OPEN DATA KIT:

Building and Refining Information Services for under-served Populations

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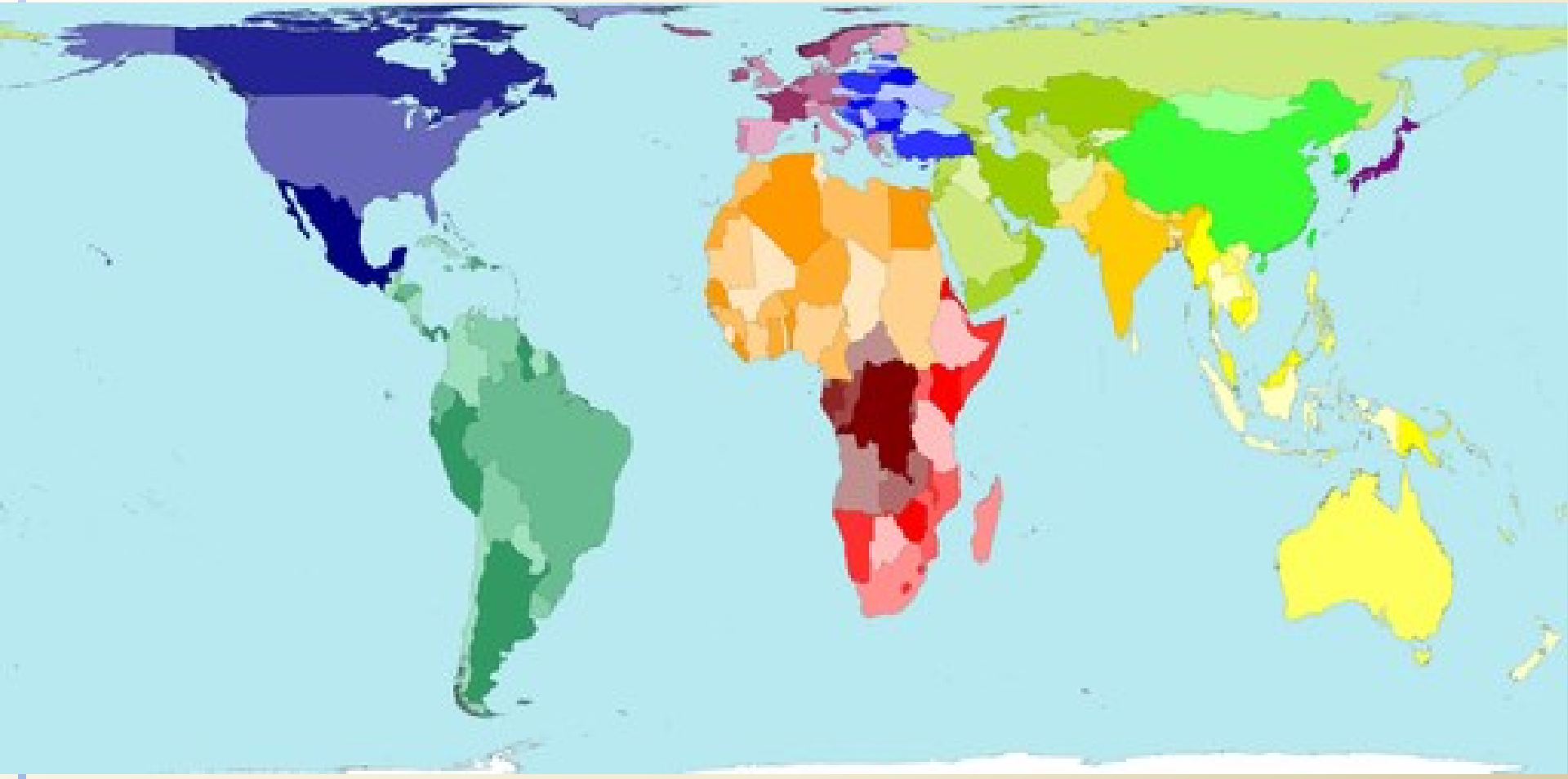
Department of Computer Science & Engineering

The work being discussed was done by a LARGE TEAM in UW-CSE.

In Tribute…

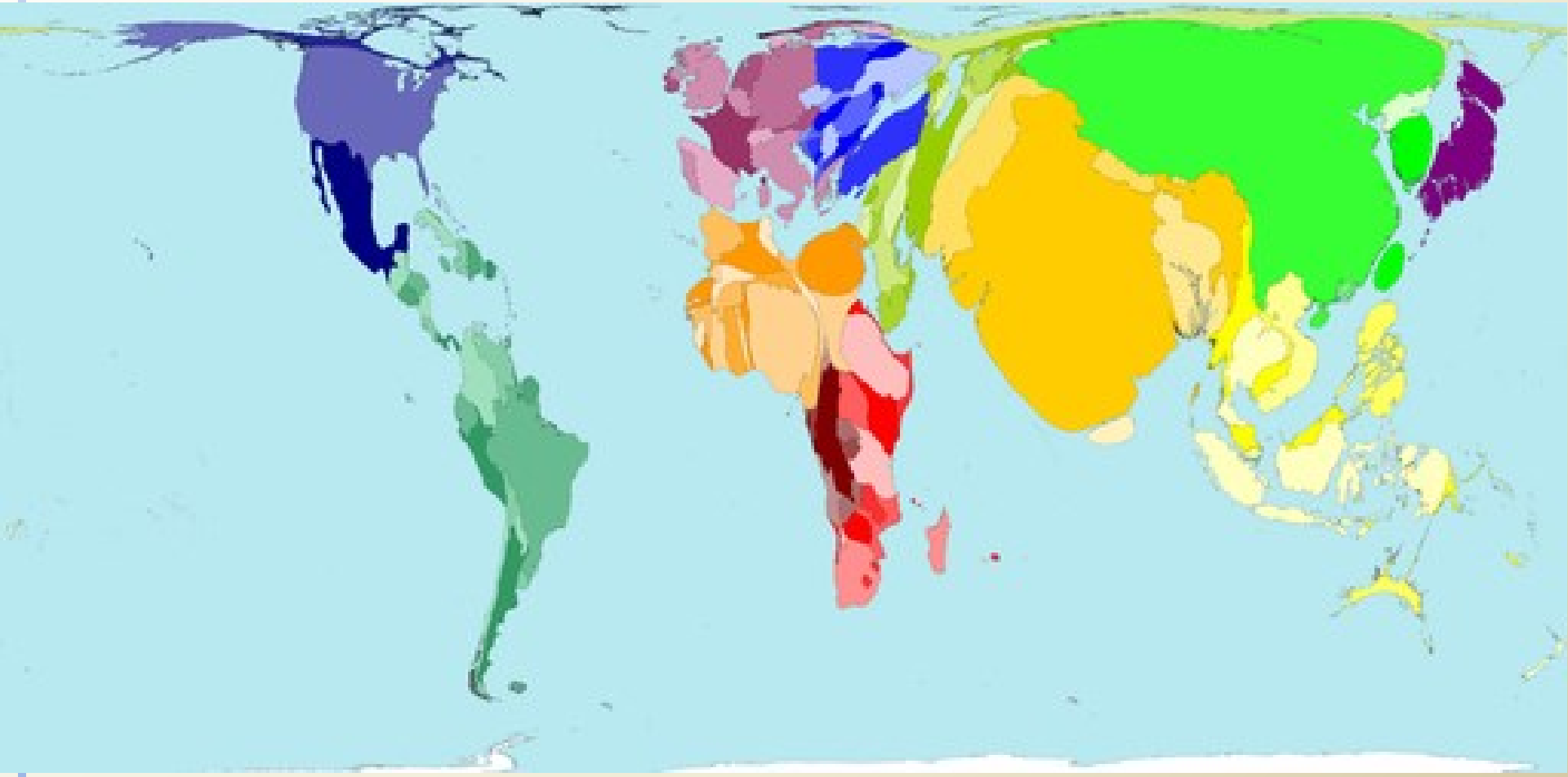
- Remembering Prof. Gaetano Borriello
- Open Data Kit's visionary and leader

World Map



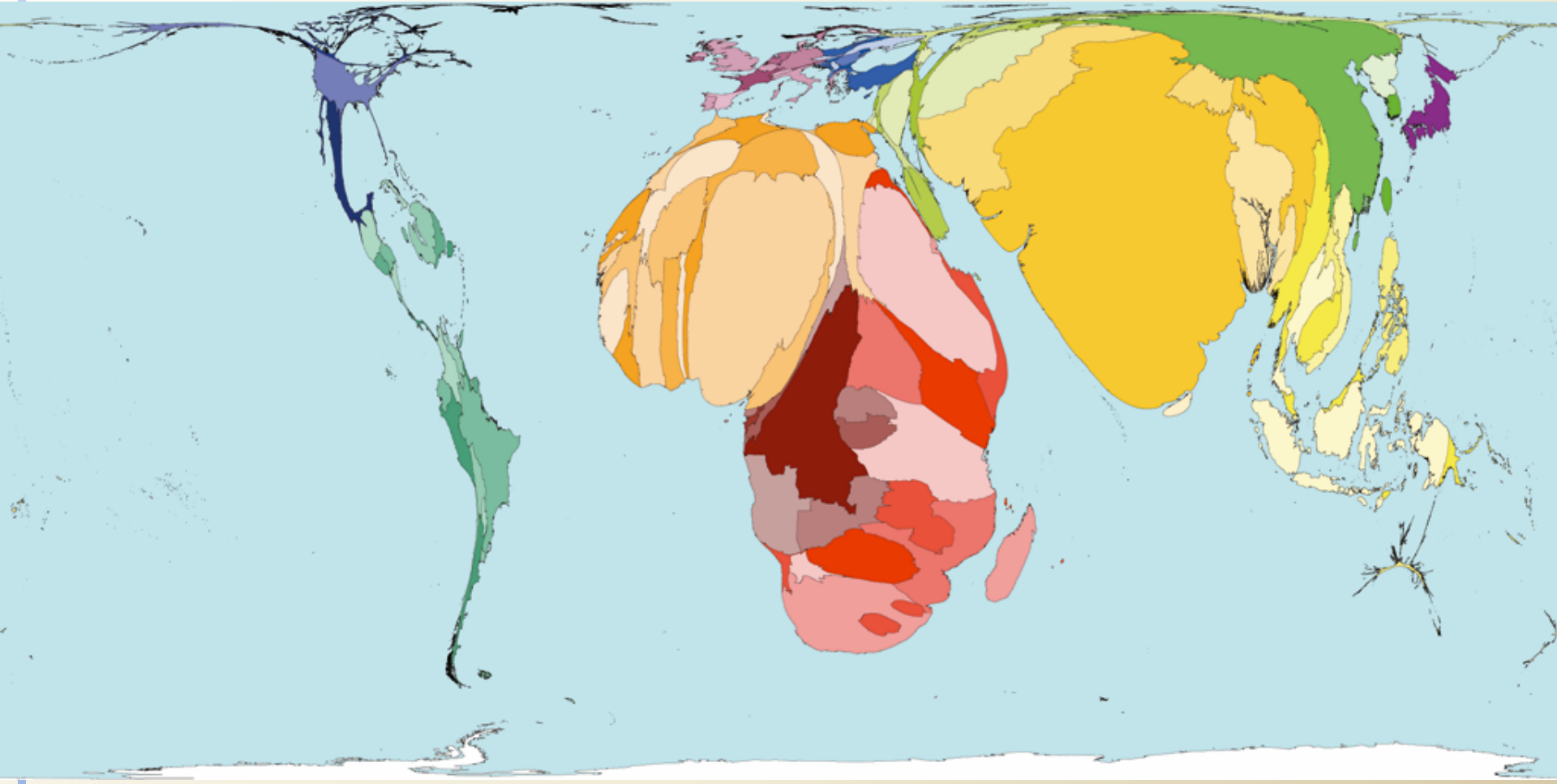
SOURCE: www.worldmapper.org

Population View



SOURCE: www.worldmapper.org

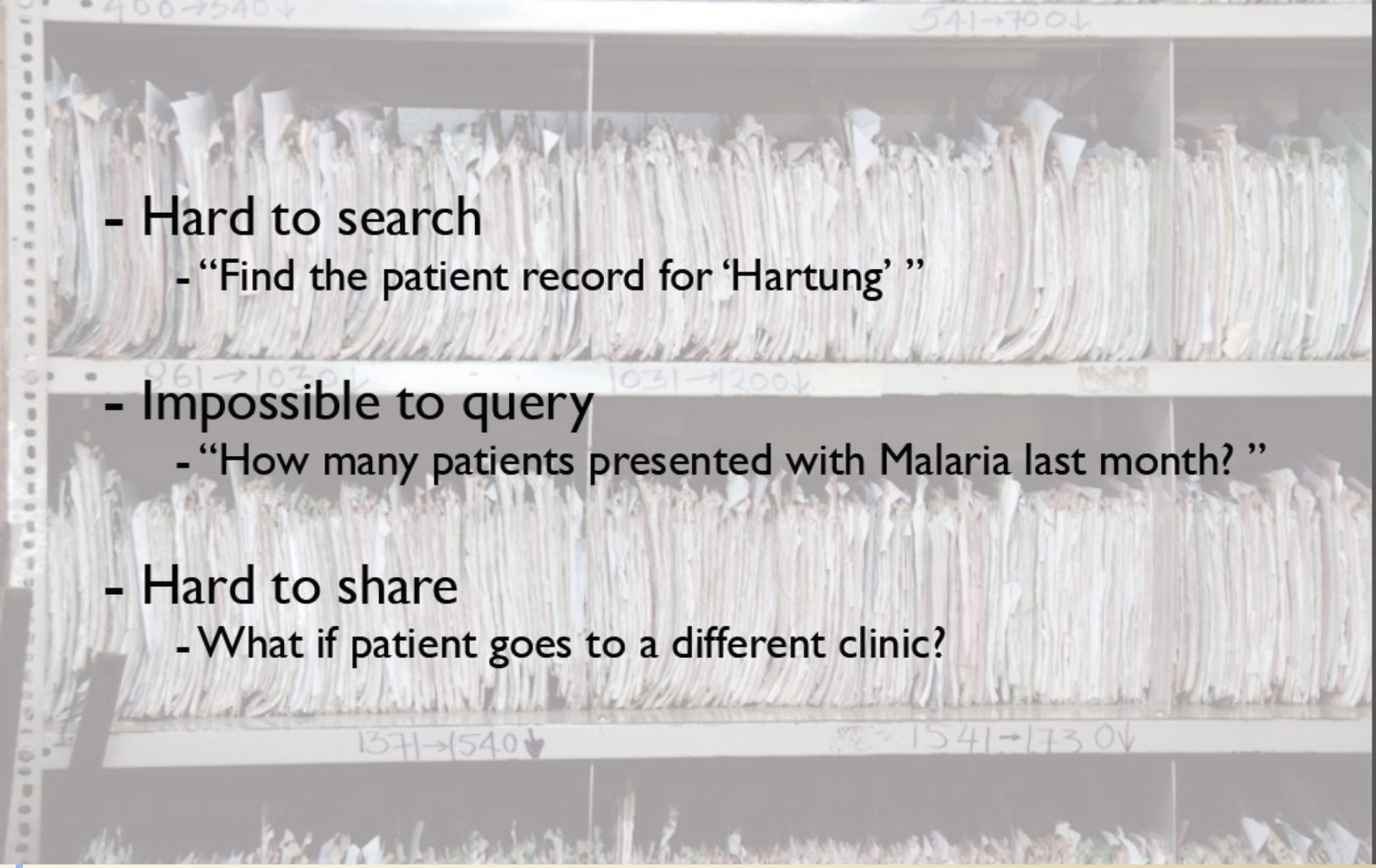
Often Preventable Deaths 2002



SOURCE: www.worldmapper.org

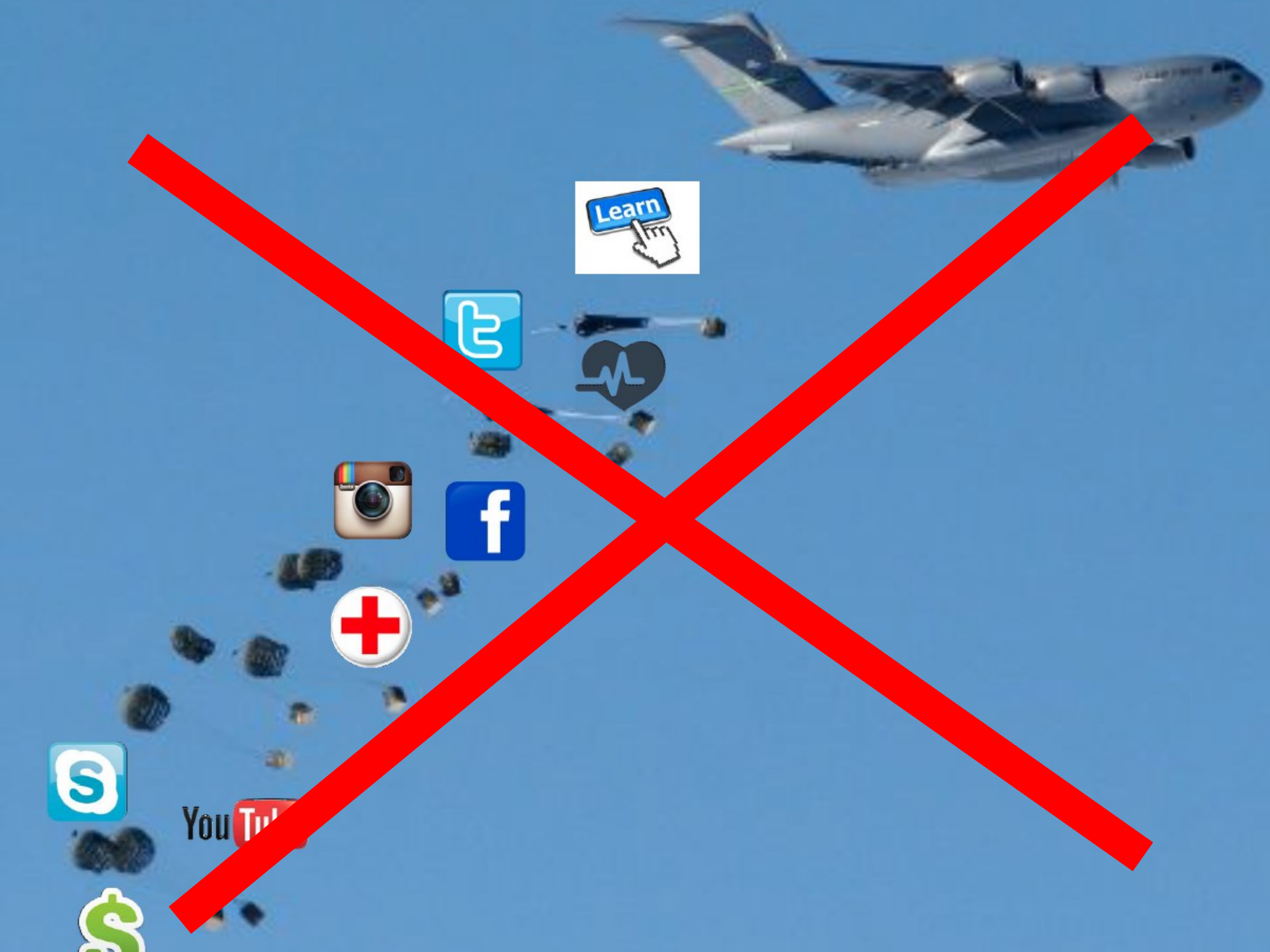
Organizations working in developing regions rely on field workers to collect data

