



Geotagging Research and Outreach Activities

Big Data in Agriculture Course

Citation: Al-Shamaa, K and Biradar, C. (2018). Geotagging Research and Outreach Activities. Big Data in Agriculture course, 12 Dec 2018, ICARDA, Rabat, Morocco. Geoinformatics Unit, ICARDA. 37 slides.

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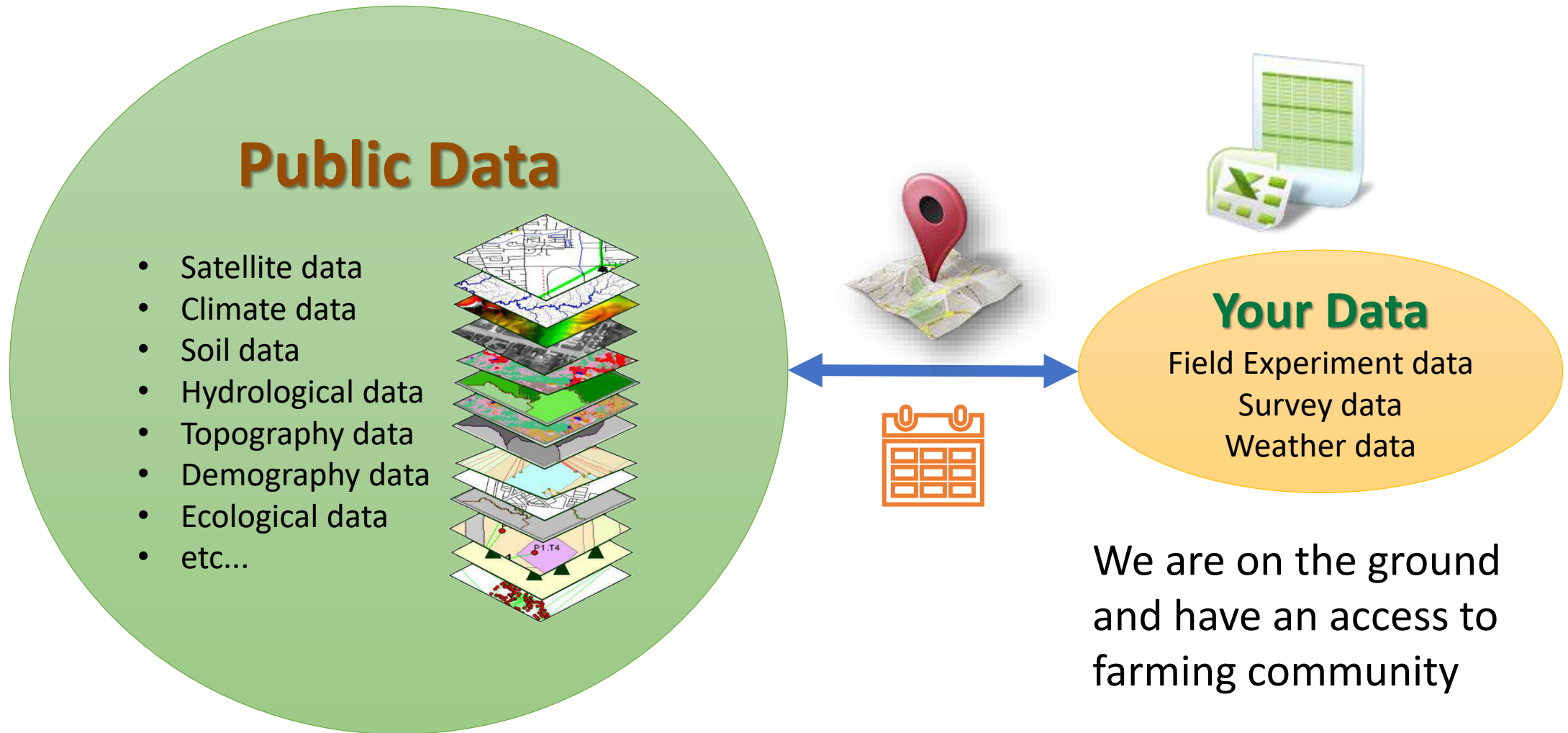
International Center for Agricultural Research in the Dry Areas



Agenda

- Why Geo-Tagging? Available Public Data, and Calibration RS models.
- Who (Geo-Tagging team)? Metadata!
- How I can Geo-Tag my Data? Smart Phone!
- Basic Concepts (GPS, DMS vs. DD, Degree Precision vs. Length).
- Digitize and Geo-Tag Surveys using Open Data Kit (ODK).
- ODK Practical Session.

Why Geo-Tagging?



Available Public Data



**Landsat 4, 5, 7, 8
and Sentinel 1, 2**
Raw, TOA, SR, .. 10-30m,
14 day



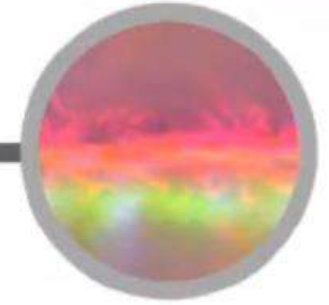
MODIS
Daily, NBAR, LST, ...
250m daily



Terrain
SRTM, GTOPO, NED, ...



Land Cover
GlobCover, NLCD, ...

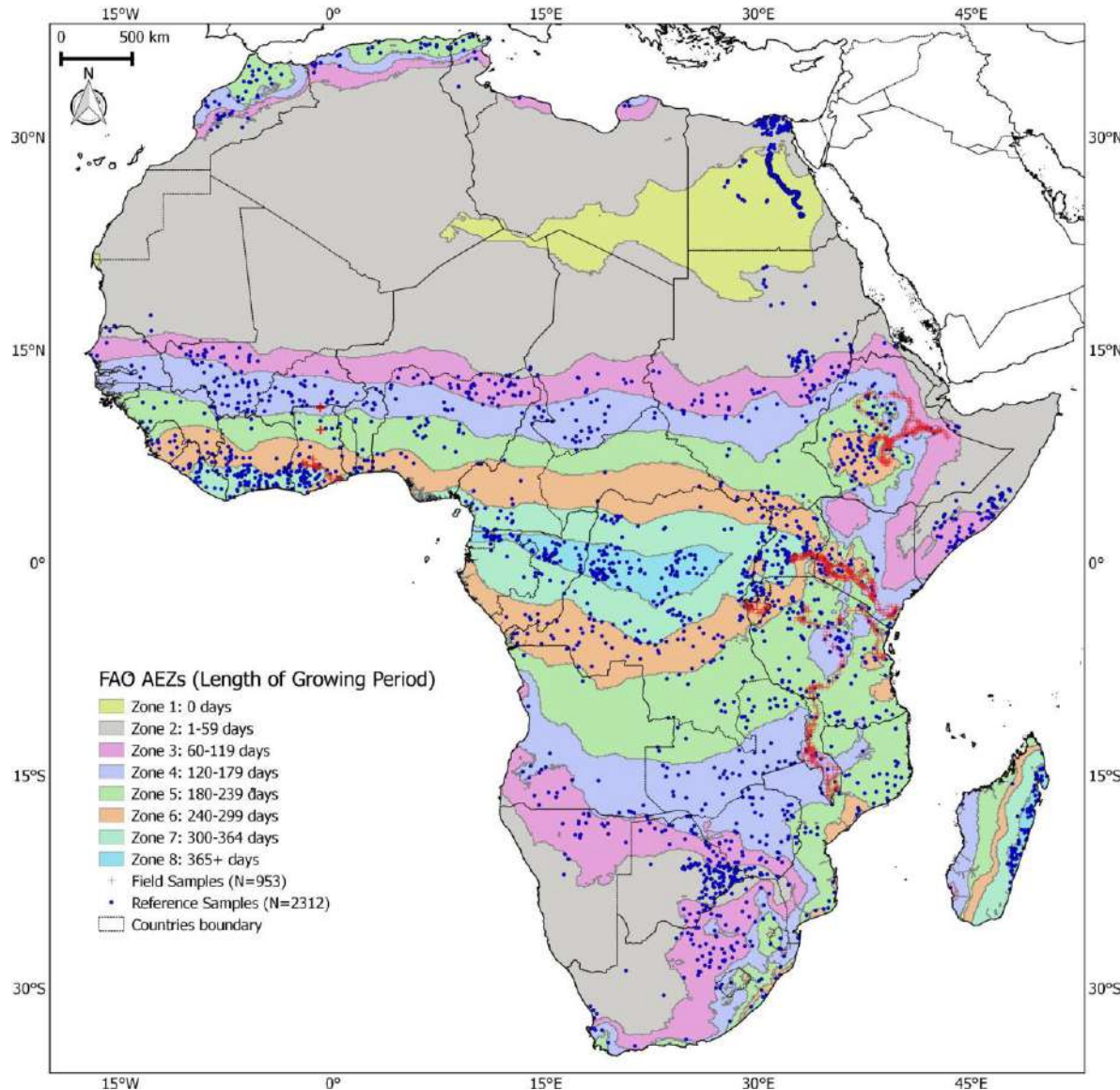


Atmospheric
NOAA NCEP, OMI, ...

- > 200 public datasets
- > 5 million images
- > 4,000 new images every day
- > 5 petabytes of data

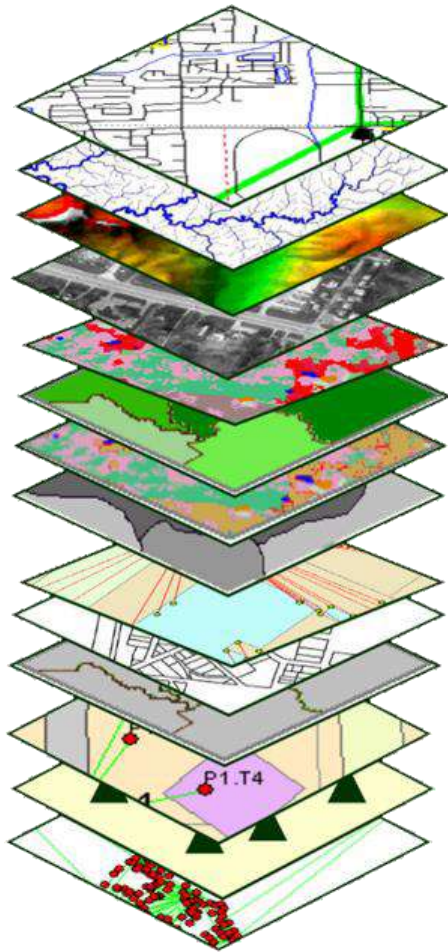
Ground Truthing

The collection of ground-truth data on location enables calibration of remote-sensing data, and aids in the interpretation and analysis of what is being sensed.



