Technologies for Communities: Managing Information from the Grassroots

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The Rural Developing World

4.8B people live in developing countries (many in rural areas)

Rural developing world people have many information needs
  – Manage finances
  – Learn about business opportunities
  – Access government services
  – Access medical guidance
  – Communicate with customers or suppliers

However, they also have constraints
  – Purchasing power
  – Infrastructure (power, network, shelter)
  – Education and literacy
Projects

**Knownet-Grin**
knowledge network for grassroot innovators

**Hisaab**
interfaces for semi-literate users

**CAM Framework**
paper programming for mobile phones
Knownet-Grin
Knowledge Network for Grassroot Innovators: A Honey Bee Project

- Honey Bee Network shares local knowledge and grassroots innovation
- Publishes regional magazines
  – agricultural practices and other innovations
- Interested in finding new ways to share content and facilitate multi-stakeholder communication
- Visual Basic app with multi-media distributed database with asynchronous updates and messaging
- Implemented at kiosks in Gujarat, Madhya Pradesh, Maharashtra and Tamil Nadu
8 Rules for Rural Computing

- **Easy to Use**: Deal with all classes of novice users
- **Easy to Teach**: Conveyed by *word of mouth*
- **Easy to Distribute**: Remotely, and person-to-person
- **Easy to Share**: Individuals can't afford devices
- **Easy to Develop**: Allow local content and applications
- **Flexible**: Language, culture, infrastructure varies
- **Trusted**: By both users and *non-users*
- **Serving a Need**: Technology is a big investment
Self-Help Groups are member-owned microfinance groups

- 12-20 members, over 1m SHGs in India (90% women)
- Members from poor, disadvantaged classes
- Save money during meetings, make small loans for starting a business, buying livestock, education, etc.
- Repayment based on peer pressure
- Similar groups exist worldwide – Grameen, Village Banking, Credit Unions, ROSCAs, etc.
Banks would love to work with SHGs
- Demand for capital exceeds supply
- Excellent performance (90-98% repayment)
- Fulfill social (and regulatory) objectives

However, there are many obstacles
- Members have little or no education
- Many practices are inconsistent
- Groups spread across remote rural areas
- Expensive to collect information and money
Hisaab: Problem Statement

Information systems are key to scaling microfinance
- Transaction processing
- Monitor members and groups
- Analyse performance and impact
- Link to formal institutions

Can we design a UI allowing SHG members to document their own transactions?
- Accessible to semi-literate and illiterate users
- Accurate and efficient
Importance of Paper
- Ubiquitous in existing work practice
- Understanding tied to current tabular formats

Numeric Input / Output
- Calculators are commonly used
- Even semi-literate users can input numbers
- Avoids local language input

Audio Output
- Local language audio great for rapport
- Accessible to semi-literate and illiterate users
**Scalability**
- PCs and Laptops are too expensive
- Affordable if shared by many groups
- Infrastructure - power, network, shelter
- Must be kept at a central place
- Excessive travel and inconvenience

**Accessibility**
- Users developed understanding of the system
- But can't provide efficiency or accuracy
Mobile phones are an attractive alternative
  – Exponential growth in Africa and Asia
  – Numeric Keypad, Audio, Network

Mobile device supports Agent Model
  – Travelling agents collect money and data
  – Common motif for many rural services
  – Most convenient for members / clients

Mobile UIs are hard to use - Can we develop a suitable UI?

The Next Step: Mobile Phones

The Economist, Mar 10, 2005
**CAM:** Paper Programming for Mobile Phones

**CAMForms**
Interactive forms

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**CAMBrowser**
Mobile phone app to process forms

```html
<function name="a_click">
  d = input_date("Date", "date.wav");
  i = input_int("Interest", "int.wav");
  p = input_int("Principal", "pri.wav");
  if (d & p & i)
    http_put("...");
</function>
```

**CAMScript**
Scripting language for form interaction
Navigation
- Barcodes and printed numeric strings used to access records and functions

Content
- XML scripting language
- API for accessing phone features
- Multimedia – play and record

```python
<function name="a_click">
    date = input_date("Enter Date" "date.wav" );
    amt = input_int("Enter Amount", "amount.wav");
    message_note("Say your name","sayname.wav");
    record_audio("name.wav");
    if (amt != 0)
        email("tap2k@yahoo.com", "a="#amt, "name.wav");
</function>
```

Networking
- Synchronous - HTTP
- Asynchronous - SMS, MMS, E-mail
Usability Testing

Task: Record transactions during SHG meeting
- 'Laboratory' and in-situ testing
- Using barcode navigation
- Users: 14 NGO field staff from villages
- Literate - 7th grade to college education

Results: Mobile phones are a usable solution
- Learned system within 3 days
- Avg 30 secs per form, 8-10 mins per meeting
- Less than 1% error rate
- All users described interface as very easy or easy
SHG MIS using CAM

- Pilot planned with 24 staff / 400 SHGs / 6000 members
- Reports will be provided to NGO and banks
- Many other NGOs and MFIs are interested
More Applications

Supply Chain  Javid and Parikh - ICTD 2006
- Track distribution of products
- Manage inventory at rural warehouses
- Integrated with GSM / GPS tracking

Rural Cash Register
- Cash Register + Scanner + POS
- Track sales and inventory
- Linked to credit, accounting

Health Monitoring
- Access to electronic patient records
- Unified history
8 Rules for Rural Computing

- **Easy to Use**: Demonstrated for novice rural users
- **Easy to Teach**: Simple, directed interaction model
- **Easy to Distribute**: Messages, paper references
- **Easy to Share**: One agent can serve many users
- **Easy to Develop**: XML scripting language
- **Flexible**: Mobiles, SMTP, Numbers, Audio, Images
- **Trusted**: Vernacular audio, linked to paper records
- **Serve a Need**: Economic opportunity
Vision: Breaking the Information Chains

- events
- objects
- stories

multimedia

paper

123 numbers

CAM

knowledge

analysis

access
Pending Questions

Which CAM Applications can have the most Impact?
- Huge potential in microfinance and related areas
- Accountability, Security, Trust, Privacy

Can results be applied for other naïve users?

How would we design a Server?

How about a new Device?

Can we measure our long-term Sustainable Impact?
Lots of interesting UI research
  – Each iteration has led to novel insights
  – Results may be more generally applicable

Lots of compelling applications
  – Need significant time to understand
  – “the dawn of the digital age”

Lots of potential value
  – Communities will benefit by managing information better
  – Systems will succeed with community investment
ekgaon was founded in 2002 and works in providing technical, managerial and strategic support to community-led initiatives around India and the world. Currently we are based in New Delhi with a field office in Madurai, Tamil Nadu.

Current Partners and Supporters

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CARE International
Oxfam-Great Britain
Deutsche Gesellschaft for Technische Zusammenarbeit (GTZ)
Small Enterprise Education and Promotion Network (SEEP)
International Development Research Centre (IDRC)
Sarai New Media Initiative

http://www.ekgaon.com
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