

An Exploration of the Open Data Kit

MOBILE MEETS THE CLOUD

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ABSTRACT

The growth of mobile device usage in everyday life continues to sky rocket. As private business and public organizations embrace the rapid change a number of positive results are being achieved through the use of smartphone and tablet devices, particularly in the area of data collection.

The Open Data Kit (ODK) originated as a google.org initiative where research efforts focused on applying technology in developing regions to assist in health and environmental initiatives. The University of Washington's Department of Computer Science and Engineering have pioneered this project for the last four years where they have established a suite of open-source tools to assist under-served communities collect and manage important datasets for strategic initiatives. Through the use of the Google App Engine cloud service, the ODK suite neatly captures and manages data from android mobile devices.

The focus of this presentation will be to explore the Open Data Kit features and capabilities as a framework that simplifies disconnected field data capture while providing data flow and storage to the cloud. The ubiquitous presence of the data within the cloud readily feeds the geospatial and information systems of the organization.

AGENDA

- + Open Data Kit (ODK) Introduction
- + The ODK Projects
- + Just Beyond ODK
- + Practical Insights
- + Questions / Discussion

Mobile Meets the Cloud: An Exploration of the Open Data Kit

Open Data Kit

INTRODUCTION

OPEN DATA KIT INTRODUCTION

✕ What is the Open Data Kit ?

“Open Data Kit (ODK) is an open-source suite of tools that helps organizations author, field, and manage mobile data collection solutions.”

+ Open-Source suite of tools

✕ Headed by Gaetano Borriello

- ✕ Some key contributors: Yaw Anokwa, Carl Hartung, Brian DeRenzi
- ✕ But many others too!
- ✕ Efforts continue at the University of Washington, Department of Computer Science and Engineering

+ Mobile Data Collection

✕ Android OS - Phones, Tablets

OPEN DATA KIT INTRODUCTION

- ✕ How did this start ?
 - + Originated as a google.org initiative
 - + Support
 - ✕ Global Health, Humanitarian and Environment Issues
 - ✕ Particularly in developing regions

BERKELEY HUMAN RIGHTS CENTER CENTRAL AFRICAN REPUBLIC

Building Peace, Seeking Justice: A Population-Based Survey on Attitudes about Accountability and Social Reconstruction in the Central African Republic (August 2010)

“The **INITIATIVE FOR VULNERABLE POPULATIONS** conducts research in countries experiencing serious violations of human rights and international humanitarian law. Using empirical research methods to give voice to survivors of mass violence, the Initiative aims to ensure that the needs of survivors are recognized and acted on by governments, UN agencies, and nongovernmental organizations.”



http://www.law.berkeley.edu/files/HRC/Publications_Building-Peace-Seeking-Justice_08-2010.pdf

ACADEMIC MODEL FOR THE PREVENTION AND TREATMENT OF HIV

IU-Kenya Partnership/AMPATH (July 2010)

“AMPATH believes the most powerful case finding and prevention tool is home-based counseling and testing (HCT). By offering testing in individual homes, AMPATH is more likely to diagnose early disease and provide care that is at once less expensive and more effective at keeping those who are HIV-positive from ever progressing to advanced disease and death.”



[http://www.ampathkenya.org/our-programs/communicable-diseases/home-based-counseling-and-testing-\(hct\)/](http://www.ampathkenya.org/our-programs/communicable-diseases/home-based-counseling-and-testing-(hct)/)

OPEN DATA KIT INTRODUCTION

INSIGHTFUL SIDE BAR

- ✗ Gaetano Borriello at TEDx Seattle April 2010
 - + Discusses the work of one of his graduate students in Mtwara
 - + Poor coastal community located in Tanzania
- ✗ Stats
 - + United States 430 people per doctor
 - + Tanzania 50,000 people per doctor
- ✗ Clinicians front line medical provider
 - + World Health Organization Protocols
 - + Integrated Management of Childhood Illness
 - ✗ 43 page paper flowchart
 - ✗ 173 page handbook
 - + Patient demand on clinicians
 - ✗ Paper flowchart not efficient
 - ✗ Rely on memory
 - + Impact
 - ✗ Incomplete assessments
 - ✗ Missing the mark on diagnosis
 - ✗ Increases risk of missing urgent cases
- ✗ Positive results
 - + Adhering to protocol
 - + More complete history

The image displays four pages of the Integrated Management of Childhood Illness (IMCI) protocol, a WHO and UNICEF initiative. The top-left page is the 'INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESS' cover and index. The top-right page is 'ASSESS AND CLASSIFY THE SICK CHILD AGED 2 MONTHS UP TO 5 YEARS', featuring a flowchart for 'CHECK FOR GENERAL DANGER SIGNS' and 'THEN ASK ABOUT MAIN SYMPTOMS'. The bottom-left page is a flowchart for 'Does the child have diarrhoea?'. The bottom-right page is a flowchart for 'Does the child have fever?'. The flowcharts use color-coded boxes (pink, yellow, green) to guide the clinician through the assessment and classification process, leading to specific treatment recommendations.

<http://www.youtube.com/watch?v=X7evoDIDQU>

<http://homes.cs.washington.edu/~bderenzi/Papers/chi1104-bderenzi.pdf>

OPEN DATA KIT INTRODUCTION

OPEN DATA KIT INTRODUCTION

- ✖ Why Open Data Kit ?
 - + Technology and Numbers
 - + Developing Nations
 - ✖ Have Limited Technology Infrastructure
 - ✖ Large Number of Surveys to Perform
 - ✖ Effective Spending of Limited Dollars



OPEN DATA KIT INTRODUCTION

✗ But ... Why Open Data Kit ?

+ Technology and Numbers

- ✗ Open Source = Free
- ✗ Open Source = Extensible
- ✗ Open Standard (XForms*) = Good
- ✗ The Android Market Share **
- ✗ The Android Device
 - ★ Low Cost
 - ★ GPS
 - ★ Camera
 - ★ Microphone



* More to come!

** http://www.huffingtonpost.com/2012/09/18/android-market-share-q3-2012_n_1893292.html

OPEN DATA KIT INTRODUCTION

✕ Other Uses for the Open Data Kit

- + Emergency Response
- + Damage Assessment
- + Outage Management
- + Municipal Management
- + Campus Facilities
- + Learning / Training



OPEN DATA KIT INTRODUCTION

✖ So ... What is the Open Data Kit Again ?

“Open Data Kit (ODK) is an open-source suite of tools that helps organizations author, field, and manage mobile data collection solutions.”



Mobile Meets the Cloud: An Exploration of the Open Data Kit

Open Data Kit as a Framework

ODK PROJECTS

ODK PROJECTS

✕ Brief Wiki

- + “XForms is an XML format for the specification of a data processing model for XML data and user interface(s) for the XML data, such as web forms.”
<http://en.wikipedia.org/wiki/XForms>
- + “JavaRosa is an XForms client written in Java Mobile Edition (J2ME), and supports a wide array of devices, from top-end smart phones and PDAs with large screens and abundant memory”
<http://en.wikipedia.org/wiki/XForms>
- + OpenRosa consortium is a group of organizations working together to created mobile data collection standards, particularly involving XForms

ODK PROJECTS

✕ Key Projects

- + Build: HTML5 web application used to build basic XForms
- + Collect: Android application used to capture data while in the field
- + Aggregate: Web application used to distribute blank XForms and gather captured data*
- + Validate: A desktop Java application used to validate OpenRosa compliant forms

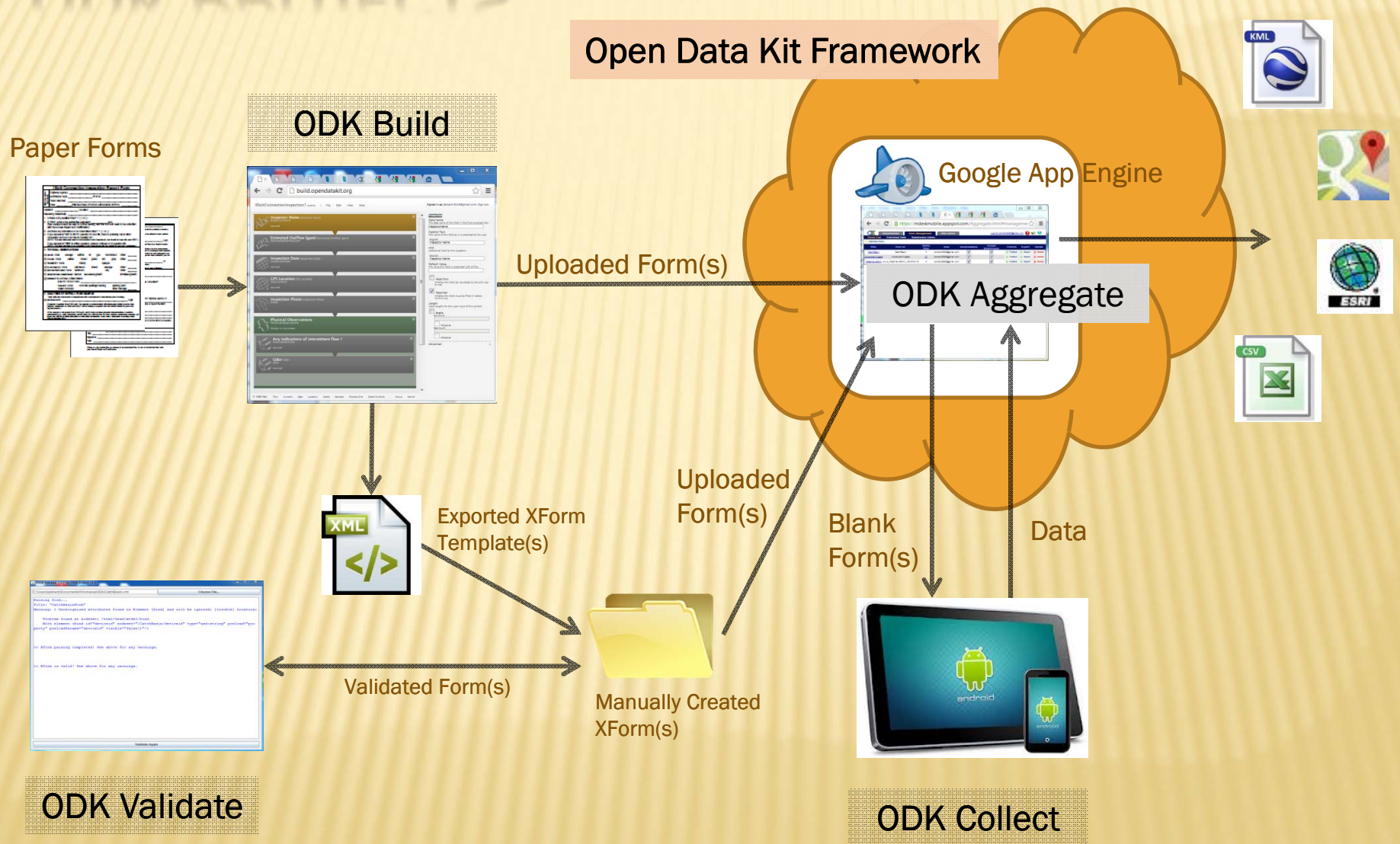
* Assuming Google App Engine Installation, although there are other deployment options

✕ Additional Projects* *

- + Form Uploader
- + Briefcase
- + XLSXForm

** Will not be formally discussed within this presentation

ODK PROJECTS



What information is needed ?

