Data Cloud SOLUTIONS
A WOOLPERT COMPANY

Revolutionizing Property Appraisals:
Exploring Emerging Geospatial Data & Technologies

Presented by:

Daniel Anderson

Vice President, Practice Leader, Woolpert

Agenda

1. Geospatial Technology
2. Integration
3. Sketch Validation
4. Enhanced Change/Error Detection
5. What's Next?
   - Other emerging GIS tools

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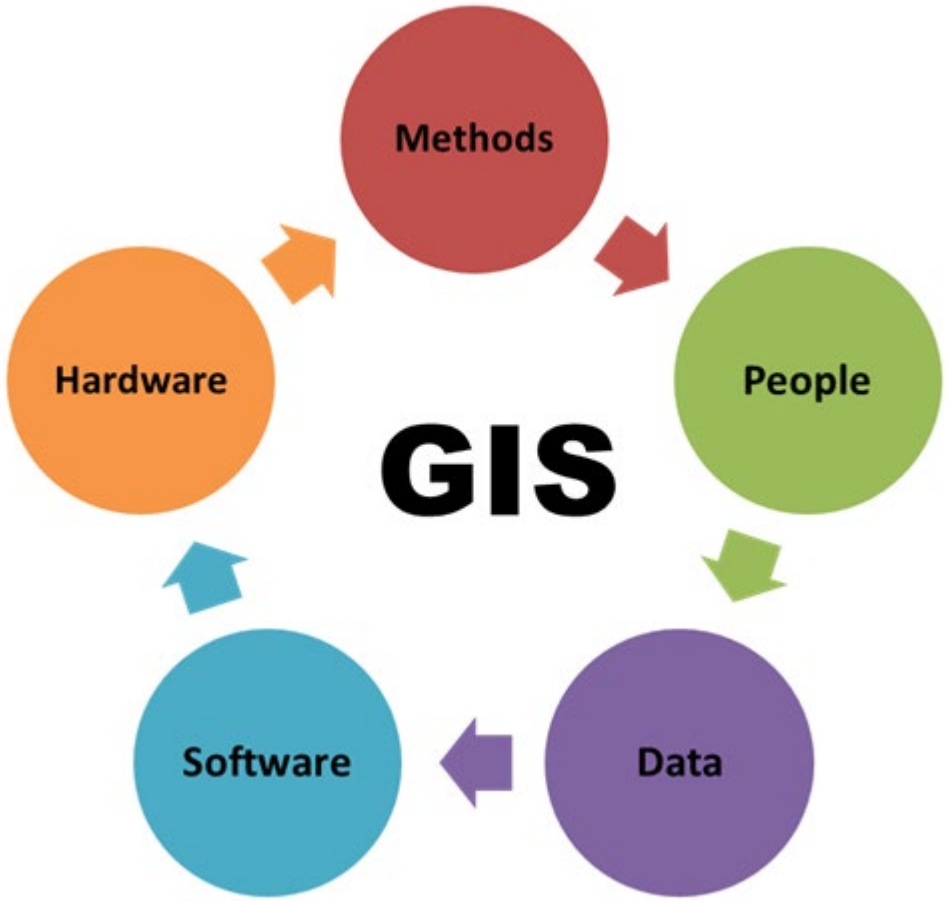
Geospatial Technology

GIS



Hardware - Hardware is the computer on which a GIS operates. Today, GIS software runs on a wide range of hardware types, from centralized computer servers to desktop computers used in stand-alone or networked configurations.

Software - GIS software provides the functions and tools needed to store, analyze, and display geographic information.

Data - Possibly the most important component of a GIS is the data. Geographic data and related tabular data can be collected in-house or purchased from a commercial data provider.

People - GIS technology is of limited value without the people who manage the system and develop plans for applying it to real world problems.

Methods - A successful GIS operates according to a well-designed plan and business rules, which are the models and operating practices unique to each organization.

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GIS Benefits

The following “benefit vignettes” were compiled from interviews and the surveys of federal, state, regional and local governments. Each vignette looks a specific application or implementation and describes the investment and benefits from accrued from the use of GIS.

GIS Benefit Categories

- GIS benefits have been characterized in many ways. For the vignettes published here the benefits fall into one or more categories.
- Increased Efficiency – Saving time and resources by doing current tasks in less time or with fewer resources. Parcel mapping with a GIS instead of hand drafting is a typical example of increased efficiency of GIS in local governments. Doing more with less is another example of efficiency.
- Improved Effectiveness – Doing current tasks in a new way that is more accurate, more complete or improved in some measurable way. Workflow improvement is an example of increased effectiveness.
- Generate Revenue – Using GIS to create a revenue stream that did exist prior to the GIS implementation such as data sales or a GIS based service that can generate revenue.
- Cost Savings/Avoidance – Providing reports, services or data that reduces the need for future investments or expenditures. Cost savings can typically be seen in the same fiscal year, as the GIS activity while cost avoidance is typically extrapolated savings into the future.
- Improved Access/Transparency or Accountability – These are GIS activities that increase the citizen access to information about government data holdings or government activities. In the terminology of the year this has been coined increased transparency or increased government accountability. These are activities that generally increase citizen trust in government by opening processes and decisions.
- Support Decision Making – Improved support for decision making could be considered as increased efficiency or improved effectiveness but it is typically tracked as a separate benefit for organizing information by location that makes it easier for decision makers to visualize impacts, understand data set or foresee the impact of future actions. Mapping existing data for emergency response is one example of support for decision making but this could also take the form of illustrating funding allocations by geography to support budgeting or any number of data visualization or organization enhancements.

Source: Data collected by Nancy Von Meyer, Fairview Industries

One of the first examples of spatial analysis

This map of London was created by John Snow in 1854. London was experiencing a deadly cholera epidemic, when Snow tracked the cases on this map. The cholera cases are highlighted in black. Using this map, Snow and other scientists were able to trace the cholera outbreak to a single infected water pump.

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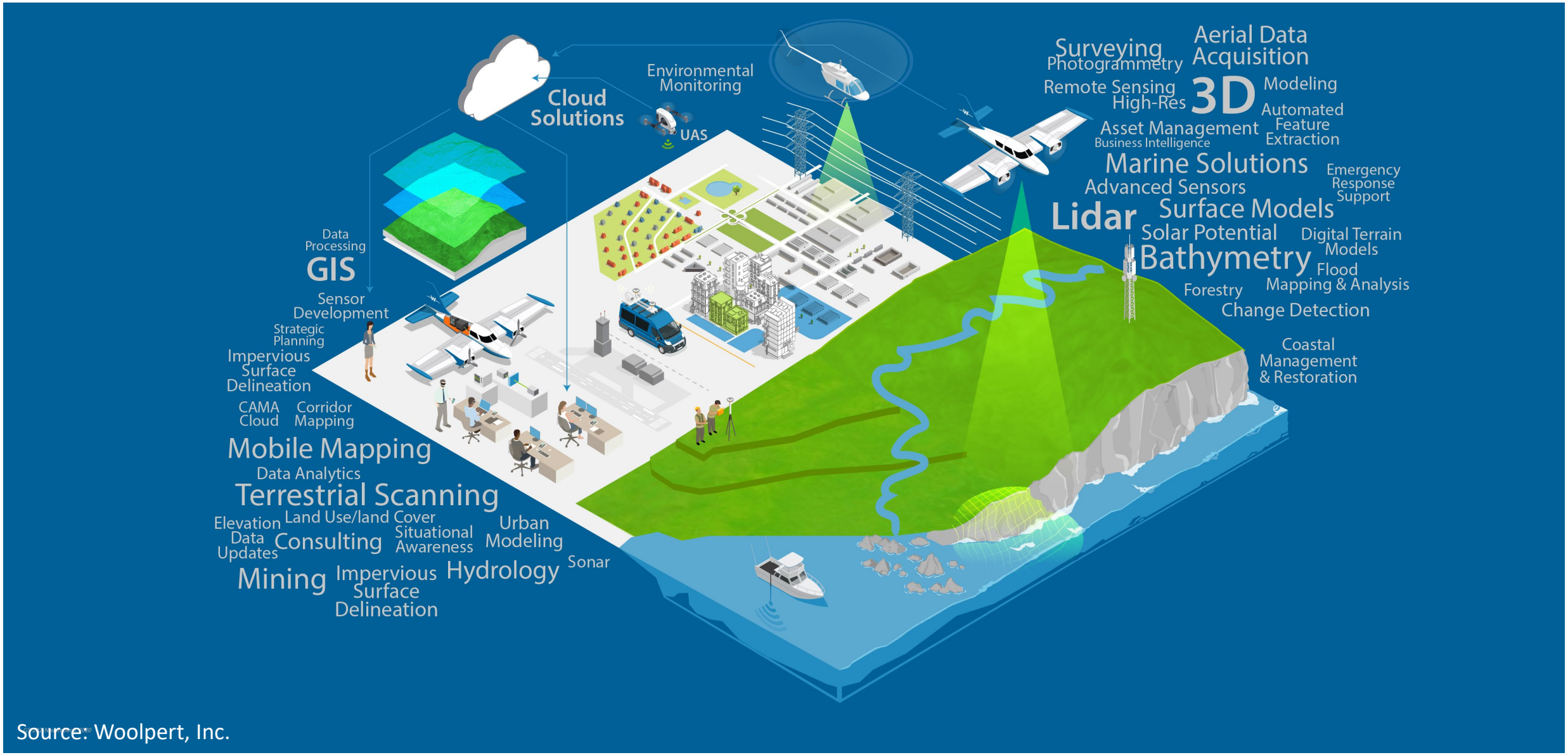
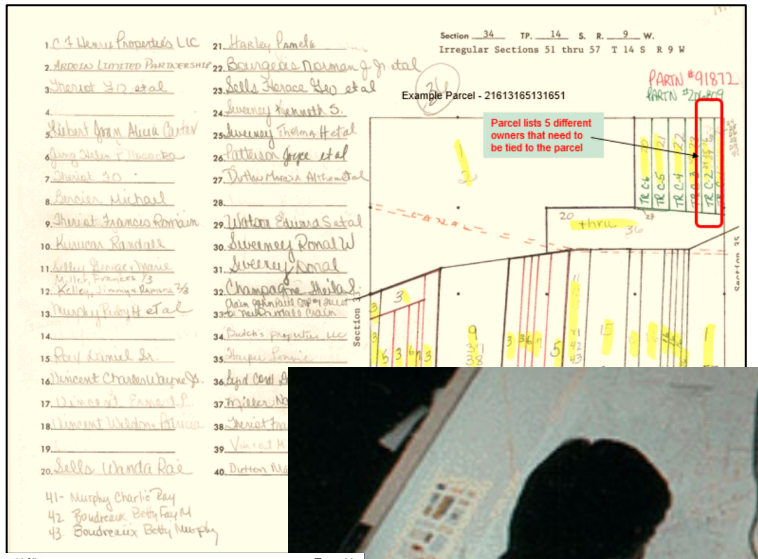
Today Geospatial is Everywhere