Added Value

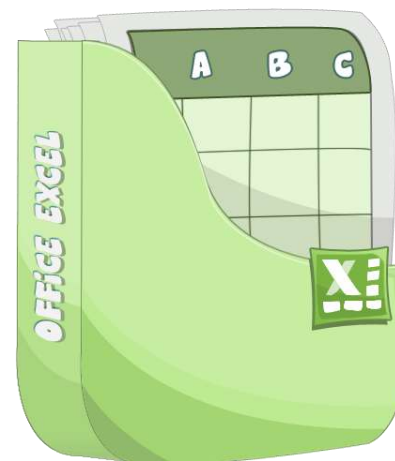
Mapping
Monitoring
Targeting
Estimating
Forecasting
Warning
Lending
Insurance
Value Chains
Carbon-Credits



Cloud Computing (e.g. AWS, GEE)
Algorithms (e.g. ML, AI, NN, DT, RF)

Who (Geo-Tagging team)?

WE NEED YOU!



How I Can Geo-Tag My Data?



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VS.

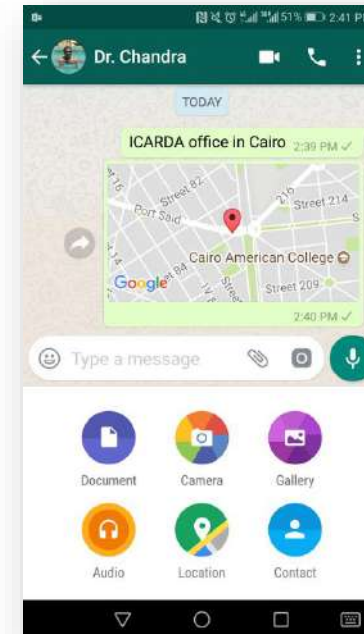
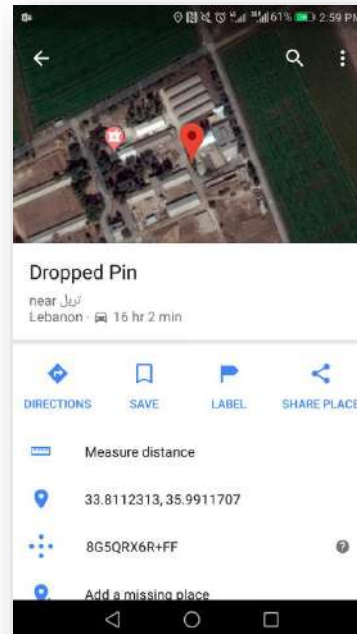


Global Positioning System (GPS)

- Global navigation satellite system that provides geolocation GPS receiver (e.g. mobile phone) anywhere on the Earth.
- GPS does not require any telephonic or internet reception.
- Mobile apps: Google Maps, WhatsApp, Open Data Kit (ODK), etc.



icarda.org



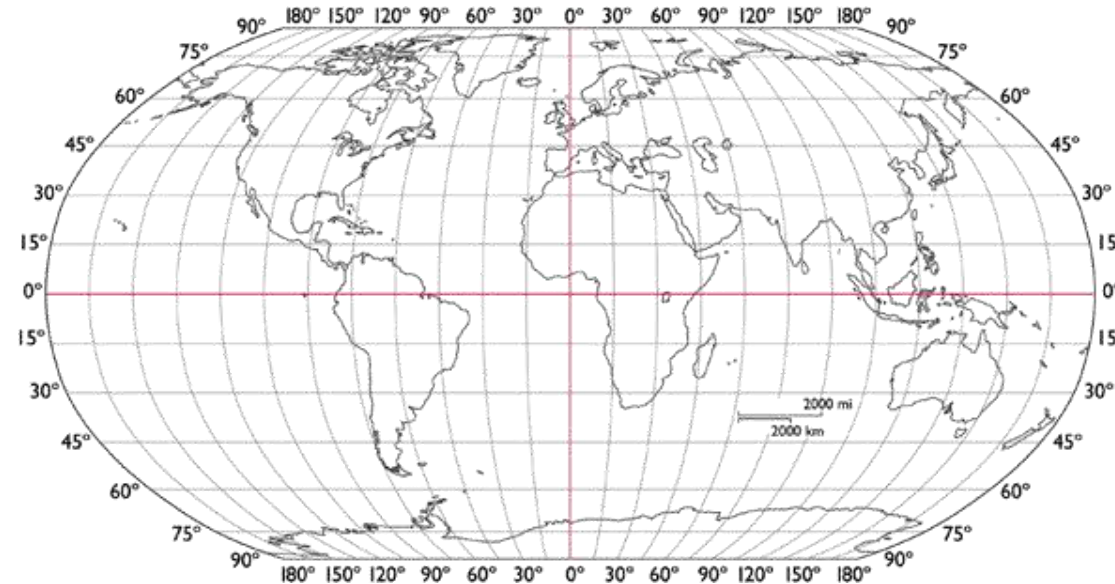
DMS vs. DD

Latitude (North/South) [90, -90], Longitude (East/West) [180, -180]

Degrees° Minutes' Seconds" (e.g. $33^{\circ}48'34.32''\text{N}$, $35^{\circ}59'20.73''\text{E}$)

Decimal Degrees (e.g. 33.809534 , 35.989091)

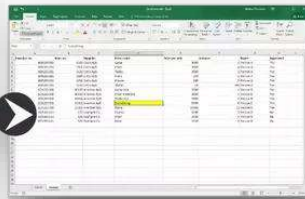
$\text{DD} = \text{degree} + (\text{min}/60) + (\text{sec}/3600)$



Degree Precision vs. Length

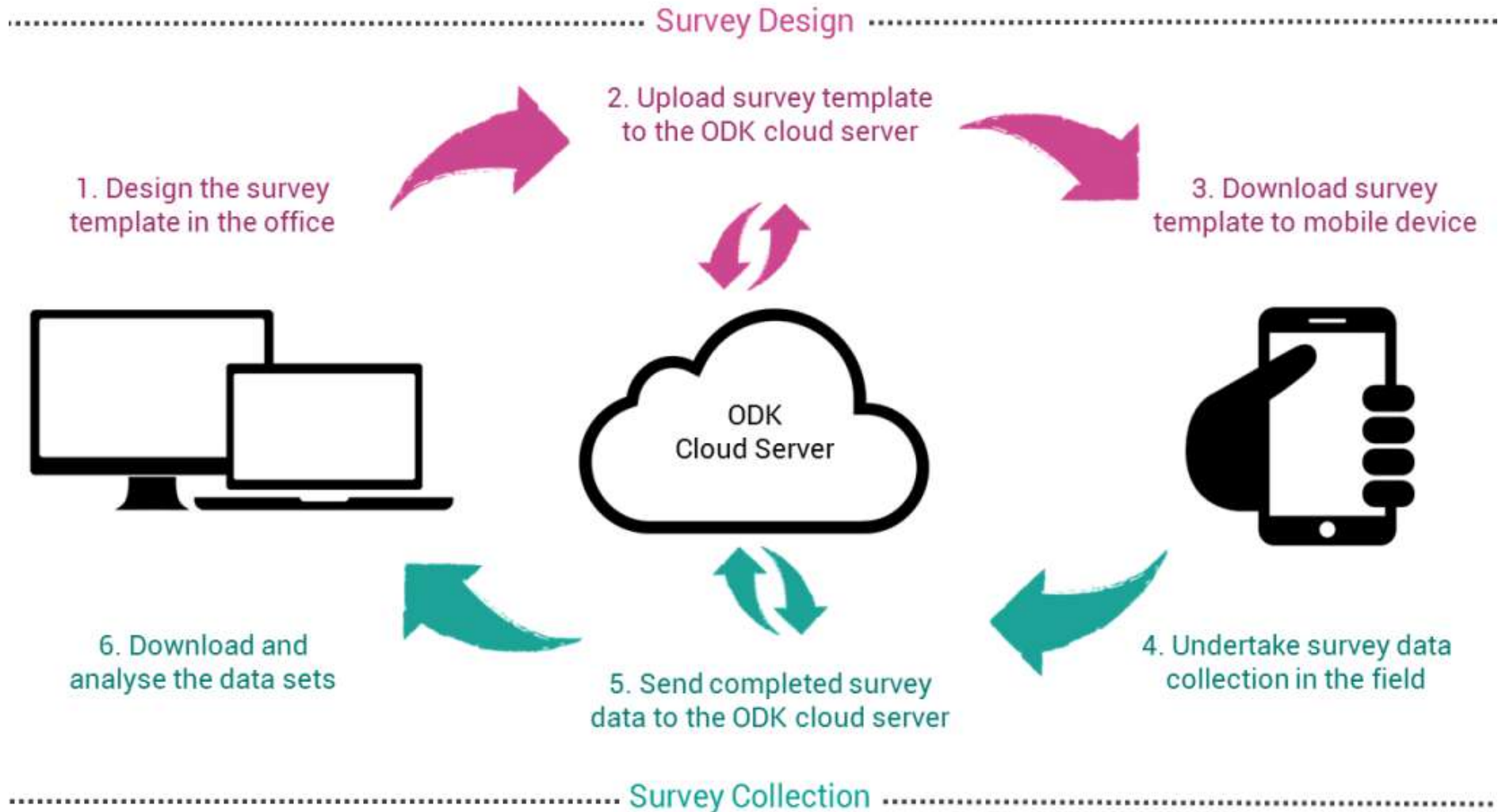
Decimal Places	Decimal Degrees	Qualitative Scale that can be identified	Length
0	1.0	Country or large region	~ 100 km
1	0.1	Large city or district	~ 10 km
2	0.01	Town or village	~ 1 km
3	0.001	Neighborhood, street, etc.	~ 100 m
4	0.0001	Field / Farm	~ 10 m
5	0.00001	Individual trees	~ 1 m
6	0.000001	Individual animals	~ 10 cm

Traditional Survey Process





Open Data Kit (ODK)



*Design**Distribution**Collection**Reporting**Coordination**Decision Making**Conventional System*

Domain Experts Design a Survey



Send the Survey by Email in PDF Format and Print it on Paper



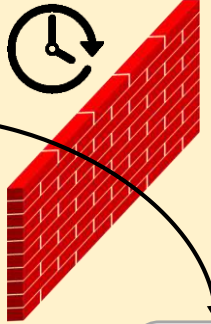
Fill-in Paper Form Freehand Writing



Time & Efforts Consuming in Spreadsheet Data Entry



Manually Aggregate Workers Data in One Master File

*Geotagging via ODK*

ICARDA Experts Convert Survey into ODK Template



Host the Survey ODK Aggregate Server



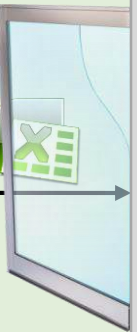
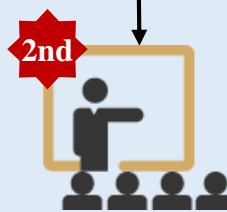
Fill-in Electronic Form Validation/Quality Control No Internet Access Needed GPS Geotagging



