

CUMBRE DE

# CATASTRO Y REGISTRO DE LA PROPIEDAD

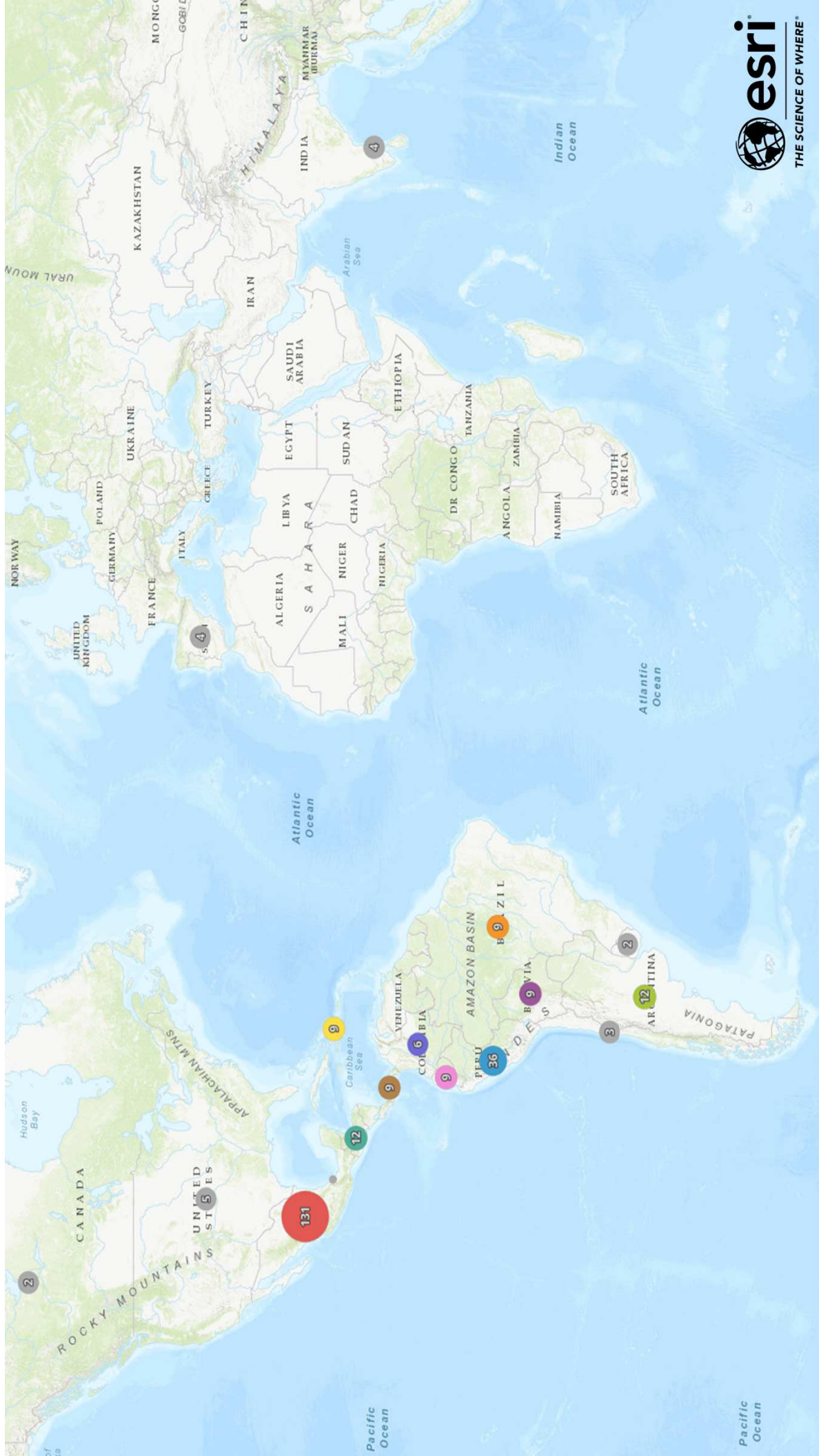


2022

# LADM - Cadastre Innovation in Colombia

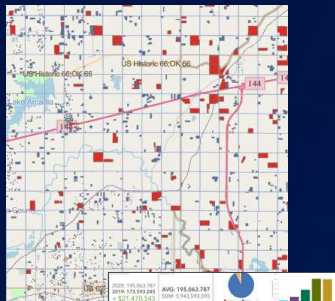
Brent Jones, PE, PLS  
Esri





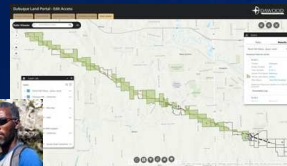
# Managing Land Information with GIS

Deed Transaction Dashboard



County Assessor  
Oklahoma County, Oklahoma

Land Acquisition  
Management for Pipeline



Dawood Engineering  
Illinois

Acquisition Portal



Mapping Boundaries  
of Agricultural Co-ops



Eos Positioning  
Systems  
Fond-des-Blancs, Haiti

Parcel Land Use



MipMap  
AIUla, Saudi Arabia

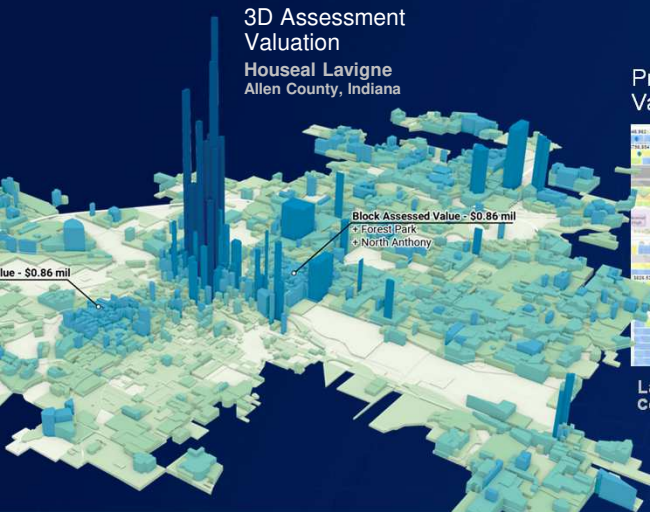
3D Property Zoning



GDS Latam Group  
City of Buenos Aires, Argentina

3D Assessment  
Valuation

Houseal Lavigne  
Allen County, Indiana



Property  
Valuation



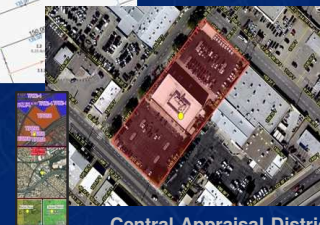
Larimer County  
Colorado

Parcel Fabric Tax Map



County of Whiteside  
Sterling, Illinois

Land Parcel  
Reporting



Central Appraisal District  
El Paso, Texas

Parcel Visualization



