Climate Smart Technologies and Practices Meet ICT Tools

EXPERIENCES OF INCLUDING MOBILE-PHONE BASED TOOLS IN RESEARCH

What do we mean by ICTs?

- Radio (local and amateur stations)
- Internet
- Mobile phones (Interactive Voice Response & voicemail)
- Social media (twitter, facebook, …)
- Text messages SMS
- Mobile apps
- Crowdsourcing technologies (sensors)
- Community mapping (collaborative cartography)
- Social computing (collaborative online behavior)

Using Science Knowledge and Expert Feedback to Accelerate Local Adoption

Climate Smart Technologies and Practices Meet ICT Tools

… goals of this project were to **combine highly relevant CSA research outputs** with **practical knowledge on the ground**, use modern information and communication technology (ICT) to support the **interaction between actors** and to accelerate the **delivery of information** from experts to implementers, and **feedback from implementers to scientific experts**.

CIAT

Selian Agricultural Research Institute (SARI) – Arusha, Tanzania

RealApps
Cali, Colombia

CGIAR

RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

CCAFS

OFID
THE OPEC FUND FOR INTERNATIONAL DEVELOPMENT
Uniting against Poverty

funded by the OPEC Fund for International Development OFID, a development finance institution of OPEC Member States

18 months / 100kUSD

CIAT linked projects and activities in East Africa

BILL & MELINDA GATES foundation — 5Q approach for project monitoring

Transformative adaptation on benchmark sites

E-adaptation with crowd-sourcing tools — FS 1. Citizen Science

IFAD — Wide-Scale Adoption of Climate-Smart Agriculture Practices
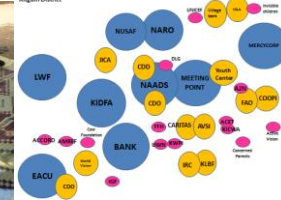
FS 4. Policy Action for Climate change Adaptation

2012	2013	2014	2015

- Land health & crop modeling
- Socio-economic modeling
- Participatory research & survey

- Knowledge Sharing Training in data Analysis Participatory sessions
- Participants: Scientist from National Institutions, Farmers

- RRA Northern Uganda
- Meta analysis of CSA practices
- Periodization workshops with Farmers/experts
- ICT tools testing
- Register actors for 5Q M&E

- IFAD Demo plots (Uganda & Tanzania)
- Citizen Science (Honduras, India, Ethiopia)
- Survey tools in 5Q approach

http://dapa.ciat.cgiar.org/ccafs-ea-fieldwork/

http://dapa.ciat.cgiar.org/kubadilishana-maarifa-knowledge-sharing-in-tanzania/

http://dapa.ciat.cgiar.org/planting-the-seed-of-csa/

http://dapa.ciat.cgiar.org/implementing-csa-the-last-mile/

http://dapa.ciat.cgiar.org/climate-smart-knowledge-sharing-in-tanzania/

our team in East Africa

Using Science Knowledge and Expert Feedback to Accelerate Local Adoption

Climate Smart Technologies and Practices Meet ICT Tools
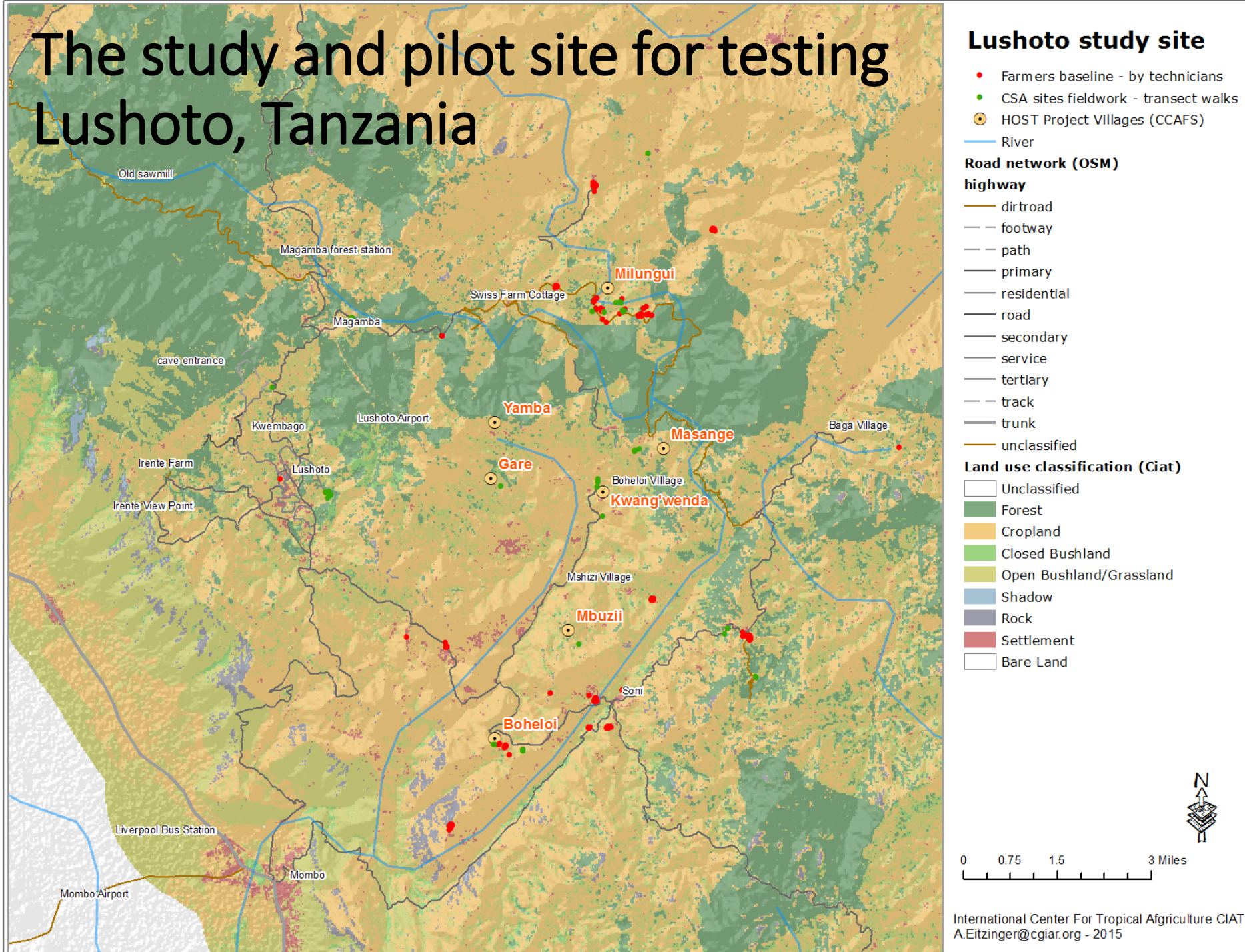
Objectives

- **Identify** most promising CSA practices for the northern Tanzania region using an existing database previously compiled in a collaborative project between CIAT and ICRAF as well as expert knowledge.

- **Develop** application domains using up-to-date soil and land health information to improve crop-soil-modeling for smallholder farmers

- **Assess** modeled agronomic and environmental benefits of the CSA practices.

- **Validate** benefits with local agriculture experts through an interactive platform developed for use by national agricultural research systems in order to outscale efforts for improved agricultural productivity.
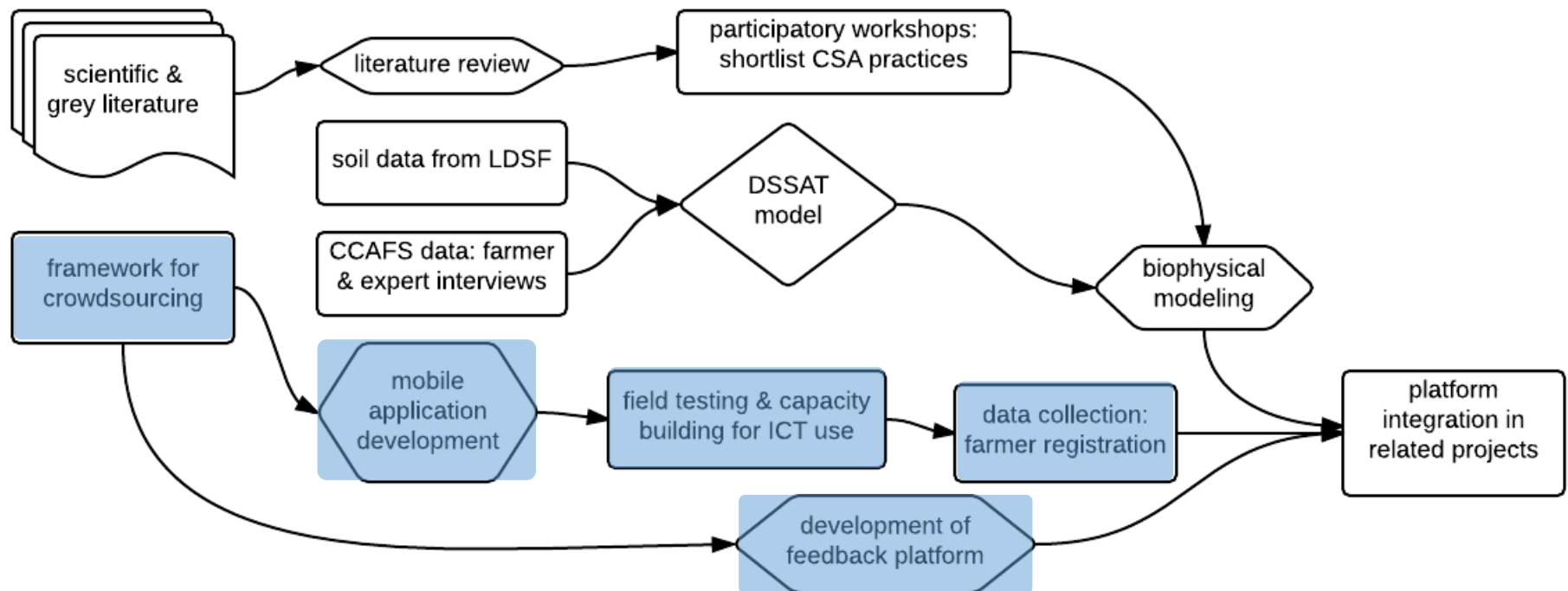
http://dapa.ciat.cgiar.org/implementing-csa-the-last-mile/
Project Final Report

