

ANALYTICS AND CHANGE DETECTION CORE

Presentation for PAIGH Annual Meeting - USNS

March 30, 2023



**Count everyone once, only
once, in the right location...**

Geography Division

- Geography Division (GEO) plans, coordinates, and administers all geographic and cartographic activities needed to facilitate the Census Bureau's statistical programs throughout the United States and its territories.
- Also manages the Census Bureau's programs to continually update the addresses, features, boundaries, imagery, and geographic entities in its nationwide, automated geographic support system.

The Master Address File

- A critical goal of the GEO is to maintain the Master Address File (MAF), the Census Bureau's database of all "living quarters" nationwide, whether they are occupied or vacant. The MAF contains addresses, unit type attributes, geocoding data, and operational information.
- Updates and corrections to the MAF have historically been undertaken by field canvassers and through data-sharing partnerships with Tribal, State, Local, and Federal Partners, such as the U.S. Postal Service.
- Leading up to the 2020 Census, the Geography Division enabled staff in the office to perform similar actions to the address list as an in-field address canvasser.

The background of the slide is a stylized map of a city street grid. It is divided into three horizontal bands of color: a light blue band at the top, a light orange band in the middle, and a light green band at the bottom. The text is centered within the orange band.

CAPTURING AND GEOCODING NEW GROWTH IN THE GEOGRAPHIC SUPPORT PROGRAM

DATA SCIENCE AND TECHNOLOGY IN THE GEOGRAPHY DIVISION

IMAGERY

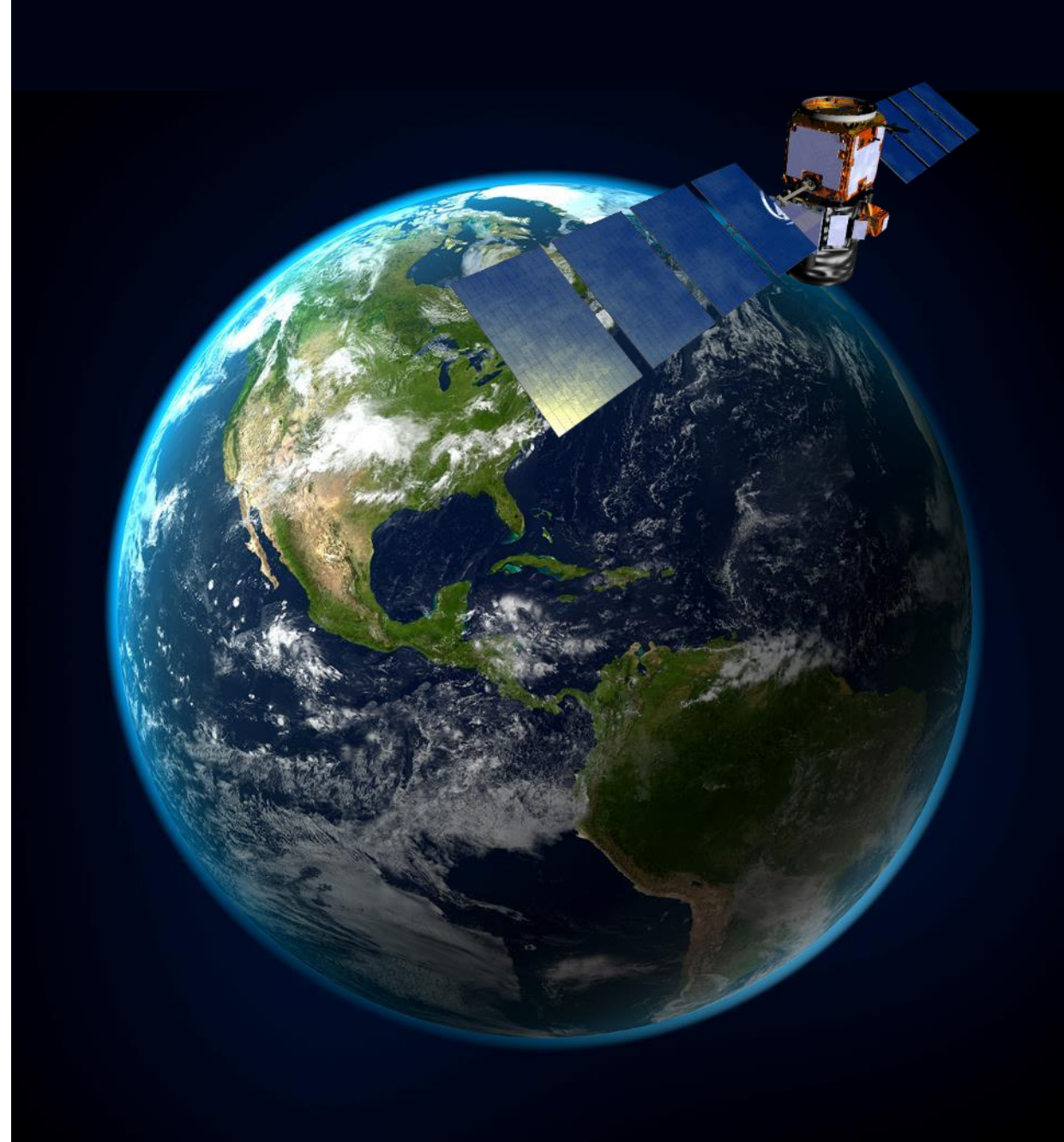
Satellite imagery for the entire nation is now freely available and updated frequently.