Majlis Bandaraya  
Johor Bahru, Malaysia

Smart City  
GIS Dashboard



Vexiza  
Guadalajara, Spain

# Managing Land Information with GIS

## Cadastral Systems



Land Title Survey Authority  
British Columbia Canada

## Comparable Parcel Assessment



North Carolina  
DEVNET

## Mapping Land Legal Descriptions



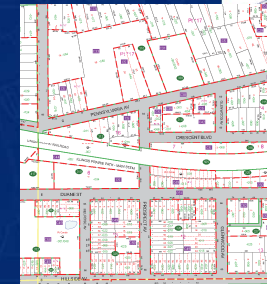
Oklahoma  
WhiteStar

## Deed Documentation



Louisiana  
WhiteStar

## Tax Mapping



Illinois  
DuPage County Assessor's Office

## Land Use



Toyohashi City, Japan  
Aichi University

## Damage Assessment



Texas  
Harris

## Appraisal Status



Kansas  
Shawnee County

## Valuation



Colorado  
Douglas County Assessor

## Parcel Citizen Viewer



Russia  
Data+

## Marine Cadastre



Offshore Cadastre  
Bureau of Ocean  
Energy Management

## Underground Cadastre



Singapore  
Singapore Land Authority

# GIS Comprehensive Geospatial Infrastructure



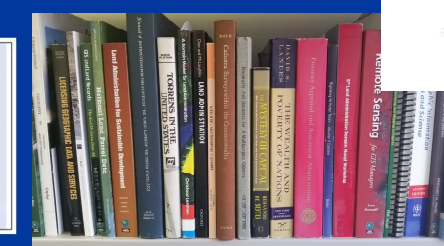
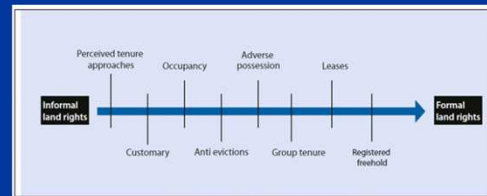
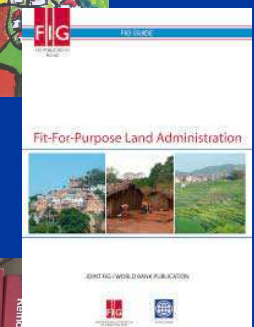
