Wifi Info

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An Introduction to Survey123 for ArcGIS

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Brandon Armstrong
Agenda

• Introductions
• Getting Started using the Survey123 website & mobile app
• Lunch
• Creating advanced forms using XLSForm & Survey123 Connect
• Setting up field collection workflows
Forms
a printed or typed document with blank spaces for insertion of required information

Many Industries
- Forestry
- Public Safety
- Government
- Utilities
- Transportation
- Health
- Emergency Management

Many Needs
- Incident Reports
- Inspections
- Damage Assessments
- Asset Inventories
- Interviews
Smart Forms for ArcGIS
Easily convert paper forms into Digital Smart ArcGIS Forms
Meeting NPDES Requirements with Survey123 for ArcGIS

Atecsadero Mutual Water Company (AMWC) is located in San Luis Obispo County, California. It was incorporated on August 12, 1993, and is the oldest continuously operating company in Atascadero. AMWC serves the entire City of Atascadero and properties in adjacent unincorporated areas. It is one of the largest mutual water companies in the state and is responsible for supplying water to more than 30,000 people for domestic and fire suppression purposes. AMWC's water system comprises approximately 250 miles of pipeline, 9 storage tanks, 17 active wells, and around 10,500 service connections.

The Challenge
The National Pollutant Discharge Elimination System (NPDES) permit program is authorized by the Clean Water Act (CWA) to control water pollution by regulating sources that discharge pollutants into the waters of the United States. Beginning in 2006, the California State Water Resources Control Board required all water systems that were not covered by a municipal separate storm sewer system (MS4) permit to apply for a newly implemented, statewide NPDES permit for drinking water system discharges. To comply with the NPDES permit requirements, AMWC needed an efficient way to collect information about each discharge.
Mobilizing Inspections Saves $40,000

Source: Field Technologies Magazine

By Brian Albright, Field Technologies

A new mobile application has reduced inspection reporting processing from 30 minutes down to 5 for a municipal utility.

San Francisco is a big, complex city that is getting bigger by the day — a challenging prospect for public utility agencies that have to juggle new construction projects and maintenance of aging infrastructure. The San Francisco Public Utilities Commission (SFPUC) is the third-largest municipal utility in the state and provides retail drinking water and wastewater services to San Francisco, wholesale water to three Bay Area counties, and green hydroelectric and solar power to San Francisco’s municipal departments, and now with CleanPowerSF, cleaner energy to residents and businesses in San Francisco.

The SFPUC’s Wastewater Enterprise (WWE) operates and maintains the city’s 1,000-mile-long combined sewer system and 17 pump stations that collect sewage from homes and businesses and stormwater in the same network of pipes, moving the wastewater to the three treatment plants for treatment and discharge to San Francisco Bay and the Pacific Ocean. With the city’s steeply pitched streets and proximity to the ocean, maintaining the combined sewer system is critical, particularly during heavy rains.

When there is new sewer construction, inspectors from the SFPUC’s Collection System Division are responsible for inspecting and documenting exactly what is underground and how it was built.

Field inspectors previously documented these sewer inspections using handwritten notes and digital cameras, and by redlining journal notes onto a digital map created by using Esri’s ArcGIS platform and a Latitude Geographies GeoCortex Essentials viewer. The digital photos had to be uploaded to the SFPUC’s network, and then all of the documents were printed and assembled for a report that had to be scanned for digital storing. The process took up to 30 minutes for each inspection.
Why Smart Forms in ArcGIS?

- **Reduce Errors**
  - During Data Capture
  - Transcribing data from paper to digital
- **Boost Field Data Capture productivity**
  - Precompute responses
  - Associate photos with alphanumeric data
- **Data: From the field to the office in Real Time**
- **All data captured is georeferenced**
1- Ask Questions  
(Design & Publish)

2- Get Answers  
(Capture Data)

3- Make Decisions  
(View & Analyze)
1) Author a survey
2) Capture data on the web and the Survey123 field app
3) Interpret results
1- Ask Questions  
(Design & Publish)

2- Get Answers  
(Capture Data)

3- Make Decisions  
(View & Analyze)
1- Ask Questions (Tools for authoring your surveys)

- **Survey123 Web Designer:**
  - Build smart forms graphically right from your web browser
  - Very easy to get started.
  - Ideal for simple forms

- **Survey123 Connect:**
  - A downloadable desktop tool. Works in combination with Microsoft Excel.
  - Requires learning and familiarity with XLSForms specification
  - Complete smart form capabilities
1- Ask Questions (Publishing and Sharing)

• **Publishing**
  - Survey123 Smart Forms are published into ArcGIS
    - Forms are a new type of item
    - Feature layers (new or existing) store captured data
  - ArcGIS Online and ArcGIS Enterprise support

• **Sharing**
  - Survey123 leverages the ArcGIS security model: Named Users and Groups
  - You can define distinct security rules to:
    - Field Users: Submit data to your survey
    - Stakeholders: View the results of your survey
1- Ask Questions (Considerations for survey authors)

- **What data must be captured?**
  - Decide what questions will be included in your survey instrument

- **User Input Validation rules**
  - Add data constraints, calculations and smart defaults

- **Optimized user experience**
  - Decide what user input controls to use (Question Types and Appearances)
  - Logically organize your survey (Groups, Relevancy rules)
  - Web and/or Native

- **Branding**
  - Style questions and survey
1- Ask Questions
(Design & Publish)

2- Get Answers
(Capture Data)

3- Make Decisions
(View & Analyze)
2- Get Answers

• **Survey123 WebForms**
  • Capture data from a web browser. Can be embedded within a web site.
  • Nothing to install.
  • Online only. Add new data only.