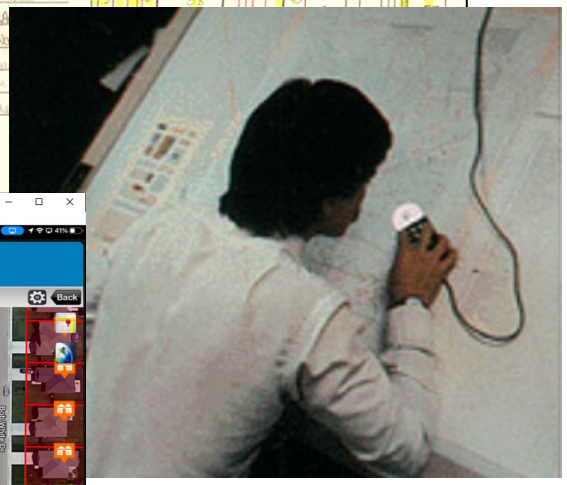


Source: Woolpert, Inc.

Property Mapping

- Paper / Mylar – early days of parcel mapping
- Digitization – digitizing boards allowed for trace digitizing parcel maps
- Arc/Info launched (1980's) – GIS software to edit splits / joins
- GIS Visualization tools became available – Spatial Analysis combining digital maps with databases
- Mobilization of field devices
- Today – cloud-based, open data platforms are improving integration potential





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Assessors were the trend setters

Assessors planted the seed that local gov't GIS grew from – it all started with the parcel layer

- *Nearly every aspect of business and government can be tied to a land parcel*
- *Once the base orthophoto and parcel layers were in place, other offices / departments began to build off it*

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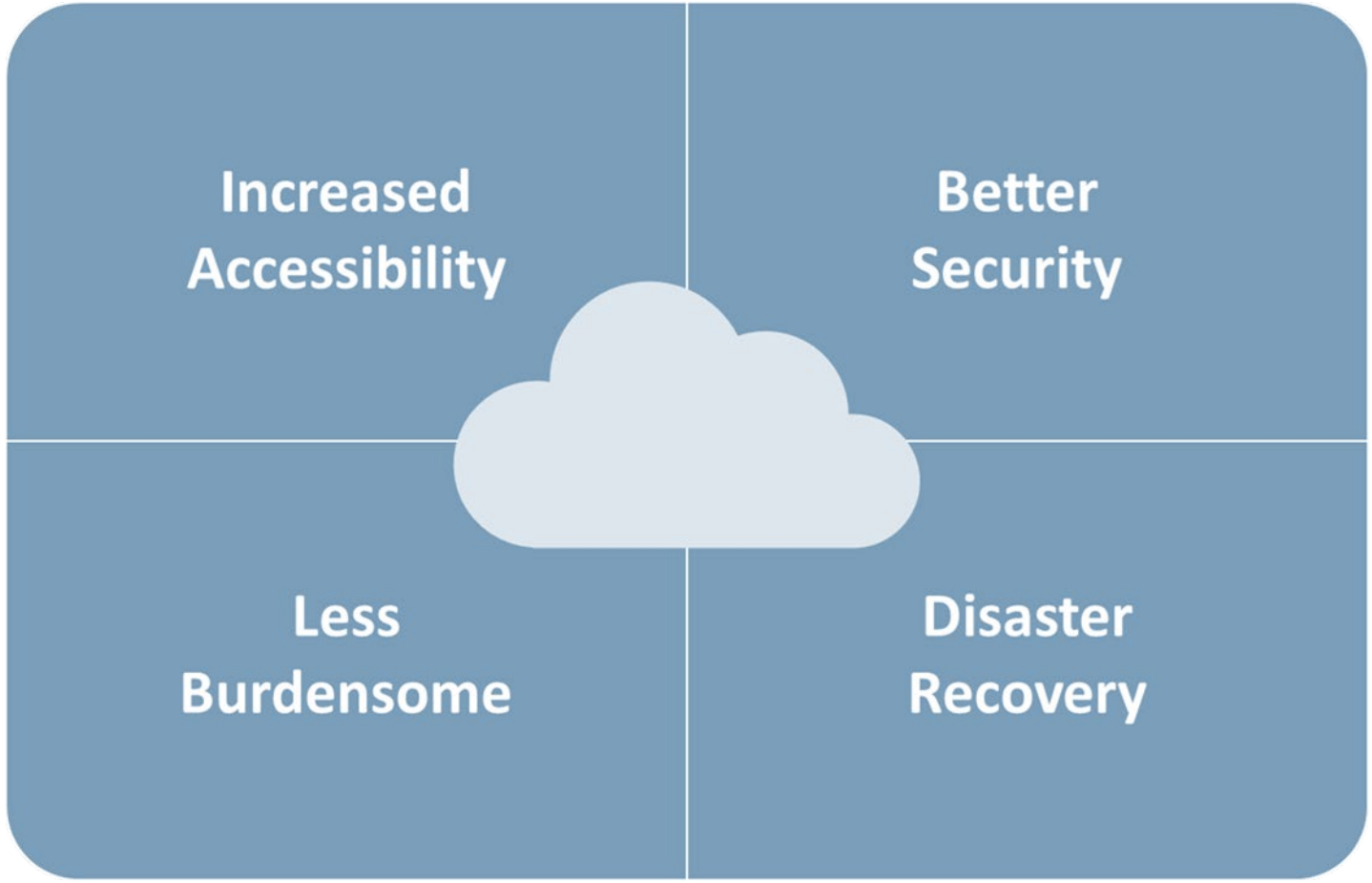
Integrating GIS & CAMA *and…*

Integration – Starting with the Cloud



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Integration – Starting with the Cloud

- Combining cloud-based solutions and open data platforms will unlock your true potential!
- The largest hurdle regarding integrating the data and systems for the betterment of the office and the public often is not a technical one; rather, it can be private vendors locking away what most would consider to be public data.
- Vendors should not be permitted to block the integration of data with and between multiple systems.

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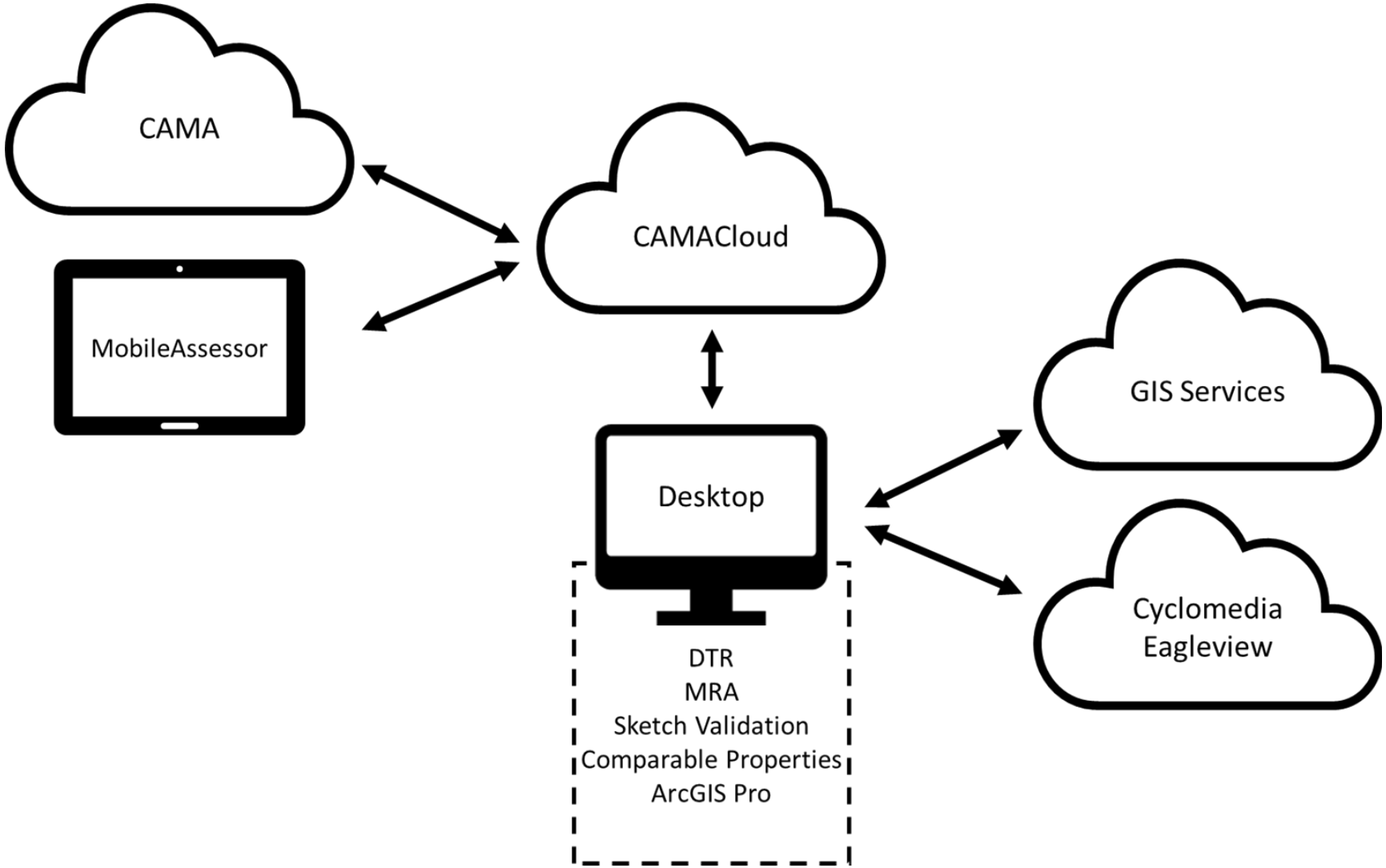
Integration – Franklin County, OH Example



