Access to information
is critical for women's
empowerment.**

Focus on creating ICTs
that benefit women



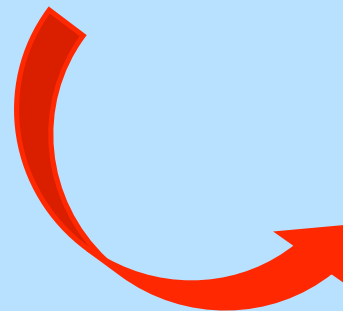
Women's empowerment leads
to community development

gold standard



in the red

Create ICTs that do not incorporate
women's requirements or needs



Uneven development/
under-development

“There’s a special place in hell for women who don’t help other women.” - Albright

When we try to do ICTD for women, we mess up. Big time.

- We don’t get to think we “know” women.
- We tend to group women together as a nice tidy coalition who will act the same, esp w/ technology.
- We can alienate men.
- We universalize the experiences of a few (case studies).
- We don’t study the culture, the gender nuances.
- We don’t study the dev efforts from yesteryear.
- We are not given the time to do it right.
- We are pushing the rock uphill to start with (meritocracy).

Advancement through Interactive Radio

- Attempts to address these issues – barriers to use, participation, individuality, cultural appropriateness
- Radio most popular mass medium: “Africa’s Internet;” massive growth in Community Radio
- Enables women’s voices and knowledge to be publicized and recognized, “legitimized.”
- Women driving their own development agenda

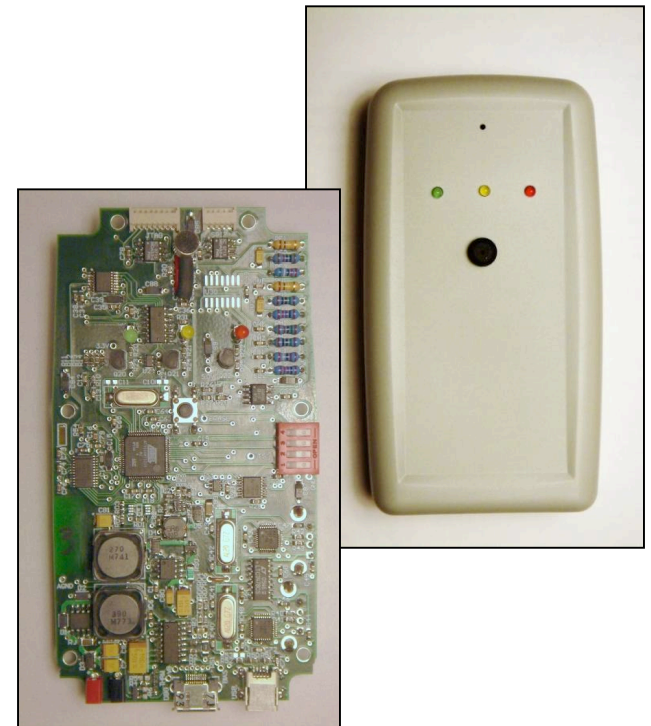


What AIR is

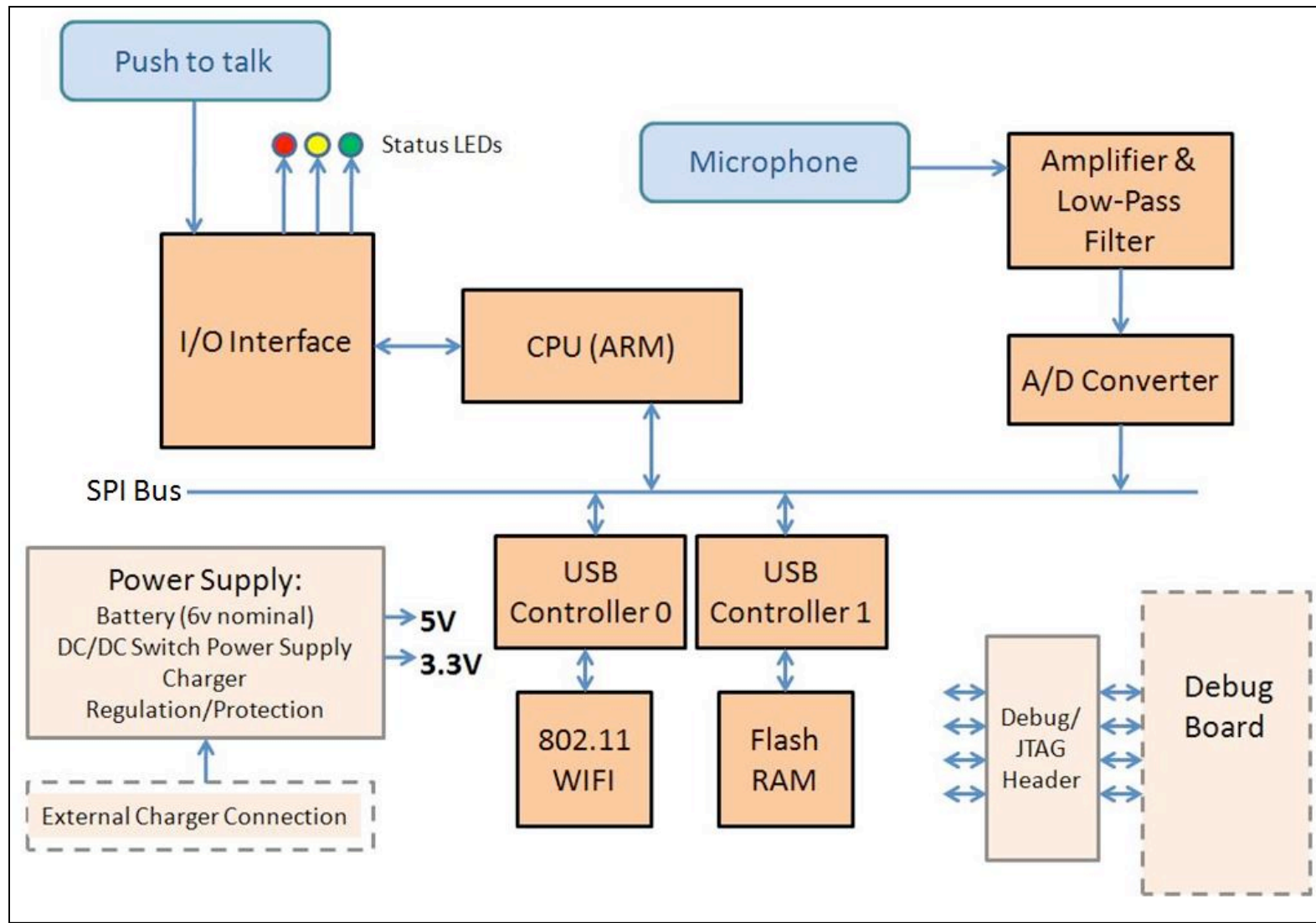
- A custom communications device to assist in women's, and thus community, advancement
- A mechanism that enables women to “talk back” on radio airwaves, giving radio limited interactivity
- Research that tests several social and development theories
- A system: handset, hardware, software, community radio
- Based on women's requirements
- An interim solution until:
 - Rural communities are on cellular and electrical grid
 - Women can afford cell phones
 - Women are permitted to be more active, vocal and mobile members of their communities