The study and pilot site for testing Lushoto, Tanzania

Lushoto study site

- • Farmers baseline - by technicians
- • CSA sites fieldwork - transect walks
- ◉ HOST Project Villages (CCAFS)
- —— River

Road network (OSM)

highway

- —— dirtroad
- – – footway
- – – path
- —— primary
- —— residential
- —— road
- —— secondary
- —— service
- —— tertiary
- – – track
- —— trunk
- —— unclassified

Land use classification (Ciat)

- Unclassified
- Forest
- Cropland
- Closed Bushland
- Open Bushland/Grassland
- Shadow
- Rock
- Settlement
- Bare Land

Old sawmill

Magamba forest station

Milungui

Swiss Farm Cottage

Magamba

cave entrance

Yamba

Kwembago

Lushoto Airport

Baga Village

Masange

Irente Farm

Lushoto

Gare

Boheloi VIllage

Irente View Point

Kwang'wenda

Mshizi Village

Mbuzii

Soni

Boheloi

Liverpool Bus Station

Mombo

Mombo Airport

N

0   0.75   1.5   3 Miles

International Center For Tropical Afgriculture CIAT
A.Eitzinger@cgiar.org - 2015

Activities and outputs

Using Science Knowledge and Expert Feedback to Accelerate Local Adoption

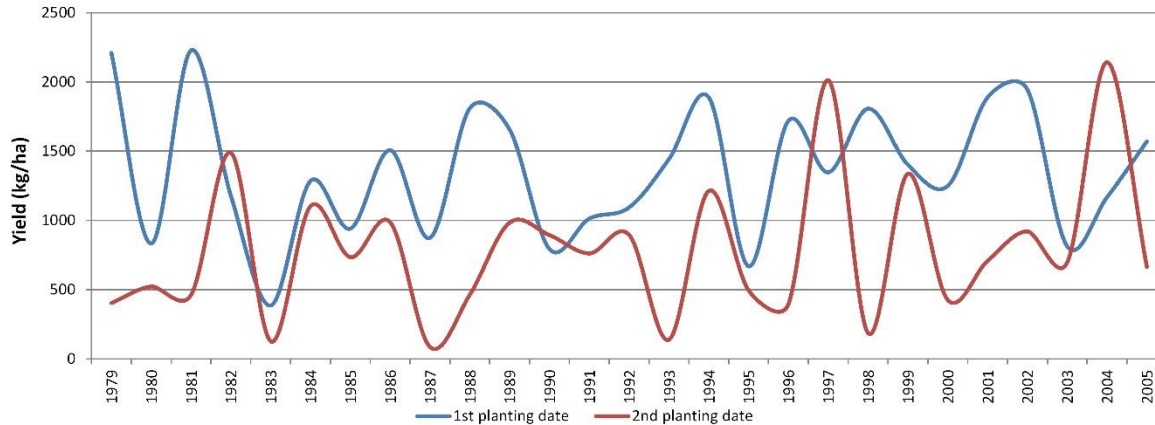*Climate Smart Technologies and Practices Meet ICT Tools*

Participatory workshops in June 2014

In a participatory workshop we grouped farmers into different groups, based on gender and agro-ecological zones.
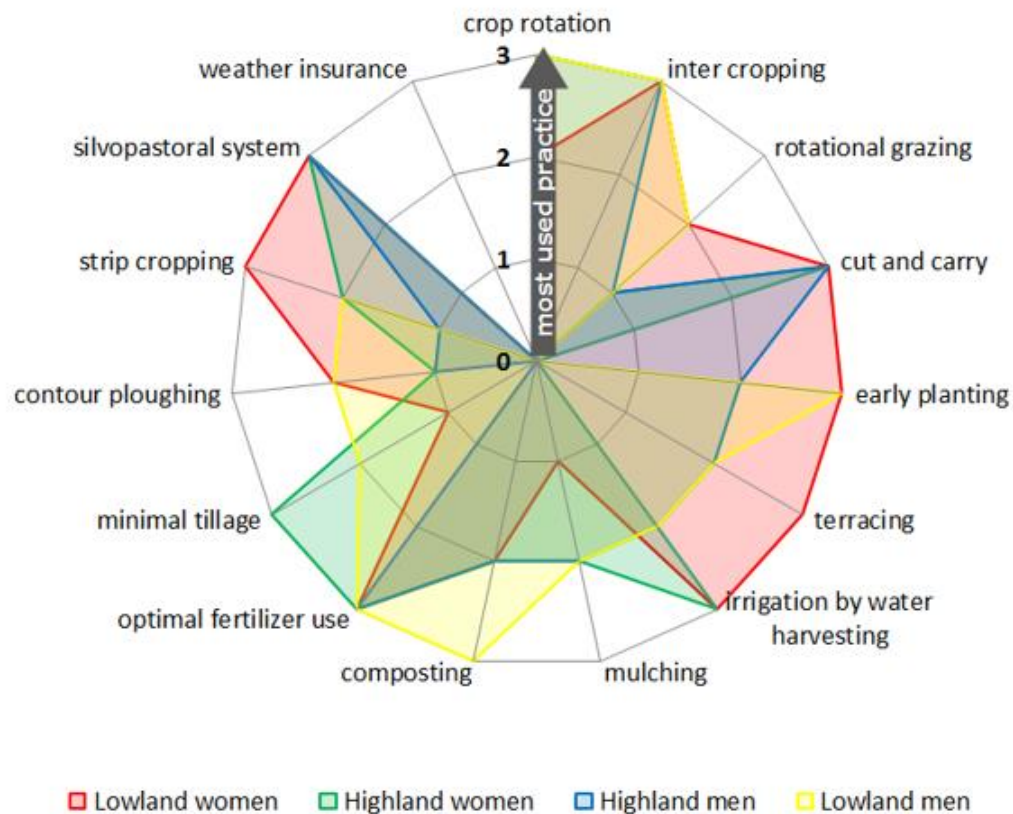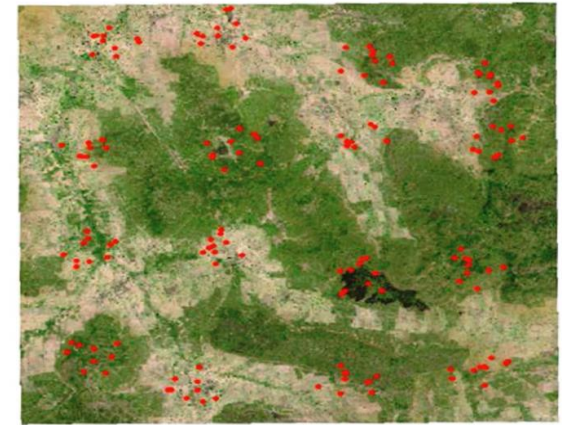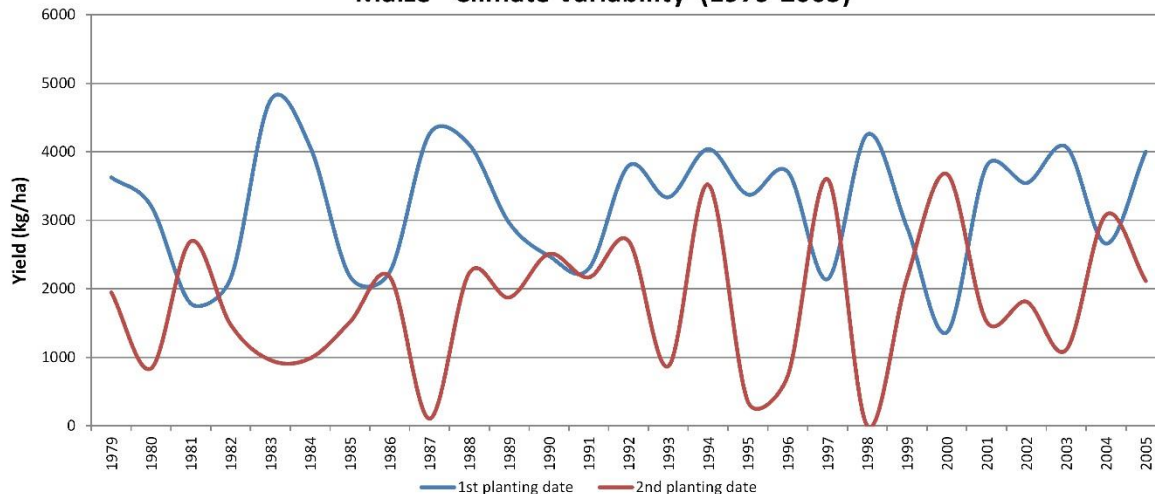
Biophysical modeling

