

# CSE 477

Project Ideas

January 20, 2009

# 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

Andy Peck

# Radio Craigslist

- Problem:

- Very little communication infrastructure in rural Africa

- Difficult to spread information on the macro level

- Weather updates, disease outbreaks, etc...

- Trading partners must meet via word-of-mouth or via chance encounters

# Radio Craigslist

- Solution
  - Create an automated radio station with user content submitted via cell phone
    - Takes advantage of the prevalence of cell phones and radios in rural Africa
  - Allow users to post ads or announcements
  - Allow official organizations to post announcements with high priority

# Radio Craigslist

- Technologies:
  - Radio (abundant, and available in human powered version)
  - Cell phones (abundant, limited use required)



Clint Tseng

# field worker management

promote easier and more frequent **collaboration**  
between different NGOs

increase environmental **awareness** and **capability** of  
NGO field workers



# field worker management

## application

mobile app

any device with GPS

no limit on data

strong communication tools

## challenges

connectivity

initial dataset

trust?

evaluation done by consumer

Guy Bordelon

# CSE 477 Project Idea Part 2

- Undependable weather forecasting in developing world
- Up to the minute weather report from neighbors
- Custom device for collecting data
- SMS for up/downloading weather data
- Server collecting (maybe processing) data

# CSE 477 Project Idea Part 2

- Build a device to collect pressure, humidity, altitude, windspeed, temperature data (or an interface for a cheap device that already exists?)
- Stationary or mobile device powered by battery (solar cell?)
- Cellphone/device communication, device maintenance, learning if it's even useful...
- Could be evaluated using local field testing

Jennifer Hanson

# Development for X

- Issues
  - There are relatively few devices made to accommodate the needs of the developing world. Technology has to be inexpensive yet rugged. The cost of components, such as the larger display screen, make computers too expensive for the average person. However, cell phones are relatively inexpensive and common and provide for oral and textual transfers of information.
  - Software for discrete applications undergoes extensive development and testing. Much time is spent individualizing it with regard to elements such as language and cultural symbols.
  - As outsiders, much time is spent learning the needs of smaller communities and just learning what problems exist and could be potentially solved.
  - People from these communities and who have come from these communities know the culture, language, and politics. They could be extremely useful.
- Solution
  - A platform for creating cellular applications could be formed. Similar to how Visual Studio abstracts the code behind visual components in forms applications, this platform could abstract the network and hard coding behind the applications.
  - This would allow people less versed in Computer Science to create applications tailored to their needs or the needs of the communities from which they came.
  - It would allow social scientist to create more programs for the societies which they study.
  - Applications could be individualized for specific languages and cultures.
  - The platform could be placed on an open source website and the applications generated could be placed in a database that could be accessed by cell phones.
- Technologies
  - The technologies would involve several software components and hardware for testing. It would have to be generalized for use on many types of phones.
  - The website could be available in English, Spanish, French, Hindi, and other larger languages for developers to use.

# Development for X

- Product would:
  - Have a platform for design similar to VS with several pictorial elements
  - Have a database that stores the applications created
  - Have a way to get the apps on the database to the people in related geographic area
- Challenges
  - Offering an incentive for people to contribute to the platform
  - Showing the apps to people in the developing communities so they will actually know and use them
  - Storing the apps for usage
- Evaluation
  - Initial testing could be done with a small local set of phones and apps
  - Larger tests could encompass a larger group of people and a few starter apps in different languages
  - An evaluation form could be added to the website or a feedback cellular application could be added

Charlotte Robinson



# Reducing Gov't Corruption: Food Distribution

## **Problem:**

Economy growing, malnourishment rampant. Starvation and malnourishment are result of the failing administrative system in India.

- Licensing procedure for running a Public Food Distribution (PDS) shop is plagued by corruption. Licenses are awarded by the respective state governments and the authority to issue them is delegated to the district administrations, which are often corrupt.
- Ration card distribution

## **Reducing Gov'nt Corruption: Food Distribution**

**Solution:** A program that tracks the locations/ statistics of PDS distributors, or, on a smaller scale, software for PDS's to record orders. Such software may not be able to absolve corruption or be able to solve problem single-handedly, but it can move in right direction, increase accountability and give access to statistics.

# Reducing Gov't Corruption: Food Distribution

**Technologies Involved:** Software program on pda/cell phones (what does typical PDS magistrate have access to power-wise?)