• **Survey123 Field App**
  • Available for download (Google Play, iOS, Windows, Mac)
  • Leverage device sensors (external GPS, camera etc)
  • Can work Online and Offline
  • Can add new data and update existing features.
1- Ask Questions
   (Design & Publish)

2- Get Answers
   (Capture Data)

3- Make Decisions
   (View & Analyze)
3- Make Decisions

• Ready to use Reporting tools
  • Understand data submission patterns
  • Create detailed survey reports
  • Aggregate survey data
  • Selectively download data
3- Make Decisions

• **Real-Time data collection**
  - Survey123 submitted data is immediately available for visualization and analysis
  - All data stored in ArcGIS Feature Services

• **Multiple Uses of data**
Introduction to Web Designer
Creating Surveys

- **Survey123 Web Designer**
  - Built within the Survey123 website
  - Interactive WYSIWYG user experience

- **Survey123 Connect**
  - XLSForms based
  - Uses spreadsheet editor

- **Video**: Product overview
Create New Survey in Web Designer
Survey123 Web Designer

- Preview in left display, set parameters in right panel
Configuration Tabs

- **Add questions**
  - 17 different types supported
  - Drag and drop onto survey
  - Easily re-order them
- **Edit/configure questions**
  - WYSIWYG user experience
- **Set a theme**
- **Settings**
Supported Question Types

- Date and time
- Number
- Likert
- Singleline text
- Multiline text
- Single choice
- Multiple choice
- Dropdown

- Rating
- GeoPoint
- Image
- Email
- Website

- More coming in future releases …
Set Relevance

- Option to Set Rule on a question
  - Single choice and Dropdown only
Survey123 Web Designer

- Preview survey as it is created
Configuration Tabs

• Add questions
• Edit/configure questions
• Set a theme
  - Define the background style for the survey
• Settings
Configuration Tabs

- Add questions
- Edit/configure questions
- Set a theme
- **Settings**
  - Set the message after survey is submitted
  - Option to enable submitting another survey
Preview Survey

• Option to preview how the survey appears in several form factors
Exercise

- Sign into Survey123 website (your own ArcGIS Organization)
- Create a new survey on your own
  - Keep it simple
  - Try to add at least 1 choice question and set rules for it
- Preview Survey and simulate capturing data with it
- Challenge: Enhance the survey with additional questions
Survey123 for ArcGIS Bootcamp

Sharing Surveys
About Sharing

- By default, a new survey is private and only visible to the owner
- A survey must be shared before others can use it
- Only share your survey when it’s ready to be used

Making changes to surveys once they have been shared may involve data-loss.
Private vs Public

• **Private Surveys**
  - Shared with a well-known group of users (secured access).
  - Requires use of one ArcGIS accounts per every field user.
  - Enables Editor Tracking capabilities.
  - Ideal for sensitive data or when you want to understand who is doing what.

• **Public Surveys**
  - Shared with everyone.
  - No need for ArcGIS accounts. Anyone can submit data.
  - Ideal for crowd-sourcing and citizen science initiatives.
Roles

• Submit Role
  • Sharing for the submit role controls who can submit data to your survey.

• Analyze Role
  • Defines who can access the results of your survey.
Sharing Surveys (Submit)

- You can share surveys on the Survey123 website > Collaborate page

Can control how they access and open the survey to submit data
Sharing Survey Results (Analyze)

• Survey results can be shared with other ArcGIS organization members
  - E.g., read only view of the data
• Enabled by hosted feature layer views
  - Coming in ArcGIS Enterprise 10.6
• Survey results link
Surveys – Behind the Scenes

• FYI: surveys are stored in a portal (ArcGIS Online/Portal for ArcGIS) in the Content page

• Each survey is a folder that contains:
  - Form item
  - Hosted feature layer

• As you change the sharing of your Survey from the surey123 website, the sharing properties of these items change.
Exercise

- Explore the sharing properties with your survey
- If you can, share with another group
  - Login to the ArcGIS Online organization with another login to verify you can see the survey
- Share your survey with everyone to make it public
- Partner with someone and complete each other’s surveys
Exercise
Create & share a survey!
Survey123 for ArcGIS Bootcamp

Capturing data with Survey123 forms
Collecting Data with the Survey

- After publishing your survey, respondents can complete via
  1. WebForm in a web browser
  2. Survey123 Field App

- As the survey author, you determine how it can be accessed
  - Survey123 website > Collaborate page