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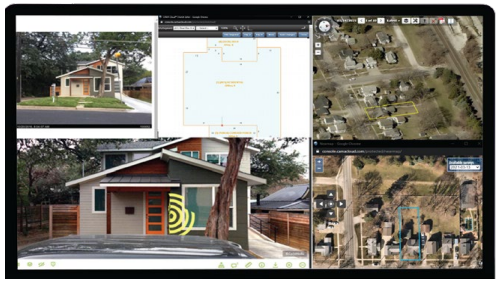
Integration – Franklin County, OH Example



Desktop Review

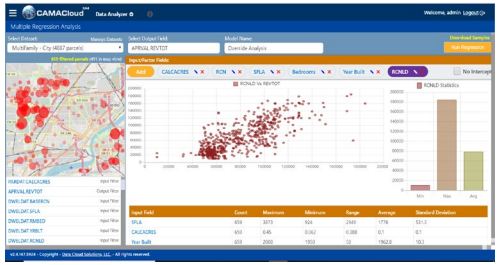
- Workflow driven
- Remote verification
- Flag discrepancies
- Schedule field visits

Sketch Validation

- Compare ground evidence, sketches and CAMA data
- Pre-canvasing
- Flag or correct errors

Comparable Properties

- Comp reporting and uniformity reports
- Estimate sold prices for unsold properties
- Reduce appeals



Data Analyzer w/ MRA

- Perform MRA
- Test valuation models
- Identify outliers
- Don't need to be a stats expert

Data is always current across all tools

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Integration – Franklin County, OH Example

Mobile Application

- Optimized travel routing
- Sketching
- Instant photo association
- Thematic mapping
- Real-time sync b/w Mobile and Admin Console
- Data never frozen or lost due to device issues
- Real time QC (staff and vendors)
- Field location tracking
- Reports and dashboards

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Georeferenced Sketch Validation

Why Sketch Validation?

- Meets IAAO Standard
- Fewer appeals
- Less reviews = reduced field work hours
- Easier reappraisals
- Increased data accuracy = less overrides
- Ensures fair and equitable taxation

IAAO Standard on Mass Appraisal of Real Property

3.3.4 Maintaining Property Characteristics Data

Property characteristics data should be continually updated in response to changes brought about by new construction, new parcels, remodeling, demolition, and destruction. There are several ways of updating data. The most efficient method involves building permits. Ideally, strictly enforced local ordinances require building permits for all significant construction activity, and the assessor's office receives copies of the permits. This method allows the assessor to identify properties whose characteristics are likely to change, to inspect such parcels on a timely basis (preferably as close to the assessment date as possible), and to update the files accordingly.

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Reasons for Incorrect Sketches

- Lack of effective permitting systems
- Unpermitted improvements
- CAMA conversion errors
- Errors with initial measuring / listing of structures
- Address errors
- Demolitions

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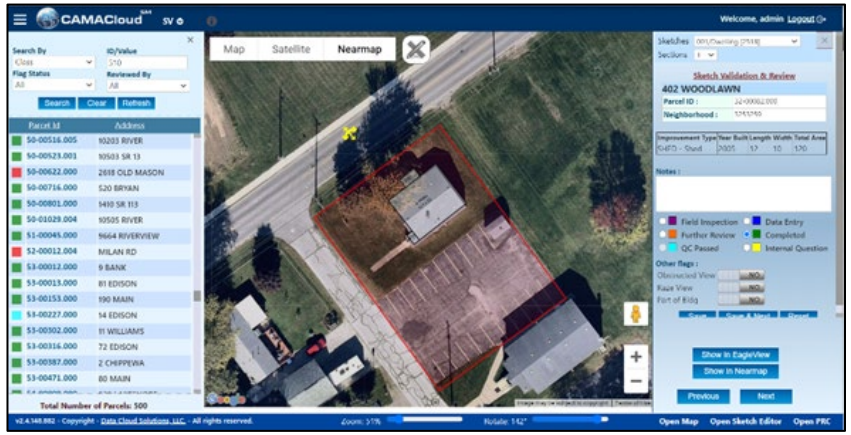
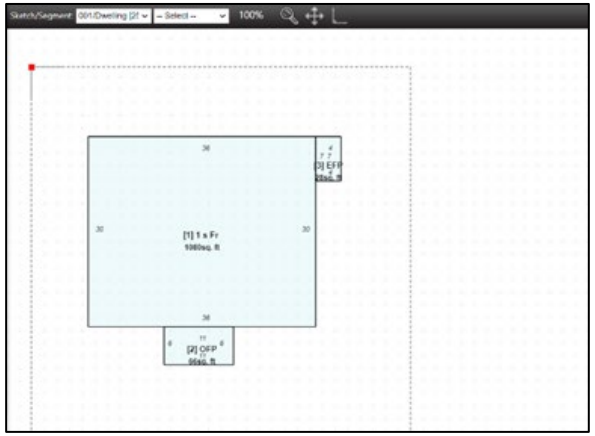
The DCS Sketch Validation Difference





- Current CAMA data, sketches and imagery provide a **more comprehensive approach** than simple imagery comparisons, including items not sketched
- CAMA data provides **greater accuracy**
- All changes are synced across all platforms

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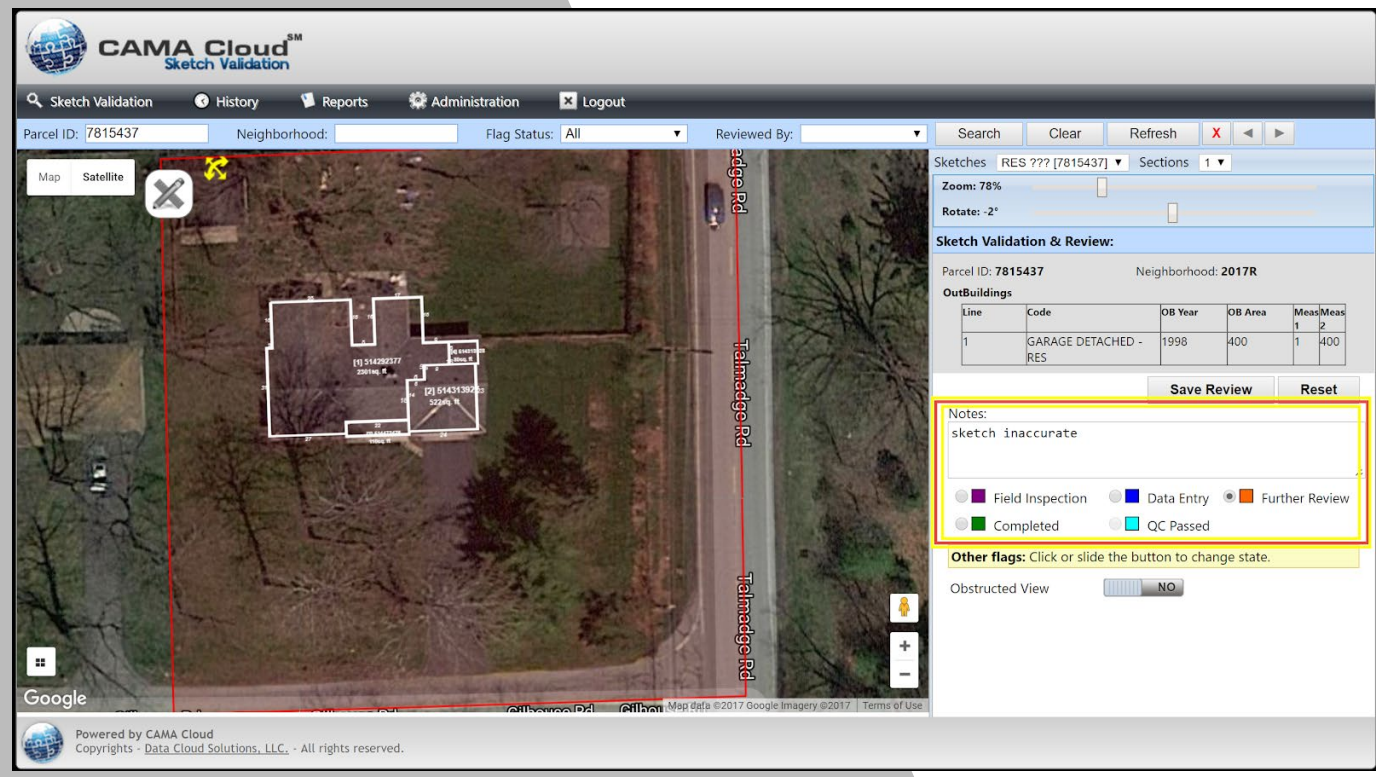
DCS Sketch Validation Sample



Sample sketch from CAMA, updated from MobileAssessor

- Auto-scaled
- Issues / Errors flagged
- Includes sketched and un-sketched data

Therefore, data is **never** stale.