**What Would Be Built:** Focus on simplicity for UI- minimize room for misinterpretation/skewing of records.

**Major Challenges:** Finding cooperation/a small enough scale focus. Huge problem- band-aid on a bullet-wound?

**How to Evaluate:** Field studies, data collection.

Sunil Garg

# Text-free UI

- Problem: Much of the world's population is illiterate and thus unable to independently access the vast majority of recorded human knowledge (ie. written media).
- Solution: Develop technology to bridge that gap by creating ways for illiterate persons to access and interact with information systems.

# Text-free UI

- Technologies
  - general UI design
  - information systems
- Challenges
  - necessitates an ethnographic needs-assessment and evaluation
  - finding a balance between generally applicable and specialized techniques (eg. illustration)
- What to build
  - front-end UI for an information system that is relevant to a target population
- Evaluation
  - case study of a particular deployment

Zac Fleischmann

# Microfinance

- Problem: Lack of capital and credit for economic growth
- Progress: Microfinance provides small loans
- Technology solution: Expand the geographic range of microfinance via electronic communication
- Client-side technologies: Android/SMS interface with authentication and encryption



# Microfinance

- Server-side technologies: Database for loan and repayment records
- Challenges: Security, authentication, non-repudiation
- Evaluation: Usage statistics, conflict-avoidance, conflict-resolution

Heather Underwood

# iPorter

- Problem: Porters in Nepal are poorly equipped to do their job, are uneducated about mountain safety, and face discrimination, malnourishment, preventable injury and disease, corruption, and death.
- Solution: Equip porters with “smart shoes” that are capable of taking basic health readings (temperature, weight, blood pressure etc.) and use a hand-held device to display health and GPS readings.

# iPorter

- Technology: GPS, health monitors (weight, temperature, blood pressure, etc.), basic mountain safety educational software, radio (walkie-talkie) functionality for communications between excursion groups.
- What would be built: The shoe chip (similar to the Nike device that syncs with iPods) and shoes, hand-held device that includes health alerts, health measurement display, tips/education on mountain safety, walkie-talkie/radio functionality.

# iPorter

- Challenges: Making it cheap, making it durable enough for trekking, charging it on long treks (minimize functionality to preserve battery life, use hand crank or “shaker” recharging techniques?), making results easy to understand and accurate
- Evaluation: Collect data on number of porter deaths/accidents each year, interview porters on usability and provided functionality
- Other ideas: Calculator, photos, weather reports, music.

Beth Gusenius

# Training Traditional Birth Attendants to Prevent Maternal Mortality

- Problem: About 99% of women who die in pregnancy or childbirth live in the developing world. Most of these women do not have access to adequate health care. Often, the only care these women receive is from traditional birth attendants.
- Solution: Provide community health workers and/or rural communities with a way of reporting infant's vital statistics health care professional for evaluation.
- Technology: Tutored video instruction, possibly augmented with flip chart or PDA based diagnostic tool.

# Training Traditional Birth Attendants to Prevent Maternal Mortality

- Challenges
  - Cost
  - Appropriate user interface
  - Cultural barriers to adoption
- What to Build
  - Editing of video series, UI for PDA-based diagnostic tool
- Evaluation
  - Feedback from community, traditional birth attendants, community health workers, and health care professionals
  - Maternal mortality statistics



# CSE 477

Project Ideas

January 13, 2009

Andy Turner

# PCG SR

## Pull Cord Generator Smart Recharger

- Problem: Low cost human power generation.

### Power

- Potenco car battery charger
- Need for better feedback on charging level



- Makes excellent use of available muscle power.
- Improper charging of batteries ruins them.

- Solution:

- Integrate power conditioning and user feedback using additional electronics, micro-controller and a simple display.

- Technologies:

- Batteries – Determine the proper recharge profiles for Lead Acid ‘wet cells’, NiCad, and Lithium Ion batteries.

- Electronics – Measurement and Power – sense system activities, condition power flow appropriately.

- Micro-Controller – Coordinate the activities of the electronics and provide user feedback.

- Product:

- One of:
- Integrated inside the generator.
- Auxiliary box.

- Challenges:

- Potenco has not yet released their product for purchase (est mid 2009).
- Determining and verifying the recharge profiles.

- Evaluation:

- Does the product ‘correctly’ recharge batteries?
- Is the device robust and fool proof?