Beans - Climate Variability (1979-2005)

Maize - Climate Variability (1979-2005)

- LDSF soil samples

- DSSAT model

- 27 years of daily weather data from CCAFS (Princeton dataset)

Framework of ICT supported CSA implementation

Technicians

- Register farmer from village on OFID app
- Doing the 5Q baseline

Invite farmers

IFAD

Demonstration plot activities

- Invite farmers to demonstrations
- Meet regularly on demonstration plot with farmer
- Geocode site
- Document progress (take pictures, write activities)
- Post questions on forum

local institutional support

On-the-ground monitoring

Participatory M&E

Demo plot implementer

5Q survey

survey

5Q survey

Feedback loops

Post questions

Post answers

5Q feedback

5Q feedback

donor

5Q survey

5Q monitoring

5Q survey

5Q feedback

Experts (project implementer)

- Track activities
- Respond questions
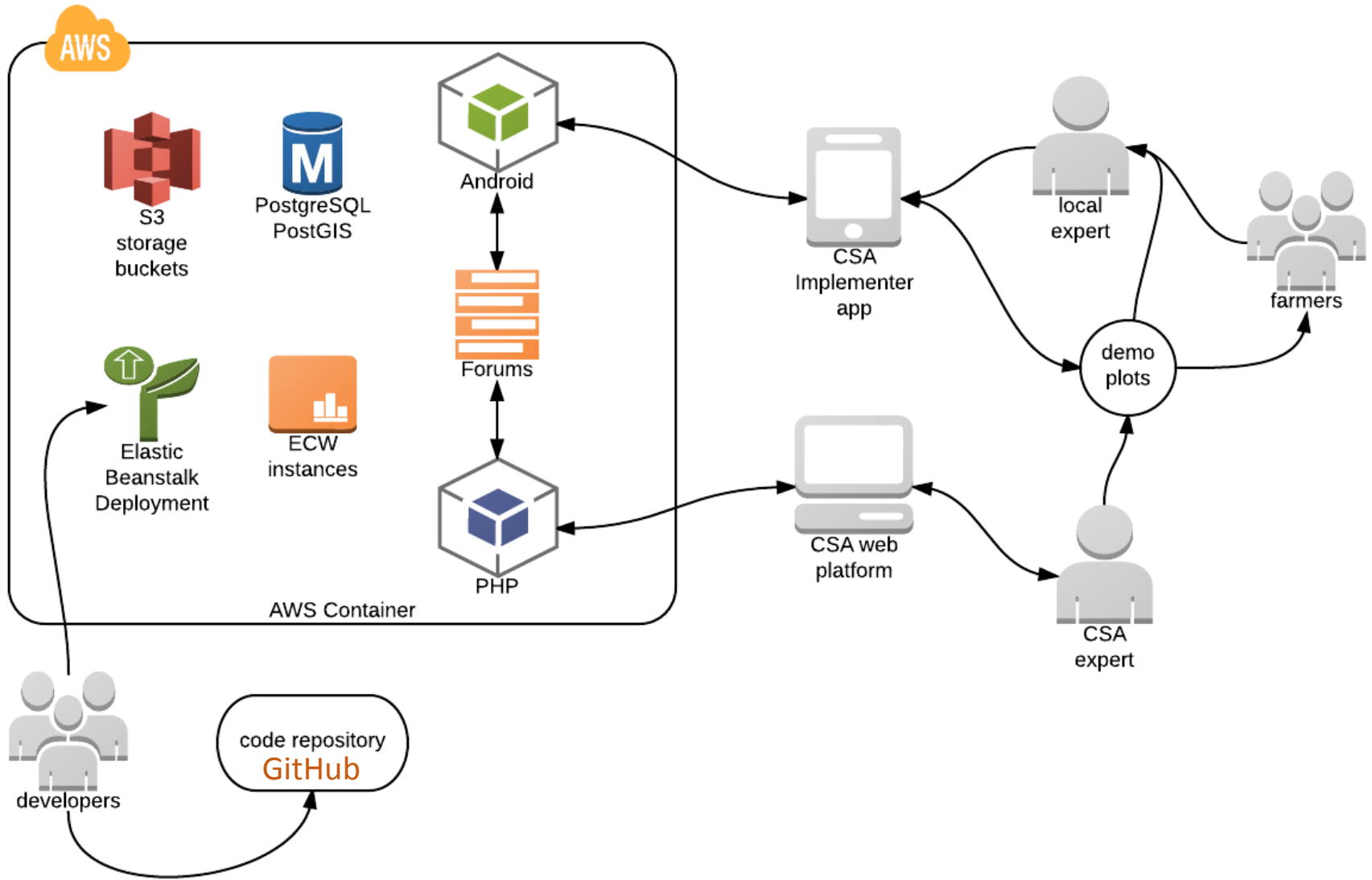- advices
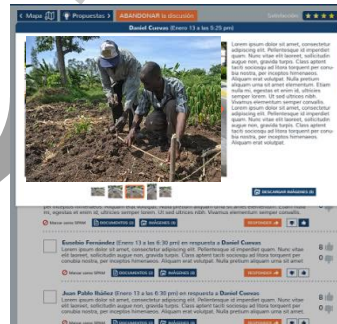
Demo plot implementer