BUILD

ODK BUILD

✕ Getting Started

- + Navigate to: <http://build.opendatakit.org>
- + Create an account
- + Drag-n-drop field types and configure

ODK BUILD

The screenshot displays the ODK Build web application interface in a browser window. The address bar shows `build.opendatakit.org`. The user is signed in as `jdoherty8329@gmail.com`. The main workspace shows a form titled `IllicitConnectionInspection1` with a menu bar (File, Edit, View, Help). The form is composed of several fields, each with a unique icon and a close button (X):

- Inspector Name** (InspectorName): A text field with a required status.
- Estimated Outflow (gpm)** (EstimatedOutflowGpm): A numeric field.
- Inspection Date** (InspectionDate): A date field with a required status.
- GPS Location** (GpsLocation): A location field with a required status.
- Inspection Photo** (Inspection Photo): A photo field.
- Physical Observations** (PhysicalObservations): A text area with a "display on one screen" option.
- Any indications of intermittent flow?** (IntermittentFlow): A select one field with a required status.
- Odor** (Odor): A select multiple field with a required status.

On the right side, the **Properties** panel is visible, showing configuration options for the selected field (Inspector Name):

- Data Name:** InspectorName
- Caption Text:** Inspector Name
- Hint:** Inspector Name
- Default Value:** (empty)
- Read Only:** ☐
- Required:** ☒
- Length:** ☐ Enable, Minimum: (empty), ☐ Inclusive, Maximum: (empty), ☐ Exclusive
- Advanced:** (collapsed)

At the bottom, a toolbar includes an **Add new** button and various field types: Text, Numeric, Date, Location, Media, Barcode, Choose One, Select Multiple, Group, and Branch.

BASIC TYPES

- ✕ Text
- ✕ Numeric
- ✕ Date
- ✕ Location
- ✕ Media
 - + Image / Video / Audio
- ✕ Choose One
- ✕ Select Multiple
- ✕ Metadata
- ✕ Group

ADVANCED TYPES*

- ✕ Date
 - + Month – Year / Year / Time / Date - Time
- ✕ Location with Map
- ✕ Barcode **
- ✕ Image with Markup
- ✕ Sketch
- ✕ Signature
- ✕ Selection by Image
- ✕ Cascading Selects
- ✕ Skip Logic

+ Add new Text Numeric Date Location Media Barcode Choose One Select Multiple Metadata Group Branch

ODK BUILD

* Manual Edit of XForm

** Barcode Reader App Required

ODK BUILD

✕ Basic Types

+ Text

- ✕ Click “Text”
- ✕ Fill in the “Properties”
- ✕ Typical properties
 - ★ Data Name
 - ★ Caption Text
 - ★ Hint
 - ★ Default Value
 - ★ Read Only (check)
 - ★ Required (check)

The screenshot shows the ODK Build web interface in a browser. The main area displays a form with a single text field labeled "[no caption text yet]". To the right, the "Properties" panel is open, showing the following fields:

- Data Name:** The data name of this field in the final exported XML. Value:
- Caption Text:** The name of this field as it is presented to the user. Value:
- Hint:** Additional help for this question. Value:
- Default Value:** The value this field is presented with at first. Value:
- Read Only:** ☐ Whether this field can be edited by the end user or not.
- Required:** ☐ Whether this field must be filled in before continuing.
- Length:** Valid lengths for this user input of this control.
 - ☐ **Enable**
 - Minimum:**
 - ☐ **Inclusive**
 - Maximum:**
 - ☐ **Inclusive**

The interface also shows a top navigation bar with "File", "Edit", "View", and "Help" menus, and a bottom toolbar with buttons for "Add new", "Text", "Numeric", "Date", "Location", "Media", "Barcode", "Choose One", "Select Multiple", and "Group".

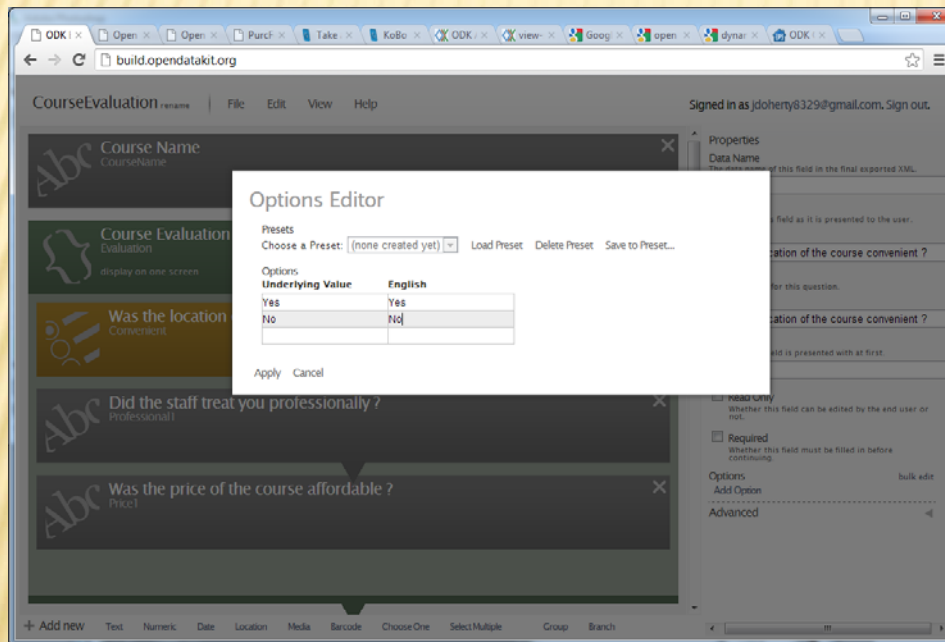
ODK BUILD

✕ Basic Types

+ Choose One

✕ Pick from list

✕ Bulk Edit







ODK BUILD

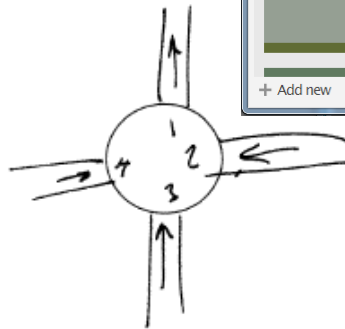
✖ Basic Types

+ Group

- ✖ Logically associate
- ✖ Display fields together
- ✖ Enable 1 to Many

Pipe:

	Seal Condition	I/I	Diameter	Type
Pipe #1	G  P	---	8	Ver
Pipe #2	G  P	---	8	L
Pipe #3	G  P	---	8	L
Pipe #4	G F  P	---	6	L
Pipe #5	G F P	---	---	---
Pipe #6	G F P	---	---	---



ManholeInspection rename | File Edit View Help

Signed in as jcdoherty8329@gmail.com. Sign out.

Pipes
Pipes
looped

Pipe No. Pipe Number
PipeNo

Pipe Type Pipe Type
PipeType

Pipe Seal Condition Pipe Seal Condition
PipeSealCondition

Pipe Diameter Pipe Diameter
PipeDiameter

Properties

Name
The data name of this group in the final exported XML.
Pipes

Label
Give the group a label to give a visual hint to the user.
English
Pipes

☒ Looped
Whether or not to allow this group to loop.

☐ Display On One Screen
Display all the controls in this group on one screen

Advanced

+ Add new Text Numeric Date Location Media Barcode Choose One Select Multiple Group

ODK BUILD

```
1 <h:html xmlns="http://www.w3.org/2002/xforms" xmlns:h="http://www.w3.org/1999/x
2 <h:head>
3 <h:title>AdvancedWidgets</h:title>
4 <model>
5 <instance>
6 <data id="AdvancedWidgets">
7 <InspectionDate/>
8 <CurrentLocation/>
9 </data>
10 </instance>
11 <itext>
12 <translation lang="eng">
13 <text id="/data/InspectionDate:label">
14 <value>Inspection Date (Month-Year)</value>
15 </text>
16 <text id="/data/InspectionDate:hint">
17 <value>Inspection Date (Month-Year)</value>
18 </text>
19 <text id="/data/CurrentLocation:label">
20 <value>Current GPS Location (with Map)</value>
21 </text>
22 <text id="/data/CurrentLocation:hint">
23 <value>Current GPS Location (with Map)</value>
24 </text>
25 </translation>
26 </itext>
27 <bind nodeset="/data/InspectionDate" type="date" required="true()" />
28 <bind nodeset="/data/CurrentLocation" type="geopoint" />
29 </model>
30 </h:head>
31 <h:body>
32 <input ref="/data/InspectionDate" appearance="month-year">
33 <label ref="jr:itext('/data/InspectionDate:label')"/>
34 <hint ref="jr:itext('/data/InspectionDate:hint')"/>
35 </input>
36 <input ref="/data/CurrentLocation" appearance="maps">
37 <label ref="jr:itext('/data/CurrentLocation:label')"/>
38 <hint ref="jr:itext('/data/CurrentLocation:hint')"/>
39 </input>
40 </h:body>
41 </h:html>
```

✗ Advanced Types

+ Examples

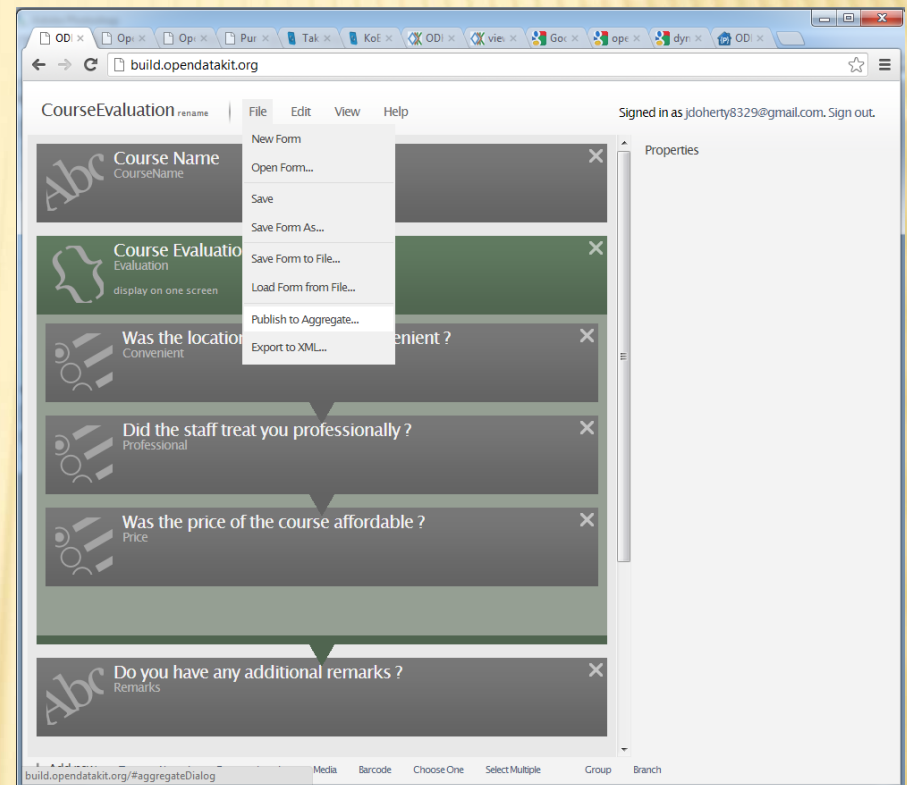
✗ Month-Year

✗ Location with Map

+ Use of “appearance”

FINISHING THE FORM BUILD

- ✖ Publish to Aggregate ...
 - + Posts blank XForm to Aggregate Host
- ✖ Export to XML ...
 - + Used to extend basic Form with advanced types

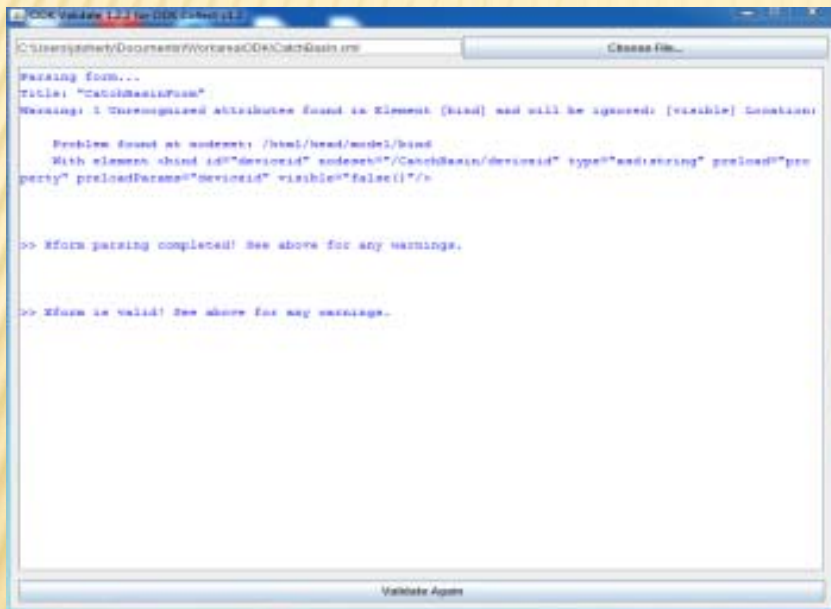


ODK BUILD

Do our form templates conform ?