Paper Systems are difficult to Search and Transport



Paper Systems are difficult to Search and Transport

Learn
YouTube


Learn

Ideas that shaped ODK

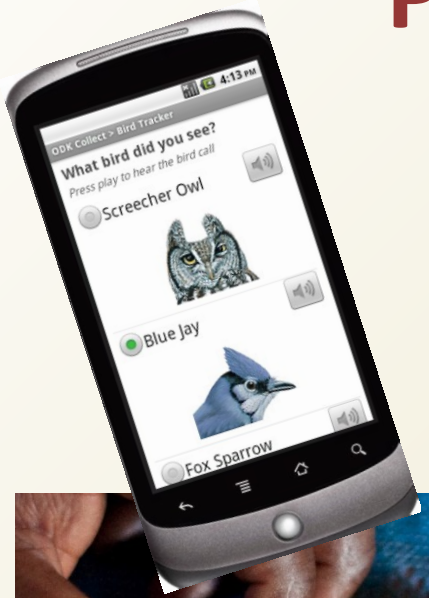
- Technology by itself is generally NOT a solution
- Magnify *Human* resources through Technology
- Technology requires support infrastructure

Open Data Kit (ODK)

- **Project started in 2008-09**
- **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)**

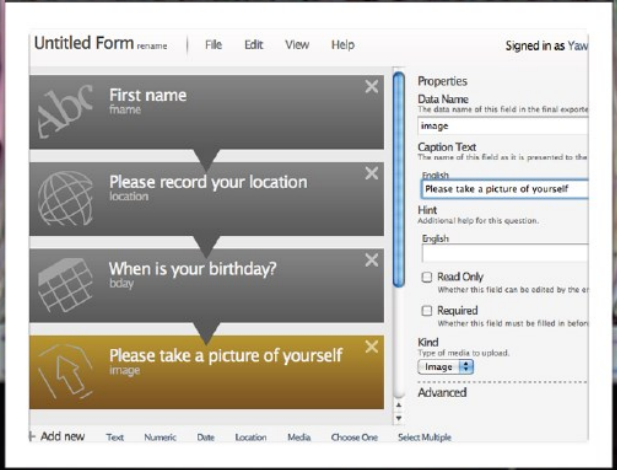
GOAL: ***Magnify human resources through technology***

Platform Shift from PCs to



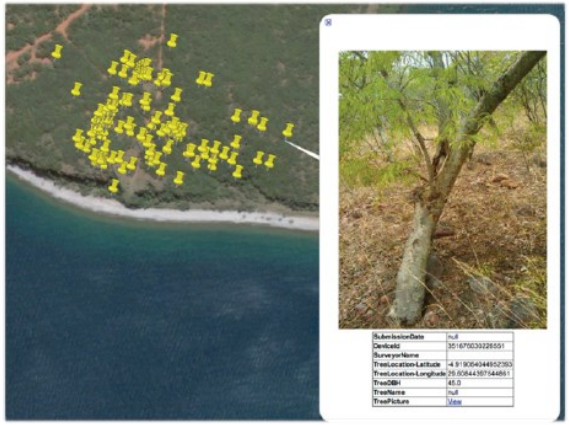
Smart Phone + Cloud

1. Build form



2. Collect data

3. Aggregate results



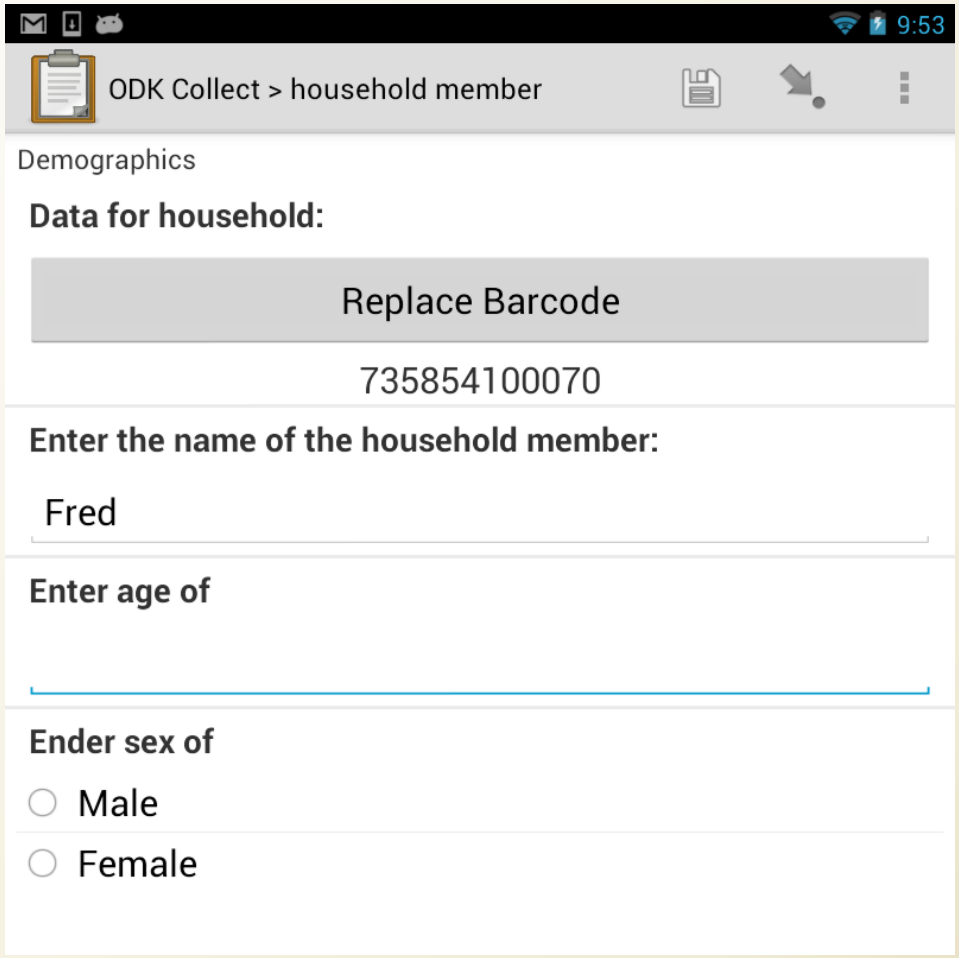
http://opendatakit.org

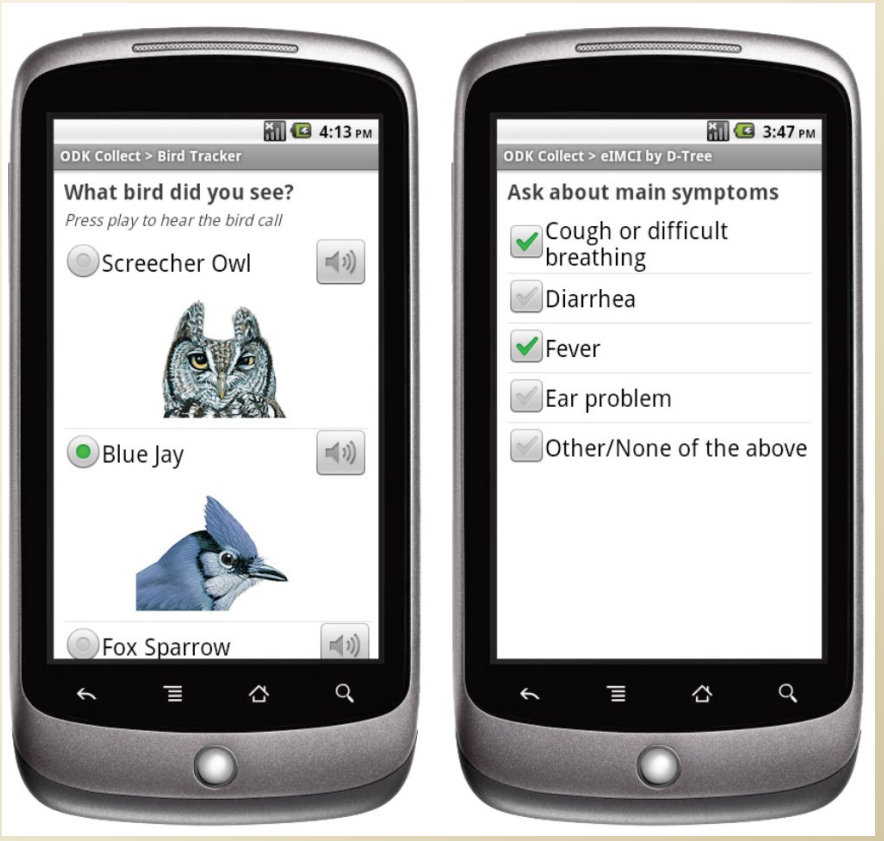
GOAL: ***Magnify human resources through technology***

ODK 1.x: Data Collection

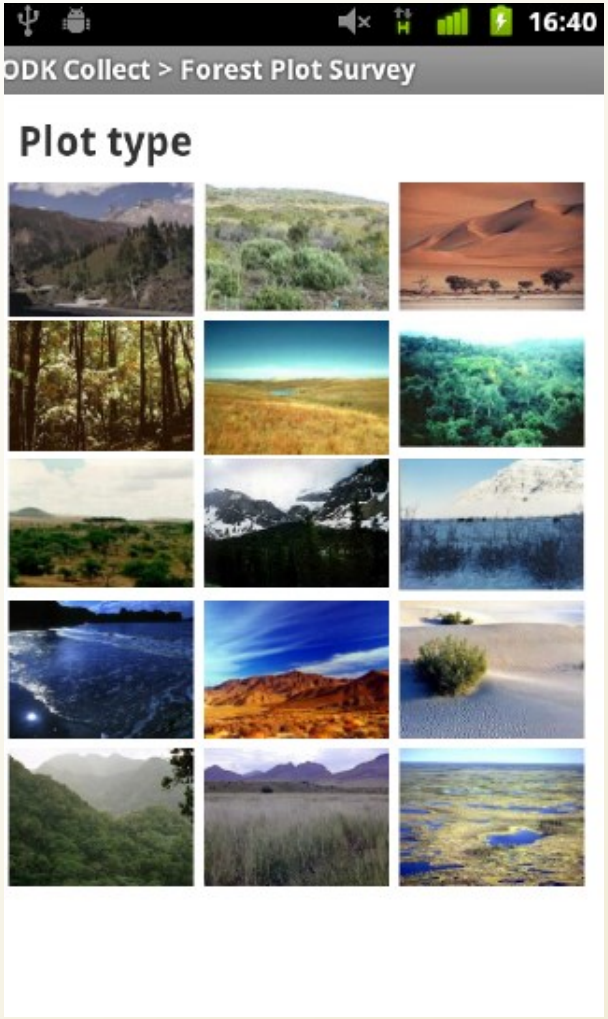
ODK Collect

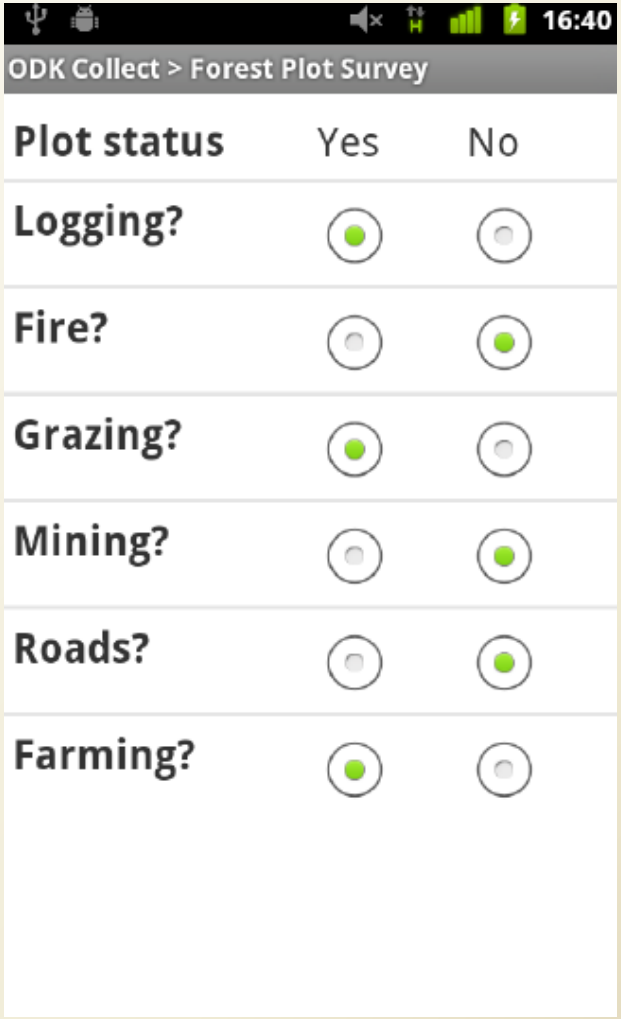
- Renders question prompts defined by the user