Survey link:

https://survey123.arcgis.com/share/ca4ed5987799421ca206b67c1652fee5

- Open the survey in browser directly
- Ask the user how to open the survey, in browser or in the Survey123 field app
- Open the survey in the Survey123 field app directly. (Learn more about this option)
Completing the Survey on the Web

- WebForm appears in web browser
Survey123 for ArcGIS Field App

- Form-Centric data capture app
- Available on Smartphones and Tablets
  - iOS, Android, and Windows 10
- Also available on desktops
  - Windows 7, 8, 10; OS X, and Ubuntu Linux

Workflow
- Login & download survey
- Capture data using smart forms (connected or disconnected)
- Submit data when online
## Collecting Data: WebForm vs. Field App

<table>
<thead>
<tr>
<th>WebForm</th>
<th>Field App</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runs in your web browser (desktop/mobile)</td>
<td>Runs natively on desktop or mobile device (desktop/mobile)</td>
</tr>
<tr>
<td>IE, FireFox, Chrome, and Safari</td>
<td>iOS, Android, Windows, Mac, and Ubuntu</td>
</tr>
<tr>
<td>Online only</td>
<td>Online/offline</td>
</tr>
<tr>
<td>Add data only</td>
<td>Add data and update data</td>
</tr>
<tr>
<td>Limited smart form capabilities</td>
<td>Complete smart form capabilities (e.g., barcode, signatures, draw...)</td>
</tr>
</tbody>
</table>
Exercise
Go out into the field and collect survey data
Survey123 for ArcGIS Bootcamp

Reports in Survey123
Looking at your Survey Results

- Survey123 website includes many built-in reporting capabilities
- Enables you to examine your survey data
- Potentially observe trends and patterns about
  - The survey collection process
  - The collected survey data
- All data results can be filtered by date and date ranges
- Helps in better decision making
Survey123 website – Overview tab

- High level overview of your survey results
Survey123 website – Analysis tab

- More detailed view of the survey data
- Each survey question’s results are shown
- You can omit/re-add survey questions as desired

- Numeric questions will be displayed graphically
  - Can also render on a map
  - You control the appearance
- Text questions will appear as word clouds
  - If more than 50 responses

- Results can be printed as a report
Survey123 website – Data tab

- View the actual survey data
  - Spatial distribution and every submitted survey
  - Option to export the data
  - Open in the Map Viewer

- Print specific surveys submitted
Demo
Learn More

• YouTube Survey123 Video-Tutorial
• Understanding Survey results Blog Post
• Leveraging custom report templates
Survey123 for ArcGIS Bootcamp

Creating Custom Reports
Custom Reports

- Accessible through the Data tab’s individual response views
Creating a Template

- Template files are MS Word .docx files
- Managed through Survey123 website; stored as items in your ArcGIS Content
- Download a sample template (like a basic pop-up) to get started
Demo
Survey123 for ArcGIS Bootcamp

Using Survey123 data in your own Web Mapping applications
Survey123 is part of the ArcGIS Platform

• Collected survey data works with the rest of the ArcGIS Platform
• Survey data is a feature service, can be leveraged like any other feature service
  - Use survey data directly
  - Add to a web map
• Survey data can be used by other ArcGIS apps
Leverage Survey data in ArcGIS Apps
Exercise

- Sign into Survey123 website > Data tab
- Open your survey data in the Map Viewer
- Symbolize your data
  - E.g.: smart mapping, enable pop-ups
- Save web map
- Share web map > Create a web app
  - Configurable application template or Web AppBuilder for ArcGIS
Survey123 for ArcGIS Bootcamp

Introduction to XLSForms
About XLSForms

• XLSForm is a standard created to help simplify the authoring of forms in Excel
• Many different form-centric tools use XLSForm, including Survey123
• XLSForm’s is described at http://xlsform.org/

• Notes:
  • Not all (but most) XLSForms features are implemented in Survey123
  • Survey123 extends XLSForms with features that are not implemented in other tools
  • Your reference to using XLSForms in Survey123 is our Survey123 help
XLSForm looks something like this:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>name</td>
<td>label</td>
<td>appearance</td>
</tr>
<tr>
<td>begin group</td>
<td>GroupViolation</td>
<td>&lt;center&gt;Violation Details&lt;/center&gt;</td>
<td></td>
</tr>
<tr>
<td>dateTime</td>
<td>ReportDateTime</td>
<td>Date &amp; Time Observed: now()</td>
<td></td>
</tr>
<tr>
<td>select_multiple violationTypes</td>
<td>ViolationType</td>
<td>Type of Violation</td>
<td></td>
</tr>
<tr>
<td>text</td>
<td>ViolationType_Other</td>
<td>Other Violation Description</td>
<td>multiline</td>
</tr>
<tr>
<td>text</td>
<td>ReportNotes</td>
<td>Notes:</td>
<td></td>
</tr>
<tr>
<td>image</td>
<td>ViolationPhoto</td>
<td>Photo</td>
<td></td>
</tr>
<tr>
<td>geopoint</td>
<td>ViolationLocation</td>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>end group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>begin group</td>
<td>GroupViolator</td>
<td>&lt;center&gt;Offender Details&lt;/center&gt;</td>
<td></td>
</tr>
<tr>
<td>select_one responsiblePartyType</td>
<td>ResponsibleParty</td>
<td>Type</td>
<td>minimal</td>
</tr>
<tr>
<td>text</td>
<td>OffenderName</td>
<td>Offender’s name</td>
<td></td>
</tr>
<tr>
<td>select_one yes_no</td>
<td>OffenderPresent</td>
<td>is Offender or Representative Present at Time of Report</td>
<td>horizontal</td>
</tr>
<tr>
<td>image</td>
<td>Signature</td>
<td>Signature</td>
<td>signature</td>
</tr>
<tr>
<td>end group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>note</td>
<td>Note</td>
<td>&lt;center&gt;&lt;a href=&quot;tel:9093624397&quot;&gt;Call Water Department at 909-362-4397&lt;/a&gt;&lt;/center&gt;</td>
<td></td>
</tr>
</tbody>
</table>
About Survey123 Connect for ArcGIS