VALIDATE

ODK VALIDATE



✗ Getting Started

+ Navigate to:

<http://code.google.com/p/.opendatakit/>

+ Under Featured Downloads

✗ Download

“ODK Validate 1.2.2 for ODK Collect v1.2.jar”

✗ On your PC run

“ODK Validate 1.2.2 for ODK Collect v1.2.jar” *

✗ “Choose File ...” to
validate

✗ Correct Issues and
Revalidate

* Requires Java

How do we get the data ?

COLLECT

ODK COLLECT

✕ Getting Started*

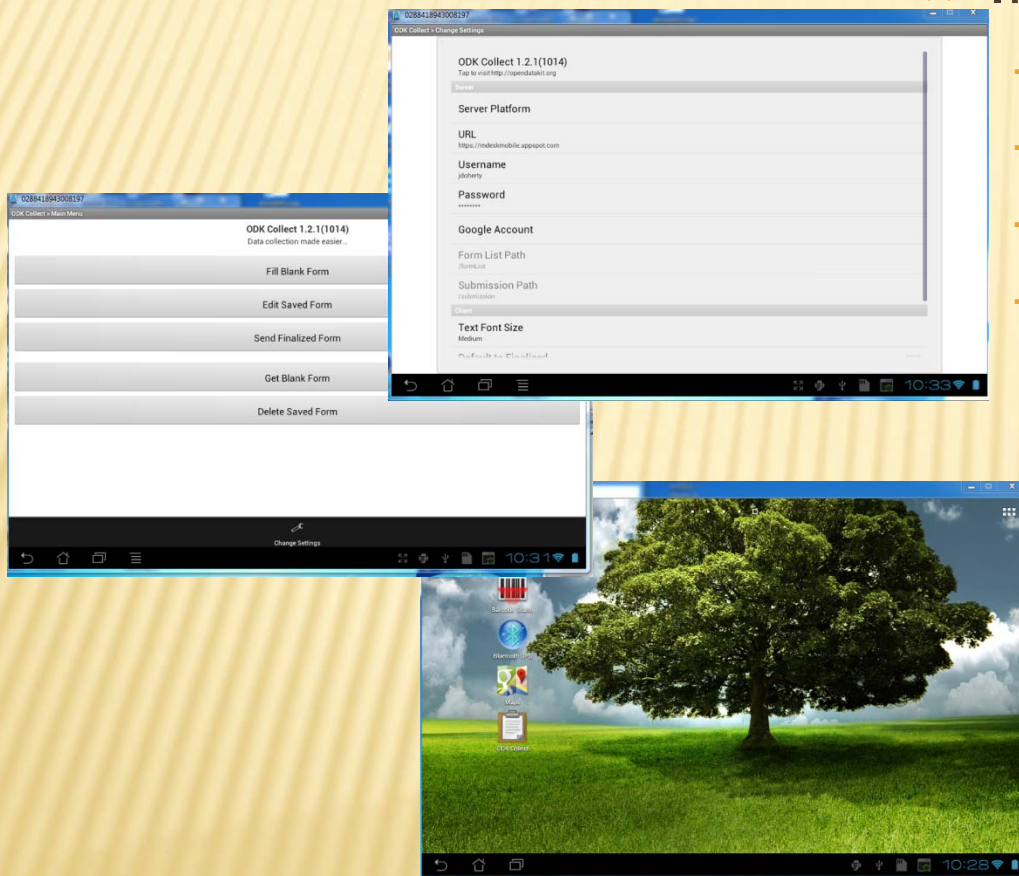
- + From Android Device use the Browser App to navigate to: <http://code.google.com/p/.opendatakit/downloads/list>
- + Download “ODK Collect v1.2.1 rev 1014.apk”
- + Install the APK on the Android Device
- + Perform Initial Setup / Configuration
- + Download Forms
- + Capture Data
- + Post Captured Data

* Connection to internet required at times via WiFi, 3G, 4GLTE etc ...

ODK COLLECT

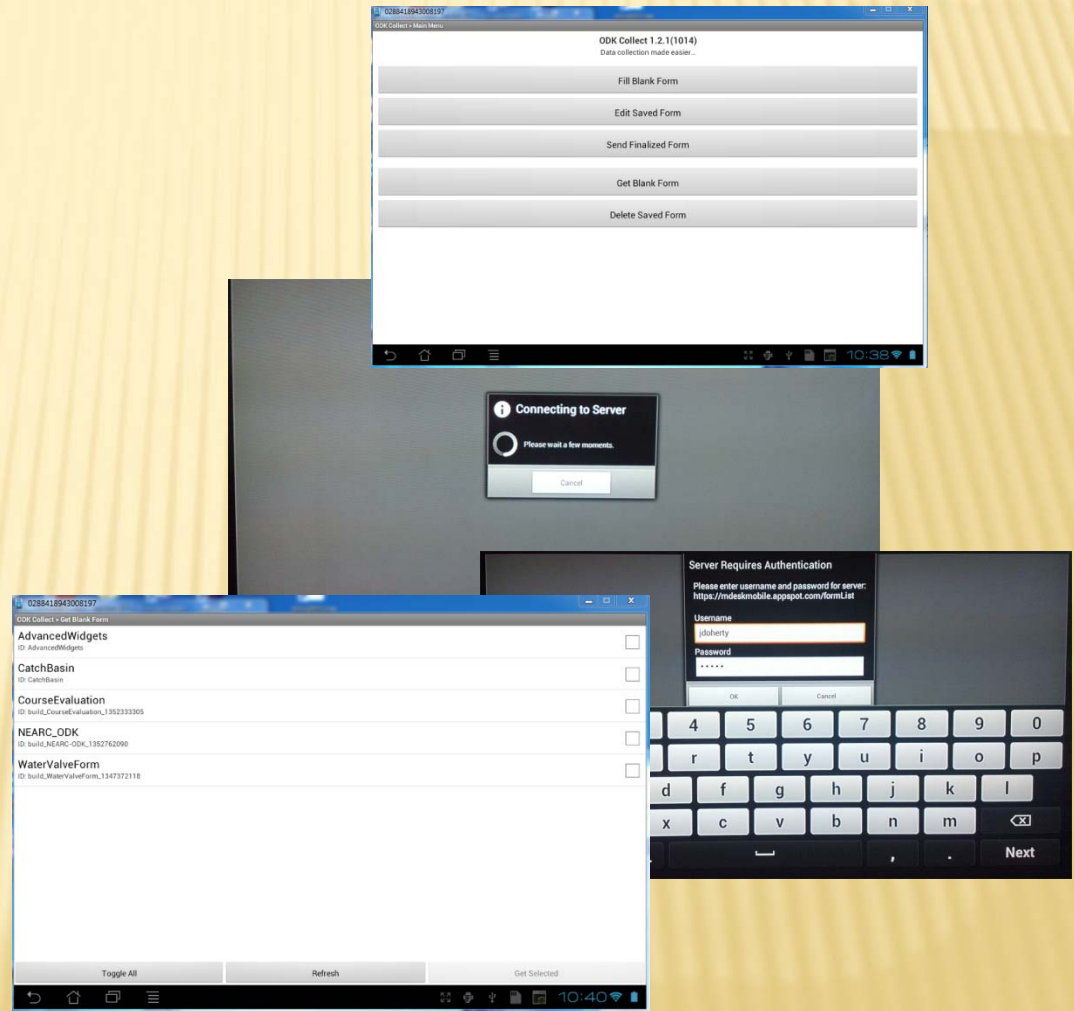
✕ Initial Setup/Configuration

- + Open ODK Collect App
- + Navigate into Change Settings
- + Set the URL
- + Set the Username / Password

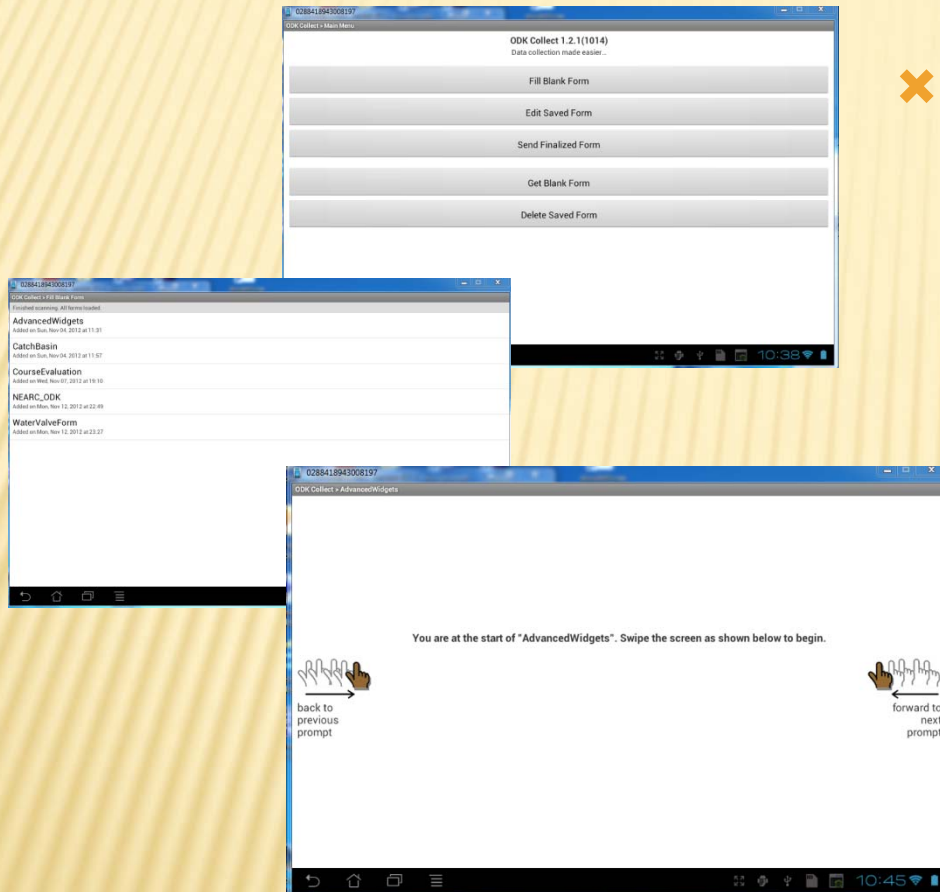


ODK COLLECT

- ✗ Download Forms
 - + Tap “Get Blank Form”
 - + Complete Login
 - + Check Form(s)
 - + Tap “Get Selected”