- final report of outcomes from demo plot

Experts
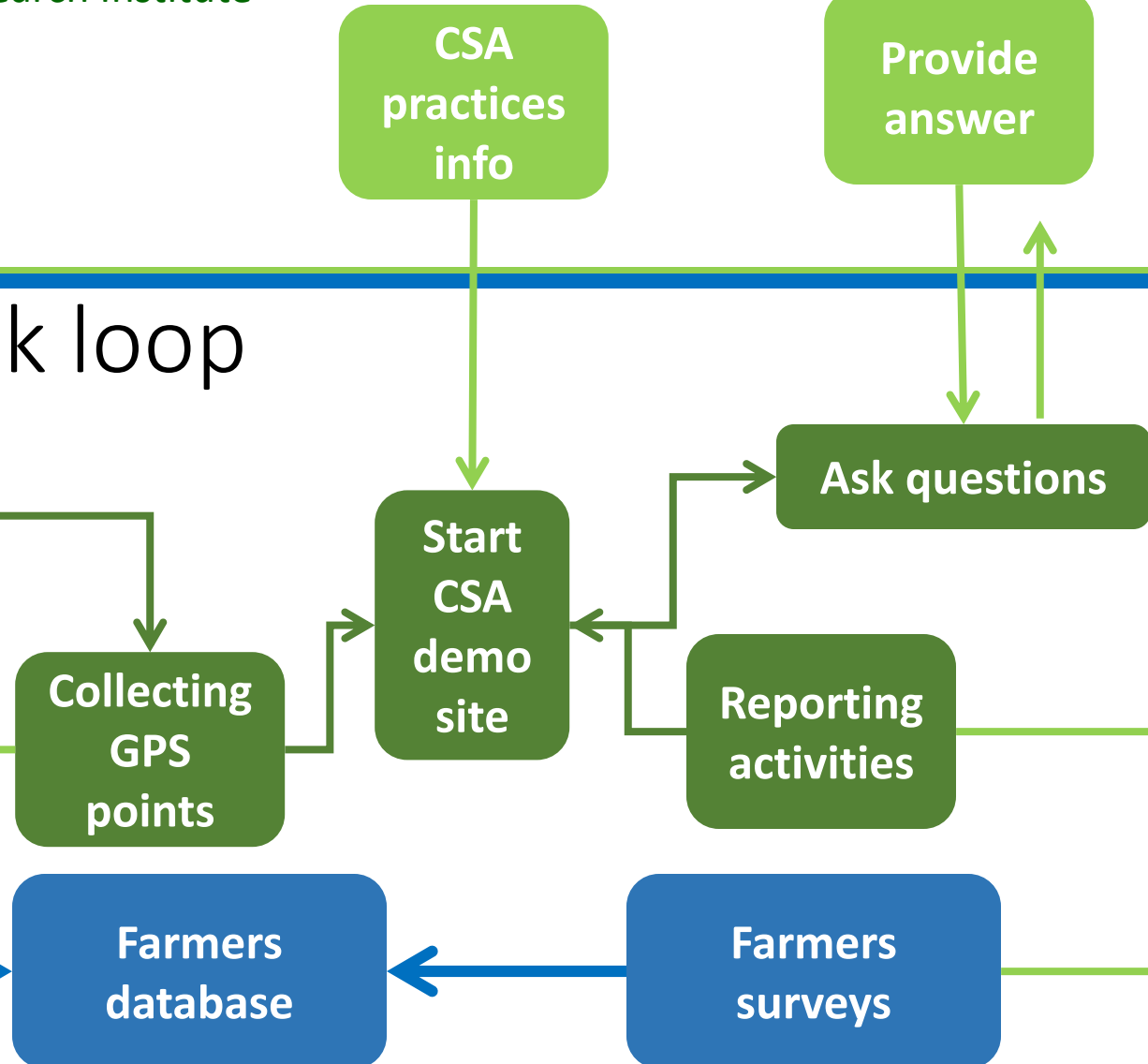
- Evaluation by experts

CSA Implementer

AWS

S3 storage buckets

PostgreSQL PostGIS

Android

Forums

Elastic Beanstalk Deployment

ECW instances

PHP

AWS Container

CSA Implementer app

local expert

farmers

CSA web platform

demo plots

CSA expert

developers

code repository GitHub

Live demo!!

Left screen

CSA Implementer

Register a new farmer

Farmers photo here
Click to add a picture

Names *

Surnames *

Phone *

Email

START REGISTER

Right screen

CSA Implementer

Register a new farmer

Farmers photo here
Click to add a picture

Names *

Surnames *

Phone *

Email

* Fields are mandatory

START REGISTER

Left Screen

Name: Sharifa Kuziwa
Phone: 0719189209
Email:
Collected points: 0

Farmers Surveys

CSA farmer baseline
baseline survey for new farmers
Pending

Go to map and collect GPS-points

Go to start page

Right Screen

Survey: IFAD/5Q farmer 1st

This is the first survey of 5Q for farmers
Farmer: Testname Testsurname

We are collecting information on agricultural practices. Please answer the following questions to reflect your opinions as accurately as possible. Your feedback will assist in the improvement of agriculture research for smallholder farmer in East Africa. Information received will be kept strictly confidential. Are you willing to participate?

Yes | No

Have you heard about manure compost?

Yes | No

Do you do manure compost?

Yes | No

Have you received information on compost manure?

Yes | No

Would you like to receive information about this?

Yes | No
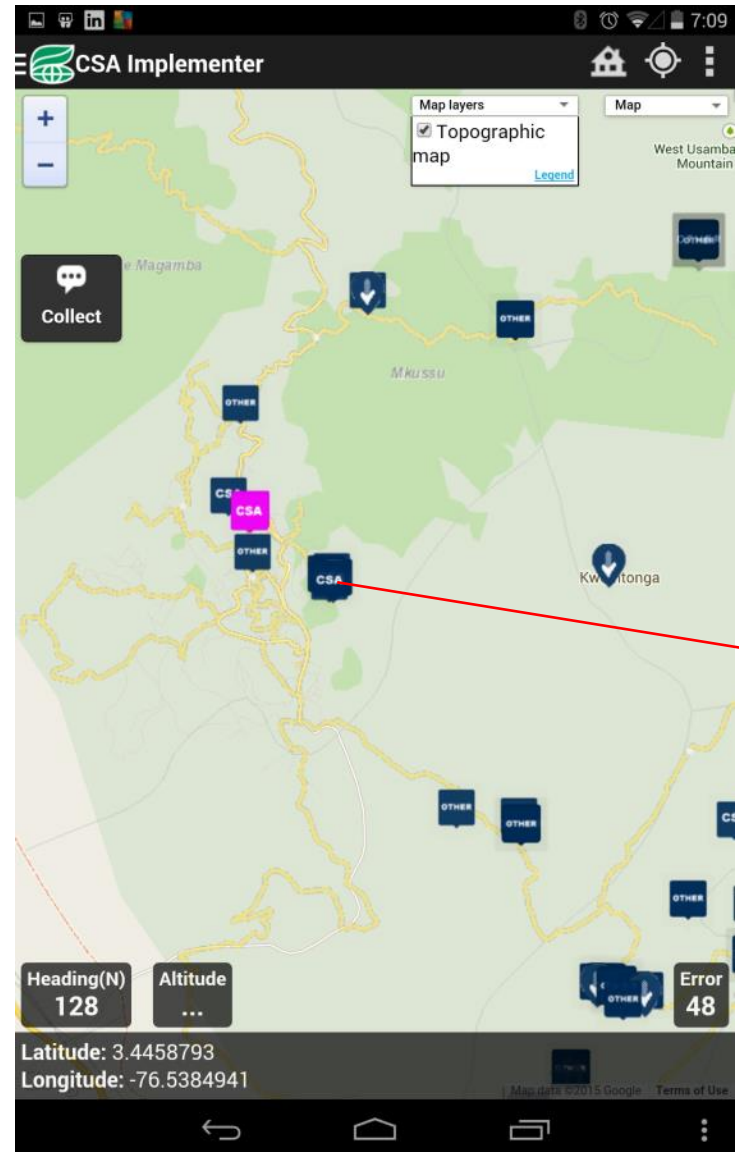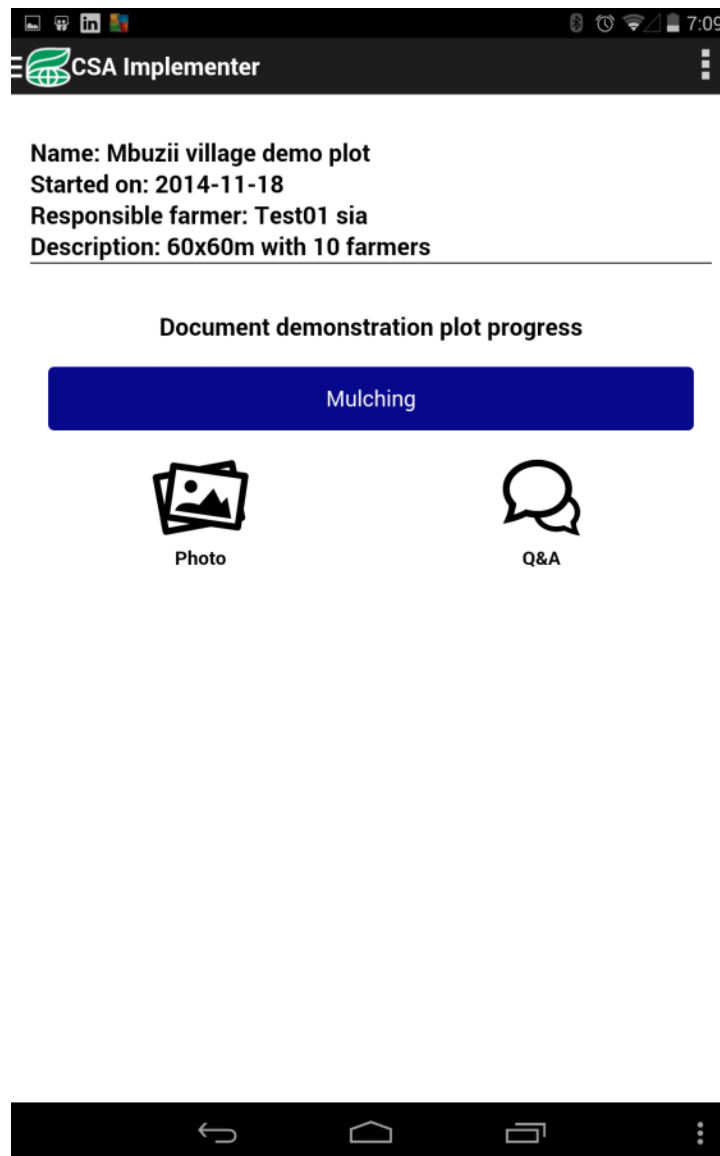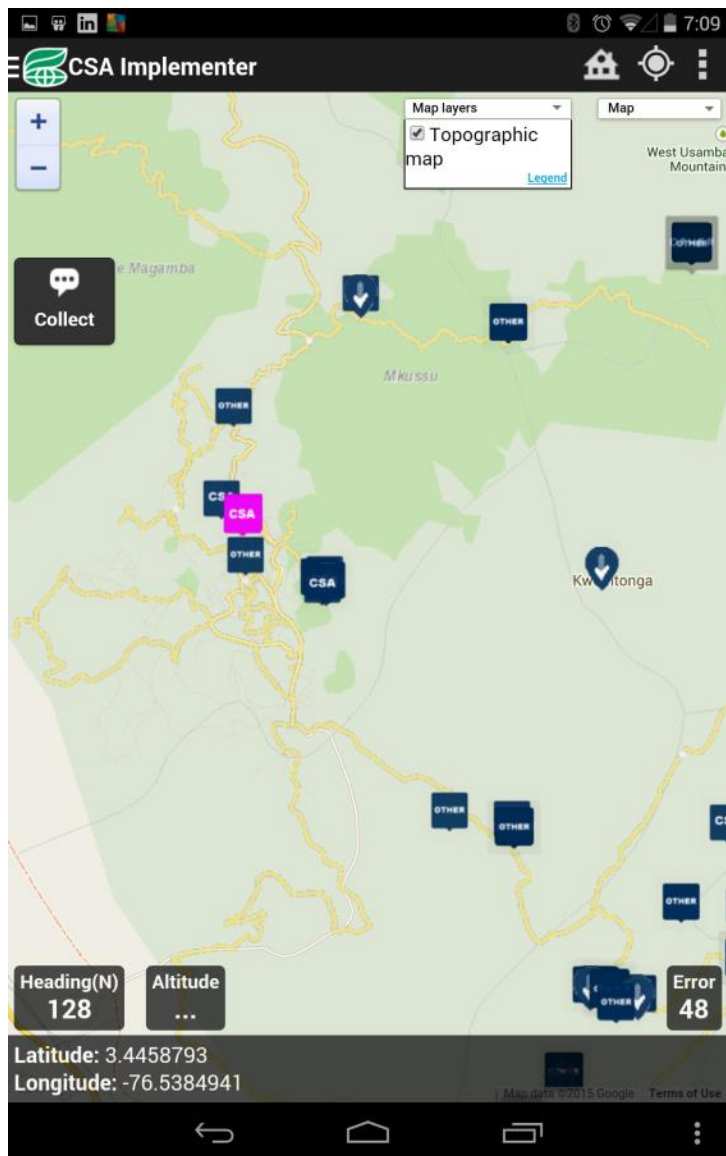
SEND

