

GIS in Assessment Operations

Lauren Voelker, Sr. Solution Engineer



Agenda

- Common Assessor Challenges
- GIS and Integration in Local Government
- Current State of Technology
- Parcel Management
- GIS-Based Valuation Analytics
- Apps
- Public Engagement
- Resources

Land Records and Assessment Challenges

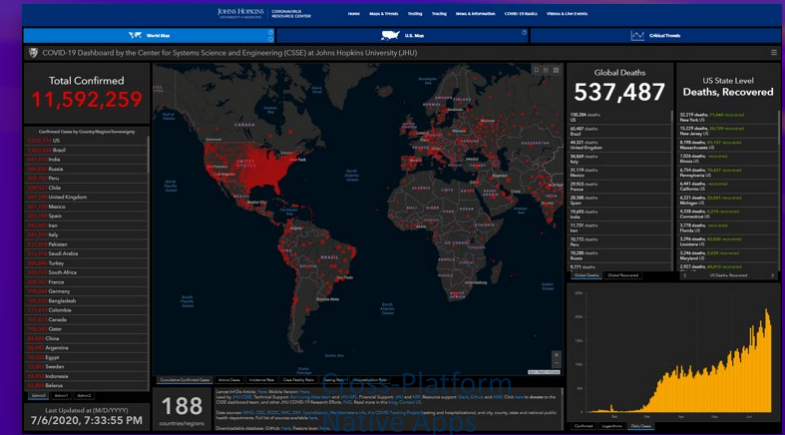
Common challenges in land records, tax, and assessment operations

- Maintaining public trust and confidence
- Fulfilling public data/map requests
- Reducing counter traffic & telephone calls
- Keeping data current
- Transparent operations
- Improved analysis
- Multiple connected business systems
- Minimizing appeals, improved defense
- Data sharing
- Staff turnover/training
- Operational costs
- Changing public expectations
-

GIS Comprehensive Geospatial Infrastructure



Enterprise Data Management,
Mapping, Analysis and Collaboration



Cross-Platform
Native Apps

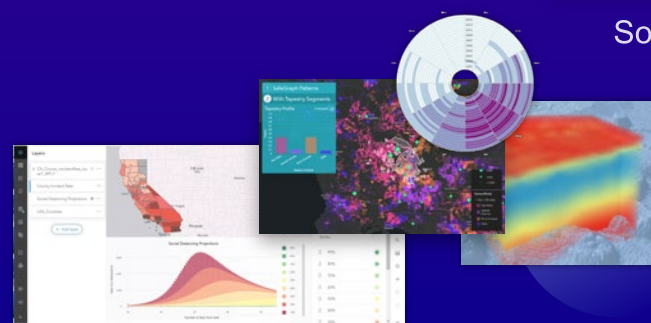
Dashboards



Hubs

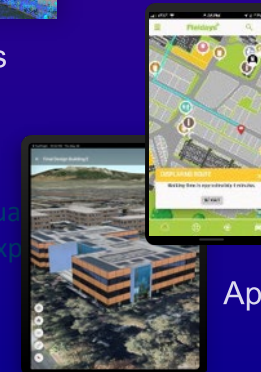


Solutions



Analysis and Data Science

Visual
& Exp



Apps and App Builders

GIS Technology Is Advancing Rapidly

Integrating and Leveraging Many Innovations



Expanding into nearly all areas of society.....

GIS Connects all

Governments and Citizens | Domain and Disciplines



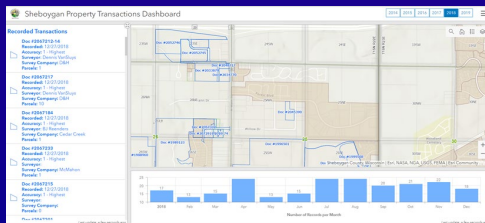
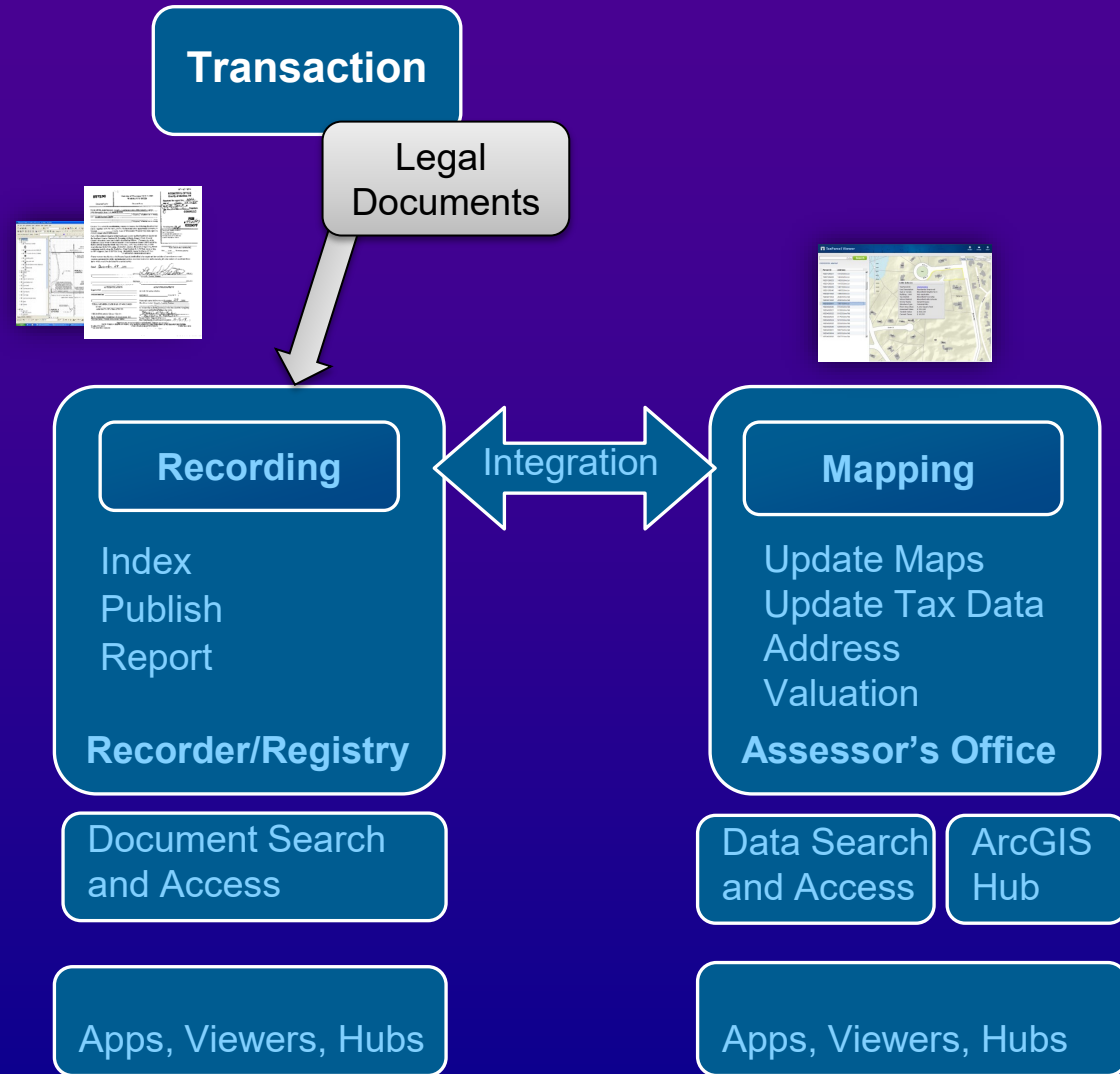
GIS – Technology Infrastructure for Local Government

Enabling new capabilities and efficiencies in local government



Registry Integration with GIS

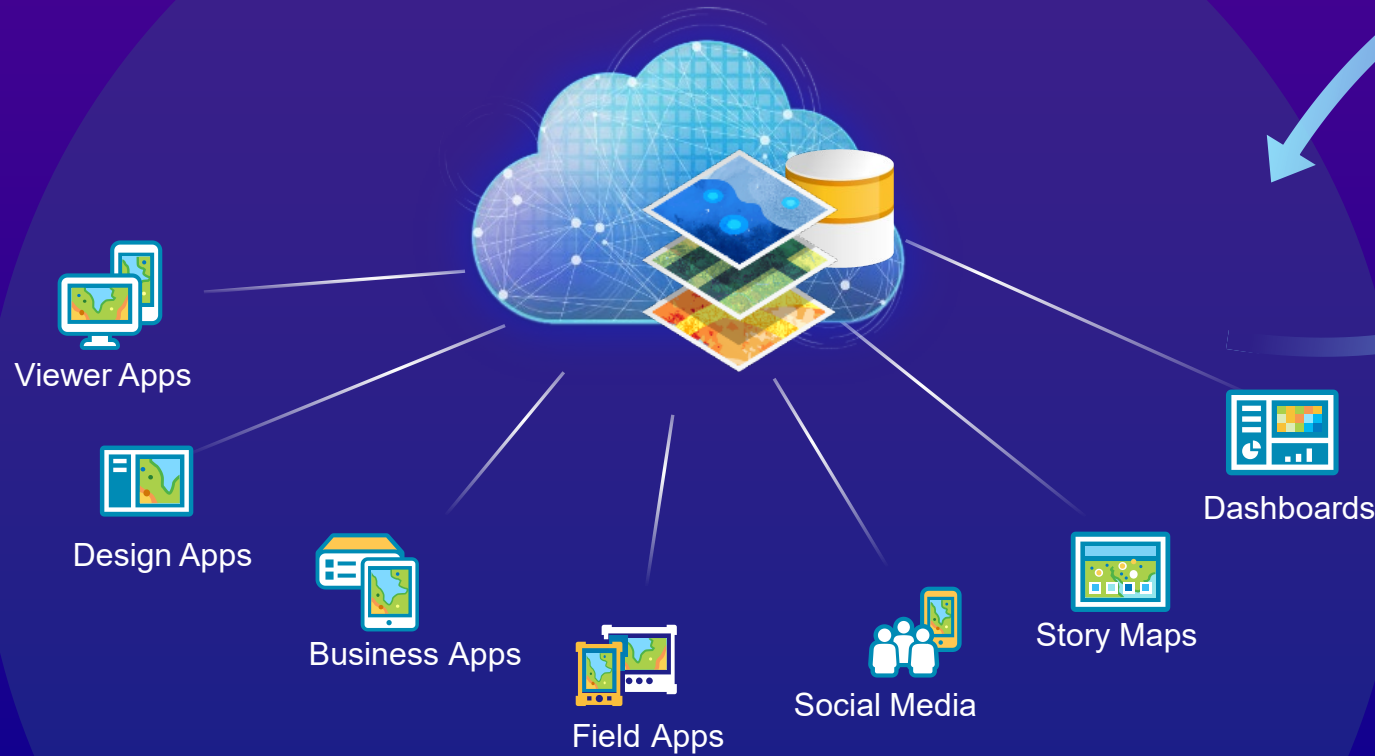
- Reduce redundancy
- Improve quality
- Increase efficiency
- Maintain public trust
- Improve service delivery
- New services
- Single access point
- Fraud detection
- Understand market
-