ODK COLLECT



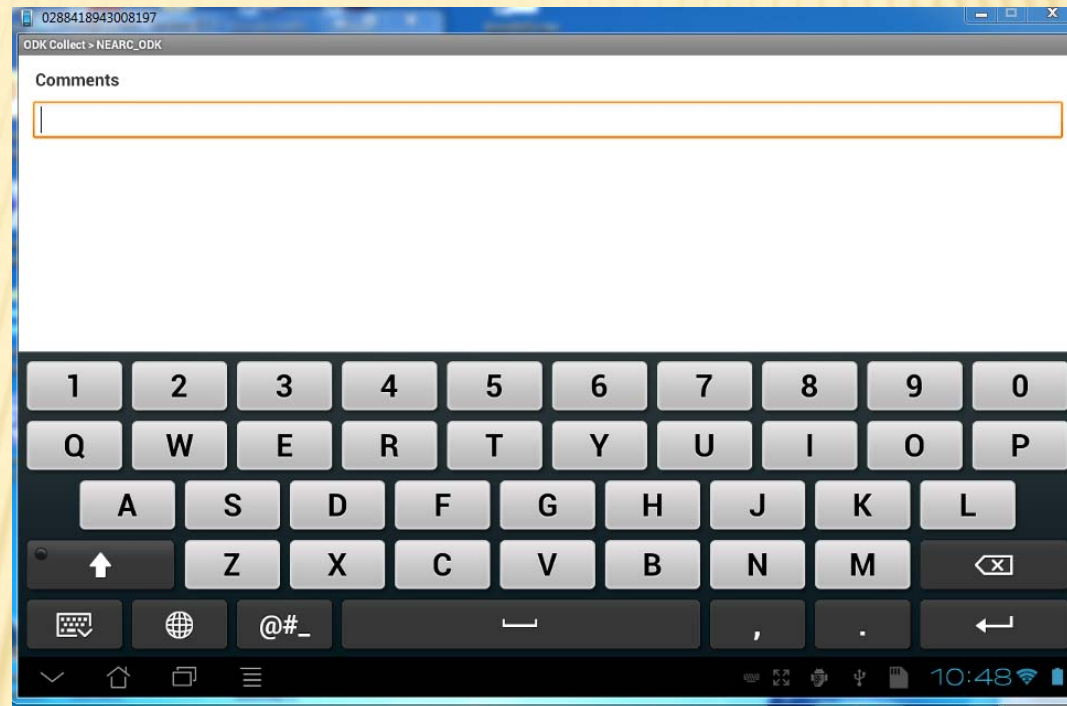
✕ Capture Data

- + Tap “Fill Blank Form”
- + Tap a Form in the list
- + Swipe Through Each Question

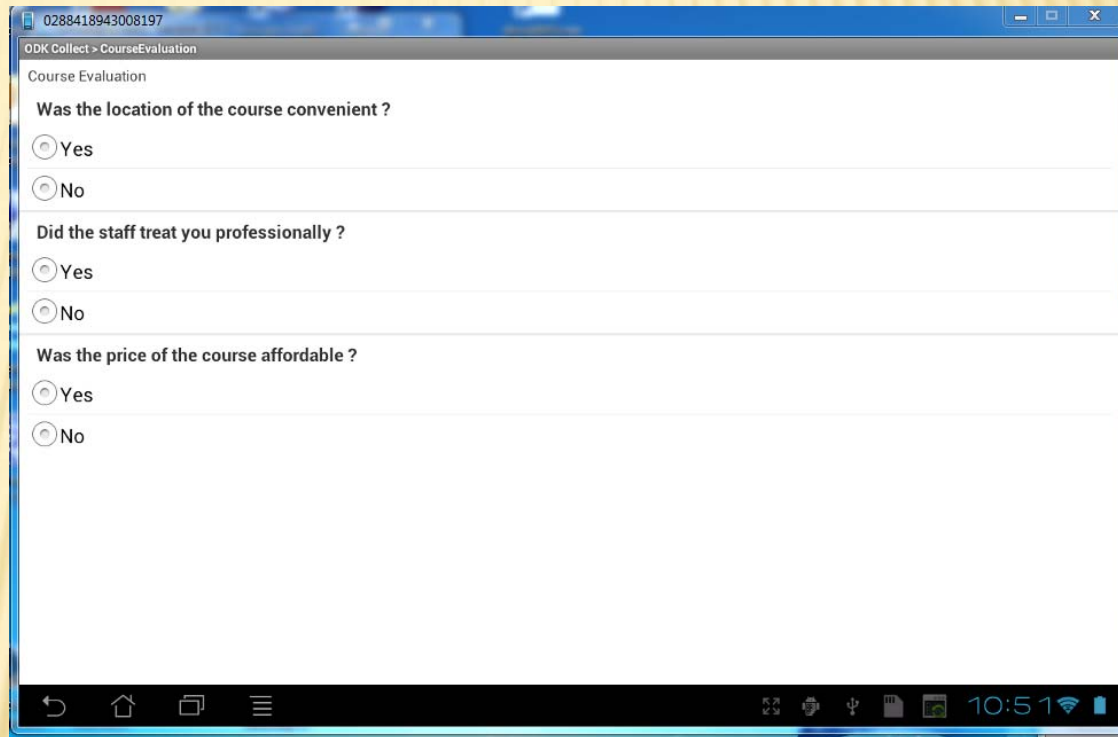
ODK COLLECT

✗ Capture
+ Text

- ✗ Key Touch Entry
- ✗ Mic has mixed results



ODK COLLECT



0288418943008197

ODK Collect > CourseEvaluation

Course Evaluation

Was the location of the course convenient ?

☐ Yes

☐ No

Did the staff treat you professionally ?

☐ Yes

☐ No

Was the price of the course affordable ?

☐ Yes

☐ No

Navigation icons: back, home, recent apps, menu, and status bar with time 10:51 and battery level.

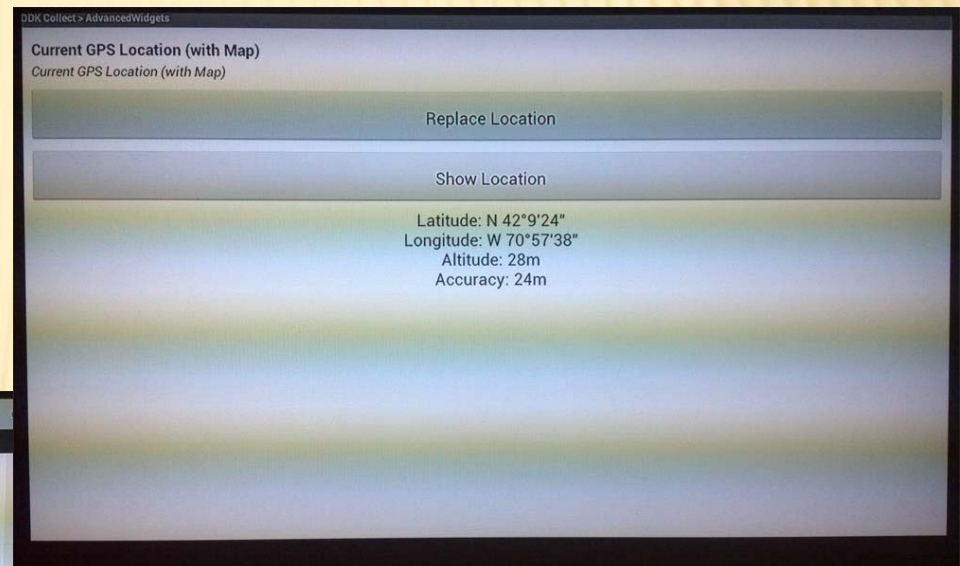
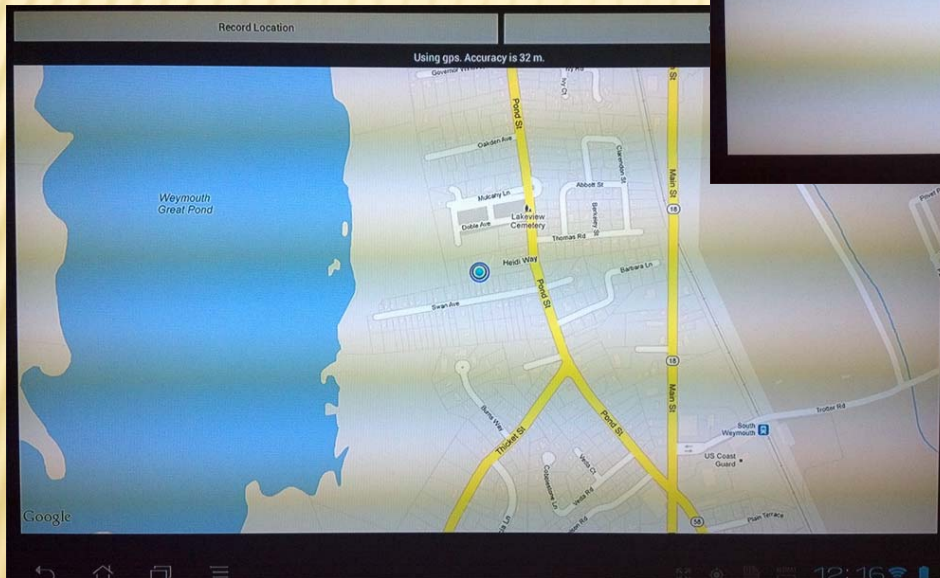
✗ Capture

+ Choose One

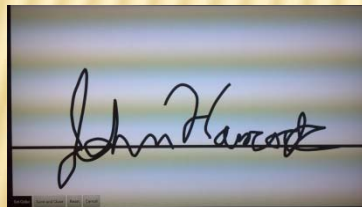
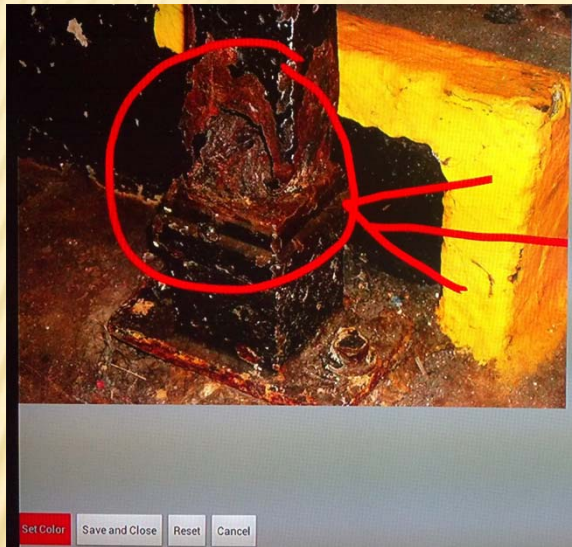
+ Group – Show Together

ODK COLLECT

- ✗ Capture
- + Location – with Map

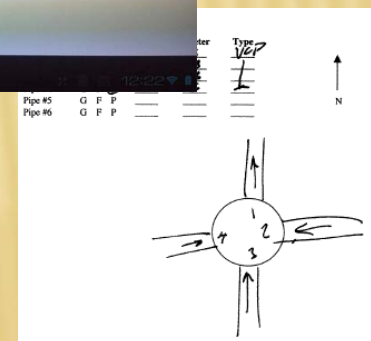
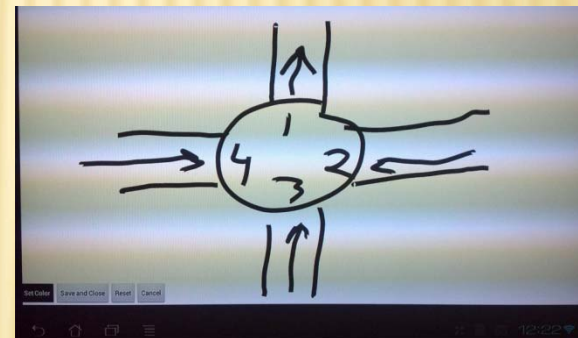


ODK COLLECT

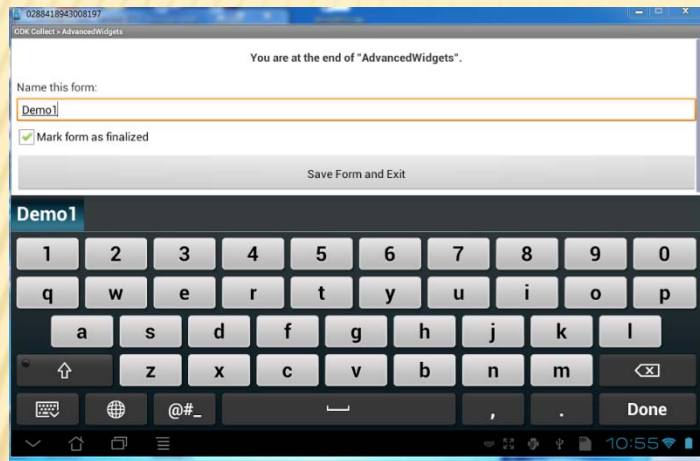


✕ Capture

- + Image with Markup
- + Sketch
- + Signature



ODK COLLECT



0288418943008197
ODK Collect - AdvancedWidgets

You are at the end of "AdvancedWidgets".