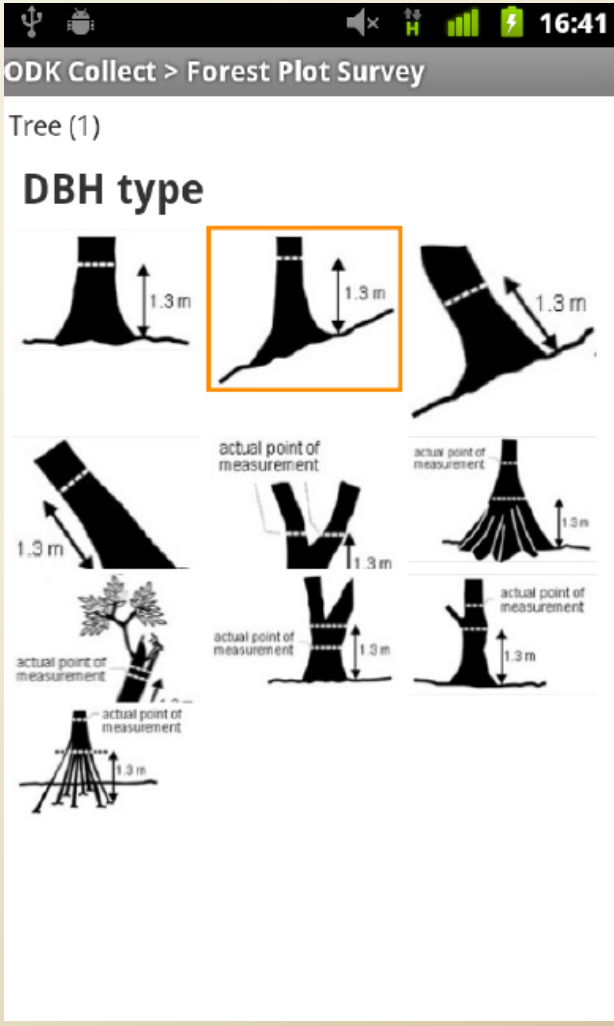




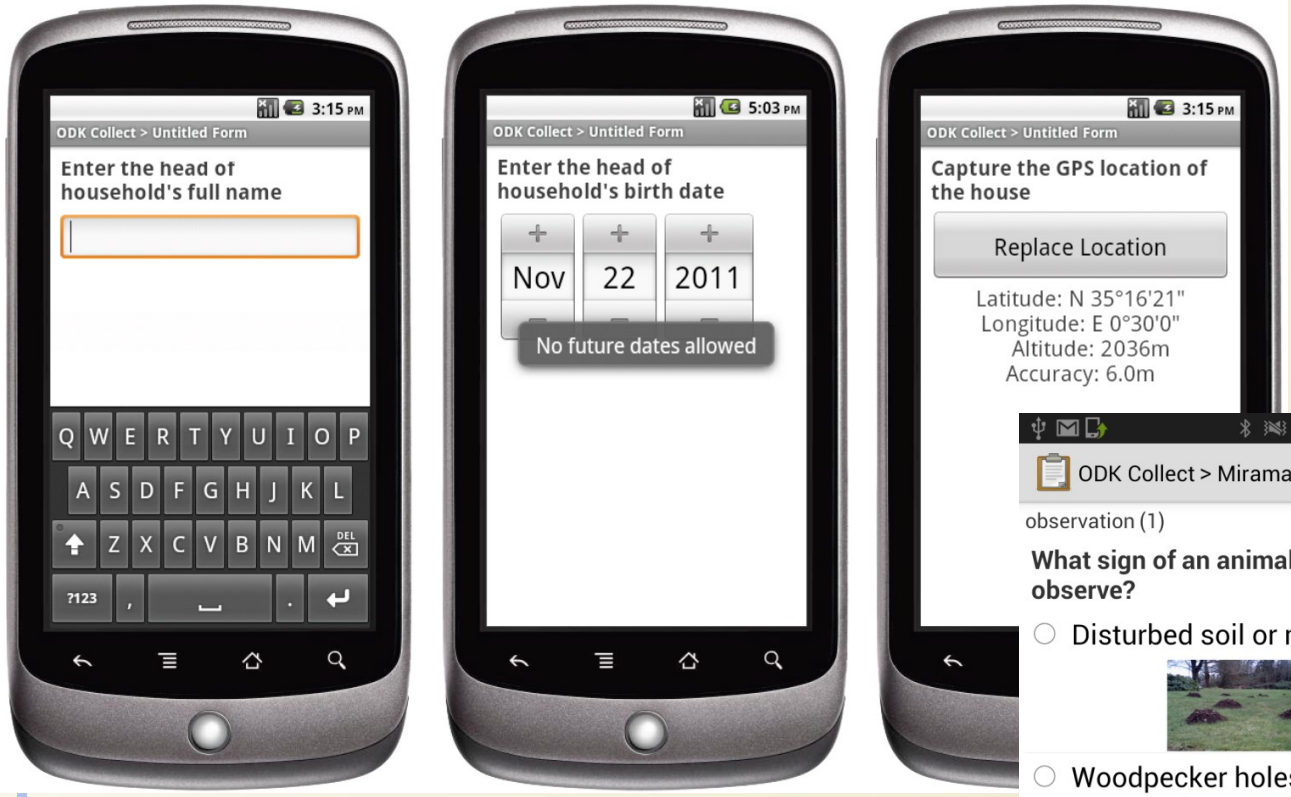
ODK Collect Question Layouts



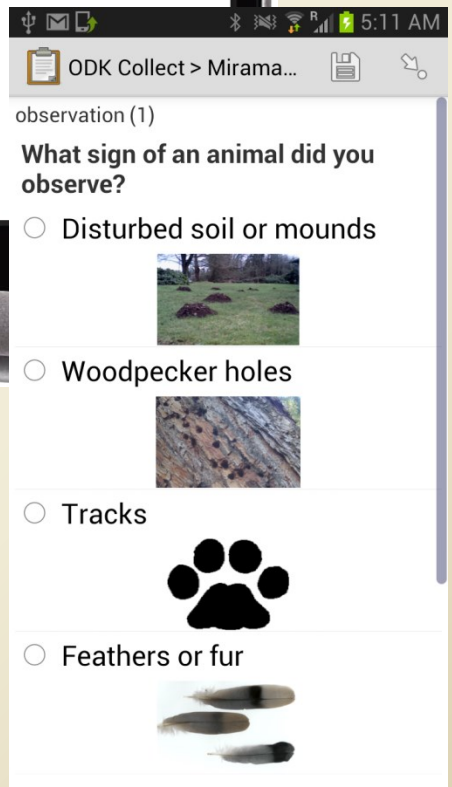


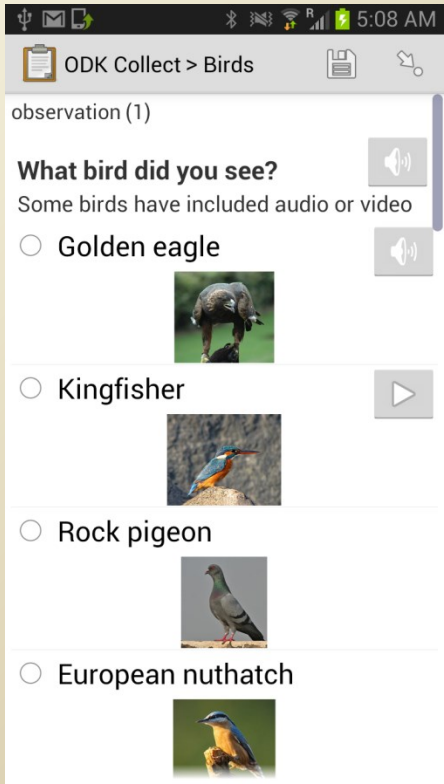


ODK 1.x: ODK Collect

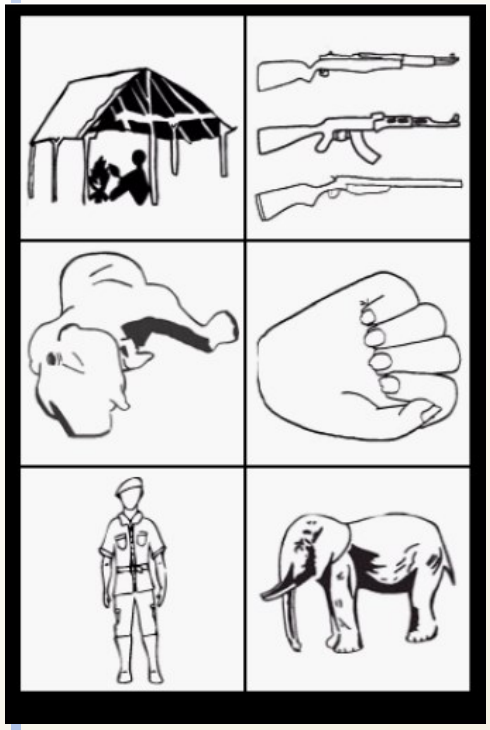


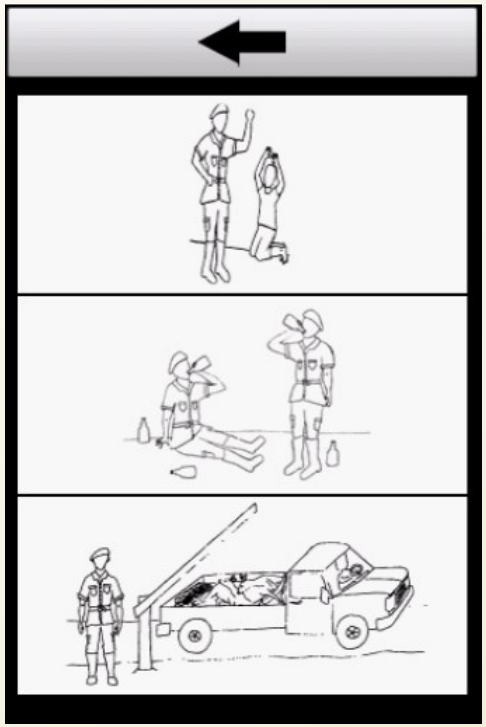
Automated Survey Renderer with enhanced data types
- Pictures, Video
- GPS
- Barcode

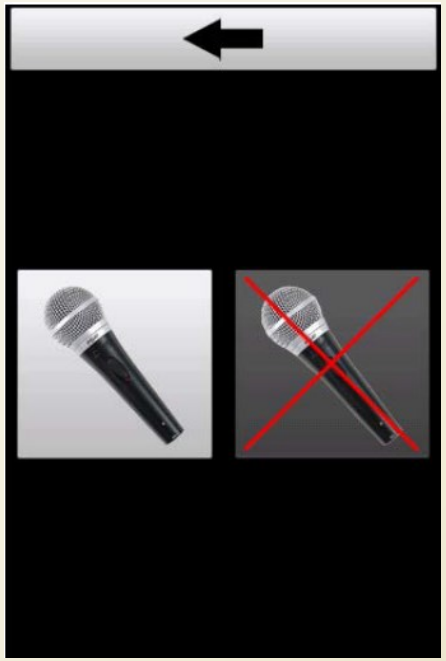


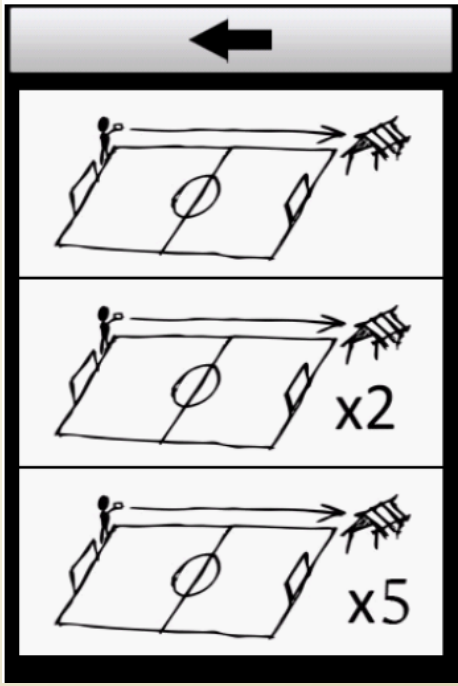


Icon Example





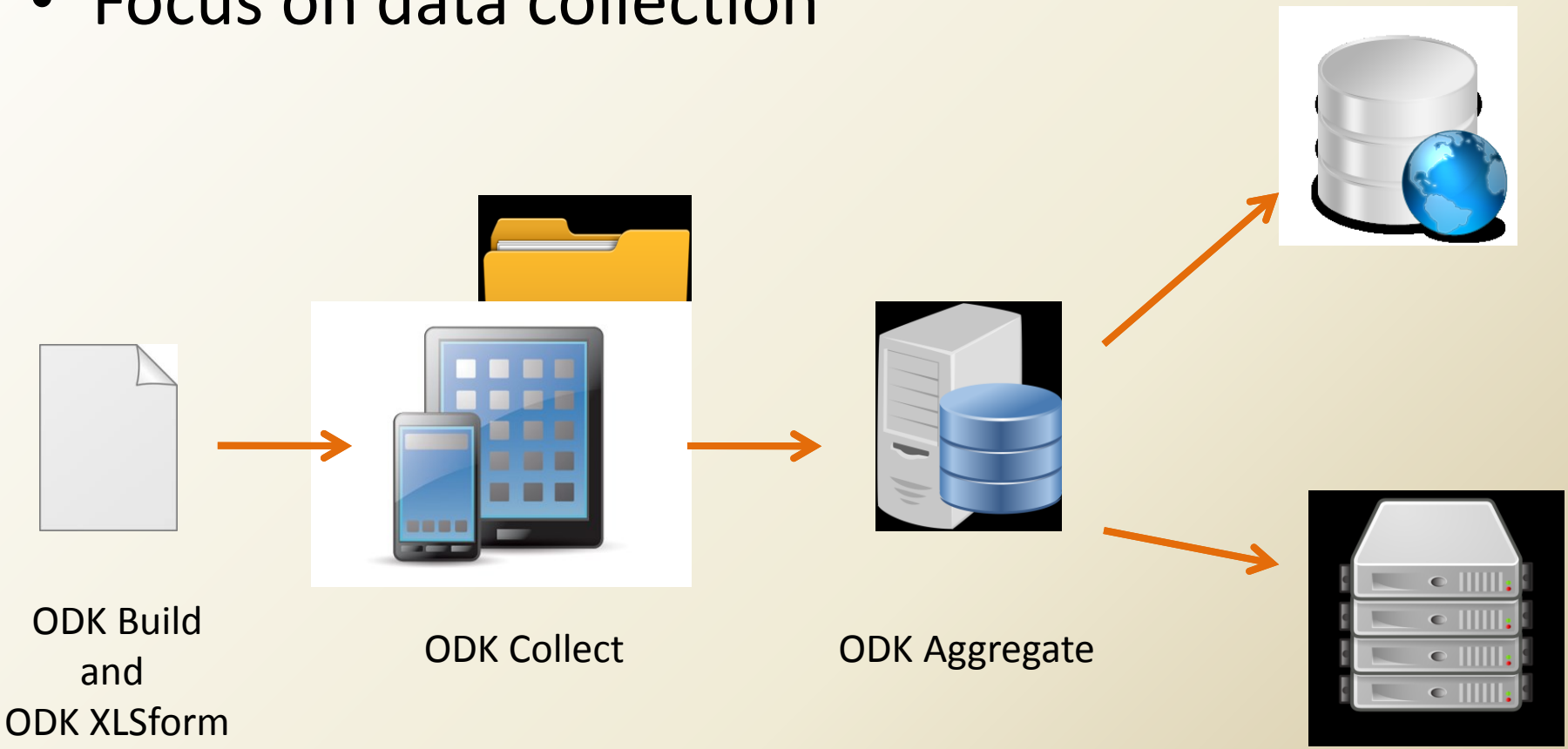




- University College London project
- Goal to have indigenous population report poachers.

ODK 1.x

- Focus on data collection



ODK Video

- https://www.youtube.com/watch?v=CHyUS4JnajM

"Features sometimes trump cost...we needed to get more out of the phone and ODK allowed us to do that."

D-Tree International

"It is relatively easy to train using ODK...even for people who have little or no computer experience."

Berkeley Human Rights Center

"[Health workers felt] the system facilitated their home visits and allowed them to collect higher quality data. We actualized higher cost savings over our previous PDA-based system."

USAID-AMPATH

USAID-AMPATH

- Began using ODK in 2009
- Provides care to over 160K HIV patients in Kenya
- Enrolls about 2K new patients a month
- In 2014, had over 1 million entries with ODK

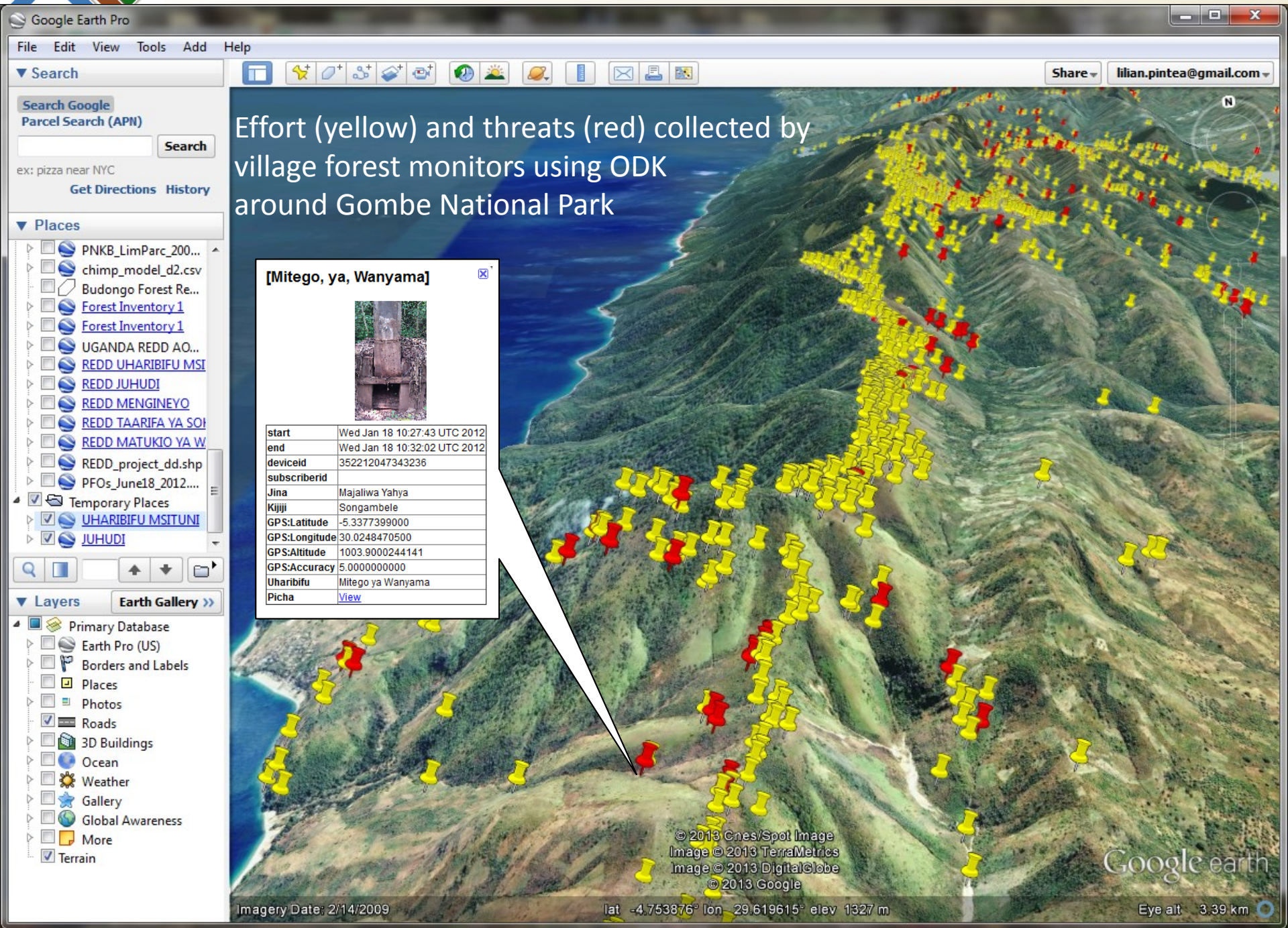
Other Deployments

- Neglected Tropical Diseases Support Center
  - Based at the Task Force for Global Good
  - Collected 50 million data points across 200 projects in 20 countries

Election Monitoring

The Carter Center uses ODK as part of their ELMO software to monitor elections.

