Appendix 13

Nationwide Geocoding Recommendations

In order to achieve the recommendations proposed in sections 6.3, we deem it necessary to assign geographic coordinates to each FFS beneficiary. The process by which this is done is known as geocoding. Geocoding is a complex process by which geographic coordinates are matched to a physical address or address part (such as USPS ZIP Code, ZIP Plus 4, city etc.). This procedure allows analysts to visualize data at different levels of granularity depending on analytic needs: examples include singular locations or Census based geography. To easily and effectively incorporate block group level data from the US Census Bureau, we have determined that our ideal level of granularity is at the Zip Plus 4 level. A ZIP+4 code uses the basic five-digit code plus four additional digits to identify a geographic segment within the five-digit delivery area, such as a city block, a group of apartments, an individual high-volume receiver of mail or any other unit that could use an extra identifier to aid in efficient mail sorting and delivery. Limitations exist within this level of geography, most not all addresses within the US are assigned a ZIP Plus 4. By selecting this level of granularity rather than singular address points, we are able to avoid the very tedious and time consuming task of standardizing every address. Standardization is a critical component of pre-processing where each address part is formatted for consistency, spelling accuracy, and the removal of extraneous information. Data entry errors originating upstream make this a required part of any geocoding workflow. Matriculation of newly eligible individuals into the program is done so on a regular basis; in order to maintain the most current dataset while also being sensitive to the time and effort needed, we recommend this process be carried out semiannually.

A variety of open-source and proprietary geocoding products are on the market. We are most familiar with the geocoding functionality of ESRI's ArcGIS (2013, Environmental Systems Research Institute) and SAS (2013, SAS Institute Inc.) both of which are highly accurate and reliable. Validity testing on our part revealed each platform achieved near 100% match success within three successive rounds of geocoding a single file of nearly 50,000 records. Most critical to achieving this high rate of matching success depends on utilizing current address look up files. Historically, ESRI has been our primary platform for geocoding to the ZIP Plus 4 level. However, nearly all of their services have been deprecated and these look up files will become dated very quickly. SAS offers a geocoding method which identifies the ZIP Plus 4 location however, the look up files used are from 2006. Each platform has unique challenges, varying significantly in processing speeds/times and file size capacity. In order to accurately match all 36 million records to the ZIP Plus 4 location with the highest level of accuracy possible, we deem it necessary to construct a custom composite geocoder. This custom locator will consist of 3 levels: the subscription ZIP Plus 4 locator, the ZCTA locator and the ESRI ZIPS 2012 locator. In order to achieve this, the following is recommended.

1. Acquire latest Zip Plus 4 Deluxe file for all US States and Territories from zip-codes.com for $895.00. This price is good for one year with updates once a month directly from US Postal Service, as the company is a licensed distributor. The direct link with specific information is here: http://www.zip-codes.com/zip-plus-4-database.asp

   Size of file is about 1,000 MB (.97 of a GB) and contains roughly 45,965,735 records. Column attributes include ZIP code, ZIP4 low and high, Street name, record type (P = PO Box, S = Street

Delivery etc), Street address ranges low to high, County FIPS code, Center Latitude and Center Longitude for ZIP Plus 4 code in decimal degrees, current Census Block Group number. File includes all 50 states plus Puerto Rico and the US Virgin Islands. (Note: Many commercial ZIP Plus 4 products reviewed did not include data for Puerto Rico or the Virgin Islands and some were 2-3 times the cost of this product)

2. Construct a composite address locator with the centerpiece being the subscription ZIP Plus 4 deluxe file. A "composite address locator" consists of two or more individual address locators and/or geocode services. Level 1 of the composite geocoder is constructed with the latest ZIP4 and center latitude/longitude coordinate values from the nationwide subscription file we will be acquiring. Level of the composite geocoder will be based on ZCTA, the Census Bureau acronym for Zip Code Tabulation Area. ZCTAs are generalized areal representations of USPS zip code service areas. More information regarding ZCTAs can be found at this link: https://www.census.gov/geo/reference/zctas.html. ZCTA geographic files (5 digit zip code polygon centroid) allow us to resolve the small number of records that do not geocode to a ZIP plus 4. Those records that do not geocode to ZIP 4 on the first go around will end up going through this 2nd level of the composite geocoder. The third level of the geocoder will capture any remaining unmatched records and finally geocoded them to the centroid. This 3rd level address locator will be based on the ZIPS 2012 file from ESRI.