Name this form:

☒ Mark form as finalized

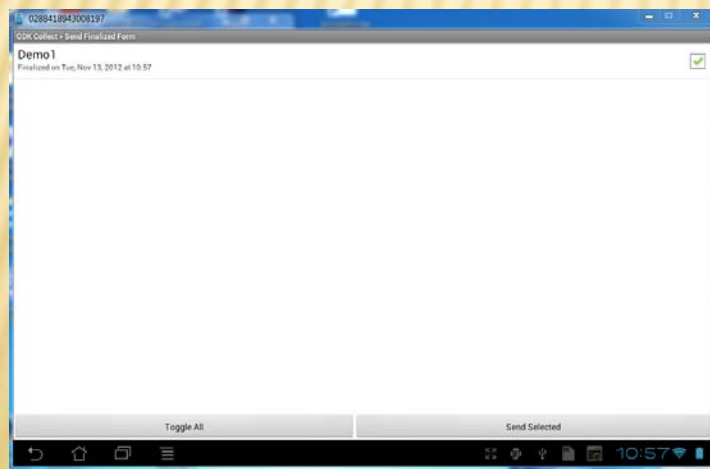
Save Form and Exit

Demo1

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
↑ z x c v b n m ↵
⌨️ 🌐 @#_ , . Done

10:55

✗ Complete Capture



0288418943008197
ODK Collect - Send Finalized Form

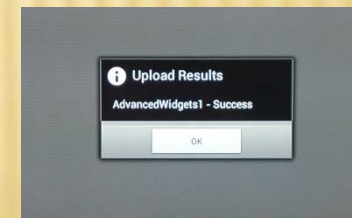
Demo1
Finalized on Tue, Nov 13, 2012 at 10:57

Toggle All

Send Selected

10:57

✗ Post Captured Data



Mobile Meets the Cloud: An Exploration of the Open Data Kit

Can we bring it all together ?

AGGREGATE

ODK AGGREGATE

✕ Getting Started

+ Install the App Engine

- ✕ Navigate to: <http://appengine.google.com>
- ✕ Setup a Google App Engine Account
- ✕ Use the “Create Application” button and provide an application identifier
- ✕ Application identifier determines URL (e.g. <http://calgis.appspot.com>)

+ Prepare the ODK Aggregate Install Wizard

- ✕ Navigate to: <http://code.google.com/p/opendatakit/downloads/list>
- ✕ Download and Run “ODK Aggregate v1.2.0 windows-installer.exe”

+ Configure New ODK Aggregate Server Instance



ODK AGGREGATE

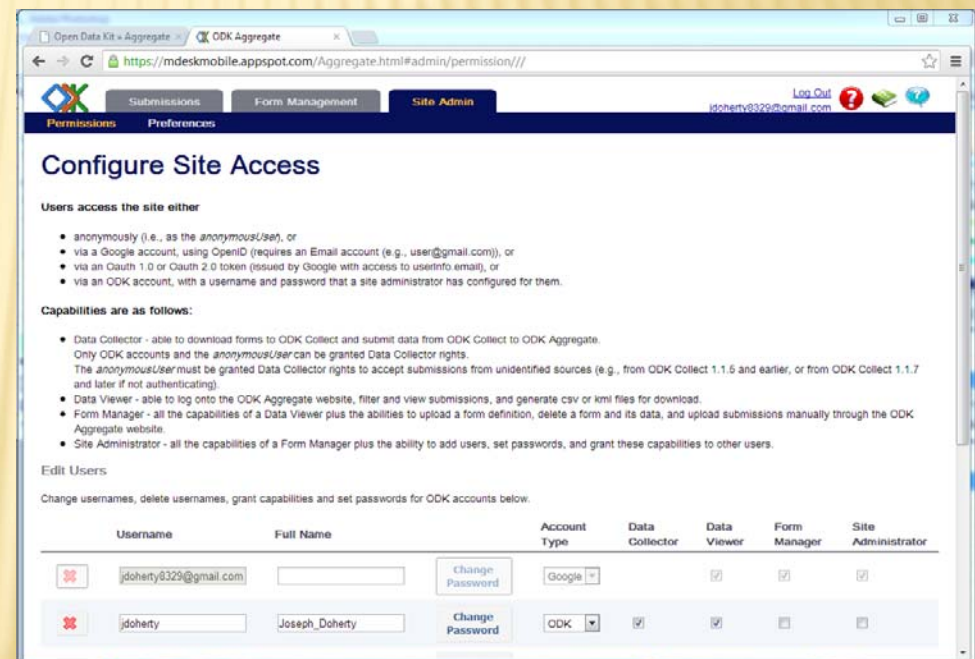
Installation Wizard

The installation wizard consists of six sequential windows:

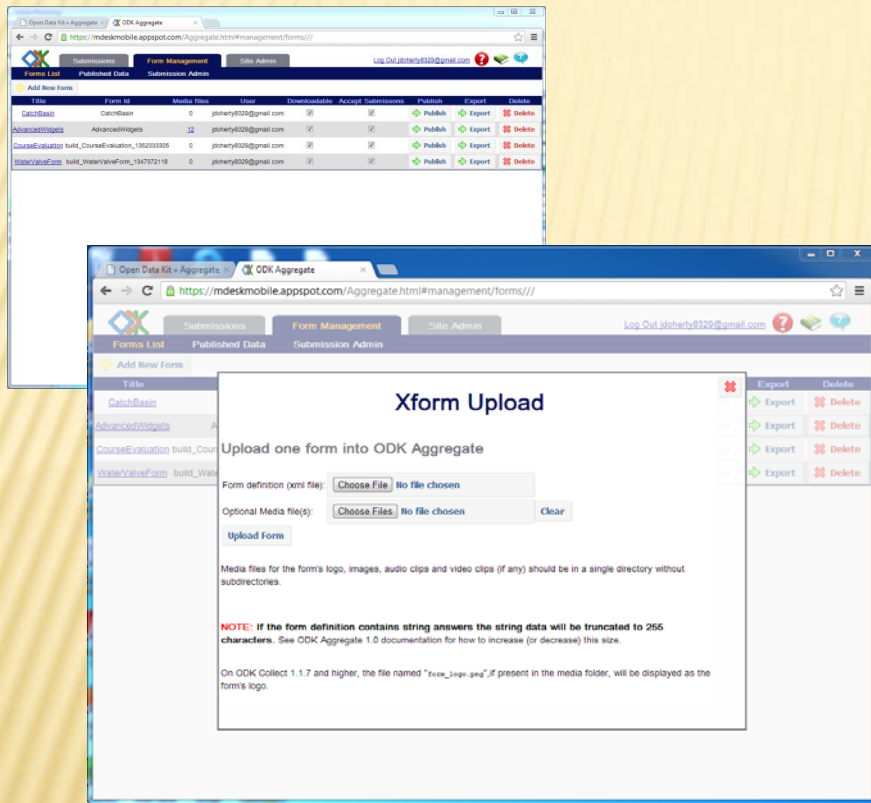
- Select an output parent directory:** A text box contains 'nearc'. Instructions explain that the installer guides configuration and provides final instructions for MySQL or PostgreSQL deployments.
- Choose Platform:** Three radio buttons are shown: 'Google App Engine' (selected), 'MySQL', and 'PostgreSQL'. Each option has a brief description of the underlying services.
- ODK Aggregate Instance Name:** A text box contains 'nearc'. A note states that the instance name will be displayed to users and that subsequent upgrades require a record of the chosen name.
- Super-user E-mail Address:** A text box contains 'jdoherly8329@gmail.com'. Instructions state that this user will have full permissions and that this is the first time ODK Aggregate runs.
- Google AppEngine application ID:** A text box contains 'nearc'. Instructions direct the user to obtain an application identifier from Google's AppEngine cloud services.
- Completing the ODK Aggregate Setup Wizard:** The final window shows the ODK logo and the text 'Setup has finished configuring ODK Aggregate.' with a checked box for 'Launch installation script (3-10 minutes)'.

ODK AGGREGATE

- ✗ Configure New ODK Aggregate Instance
 - + Navigate to App Engine instance (e.g. <http://calgis.appspot.com>)
 - + “Sign in with Google”
- ✗ Site Admin
 - + Configure Site Access
 - ✗ Google Accounts .vs. ODK Accounts
 - ✗ Rights
 - ★ Data Collector
 - ★ Data Viewer
 - ★ Form Manager
 - ★ Site Administrator



ODK AGGREGATE



- ✕ Form Management
 - + Panels
 - ✕ Forms List
 - ✕ Published Data
 - ✕ Submission Admin
 - + New Forms via
 - ✕ ODK Build
 - ✕ “Add New Form”
 - + Remove Forms
 - ✕ ... and Submitted Data