Integrating CAMA and GIS

Leverage the value of your data

GIS Provides the Integration Platform



ETL Services

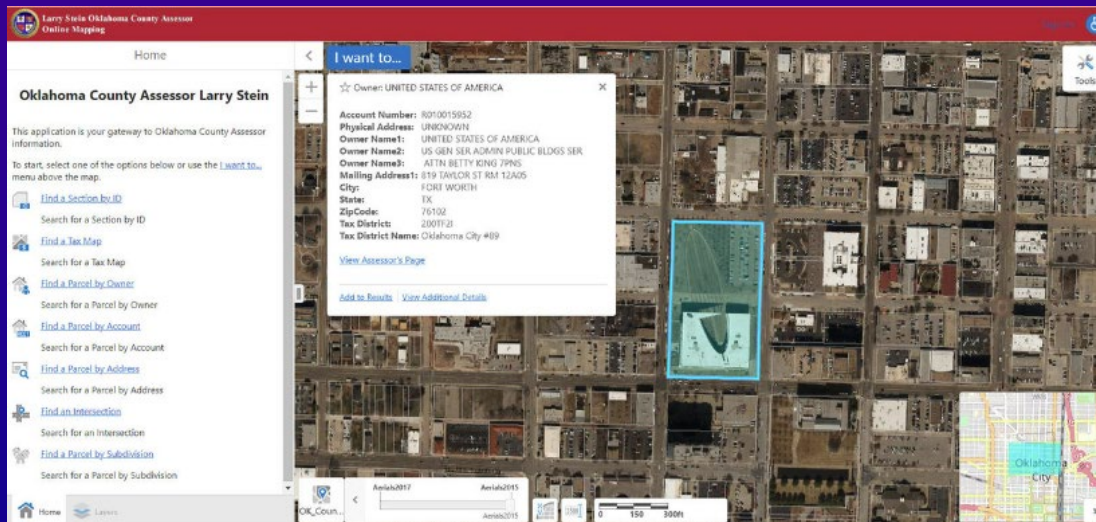


Value
Tax
Registry
Permits
Engineering
Public Works
.....

Oklahoma County – Modernizes with GIS

REGISTRY INTEGRATION WITH GIS

The Oklahoma County Assessor's Office, which holds the greatest amount of county-level responsibility in the state, has successfully streamlined its workflows, integrating mapping technology with existing records systems.



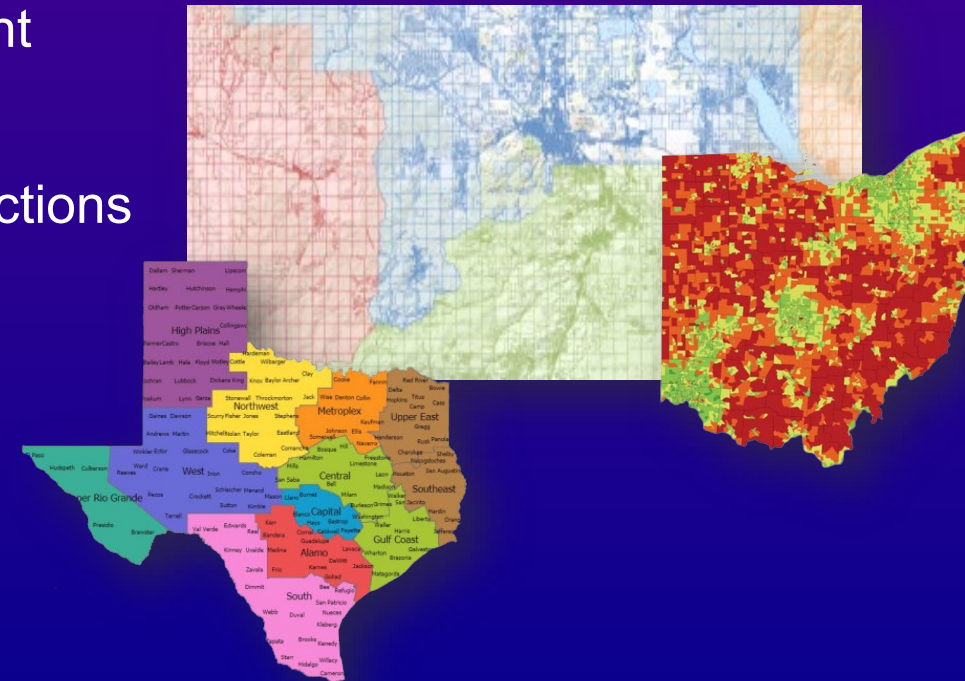
“GIS is the key that unlocks the doors to making incredible amounts of data available to anyone in the world. For Oklahoma County, it means the ability of more than 25 million visitors to our website every year [to see] information about more than 325,000 parcels online anytime, instead of having to travel to the courthouse to get the information they want.”

Parcel and CAMA Data Aggregation

Leveraging parcel data statewide with COTS applications

- Equalization
- Emergency Management
- Population Forecasting
- Tax Exempt Property Analysis
- Natural Resource Management
- Economic Development
- Destination Sales Tax
- Energy Resources
- Recreation
- Right of Way Management
- Flood Planning
- Wildlife Management
- Site Selection
- Public Health Inspections
-

Statewide Parcels



Web Services

Saleable, Secure, Sustainable Technology



Client / Server
Stand-Alone Desktop
Data Models
Static Data
Single Server
Custom Applications
Proprietary Data
2D Features
Spatial Analysis
Digital Cartography



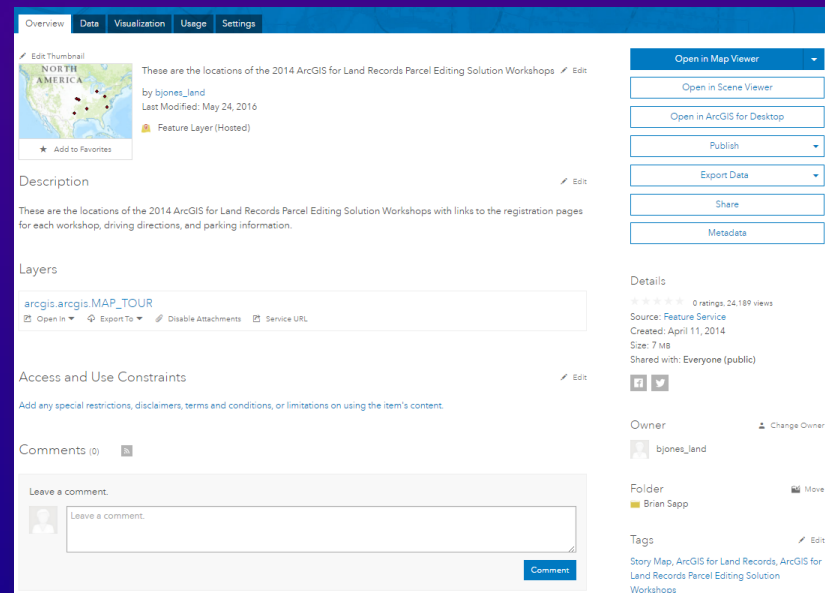
Web Services & Apps
Connected Desktops
Web Maps & Layers
Real-Time
Distributed Computing
Configurable Templates and Apps
Open Data & Shared Services
3D Features
Spatiotemporal & Big Data Analytics
Smart Mapping

Web Services

Managing enterprise data securely...

- Secure
- Standards-based
- Scalable
- Stable
- Controlled Access via Identity
- Control Who Does What
 - View
 - Query
 - Edit
- Monitor/Track

https://



ArcGIS Services
KML
WFS
WMS
WMTS
.....

The background features a dark purple gradient with several glowing, multi-colored light trails in shades of blue, cyan, and magenta. These trails are curved and layered, creating a sense of motion. A faint, semi-transparent map of Europe is visible in the lower-left quadrant, rendered in a light purple hue. The overall aesthetic is modern and digital.

Examples

GIS

Integrates and manages all types of data – powering apps



Data

Web Apps

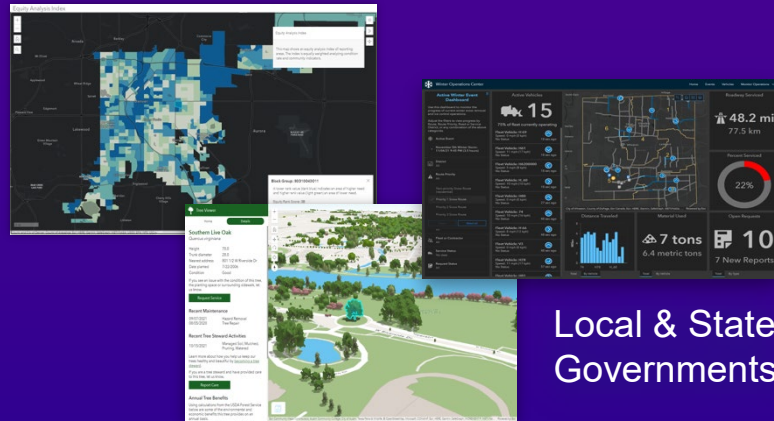


Solution Templates

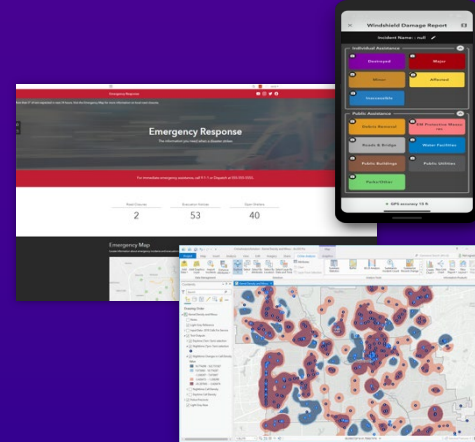
Ready-to-Use Applications and Configurations

Preconfigured

Tools
Data Models
Apps
Initiatives
Dashboards
Workflows
Maps
Add-Ins



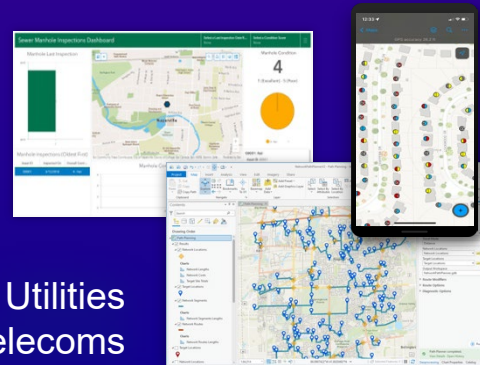
Local & State Governments



Emergency Management & Public Safety



Health & Human Services



Utilities & Telecoms

- Extensive (150+)
- Easy to Deploy
- Fully Supported
- ... Included as Part of ArcGIS