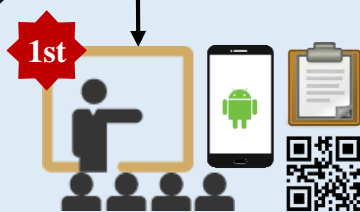
One Click to Send All Collected Data No Time Barrier No Extra Efforts



Briefcase & Aggregate ODK Server Interface: Progress Report and Dataset Snapshot

Feedback
Analyzing
Tuning*Capacity Building*

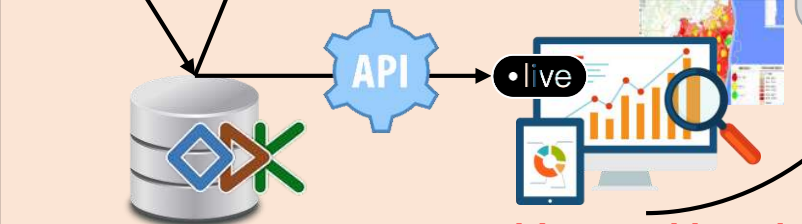
Designing Custom ODK Survey for Project Specific Needs



Field Demos of Geotagging the Interventions



Setup, Configure, and Administrative ODK Aggregate Server at NARS Data Center

*Development*

Data from Field to DB: 3 steps vs. 1 Less Time & Errors + Geotagging



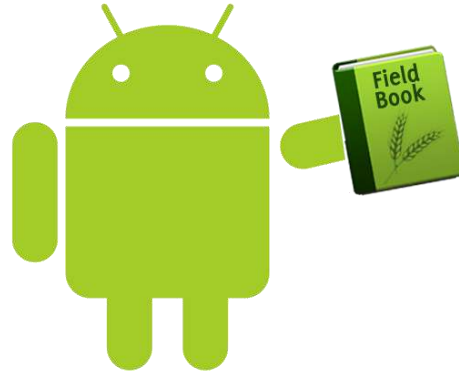
ODK Case Study

- Advantage: No delay or overhead process to get collected data on real-time.
- Baseline study case: Digitized survey of 43 pages (~800 questions/data point).
- Deliver training for +130 extension agents on using ODK Collect.
- ~4300 forms submitted from 173 villages in 4 provinces.
- Setup ODK Aggregate server at AREEO data center.



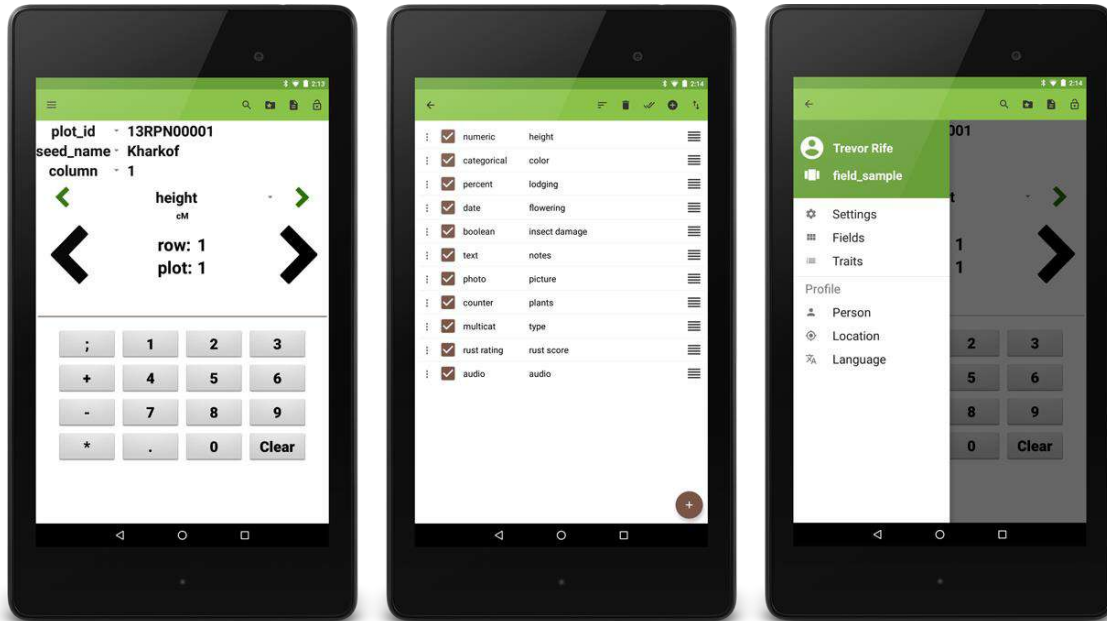


Field Experiments
Integrate with BMS
Arabic Translation by ICARDA



Android Field Book

✓
ENKETO



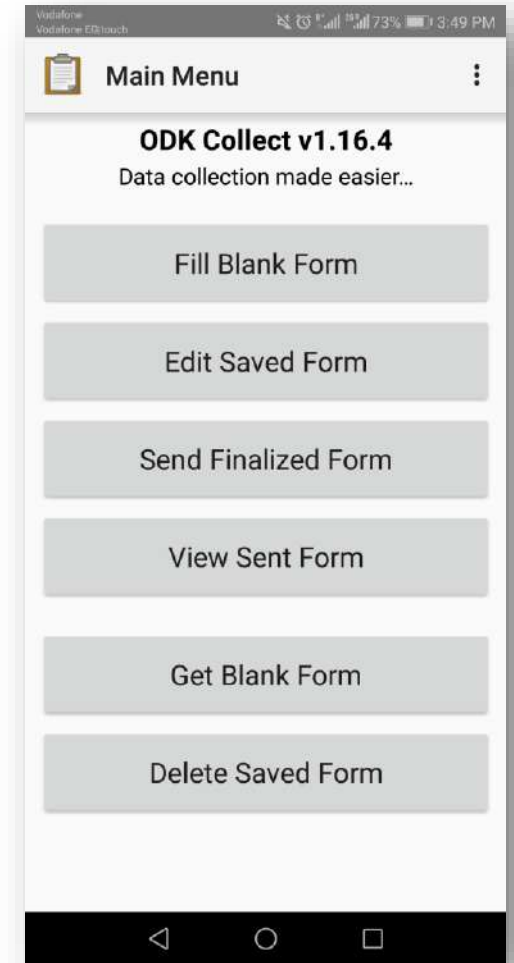
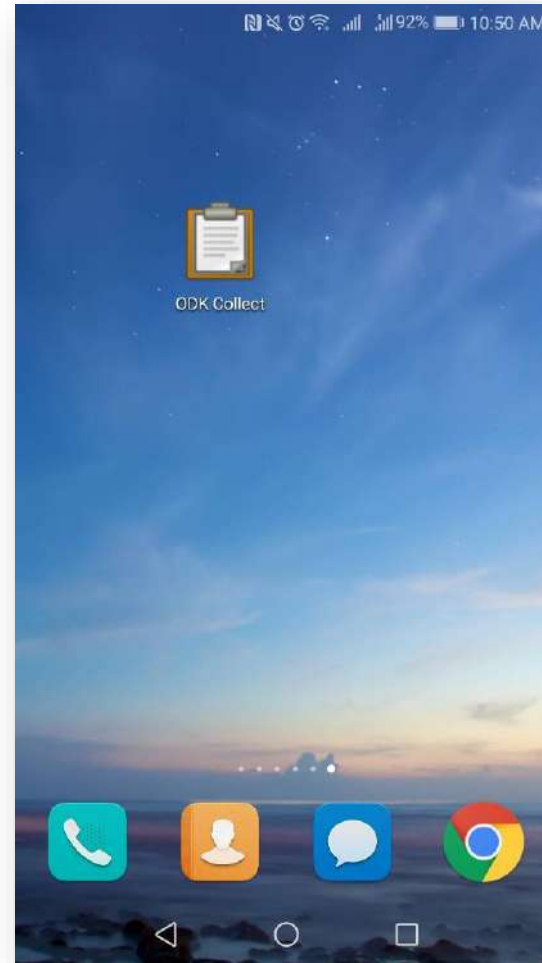
ARE YOU
SURE THIS IS
HOW WE GET
DATA INTO
THE CLOUD?



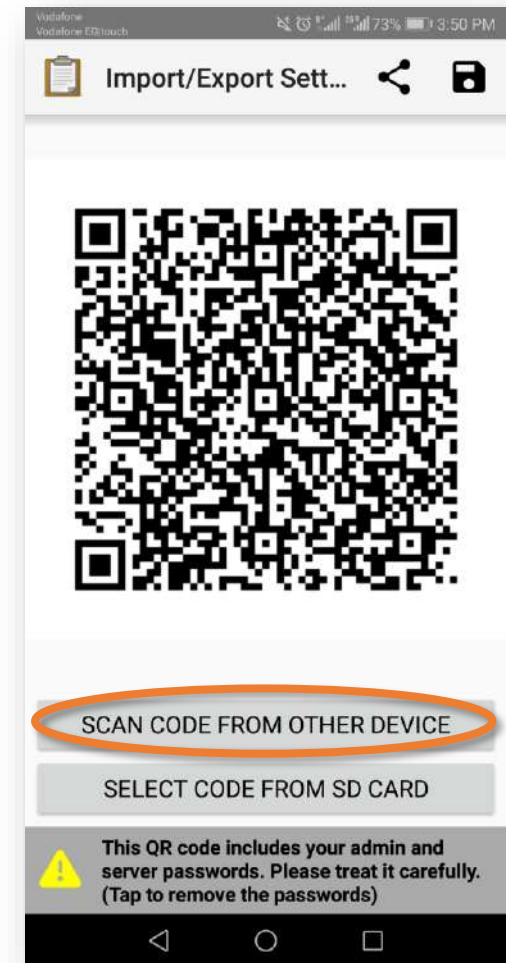
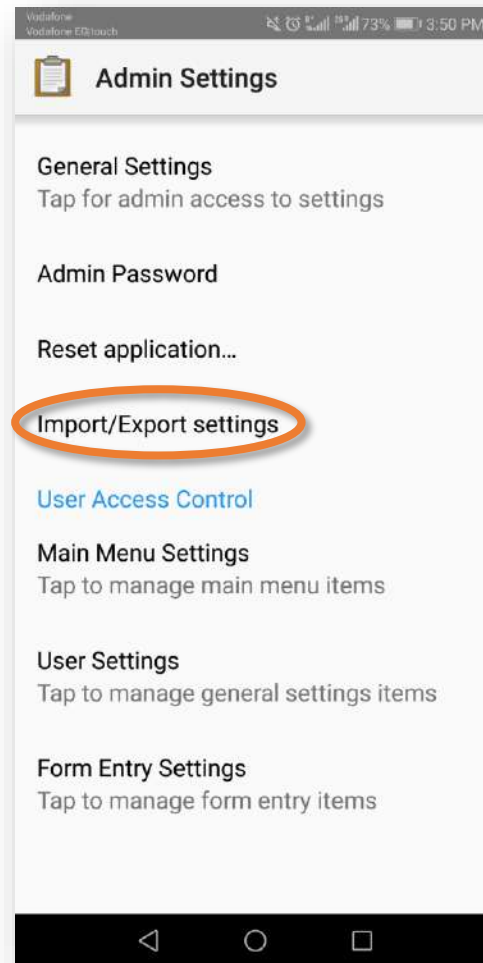
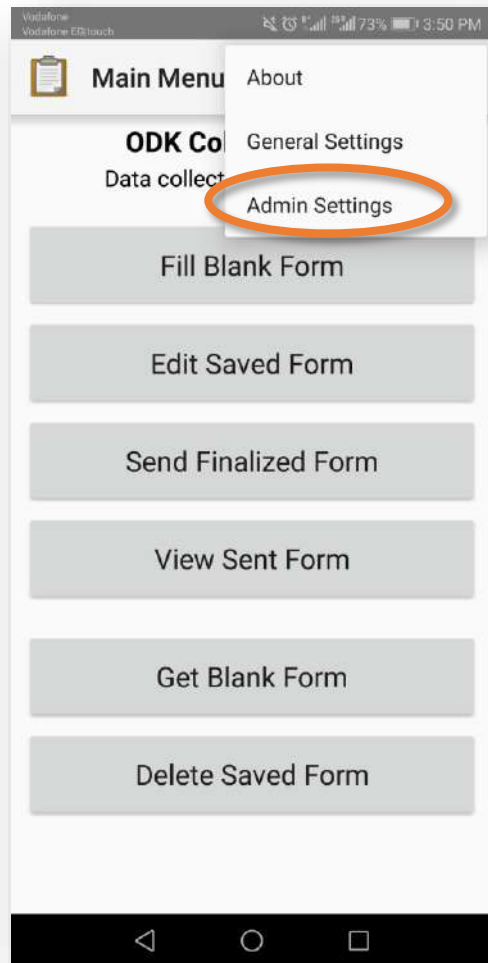
A yellow sticky note is centered on the slide, held in place by two pieces of yellow tape at the top. The note has a slight shadow underneath it. The text "Practice Makes Perfect" is written on the note in a large, bold, black, sans-serif font, arranged in three lines.