PARCELS

Improvements to national parcel datasets have opened access to a critical new address source.

MACHINE LEARNING

Applying Data Science methods such as machine learning to these datasets will allow the Geography Division to rely on automated solutions to improve and maintain the MAF/TIGER System.



ANALYTICS AND CHANGE DETECTION

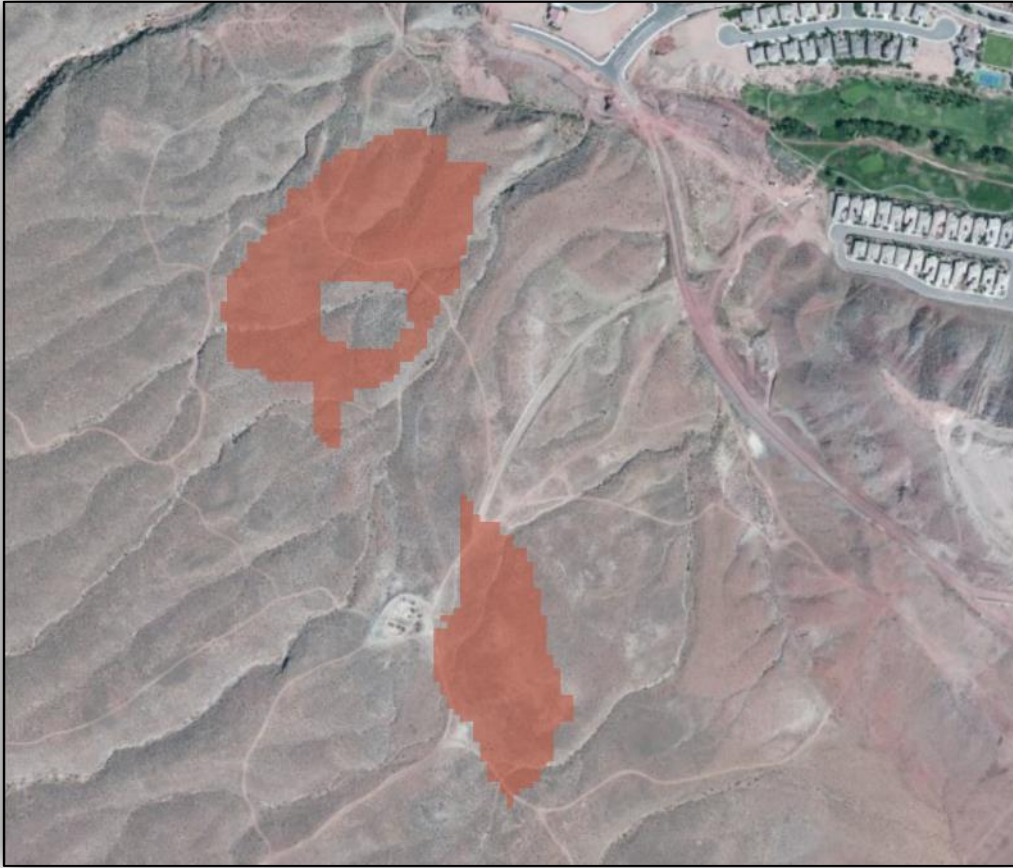


AUTOMATED CHANGE DETECTION

- The Geographic Support Program Analytic and Change Detection Core Working Group plans to run a moderate resolution Automated Change Detection process on the nation every six months.