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Parcel ID :	306325
Neighborhood :	1533

Notes :

Front and Rear additions / sketch inaccurate.

- Field Inspection
- Data Entry
- Further Review
- Completed
- QC Passed

Other flags :

Save Review | Reset

DCS Sketch Validation Sample

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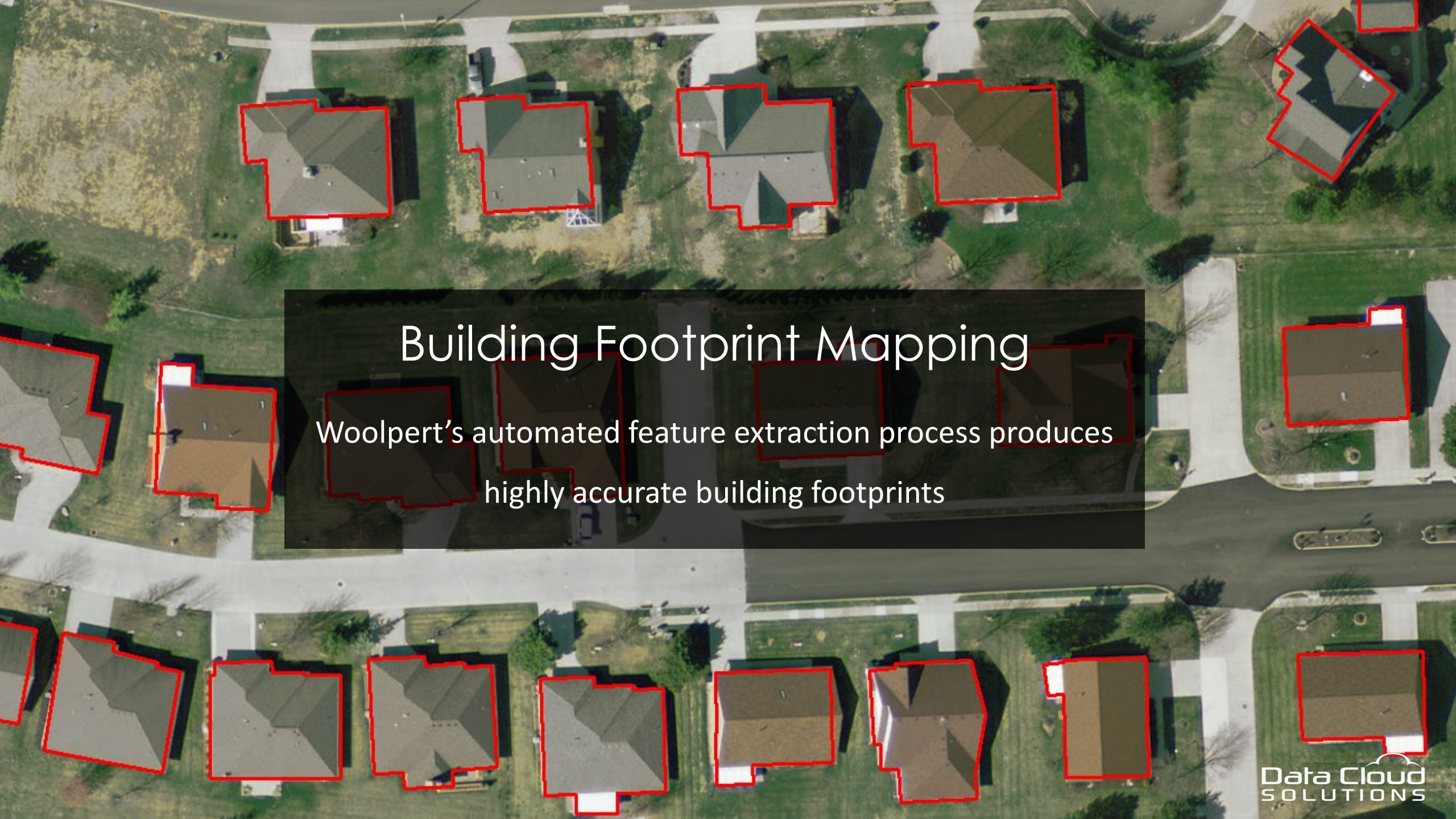
Introducing: Enhanced Change + Error Detection

Next Generation of Sketch Validation: Error Detection

Leveraging geospatial data and deep learning using:

- Building Footprint Mapping
- Heat Maps
- Current CAMA Data
- Intelligently-Ranked Worklists



Building Footprint Mapping

Woolpert's automated feature extraction process produces highly accurate building footprints

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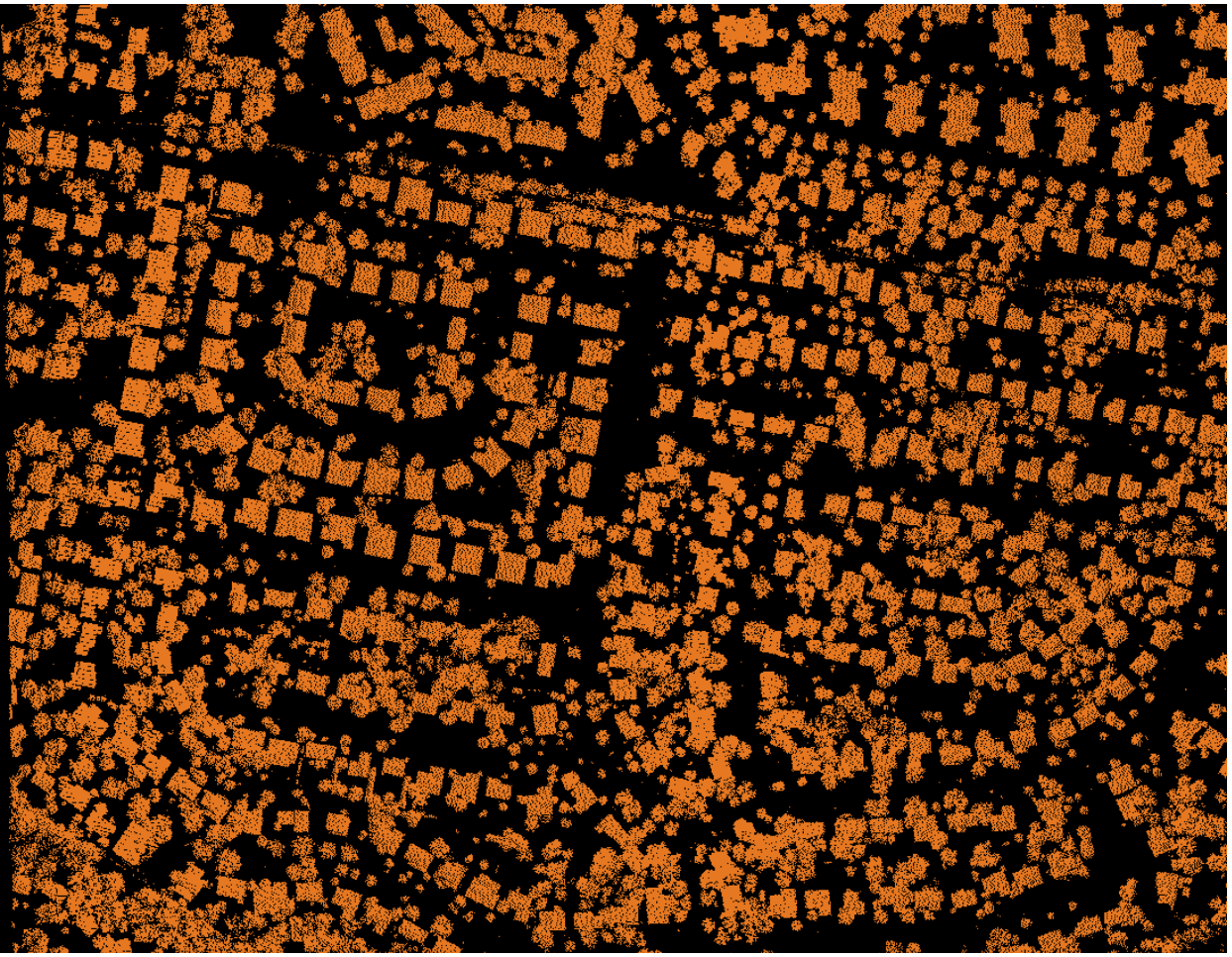
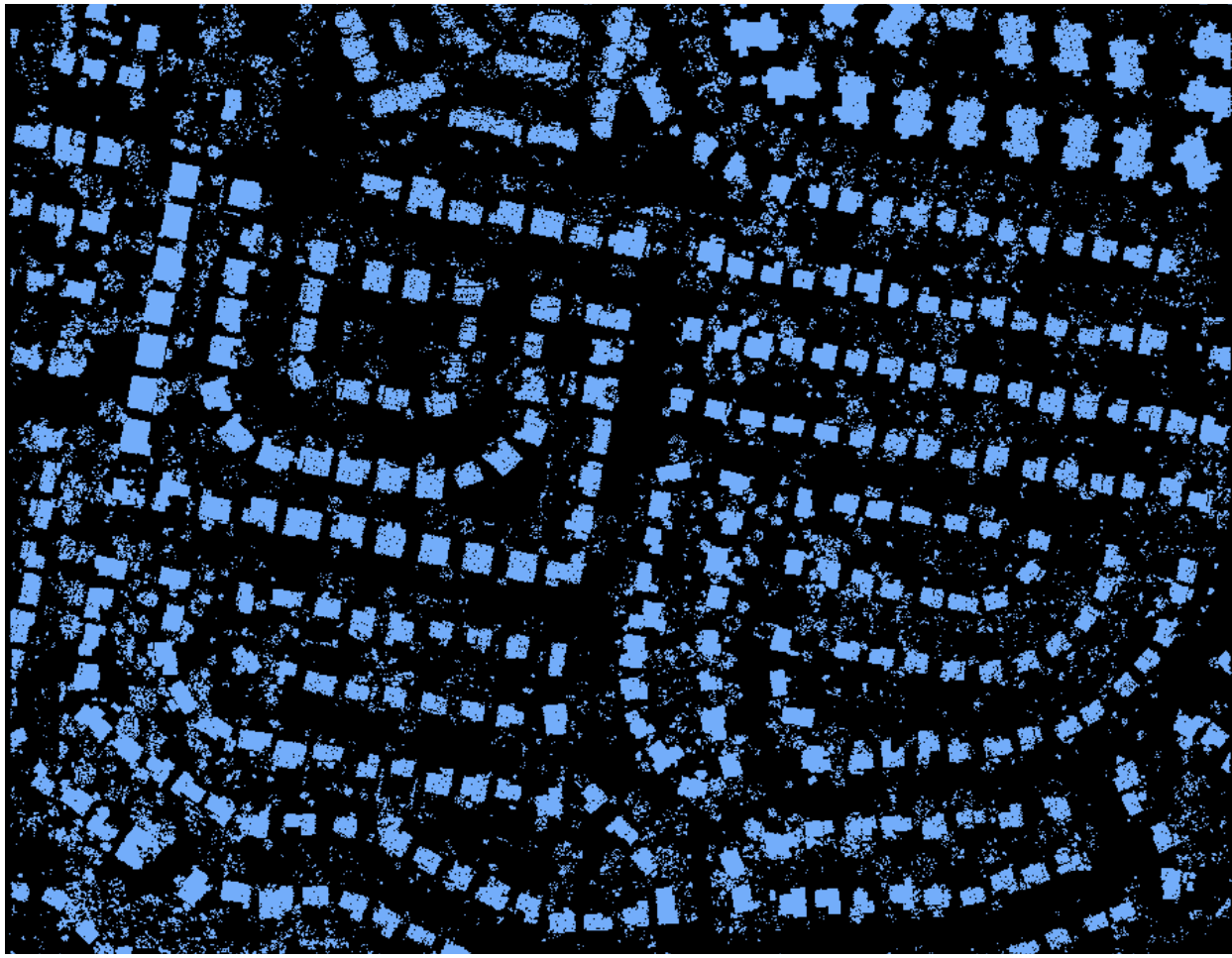
Building Footprint Mapping