3. As USPS data, GIS layers, Census Data files & ESRI feature class updates become available, we will reflect those changes within our composite address locator. The USPS data is updated on a monthly basis, whereas the other files are updated periodically and without regularity.

Cost Analysis/Quality Comparison of ZIP Plus 4 Products (as of 10/2014)

A. Zip-Codes.com (recommended product) – $895.00 for 1 year with monthly USPS updates/$895.00 per year renewal. Up to 25 users can access and they have a 100% money back guarantee.
http://www.zip-codes.com/zip-plus-4-database.asp

B. Maponics – $897.00 (Puerto Rico and Virgin Islands data not included) for 1 year/1 user, updated quarterly. No refund if you are unsatisfied.
http://www.maponicsonlinestore.com/products/zip4-product/zip4-product.html

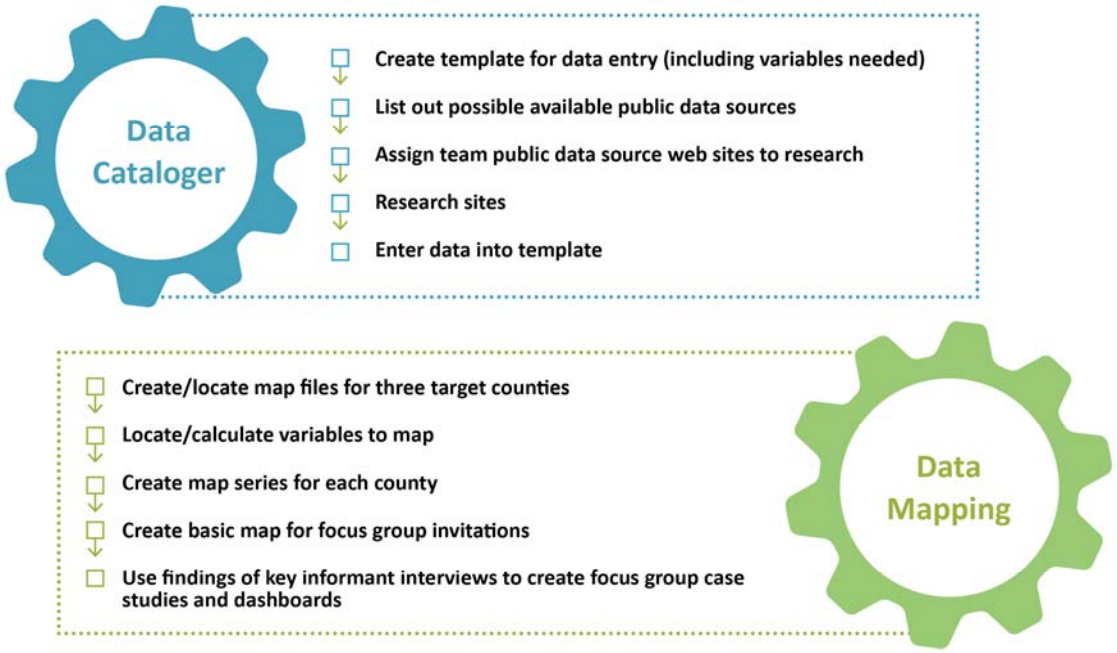
C. EASI Demographics – $1,250.00 for 1 user.
http://www.easidemographics.com/Cgi-bin/DbZip4.asp