**Practice
Makes
Perfect**

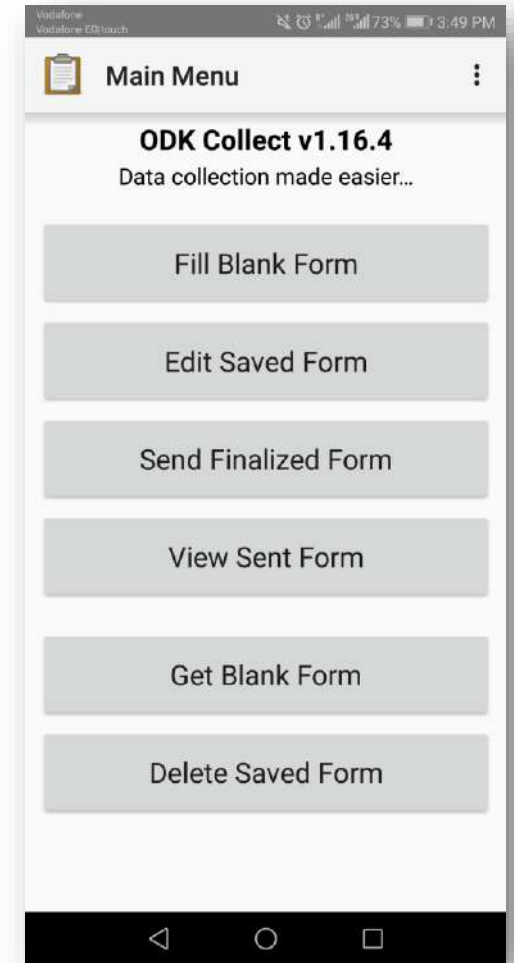
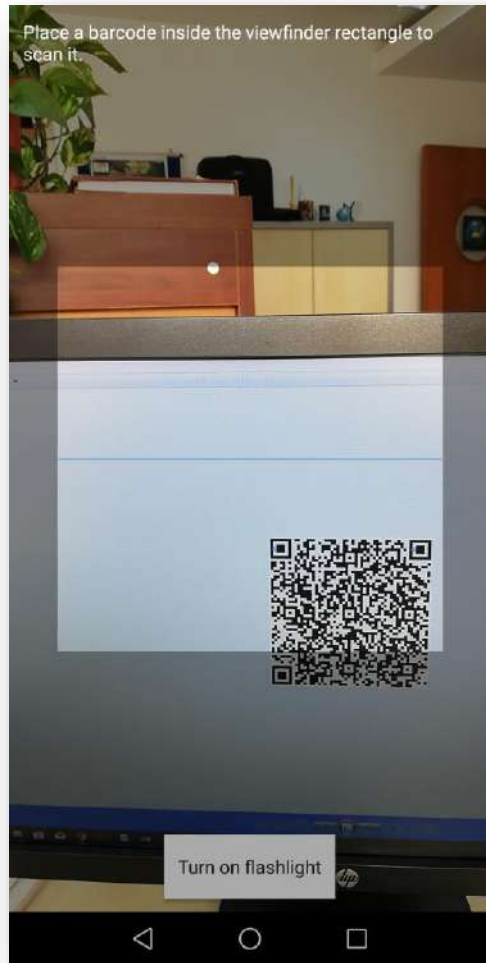
Install ODK Collect



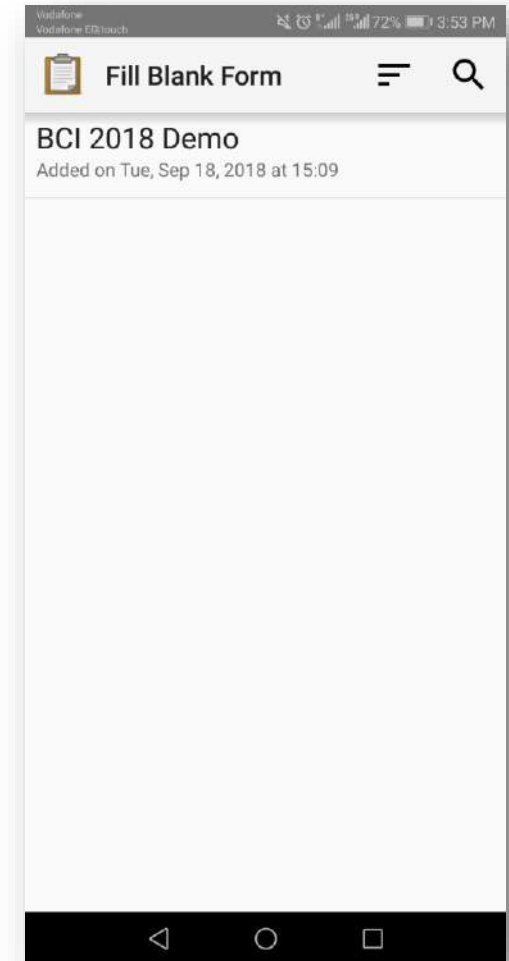
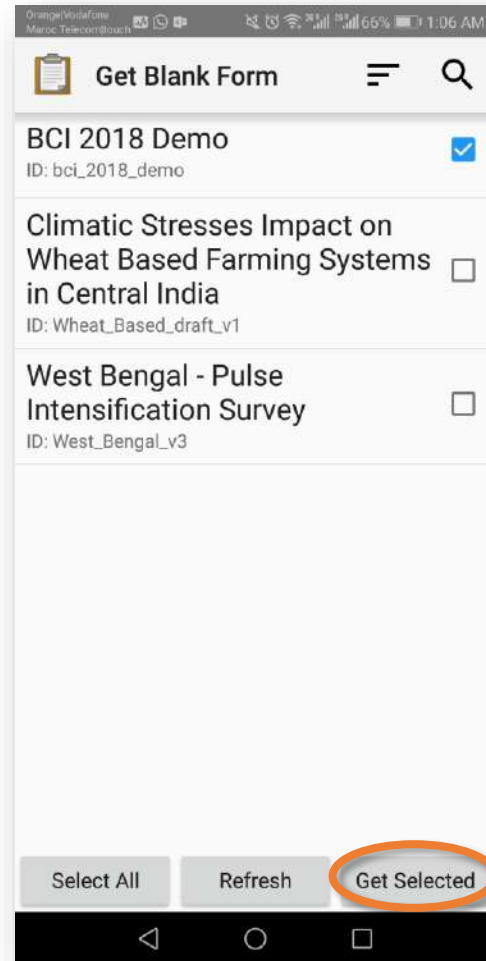
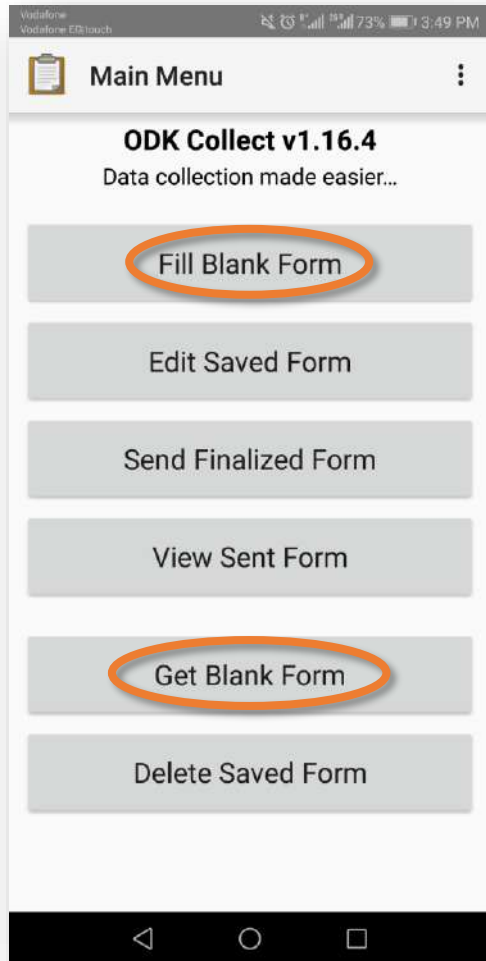
Configure ODK Collect