Training in Gombe National Park


Google Earth Pro
File Edit View Tools Add Help
Search
Search Google
Parcel Search (APN)
Search
ex: pizza near NYC
Get Directions History
Places
PNKB_LimParc_200...
chimp_model_d2.csv
Budongo Forest Re...
Forest Inventory 1
Forest Inventory 1
UGANDA REDD AO...
REDD UHARIBIFU MSI
REDD JUHUDI
REDD MENGINEYO
REDD TAARIFA YA SOI
REDD MATUKIO YA W
REDD_project_dd.shp
PFOs_June18_2012....
Temporary Places
UHARIBIFU MSITUNI
JUHUDI
Layers
Earth Gallery
Primary Database
Earth Pro (US)
Borders and Labels
Places
Photos
Roads
3D Buildings
Ocean
Weather
Gallery
Global Awareness
More
Terrain
Share
lilian.pintea@gmail.com
Effort (yellow) and threats (red) collected by village forest monitors using ODK around Gombe National Park
[Mitego, ya, Wanyama]
start Wed Jan 18 10:27:43 UTC 2012
end Wed Jan 18 10:32:02 UTC 2012
deviceid 352212047343236
subscriberid
Jina Majaliwa Yahya
Kijiji Songambele
GPS:Latitude -5.3377399000
GPS:Longitude 30.0248470500
GPS:Altitude 1003.9000244141
GPS:Accuracy 5.0000000000
Uharibifu Mitego ya Wanyama
Picha View
© 2013 Cnes/Spot Image
Image © 2013 TerraMetrics
Image © 2013 DigitalGlobe
© 2013 Google
Google earth
Imagery Date: 2/14/2009
lat -4.753876° lon 29.619615° elev 1327 m
Eye alt 3.39 km

Carbon market certification
and indigenous culture

Training with Surui

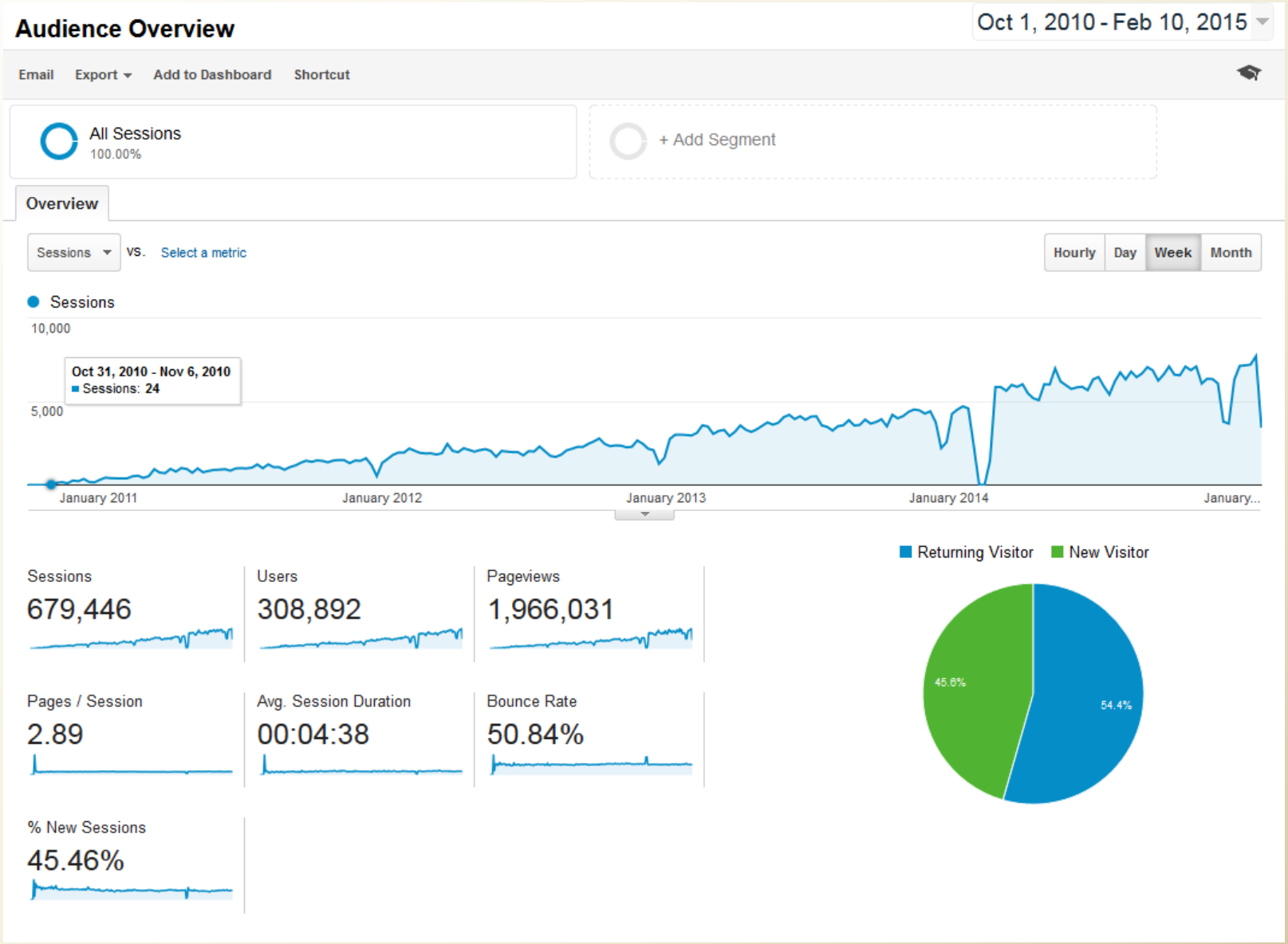
Videos

- Reproductive Health Vouchers
  - http://vimeo.com/38123850

ODK's Usage

Website visits from 225 countries/territories (187 countries/territories last month)

ODK Growth



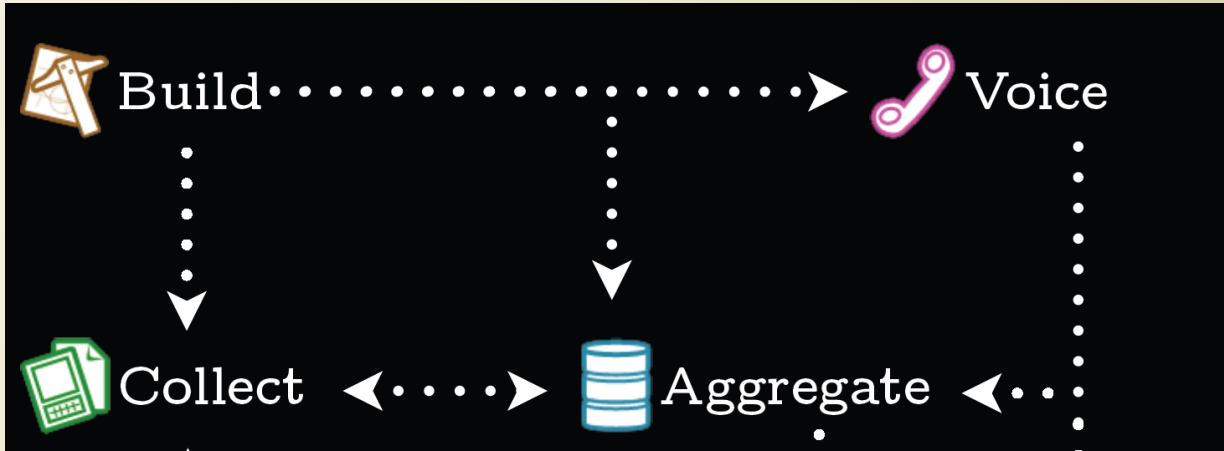
Over 300,000 unique visitors from 225 countries/territories (Average of ~27,000 hits a month)

Community

- Many consulting companies (50+) “support” ODK tools
  - Nafundi
  - Dimagi
  - SurveyCTO
  - MANY MORE

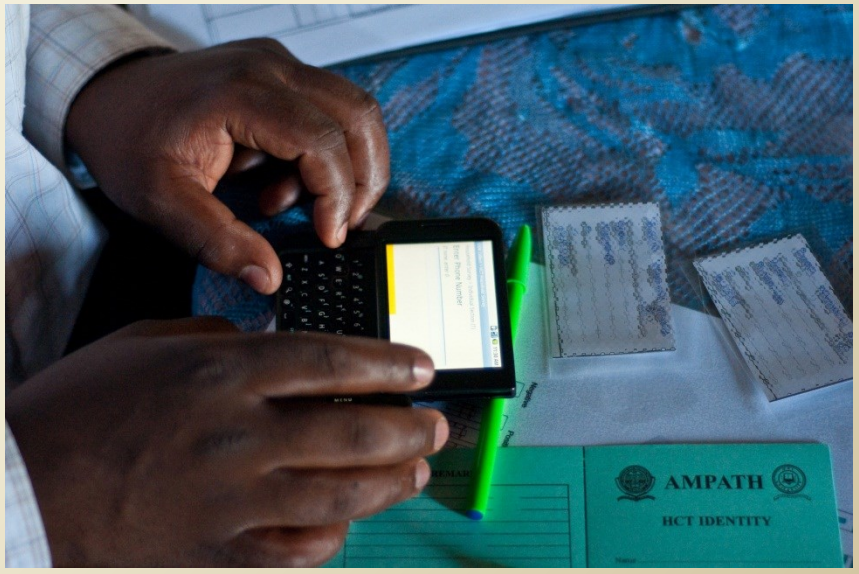
Open Data Kit

- Make tools highly modular and customizable
  - Enables organizations to compose tools that are appropriate for their deployments
- Exploit open interfaces and standards
  - Avoid “silo-ed” monolithic proprietary solutions
- Allow organizations to leverage evolving technologies
  - Avoid early obsolescence



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 various sensing devices
- Usage of cheaper technologies (e.g., paper, SMS)



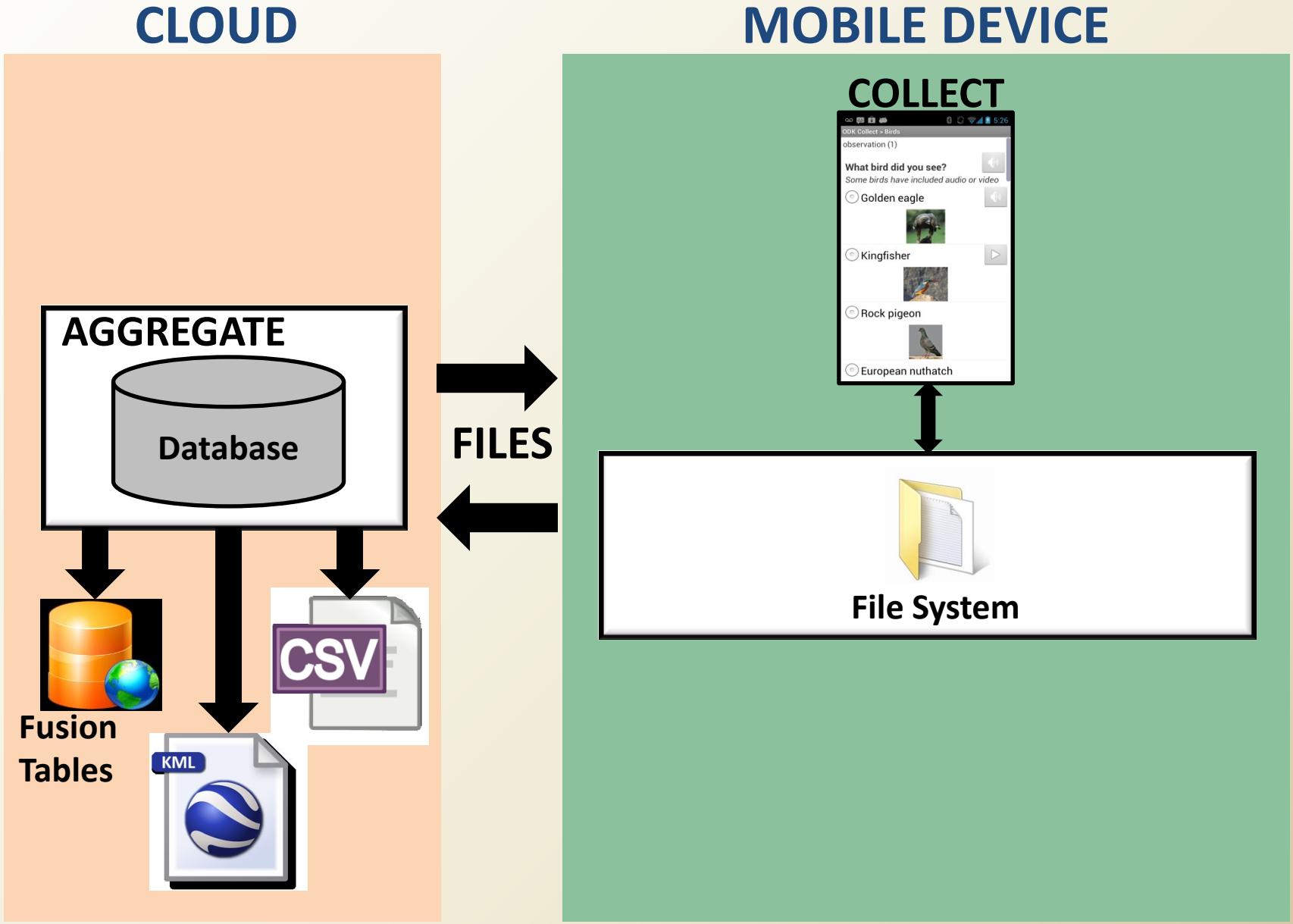
ODK Versions

CURRENT TOOLS
(Referred to ODK 1.x)

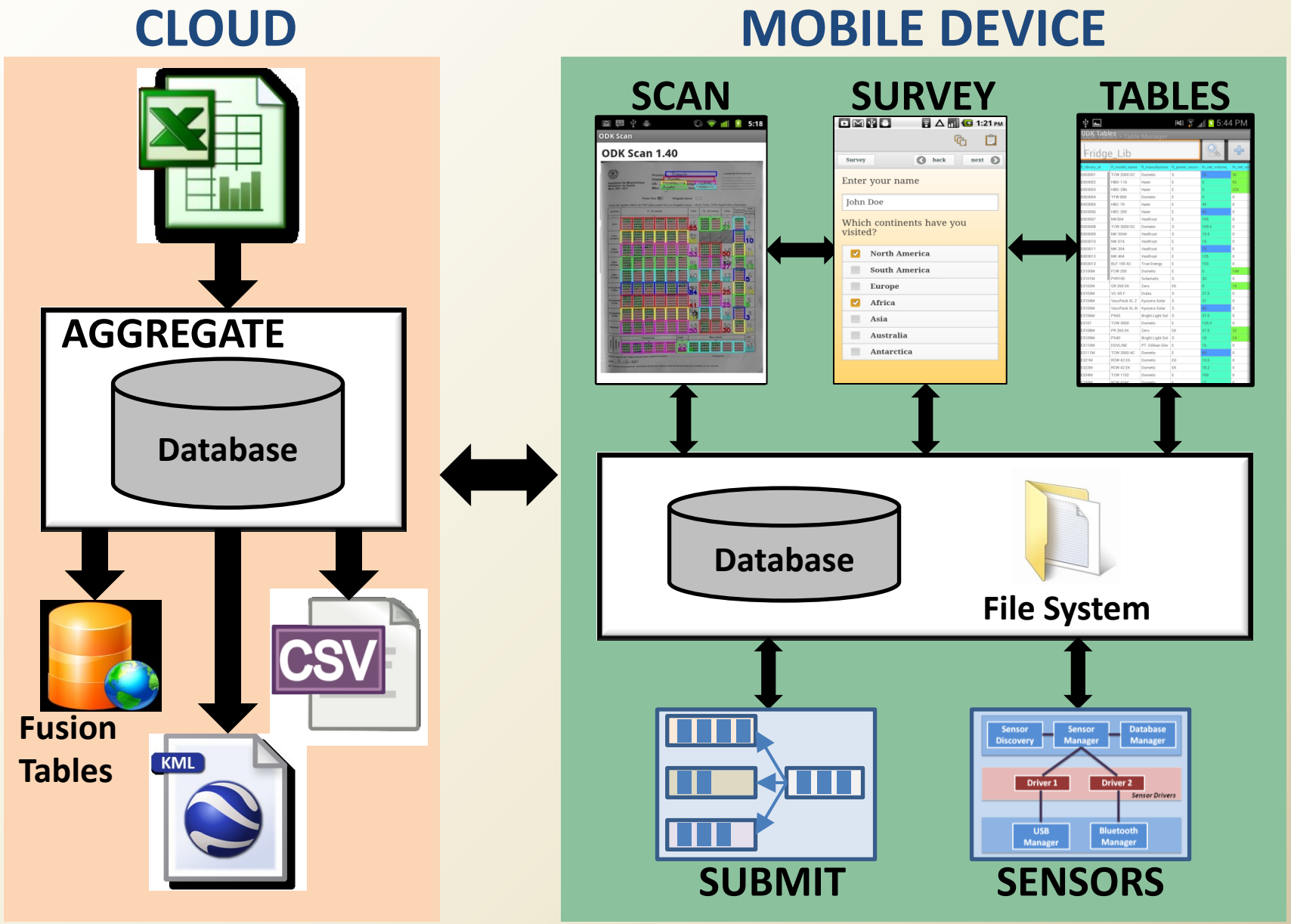
versus

NEW TOOLS
(Referred to ODK 2.x)