Industries

- Land Records
- Planning and Development
- Public Works
- Emergency Management
- Utilities / Network Management
- Elections
- Natural Resources
- Conservation
- Transportation
- Defense
- Public Safety
- Telecommunications
- Health & Human Services

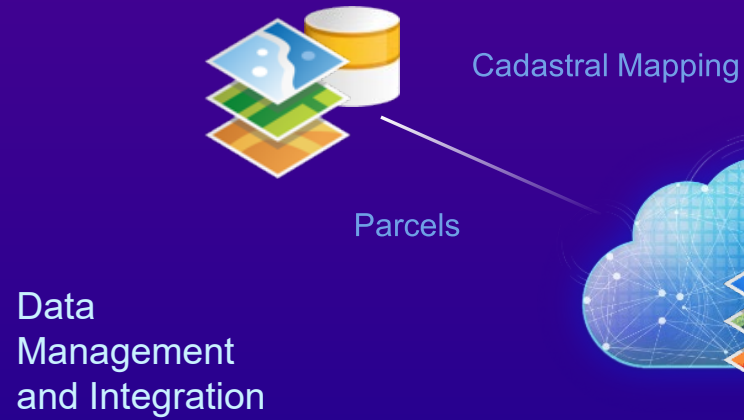
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Examples

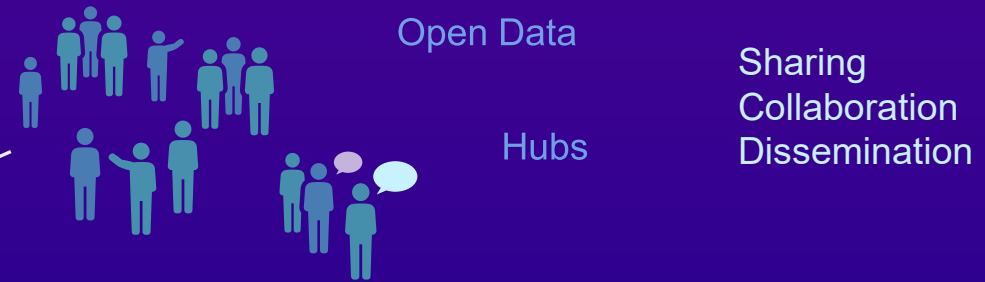
GIS Enables Three Key Systems

Geospatial infrastructure transforming operations

System of Record



System of Engagement



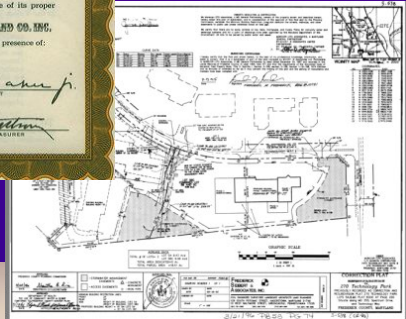
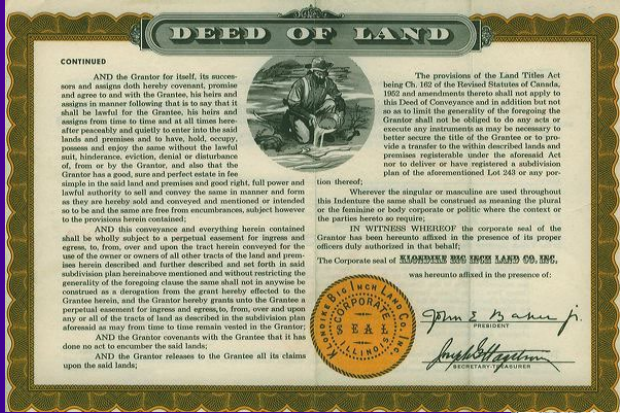
System of Insight



The background features a dark blue aerial map of a region with a river and various land parcels. Overlaid on the right side are several vibrant, glowing light trails in shades of blue, purple, and orange, which curve and swirl across the scene, creating a sense of motion and modern technology.

Parcel Management

System of Record



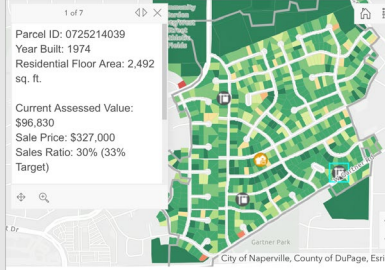
Value Analysis Dashboard

The Value Analysis Dashboard is a configuration of Operations Dashboard for ArcGIS that can be used by assessors to visualize the impact of sales, foreclosures, and assessment appeals on property value in a neighborhood or tax district.

Select an Assessment Neighborhood to refine the results.

272

All Sales



\$81,339,801 \$76,474,552

Sales

3

Summary

Appeals

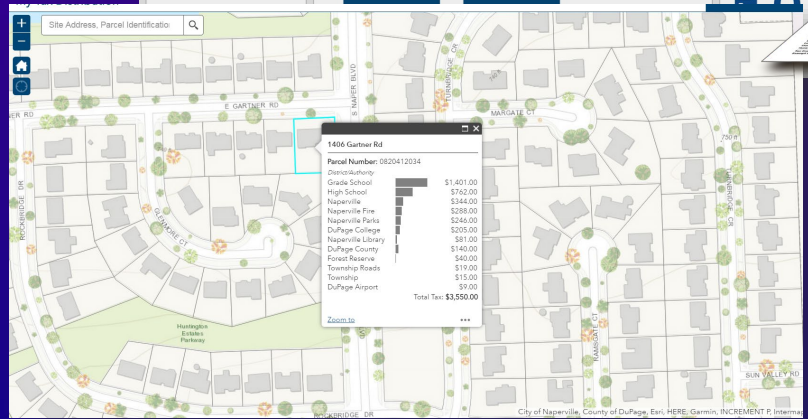
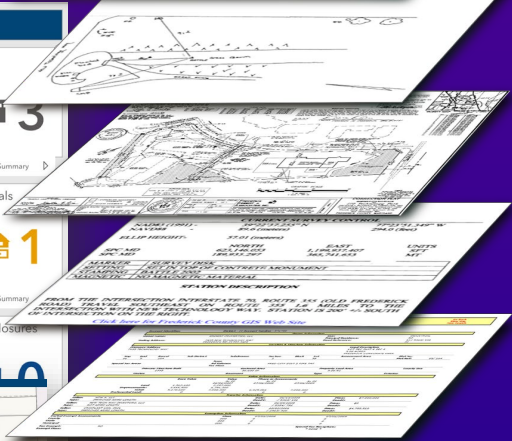
1

Summary

Foreclosures

1

Summary



Parcel Capabilities

Examples of parcel uses in GIS

Parcel Land Use



MipMap
AIUla, Saudi Arabia

3D Assessment Valuation

Houseal Lavigne
Allen County, Indiana



Mapping Boundaries of Agricultural Co-ops



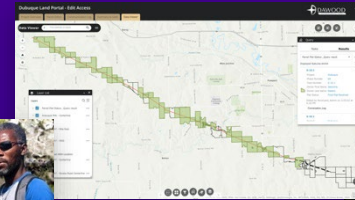
Eos Positioning Systems
Fond-des-Blancs, Haiti

Property Valuation



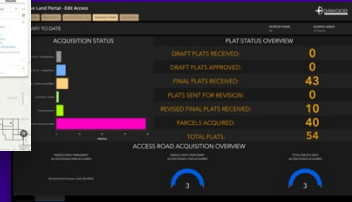
Larimer County
Colorado

Land Acquisition Management for Pipeline



Dawood Engineering
Illinois

Acquisition Portal



Parcel Fabric Tax Map



County of Whiteside
Sterling, Illinois

Land Parcel Reporting



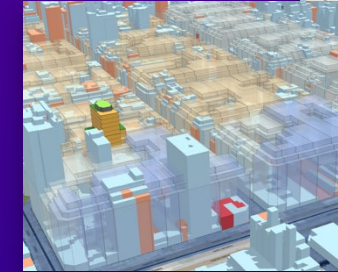
Central Appraisal District
El Paso, Texas