- Identified Sentinel 2 as the imagery source due to the 5-day revisit period, multiple bands of data per pixel, and manageable size in comparison to higher resolution imagery.
- Parallel models will also be developed, as the Data Science staff explore methods.
- Investigating multiple Cloud-based processing environments to run models against the imagery data.

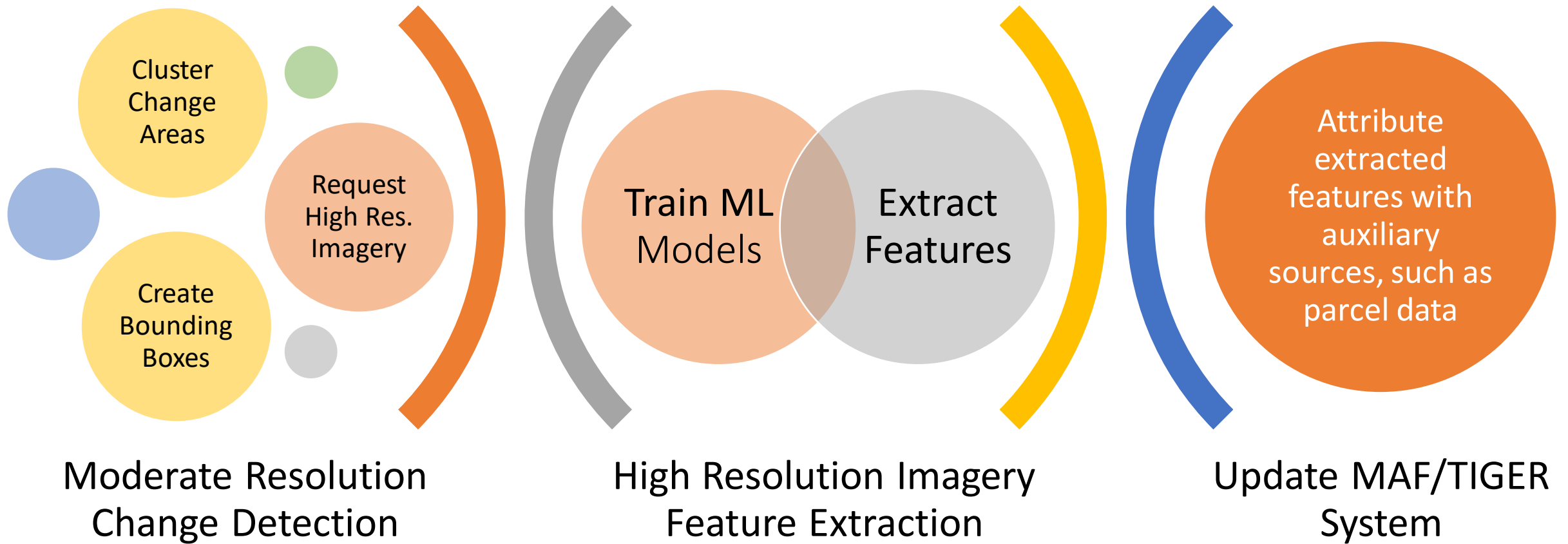
AUTOMATED CHANGE DETECTION

MODERATE RESOLUTION CHANGE DETECTION



AUTOMATED CHANGE DETECTION

HIGH RESOLUTION IMAGERY OBJECT DETECTION



PARCEL MATCHING

Use of commercially available parcel data thru the Homeland Infrastructure Foundation Level Data (HIFLD) program (Department of Homeland Security's open data).