Go to start page

Name: Mbuzii village demo plot
Started on: 2014-11-18
Responsible farmer: Test01 sia
Description: 60x60m with 10 farmers

Document demonstration plot progress

Mulching

Photo

Q&A

Prev

Next

Name: Mbuzii village demo plot
Started on: 2014-11-18
Responsible farmer: Test01 sia
Description: 60x60m with 10 farmers

Document demonstration plot progress

[Mulching]

Photo

Q&A

[Mulching]

You have 1 activities reports [View]

Make a new report of activities

Date

Click to add a picture

How many farmers did participate?

Activity descriptions and observations

[Send report] [Cancel]

CSA Implementer   ⋮

Name: Mbuzii village demo plot
Started on: 2014-11-18
Responsible farmer: Test01 sia
Description: 60x60m with 10 farmers

Document demonstration plot progress

Mulching

Photo   **Q&A**

CSA Implementer   ⋮

Questions and Answers

You have 0 new answers | View |

Select practices...

Ask your question

Click to add a picture

Send		Cancel

Web platform for experts, to see activity reports and
answer questions made on demonstration plots

Newsfeed | Questions and Ans… | **Activity Reports** | Sites | Map resources

Filter/sort by: *last updated(default)*

Country ▾   Site ▾   CSA ▾

Peters farm   **Lushoto**   ◉ show on map   **2** reports from this site

started on October 28, 2014			CSA implementation: *Manure composting*
November 15, 2014 Another test	8 farmers participated		Reported by: …
October 28, 2014 Soil preparation with Leigh	25 farmers participated		Reported by: …

Nicholas farm   **Lushoto**   ◉ show on map   **2** reports from this site

started on November 13, 2014			CSA implementation: *Mulching*	
November 15, 2014 Testing	5 farmers participated		Reported by: …	Media files: 4
November 13, 2014 Collection of farm wastes for mulching	10 farmers participated		Reported by: …	

Newsfeed

Questions and Answers

Activity Reports

Sites

Map resources

Lushoto, go to map

4 demo sites
CSA Practices: *Manure composting, Mulching*
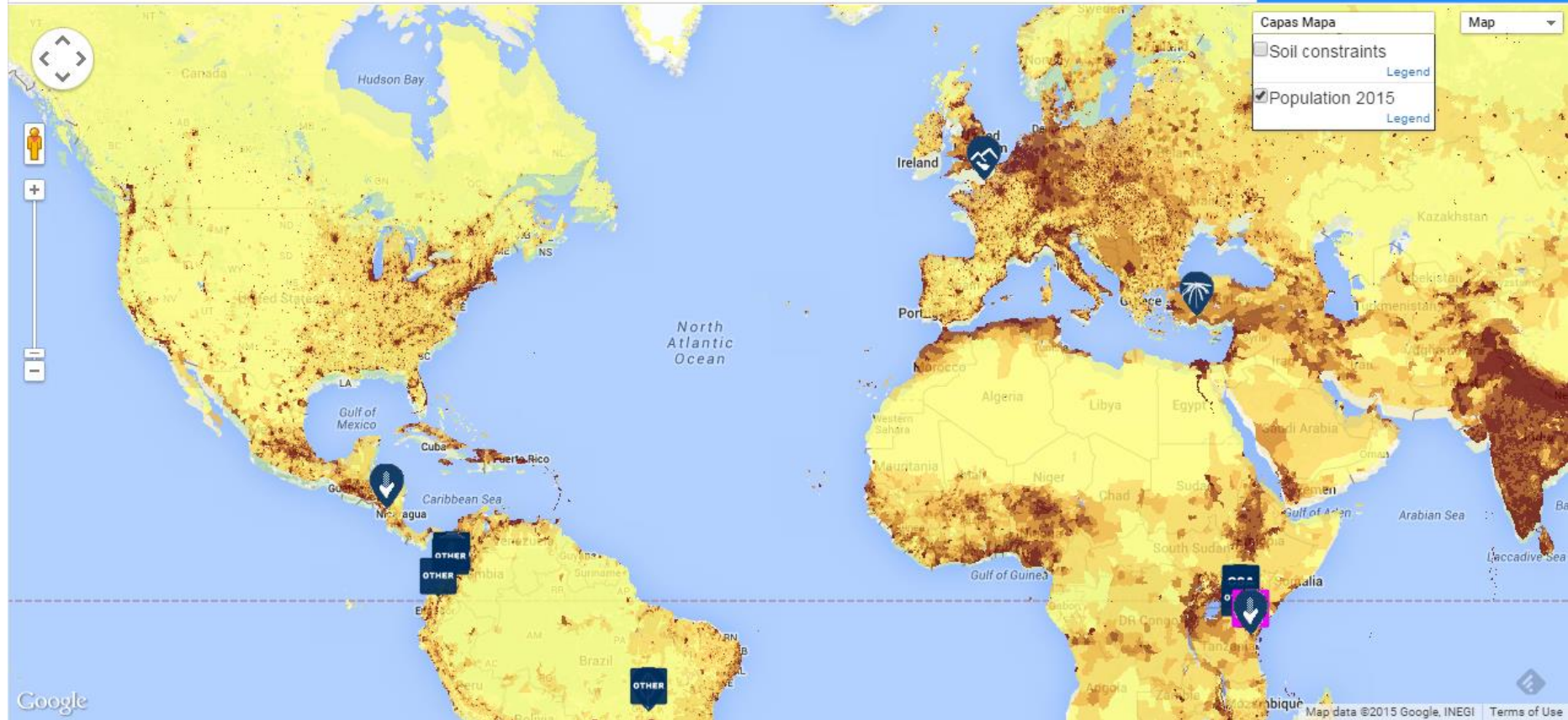
CSA Implementer
user manual mobile app v 1.0

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Since 1967 / *Science to cultivate change*

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Climate Smart Technologies and Practices: Using Science Knowledge and Expert Feedback to Accelerate Local Adoption

01 Login/create account

02 Edit your expert profile

03 Newsfeed

04 Activity Reports

05 Questions / Answers

06 Sites

07 Map view

CSA Implementer
user manual web platform v 1.0

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Newsfeed   Questions and Answ...   Activity Reports   Sites   Map resources   About

The CSA Implementer interactive platform is a crowd-sourcing tool for collaborative testing and learning of climate smart agriculture practices (CSA). It consists of a mobile application and this expert web-platform. The mobile application can be used to manage farmers data and surveys in a database and to monitor ongoing activities on a demonstration or farmers plot. The web platform is used for connecting experts to the ongoing activities on the demonstration sites and to stimulate a two-way feedback loop were local Implementers can upload questions through the mobile app and experts can respond and provide their expert knowledge in a forum on the web platform which will be sent back to the implementers to the mobile app.