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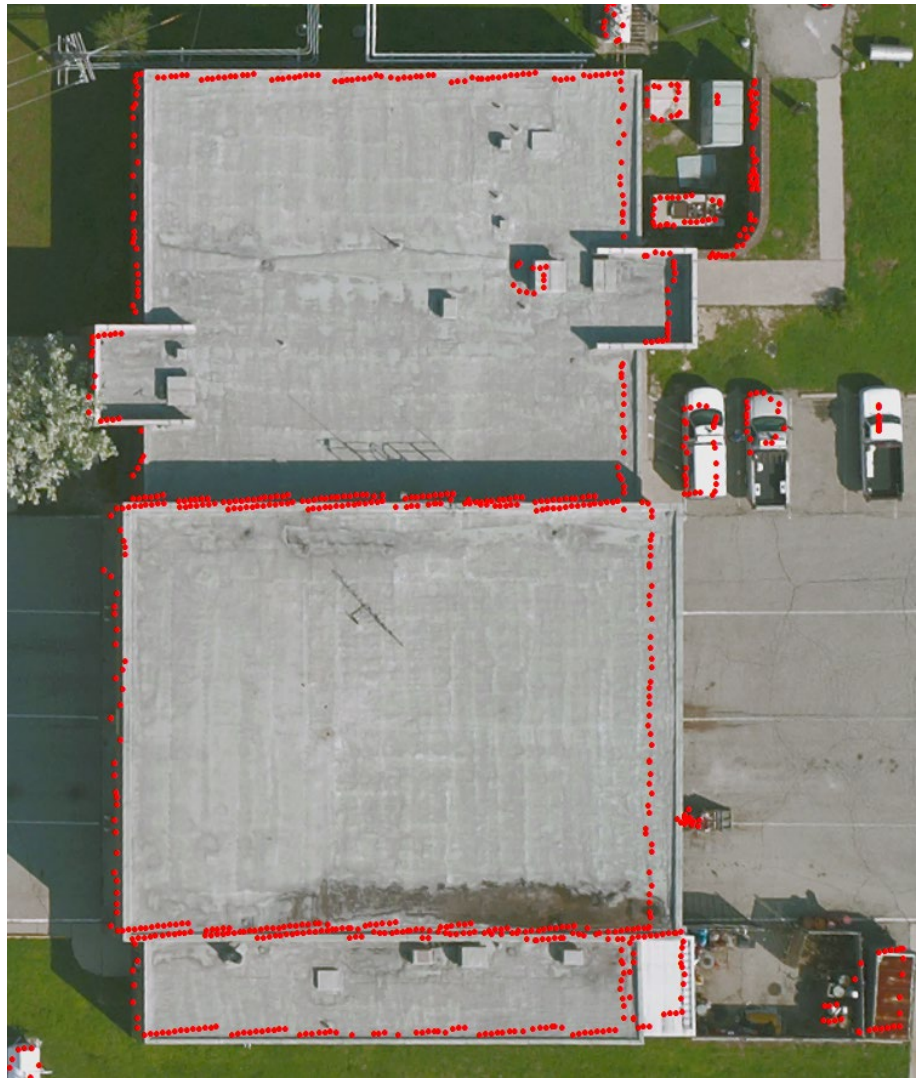
Building Footprint Mapping



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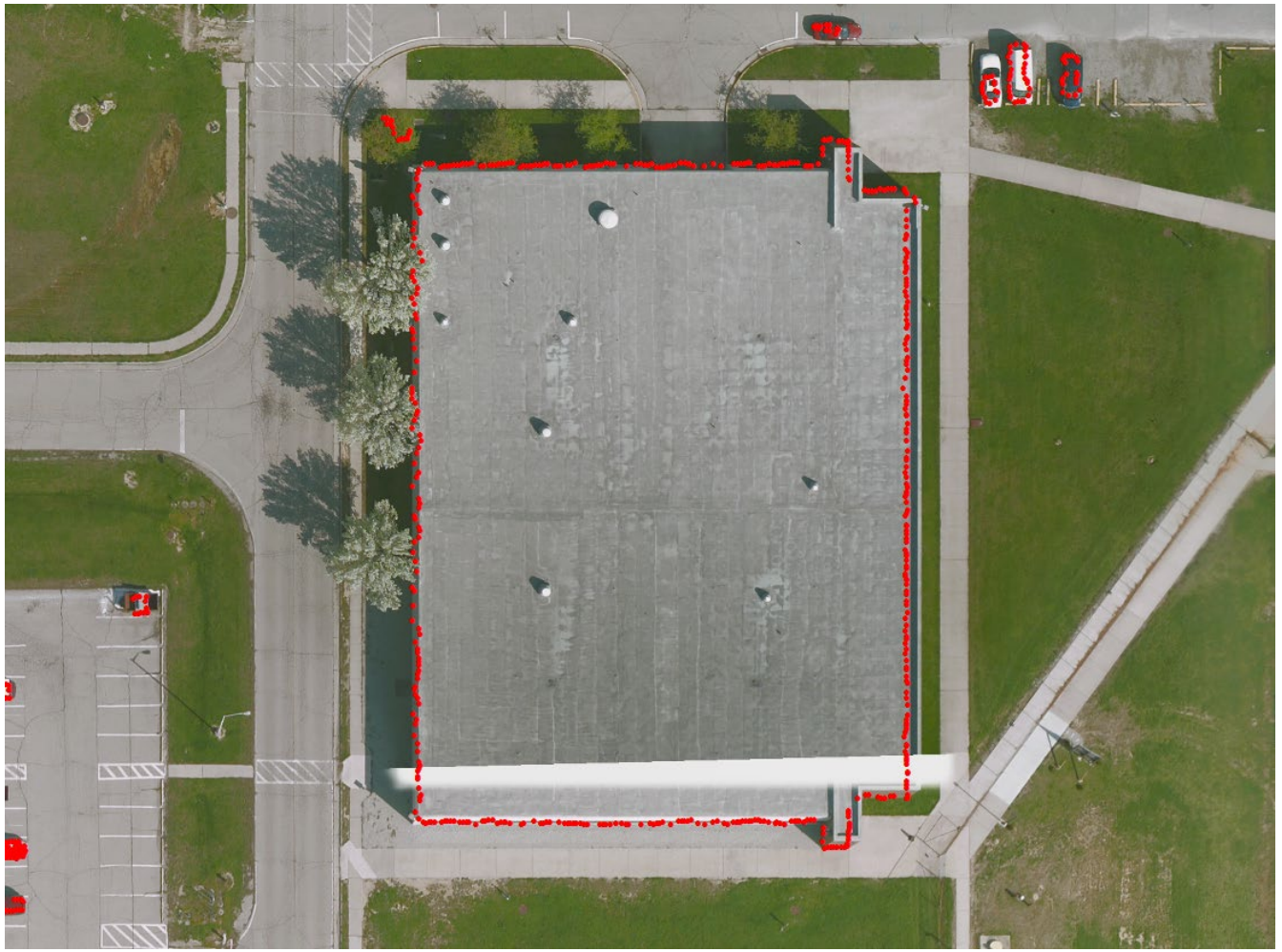
Building Footprint Mapping



