Open Data Kit (ODK)
Mobile Data Collection, Aggregation, and Dissemination

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Space of ICTD technologies

- At least 3 dimensions
  - Platform: dumb, feature, smart, tablet, laptop/desktop, cloud
  - User (means): person, family, worker, enterprise
  - Mode (ends): benefit individual, community, population

- Where we work
  - Smartphones, tablets, cloud
  - Mostly worker, some personal and enterprise
  - Individual and population

- “Magnifying human intent” – Toyama
  - Strengthening existing systems in health, conservation, human rights
Open Data Kit (ODK)

- Project started in 2008
- Mobile data collection tools for Android devices
  - There was too much focus on clumsy J2ME devices
  - Not enough focus on the trajectory of technology
- Modular, open architecture
  - Too many stove-piped solutions
  - Large commercial enterprise systems
- Open source (Apache2)
  - To use for any purpose
1. Build form
2. Collect data
3. Aggregate results

http://opendatakit.org
Effort (yellow) and threats (red) collected by village forest monitors using ODK around Gombe National Park.

Courtesy of J. Pintea, Jane Goodall Institute.
Training in Gombe
Training with Surui

Carbon market certification and indigenous culture
ODK Usage

- ODK has been a successful open source project
  - Website usage stats (still doubling every year)
    - Over 150K unique visitors from 202 countries
    - Average of 10K unique visitors/month
    - Code site gets over 3K unique visitors/month
  - Online survey (73 respondents) last year (small portion of users)
    - 55 deployments involving >5500 devices in 30+ countries
- Installs and code downloads
  - 3.5K code downloads
  - 25K distinct clients have installed ODK Collect using Play
  - NOTE: many orgs setup their devices directly w/o Play
Community

- Mailing list of over 1K, developers list of over 500
- Many consulting companies (25+) “support” the ODK tool suite
  - Nafundi
  - Dimagi
  - SurveyCTO
  - Mindflow
  - Salumedia
  - Seeing Swans
Some Missing Capabilities

- Updating data on the mobile device
  - Allow users to view and edit collected data
- Customizing applications to different situations without recompiling
- Collecting information from sensors
  - Continuously and occasionally
  - Wired and wireless
- Usage of cheaper technologies (e.g., paper, SMS)
New Tools in ODK

- Survey – more customizable forms
- Tables – client-side browsing of databases
- Scan – mixing paper and digital
- Diagnostics – interpreting point-of-care rapid tests
- Sensors – internal/external sensors for monitoring
Data Architecture of ODK 2.0

Local DB on client

Sync to cloud

Row

Media files
App architecture of ODK 2.0

**App** includes
+ forms
+ data tables
+ media
+ icon
+ html/js

**Survey** app reads formdef constructs HTML5 files to render

**WebKit** renders JS/HTML5 and gathers data interacts with DB

Data rows stored in multiple tables client DB viewable with **Tables**

UC Berkeley - Development Engineering Seminar
5 Feb 2015
Architecture of ODK 2.0

![Diagram showing the architecture of ODK 2.0 between Cloud and Mobile Device sections with aggregating data sources and processing, including CSV and KML files, and database connections.]

UC Berkeley - Development Engineering Seminar

5 Feb 2015
ODK Survey

Section 2

Make a list of all individuals who normally live in this household

Listing Order: (head, spouse, children not married, children married, other relatives, domestic servant, employed guard, non-relatives)

Last Saved Name Finalized

2/3/2014 Tom

2/3/2014 Katie

Add House Member

Section 5

Who has ever smoked?

- Tom
- Katie

Fever

Is it possible to measure axillary temperature?

- Yes
- No

Feel for fever:

Required value not provided. Is it possible to measure axillary temperature?

OK
ODK Survey

Please enter your name: Tom Thumb

Please select your region: Eastern Mediterranean

Please select your country: Afghanistan

Which bird did you see? Eagle selected

This is a custom template that uses D3.js to plot an age and weight on a growth chart:
ODK Tables

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:00</td>
<td>The Ave</td>
<td>Greenwood</td>
<td></td>
</tr>
<tr>
<td>01:00</td>
<td>Kite hill</td>
<td>Gasworks</td>
<td></td>
</tr>
<tr>
<td>02:00</td>
<td>HUB construction</td>
<td>Upper Fremont</td>
<td></td>
</tr>
<tr>
<td>03:00</td>
<td>Greenlake</td>
<td>Foot of Latona</td>
<td></td>
</tr>
<tr>
<td>04:00</td>
<td>Ravenna Park</td>
<td>Chandler's Cove</td>
<td></td>
</tr>
<tr>
<td>05:00</td>
<td>Docks at WAC</td>
<td>Fremont Bridge</td>
<td></td>
</tr>
</tbody>
</table>

![ODK Tables](image-url)
ODK Tables – Hope Study App

**Hope Study**

- Screen Female Client
- Follow Up with Existing Client
- Send Data

**Add Client**

- 14752
  Age: 21
  Randomization: Control

- 88563
  Age: 20
  Randomization: Control

- 98563
  Age: 29
  Randomization: Control

- 25364
  Age: 19
  Randomization: Control

- 23456
  Age: 23
  Randomization: HOPE

- 36985
  Age: 36
  Randomization: HOPE

**Graph View**

**Intervention Arms**

- Eligible: 24%
- Hope: 35%
- Control: 41%

**HIV Status**

- Not Tested: 24%
- HIV+: 16%
ODK Tables and D3
Tea Time
ODK Scan

1. Capture form image

2. Segment the form into image “snippets”

3. Automatically classify machine-readable data types.

4. Display snippets on screen for efficient checking or data entry.
Vaccine logistics in Mozambique
ODK Diagnostics
ODK Diagnostics
Tracking time spent gathering water in Ethiopia
Human breast milk pasteurization
How we work

- Identify technology needs from on-the-ground experience
- Work with local NGO to strengthen their systems
- Focus research questions on improvements rather than outcomes
- Provide community with new building blocks
Capstone Design Courses

- Incubators for new ideas
- 3 Gates Grand Challenge Grants to date
  - Midwives’ Ultrasound (with UW Radiology) - Uganda
  - Milk Banking (with PATH) – South Africa
  - ODK Scan (with VillageReach) - Mozambique
- All projects have external customers – local NGOs
- Students from CSE and Human-Centered Design & Engr. work in teams with course staff as managers
Future Work

- Further refinement of ODK Tools for non-programmers
- Integration of interactive voice response (IVR) and SMS
- Complete sensor data flow including provenance
- Improved security and privacy
- Connection with electronic banking systems
Thank you!

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