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Correct citation:
Eitzinger, A., Sayula, G., Benjamin, T., Rodriguez, B., Winowiecki, L., Läderach, P., Koech, N., Twyman, J. 2015. Project Report: Using Science Knowledge and Expert Feedback to Accelerate Local Adoption: Climate Smart Technologies and Practices meet ICT tool. International Center for Tropical Agriculture CIAT. Cali, Colombia. Available online at: http://dapa.ciat.cgiar.org/

Disclaimer:
This platform has been developed as part of the project "Using Science Knowledge and Expert Feedback to Accelerate Local Adoption: Climate Smart Technologies and Practices meet ICT tool" funded by the OPEC Fund for International Development OFID, a development finance institution of OPEC Member States established to provide financial support for socio-economic development, particularly in low-income countries, and by the Climate Change, Agriculture and Food Security program CCAFS. For the technological platform, researchers adapted an existing platform-framework for collaborative problem solving within the citizen's spatial context, geociudadano.org (Resl et al. 2013, Atzmanstorfer et al. 2014). The framework is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

References:
Atzmanstorfer, K., Resl, R., Eitzinger, A., & Izurieta, X. (2014). The GeoCitizen-approach: community-based spatial planning – an Ecuadorian case study. Cartography and Geographic Information Science, 00(00), 1–12. doi:10.1080/15230406.2014.890546

Resl R, Eitzinger A, Atzmanstorfer K. 2012. Platform for Collaborative Problem Solving within the Citizen's Spatial Context - the Geo-Citizen framework. 2012 Esri International User Conference Paper Sessions. San Diego, USA

Farmers engagement in scientific process, ICT in action research, some research questions ...

- Can mobile applications help to make field data collection easier and more effective?
(even as crowd sourcing)

- Can we improve the communication and feedback loop between scientists, CSA experts and local Implementers? (e.g on a CSA demonstration site, Citizen Science)

- Can we get faster in monitoring a project implementation using technology as a low-cost option? (voice-surveys, text messages)

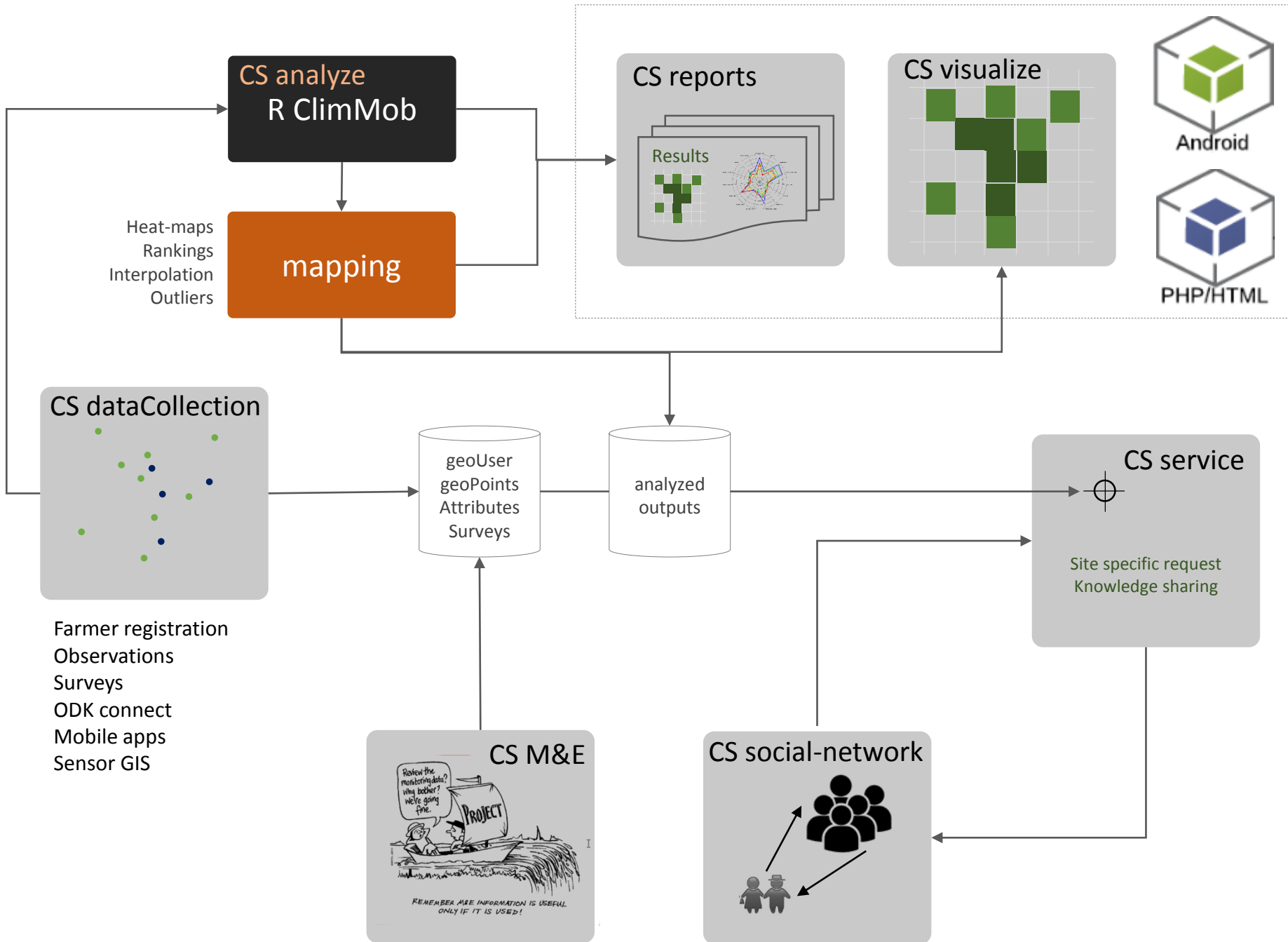# CIAT Fieldwork app, v1, Enero 2014

https://play.google.com/store/apps/details?id=com.geocitizen.ciat
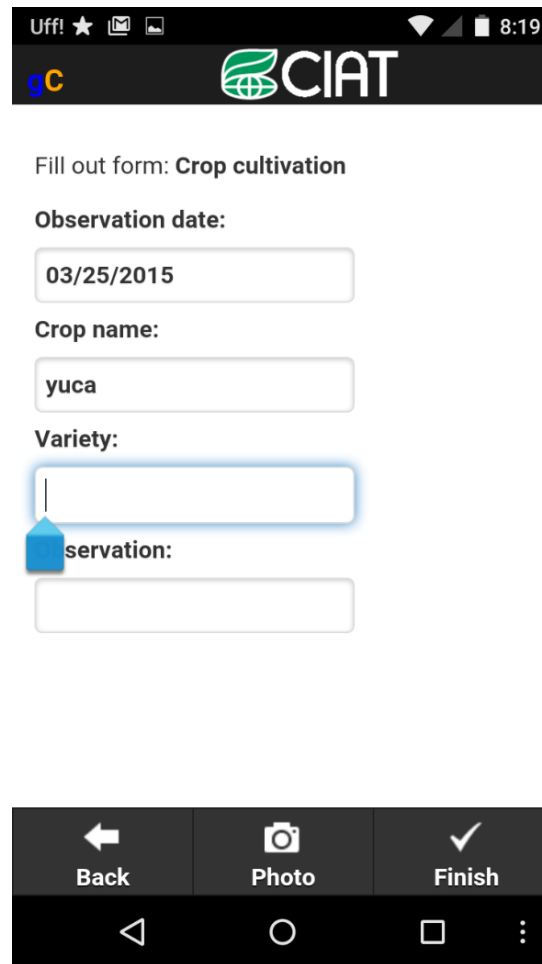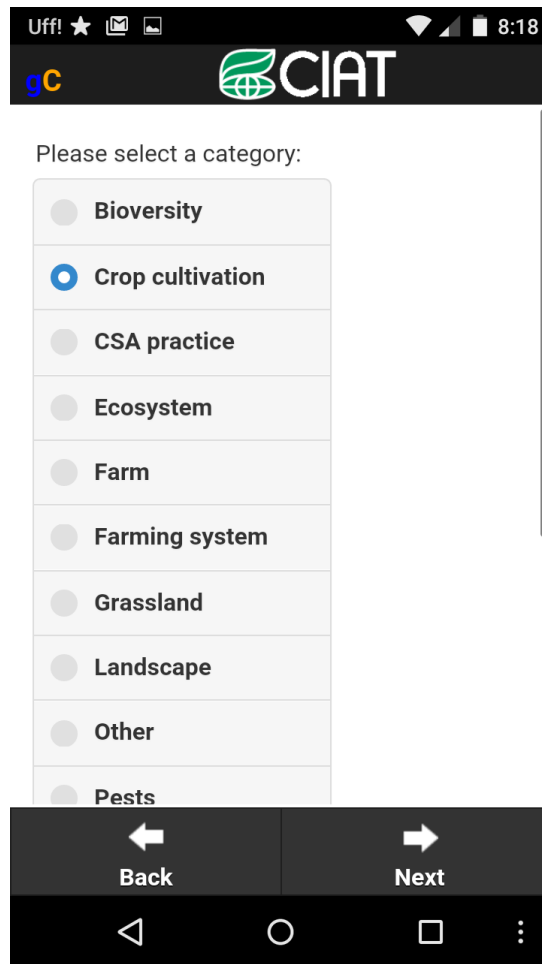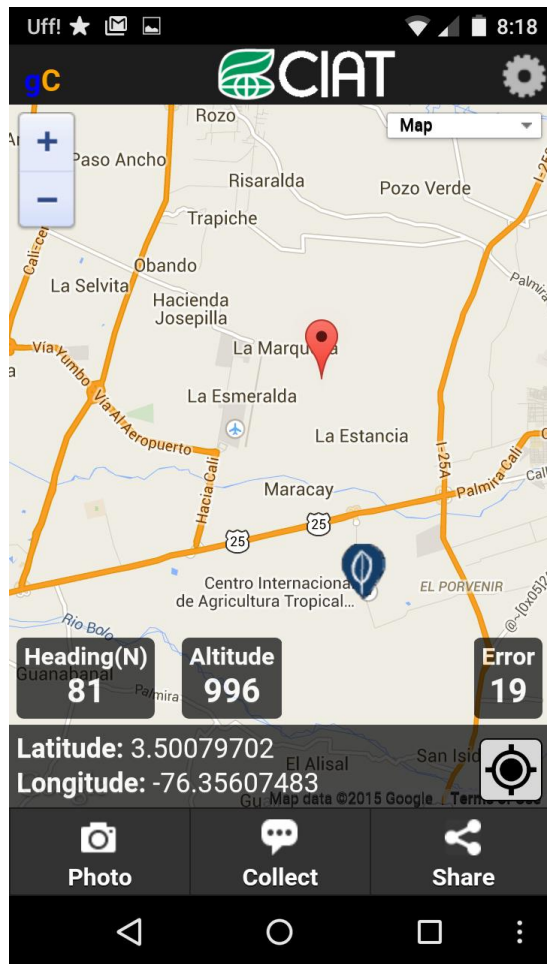
Outscaling a citizen science approach to test climate adaptation technologies on farms :
Jacob Van Etten, Bioversity International