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Building Footprint Mapping

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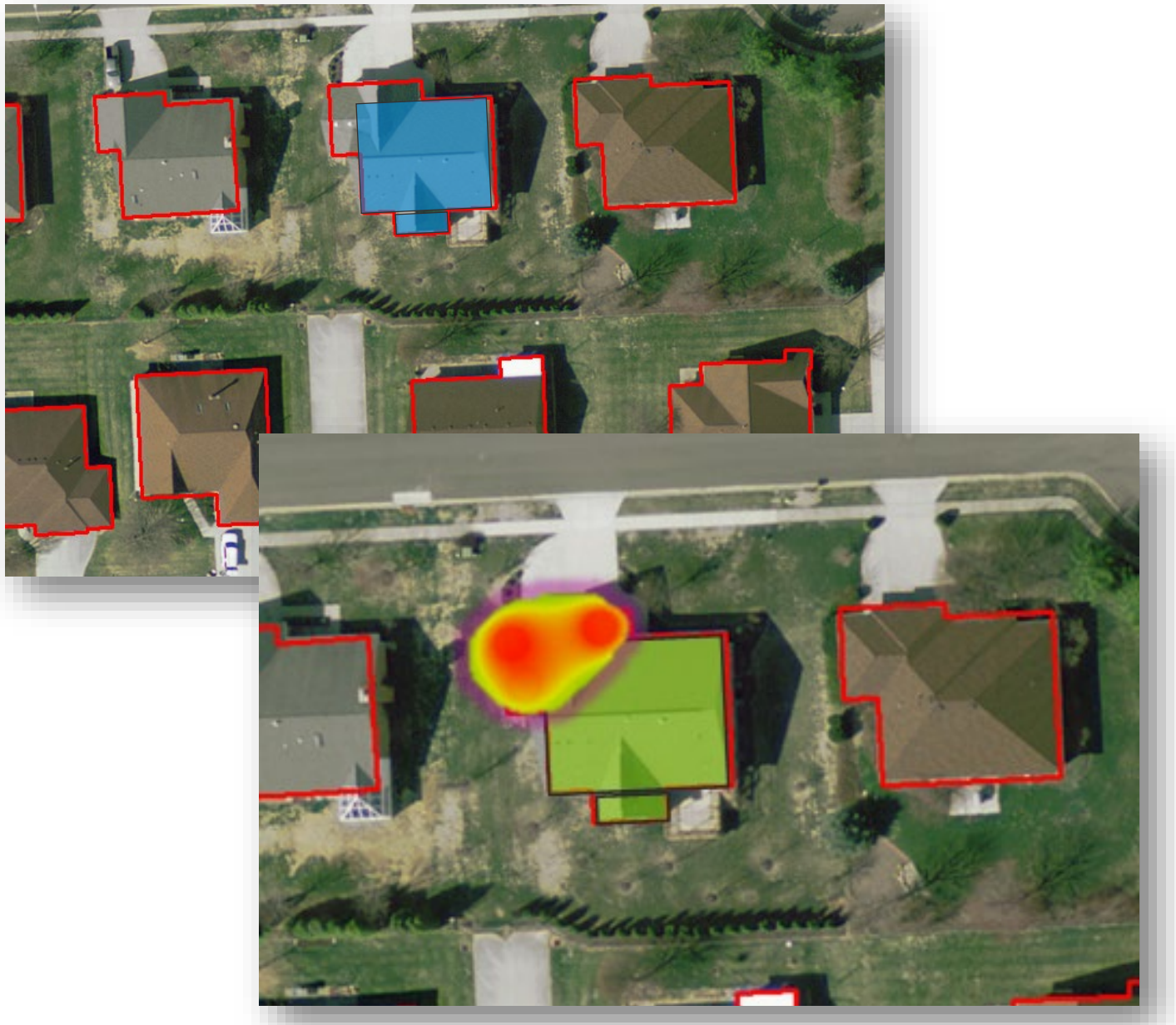

Heat Maps

The building footprints can then be oriented with sketches from CAMA already within the Sketch Validation module.

Allowing Heat Maps to identify inconsistencies and areas of major change.

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Heat Map-Based Rankings

- Potential changes generated
- Comparison of un-sketched CAMA data with imagery
- Review of permit data and value changes from CAMA
- Resulting in an **intelligently-ranked worklist**
- Allowing users to focus on the most probable issues first

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Automated (Machine Learning) Change Detection Analysis

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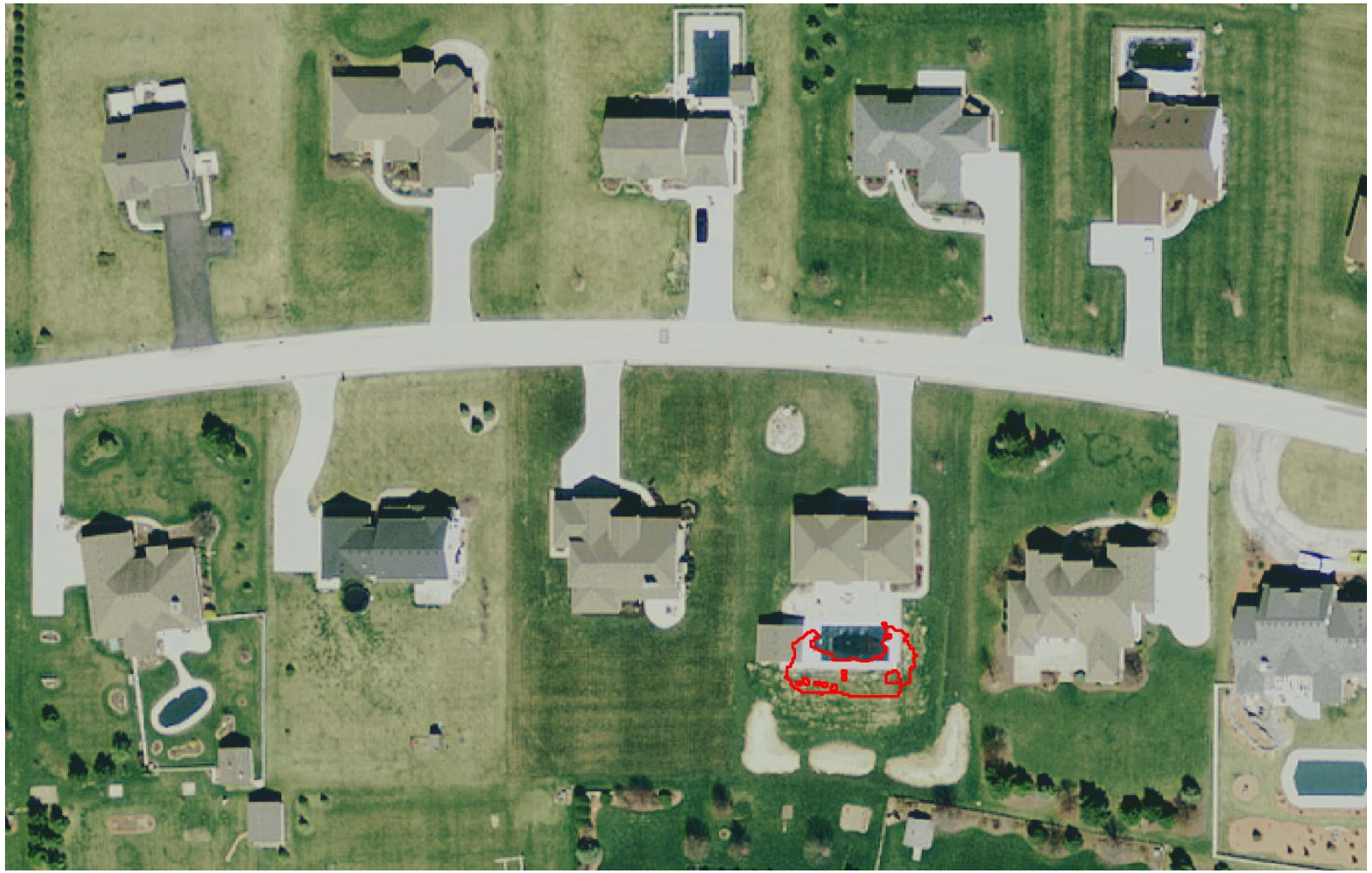

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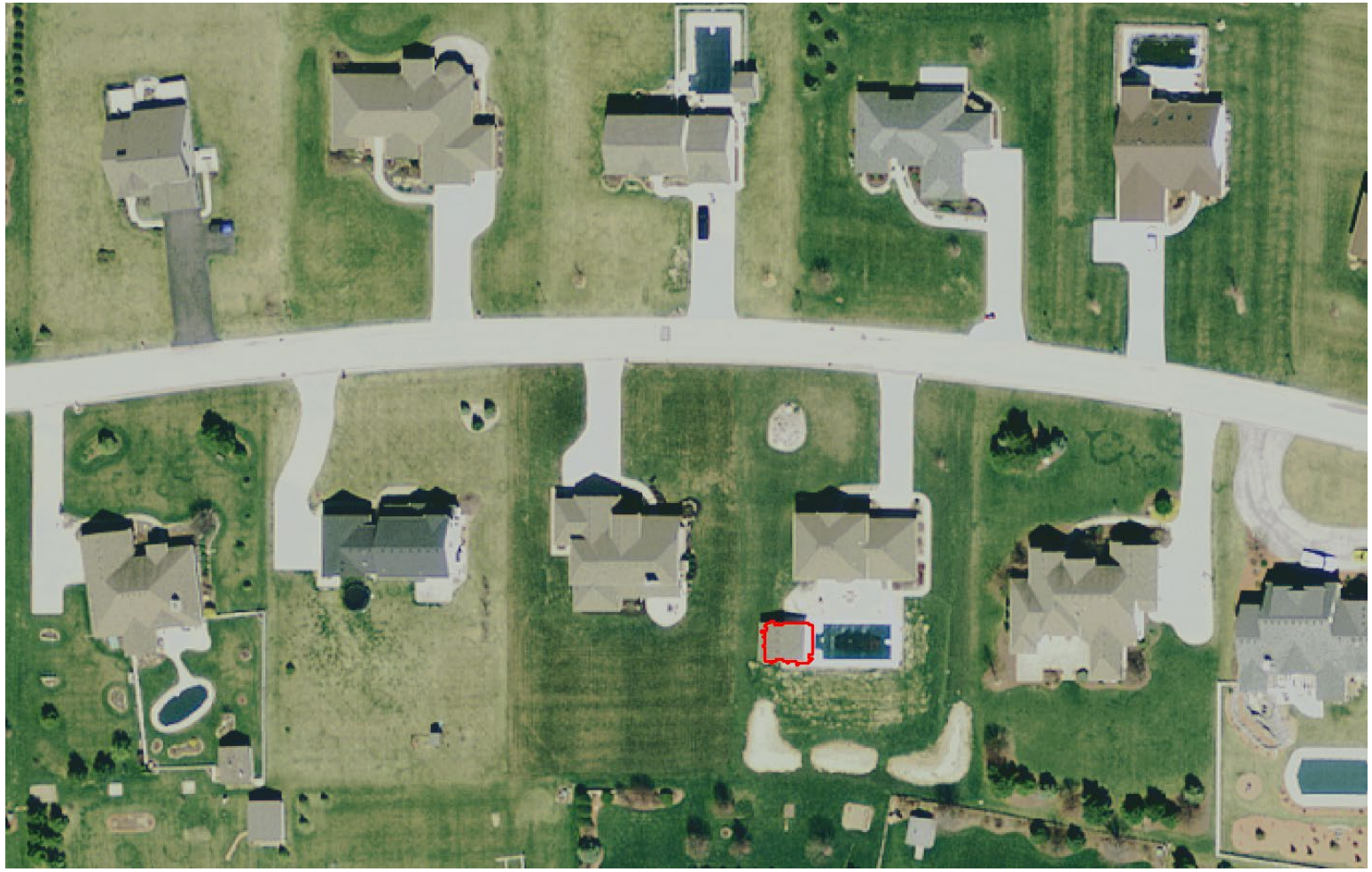