Deed Transaction Dashboard



County Assessor
Oklahoma County, Oklahoma

3D Property Zoning



GDS Latam Group
City of Buenos Aires, Argentina

Parcel Visualization

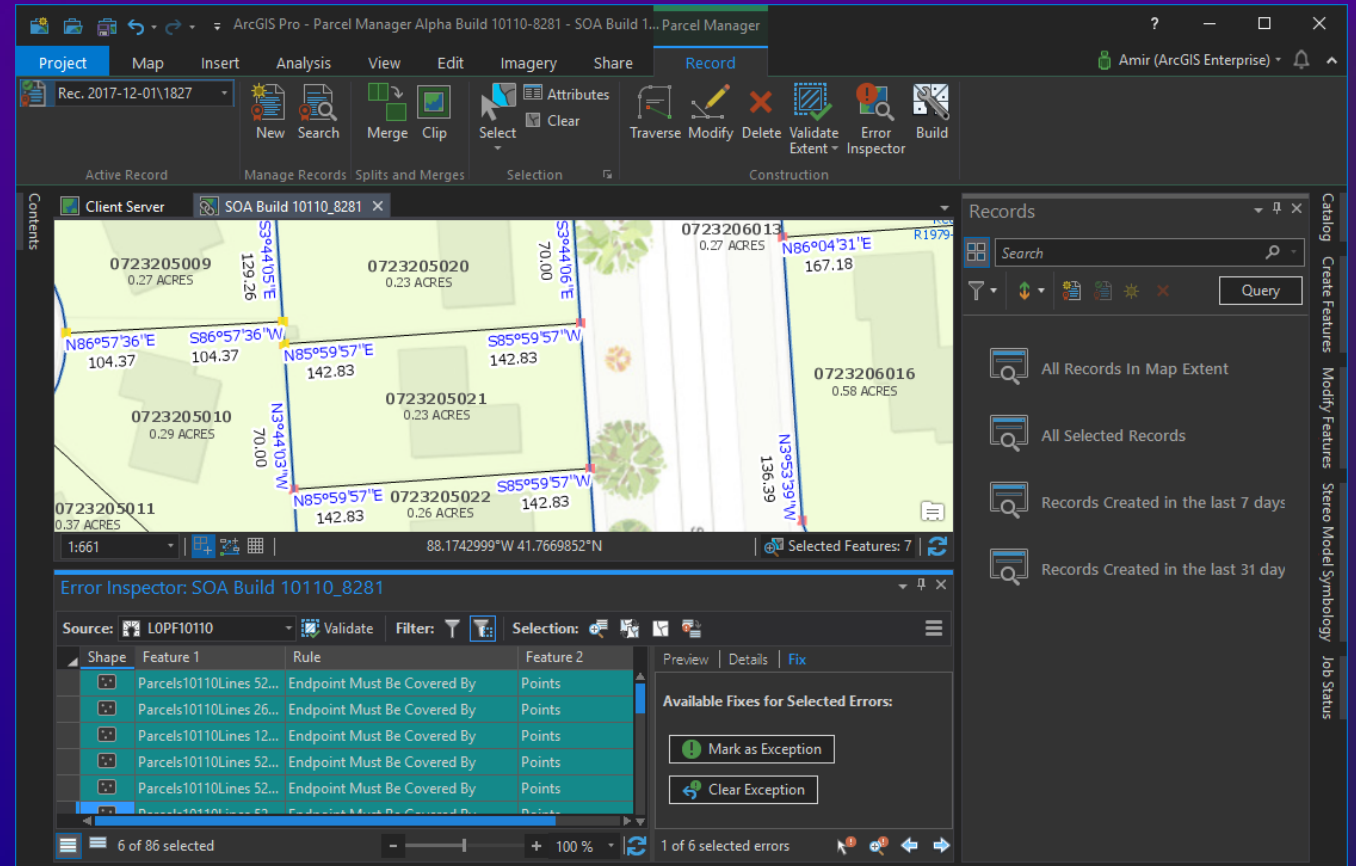


Majlis Bandaraya
Johor Bahru, Malaysia

Parcel Fabric

Efficient, scalable, industry standard

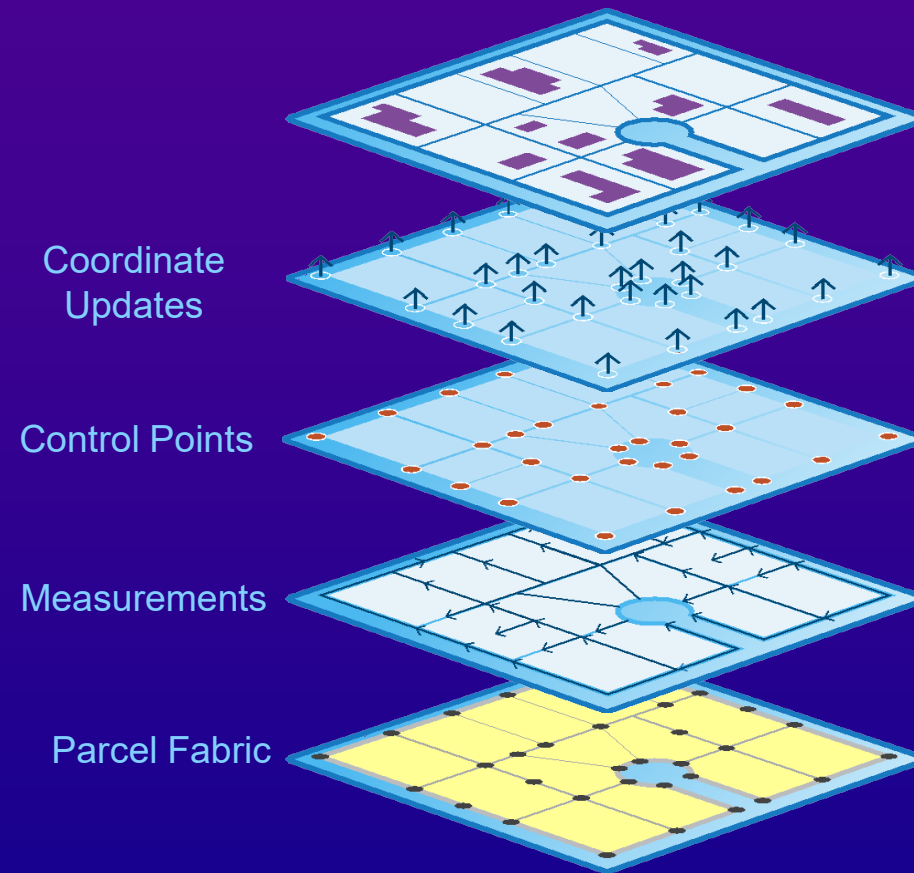
- COTS Parcel Management
- Defined workflows
- Tasks
- Standards-based
- Core ArcGIS Pro
- Multi-user
- Integrate with registry and valuation systems



Purpose-Built Tools

Data integrity, topology, history

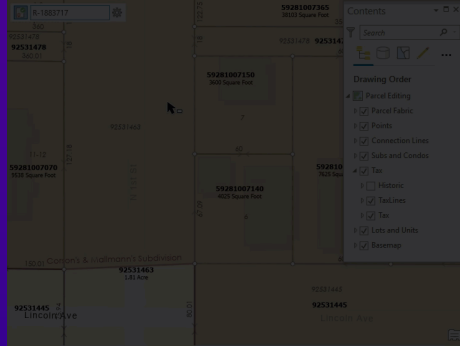
- Flexible Data Model
- Parcel Topology
- History Tracking
- Least Squares Analysis & Adjustment (DynAdjust)



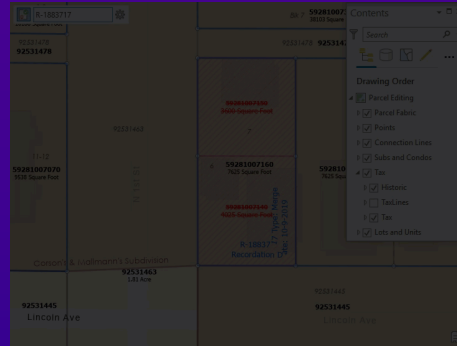
Improving Parcel Data With Survey Measurements....

Purpose-Built Tools

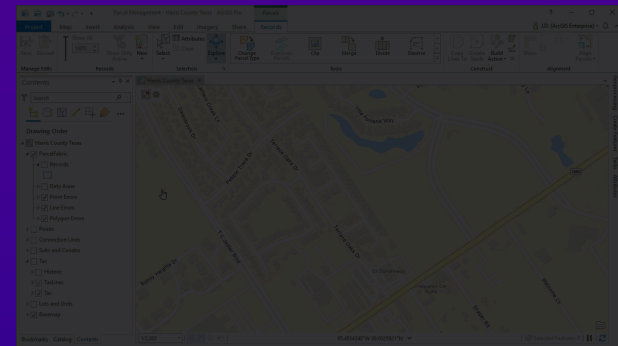
Topological Integrity



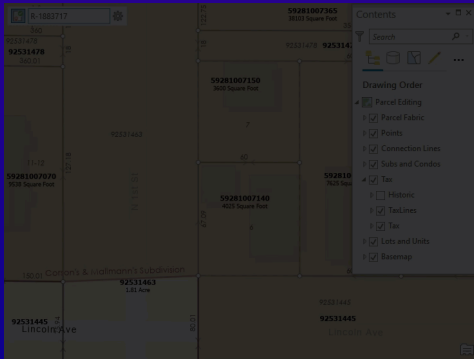
Lineage



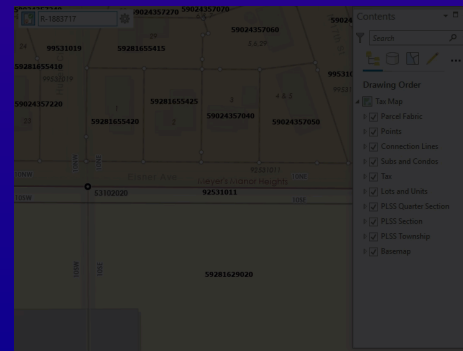
Survey Record



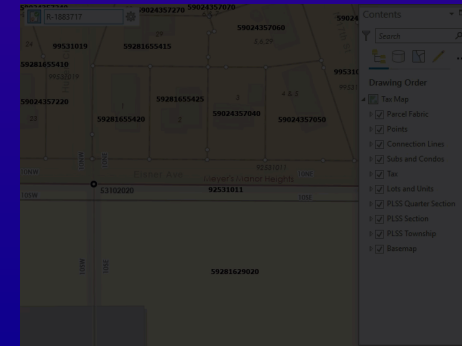
History



Vertical Alignment



Built-in Workflows



3D Parcels and Cadastral Systems

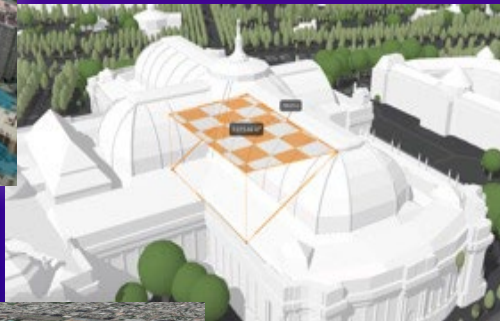
Managing and analyzing strata rights...



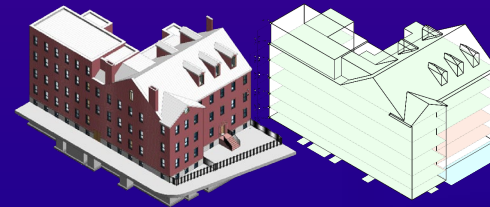
Scenarios and Dashboards



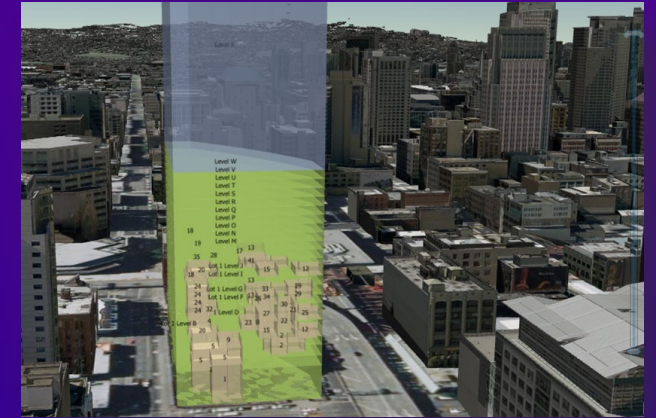
3D Measurement



BIM Integration



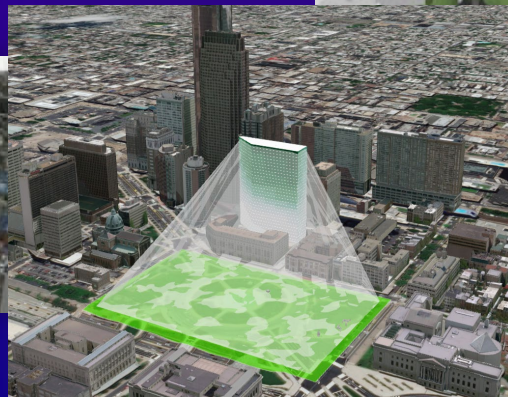
3D Value Assessment



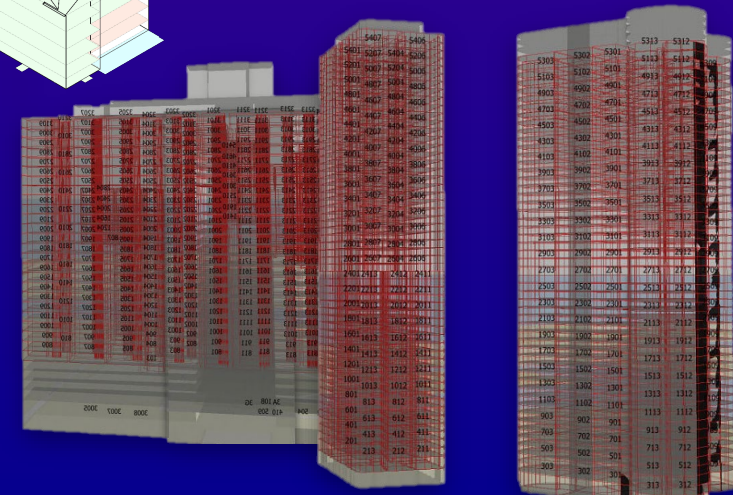
3D Parcels



Line of Sight



Viewshed Analyses



New York City Department of Finance

ROLLS OUT 3D CADASTRE

The NYC DOF recently released its modernized Digital Tax Map (DTM) with 3D capability. The system can manage challenging use cases such as air rights and subterranean lots and allows for digital submission of BIM design files for review and integration into the DTM.