ODK AGGREGATE

✕ Form Management

+ Export

✕ File Types

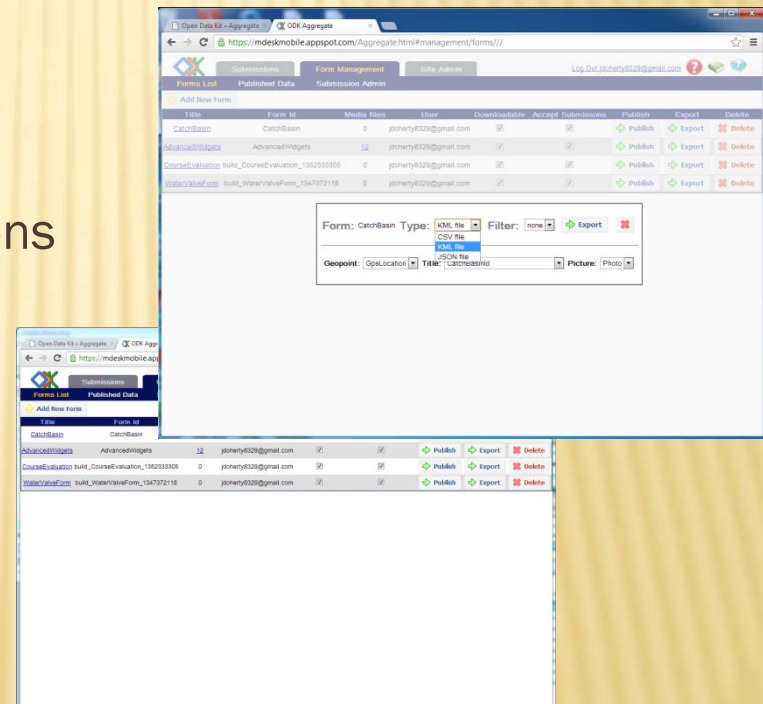
✧ CSV / KML / JSON

✕ Batch Job -> Exported Submissions

+ Publish To

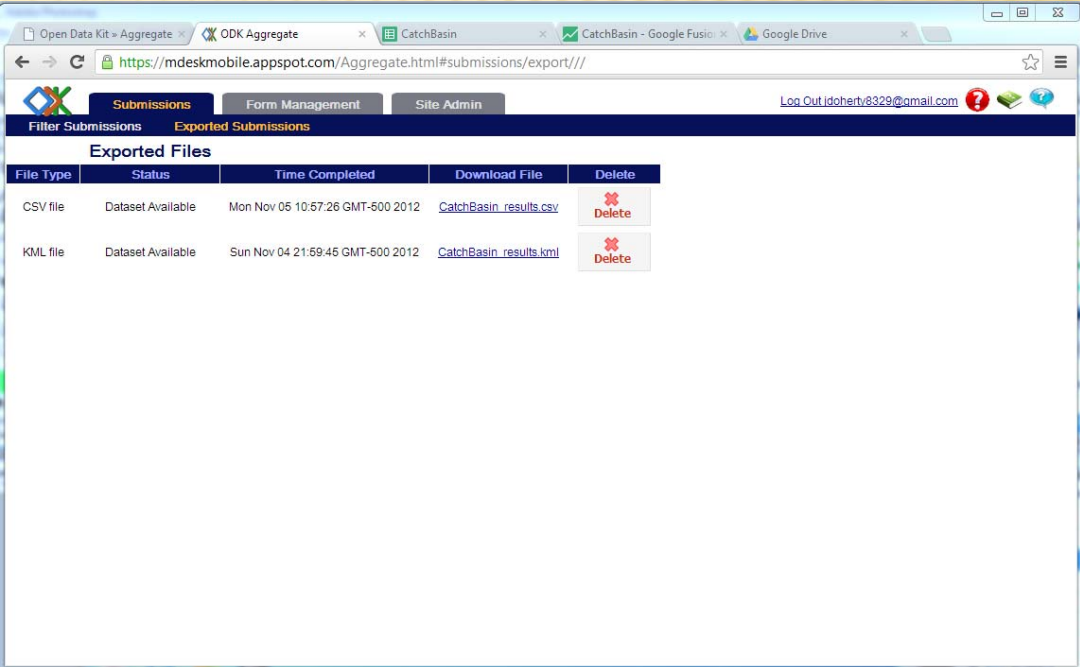
✕ Google Fusion Tables

✕ Google Spreadsheet



ODK AGGREGATE

- ✗ Submissions
 - + Exported Submissions Panel
 - ✗ Link to export file download



The screenshot shows a web browser window with the URL <https://mdeskmobile.appspot.com/Aggregate.html#submissions/export/>. The page has a navigation bar with 'Submissions', 'Form Management', and 'Site Admin'. Below the navigation bar, there are tabs for 'Filter Submissions' and 'Exported Submissions'. The 'Exported Files' table is displayed with the following data:

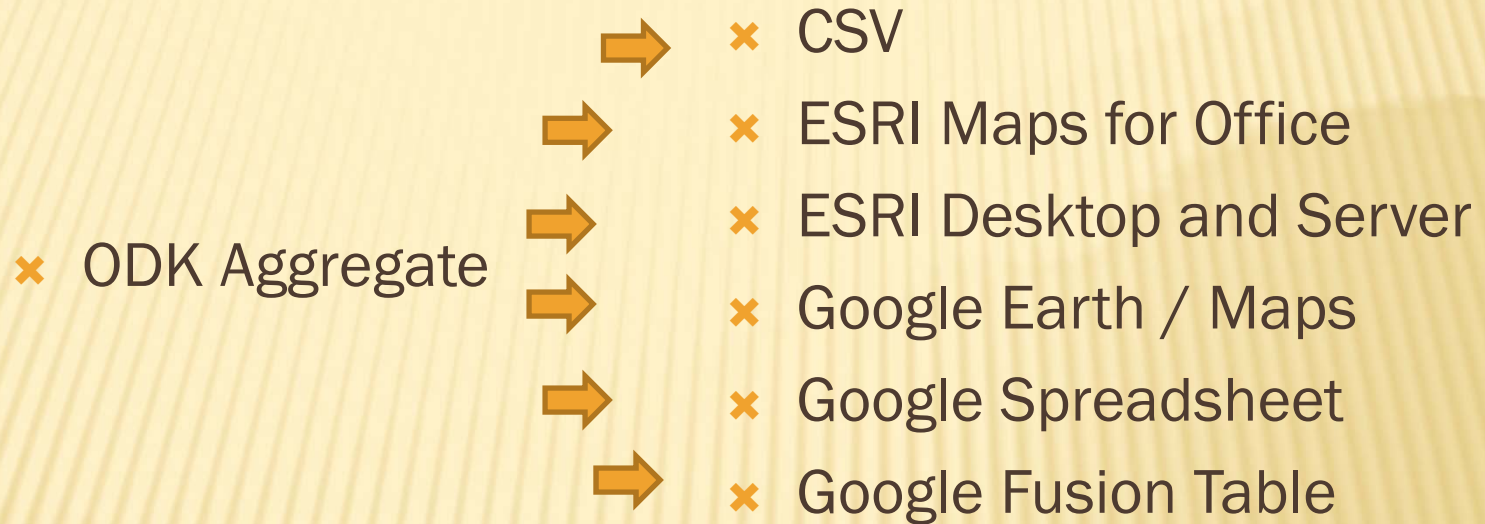
File Type	Status	Time Completed	Download File	Delete
CSV file	Dataset Available	Mon Nov 05 10:57:26 GMT-500 2012	CatchBasin_results.csv	Delete
KML file	Dataset Available	Sun Nov 04 21:59:45 GMT-500 2012	CatchBasin_results.kml	Delete

Mobile Meets the Cloud: An Exploration of the Open Data Kit

How can the information used ?

JUST BEYOND ODK

DATA AND VISUALIZATION OUTSIDE THE ODK



JUST BEYOND ODK

JUST BEYOND ODK

CSV file

CatchBasin_results (1) - Microsoft Excel

File

Home

Insert

Page Layout

Formulas

Data

Review

View

Developer

Team

Clipboard

Font

Alignment

Number

Styles

Cells

Editing

D2

CB-100

	A	B	C	D	E	F	G	H	I	J	K
1	deviceid	start end	CatchBasinId	GpsLocation:Latitude	GpsLocation:Longitude	GpsLocation:Altitude	GpsLocation:Accuracy	NeedService	Photo	Remarks	
2	99000083183248	null	CB-100	42.156543	-70.96112	68.8	3.51	Yes	https://mdeskmobile.appspot.com/view/	Sunken	
3	99000083183248	null	CB-101	42.15691	-70.959106	62.6	2.25	No	https://mdeskmobile.appspot.com/view/	null	
4	99000083183248	null	CB-102	42.157366	-70.959158	63.1	2.425	No	https://mdeskmobile.appspot.com/view/	null	
5	99000083183248	null	CB-103	42.15893	-70.95666	39.7	2.2	Yes	https://mdeskmobile.appspot.com/view/	Clogged	
6	99000083183248	null	CB-104	42.159096	-70.956606	43.1	2.325	Yes	https://mdeskmobile.appspot.com/view/	null	
7	99000083183248	null	CB-105	42.159251	-70.95747	49.2	2.025	No	https://mdeskmobile.appspot.com/view/	null	
8	99000083183248	null	CB-106	42.164756	-70.95513	51.3	2.05	No	https://mdeskmobile.appspot.com/view/	null	
9	99000083183248	null	CB-107	42.164793	-70.954943	50.7	2.225	No	https://mdeskmobile.appspot.com/view/	null	
10	99000083183248	null	CB-108	42.165401	-70.945106	59.3	2.25	No	https://mdeskmobile.appspot.com/view/	null	
11	99000083183248	null	CB-109	42.164711	-70.942428	59.5	2.225	Yes	https://mdeskmobile.appspot.com/view/	Clogged	
12	99000083183248	null	CB-110	42.164435	-70.941988	59.9	2.225	Yes	https://mdeskmobile.appspot.com/view/	Clogged	
13	99000083183248	null	CB-111	42.1626	-70.940311	56.5	2.25	Yes	https://mdeskmobile.appspot.com/view/	Clogged	
14	99000083183248	null	CB-112	42.16193	-70.940075	57.6	2.25	Yes	https://mdeskmobile.appspot.com/view/	Clogged	
15	99000083183248	null	CB-113	42.161311	-70.939996	56.6	2.25	Yes	https://mdeskmobile.appspot.com/view/	Clogged	
16	99000083183248	null	CB-114	42.160415	-70.940093	59.5	2.4	No	https://mdeskmobile.appspot.com/view/	null	
17	99000083183248	null	CB-115	42.159985	-70.940181	60.3	2.3	Yes	https://mdeskmobile.appspot.com/view/	Clogged	
18	99000083183248	null	CB-116	42.159191	-70.940583	58.1	2.275	No	https://mdeskmobile.appspot.com/view/	null	
19	99000083183248	null	CB-117	42.158921	-70.940733	56.1	2.275	No	https://mdeskmobile.appspot.com/view/	null	
20	99000083183248	null	CB-118	42.156645	-70.940435	54.5	2.275	No	https://mdeskmobile.appspot.com/view/	null	
21	99000083183248	null	CB-119	42.156331	-70.940181	54.7	2.325	No	https://mdeskmobile.appspot.com/view/	null	
22	99000083183248	null	CB-120	42.158485	-70.942745	52.3	2.325	No	https://mdeskmobile.appspot.com/view/	null	
23	99000083183248	null	CB-121	42.158451	-70.942636	52.3	2.3	No	https://mdeskmobile.appspot.com/view/	null	
24	99000083183248	null	CB-122	42.157346	-70.943928	51.3	2.3	No	https://mdeskmobile.appspot.com/view/	null	
25	99000083183248	null	CB-123	42.157273	-70.943906	50.3	2.3	No	https://mdeskmobile.appspot.com/view/	null	
26	99000083183248	null	CB-124	42.157048	-70.944748	52.2	2.3	No	https://mdeskmobile.appspot.com/view/	null	
27	99000083183248	null	CB-125	42.156978	-70.944718	51.4	2.3	No	https://mdeskmobile.appspot.com/view/	null	
28	99000083183248	null	CB-126	42.156746	-70.945676	51.4	2.35	No	https://mdeskmobile.appspot.com/view/	null	
29	99000083183248	null	CB-127	42.15668	-70.945595	50.7	2.35	No	https://mdeskmobile.appspot.com/view/	null	
30	99000083183248	null	CB-128	42.15654	-70.946315	51	2.3	No	https://mdeskmobile.appspot.com/view/	null	
31	99000083183248	null	CB-129	42.156461	-70.94628	50.9	2.325	No	https://mdeskmobile.appspot.com/view/	null	

CatchBasin_results (1)

Ready

80%

JUST BEYOND ODK

ESRI Maps for Office

The screenshot displays a Microsoft Excel spreadsheet titled 'CatchBasin_results.xlsx' with a table of catch basin data. The table includes columns for CatchBasinId, GpsLocation, GpsLocationLatitude, GpsLocationLongitude, GpsLocationAltitude, GpsLocationAccuracy, NeedService, Photo, and Remarks. A pop-up window for 'CB-115' shows its specific details, including a photo of a clogged catch basin. The ESRI Maps application is overlaid on the spreadsheet, showing a map of the area with a red pin indicating the location of CB-115. The map includes a legend, a search bar, and a list of map contents.