Guy Bordelon

# CSE 477 Project Idea

- Cuba is ravaged by tropical storms
- More people are buying cell phones
- SMS storm alerts to subscribers
- UW Dept of Atmospheric Sciences data
- Software application that reads forecast data
- Internet-based software application that sends SMS alerts

# CSE 477 Project Idea

- Bureaucracy
- Finding Participants
- Could be evaluated using field testing



Trevor Bosaw

# Text Viewer

- Problem: Even with limited internet in extremely rural areas, information is still very difficult to receive. There doesn't seem to be many easy ways to quickly receive moderate amounts of information (for example, almanac info for farmers).
- Technology solution: Simple, cheap text viewer (similar to kindle, but less features). No direct internet connection, but would connect to computer via usb, drag text files (or something similar) to volume.

# Text Viewer

- Technologies: Hardware of device, usb, website server
- Challenges: cost of device, intuitive and simple device interface, intuitive website (to be able to quickly find and download necessary information)
- Evaluation: Data on a single (or multiple) town's usage of the device would be taken, including how they were able to contribute/download from the website.

Charlotte Robinson

# Distribution: Reducing Gov't Corruption

**Problem:** Food, other goods, or services are transferred from government sources to sometimes corrupt district magistrates to be distributed. (IE, school incentives, etc)

**Solution:** Corruption might be lessened by automated and reliable delivery systems and computerized record keeping. Electronic record keeping would provide a way to track what is going where and make individuals more accountable.

# Distribution: Reducing Gov't Corruption

**Technologies Involved:** Data storage/networking/potential low-cost devices for record entry/signatures.

**What Would Be Built:** UI for data entry/ record lookups.

**Major Challenges:** Getting gov'n't workers to embrace system / having people track results.

**How to Evaluate:** Data collection in India / (surveying citizens, comparing against current numbers).

Clint Tseng

# goods and services

may be difficult to sell/trade goods and services  
between reasonably close rural villages and towns

therefore, build a 'craigslist for the developing world'



# goods and services

organic enough to deal with **connectivity**  
mesh/p2p networking

simple enough to deal with **clarity**  
visual interface; audio/video options

evaluation is easy; collect usage data

Tom Sommerville

# Genealogical/Social Identification

- Problem: Maintaining records of individuals is difficult when there is no unique identifier. The problem is made worse by the fact that information is often incomplete or missing (unknown birthdates, inconsistent names, etc.)
- Solution: Create a system that combines a map of a person's familial relationships with another of their social relationships, along with other information such as social positions, to uniquely identify that person. Collect information about a person's family tree, as well as neighbors and friends, and their social roles, to create the maps.

# Genealogical/Social Identification

- Technology: Map-Matching  
Mobile (Android?) Interface
- Challenges: UI Design  
Designing Questionnaire  
Developing Matching Algorithms  
Determining ways to accommodate missing data such as birthdates  
Determining ways to accommodate inconsistent data  
Maintaining Data Security

# Genealogical/Social Identification

- What to Build:
  - Database for Identity Data
  - Mobile Interface (Android?)
  - Interview Questionnaire for Identity Establishment
  - Interview Questionnaire for Identity Testing
- Evaluation:
  - Health Workers and other organization representatives whom use the data to ID individuals
  - Individuals who use the system to track their genealogy

Beth Gusenius

# Birth Records & Neonatal Risk Detection

Beth Gusenius

# Birth Records & Neonatal Risk Detection

- Problem: Many births in the developing world occur without the assistance of a medical professional. Often attendants do not have the training to recognize significant risk factors, such as low birth weight.
- Solution: Provide community health workers and/or rural communities with a way of reporting infant's vital statistics health care professional for evaluation.
- Technology: Web-enabled cell or possibly an Android implementation



# Birth Records & Neonatal Risk Detection

- Challenges
  - Designing practical UI for non-literate users
  - Connectivity
  - Cost
- What to Build
  - Create form/survey to collect vital information, possible Android implementation, & durable, low-cost scale
- Evaluation
  - Feedback from community health workers and health care professionals, Comcare project

Jennifer Hanson

# Potable Water in the Developing World

## Description

- Clean water is essential for life, yet large segments of the world lack this vital resource. It is quite costly and often privatized in the developing world.
- 99 percent of water on Earth is unavailable or unsafe for consumption.
- About 1.2 billion people lack safe water.
- 2.6 billion do not have access to adequate sanitation.