NYC Department of Finance Property Information Portal

Property Details

3758 BAY VIEW AVENUE
BROOKLYN, NY 11224
Borough: BROOKLYN Block: 6956 Lot: 10 (BBL: 3069560010)

Directions Share Print Certify

Owner: CHEN CHRISTINE K
Type: ONE FAMILY ATTACHED OR SEMI-DETACHED (A5)

Taxes: \$2712.38
Valuation: \$477,636

Jump to: [Building](#) | [Land](#) | [Tax](#) | [Valuation](#) | [Permits](#) | [Sales](#) | [Liens](#) | [Neighborhood](#)

Building Information

1	3	1	1
Num. of Buildings	Num. of Floors	Num. of Units	Residential Units
1985	3,635 sf		
Year Built	Gross Floor Area		

The screenshot also shows a 3D map of the property with a yellow highlighted lot and a street view image of the building.

RevitGeoreferencing Test Command Search (Alt+Q)

Project Map Insert Analysis View Edit Imagery Share Help Feature Layer Labeling Data BIM Data

Define Projection Georeference Create Building Scene Layer Building Filter Refresh Filter Values Select Select By Select By Attributes Location Clear Refresh From Source Copy Features Merge Append Export Features

Alignment Conversion Filter Filter Values Selection Selection Zoom To BIM Cloud Tools

Contents Search

Drawing Order

- Scene
- 3D Layers
 - Areas
- Walls
- 2D Layers
 - World Imagery
 - Elevation Surfaces
 - Ground
 - WorldElevation3D/Terrain3D

Bookmarks Search

139 ft 73.6790747°W 41.4065449°N 656.91 ft Selected Features: 0

The screenshot shows a 3D model of a building with five areas highlighted in cyan, labeled Area 1 through Area 5. The model is overlaid on a satellite image of the building's location. The software interface includes a ribbon with various tools and a contents panel on the left.

The background features a dark purple gradient. On the right side, there are several glowing, multi-colored light trails in shades of blue, purple, and orange, curving across the frame. A faint, light-colored map of Europe is visible in the lower-left and central areas, overlaid on the purple background.

Examples



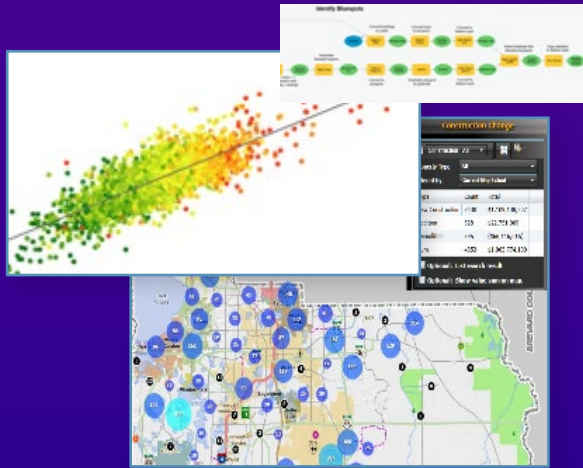
Valuation and Assessment

System of Insight

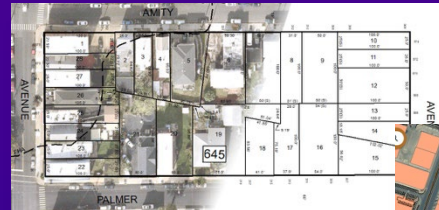
Assessment Capabilities in GIS

Tools for assessors, data scientists, and modelers...

Spatial Modeling & Analysis



Tax Mapping Using Parcel Fabric



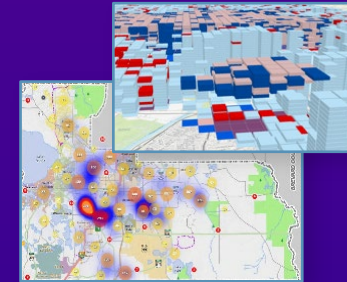
Parcel History



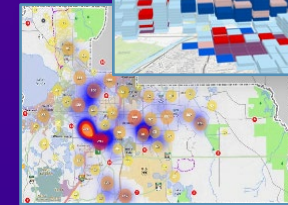
Field Apps



Outlier Detection



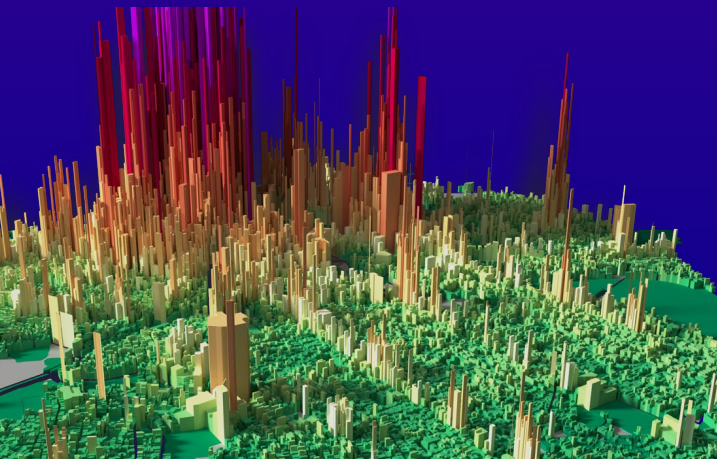
Exploratory Analysis



Imagery & Change Detection



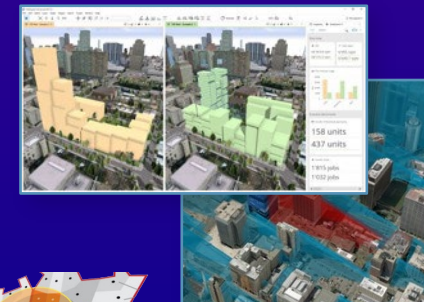
Taxable Property Value



Dashboards



CAMA Integration

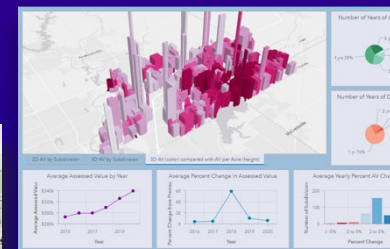


3D



Data Enrichment

Valuation



Abandoned Property



Tax Delinquencies

GIS is a Spatial Analytics Platform

A complete analysis system...

Multiple User Experiences

- Web Apps
- ArcGIS Pro
- Insights
- Python & JavaScript
- Notebooks

Rich Capabilities

AI, ML & DL Mapping

Data Engineering Vector Analytics Image & Raster Analytics

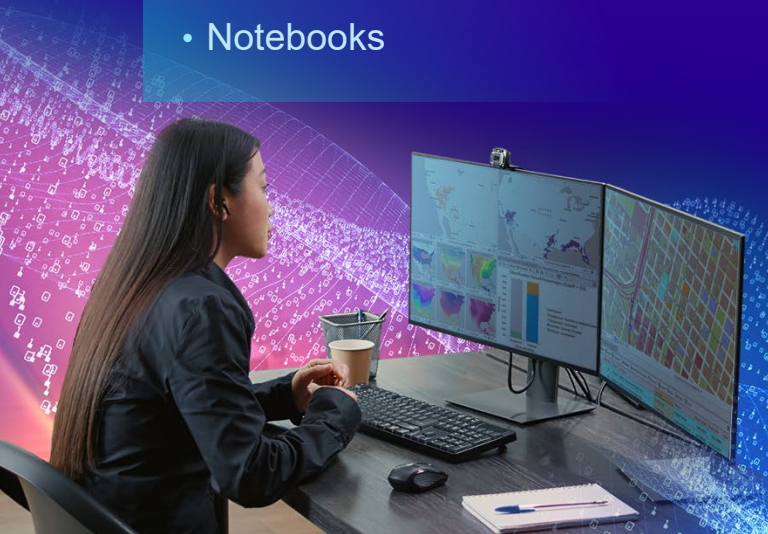
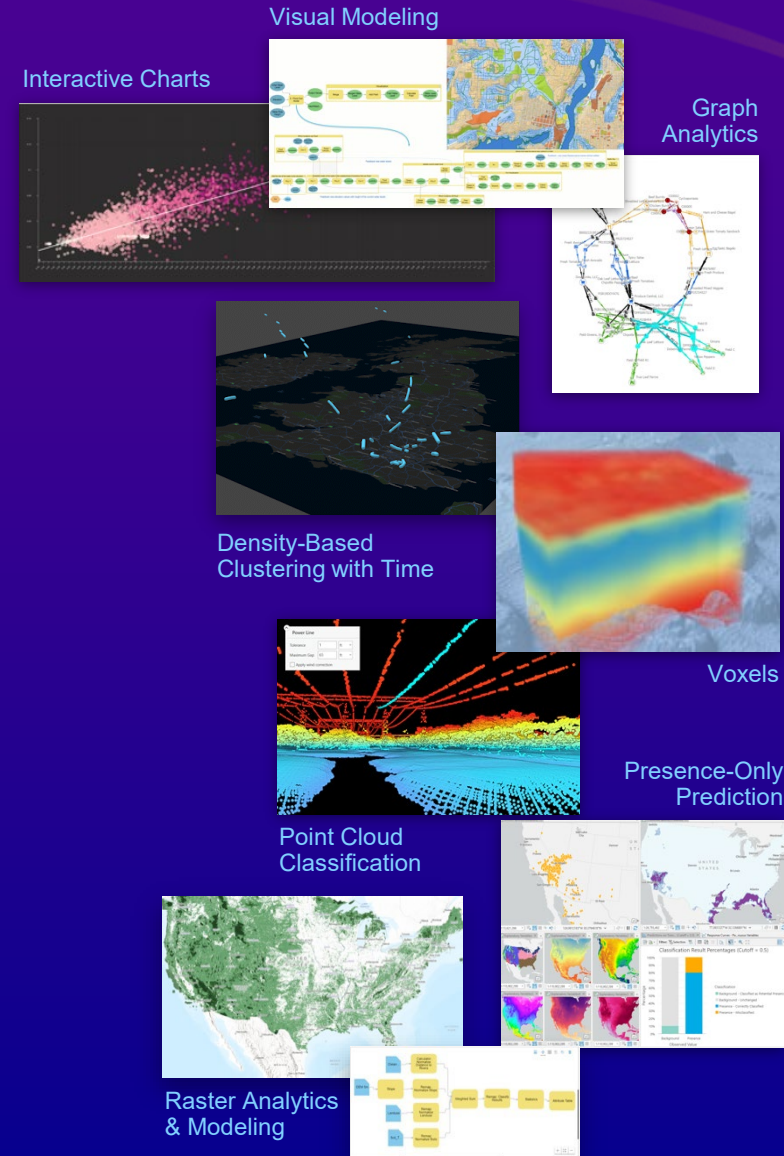
Spatiotemporal Statistics Graph Analytics Advanced Visualization