Farmers as Scientists!

1. A broad set of varieties is evaluated

2. Each farmer gets a different combination of varieties

3. Environmental data (GPS, sensors) to assess adaptation

4. Farmers test and report back by mobile phone

5. Farmers receive tailored variety recommendations and can order seeds

6. Detect demand for new varieties and traits

wimoto
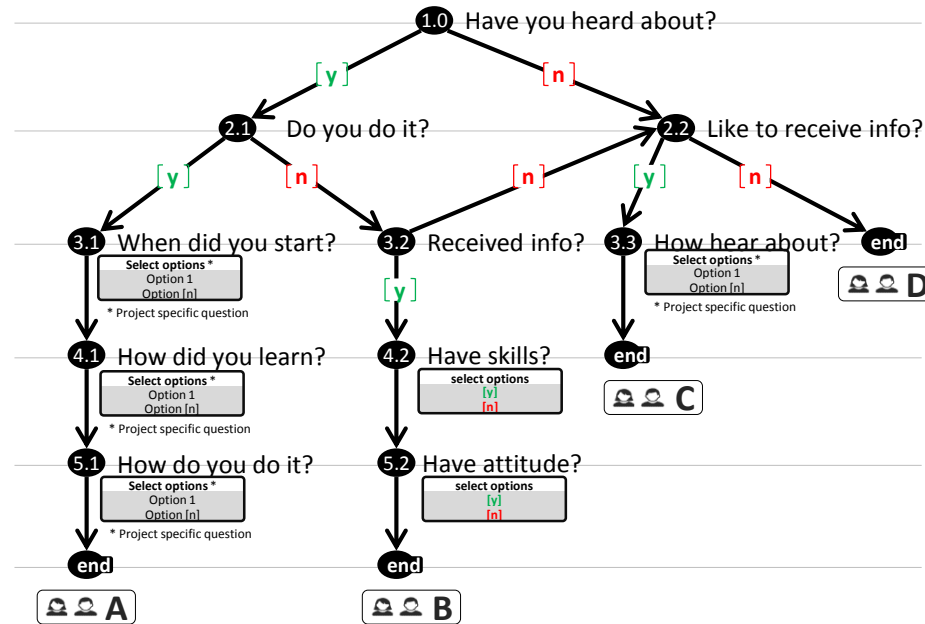
wimoto

Objective of the 5Q approach

Five simple questions will be asked to farmers, project implementers, and donors to measure changes in knowledge, attitude, skills, access, and use of information.

Responses are collected using various tools, digital when possible, and will be automatically uploaded, analyzed, and disseminated through an online dashboard to visualize changes throughout the project cycle, establishing effective and efficient feedback loops.

Figure 1: Schematic visualization of the proposed feedback approach to be embedded throughout all project cycles.

1.0 Have you heard about?

[y] [n]

2.1 Do you do it?   **2.2** Like to receive info?

[y] [n] [n] [y] [n]

3.1 When did you start?   **3.2** Received info?   **3.3** How hear about?   **end**

Select options *
Option 1
Option [n]
* Project specific question

[y]

Select options *
Option 1
Option [n]
* Project specific question

D

We ask the farmer about *"awareness", …*

We ask the farmer about his *"knowledge"*

4.1 How did you learn?   **4.2** Have skills?   **end**

Select options *
Option 1
Option [n]
* Project specific question

select options
[y]
[n]

C

We identify *"skills"*

5.1 How do you do it?   **5.2** Have attitude?

Select options *
Option 1
Option [n]
* Project specific question

select options
[y]
[n]

