

# Androids in the Bush

*an update on UReport and its alpha-pilot in Uganda*

Gaetano Borriello

Dept of Computer Science & Engineering, University of Washington  
Google-Seattle/Google.org (sabbatical leave)

*with Yaw Anokwa (UW), Julie Chin (PM), Carl Hartung (UW),  
Adam Lerer (MIT), and Bill Schilit (Google co-lead)*



# UReport

- Tools for community-based monitoring
- Enable resource-poor organizations to build scalable data collection/visualization systems
- Rich UI and sensing on new generation of mobile devices (G1)

open source modular tools  
on common platforms



# Community-based monitoring

- Enable people to act as a distributed sensor network
- Citizen science
  - Environmental conditions
  - Flora/fauna census/tracking
- Public health
  - Patient follow-up
  - Disease surveillance
- Demographics
  - Census taking
  - Public opinion polls
- Disaster recovery/response

# Our approach

- Blaze a thin trail - end-to-end basic functionality
- Widen the path - add higher-level modules, modularize
- Make it a road - get real users to validate module collection
- Road network - multiple applications using different modules
- We have our thin trail
  - ▣ creation of surveys
  - ▣ download to mobile device
  - ▣ collect data from device sensors
  - ▣ upload to server
  - ▣ visualize in custom web pages
- Get into the field and iterate....



# Our first deployment

- Partner:
  - Grameen Foundation AppLab in Kampala, Uganda
- Application:
  - Survey to evaluate AgTips (“Farmer’s Friend”)
  - SMS-based query returns relevant “tip”
- Scale:
  - 20 shared phone operators that send the SMS for farmer
  - Based throughout Uganda  
including remote rural regions off the grid

# Example AgTips

- sent: Banana Pests
- response: No direct match to your question however this may be a useful tip, 'To control banana yellow wilt, ferment animal or human urine for 2 weeks, and apply to the roots plant.' Reply with 1. Nematodes 2. Wilt 3. Weevils 4. Pests 5. Spacing 6. leaf spot. Agriculture information by BROSDI. It is INFORMATION ONLY
- sent: Banana leaf spot
- response: To control banana (leaf spot) sigatoka, apply organic fertilizer, and prune old leaves always. Agriculture information by BROSDI. It is INFORMATION ONLY.

# Goals

- For Grameen:
  - ▣ Evaluate AgTips from farmer's viewpoint, usage data
  - ▣ Expect 1000 surveys over life of project
- For us: shake out of our system
  - ▣ User interface
  - ▣ Software
  - ▣ Connectivity
  - ▣ Power/charging

# Where we were





# Survey Questions

- 1) Have you used this service before? / Wali okozesezzako enkola eno? (select)
- 2) Is the information you just received useful? / Obubaka bwe wakafuuna bwamugaso? (select)
- 3) If yes, how will you use the information. If no, how can the service be more useful? / Oba ye, obubaka onobukozessa otya? Oba nedda, nkyukakyuki gyewaliyagadde tukole? (textArea)
- 4) What do you think would be a fair price for this service? / Bisale kyi bye waliyagadde okusasulira enkola eno? (text)
- 5) Where is the information for this service coming from? / Olowozza amawulire ganno gavaawa? (text)
- 6) Do you trust the source of the information? / Wesiga esibukko ya mawulire ganno? (select)
- 7) Before this service existed, where would you learn this information? / Nga enkola eno tenabawo, amawulire nga gano wagajjangawa? (text)
- 8) Would you tell your friends about this service? / Oyinzza okubulira kubano kunkola eno? (select)
- 9) This service provides weather and farming information. What other topics would you like to see offered by this service? / Eno enkola ekuwa amawulire gebera yobudde ne byobubilimi, mu ki omulara mwewaliyagadde ofuna amawulire? (text)
- 10) Please record your location. / Tekamu ekifo woli. (location)
- 11) Please record the time. / Tekamu esawa wobuliza embera yobudde. (time)
- 12) Please enter the farmer's name. / Yingiza mu elinya lyo mulimi. (text)
- 13) Please take a picture of the farmer. / Omulimi mukubbe ekiffananyi bwaba ayagadde. (photo)