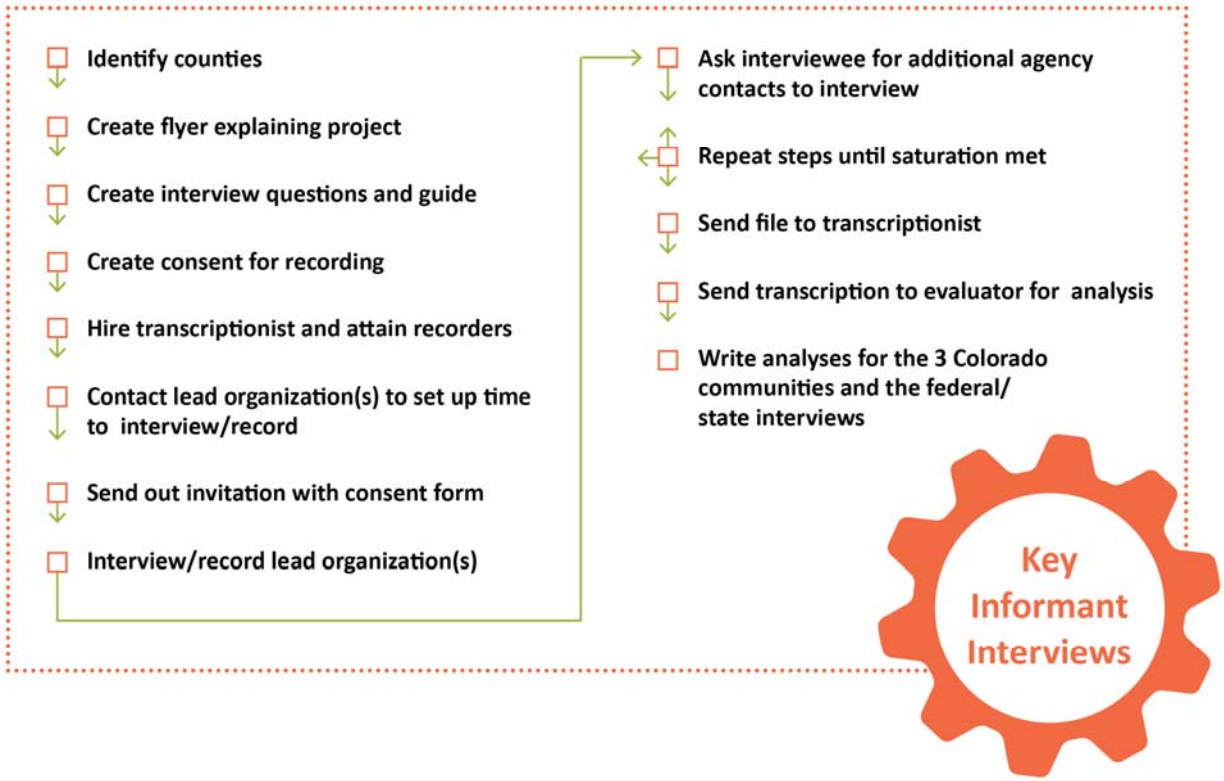
D. Geolytics – $1,095.00 for 1 user
http://www.geolytics.com/USCensus,Zip4,Products.asp

E. Melissa Data - $2000.00 for 1 user
http://www.melissadata.com/reference-data/geodata.htm

F. ESRI Address Coder/Business Analyst – Thousands for each individual license for both extensions.
http://www.esri.com/software/coder

Appendix 14


Data Cataloger
Create template for data entry (including variables needed)
List out possible available public data sources
Assign team public data source web sites to research
Research sites
Enter data into template
Create/locate map files for three target counties
Locate/calculate variables to map
Create map series for each county
Create basic map for focus group invitations
Use findings of key informant interviews to create focus group case studies and dashboards
Data Mapping


Identify counties
Create flyer explaining project
Create interview questions and guide
Create consent for recording
Hire transcriptionist and attain recorders
Contact lead organization(s) to set up time to interview/record
Send out invitation with consent form
Interview/record lead organization(s)
Ask interviewee for additional agency contacts to interview
Repeat steps until saturation met
Send file to transcriptionist
Send transcription to evaluator for analysis
Write analyses for the 3 Colorado communities and the federal/ state interviews
Key Informant Interviews

- [ ] Book rooms in each community to hold the meeting
- [ ] Create:
  - [ ] invitation for Federal Stakeholders with all 3 dates
  - [ ] invitations for individual counties
  - [ ] moderator guide
- [ ] Send/email invitations, individually, to each stakeholder 1 month prior
- [ ] Send accompanying calendar appointments to all stakeholders with invitation attached
- [ ] Create presentation slides, forms, and handouts
- [ ] Mock focus group and integrate changes
- [ ] Send reminders 2 days prior to focus group
- [ ] Conduct focus group
- [ ] Send recording to transcriptionist
- [ ] Send transcriptionist to evaluator for analysis
- [ ] Write analysis for each county
- [ ] Share results with participants