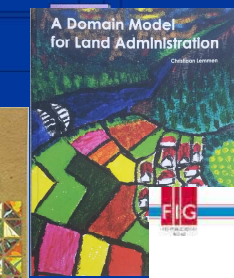
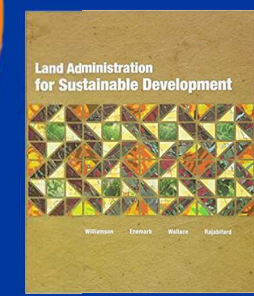
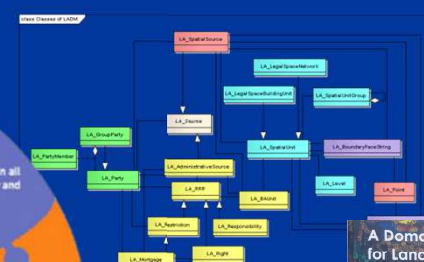
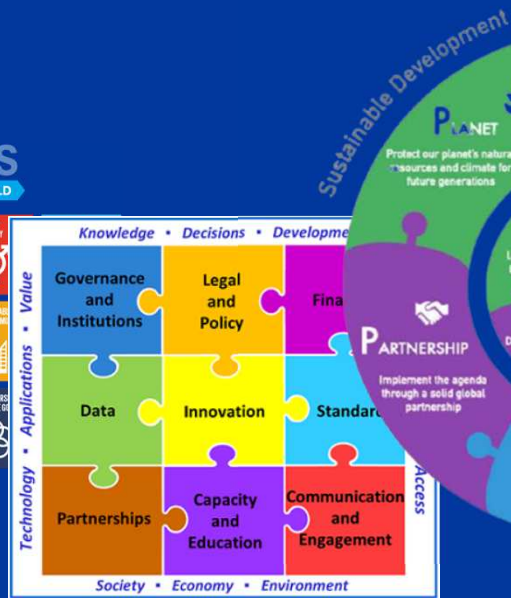
# GIS – Geographic Information Systems

Operationalizing Modern Land Administration



# Global Standards, Frameworks, Initiatives, Models, Data.....

Cookbooks for modernizing land administration,,,,,



# GIS is Standards-Based

## Open Standards and Formats

**LADM**

**WWW**

**ISO**

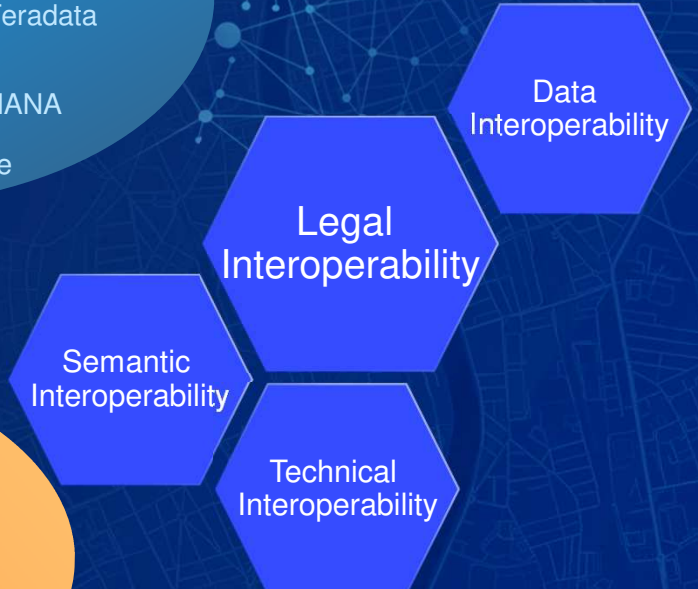
WMS, GML, WCS, KML, XLSForm, WFS, IFC, SQL, Web Scene (I3S), OPeNDAP, SLD, SOAP, WMTS, LERC, JSON, LAS, CSW, WPS, REST, WaterML, INSPIRE, Shapefiles, NetCDF, GeoPackage, OneGeology, CityGML, **OGC** Principal Member

## Systems Integration

MS Office, Adobe Creative Cloud, SharePoint, SQL Server, Azure, Jupyter Notebooks, Power BI, Netezza, Teradata, AWS, Python, R, AutoCAD, IBM Cognos, SAP HANA, Oracle

## Open Software

Open Data Access, Open APIs & SDKs, Extensible Architecture, Embeddable Components, Open-Source Contributions, Open-Source