3D Visualization Modeling

Big Data Real-Time

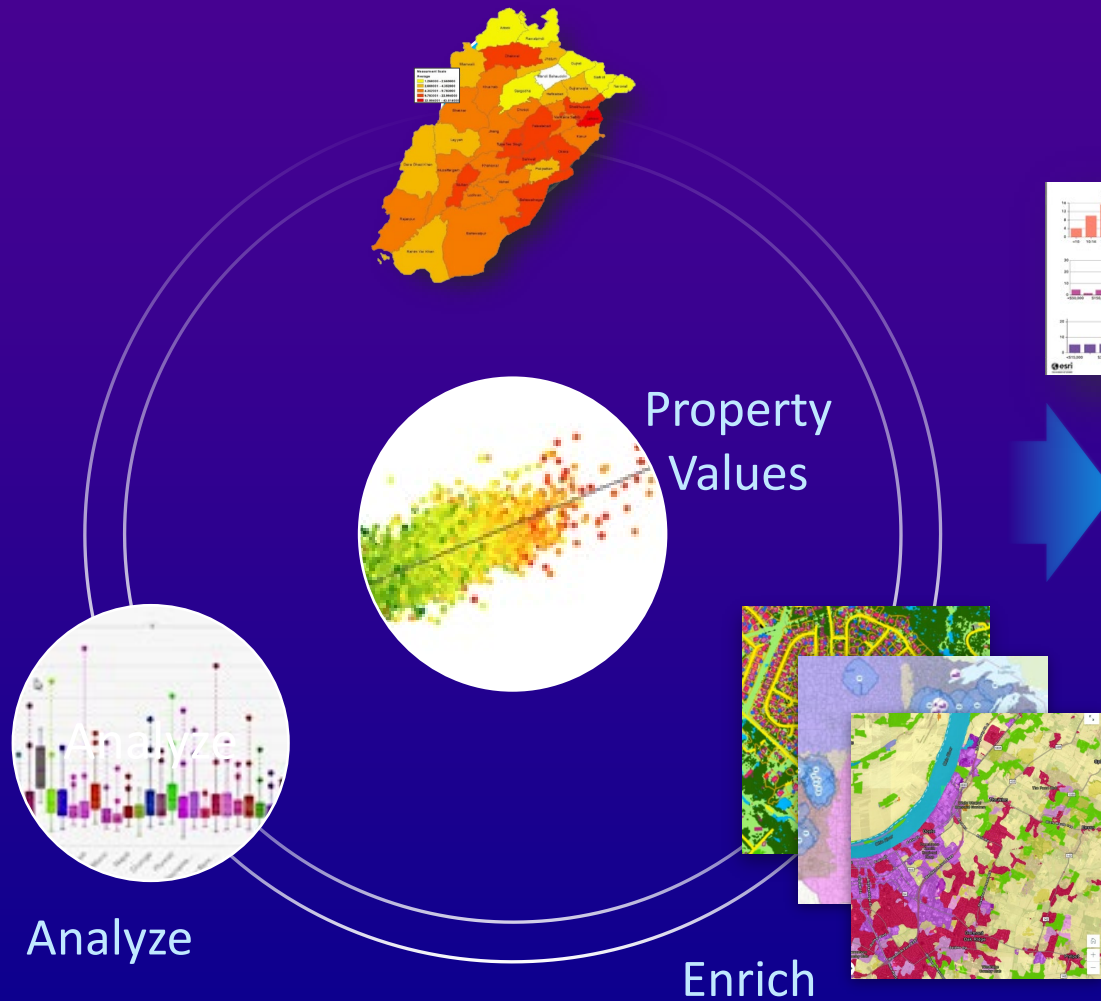
Network Analysis Statistical Modeling

1000s of Tools & Methods



Value Analysis with GIS

Improving values, public trust, and confidence



Interactive
Visual Analytics

Reporting

Dashboards

Infographics

Hubs
Services
Share
Apps
Open Data

Total Parcels Valued	Single-Family Homes	Condominiums
58,301	52,039	290
Commercial	Green Space	Total Assessed Value
690	1,232	\$12,640,076,360.00

Property Applications

- Floodplain Inquiry
- Tax Parcel Viewer
- Residential Comp Finder
- My Tax Distribution

Property Data

Data Exploration

Interactive visual analytics

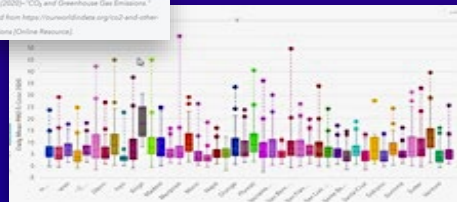
ArcGIS Insights

Connects & Works with All
Types of Enterprise Data

Reporting

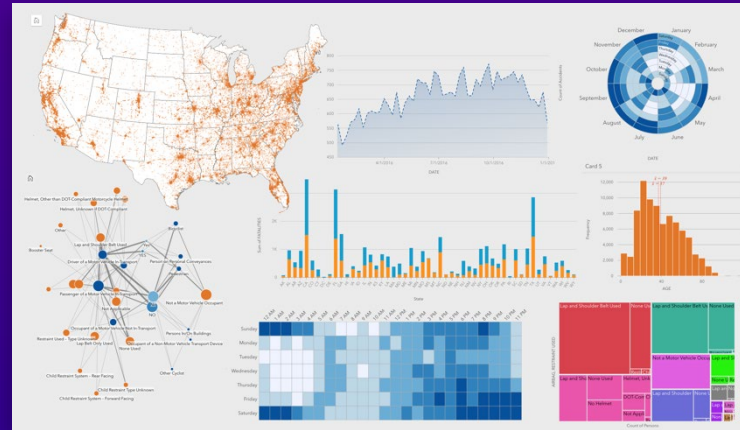


Statistics

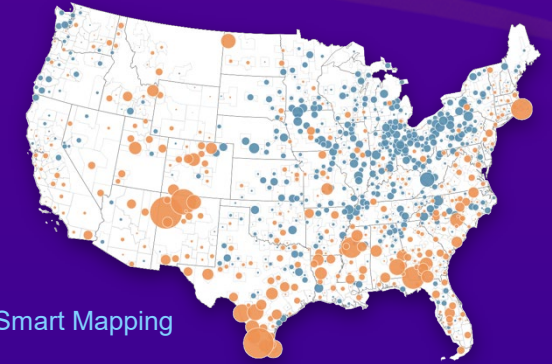


Web and Desktop

Intuitive—Easy to Learn and Use



Shareable Interactive Visualization



Smart Mapping

Reports &
Visualizations

Advanced
Analysis

Data Engineering

Data Access

Improvements



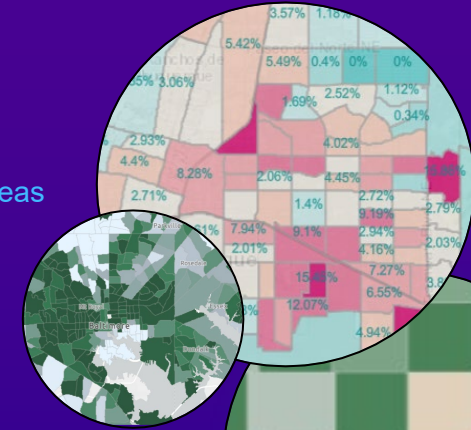
Enrich with External Data for Improved Analysis

Integrating all types of data

Analytical Visualization

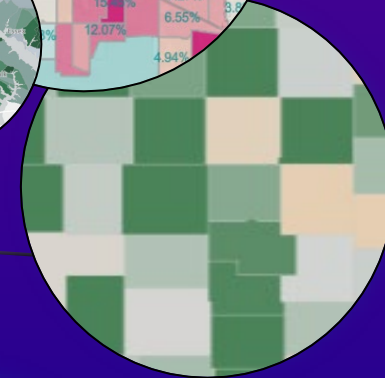


FEMA Flood Hazard Areas



Evictions

Income



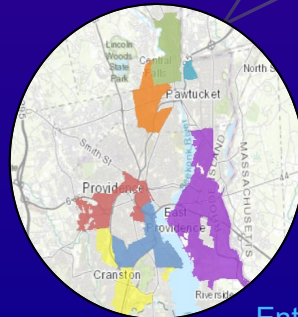
Social Vulnerability



Lidar

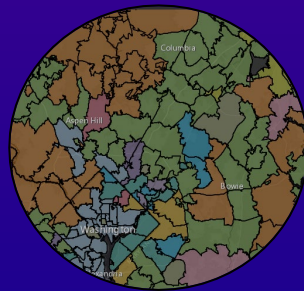


Oblique Imagery



Enterprise Zones

Special Districts



Demographics

Census

Value Analysis Dashboards

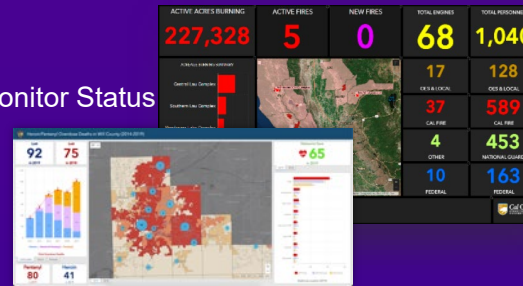
Dynamic visual reporting

- Easy to Configure
- Ready to Use
- Interactive
- Flexible
- Highly Scalable
- Embeddable