Connect to ICARDA ODK Server



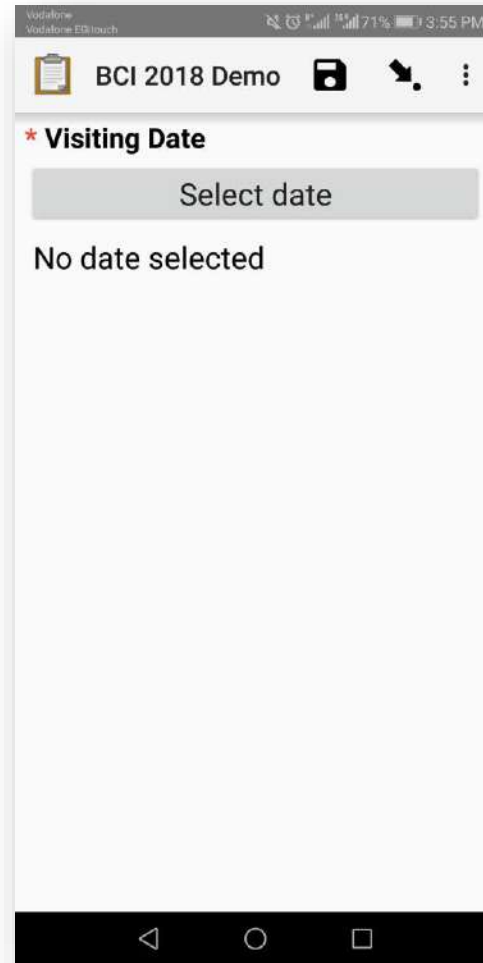
Get a Blank Form



Fill a Blank Form



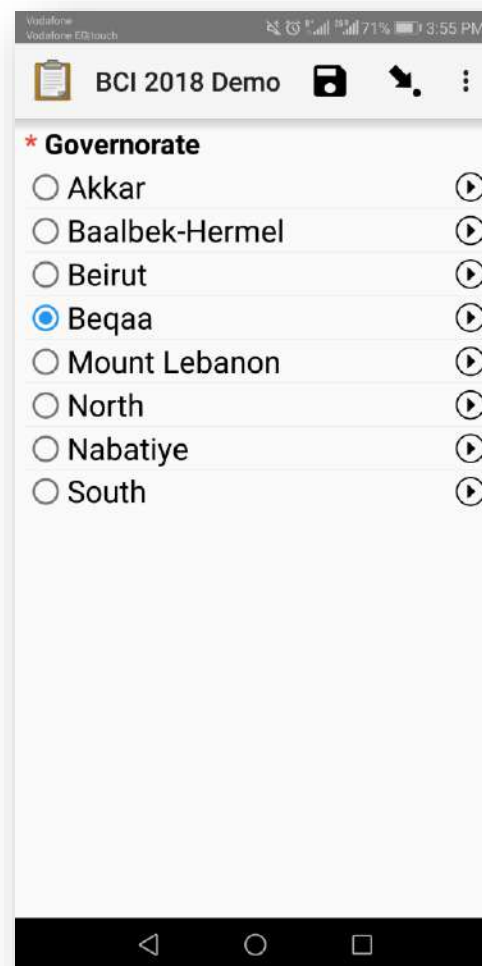
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23

Cascading Select

Cascading select questions are sets of questions whose options depend on the response to a previous question.



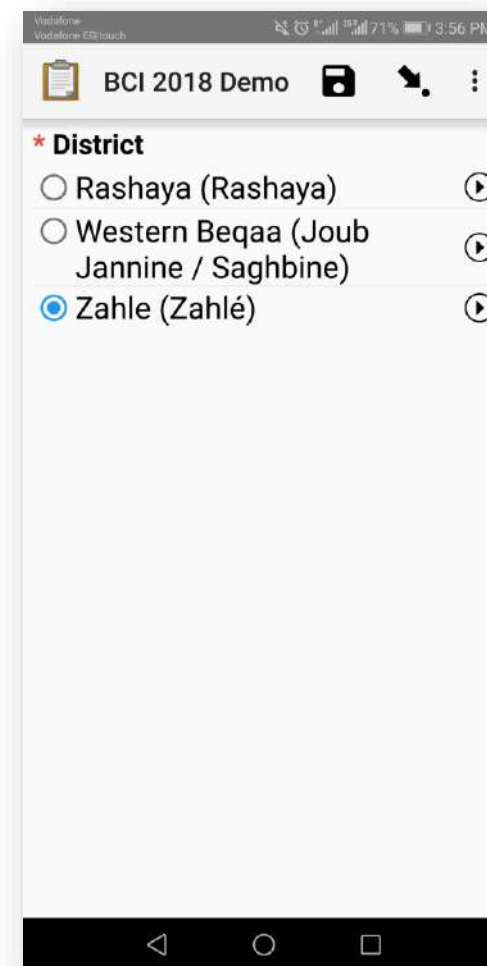
Vodafone
Vodafone EDtouch

BCI 2018 Demo

* Governorate

- ☐ Akkar
- ☐ Baalbek-Hermel
- ☐ Beirut
- ☒ Beqaa
- ☐ Mount Lebanon
- ☐ North
- ☐ Nabatiye
- ☐ South

The screenshot shows a mobile application interface with a status bar at the top displaying 'Vodafone', 'Vodafone EDtouch', and battery/usage icons. Below the status bar is a header with a clipboard icon and the text 'BCI 2018 Demo'. The main content area is titled '* Governorate' and contains a list of seven options, each with a radio button and a right-pointing arrow. The 'Beqaa' option is selected, indicated by a blue dot. The bottom of the screen shows a standard Android navigation bar with back, home, and recent apps buttons.



Vodafone
Vodafone EDtouch

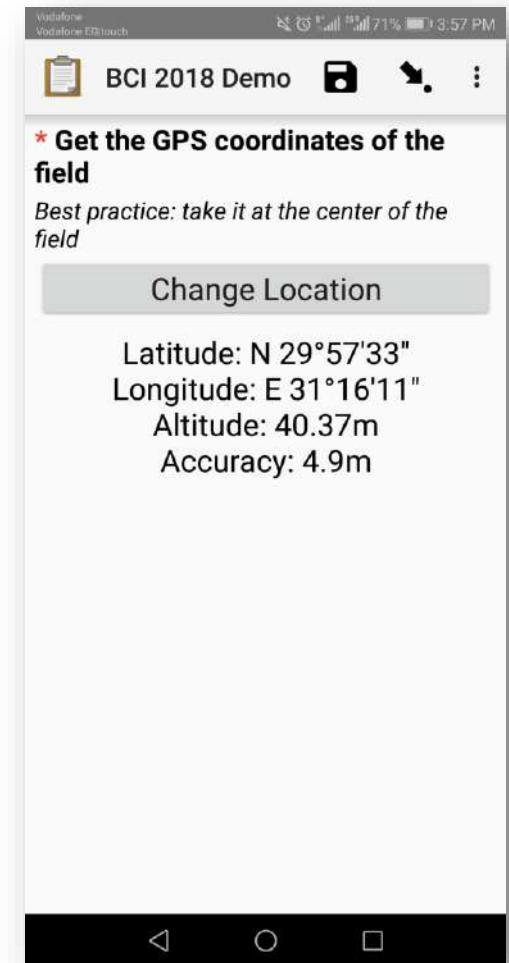
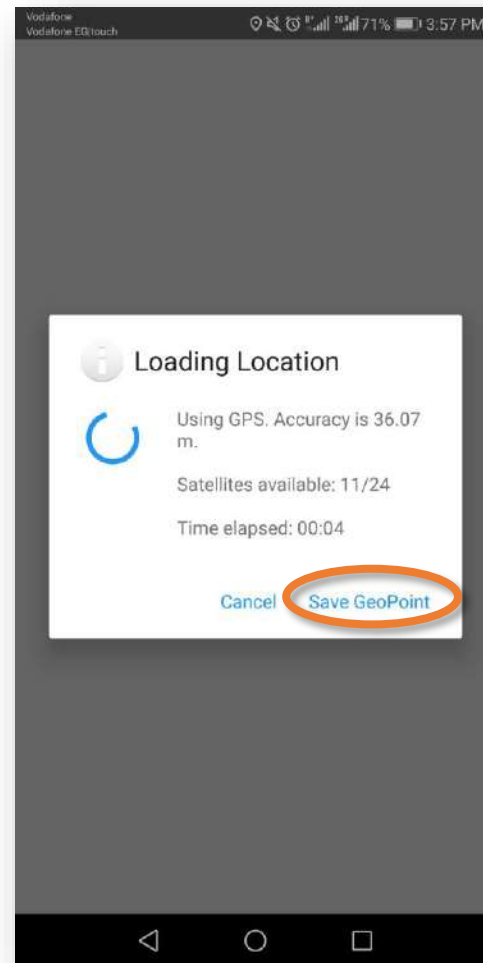
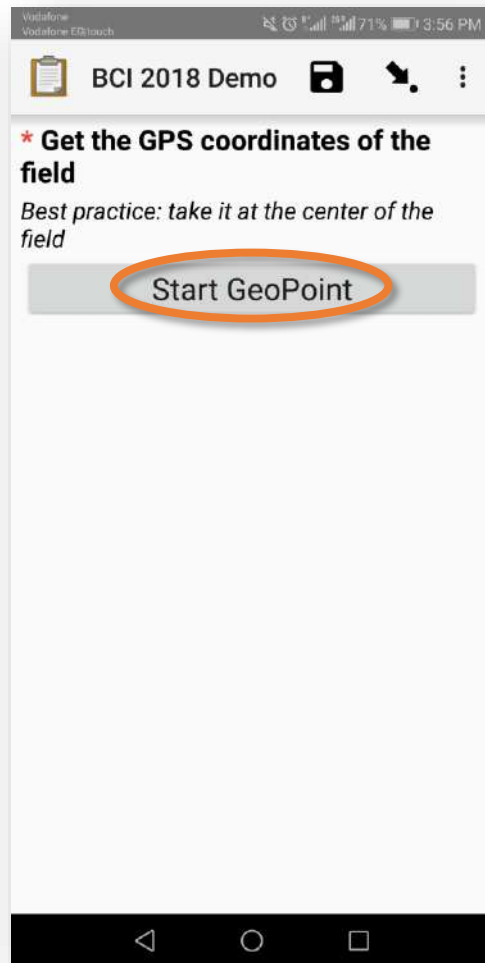
BCI 2018 Demo