CatchBasinId	GpsLocation	GpsLocationLatitude	GpsLocationLongitude	GpsLocationAltitude	GpsLocationAccuracy	NeedService	Photo	Remarks
CB-100	42.15654	-70.9611	68.8	3.51	Yes	https://m	Sunken	
CB-101	42.15691	-70.9591	62.6	2.25	No	https://m	null	
CB-102	42.15737	-70.9592	63.1	2.425	No	https://m	null	
CB-103	42.15893	-70.9567	39.7	2.2	Yes	https://m	Clogged	
CB-104	42.1591	-70.9566	43.1	2.325	Yes	https://m	null	
CB-105	42.15925	-70.9575	49.2	2.025	No	https://m	null	
CB-106	42.16476	-70.9551	51.3	2.05	No	https://m	null	
CB-107	42.16479	-70.9549	50.7	2.225	No	https://m	null	
CB-108	42.1654	-70.9451	59.3	2.25	No	https://m	null	
CB-109	42.16471	-70.9424	59.5	2.225	Yes	https://m	Clogged	
CB-110	42.16444	-70.942	59.9	2.225	Yes	https://m	Clogged	
CB-111	42.1626	-70.9403	56.5	2.25	Yes	https://m	Clogged	
CB-112	42.16193	-70.9401	57.6	2.25	Yes	https://m	Clogged	
CB-113	42.16131	-70.94	56.6	2.25	Yes	https://m	Clogged	
CB-114	42.16042	-70.9401	59.5	2.4	No	https://m	null	
CB-115	42.15999	-70.9402	60.3	2.3	Yes	https://m	Clogged	
CB-116	42.15919	-70.9406	58.1	2.275	No	https://m	null	
CB-117	42.15892	-70.9407	56.1	2.275	No	https://m	null	
CB-118	42.15665	-70.9404	54.5	2.275	No	https://m	null	

Map 1

CB-115
1 of 1

CatchBasinId CB-115
GpsLocation:Latitude 42.15999
GpsLocation:Longitude -70.9402
GpsLocation:Altitude 60.3
GpsLocation:Accuracy 2.3
NeedService Yes
Photo https://mdesktopmobile.appspot.co...
Remarks Clogged

Map Contents Search

Excel Layer

Not Grouped

No

Yes

Topographic

binaryData (3264x2448)

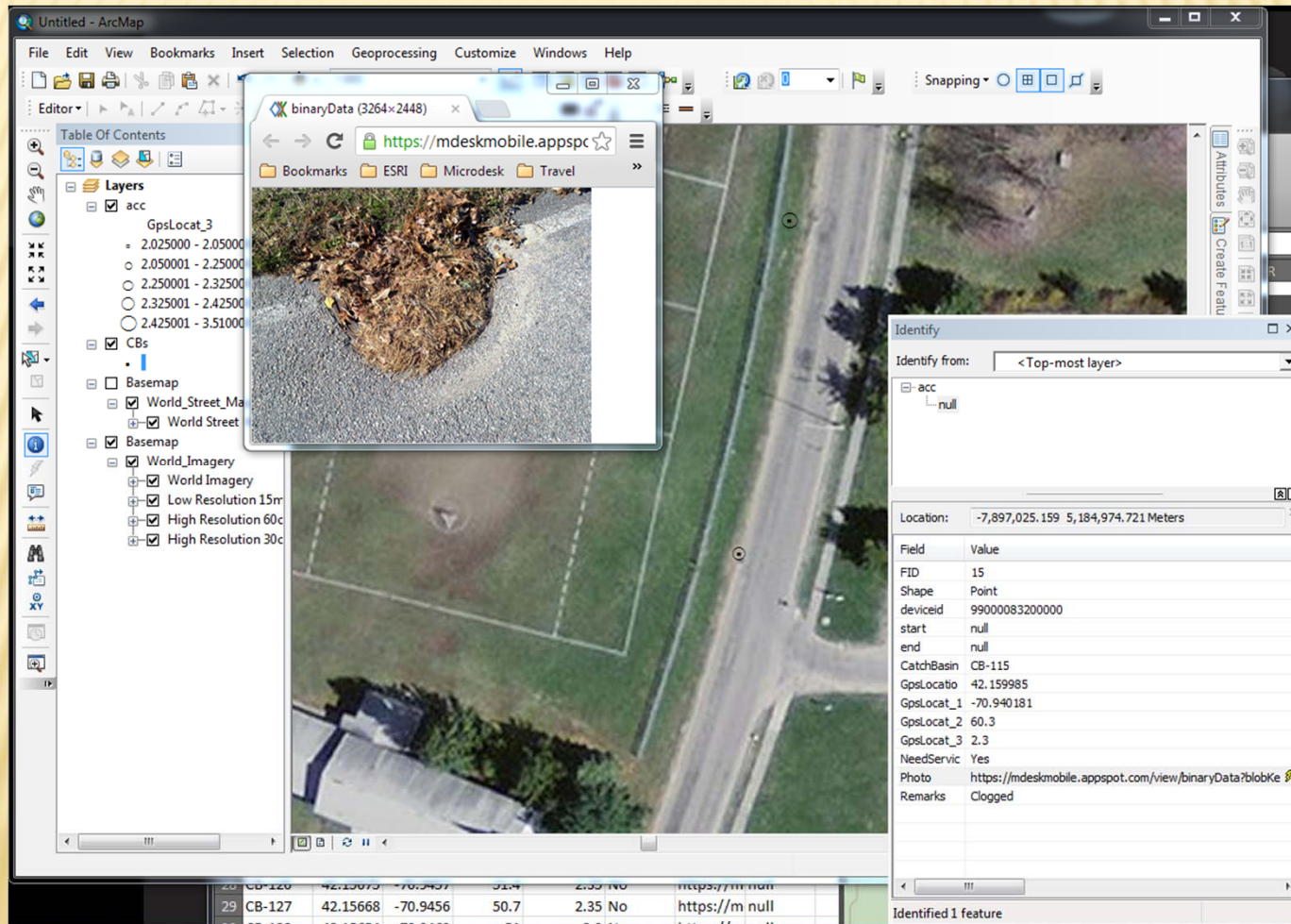
https://mdesktopmobile.appspot.co

Bookmarks ESRI Microdesk Travel

Photo of a clogged catch basin

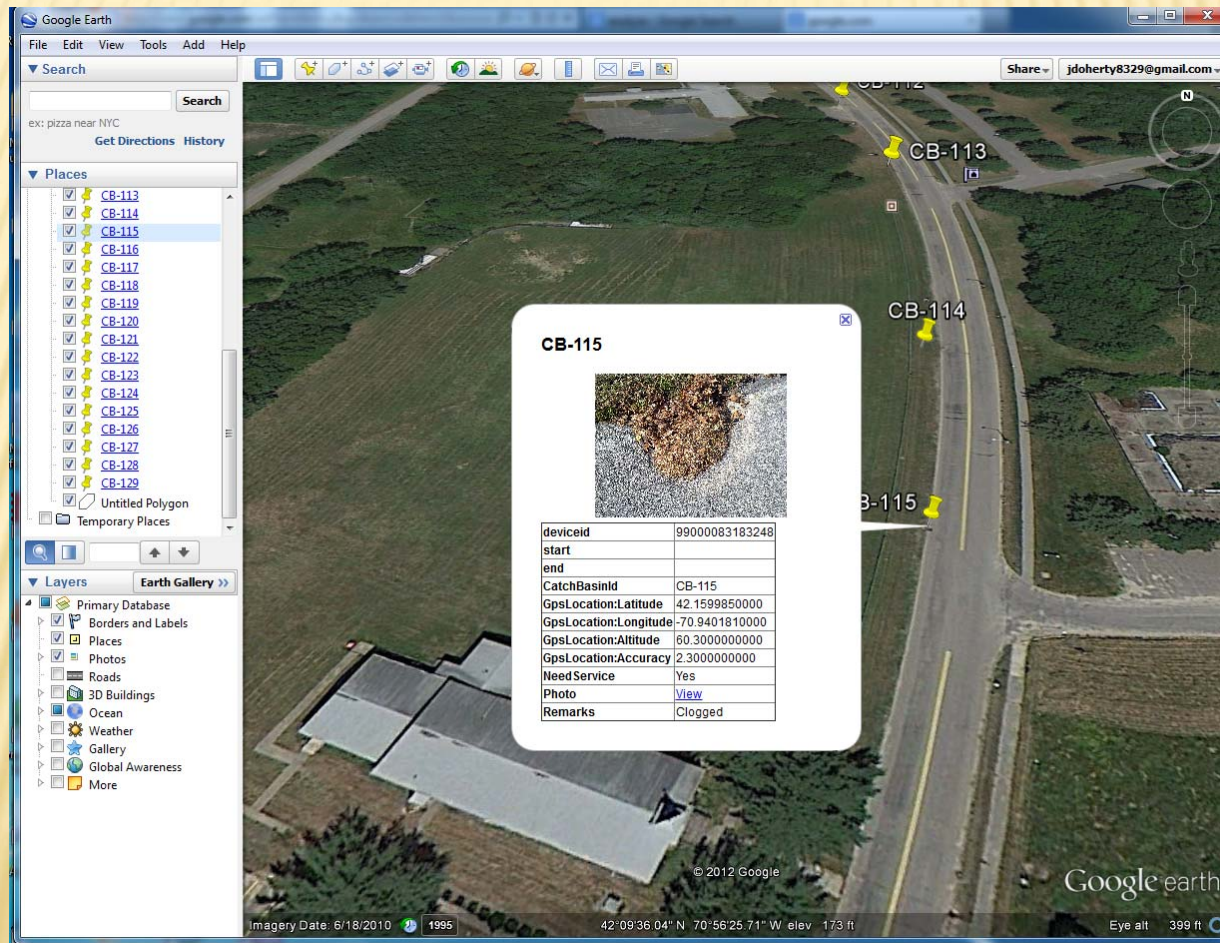
JUST BEYOND ODK

ESRI ArcMAP



JUST BEYOND ODK

Google Earth



JUST BEYOND ODK

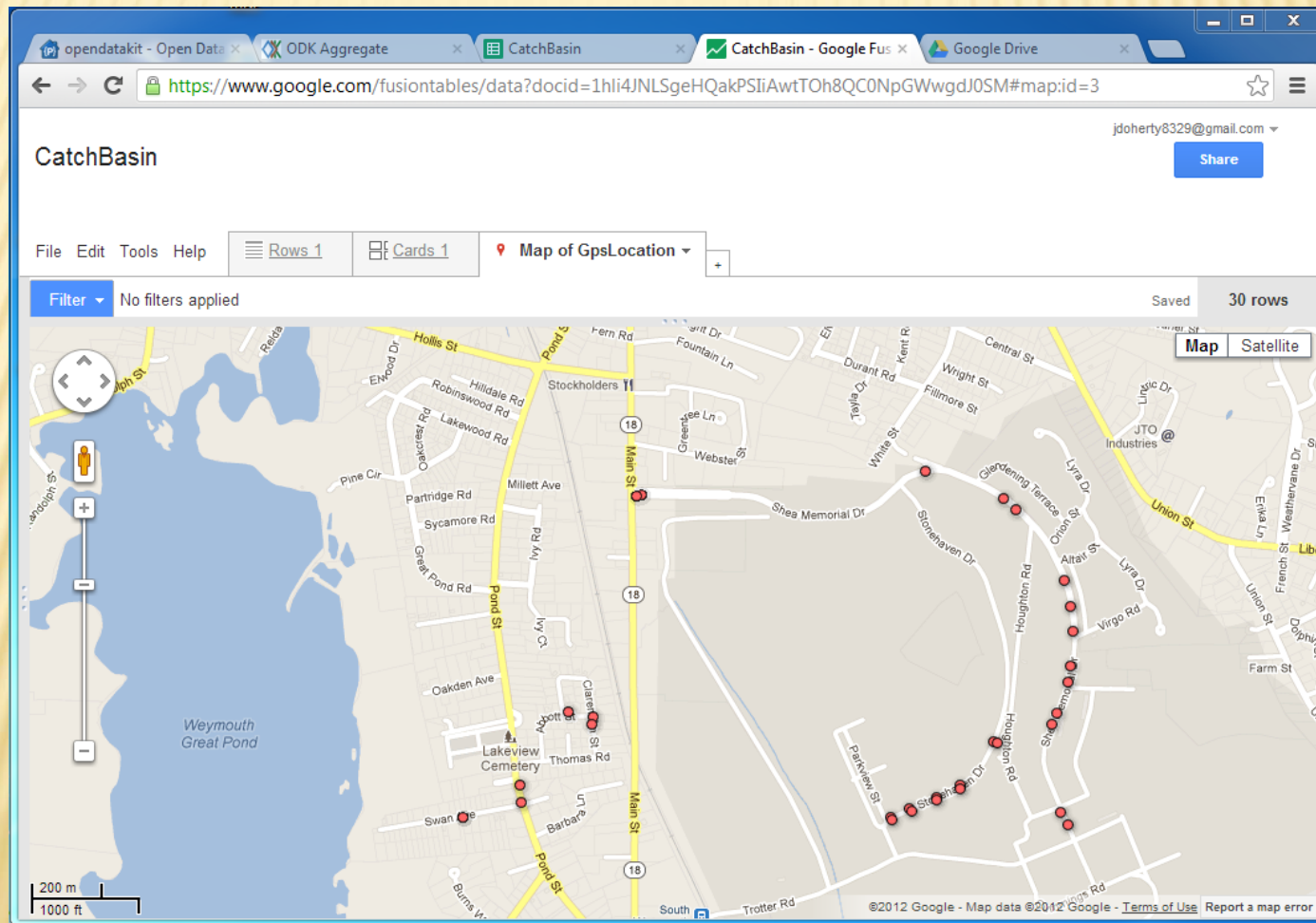
Google Spreadsheet

The screenshot shows a Google Spreadsheet titled "CatchBasin" with the following data:

