Field Data Collection Utilizing iPADs on the USDA’s June Area Survey

Geographic Information Running Area Frame Forms Electronically

National Agricultural Statistics Service
Presented by: Michael Gerling

“... providing timely, accurate, and useful statistics in service to U.S. agriculture.”
Overview of June Area Survey

- Annual survey that provides data on U.S. crops, livestock, grain storage capacity, and type and size of farm.

- Comprised of designated land areas (segments). Each segment is about 640 acres (1 square mile).

- 11,000 segments surveyed across the U.S.
Using a provided aerial photo, the interviewer divides segment into tracts representing unique land operating arrangements.

Interviewers screen for whether tract is part of a farm and collect crop and livestock information for each tract.

42,000 Agricultural Tracts.

Paper questionnaire used to record data.
Current Paper Version 24 or more pages.

Shows one of two pages used to collect tract and field level information.

Basically, lots of rows and columns.
Hybrid of the Thin Client CAPI Framework

Agricultural Operation
Field Interviewer (iPad)
Wireless Broadband (3G/4G)

USDA-NASS
Iowa State University
Web Survey Site

Cell Tower

USDA - NASS Field Office
## Development NASS June Area Survey

### Indiana, Whitley County, Segment EXERCISE10039

<table>
<thead>
<tr>
<th>Done</th>
<th>Tract</th>
<th>Field</th>
<th>Use</th>
<th>Area (ac)</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑</td>
<td>A</td>
<td>1</td>
<td>Farmstead</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>A</td>
<td>2</td>
<td>Winter wheat</td>
<td>20.8</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>A</td>
<td>3</td>
<td>Corn for grain</td>
<td>76.4</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>B</td>
<td>1</td>
<td>Farmstead</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>B</td>
<td>2</td>
<td>Soybeans</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>B</td>
<td>3</td>
<td>Woodland pastured</td>
<td>34.8</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>B</td>
<td>4</td>
<td>Soybeans</td>
<td>56.8</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>B</td>
<td>5</td>
<td>Corn for grain</td>
<td>30.6</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>B</td>
<td>6</td>
<td>Corn for silage</td>
<td>40.1</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>B</td>
<td>7</td>
<td>Alfalfa hay</td>
<td>19.4</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>C</td>
<td>1</td>
<td>Fertilized</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>C</td>
<td>2</td>
<td>Corn for grain</td>
<td>76.6</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>D</td>
<td>1</td>
<td>Non-ag</td>
<td>15.3</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>E</td>
<td>1</td>
<td>Farmstead</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>E</td>
<td>2</td>
<td>Corn for grain</td>
<td>59.1</td>
<td></td>
</tr>
<tr>
<td>☑</td>
<td>E</td>
<td>3</td>
<td>Winter wheat</td>
<td>11.7</td>
<td></td>
</tr>
</tbody>
</table>
Available Tools

- Pause
- Cache Imagery
- Zoom to Segment
- Zoom to Selected
- Select All Visible
- Select None
- Select Feature(s)
- Split Feature(s)
- Merge Selected
- Undo
- Undo All
- Redo
- Redo All
Select the Split Button tool. Start a new line by tapping once outside of the red boundary and a yellow circle will appear.
Drawing lines is NOT a dragging motion. Lift your finger and tap outside the bottom edge of the red boundary and another yellow circle will appear with a yellow line connecting the two circles.
Tapping quickly 2 times completes a line. Make sure to do this outside of the red boundary and close to the last yellow circle.
Once you tap twice a blue line will appear within the red boundary and all circles and lines outside the boundary will disappear.
National Agricultural Imagery Program (NAIP Imagery)
Cropland Data Layer
The Benefits

1. Lower Costs
   a. Data Entry
   b. Less Paper
   c. Fewer Resources Needed (Aerial Photo)
   d. Minimizes mailing costs

2. Improve Data Quality
   a. Edit Checks
   b. Geographic Information System (GIS) - improved precision

3. Flexibility
   a. Able to move assignments around

4. Widens Data Collection Window
   a. Collect data even at the last minute

5. Will improve the Cropland Data Layer which in turn improves our sampling scheme and what is displayed on the iPAD for the next year.
Run on an iPad

Capture tract and field boundaries as GIS polygons
  ◦ Display imagery
  ◦ Provide the appropriate GIS tools

Label tracts and fields appropriately

Operate without a reliable Internet connection

Automatically save data to server when possible
Computer off the Shelf (COTS) + Custom Code vs. Open Source + Custom Code

- **ArcGIS API?**
  Editing operations are server-side (*off-line operation not possible*)

- **Java Script API?**
  Not optimized for touch interfaces

- **Native iOS API - iPad?**
  No expertise and steep learning curve (language, libraries, etc.)
  Distribution/deployment questions - legalities

API = Application Programming Interface
Popular JavaScript Web Mapping Libraries

- Google Maps
- Bing Maps
- Leaflet – open source JavaScript library for mobile-friendly interactive maps
- ArcGIS API for JavaScript
- OpenLayers
OpenLayers

- Quickly make web pages with embedded maps.
- Support for various image layer types.
- Standard tools for map navigation and editing
- Support for user-editable vector layers
So How can this Benefit my Agency?

- Not just agriculture but draw off any land shapes and capture data about it.

- Shows that this hybrid of the true thin client data collection approach can actually work.

- Future – show location of the interviewer. Add a roads map layer.

- Two side benefits of the project:
  1.) Recording interviews with another iPAD.
  2.) Remote/Correspondence Training
The TEAM for Phase I

Executive Sponsors
Jeff Bailey, Mark Harris, Chris Messer

Eric Wilson – Team Leader

Michael Gerling, Matt Deaton, William Jordan, David Hancock,
Leslee Lohrenz, Pam Hird, Prince Hakim, Jonathan Lisic

Linda Lawson – Indiana
Debbie Dunham – Indiana

Sherry Deane – Pennsylvania
Jillayne Weaber – Pennsylvania

Eric Stebbins – Washington

Iowa State University
Sarah Nusser
Alan Dotts
Andrew Vardeman
Contact Information

- Michael Gerling  michael.gerling@nass.usda.gov
- Claire Boryan    clarie.boryan@nass.usda.gov
Questions

“... providing timely, accurate, and useful statistics in service to U.S. agriculture.”