# Power

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



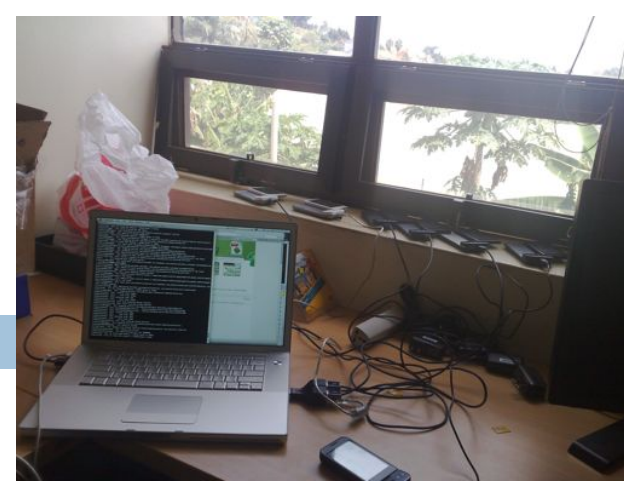
# Connectivity

- Voice/SMS are fairly ubiquitous
- Carriers give voice highest priority
  - ▣ SMS ok because messages are short
  - ▣ GPRS suffers greatly
- GPRS can be slow and unreliable during the day



# Software/GPS

- G1 assumes much
- GPS needs to download new almanacs
  - ▣ Relies on bootstrapping from cell towers
- Calls home to report status/usage
  - ▣ Causes messages about data charges
- Programmatically change settings on device
  - ▣ Ensure our apps start up with correct resources available
- Manage SMS queues/alerts
- MicroSD required for camera
- UReport must become a native app rather than working through browser
- Sync needs to be a background task



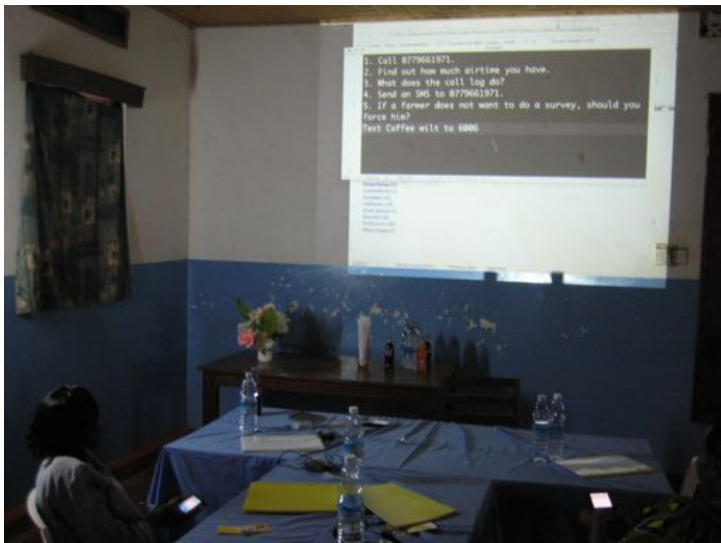
# User interface



- ❑ Sunlight makes screen difficult to read
- ❑ Small lettering difficult for older SPOs
- ❑ Unfamiliarity with touch screen
- ❑ Callused fingers do not capacitively couple
- ❑ Keyboard on “bronze” G1s difficult to read
- ❑ 9-digit keypad interface much more familiar than QWERTY
- ❑ Inconsistency in use of buttons and screen
- ❑ Difficult to get to SIM card
- ❑ Screen swing mechanism too delicate



# Training



# Roadblocks are not what you expect!



# Next steps

- Target applications for community health workers
- Make UReport app native and render Xforms
  - Align with OpenROSA consortium
  - Add pictures, GPS, deferral, etc.
- Visualization of collected data
  - Connect to Google gadgets
  - Get past AppEngine's quanta limitations