- A desktop tool that will help you author XLSForms and publish them into ArcGIS
- Available for Windows, Mac and Ubuntu Linux
Downloading Survey123 Connect

1) Log into https://survey123.arcgis.com

2) Click on Create a New Survey

3) Select Survey123 Connect and Download
How does Connect work?

Define your form in Excel using XLSForms syntax

Preview your XLSForm in Connect when happy… publish
XLSForms Essentials

• An XLSForm is made out of at least three worksheets
  • ‘survey’ (defines questions to be shown in your form)
  • ‘choices’ (defines items in lists used in your form)
  • ‘settings’ (a mixed bag of things)
The survey worksheet (your questions)

- Three mandatory columns
  - **type**  The type of question: text, integer, date, etc…
  - **name**  The name of the field in your database where answers will be stored
  - **label**  The question label to be shown to users in your form

- A bunch of optional columns
  - More on this later
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>type</td>
<td>name</td>
<td>label</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>date</td>
<td>inspectiondate</td>
<td>Inspection date:</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>barcode</td>
<td>treeid</td>
<td>Tree ID:</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>geopoint</td>
<td>location</td>
<td>Tree location:</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>select_one</td>
<td>health</td>
<td>Health:</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>select_one</td>
<td>actionrequired</td>
<td>Action required?</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>select_one</td>
<td>Action or action</td>
<td>Action:</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>date</td>
<td>actiondate</td>
<td>Target date for action:</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>image</td>
<td>photo</td>
<td>Photo</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>text</td>
<td>notes</td>
<td>Notes</td>
<td></td>
</tr>
</tbody>
</table>
The **choices** worksheet  (lists of choices)

- **Three mandatory columns**
  - `list_name` Can you guess what this is?
  - `name` The value to be stored when this choice is selected
  - `label` The label to be shown to users in your list

- **A few optional columns**
  - More on this later
<table>
<thead>
<tr>
<th>A</th>
<th>list_name</th>
<th>B</th>
<th>name</th>
<th>C</th>
<th>image</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td>yes_no</td>
<td></td>
<td>1</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>yes_no</td>
<td></td>
<td>2</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>TreeHealth</td>
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<td></td>
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<td>7</td>
<td>TreeHealth</td>
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<td>Dead</td>
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<td></td>
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<td></td>
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<td></td>
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<tr>
<td>9</td>
<td>TreeTarget</td>
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<td>People</td>
<td>1</td>
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<td>12</td>
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<td>14</td>
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<td>Structure</td>
<td>6</td>
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<td></td>
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<tr>
<td>15</td>
<td>TreeTarget</td>
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<td>Sport facility</td>
<td>7</td>
<td>Sport facility</td>
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<td></td>
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<td>16</td>
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<td></td>
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<td></td>
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<tr>
<td>17</td>
<td>Defect</td>
<td>1</td>
<td>None</td>
<td>1</td>
<td>None</td>
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<td></td>
</tr>
<tr>
<td>18</td>
<td>Defect</td>
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<td>Root</td>
<td>2</td>
<td>Root</td>
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</tr>
<tr>
<td>19</td>
<td>Defect</td>
<td>3</td>
<td>Trunk</td>
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<tr>
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<tr>
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<td>5</td>
<td>Species</td>
<td>5</td>
<td>Species</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The **settings** worksheet

- Most common settings:
  - title
  - instance_name
- More about this later
Survey123 for ArcGIS Bootcamp

XLSForm Questions Types & Appearances
Basic Entry Types

- A question’s *type* controls what type of data is collected.
- Additional types help us structure a survey.
- A question’s *appearance* controls how the question looks & behaves on the form.
### Question Types – Data Entry

<table>
<thead>
<tr>
<th>Basic Data</th>
<th>Date</th>
<th>Choice Lists</th>
<th>Visual/Aural</th>
</tr>
</thead>
<tbody>
<tr>
<td>• text</td>
<td>• date</td>
<td>• select_one</td>
<td>• image</td>
</tr>
<tr>
<td>• integer</td>
<td>• time</td>
<td>• select_multiple</td>
<td>• barcode</td>
</tr>
<tr>
<td>• decimal</td>
<td>• datetime</td>
<td></td>
<td>• audio</td>
</tr>
</tbody>
</table>