## Importance

- Water is essential for poverty reduction, agriculture, food and energy production, and recreation.
- It is a women's issue-Time spent gathering household water, traditionally a women's task, robs women and girls of getting an education or engaging in meaningful work.
- It is a children's issue-water is essential for healthy development.
- It is a national security issue-many conflicts arise from disputes over arable land and water.

# Potable Water in the Developing World

## Description of the application

- A simple communal water purification system could be devised.
- It could contain a water purification component, a cost counter (ie a gas pump only for water), and a tab system.

## What does it do?

- The owner could purify the water, charge a nominal fee per volume purchased, and monitor payments.
- The purification component would remove harmful bacteria, parasites, calcium, heavy metals and other toxins.

## What is it good for?

- The system could allow the economically disadvantaged an opportunity to purchase cheap and safe water.
- It could foster home businesses and increased entrepreneurship opportunities for those in impoverished communities.

## Who will care?

- This system could benefit those in need of clean water and cannot afford to purchase current options.
- This system could benefit those who could form the home business.

Heather Underwood

# Project Proposal: Deaf Education

Heather Underwood

- Problem: India and Nepal have large deaf populations. Deaf children have little or no access to education and are often seen as outcasts.
- Solution: Develop a sense of community among the deaf in these areas. Provide education to deaf children from deaf children. Foster a national form of sign language.

- Technologies:
  - Video phones, better video/picture SMS technologies
  - DVDs focusing on promoting literacy and sign language (as well as basic health education), video manipulation, editing, replay.
  - Wireless connectivity, long distance networking
- Challenges:
  - Power, connectivity
  - Cooperation among deaf population and reaching deaf populations in rural areas
  - Communication, literacy, text to sign translation
  - Deaf-targeted UI for education and communication



- What to build:
  - Cheap portable DVD player
  - Robust video phones that can be used with local telephone connections
  - Educational software for deaf children to promote literacy and a national form of sign language
- Evaluation:
  - Feedback from teachers of deaf students in India
  - Determine if a national form of sign language is developing by comparing the signs used in various regions.

Danny Anderson

# Mobile marketplace

**Problem:** Merchants, farmers, and service providers aren't reaching as wide of an audience as they could.

**Solution:** Build an SMS based mobile marketplace where sellers can upload ads and customers can search any desired good.

**Technology:** SMS I/O with SQL server. A free phone number should be provided to teach how to use the system, and also a web page and portal to the system. Hopefully this all could be provided as a free service.

# Mobile Marketplace

Challenges: Secure use and not exploitable by any party. Fair and equal somehow. Schema to index information.

What to build:

Web page, database, and SMS combined project. Use an existing SMS SQL interface.

Evaluation:

Have buyers remove sold items, track sales.

Sunil Garg

# Rural Mapping

- Problem: NGOs are not able to maximize their effectiveness in working with their target populations due to inadequate record keeping, lack of access, and difficult terrain.
- Solution: Build a system that facilitates geotagged data collection which would then allow rich mapping of the population and issues surrounding them, as well as location-enabled services for rural workers.

# Rural Mapping

- Technologies: existing NGO information systems, location-enabled mobile devices
- Challenges
  - effective mobile user interface
  - integration with existing systems
  - cost
- What to Build
  - mobile data collection toolkit that is location-enabled
  - collect information that is easily consumed by existing information systems
  - display and visualize the geotagged data in a useful manner
- Evaluation
  - feedback from the NGO
  - data collected from deployments

# Additional Ideas



Charlotte Robinson

# Translating Existing Medical Data/ Easy Entry

**Problem:** Currently, healthcare workers may waste time trying to identify someone/re-identify their problem, because of inconsistent methods of identifying someone.

**Solution:** Develop programs to translate current data into common formatting, and/or a program with easy UI/data entry for translating paper records to computer with low technical expertise.

# Translating Existing Medical Data/ Easy Entry

**Technologies Involved:** Devices for data-entry, surveying.

**What Would Be Built:** Mobile program for surveying, laptop program for data entry and/or surveying and/or translation of existing records.

**Major Challenges:** Creating UI for non-technical people to enter/translate data.

**How to Evaluate:** Data collection in India / (surveying citizens, comparing against current state).

# Richard Anderson

- From January 6

# 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