*Future-Proof Systems with Standards*



# GIS Simplifies Working With All Types of Data

Integrates All Types of Data



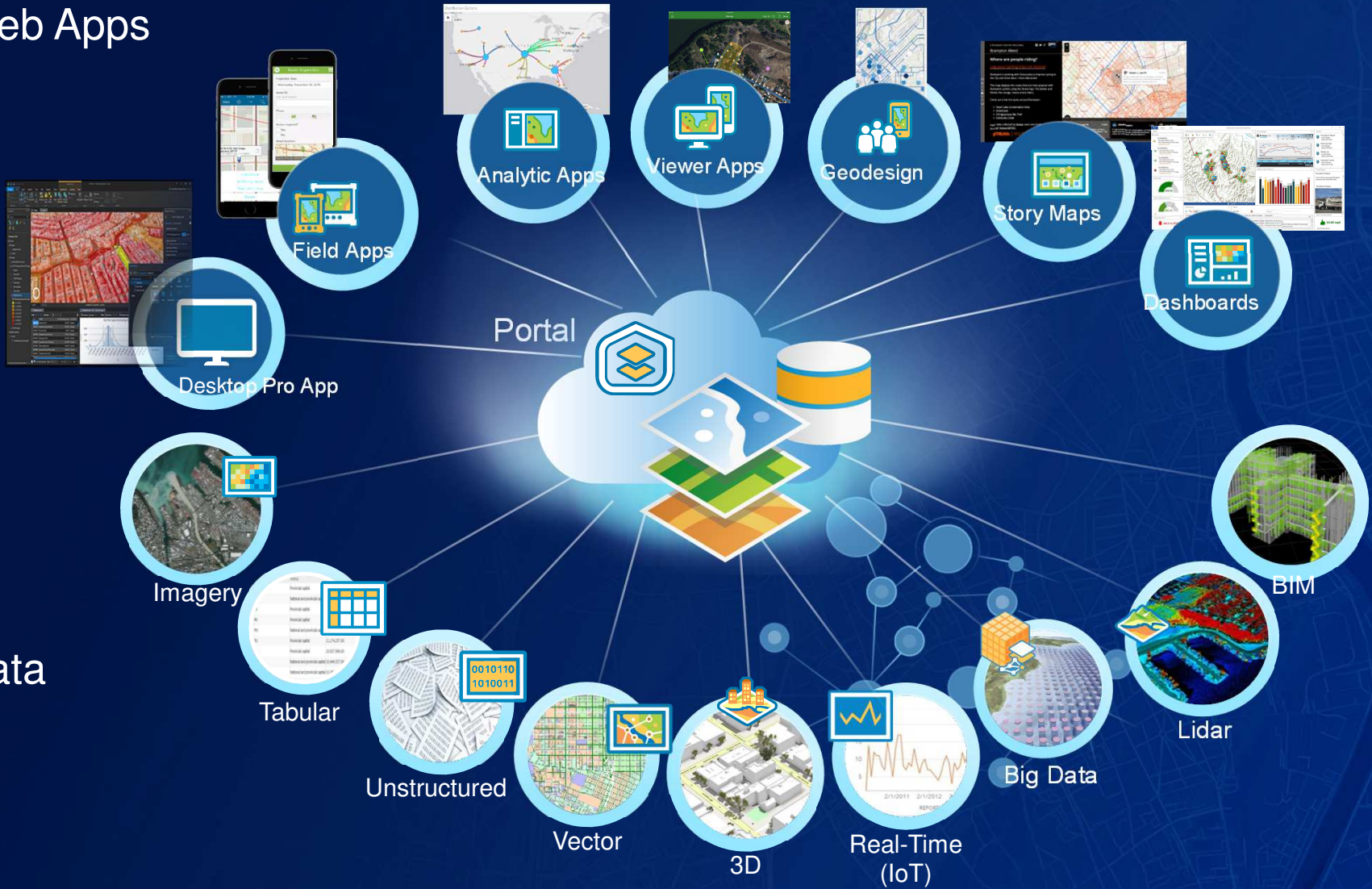
# Configurable Apps

Leveraging the value of your data



*Across Organizations and Beyond*

# Web Apps

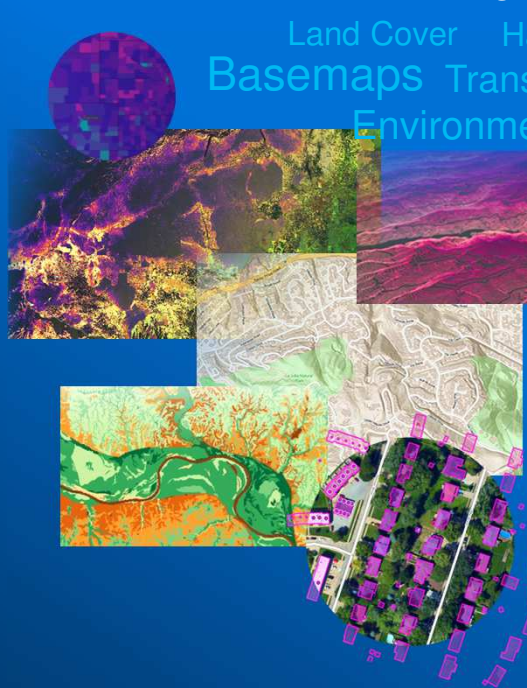


# Data

# Global Maps and Data

ArcGIS Living Atlas of the World

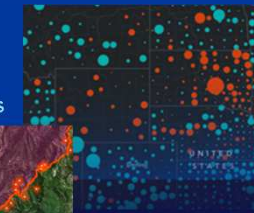
## Living Atlas



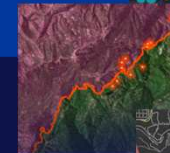
Land Cover Habitats Biodiversity  
Basemaps Transportation Landscape  
Environment Movement Infrastructure  
Hydro Traffic Business  
Elevation Boundaries  
Demographics Imagery  
POI Oceans Hazards  
Weather Soils  
Authoritative  
Community Content

- Thousands of High-Quality Maps, Layers and Datasets
- Updated Regularly
- Billions of Requests Daily

Monthly Unemployment Statistics (BLS)



Real-Time Observations



OpenStreetMap Layers

Global & Local Geographic Content . . .  