**Automatic collection (no user input)**

| • username       | • start               | • hidden                   |                             |
| • email          | • end                 | • calculate                |                             |
Appearances: Basic Data

- multiline
- spinner
- numbers
- calculator
- distress
Appearances: Images

- Signature
- Draw
- Annotate

Capture Signature
Trace your signature with your finger (type=image, appearance=signature)
Survey123 for ArcGIS Bootcamp

Back at 12:45!
Survey123 for ArcGIS Bootcamp

XLSForm  Expression Essentials
XLSForm Expressions

- **Use them to make your form smart:**
  - Hide and show questions as appropriate
  - Precalculate responses based on previous answers
  - Validate user input
  - Other uses to be discussed later
XLSForm Expression Syntax

• Very similar (not the same) as Formulas in Excel

\[ 4 \times 3 \text{ returns } 12 \]

• Variables

\[ \${\text{questioName}} \]

• Example: Return the length of a pipe in meters:

\[ \${\text{pipe_length_feet}} \times 0.3048 \]
XLSForm Expression Syntax

- `_${age}_ > 17` Returns true if the age question has a value greater than 17
- `_${boys}_ + ${girls}_` Returns the total number of children
- `_${pipelength}_ * 1.45` Applies a 1.45 ratio to the length of a pipe and returns the value
- `Today()` Returns the current date
- `String-length(${schoolname})` Returns the length of the response to schoolname
Where to use your Expressions

- **Constraint:**
  - Expressions in this column limit the user input

- **Relevant:**
  - If the expression evaluates to false, the question is hidden

- **Calculation:**
  - Used to prepopulate questions
Calculate Different Values based on previous questions

- if(<condition>, <trueValue>, <falseValue>)
  if(${age} >= 18, “Adult”, “Minor”)

- Nested if() allow for more than 2 answers (similar to Excel)
  if(${grade} < 7, “Elementary”, if(${grade} < 9, “Middle”, “High School”))

- Resource: Survey123 Documentation
Demo

Smart defaults
Constraints
Relevant
Calculations
# Basic Cheatsheet

<table>
<thead>
<tr>
<th>Returns the value of a question</th>
<th>${question}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns the value of the current question</td>
<td>.</td>
</tr>
<tr>
<td>Mathematical operators</td>
<td>+ - div * sin() log() …</td>
</tr>
<tr>
<td>Comparison operators</td>
<td>= &lt; &gt; != …</td>
</tr>
<tr>
<td>Return todays date</td>
<td>today()</td>
</tr>
<tr>
<td>Return current time</td>
<td>now()</td>
</tr>
<tr>
<td>Length of a string</td>
<td>string-length ( string )</td>
</tr>
<tr>
<td>Conditions</td>
<td>If (condition, output if true, output if false)</td>
</tr>
</tbody>
</table>
Learn More

• Quick Reference
• Calculations sample in Connect
• Calculations video-tutorial
• Using Formulas GeoNet Blog Post and Help Topic
• Mathematical Functions GeoNet Blog Post
• The Art of Hiding GeoNet Blog Post
Survey123 for ArcGIS Bootcamp

Using Lists
List Essentials

Why to use them?

• Use Lists to standardize user input
• Lists accelerate data collection

• Lists in XLSForms
  • Modeled after two question types:
    • select_one and select_multiple
  • Look and feel controlled through the appearance column
How to build a list

• They live in the *choices* worksheet
  • `list_name`: must be unique, no spaces, no special characters
  • `name`: the value that will be stored in your database, unique no spaces or special characters!
  • `label`: the description presented to the user
<table>
<thead>
<tr>
<th>list_name</th>
<th>name</th>
<th>label</th>
<th>image</th>
<th>label::language1</th>
</tr>
</thead>
<tbody>
<tr>
<td>species_confidence</td>
<td>Guess</td>
<td>I'm guessing here...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species_confidence</td>
<td>Probably</td>
<td>Probably I'm a bit uncertain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species_confidence</td>
<td>Confident</td>
<td>Very Confident</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species_confidence</td>
<td>Absolutely Confident</td>
<td>I'm absolutely certain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>location_carcass</td>
<td>Surface</td>
<td>Road Surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>location_carcass</td>
<td>Center</td>
<td>Center-Divide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>location_carcass</td>
<td>Shoulder</td>
<td>Road Shoulder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>road_freq</td>
<td>Daily</td>
<td>Daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>road_freq</td>
<td>Weekly</td>
<td>Weekly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>road_freq</td>
<td>Monthly</td>
<td>Monthly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>road_freq</td>
<td>Rarely</td>
<td>Rarely or first time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Odocoileus_hamionus</td>
<td>Mule Deer (Odocoileus hamionus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Cervus_canadensis</td>
<td>Elk (Cervus canadensis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Odocoileus_virginianus</td>
<td>White-tailed Deer (Odocoileus virginianus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Alces_americanae</td>
<td>Moose (Alces americanus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Phasianus_colchicus</td>
<td>Ring-necked Pheasant (Phasianus colchicus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Lynx_rufus</td>
<td>Bobcat (Lynx rufus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Buleo_jamaicensis</td>
<td>Red-Tailed Hawk (Buleo jamaicensis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Branta_canadensis</td>
<td>Canada Goose (Branta canadensis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>species</td>
<td>Anthus_magnirostris</td>
<td>Rock Bunting (Anthus magnirostris)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How to use lists