* District

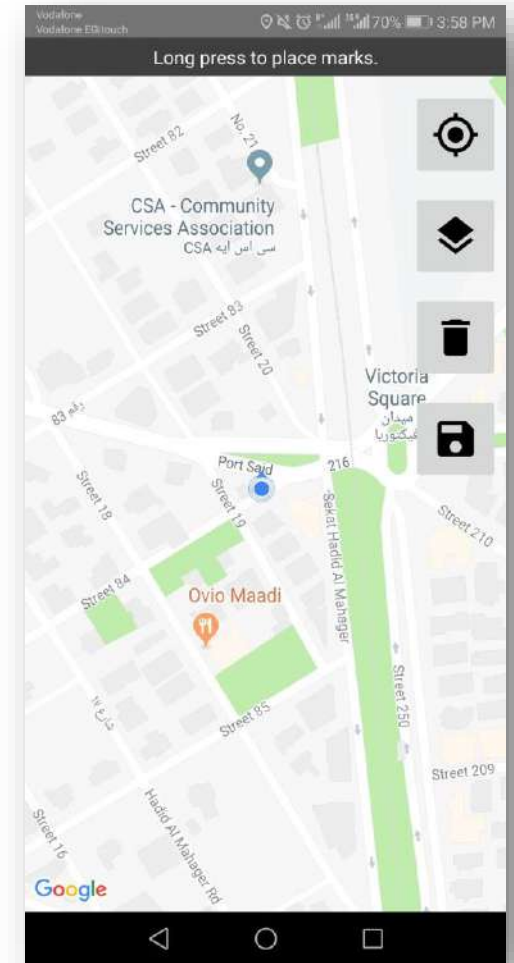
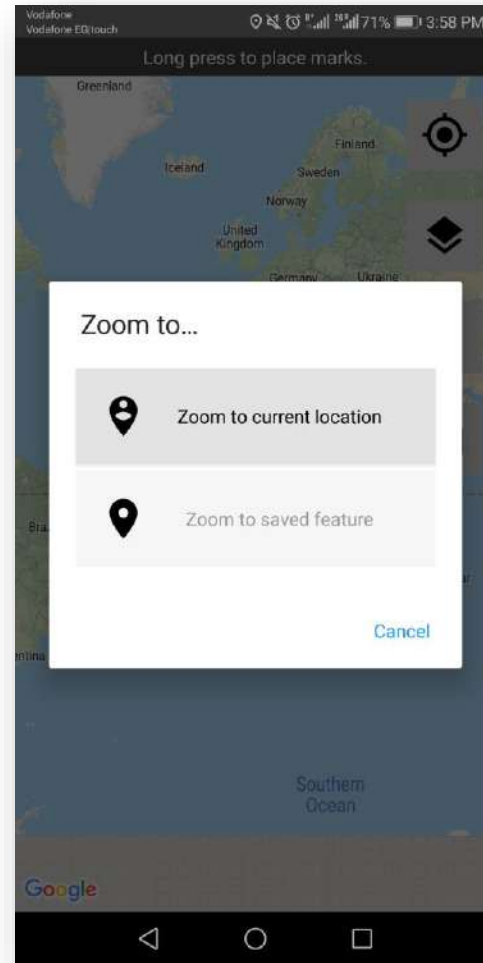
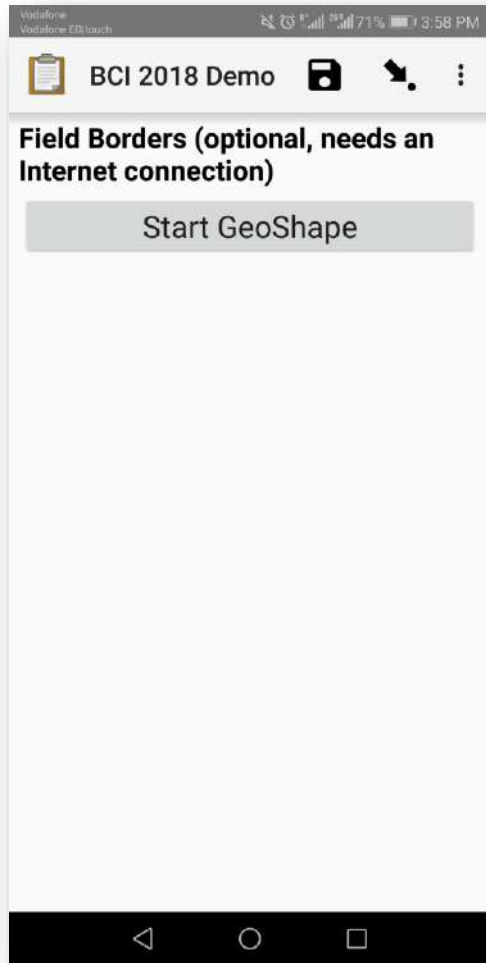
- ☐ Rashaya (Rashaya)
- ☐ Western Beqaa (Joub Jannine / Saghbine)
- ☒ Zahle (Zahlé)

The screenshot shows the same mobile application interface as the previous one, but the main content area is now titled '* District'. It contains a list of three options, each with a radio button and a right-pointing arrow. The 'Zahle (Zahlé)' option is selected, indicated by a blue dot. The status bar and header remain the same. The bottom of the screen shows the same Android navigation bar.

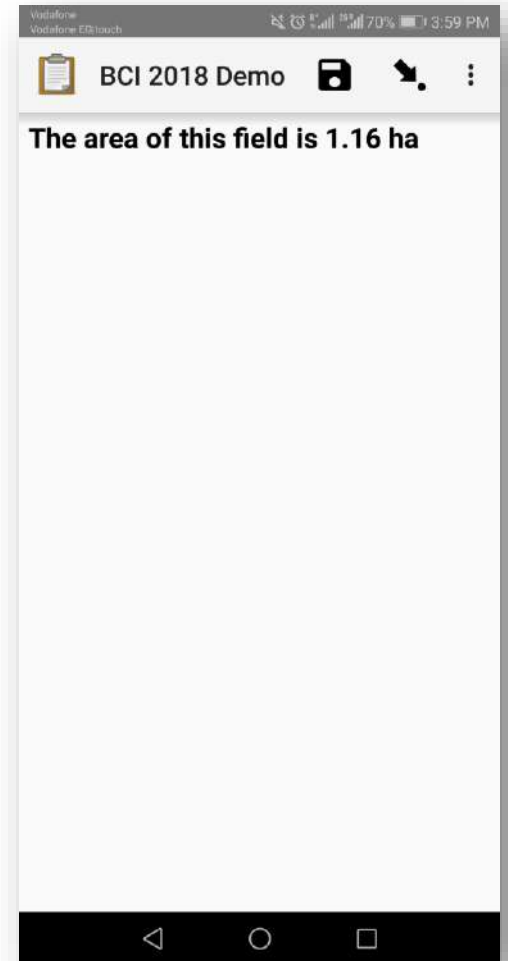
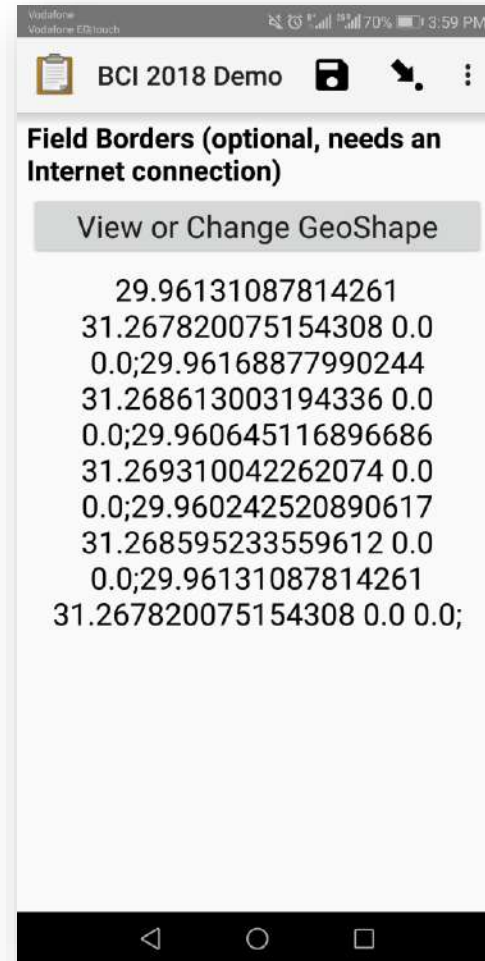
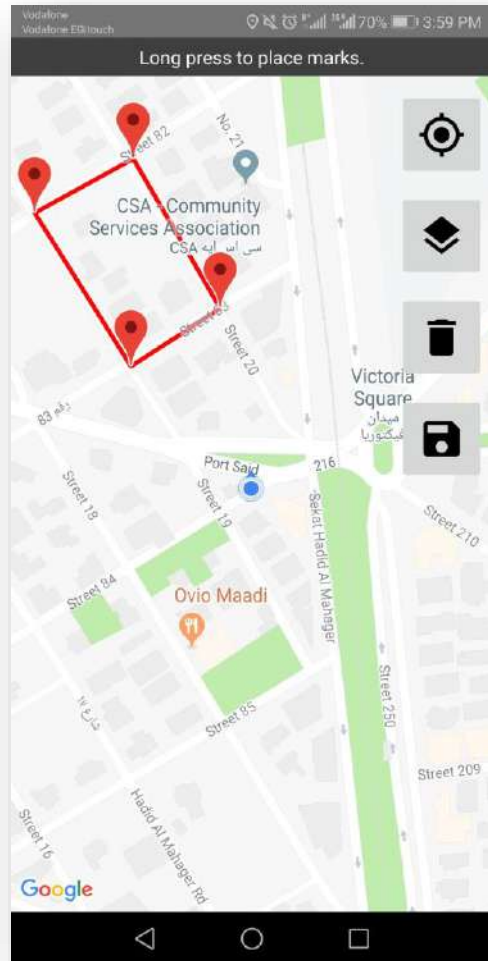
Geo-Point Input



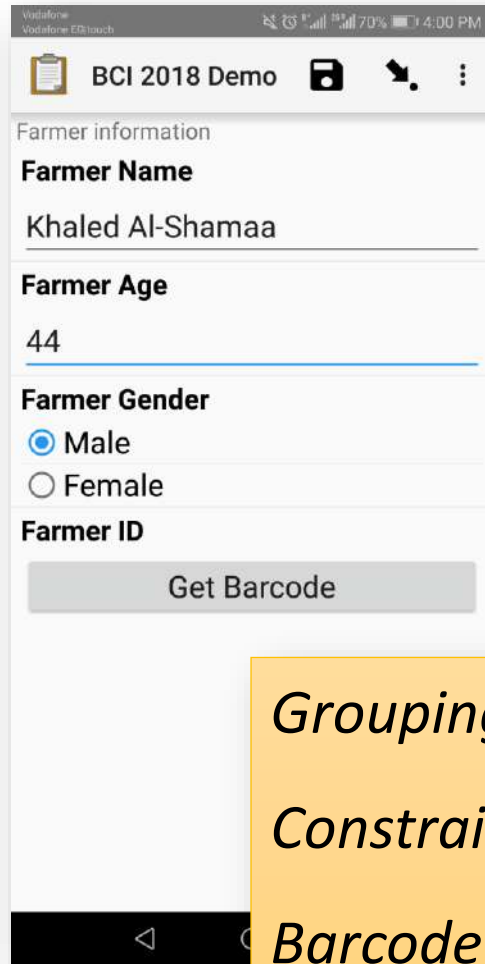
Geo-Shape Input



Geo-Shape Input (continue)