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Automated (Machine Learning) Change Detection Analysis

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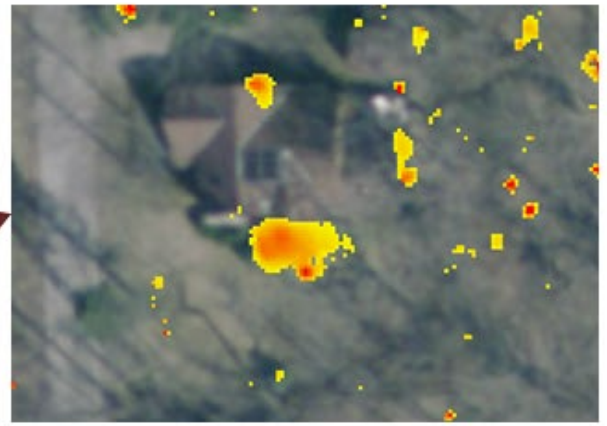
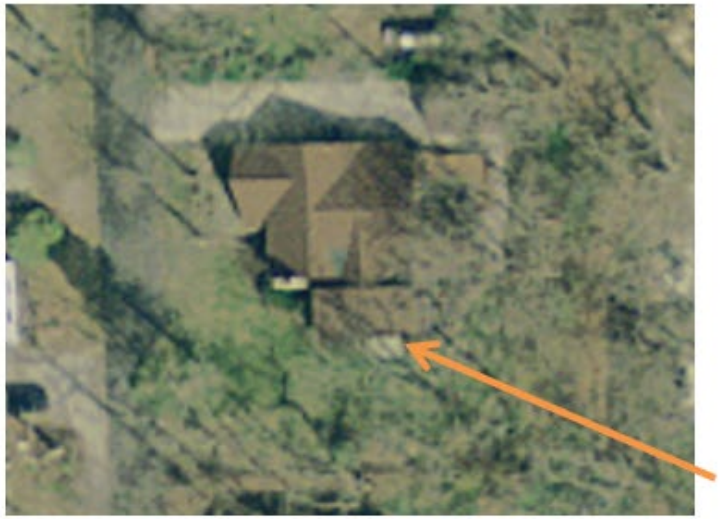
Automated (Machine Learning) Change Detection Analysis

2006



Change heat map



New deck

2011

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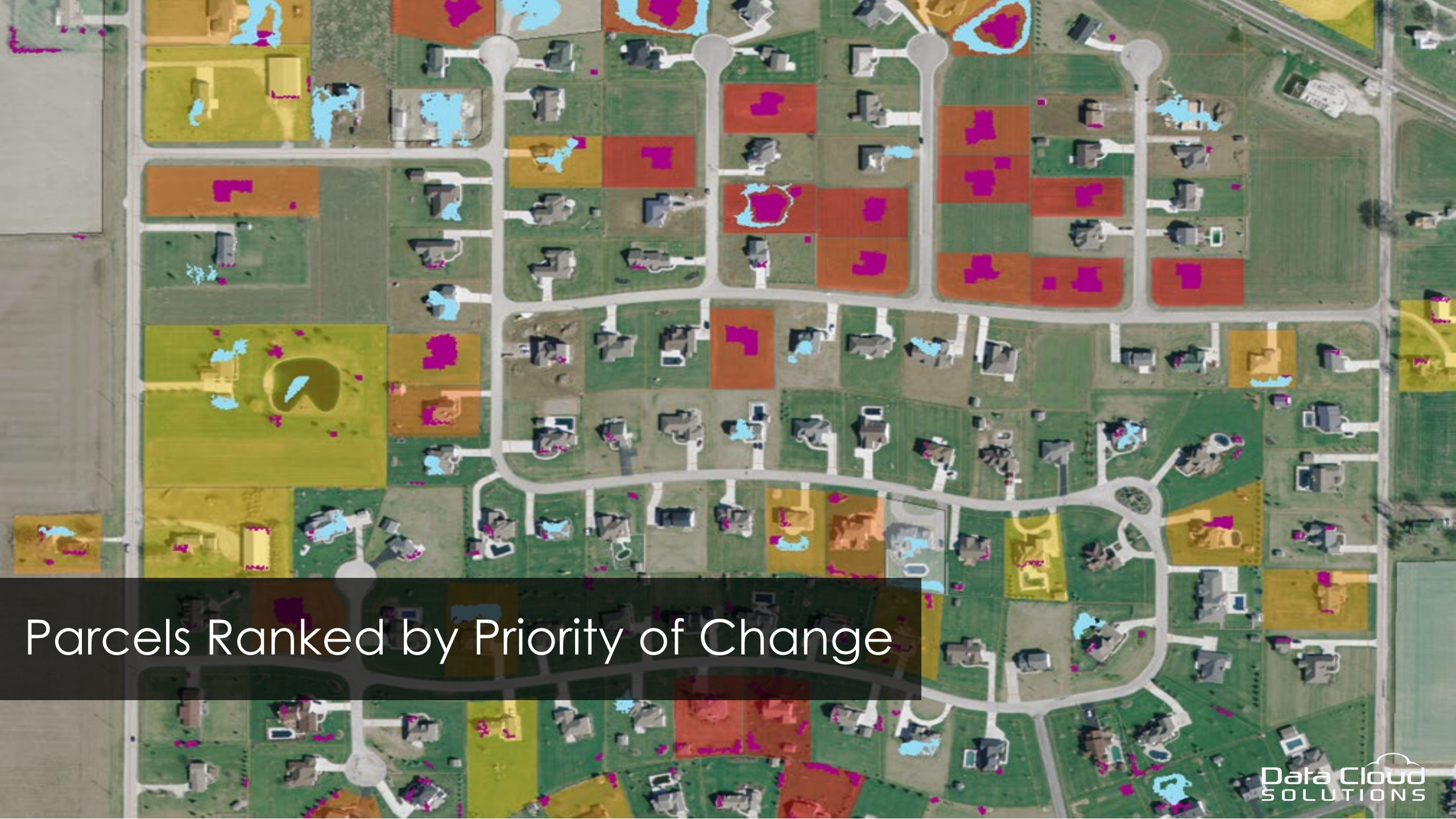

Parcels Ranked by Priority of Change

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Change Detection Analysis

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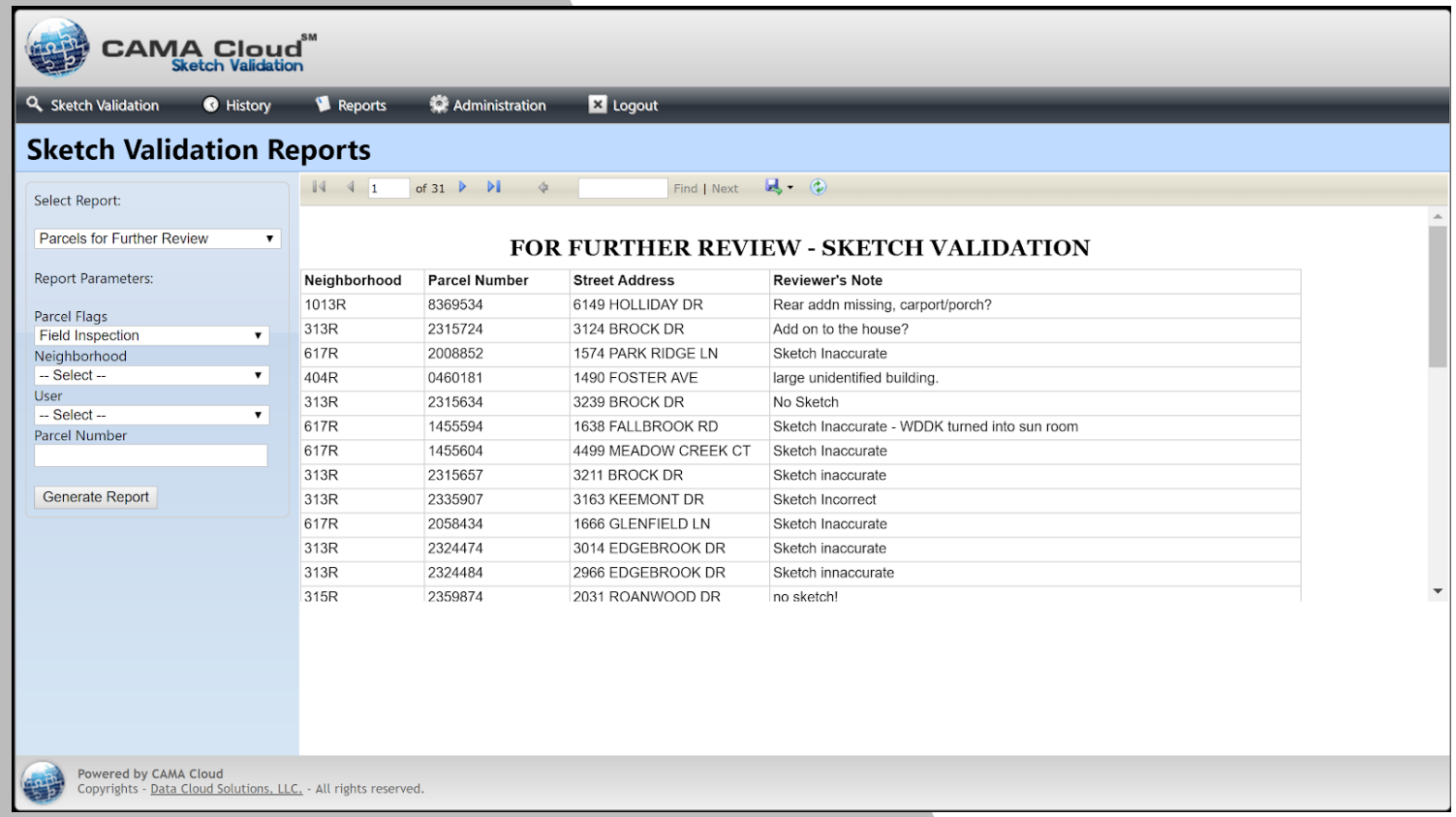
Assigning Field Work