• Use question types: `select_one` and `select_multiple`
Appearance column

- Controls the look and feel of the list
  - Default
  - Minimal
  - Horizontal
  - Likert
  - Autocomplete
Default appearance

- Leave appearance value empty
- Quick to select options
- Not ideal for long lists
  - Forces user to scroll form
- Tip: Use for lists of up to 7 values
Horizontal appearance

- Set appearance value to **horizontal**
- Similar to default but arranged horizontally
- Will save vertical space
- Can be easier to the field user
- Avoid with long labels
Minimal appearance

• Set appearance value to **minimal**
• Appears as a collapsed dropdown
• Can handle dozens of values
• Tip: Consider setting a **default** value when possible
Autocomplete appearance

• Set appearance to **autocomplete**
• Similar to minimal, but filters choices presented based on user input
• Can handle hundreds of values
Likert appearance

- Likert scale (typically used for rating questions)
- Also useful for very short lists
Likert appearance

**Inspection Type**
- New Installation
- Annual
- 5 year flow test

**Weather**
- Sun
- Cloud
- Snow

**Le ménage est-il marqué par les équipes de vaccination?**
- Oui
- Non
Demo

Creating lists
Appearances and Media
Emojis

Weather

<table>
<thead>
<tr>
<th>list_name</th>
<th>name</th>
<th>label</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes_no</td>
<td>yes</td>
<td>Yes</td>
</tr>
<tr>
<td>yes_no</td>
<td>no</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>weather</td>
<td></td>
</tr>
<tr>
<td>weather</td>
<td>sunny</td>
<td></td>
</tr>
<tr>
<td>weather</td>
<td>partlyCloudy</td>
<td></td>
</tr>
<tr>
<td>weather</td>
<td>rain</td>
<td></td>
</tr>
</tbody>
</table>
Lists and media

- Copy media files into the surveys media folder
- Reference your media files in XLSForms
- Case sensitive!

Tip: Look for the Media sample in Connect for details
Working with Choice Lists

- selected($\{question\}, <value>) – is the value selected in the answer?
- count-selected($\{question\}) – how many answers are selected?
- Ex: How did you get to work this week?
  - Work from home
  - Walking
  - Biking
  - Transit
  - Carpool
  - Drove

- Resource: Survey123 Help Documentation
Cascading Selects

• Advanced technique to handle long lists
• Choices in lists are filtered based on previous selections
• Examples:
  • Select tree *family*, then *genre*, then *species*
  • *Select Region, then District*

Tip: Look for the Cascading Select sample in Connect for details
Demo

BSD Cascading Select
Cascading select sample
Cascading Selects

• As of version 2.1:
  • `choice_filters` work against strings (numbers not supported)
  • Best to use `external_selects` for very long lists
    • Anything over 300 choices

Tip: Look for the Cascading Select sample in Connect for details
External Selects

• A variation of Cascading Selects optimized for long lists
  • Can handle thousands of choices
• Define the list in the external_choices worksheet
• Use a select_one_external type of question

External Selects Help Topic is here
Learn More

- Basic List video tutorials in YouTube
- Media in Lists video tutorial
- Cascading and External Selects Blog Post
- Cascading and External Selects in Help
Survey123 for ArcGIS Bootcamp

Groups (and Repeats)
Groups

• Groups help you organize questions into sections
• They make data collection easier
• Can accelerate form loading times
Group XLSForm Syntax

• Use `begin_group` and `end_group` to define groups of questions
• Use `compact` appearance to show groups collapsed
• Use expression in `relevant` column to hide/show entire Groups of questions
<table>
<thead>
<tr>
<th>type</th>
<th>name</th>
<th>label</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>begin group</code></td>
<td><code>GroupViolation</code></td>
<td><code>&lt;center&gt;Violation Details&lt;/center&gt;</code></td>
</tr>
<tr>
<td><code>dateTime</code></td>
<td><code>ReportDateTime</code></td>
<td>Date &amp; Time Observed:</td>
</tr>
<tr>
<td><code>select_multiple violationTypes</code></td>
<td><code>ViolationType</code></td>
<td>Type of Violation</td>
</tr>
<tr>
<td><code>text</code></td>
<td><code>ViolationType_Other</code></td>
<td>Other Violation Description</td>
</tr>
<tr>
<td><code>text</code></td>
<td><code>ReportNotes</code></td>
<td>Notes:</td>
</tr>
<tr>
<td><code>image</code></td>
<td><code>ViolationPhoto</code></td>
<td>Photo</td>
</tr>
<tr>
<td><code>geopoint</code></td>
<td><code>ViolationLocation</code></td>
<td>Location</td>
</tr>
<tr>
<td><code>end group</code></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| begin group           | `GroupViolator`             | `<center>Offender Details</center>`       |
| `select_one responsiblePartyType` | `ResponsibleParty`          | Type                                       |
| `text`                | `OffenderName`              | Offender's name                            |
| `select_one yes_no`   | `OffenderPresent`           | Is Offender or Representative Present at Time or Report? |
| `image`               | `Signature`                 | Signature                                  |
| `end group`           |                             |                                            |
| `note`                | `Note`                      | `<center><a href="tel:9093624397">Call Water Department</a></center></p>` |
Repeats