Text, Number, and Select Inputs



Vodafone
Vodafone EDtouch

BCI 2018 Demo

Farmer information

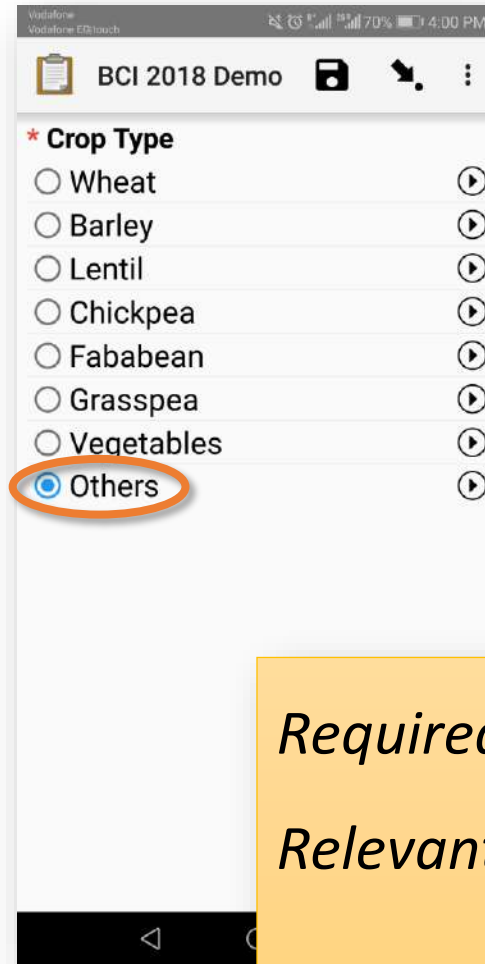
Farmer Name
Khaled Al-Shamaa

Farmer Age
44

Farmer Gender
☒ Male
☐ Female

Farmer ID
Get Barcode

Grouping
Constraint
Barcode



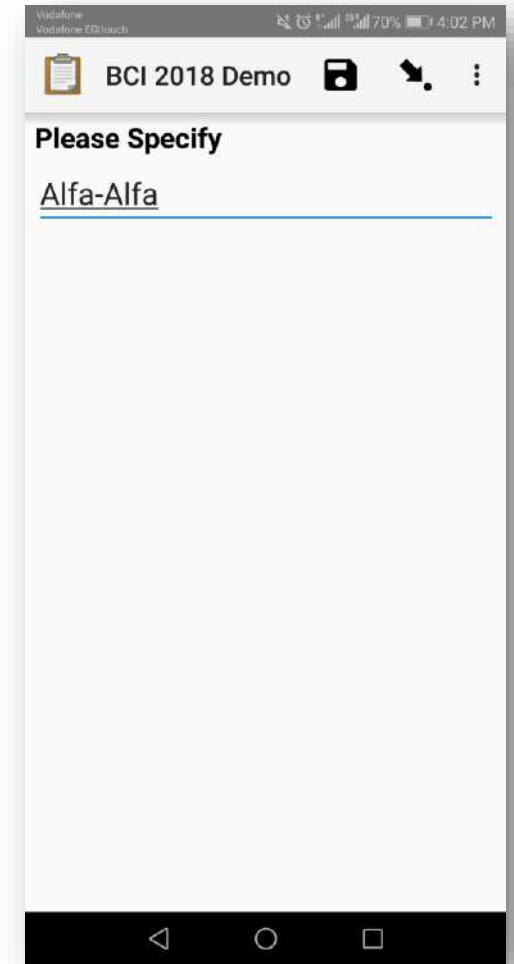
Vodafone
Vodafone EDtouch

BCI 2018 Demo

*** Crop Type**

- ☐ Wheat
- ☐ Barley
- ☐ Lentil
- ☐ Chickpea
- ☐ Fababean
- ☐ Grasspea
- ☐ Vegetables
- ☒ Others

Required
Relevant



Vodafone
Vodafone EDtouch

BCI 2018 Demo

Please Specify
Alfa-Alfa

Calculations and Photos

Vodafone
Vodafone EDtouch

BCI 2018 Demo

* Yield Production (Kg/ha)

1618

\$ & _ - 1 2 3 ?
@ () = + 4 5 6 !
{&= ' : % / 7 8 9
abc " _ * , 0 .

icarda.org

Vodafone
Vodafone EDtouch

BCI 2018 Demo

Total yield predicted is 1.877 ton

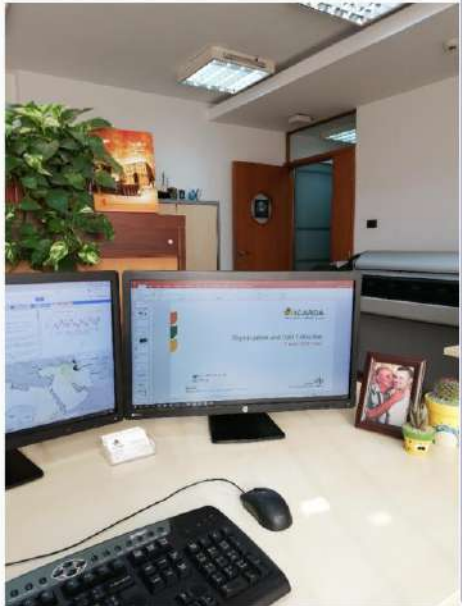
Vodafone
Vodafone EDtouch

BCI 2018 Demo

Take a Photo (optional)

Take Picture

Choose Image



Save, Finalize, and Go-To Functionalities

Vodafone
Vodafone EDtouch

BCI 2018 Demo

You are at the end of BCI 2018 Demo.

Name this form

Maadi office test

☒ Mark form as finalized

Save Form and Exit

+ testing test tests

1 2 3 4 5 6 7 8 9 0

% ^ _ | \ ' / < > { } ~

q w e r t y u i o p

@ # \$ % & * - + = , . /

a s d f g h j k l

↑ ↓ ← →

123 , . /

English (US)

Vodafone
Vodafone EDtouch

BCI 2018 Demo

The area of this field is 1.16 ha

Farmer Name
Khaled Al-Shamaa

Farmer Age
44

Farmer Gender
Male

Farmer ID

* Crop Type
Others

Please Specify
Alfa-Alfa

* Yield Production (Kg/ha)
1618.0

Total yield predicted is 1.877 ton

Go Up Go To Start Go To End

Vodafone
Vodafone EDtouch

Main Menu

ODK Collect v1.16.4
Data collection made easier...

Fill Blank Form

Edit Saved Form (1)

Send Finalized Form (1)

View Sent Form

Get Blank Form

Delete Saved Form

Edit Saved Forms

Vodafone
Vodafone EDtouch

Edit Saved Form

Maadi office test

Finalized on Thu, Sep 20, 2018 at 16:21

Vodafone
Vodafone EDtouch

BCI 2018 Demo

The area of this field is 1.16 ha

Farmer Name
Khaled Al-Shamaa

Farmer Age
44

Farmer Gender
Male

Farmer ID

* Crop Type
Others

Please Specify
Alfa-Alfa

* Yield Production (Kg/ha)
1618.0

Total yield predicted is 1.877 ton

Go Up Go To Start Go To End

Vodafone
Vodafone EDtouch

BCI 2018 Demo

* Yield Production (Kg/ha)
3142

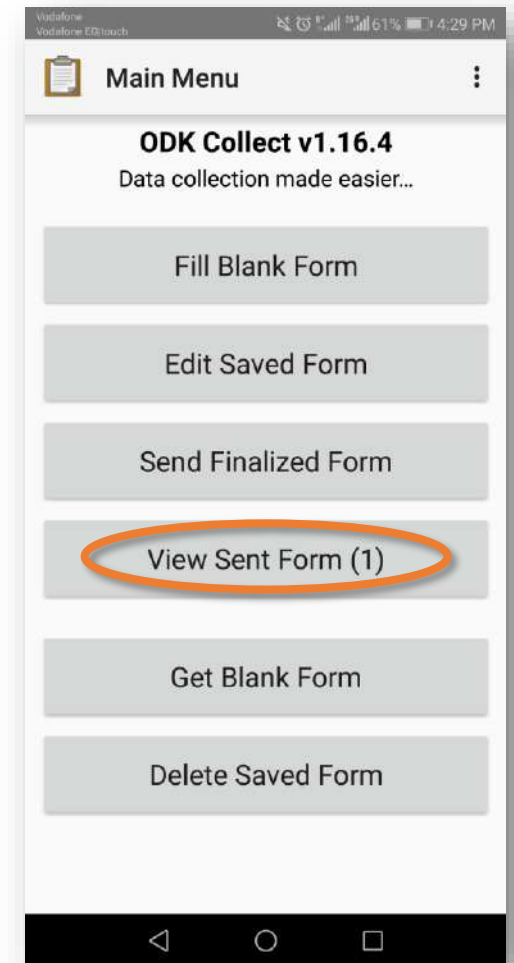
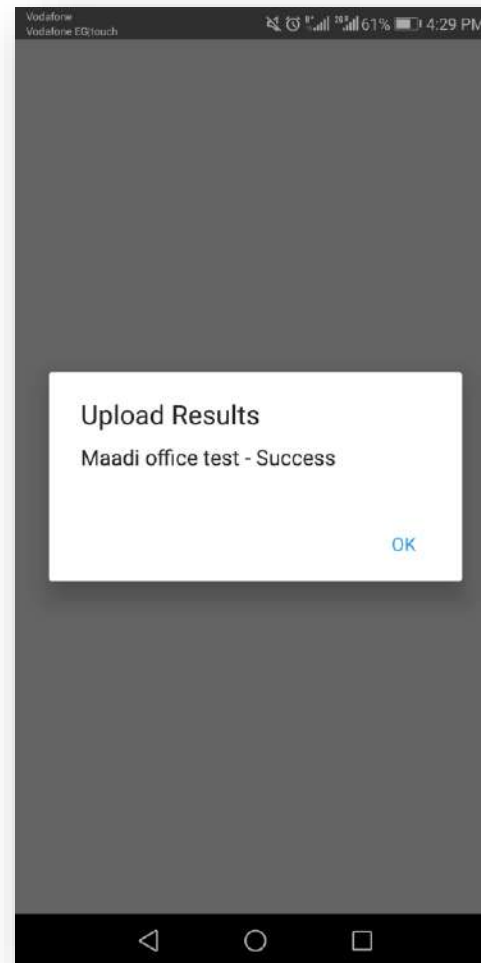
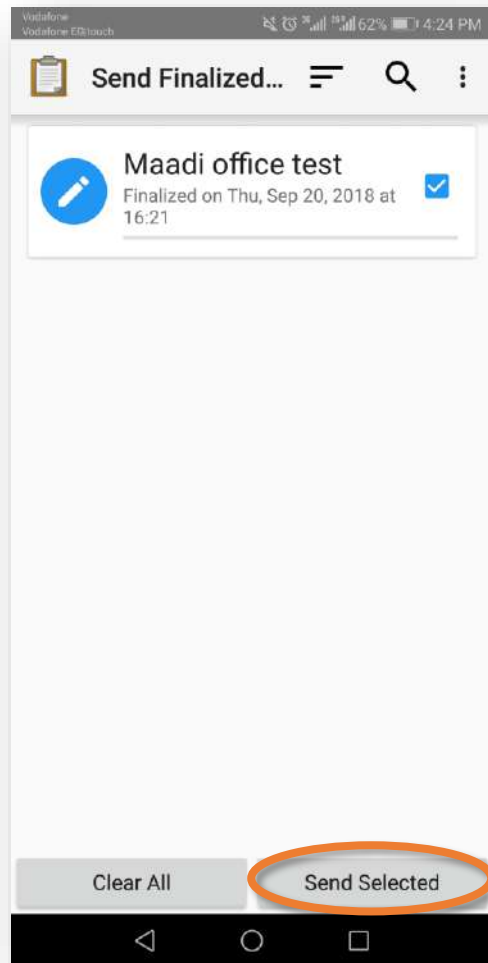
Exit BCI 2018 Demo

Save Changes

Ignore Changes

CANCEL

Send Finalized Forms



View Sent Forms

Vodafone
Vodafone EDtouch

Main Menu

ODK Collect v1.16.4
Data collection made easier...