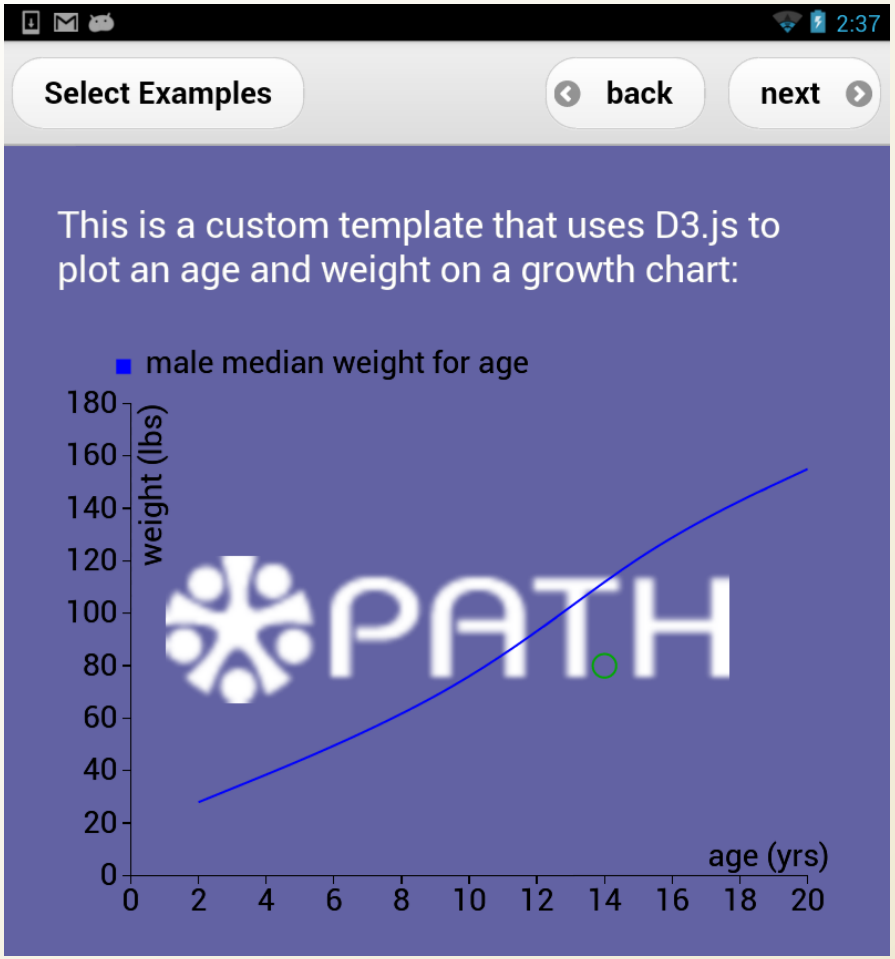
ODK 1.0 Architecture



ODK 2.0 Architecture



ODK 2.0: HTML on the Device

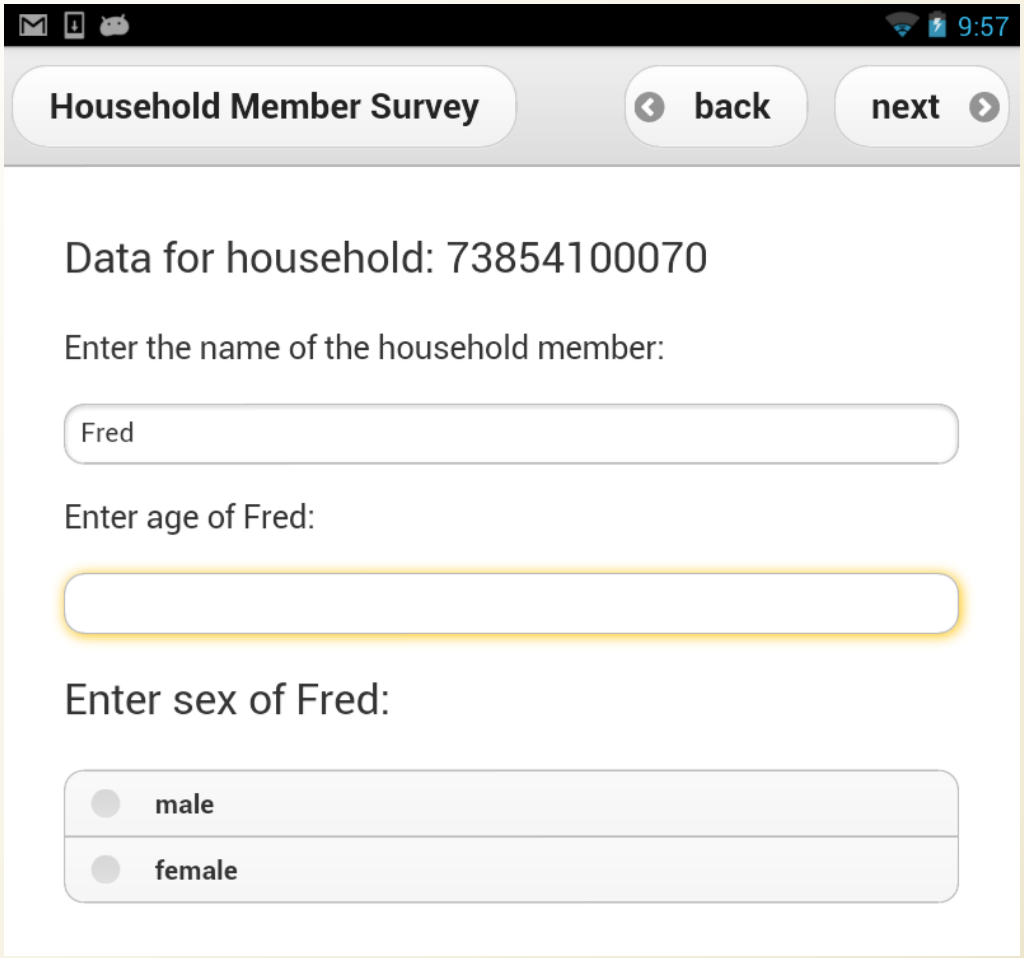


- Highly Customizable
- Dynamic Graphs
- Watermarks
- Access Server Content (AJAX)

Only WebDev Skills

Redesign

ODK 2.0: Data Collection



- Collect while disconnected
- Submit opportunistically

ODK Survey

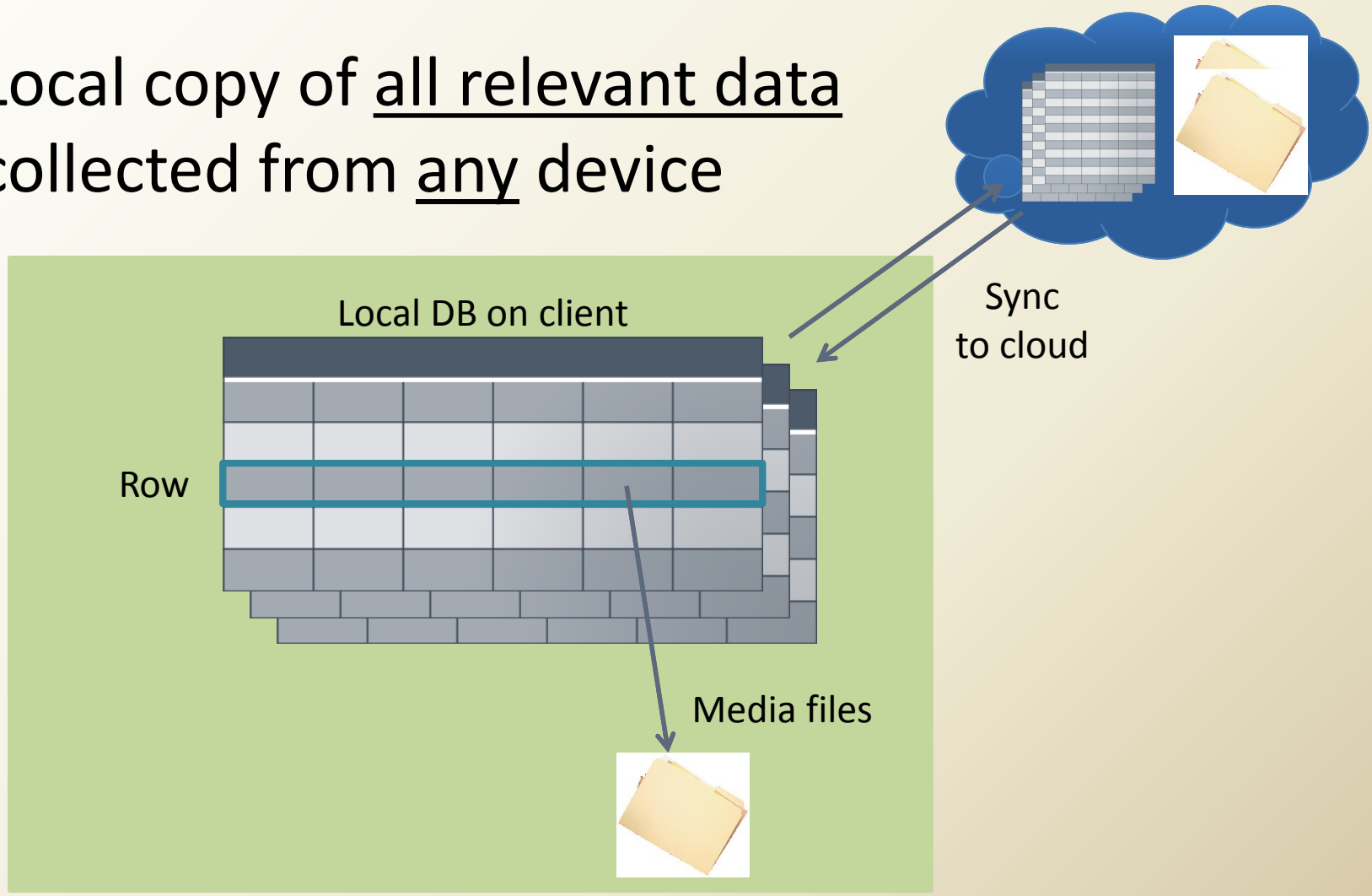
(Android Cellphone / Tablet)

Local and Remote

(various tools)

Data Architecture of ODK 2.0

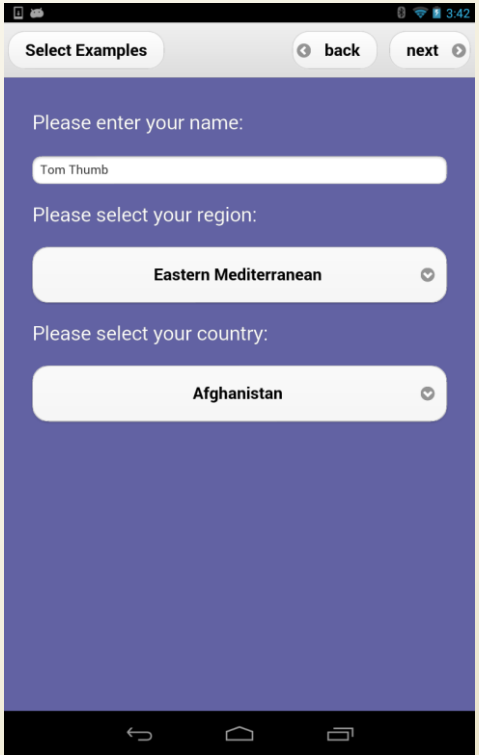
Local copy of all relevant data collected from any device

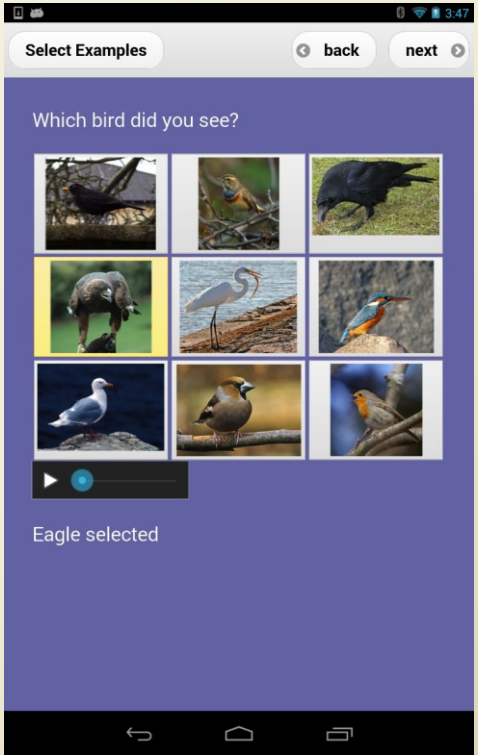


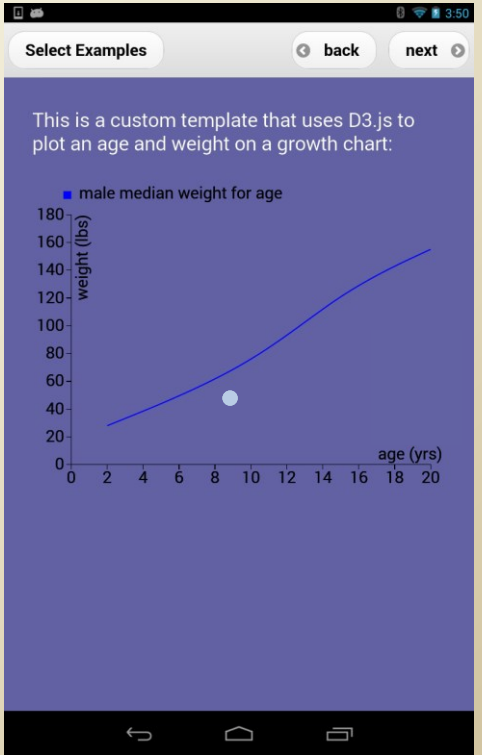
Redesign

ODK 2.0: Survey

- Complex workflows and technology assisted trainings
- Different approach than ODK Collect
  - Easier customizations via HTML and CSS
  - Easier branching and workflows
  - Easier to access databases that are synced with server

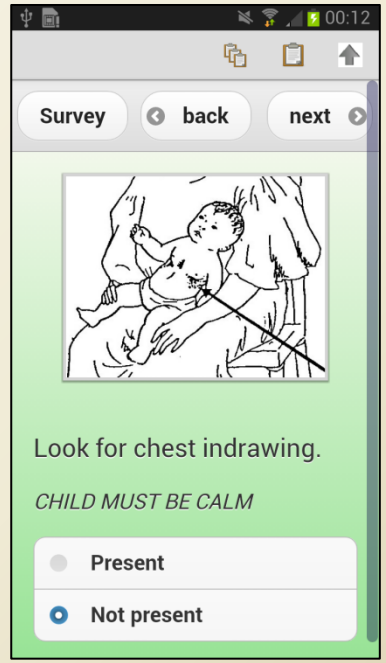


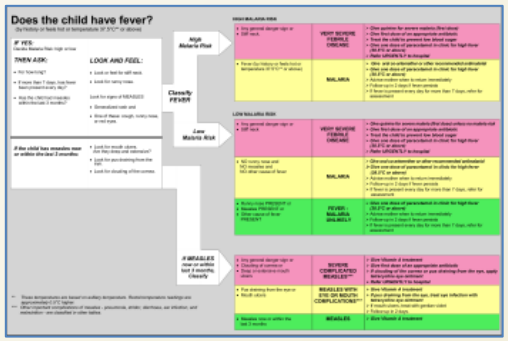




ODK 2.0 Example

- **Pneumonia Detection** **(Ghana & India)**
- Digitize complex WHO-IMCI workflows
- Guide and assist user obtaining proper patient measurements
- Display treatment based on IMCI guidelines





IMNCI

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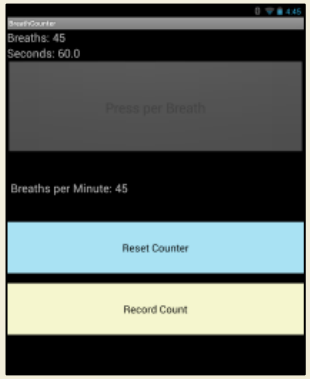