- Process parcel data for address matching (remove duplicates, categorize by parcel types, identify valid addresses).
- Match valid parcel addresses to the MAF.

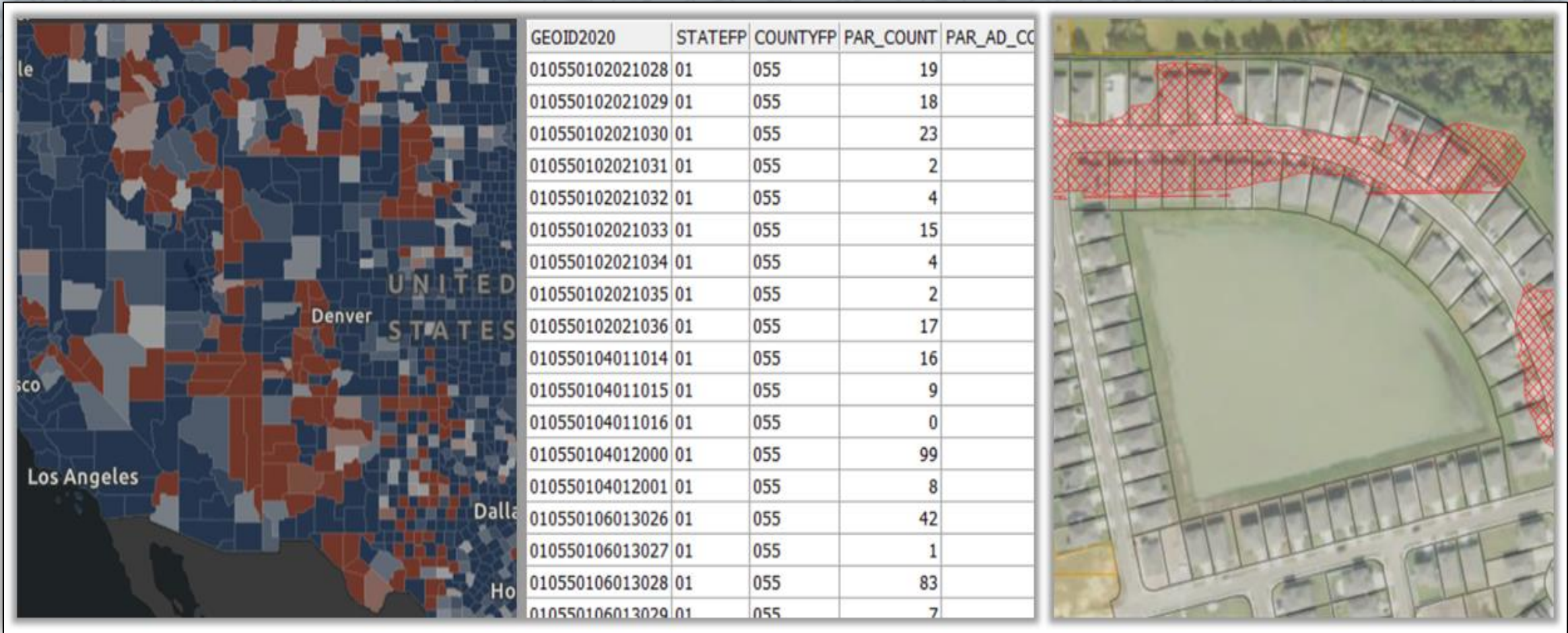
Evaluate results, populate the Intelligence Database, and determine parcel layer quality for updates.

- Type of address match (Exact or probabilistic).
- Type of geographic relationship between the parcel and its matching MAF address (in parcel, or outside of parcel).
- Create summary categories that reflect both types of relationships.
- Interactive review of high-value matches with most impact to the MAF.
- Great potential for automated updates on trusted sources and relationship type.