About Everything

# Land Administration



*ArcGIS Powers Modern Land Administration Systems .....*

# People, Rights, Parcels



Who holds  
the rights



What you are  
permitted to do



Where you  
can do it



Land  
Administration  
Domain Model

ISO 19152:2012

# Rights, Restrictions and Responsibilities (The Three R's)

The diagram consists of three teal circles arranged horizontally. Each circle is connected to a vertical line that points down to a descriptive text block. The background is a dark blue map of a city street grid.

Rights

What you are permitted to do

Restrictions

What you cannot do

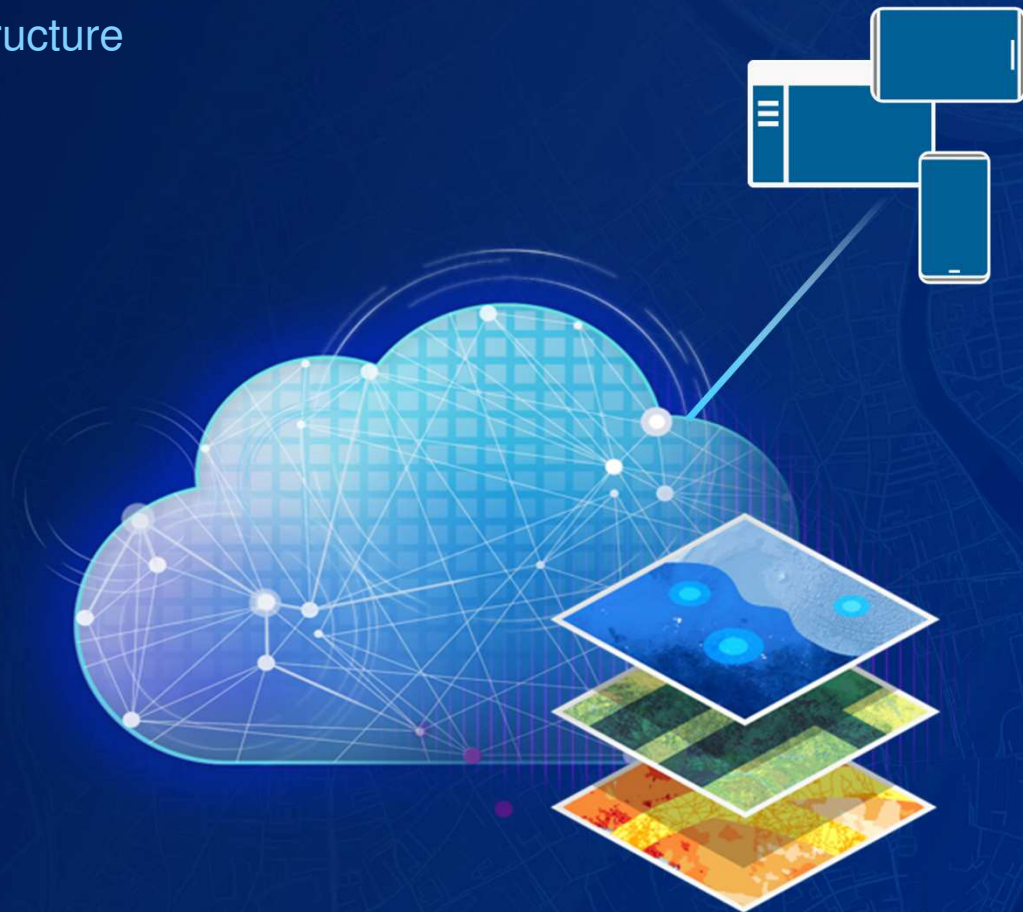
Responsibilities

What you are required to do

# Aligning Technology

GIS – Operationalizing Infrastructure

Frameworks  
Standards  
Best Practices  
Data Models  
Initiatives  
Vision  
Global Contributions





# GIS Supports Multiple Use Patterns

From Fit-for-Purpose to Enterprise Cadastre.....