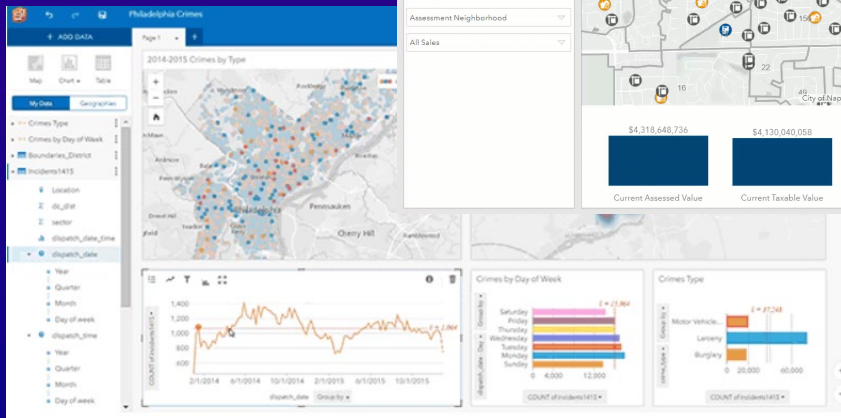
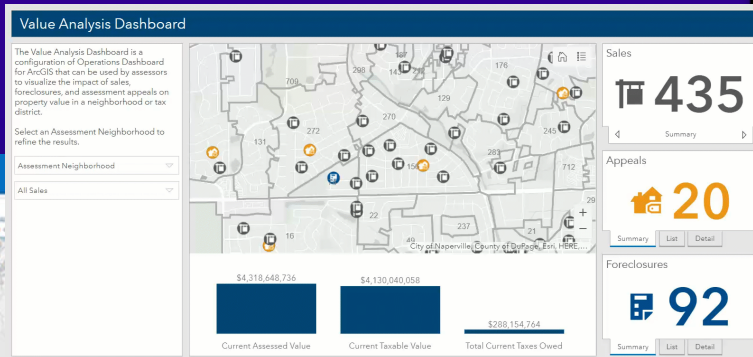
Visualize Trends



Monitor Status



Manage Backlog



- Mapping
- Data Expression
- Authoring Tools
- Summary Statistics
- Data Download
- Visualization
- Filtering

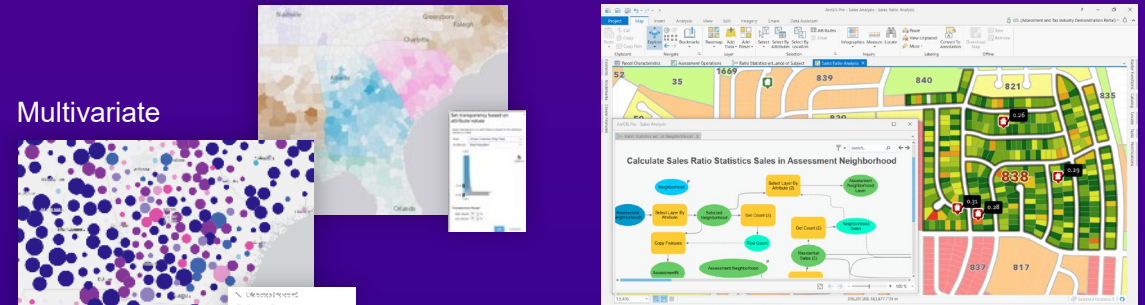
- Mobile
- Accessibility
- Filtering
- Visualizations
- Charts



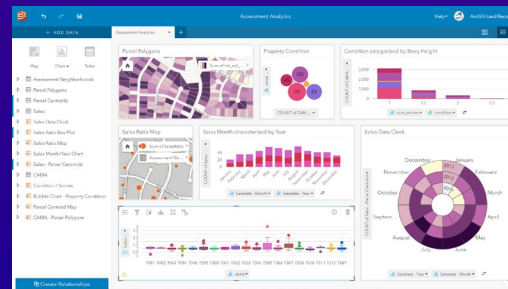
Spatial Analytics for Valuation Modeling

Analytical tools leveraging location analysis...

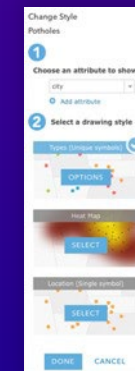
- Geographically Weighted Regression
- Forest-based Classification and Regression
- Kriging
- Multivariate
- Spatial Interpolation
- Clustering
- Outlier Detection
-



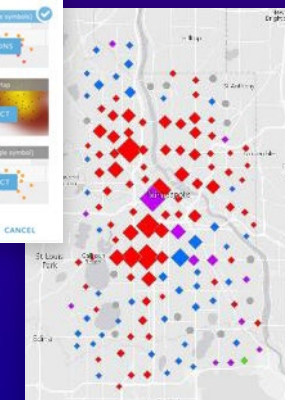
Model Builder



ArcGIS Insights



Share



Dynamic Clustering

Explore

Enrich

Analyze

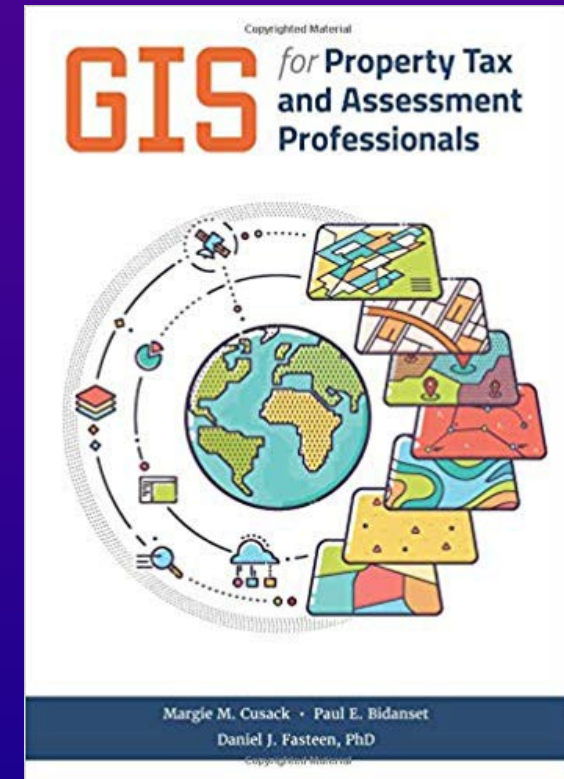
Visualize

GIS for Property Tax and Assessment Professionals

Improve values with spatial analysis

Table of Contents

- GIS and the Valuation Official
- Land Record Mapping in GIS
- Data Collection, Verification and Measurement
- Value Mapping and Geographic Analysis
- GIS and Mass Appraisal Models
- Using GIS to Serve the Taxpayer
- The Future of GIS



The background features a dark purple gradient with several glowing, multi-colored light trails in shades of blue, cyan, and magenta. These trails are curved and layered, creating a sense of motion. A faint, semi-transparent map of Europe is visible in the lower-left quadrant, rendered in a light purple hue.

Examples

The background features a dark blue gradient with a faint, light-colored world map. Overlaid on the map are several glowing, curved light trails in shades of orange, yellow, and blue, creating a sense of motion and technology.

AI & Field Operations

AI and GIS

Leveraging pre-trained models to identify specific features and detect change

Robust desktop
Review



Swimming Pool Detection



Rooftop Solar Panels

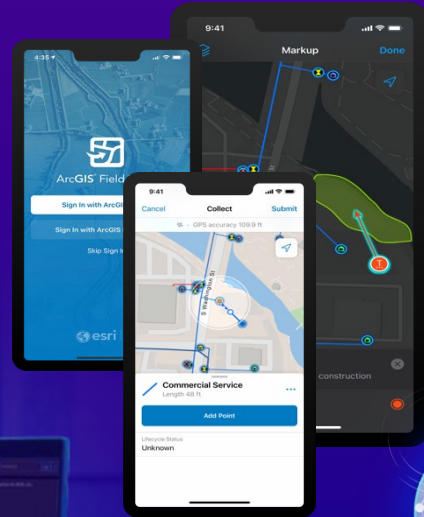


Field Operations with GIS

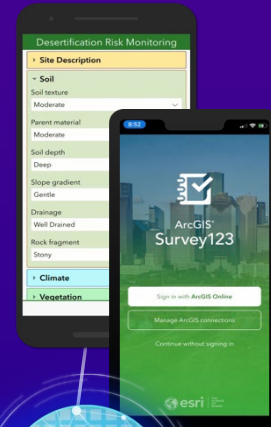
Integrating mobile data collection, location awareness, and enterprise data access

Connected &
Disconnected

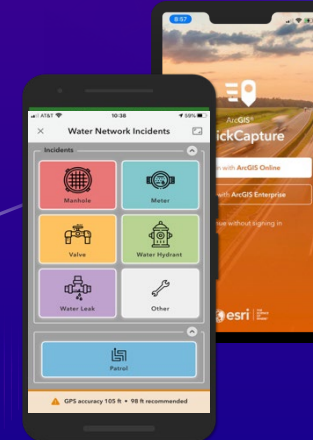
Field Maps
Map Centric



Survey123
Form Centric



QuickCapture
Rapid Collection



Dashboards



High Accuracy Options



Includes Workforce
Management & Navigation . . .



The background features a dark purple gradient with several glowing, multi-colored light trails in shades of blue, cyan, and magenta. These trails are curved and layered, creating a sense of motion. A faint, semi-transparent map of Europe is visible in the lower-left quadrant, rendered in a light purple color that blends with the background.

Examples



Stakeholder Engagement

System of Engagement

Stakeholder Engagement

Modern transparency

- Maintain Public Trust
- Improve Public Opinion
- Better Communicate
- Share Data
- Reduce Phone Calls/Office Visits
- The Public's Expectations Have Changed
 - Mobile Devices, Maps, Apps....
- Modern Transparency
 - Data, Processes, Web Apps....
- Two Way Conversation
- Technology Evolving (Easy!)

FAIR Data Principles

Geospatial infrastructure delivers FAIR requirements...and more...

Findable

Not just a data catalogue and geographic search, but apps answering questions....finding answers with data

Accessible

Interoperable

Deliver data with the consumer in mind – maps and apps!.....

Reusable

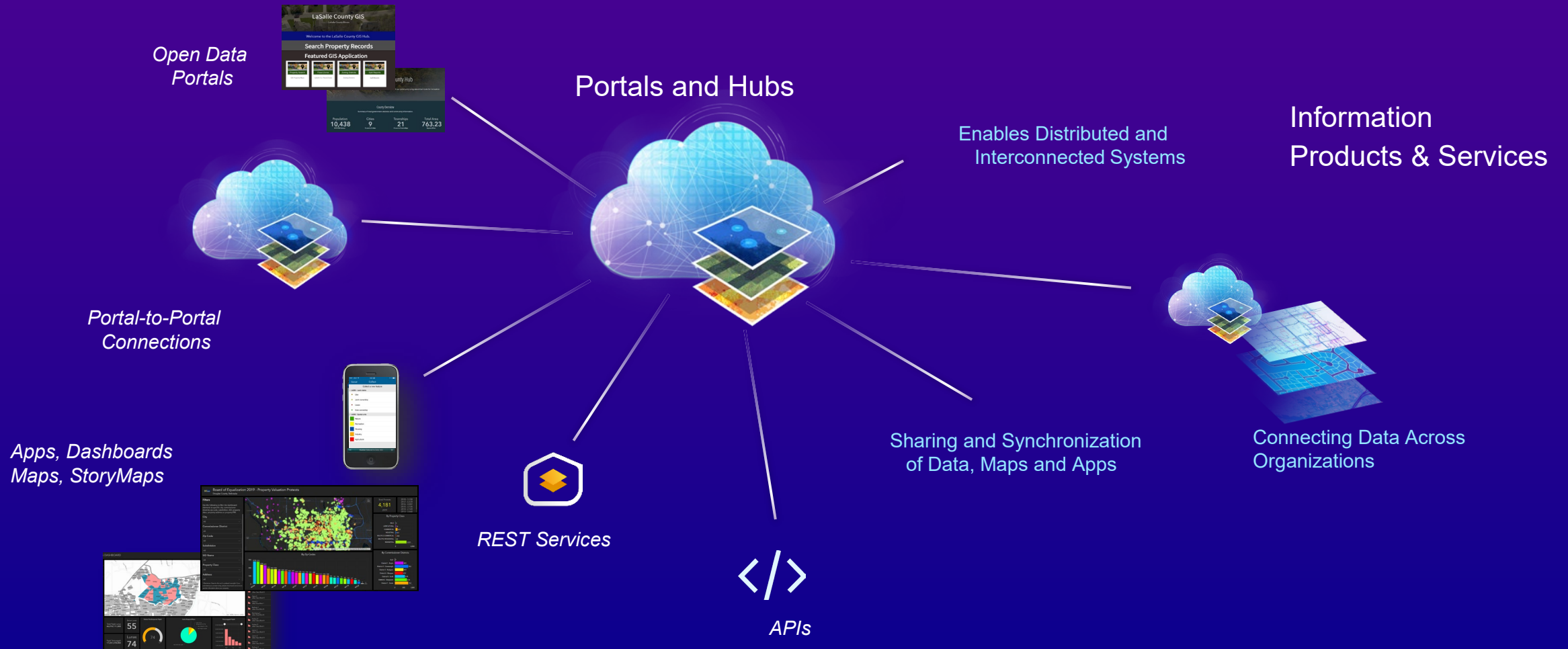
ETL doesn't count – Needs to be machine readable....