PARCEL MATCHING



THE INTELLIGENCE DATABASE

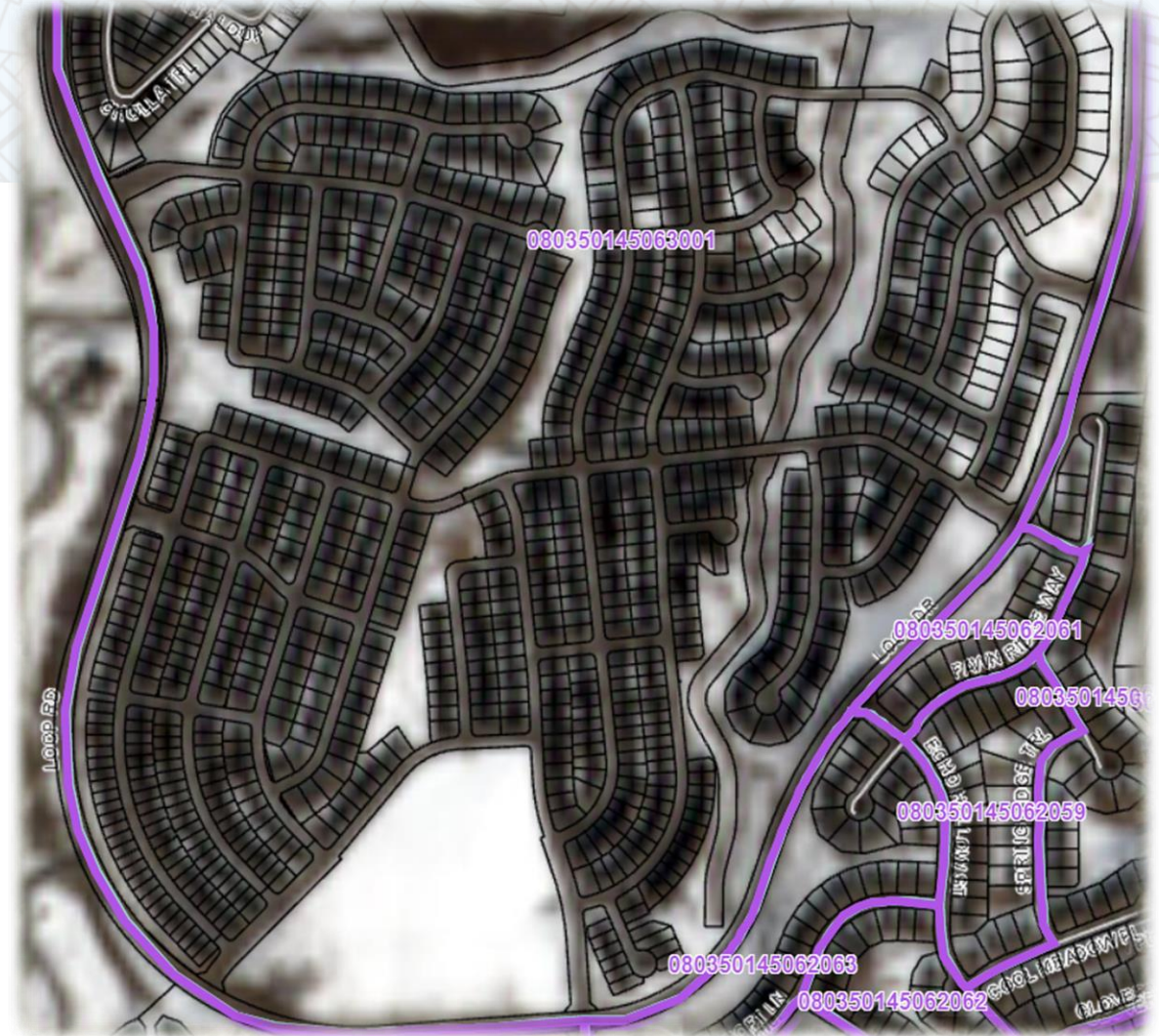


THE INTELLIGENCE DATABASE

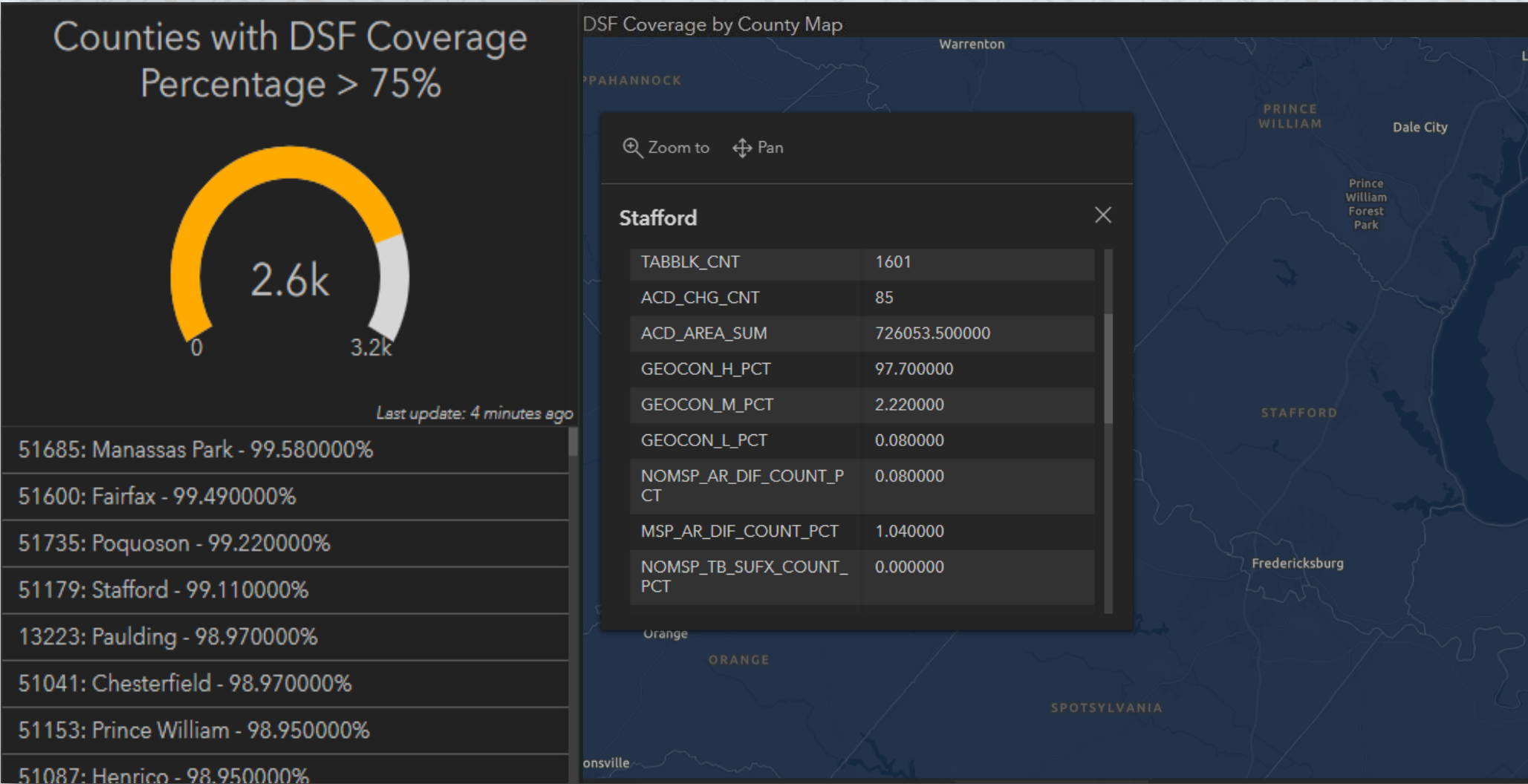
ID Block Report: 080350145063001

- Automated Change Detection: Y
- Automated Change Detection Date: 12/30/2021
- Automated Change Detection Area: 113,179 sq/m
- MAF Unit Count: 161
- DSF Count: 161
- Parcels with addresses: 846
- Parcel-Match to MAF Ungeocoded: 685
- Last Operation: Non-Response Follow Up
- Last Operation Date: 12/22/2020

**685 Ungeocoded MAF Units can
receive a block assignment**



THE INTELLIGENCE DATABASE



THANK YOU!