Respiratory Rate Counter

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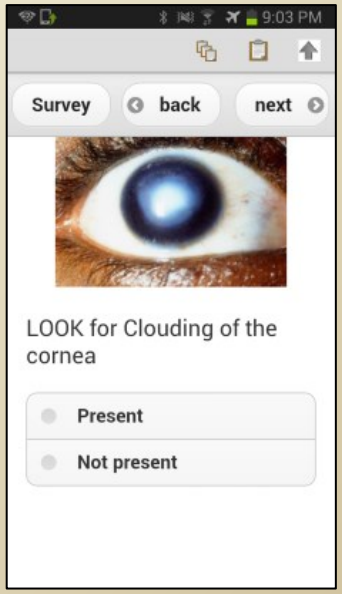
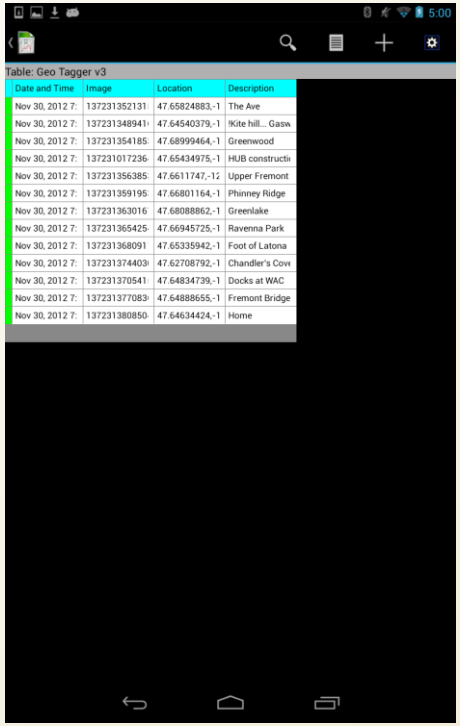
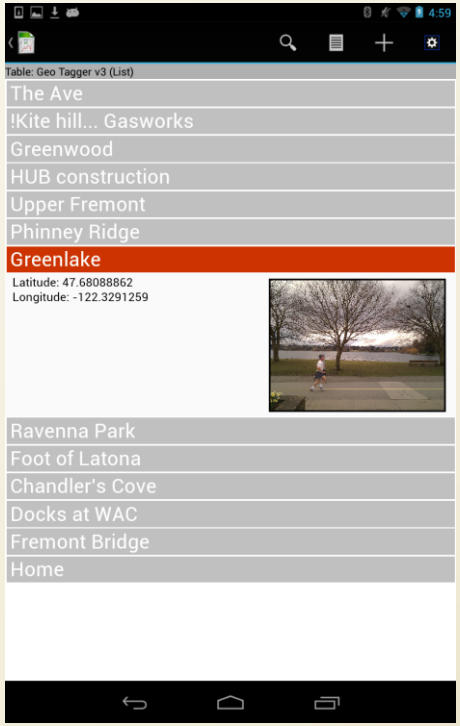
Pulse Oximetry

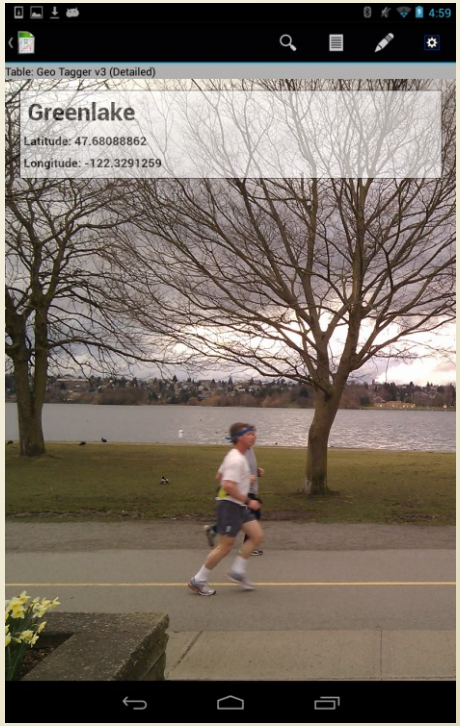


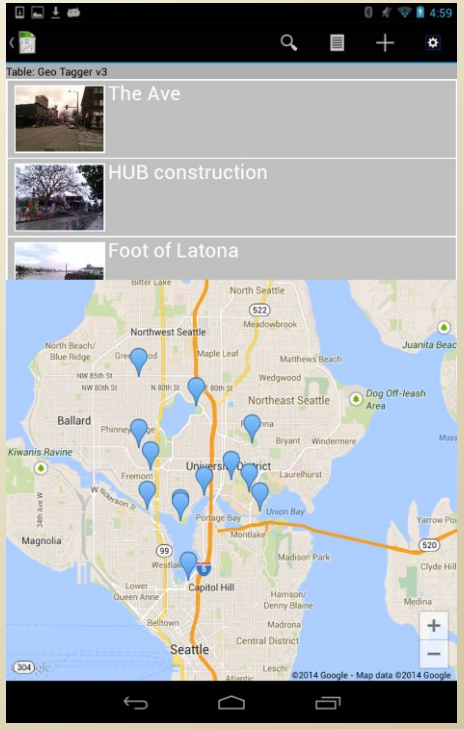
ODK 2.0: Tables

- Gap in Open Data Kit's tool suite
- Needed a flexible tool for applications where previously **collected data is often revisited and updated.**

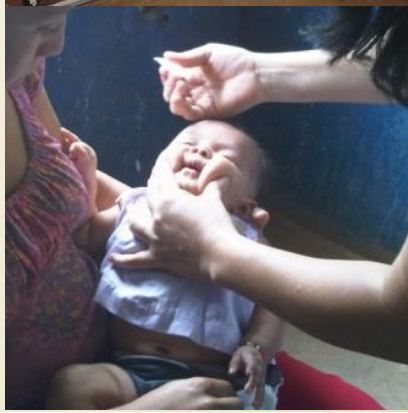








Vaccine Cold Chain



Cold chain end-points

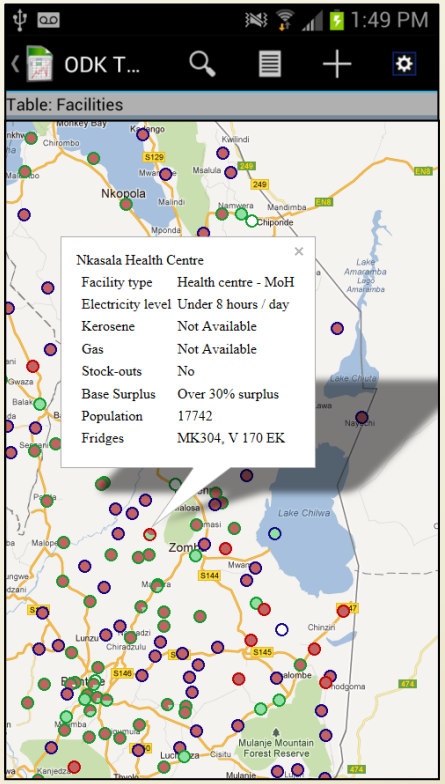
4,100 doses
Polio and Measles
$635

625 doses
Rotavirus
$4687

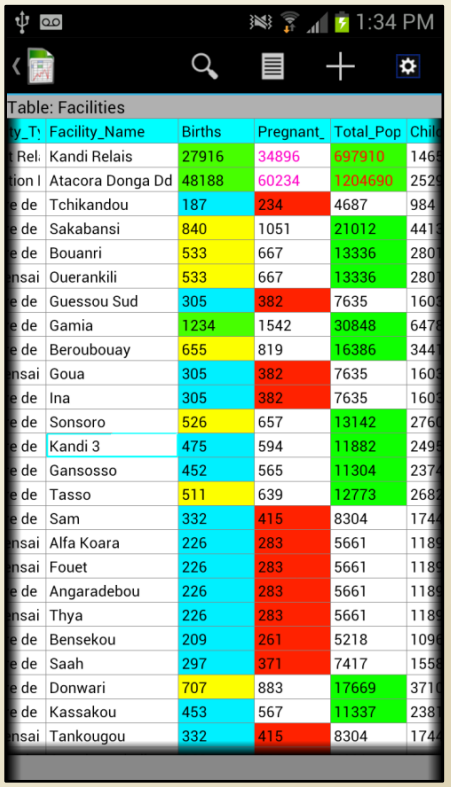
ODK 2.0: Tables

List View

Detailed View



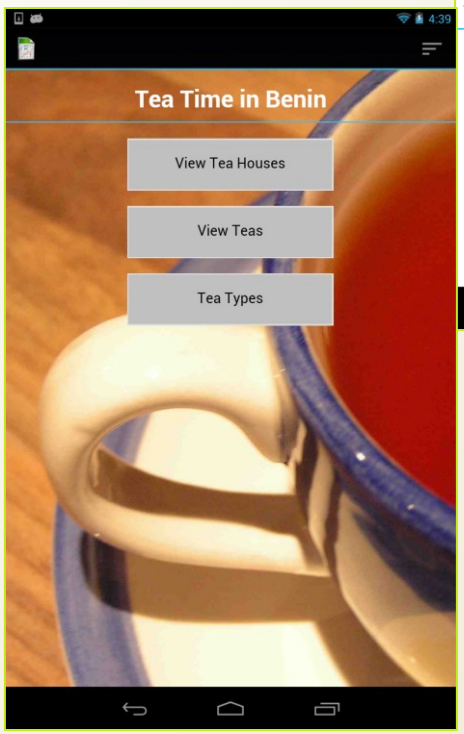
Map View

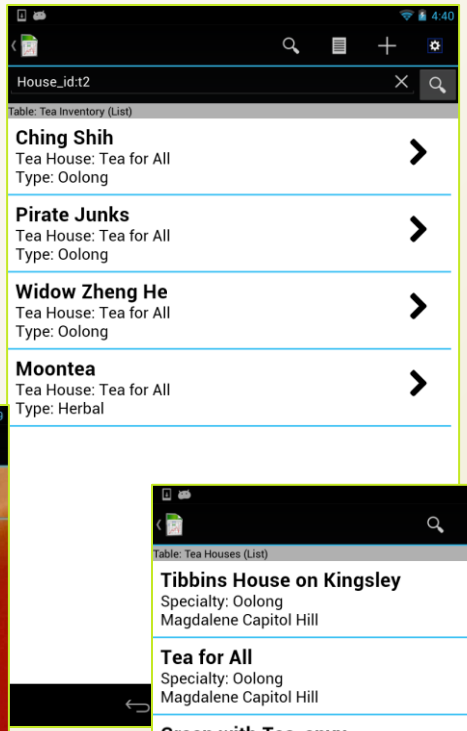


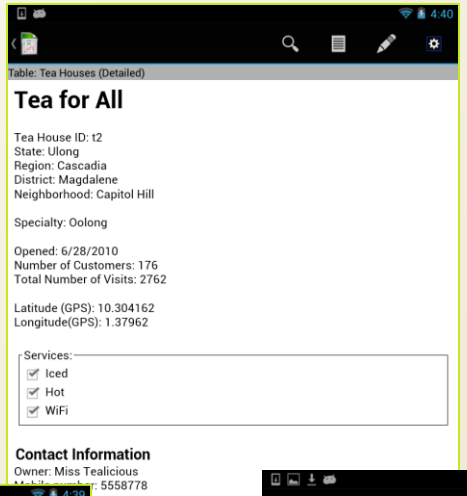
Spreadsheet

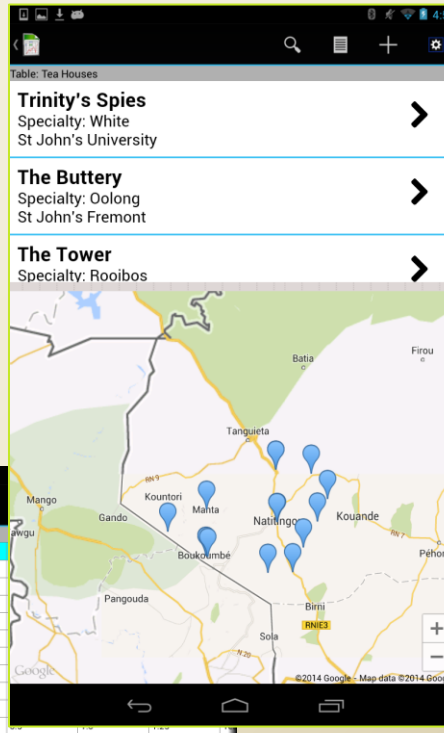
- Visualization of underlying database
- Provide users different looks at data
- ***Example:*** Cold chain monitoring