Don't forget the metadata.....

The more your data is used, the more valuable it becomes...

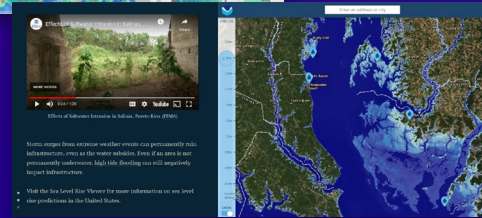
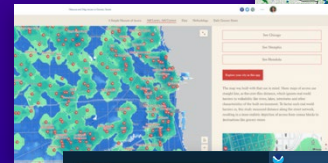
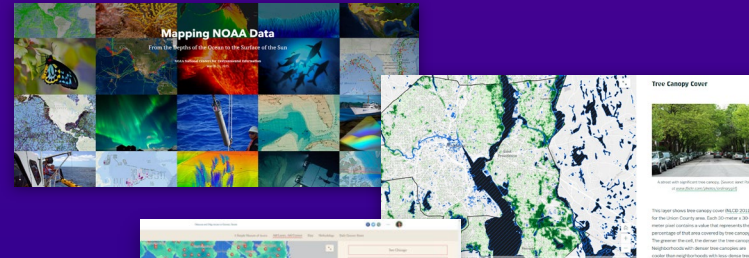
Portals and Hubs

Changing how the public connects and discovers government services...



StoryMaps for Assessors

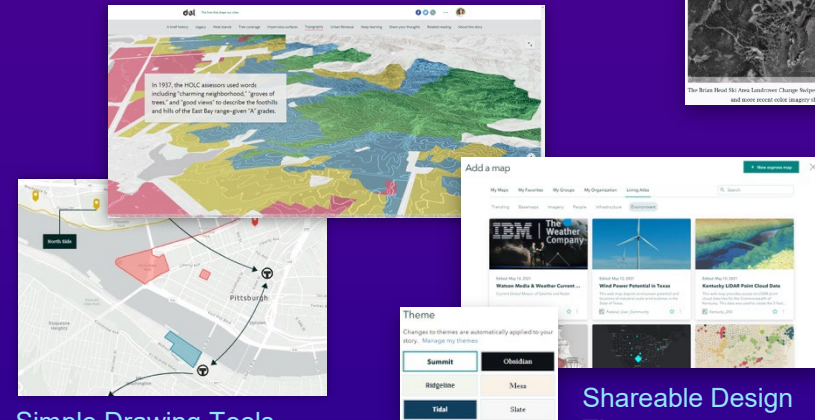
Tell your assessment story with ArcGIS



Multimedia — Images, Videos, Audio

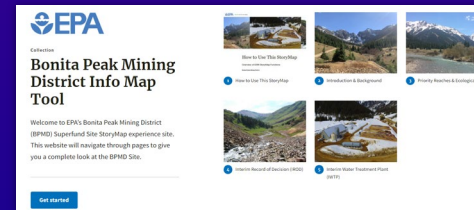
Many Styles & Templates

Integrates Any Web Map & Scene



Simple Drawing Tools

Shareable Design Themes

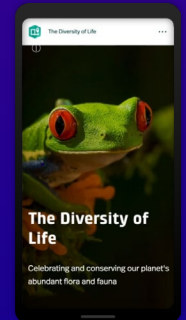


Collections — Groups of StoryMaps

Swipe



Mobile Optimized



Integrated Closely with ArcGIS

The background features a dark purple gradient with several glowing, multi-colored light trails in shades of blue, cyan, and magenta. These trails are curved and layered, creating a sense of motion. A faint, semi-transparent map of Europe is visible in the lower-left quadrant, rendered in a light purple color that blends with the background.

Examples

Resources

The background features a dark purple gradient. On the right side, there are several glowing, multi-colored light trails in shades of blue, purple, and orange, curving across the frame. A faint, light-colored map of the United States is visible in the lower half of the image, with the word 'Resources' overlaid in white text on the left side.

Guided lessons based on real-world problems

SEARCH ALL CONTENT

[Learn.arcgis.com](https://learn.arcgis.com)



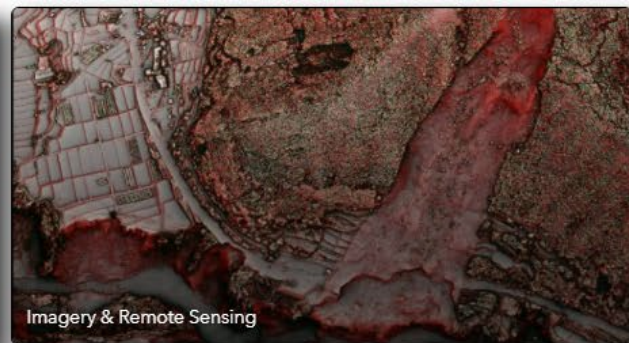
Mapping



Field Operations



Spatial Analysis & Data Science



Imagery & Remote Sensing



Field Operations



Field Operations

Get Started with Property Value Analysis

Lesson – determine and visualize property values with GIS

- Property value analysis
- Prepare data for analysis
- Visualize and analyze sales ratios
- Visualize characteristics and outliers
- Build house-valuation models with machine learning
- Identify market drivers with regression
- Enrich the data
- Create a regionalized linear regression model
- Compare model predictions



Additional Resources

Many ways to learn and get connected...



[Assessor and GIS Meetup](#)

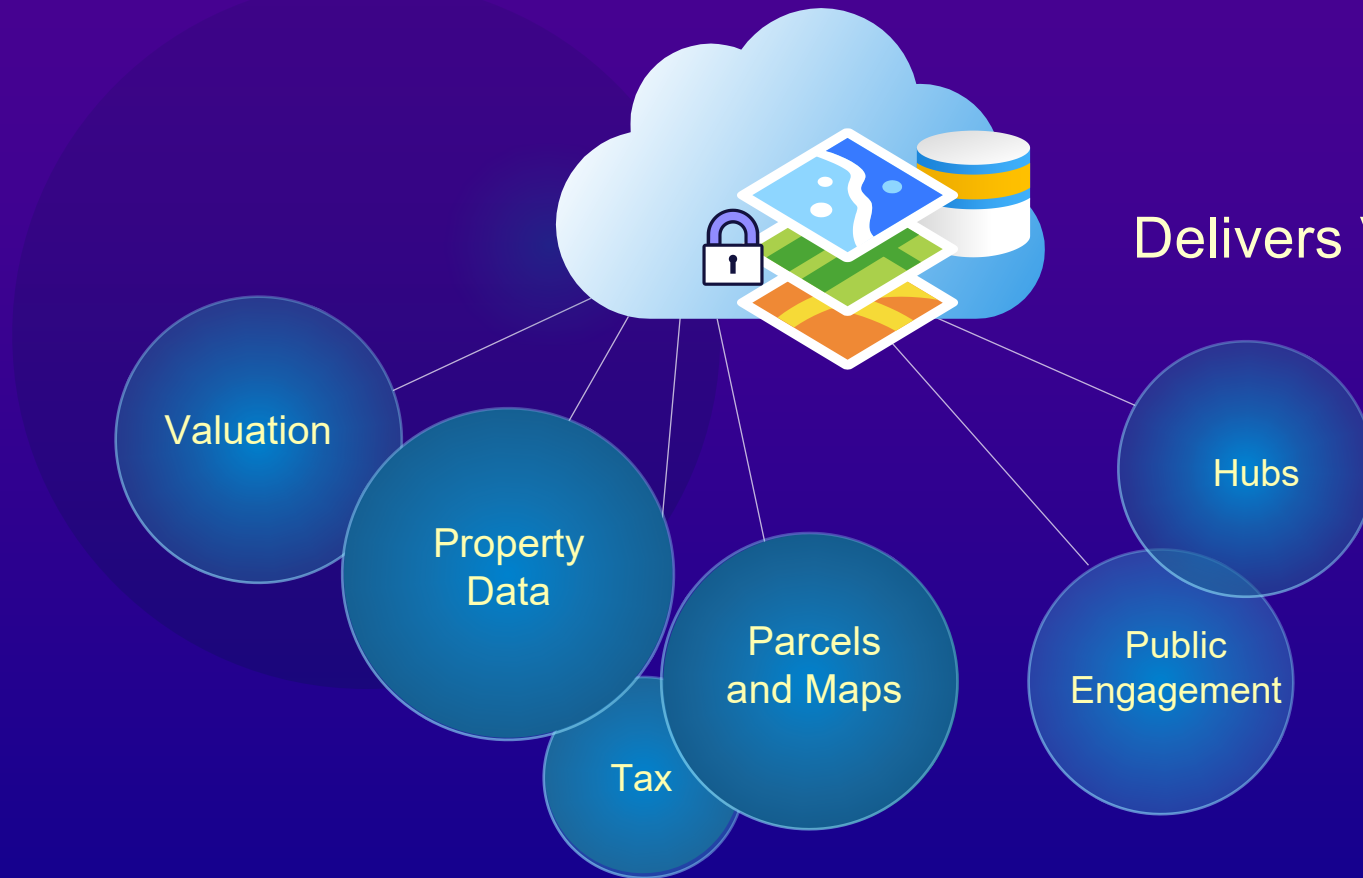


[Parcel Fabric Meetup](#)



Questions?

GIS – comprehensive geospatial infrastructure



Delivers Value to Land Records Professionals

Thank You!

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lvoelker@esri.com