	J	K	L	M	N	O	P	Q
2	CB-100	42.156543	-70.96112	68.8	3.51	Yes	https://mdeskmobile.blobKey=CatchBasin47af-48cc-beac-09ff7b03fb60%5D%2	Sunken
3	CB-101	42.15691	-70.959106	62.6	2.25	No	https://mdeskmobile.blobKey=CatchBasina513-4775-a234-73a865fa6271%5D%2	
4	CB-102	42.157366	-70.959158	63.1	2.425	No	https://mdeskmobile.blobKey=CatchBasin9327-4a3c-8c83-eb855a934f8b%5D%2	
5	CB-103	42.15893	-70.95666	39.7	2.2	Yes	https://mdeskmobile.blobKey=CatchBasin0e99-43df-a44a-fc315fb3e035%5D%2	Clogged
6	CB-104	42.159096	-70.956606	43.1	2.325	Yes	https://mdeskmobile.blobKey=CatchBasin4dc4-4764-b3e7-9b197bc6c607%5D%2	
7	CB-105	42.159251	-70.95747	49.2	2.025	No	https://mdeskmobile.blobKey=CatchBasin8859-48c3-bd93-377cd9cee818%5D%2	
8							https://mdeskmobile.blobKey=CatchBasin2c6b-459a-8187-	

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Google Fusion Table



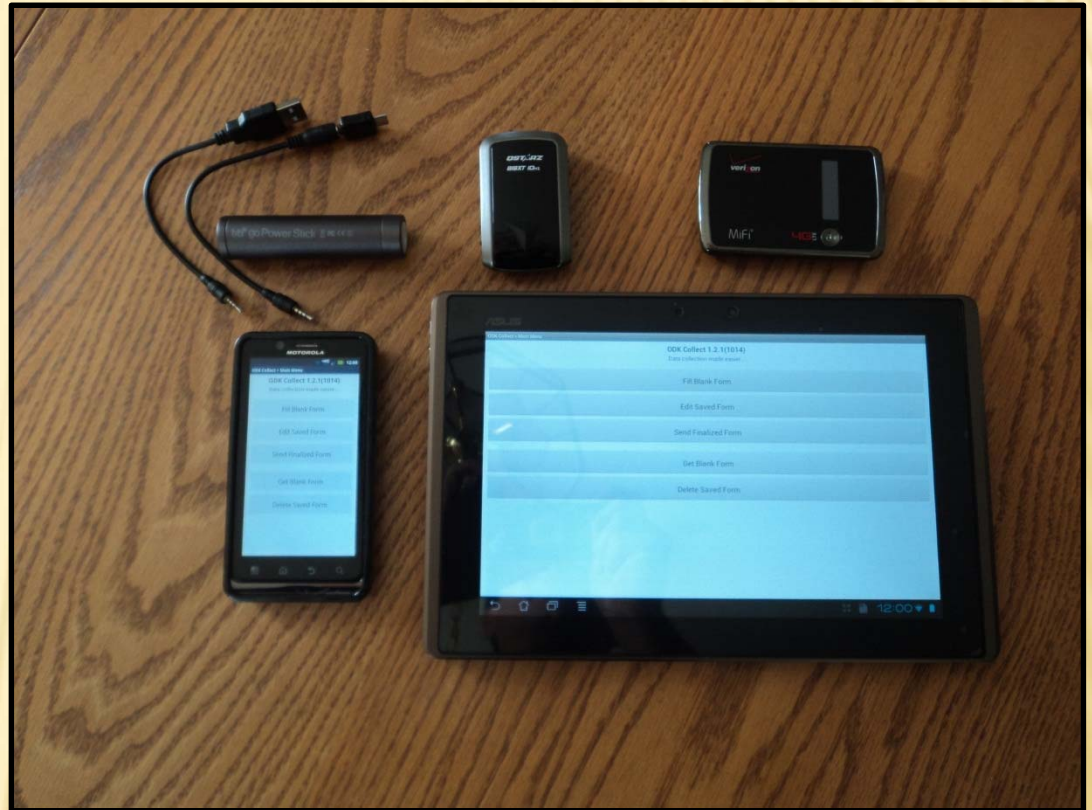
Mobile Meets the Cloud: An Exploration of the Open Data Kit

You may find this helpful

PRACTICAL INSIGHTS

MY GADGETS

- ✗ Asus Transformer Tablet TF101
 - + Android 4.0.3 (Ice Cream Sandwich)
 - + ODK Collect 1.2.1(1014)
 - + Bluetooth GPS 1.1.1
 - + Barcode Scanner 4.3.1
- ✗ Motorola Droid Bionic Smartphone
 - + Android 2.3.4 (Gingerbread)
 - + Android 4.0.4 (Ice Cream Sandwich)
 - + ODK Collect 1.2.1(1014)
 - + Bluetooth GPS 1.1.1
 - + Barcode Scanner 4.3.1
- ✗ Verizon MiFi 4GLTE
- ✗ QSTARZ 818XT Bluetooth GPS
- ✗ Bti goPower Stick



PRACTICAL INSIGHTS

PRACTICAL INSIGHTS

GPS Accuracy

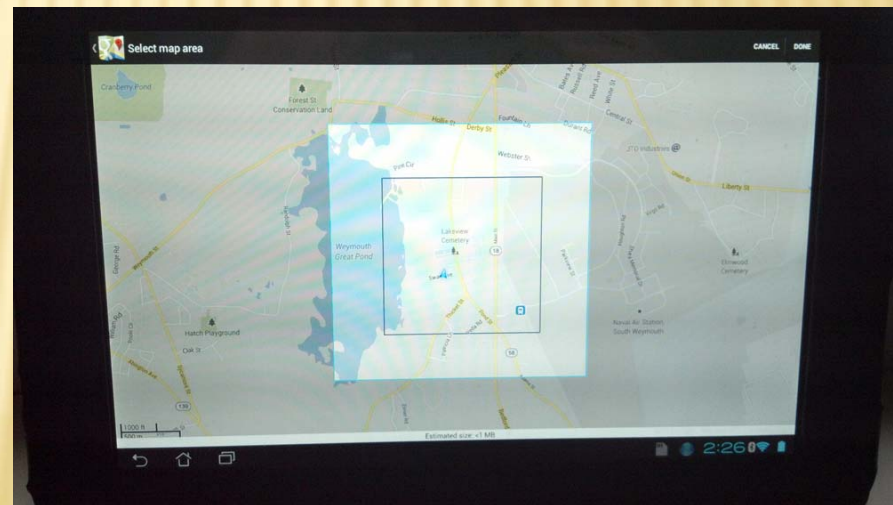
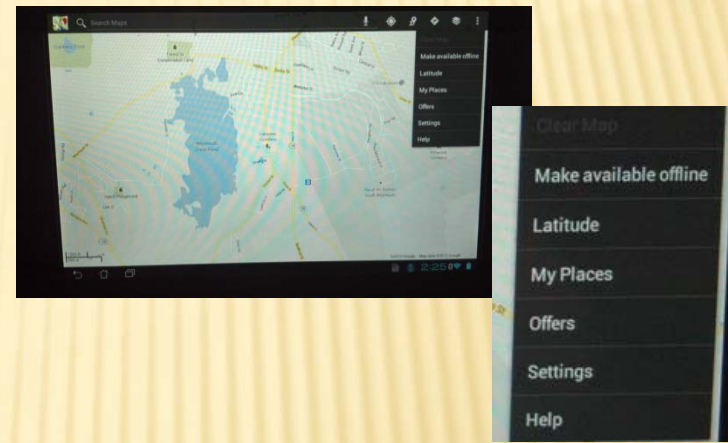
- + Varies among smartphones and tablets
- + Can be improved via more accurate Bluetooth GPS Receivers
- + Use Bluetooth GPS 1.1.1
- + Check “Enable Mock GPS Provider”



PRACTICAL INSIGHTS

Plan ahead ...

Use Offline Maps with
Google Maps



Mobile Meets the Cloud: An Exploration of the Open Data Kit

Open Data Kit

QUESTIONS / DISCUSSION

WEB SITES

- ✕ <http://opendatakit.org>
- ✕ <http://google.org>
- ✕ <http://code.google.com/p/opendatakit/>
- ✕ <http://www.w3.org/>
- ✕ <https://bitbucket.org/javarosa/javarosa/wiki/Home>
- ✕ <http://openrosa.org/>
- ✕ <http://appengine.google.com>

PAPERS

Carl Hartung, Yaw Anokwa, Waylon Brunette, Adam Lerer, Clint Tseng, Gaetano Borriello, **Open Data Kit: Tools to Build Information Services for Developing Regions**
2010 International Conference on Information and Communication Technologies and Development

Yaw Anokwa, Carl Hartung, Waylon Brunette, Jeff Beorse, Gaetano Borriello, **Dynamic Data Collection for Participatory Science in Open Data Kit**
2011 ACM CHI Conference on Human Factors in Computing Systems

Yaw Anokwa, Carl Hartung, Waylon Brunette, Adam Lerer, Gaetano Borriello, **Open Source Data Collection in the Developing World**
IEEE Computer. October 2009

REFERENCES

LINKS

- ✕ <http://www.desotoks.us/PDF%20Files/SewerPlan/Appendix%20A.PDF>
- ✕ http://www.huffingtonpost.com/2012/09/18/android-market-share-q3-2012_n_1893292.html
- ✕ <http://www.njstormwater.org/highway/pdf/HA%20Illicit%20Connection%20Inspection%20Report%20Form.pdf>
- ✕ <http://bryanmcbride.com/fun-with-the-open-data-kit>
- ✕ <http://emilykumpel.com/2011/02/13/135/>
- ✕ <http://code.google.com/p/opendatakit/wiki/XFormLogicExplained>
- ✕ <http://www.sigmacoding.com/jeff/publications/gps-capabilities-itsc2012.pdf>
- ✕ http://anokwa.com/publications/2009_Computer_ODK_Paper.pdf

IMAGES

- ✕ <http://opendatakit.org/wp-content/themes/odksite2/images/logo.png>
- ✕ http://africacenter.org/wp-content/uploads/2012/05/n_uganda.jpg
- ✕ <http://www.cyto.purdue.edu/cdroms/gh/HTML/program/media/IUKampath.jpg>
- ✕ http://www.computerworld.com/common/images/site/features/2012/05/mobile_phone_market_share_338.png
- ✕ <http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2012/02/InfrastructureMalawi.png>
- ✕ <http://1.bp.blogspot.com/-M64WOgBjXIY/UH79dbFDz5I/AAAAAABCIw/NPF5VuUXRR8/s200/Document+Code+XML.jpg>
- ✕ <http://media.nj.com/the-times/photo/2012/10/11782415-large.jpg>
- ✕ <http://www.ack.net/images/HurricaneSandy1479.jpg>
- ✕ http://www.waterworld.com/content/dam/etc/medialib/new-lib/waterworld/print-articles/volume-28/issue-3/91013.res/_jcr_content/renditions/pennwell.web.300.200.jpg

REFERENCES