AIR Features

- Lightweight, portable, sturdy (dust/wind/children)
- Very low power design based on ARM processor and RTOS
- Simple push-to-talk operation – button and microphone
- Commodity 802.11 and Flash RAM USB devices
- Designed for women’s voices - amplified and passed through a low-frequency bandpass filter before A/D conversion
- Delay-tolerant network protocols
- Adaptive routing algorithms
- LEDs provide device and transmission status information
- “Voicemail” software client on PC for post-production
- Portable solar recharge stations
- External board for debugging and software development



Device Block Diagram



Is it working??

- DVR pilot – test concept
- Two new radio programs, “heavy” topics
- Post recording interviews
 - “We feel like jumping up and down like young calves!”
 - “For instance when I hear my names mentioned at the end of a programme being credited for my contribution, it makes me feel important in the society.”
 - Speaking out about contentious topics enables women to share “great and brilliant ideas.” And “When brilliant ideas are aired, people from all walks of life listen to them and this changes the community.”
- Mixed community response, mostly positive
- Men – radio makes women important

Ongoing education...

- More important to be a social scientist than a technical expert
- Translating community requirements can lead to technical advancements
- Working with developing communities
 - They are development savvy
 - Myths of *community* and *participation* (PAR) can skew results and exacerbate community divides
 - What's in it for me? If community does not see value proposition, effort will fail. *Women enjoy celebrity status more than they are focusing on community development...*
- Must be on the ground A LOT

What to do about it?

Immerse yourself in the cultural of region:

- Caste and tribal implications (water example)
- Gender roles and history of gender roles
- Past development efforts – who, why, outcomes
- Contact the experts – “ownership”

Be realistic:

- Set expectations – development takes TIME
- You are not going to fix centuries of problems in one swoop
- Technology is a tool, not a panacea
- **Development and gender are messy work. They need good minds. Jump in. Formally or informally. Jump In.**

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ICTD in CS Curriculum

Ruth Anderson

Lecturer, Computer Science and Engineering
University of Washington



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ICTD in CS Curriculum - Why?

- Expose students to broader impacts of the field
- Appeal to altruistic and interdisciplinary interests of students
- Potential to attract, retain, motivate



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ICTD in CS Curriculum – How?

- Reading Seminars
- Integrated into other courses (Networks, OS, Architecture, HCI)
- Capstone Projects



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Capstone Design Course at UW

- Q1 - reading seminar
- Q2 - design solutions
- Q3 - implement

- Groups of 4-6 students
- Posters, papers, presentations



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Capstone Projects



- **Classroom Presenter** for the OLPC
- **Empowering Artists** – web site for helping local artisans market their crafts
- **Starbus** – coordinating transportation via text messages in Kyrgyzstan
- **MySMS** – allow cell phones to interface with database via text messages
- **CommCare** - helping community health workers in Tanzania manage patient care using cell phones
- **AIR+** - Extension to Revi's AIR project



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How to Get Involved

Student:

- Get involved in research projects
- Take classes in development or ICTD
- Engineers without Borders, Service Learning
- Apply to grad school (CS, iSchool, multidisciplinary programs)

Faculty:

- Expose your students to this area!
- Read a paper from ICTD in your networks/os/hci course
- Start a reading seminar
- H-FOSS, EWB, Service Learning
- Seek out connections in other departments

Industry:

- Your company's social responsibility goals
- Volunteer your time
- Emerging Markets/Research (ask Melissa and Revi)



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Questions?

- Ruth Anderson
(rea@cs.washington.edu)
- Elizabeth Basha
(e_basha@mit.edu)
- Melissa Ho
(mho@ischool.berkeley.edu)
- Revi Sterling
(revi@wildwood.cs.colorado.edu)

- Handout
- <http://gracehopper.ictdchick.com>



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