Pilots



Fit-for-Purpose

Projects



Departmental

Regional/Municipal

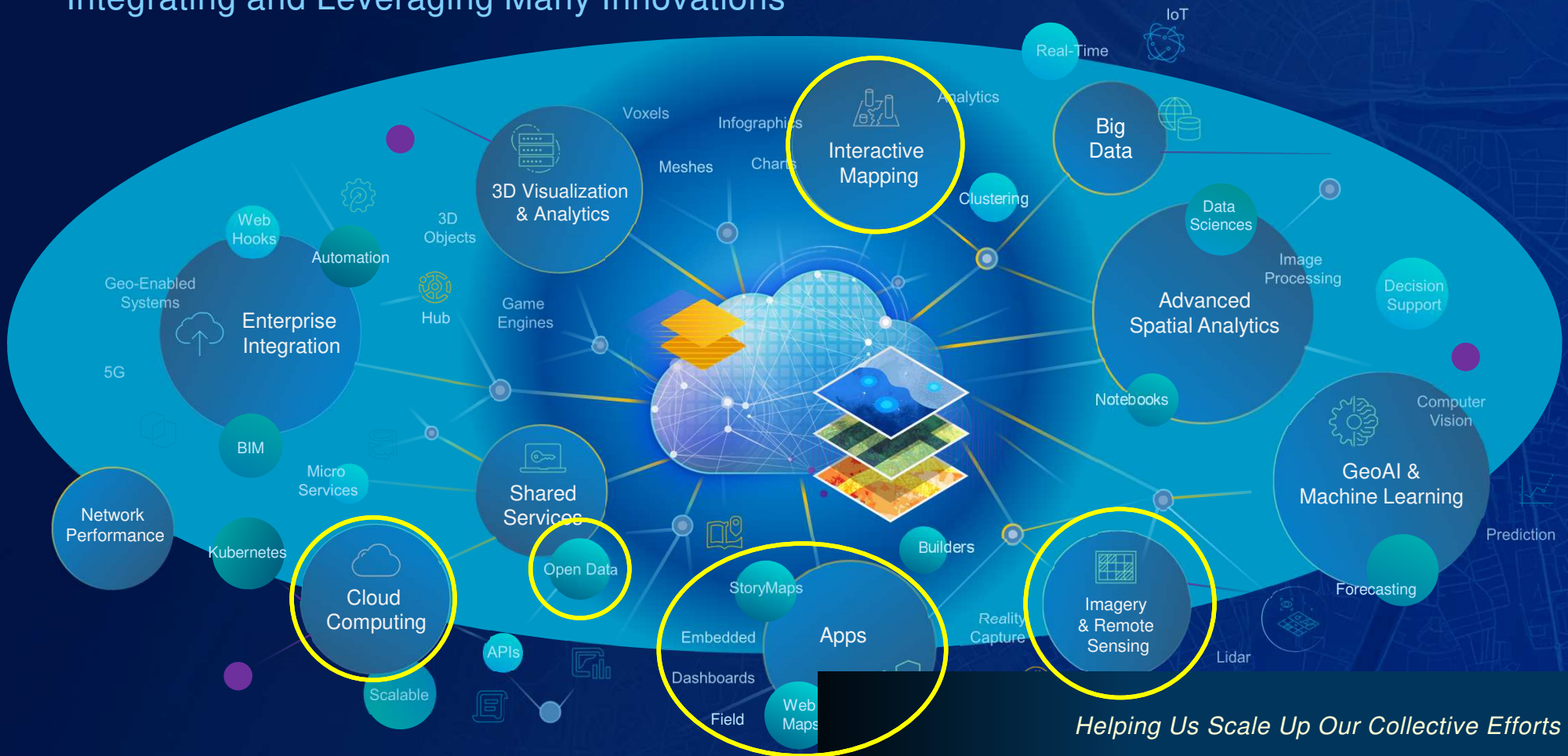


Enterprise Cadastre  
(Systems of Systems)

Open. Scalable  
... and Interoperable

# GIS Technology Is Advancing Rapidly

Integrating and Leveraging Many Innovations



*Helping Us Scale Up Our Collective Efforts*

# Quick Statistics - Colombia

- Population 52 Million (between Spain and S. Korea)
- Parcels 15 Million
  - Urban 11.6 Million
  - Rural 3.5 Million
- Area 1.1 Million km<sup>2</sup> (25<sup>th</sup> between South Africa & Ethiopia)
- Population Density 42 km<sup>2</sup> (125<sup>th</sup> between Fiji & Belarus)
  