We identify *"attitudes"*

end   **end**
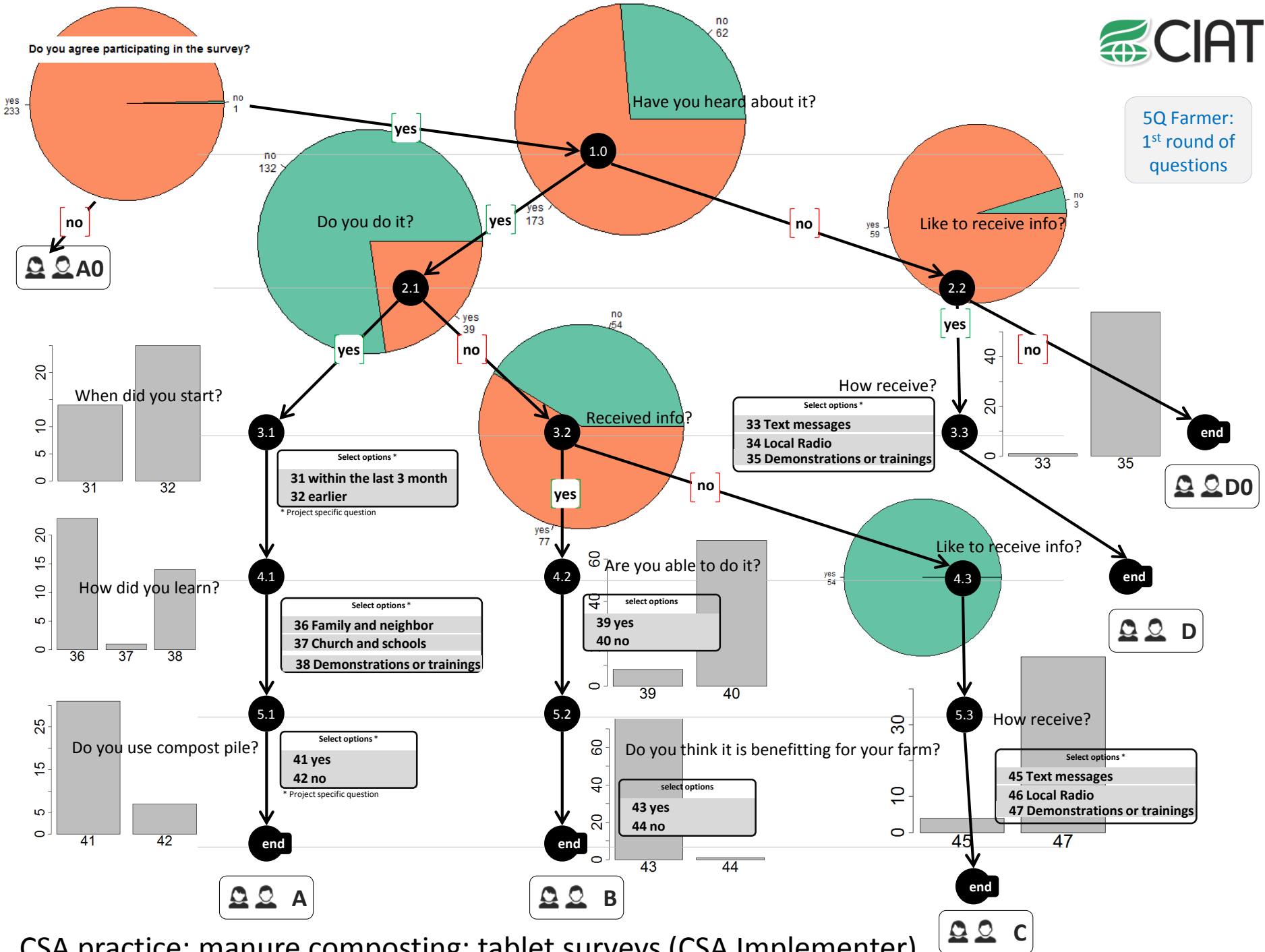
A   B

Compare different data collection methods

Mobile app   voice surveys

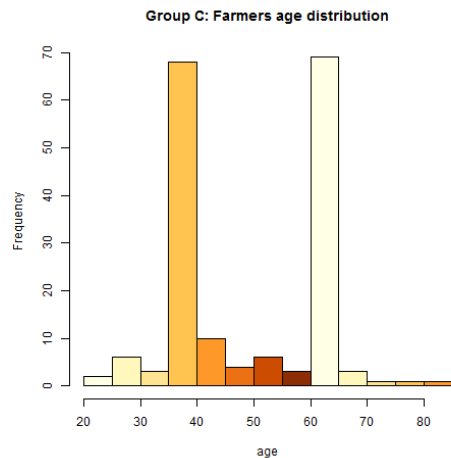CSA practice: manure composting: tablet surveys (CSA Implementer)

A	B	C	D

Group A: Farmers age distribution

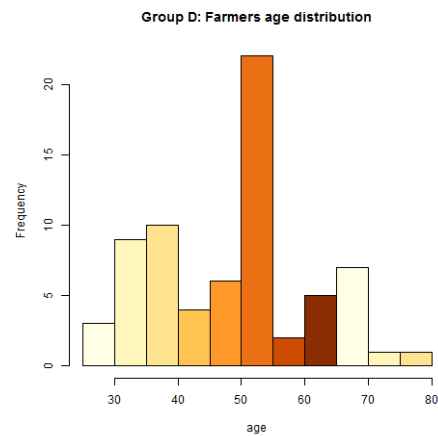**Group B: Farmers age distribution**

Group C: Farmers age distribution
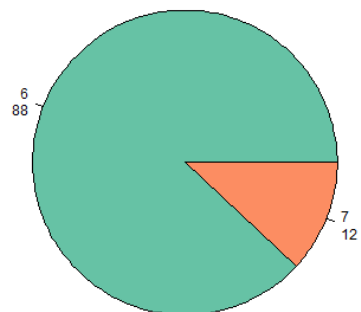
Group D: Farmers age distribution
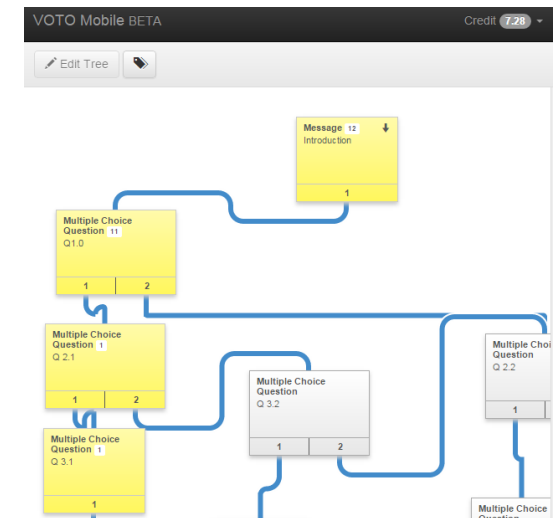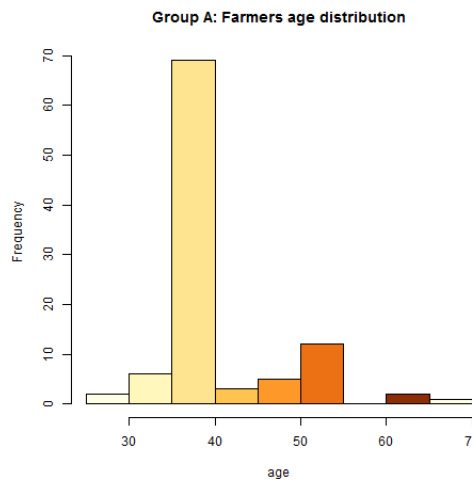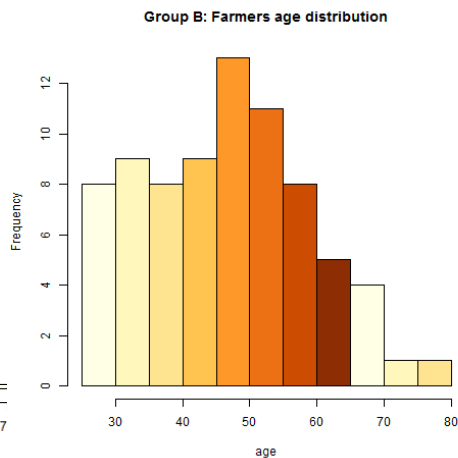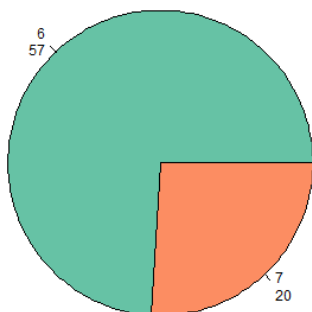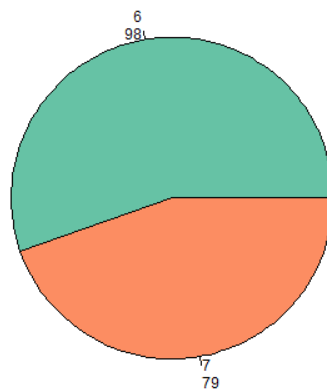
Group A gender distribution?

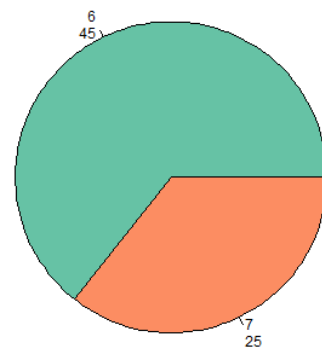**Group B gender distribution?**

Group C gender distribution?

Group D gender distribution?

Total=   100   77   177   70

CIAT

CIAT - 5QS

Dashboard

PHONEBOOK

Subscribers

Groups

CONTENT

Messages

Surveys

Trees

Outgoing Calls

+ New Outgoing Call

Active Calls

Content		Sent	Action	🔊 Status	✉ Status
5Q-IFAD-farmer1 TREE	🔊	Today - 6:51pm	✖	4/10 Succeeded, 0 Failed.	-

Completed Calls

Content		Sent	🔊 Status	✉ Status
5Q-IFAD-farmer1 TEST TREE	🔊	Mar 9 - 7:58pm	1 Succeeded, 0 Failed	-

Content Channels 🔊

Call Details

↗ Resend To ▾   **+ Create New Group For ▾**

#	Name	Phone	M	Language	Last Attempt	Call Length	Call Status	Attempts
1	Karimu Shekilango	255712443795	🔊	Swahili	10 Mar 2015 18:51:31	00:02	Finished (complete)	1
2	Martin Kadala	255653781529	🔊	Swahili	10 Mar 2015 18:57:01		Failed (No Answer)	3
3	Saidi Kikwa	255652034459	🔊	Swahili	10 Mar 2015 18:51:22	01:13	Finished (complete)	1
4	Ibrahim Mbilu	255717820828	🔊	Swahili	10 Mar 2015 18:57:01		Failed (No Answer)	3
5	Ayubu kiliganyu	255717820828	🔊	Swahili	10 Mar 2015 18:57:01		Failed (No Answer)	3
6	Richard Kisaka	255659388321	🔊	Swahili	10 Mar 2015 18:51:57	01:13	Finished (complete)	1
7	Omari Shelukindo	255714272764	🔊	Swahili	10 Mar 2015 18:53:21	00:38	Finished (complete)	2
8	Ramadhani Mdoe	255659379423	🔊	Swahili	10 Mar 2015 18:57:01		Failed (No Answer)	3
9	Rajabu Mlugu	255712443795	🔊	Swahili	10 Mar 2015 18:51:46	00:30	Finished (complete)	1
10	Halfan Mkangala	255687419649	🔊	Swahili	10 Mar 2015 18:51:54	01:00	Finished (complete)	1

⊙ Download Call Records Spreadsheet

conclusions

- Technology is not a panacea for development
- ICT mechanisms should be designed to respond to a clearly defined goal
- Technology selection have to be context specific (think about internet coverage in rural areas, technology literacy)
- ICT tools can provide the unique value of:
    - Effectiveness (lower costs)
    - Timeliness
    - Directness
    - Inclusiveness (two-way communication)
    - Promote collaboration