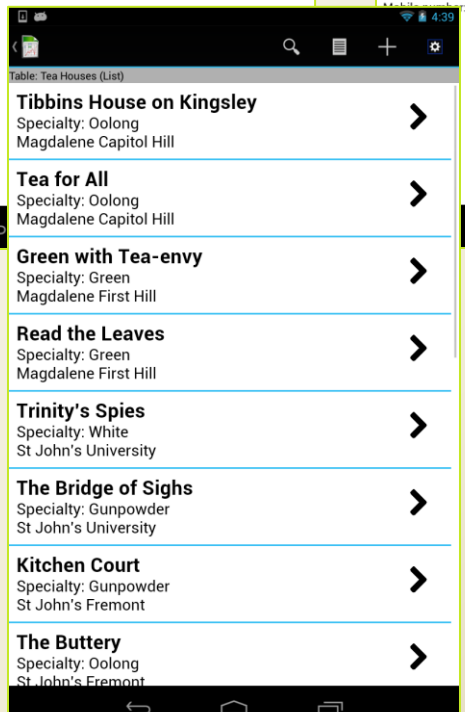
Varying Domains



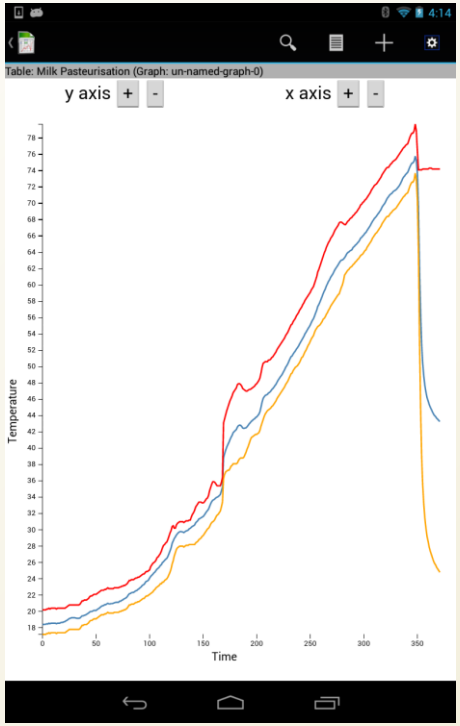


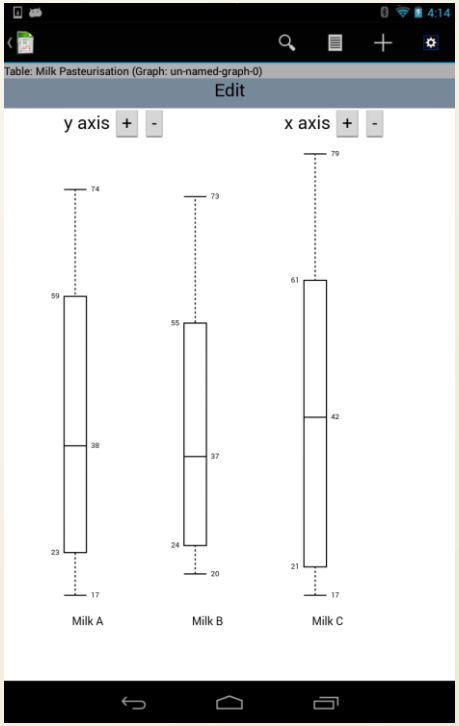


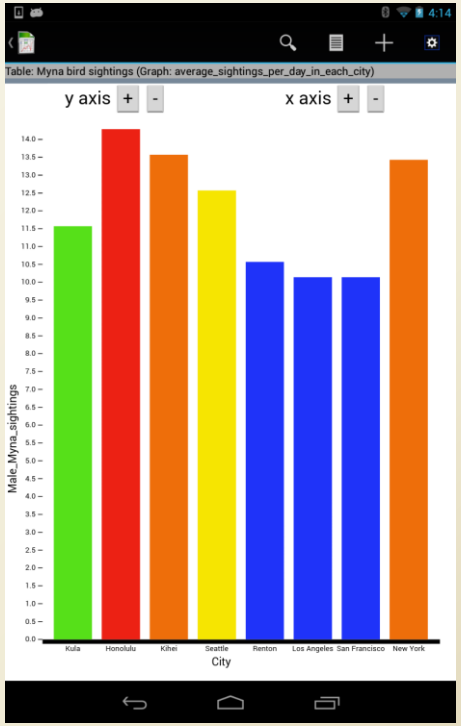


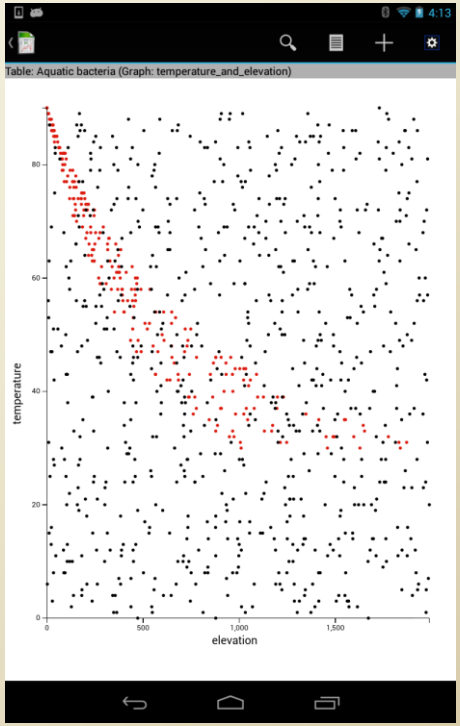


ODK Tables and D3

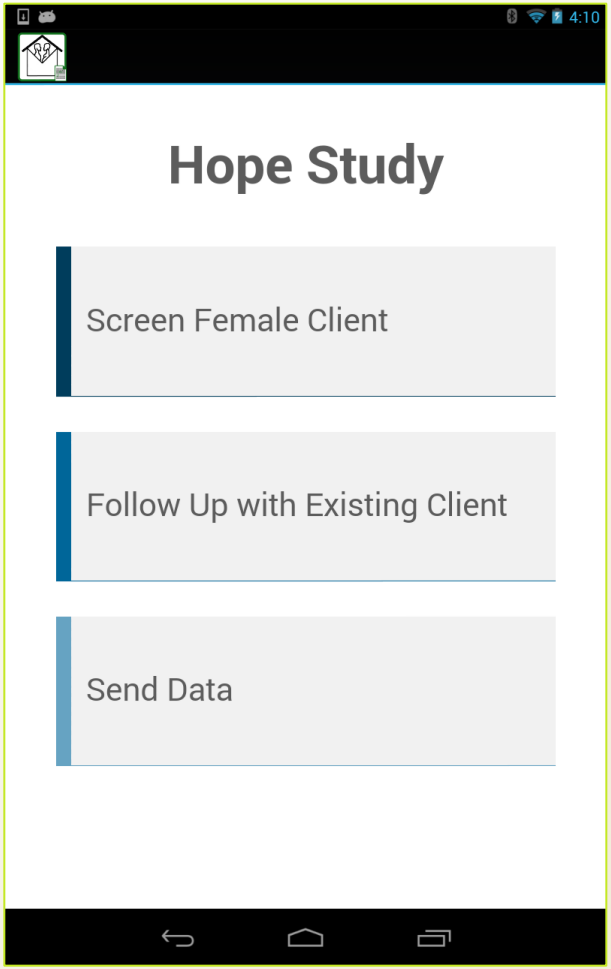


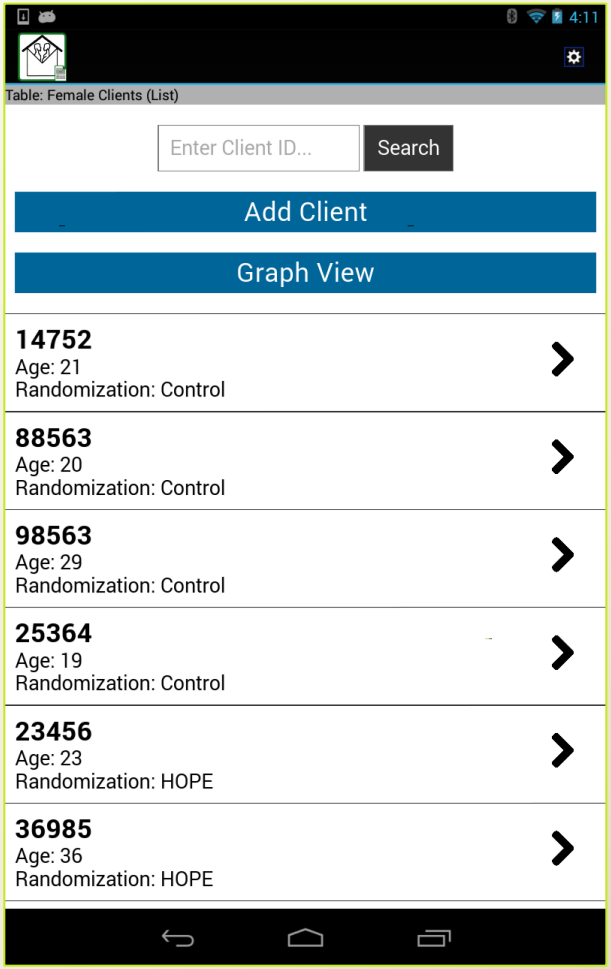


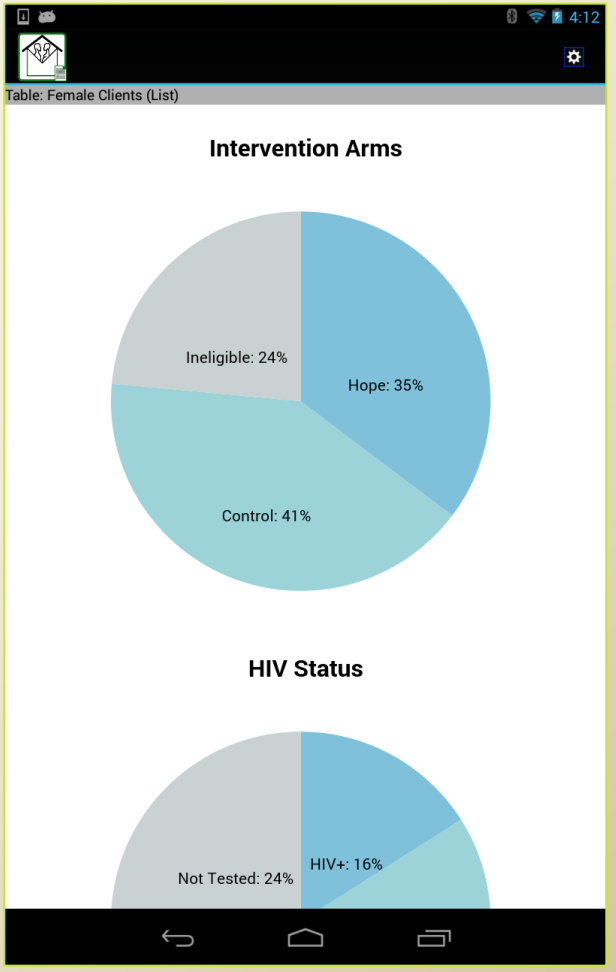




ODK Tables – Hope Study App



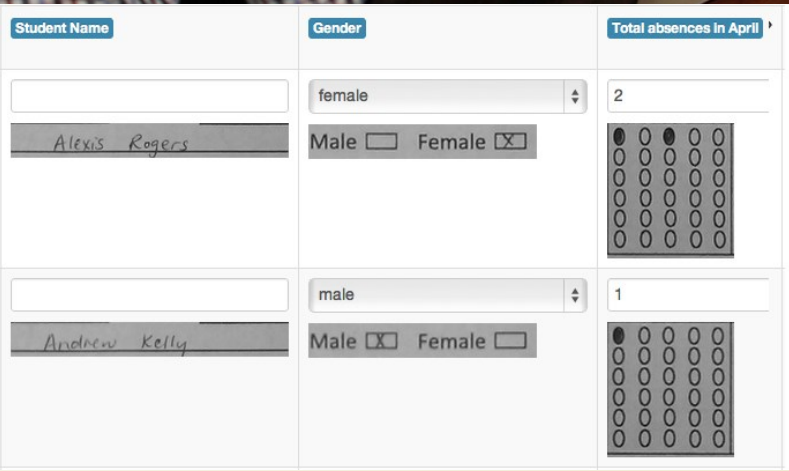




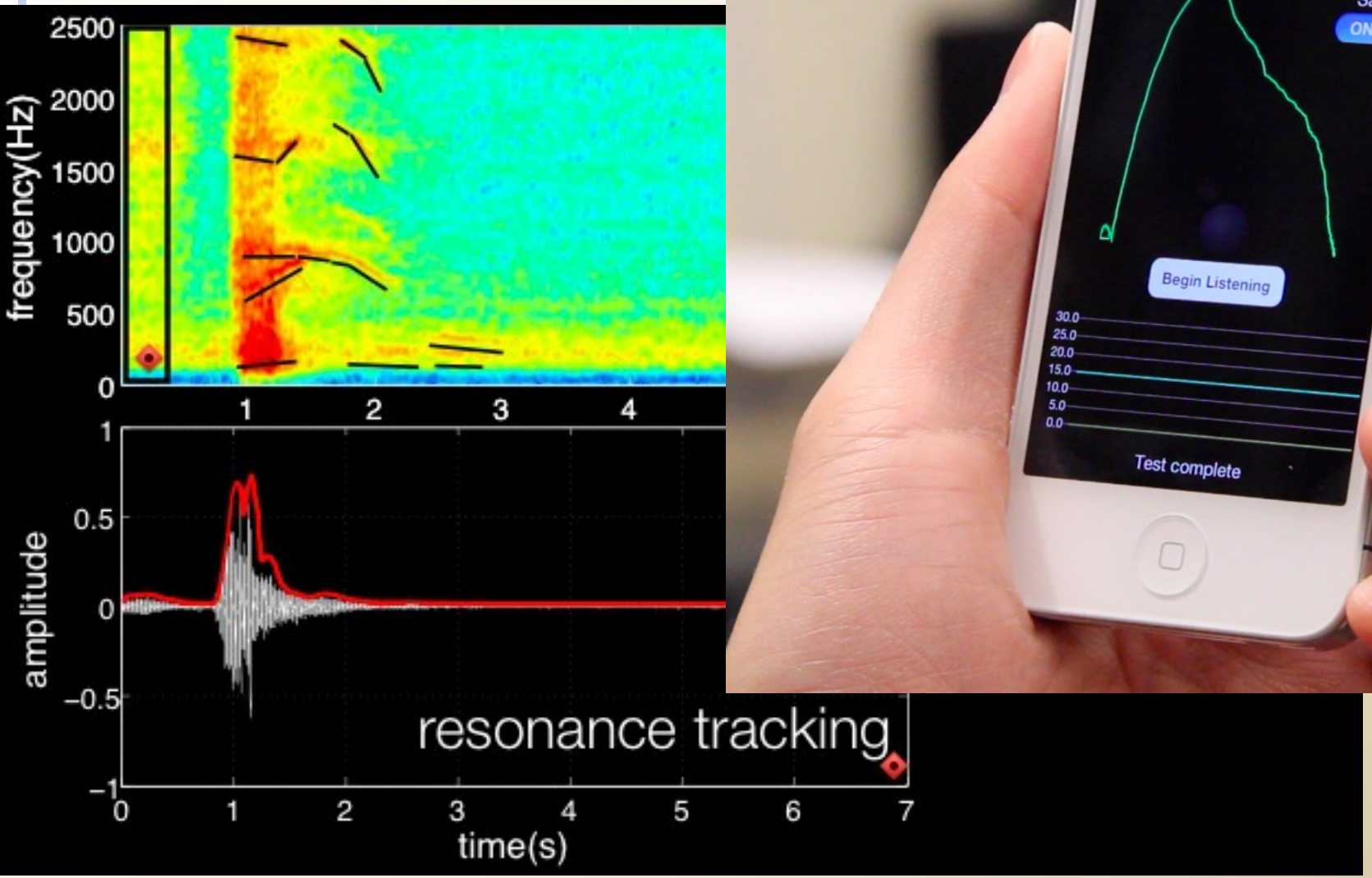
Focus of ODK Research

- Clinic decision support
- Mixing paper and digital
- Rapid diagnostic tests
- Internal sensors - spirometry
- External sensors – cold chains, milk pasteurization

ODK SCAN
Vaccine logistics in Mozambique



SpiroSmart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2000
1500
1000
500
0
1
2
3
4
amplitude
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0.5
0
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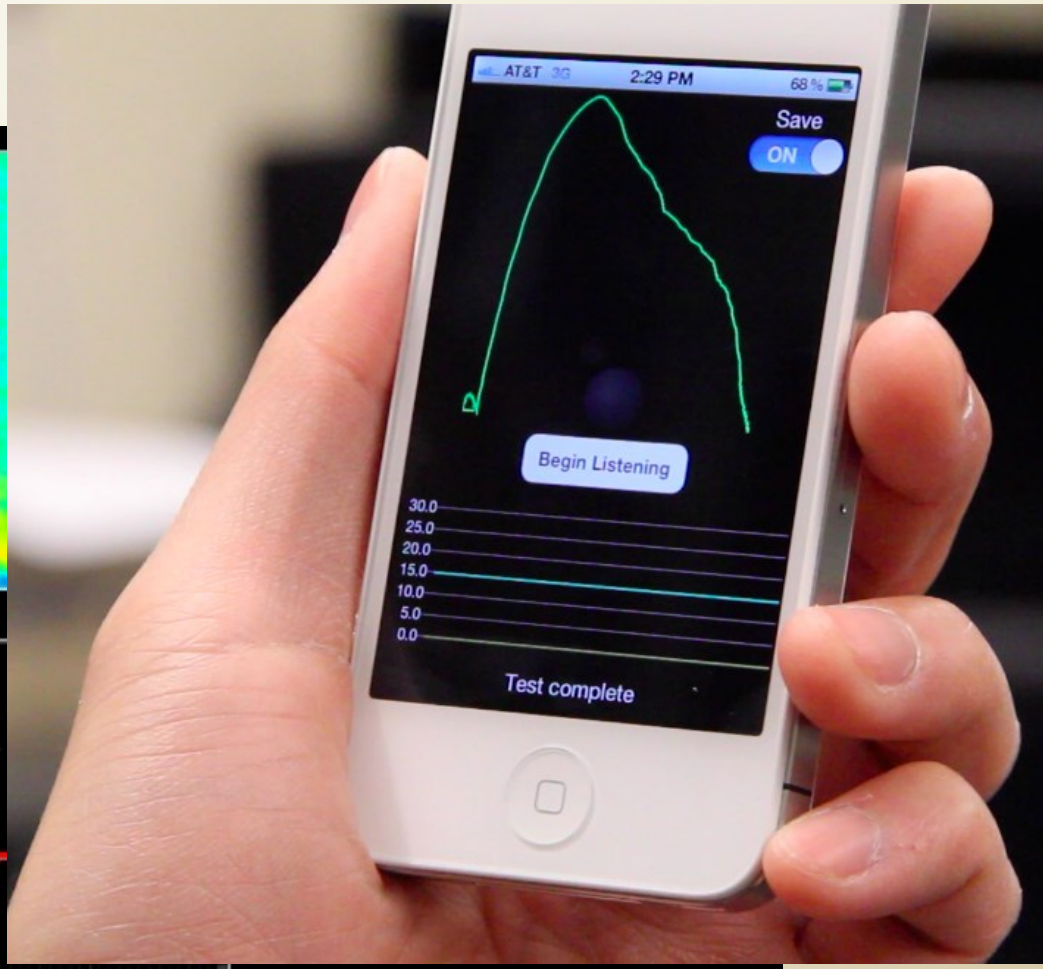
−1
0
1
2
3
4
5
6
7
time(s)
resonance tracking


AT&T 3G
2:29 PM
68 %
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Begin Listening
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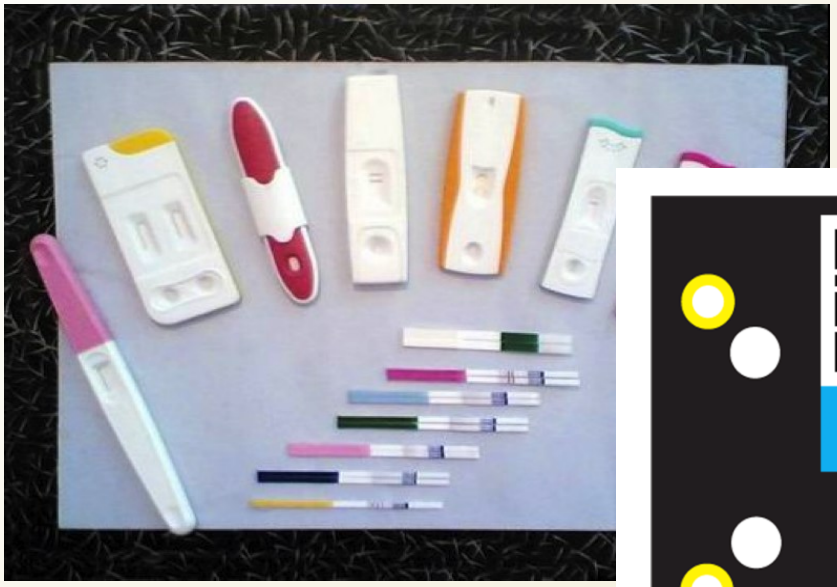
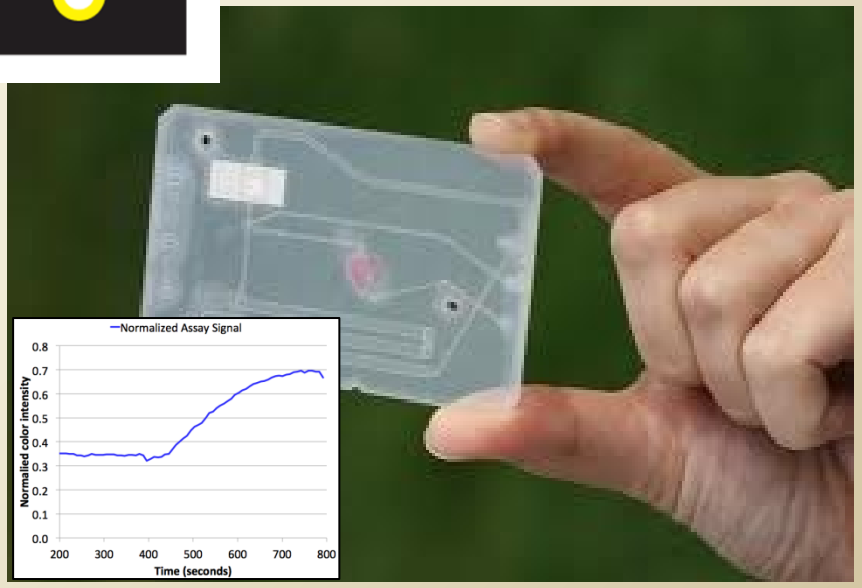
20.0
15.0
10.0
5.0
0.0
Test complete