• A repeat is a variation of the Group concept
  • Used to repeat a set of questions
  • Values will be stored as a related table or layer
Repeat Syntax

- Use `begin_repeat` and `end_repeat`
- **Compact** appearance will show your repeat collapsed
- **Minimal** appearance will add zero entries in your repeat
- **Repeat_count** column is used to limit the number of repeats
  - You can set `repeat_count` as a constant or function
Repeat Aggregation Functions

• Let you count, sum etc answers within a repeat
  • sum ( ${questionName})
  • count ( ${questionName})
  • max ( ${questionName})
  • min ( ${questionName})
Learn More

• Groups video-tutorial
Survey123 for ArcGIS Bootcamp

Using the Instance_Name
Survey Instance name – Best Practices

- Instance name setting enables field users to uniquely identify survey form Drafts, Outbox, Sent and Inbox folders in the Survey123 app.
Survey Instance name – Points to remember

- Keep it simple. Use 2 to 3 fields that can uniquely identify the record. Instance Names are also used in the Inbox folder Map view.

- Use the Connect App to validate the instance name before publishing.

- If you are using date fields format the date.

- If you are publishing the survey in Portal, ensure the fieldnames are in lowercase.
Learn More

• Using the Instance_Name blog post
• Using the Instance_Name video tutorial
• Instance_Name Help Topic
Survey123 for ArcGIS Bootcamp

Creating surveys on top of existing feature services
Introduction

- Generally, Survey123 creates a new feature service when a survey is published
- You can, however, build surveys on top of existing feature services
- Motivations:
  - You may want use Survey123 to capture data on existing features
  - You may want Survey123 to write data on your own database (SQL Server, Oracle…)
Online and Enterprise

- You can create surveys against hosted and federated services.
Create Surveys from Existing Feature Services

- Sign into a portal (ArcGIS Online/Portal for ArcGIS)
- Select a feature service
  - Survey123 Connect scans and creates an XLSForm
- Edit the form to provide additional logic, create a form for just a repeat layer, remove questions

- Publish

- Your XLSFile will be automatically set with:
  - Settings: submission_url
  - Settings: Form_ID
Requirements

- Feature services must have Sync enabled
- The feature service must have a point geometry
Learn More

• Working with existing feature services (blog)
Edit Existing Survey Data

- Why would you edit existing features?
  - Multiple inspections over time on the same asset
  - Follow-up interviews
  - Team workflows: Submitted of incident vs follow up by someone else

- Enabling the Inbox in Connect
- Using Inbox folder in the field app
- Using queries
Field App Inbox folder

- Submitted surveys retrieved from a list or map view
  - Surveys returned limited by max record count setting of feature service
- Select a survey to edit responses
Edit Existing Survey Data

Survey123 Connect

• Add the **Inbox** option to the survey
  - Optional: can apply an expression to filter data
• This capability must be enabled on the survey BEFORE it is published
• **Editing Existing Data with Survey123 video**
Edit Existing Survey Data

Survey123 Connect

- You can query on fields and profile information, ex:
  - status='pending'
  - assigned=${username}
Amending Sent Surveys

- A user can amend sent survey responses in the field app
- Review:
  - Open Sent folder
    - Contains previously submitted surveys from device
  - These can be opened, their responses edited
  - Can be re-submitted or re-sent as a new survey
  - Using the Sent folder to resubmit data video
Learn More

• Editing Data Video-Tutorial

• Resubmitting data Video-Tutorial
Survey123 for ArcGIS Bootcamp

Offline Basemaps
Going Offline

• Maps need to be pre-generated as tile packages (tpk)

• Tile Package Kreator (TPK) tool – free app on the ArcGIS Marketplace

• Configure surveys:
  - Per Survey - Include TPK in the survey’s media folder
  - Set default basemap in Survey123 Connect Map Settings
  - Multiple Surveys:
    - Load TPK into your organization
    - After initial publishing of the survey, edit the <form>.info to specify TPK location
Learn More

• Tile Package Kreator

• Taking your basemaps offline with Tile Package Kreator

• More on offline basemaps help topic
Survey123 for ArcGIS Bootcamp

Bringing Data Offline
Taking data with you

- You can package existing data with a survey for lookup
  - Location
  - Last known condition
- Place a CSV file in the media folder
- Access in form via the `pulldata()` function
- Resources:
  - Survey123 Documentation
  - Survey123 GeoNet Blog
Pulldata Function

pulldata(<table>, <outColumn>, <lookupColumn>, <value>)
pulldata(‘stations’, ‘name’, ‘stationid’,${id}) ({$id}→31002)
Learn More