Generate detailed reports to easily assign parcels for Appraiser field visits

Field Visit Reports:

- Increase productivity
- Provide flagged parcels
- Note completed visits
- Identify neighborhoods
- Provide user history

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Benefits

Summary of Benefits

- Integration of technologies produces the most accurate and comprehensive sketch validation/change detection tools on the market
- Allows users to quickly and efficiently identify properties that require further review or edits
- Discover new construction, razes and clerical errors before going to the field
- Substantially reduces total field work hours needed for review
- Fewer appeals
- Easier reappraisals and less overrides due to increased data accuracy
- Ensures fair and equitable taxation

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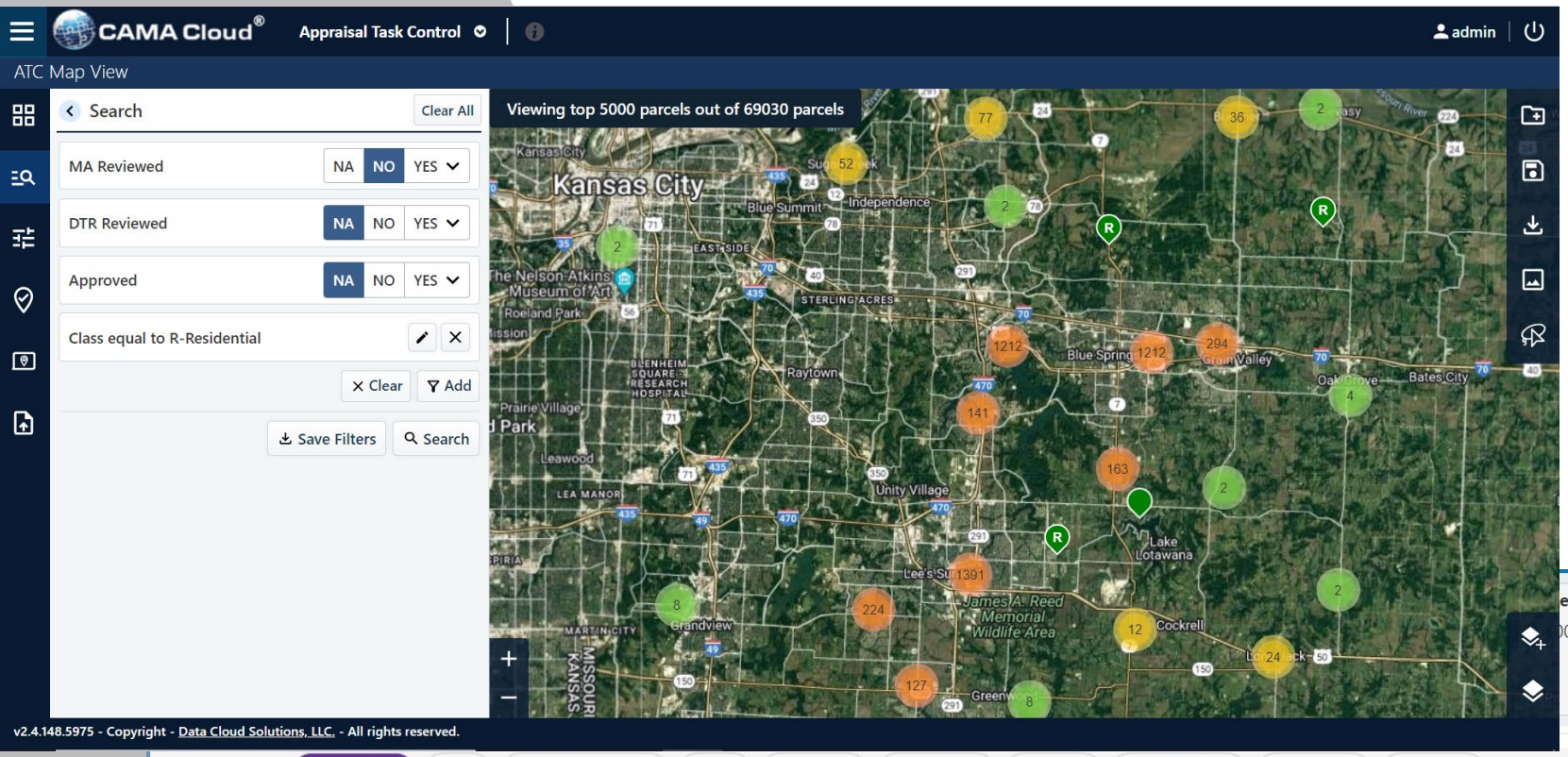
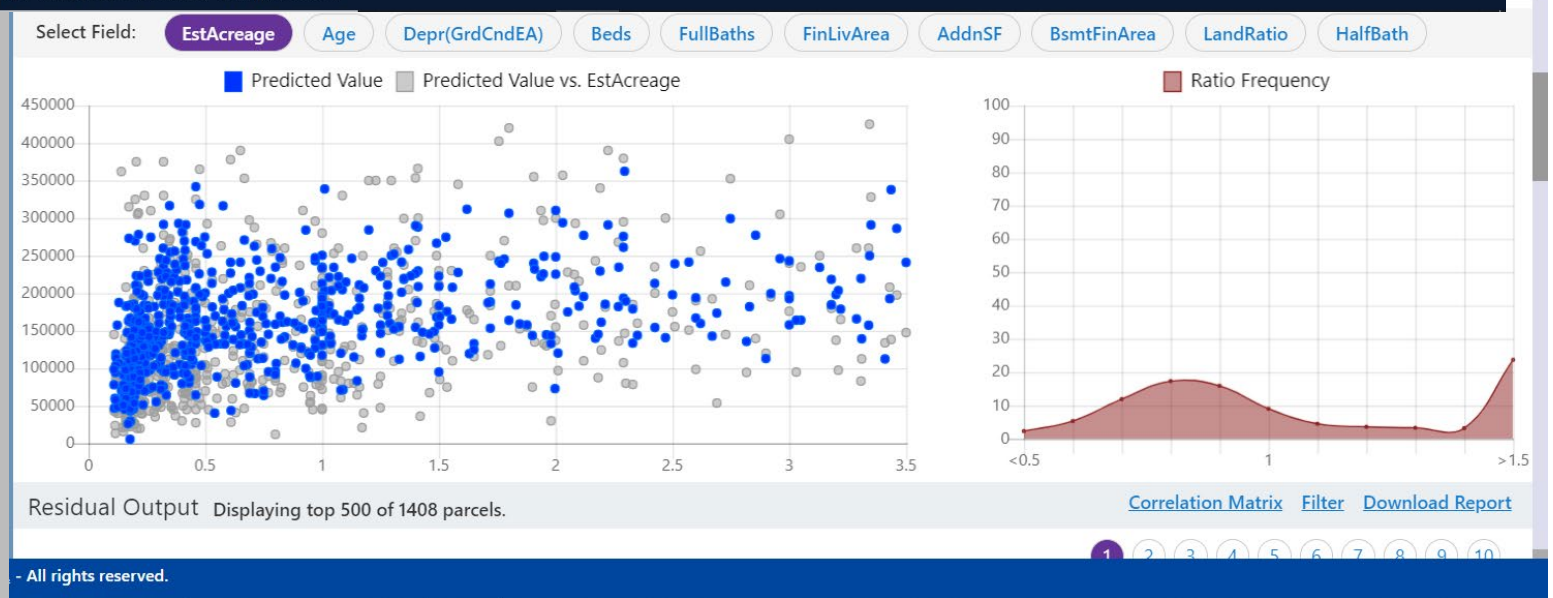
What's Next?





On-the-fly B.I.

(business intelligence)

Generate analytical feedback against historic, current, and future data.

To assist with things like:

- Outlier Detection
- Valuation Model Calibration
- Geo-based Assignments
- Neighborhood Delineation
- Status Reports
- Reappraisal Planning

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Demonstrate Other Emerging, Integrated GIS Tools

(as time allows)

Questions?

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THANK YOU

Additional questions? Contact:

Daniel Anderson

Daniel.Anderson@woolpert.com