Fill Blank Form

Edit Saved Form

Send Finalized Form

View Sent Form (1)

Get Blank Form

Delete Saved Form

Vodafone
Vodafone EDtouch

View Sent Form

Maadi office test
Sent on Thu, Sep 20, 2018 at 16:29

Vodafone
Vodafone EDtouch

BCI 2018 Demo

The area of this field is 1.16 ha

Farmer Name
Khaled Al-Shamaa

Farmer Age
44

Farmer Gender
Male

Farmer ID

*** Crop Type**
Others

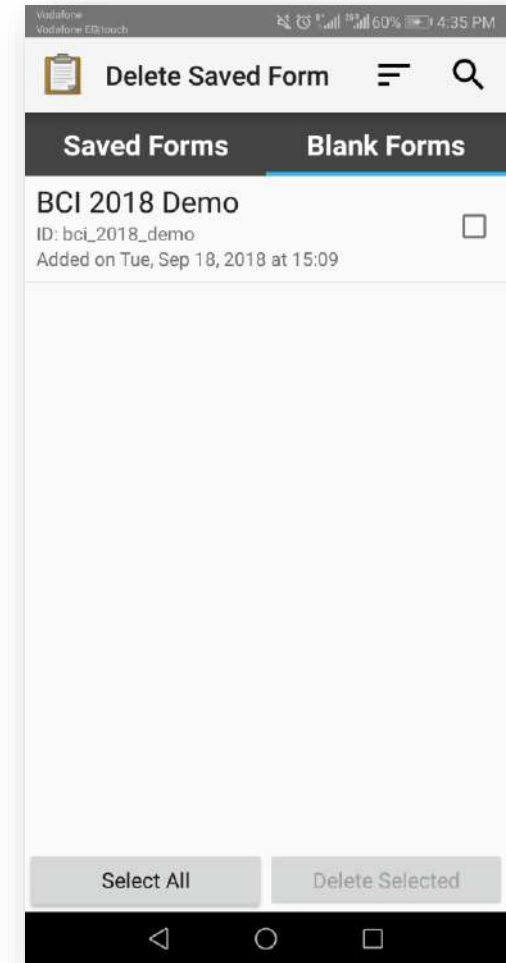
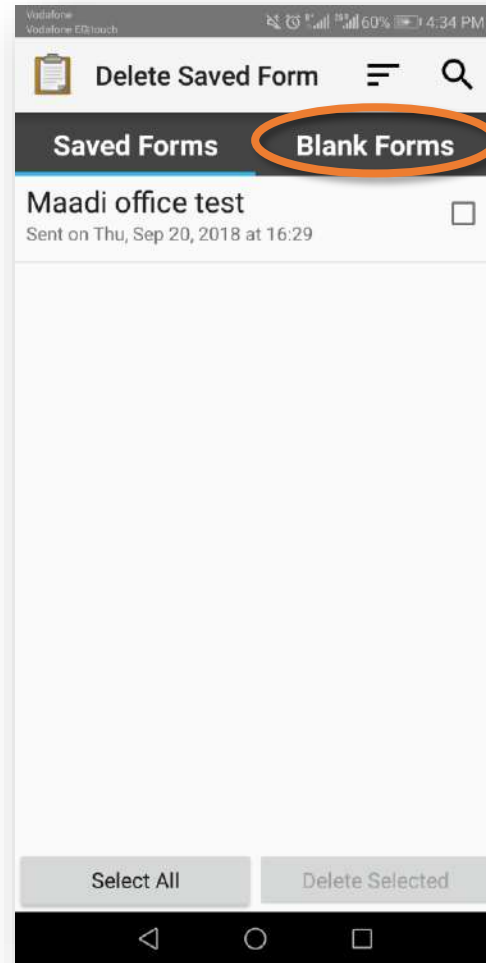
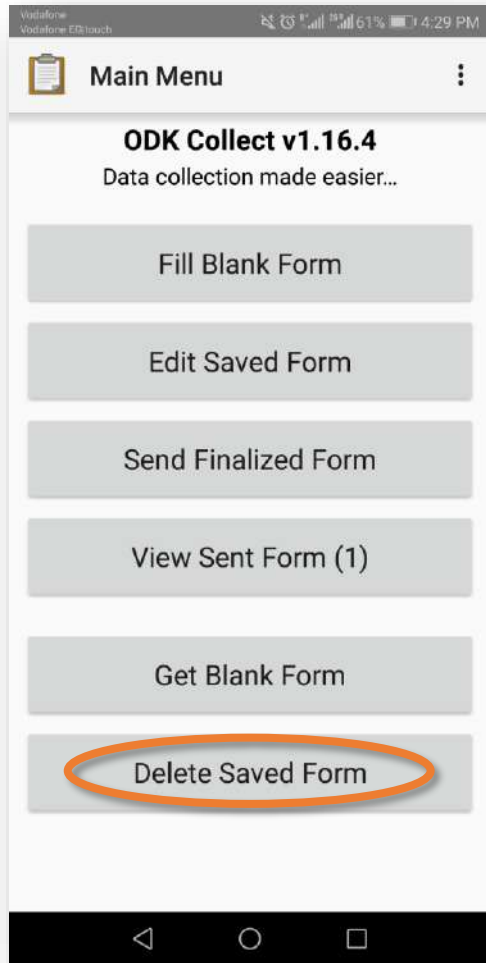
Please Specify
Alfa-Alfa

*** Yield Production (Kg/ha)**
1618.0

Total yield predicted is 1.877 ton

Go Up Exit

Delete Saved Forms and Templates



IT'S NOT BORING
UP HERE – YOU GET TO
LOOK THROUGH EVERYONE'S
DATA!

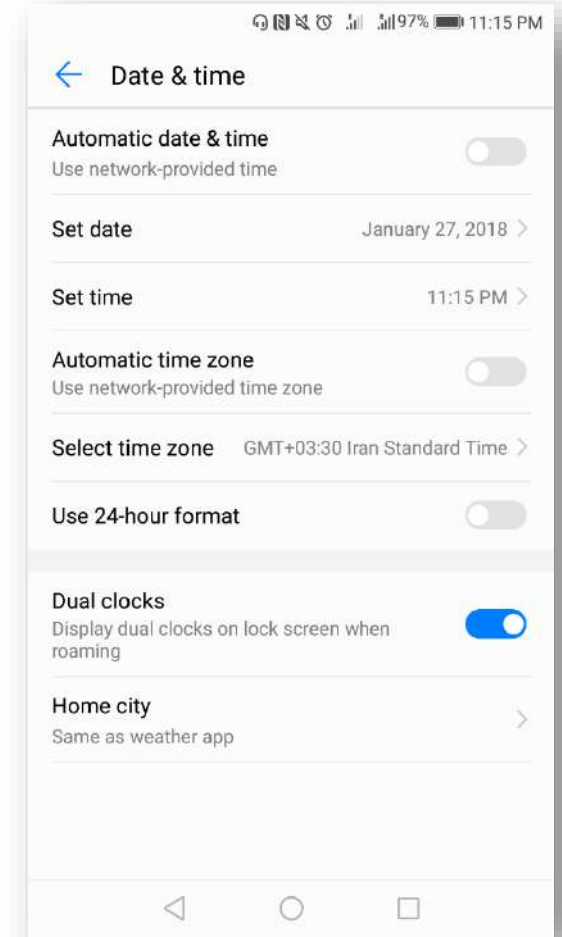
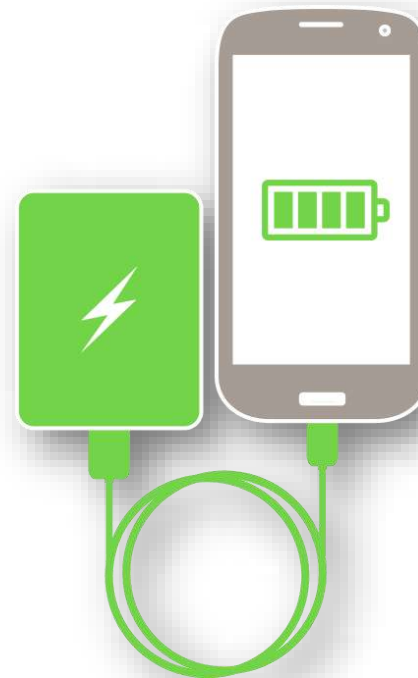
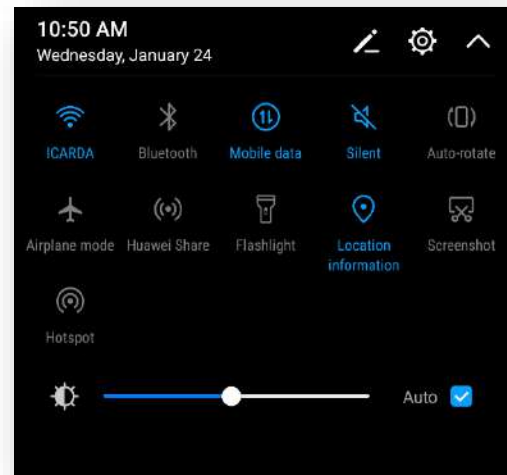


To-Do List Before Going to the Field

Ensure your device battery is fully charged and/or have a backup power bank.

Ensure the time and date are correct.

Enable GPS Location Services.



Questions?



Japanese attitude for work:

If one can do it, I can do it. If no one can do it, I must do it.

Middle Eastern attitude for work:

*Wallahi... if one can do it, let him do it.
If no one can do it, ya-habibi how can I do it?*