- Peace process with FARC began 2012 - Havana, Cuba
  - Final agreement 2016

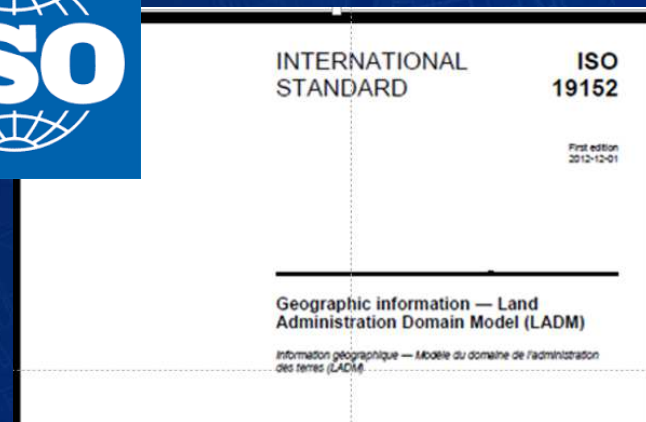
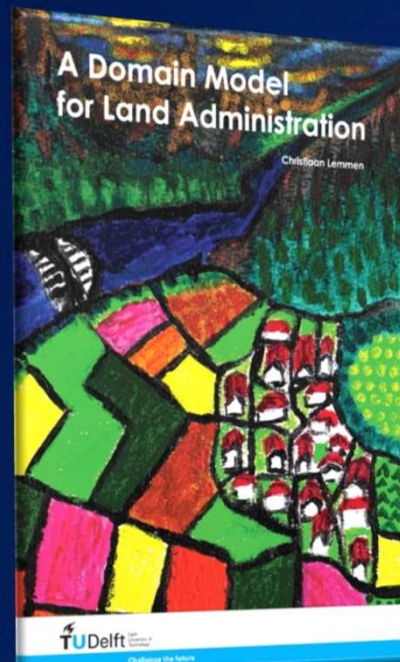
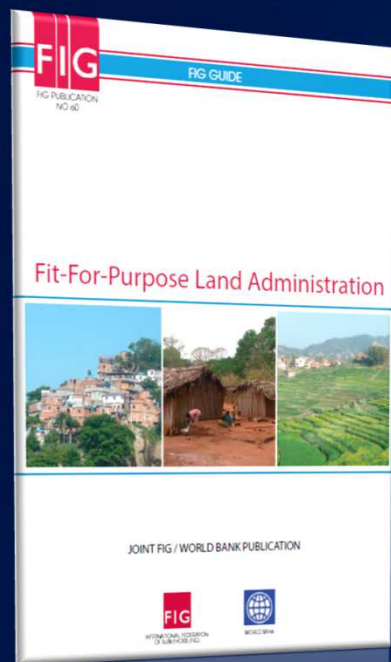


# Situation

- Post-Conflict Colombia
- Need low-cost, efficient cadastral data collection methodology
  - No programming
  - No software development
- Resolve boundary issues
- Serve data into multi-purpose cadastre
  - Connect with registry
  - Strengthen property tax
  - Support planning



# Standards-based Solution Requirement



ISO 19152

# Easy-to-Use-Requirements

Mobile  
Devices



High Accuracy



Open Standards



Basemaps and Content  
(ArcGIS Online)