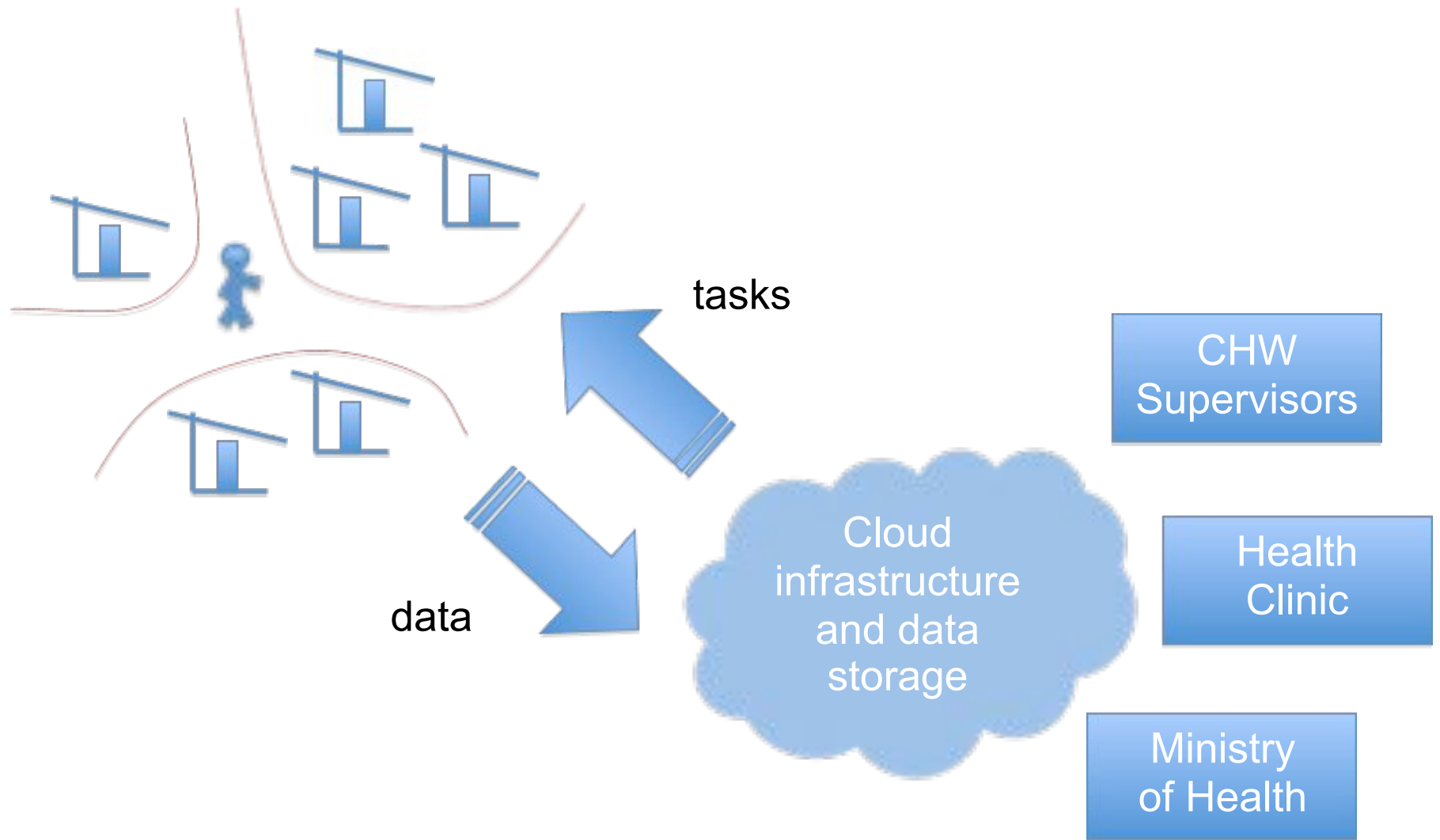


# Community Health Workers

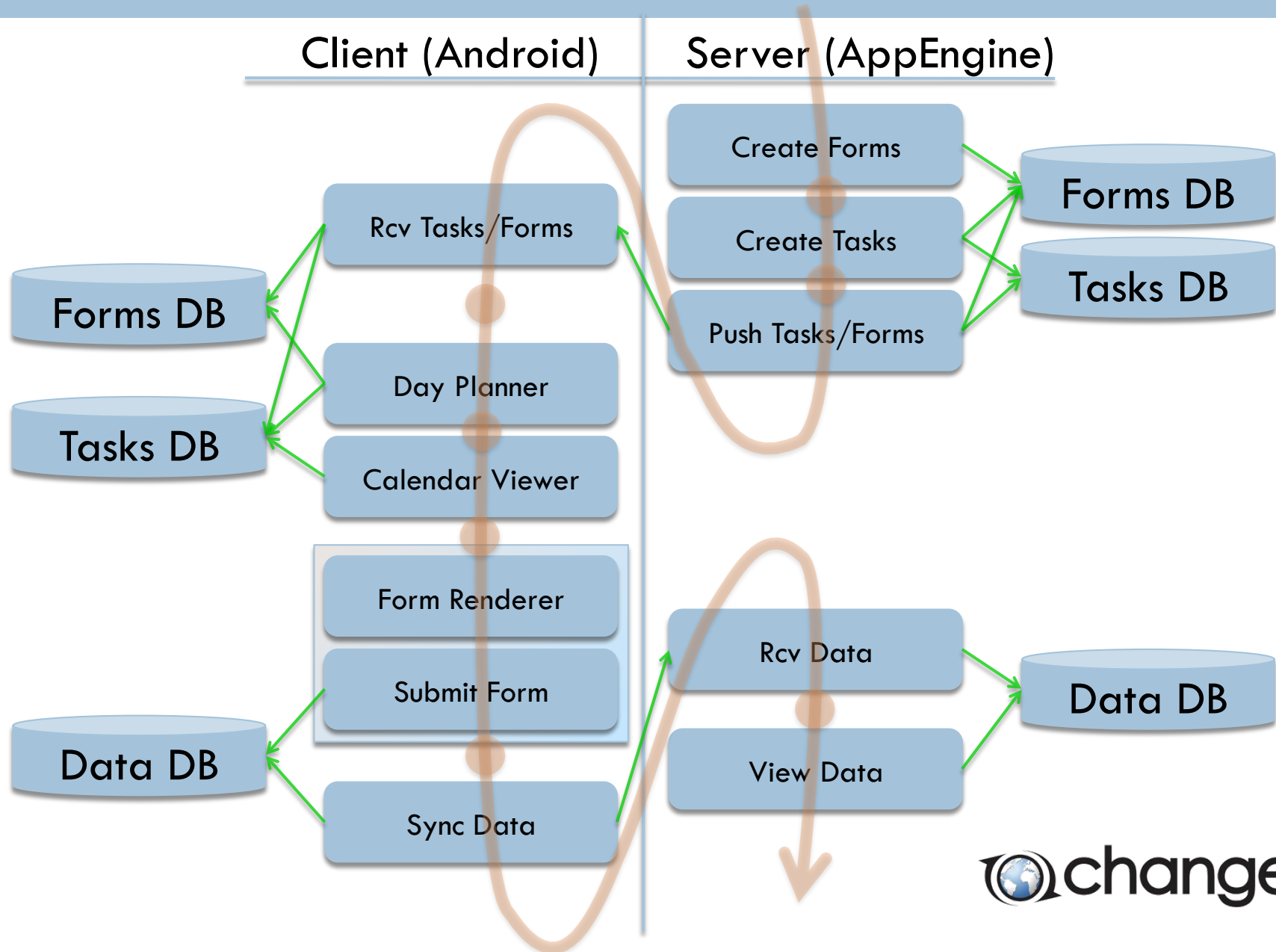
- First line health care
- Routine, regular home visits
- Know community
- Eyes and ears for local health
- Provide education for best practices



# Model



# Version 1.0 (Feb 2009)



# Next Deployments (under consideration)

- Tanzania – Pathfinder CHWs
- Zanzibar – UN water source survey
- SEAsia – Mekong Basin disease surveillance
- Ghana – Grameen Ghana Health project