- PullData Function Blog Post
- Relevant Expressions Blog Post
- PullData GeoPoint Questions Blog Post
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Location in Survey123
Location

- Location comes from the system location provider – may include Wi-Fi/Bluetooth beacons/Cellular/IP lookup
- Accuracy threshold can be set using `body:accuracyThreshold` column
- By default Survey123 stores a 2D point; to store 3D set the field type to `esriFieldTypePointZ`
- No location present → point at 0,0
Working with Location Data

- Calculating location: Create a string of “<latitude> <longitude> <altitude> <accuracy>” (last 2 optional)
- To extract values use the pulldata function:
  - pulldata(‘@geopoint’, <question>, <property>)
  - pulldata(‘@geopoint’, ${location}, ‘x’)
External GPS Receivers

- External GPS receivers for made for iOS & Android connect and override the internal location provider.
- Windows still uses legacy serial (COM ports) systems – need a bridging software to connect to location provider.
Photos & Location

- When Survey123 takes a photo, it saves the location into the image (EXIF)
- Images can be downloaded from the feature service, mapped
- GeoNet blog: https://community.esri.com/groups/survey123/blog/2017/03/22/working-with-your-survey123-photos
Learn More

• Help: Geopoints
• Blog: Calculating Locations
• Blog: Pulling Data from Geopoint Questions
• Blog: Working with Survey123 Photos
Survey123 for ArcGIS Bootcamp

Integrating Survey123 and other Apps
Survey123 – Custom URL Scheme

- Provides a well known protocol for other apps to communicate with Survey123
  - Ex:
    - Explorer for ArcGIS
    - Web AppBuilder for ArcGIS
    - Collector for ArcGIS

- Enables other apps to:
  - Launch Survey123 field app
  - Open a survey (must already be downloaded)
  - Pre-populate answers in the survey

- Useful for developers
  - Can be used to link Survey123 from a web page or email
  - Multiple surveys from a single data layer accessed through one single app
  - Multiple layers with multiple surveys accessed through one single app

- Blog post: Understanding Survey123’s custom URL Scheme, Navigator custom URL Scheme
Custom URL Scheme Workflow

- Use Collector for ArcGIS with Survey123 for ArcGIS

- Define web map for use in Collector
- Enable pop-ups for web map features
  - In pop-up, add a hyperlink that includes custom URL scheme
- Within Collector, click feature pop-up > click hyperlink
  - This will open Survey123
  - Optional: can pre-populate answers to survey questions
Calling Survey123 with URL Scheme

Syntax structure

- `arcgis-survey123://?itemid=9735c42727bb42b0936c5e7ba35117a4&field:streetaddress={PHYSICAL_STREET_NUM} {PHYSICAL_STREET_DIR} {PHYSICAL_STREET_NAME} {PHYSICAL_STREET_TYPE}&field:town={PHYSICAL_CITY}&field:state=AZ&field:zipcode={PHYSICAL_ZIP}&center={LATITUDE},{LONGITUDE}`

- `arcgis-survey123:// → calls the Survey123 field app`
- `? → starts collection of parameters`
- `itemid=9735c42727bb42b0936c5e7ba35117a4 → specifies the survey`
- `& → parameter separator`
- `field:streetaddress={PHYSICAL_STREET_NUM} {PHYSICAL_STREET_DIR} {PHYSICAL_STREET_NAME} {PHYSICAL_STREET_TYPE} → parameter field:[field_name]=[value from feature]`
  - Field names are case sensitive
- `& → parameter separator`
- `&field:state=AZ → parameter field:[field_name]=[hardcode value]`
Custom URL Scheme – Points to remember

• The custom URL Scheme is supported in ArcGIS Online, ArcGIS Enterprise 10.5 and newer
• For a seamless experience, login to the Survey123 app before utilizing the custom URL scheme in the map or app
• Ensure the data values being passed are clean and contain no special characters
• You cannot pass field values/parameters
  - To repeats in the survey
  - To date fields in the survey
Learn More

- Help: Integrate with other apps
- Blog: Survey123 URL Scheme
- Blog: Collector High Accuracy & GPS
Survey123 for ArcGIS Bootcamp

Wrap up
Survey123 for ArcGIS
Release Cycle

• ≈6-8 week release cycle
• Product Priorities derived from customer feedback through
  - GeoNet: https://geonet.esri.com/groups/survey123
  - https://ideas.arcgis.com
  - Talk to your Account Manager & Survey123 team

• 2.6: January 23
• 2.7: Late March
• 2.8: ~ Early May
• 3.0: ~ Late June
What’s coming next

• High accuracy GNSS
• Better Maps (MMPK, Web Map, Vector Tiles)
• Batch report generation
• Enterprise Workflow Integrations (Web hooks)

*Subject to change*
Survey123 Beta Program

• “Continuous beta” - open indefinitely to facilitate testing
• Direct download Android, Windows, Mac iOS via TestFlight app (register for access)
• Updated every ~1-2 weeks during development
• Holistic testing for each release
• Guides for new features