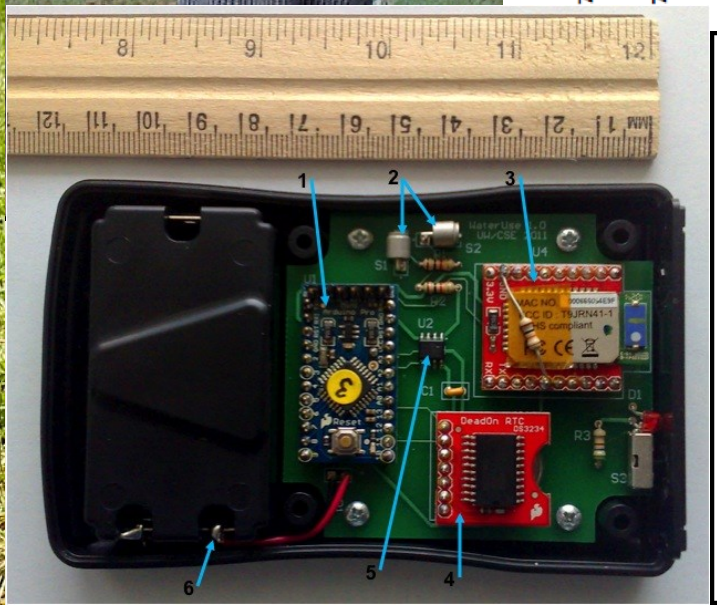
ODK Diagnostics

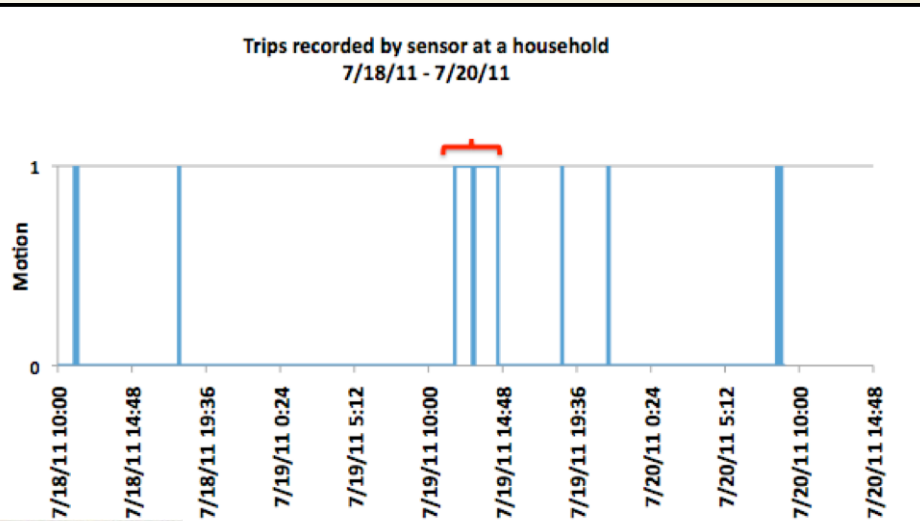


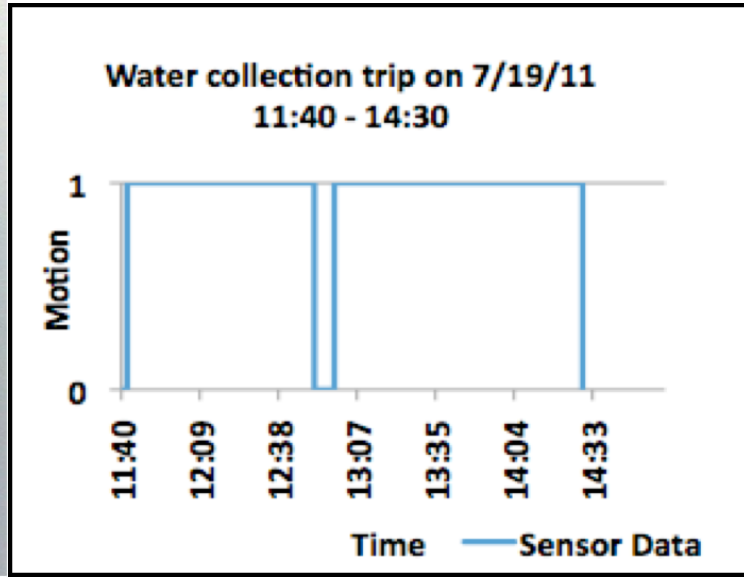


ODK SENSORS:

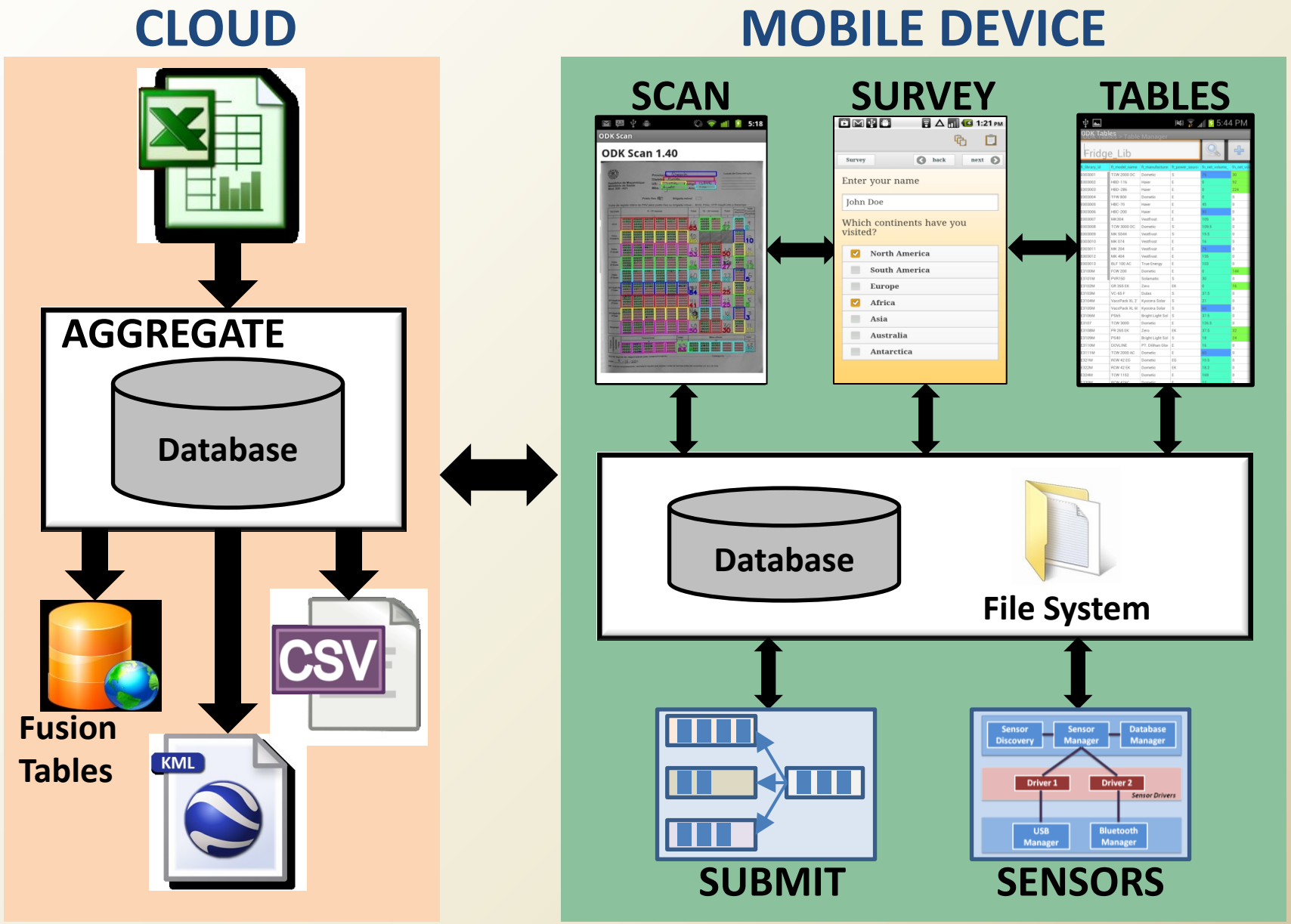
Time spent gather water in Ethiopia



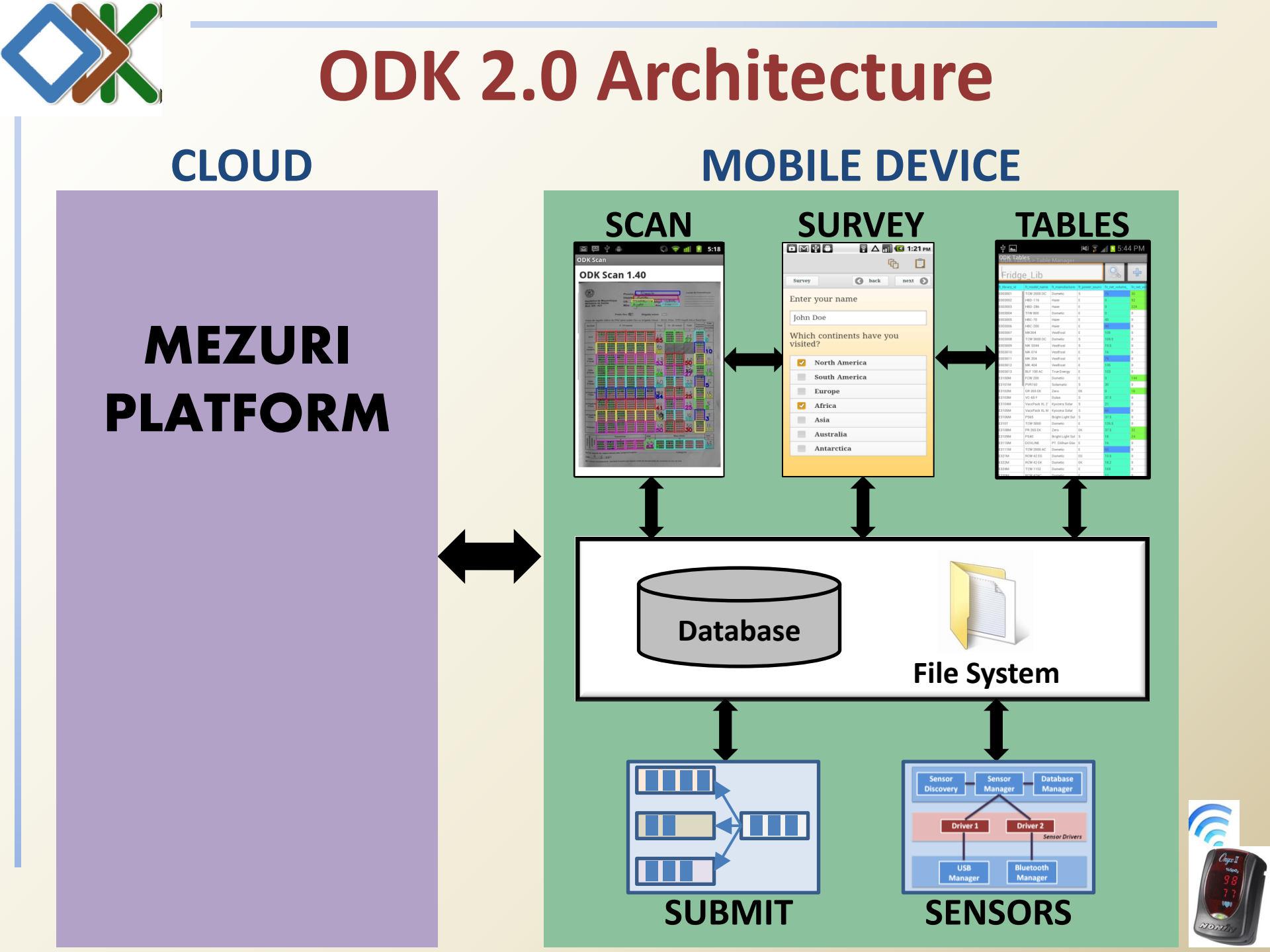




ODK 2.0 Architecture



ODK 2.0 Architecture



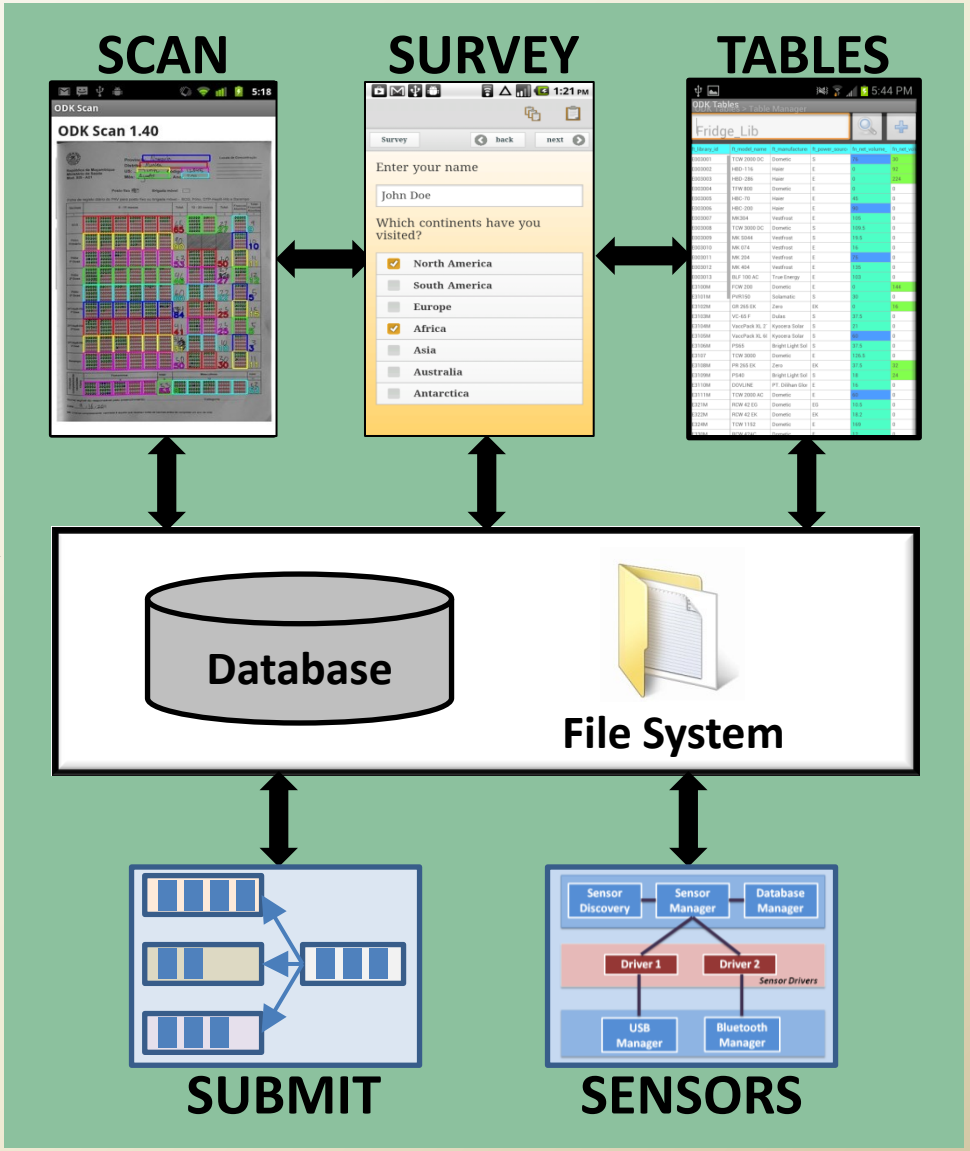
ODK 2.0 Architecture

CLOUD

MEZURI PLATFORM

- Track provenance of collected data
- Customizable dashboard for projects
- Data sharing capabilities with built-in security

MOBILE DEVICE



Planned activities

- Interactive voice response (IVR)
- P2P data transfer
- SMS connections
- Active scripts within Tables
- Develop/deploy several complete apps using 2.x toolset

Thank you to our partners!

- ***Our NGO Partners:***
  PATH, AMPATH, VillageReach, GSID, Jane Goodall Institute, Google Earth Outreach, ….

- ***Our Funding Partners:***
  NSF, Google, USAID, DARPA, NIH, Gates Foundation, Samsung, Microsoft

Questions?
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