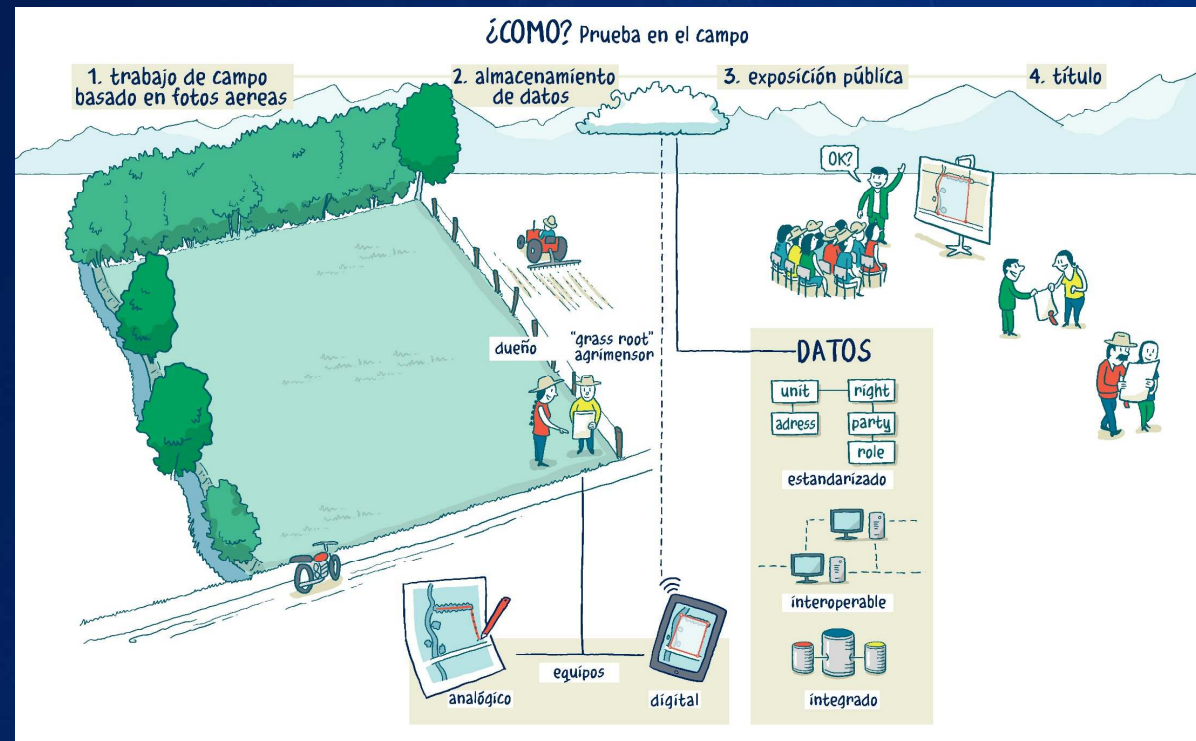
Work Anywhere  
(ArcGIS Online)

# Typical Situation



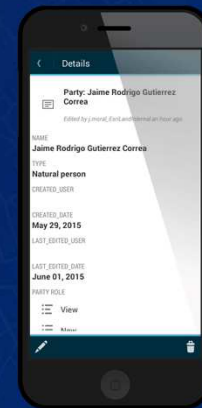
# Methodology

- Data model LADM
- Trimble R1 GNSS (sub-meter)
- Ortho photos ( digital)
- Collector for ArcGIS on Android
- Cloud storage Data (spatial and legal)
- Collect Once - participatory aspect

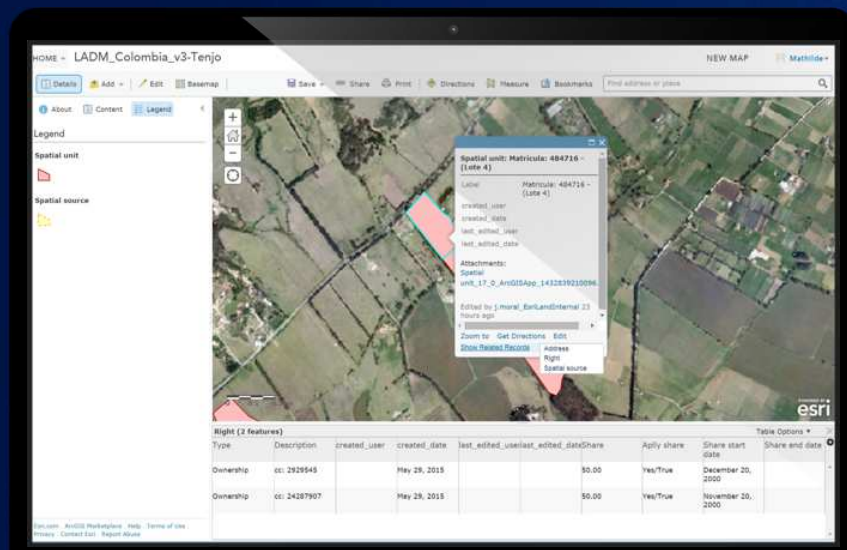




# Methodology



# LADM in ArcGIS Online



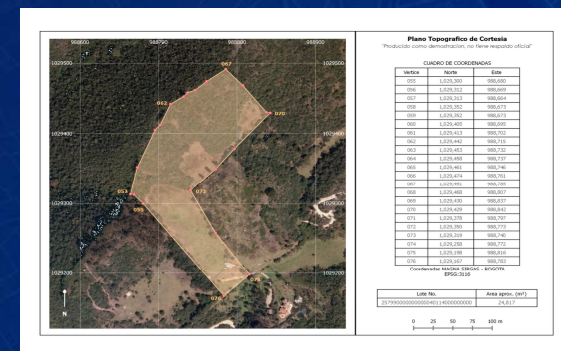
Browser Capabilities



Apps



Base Maps and Data



Reports

Many More.....

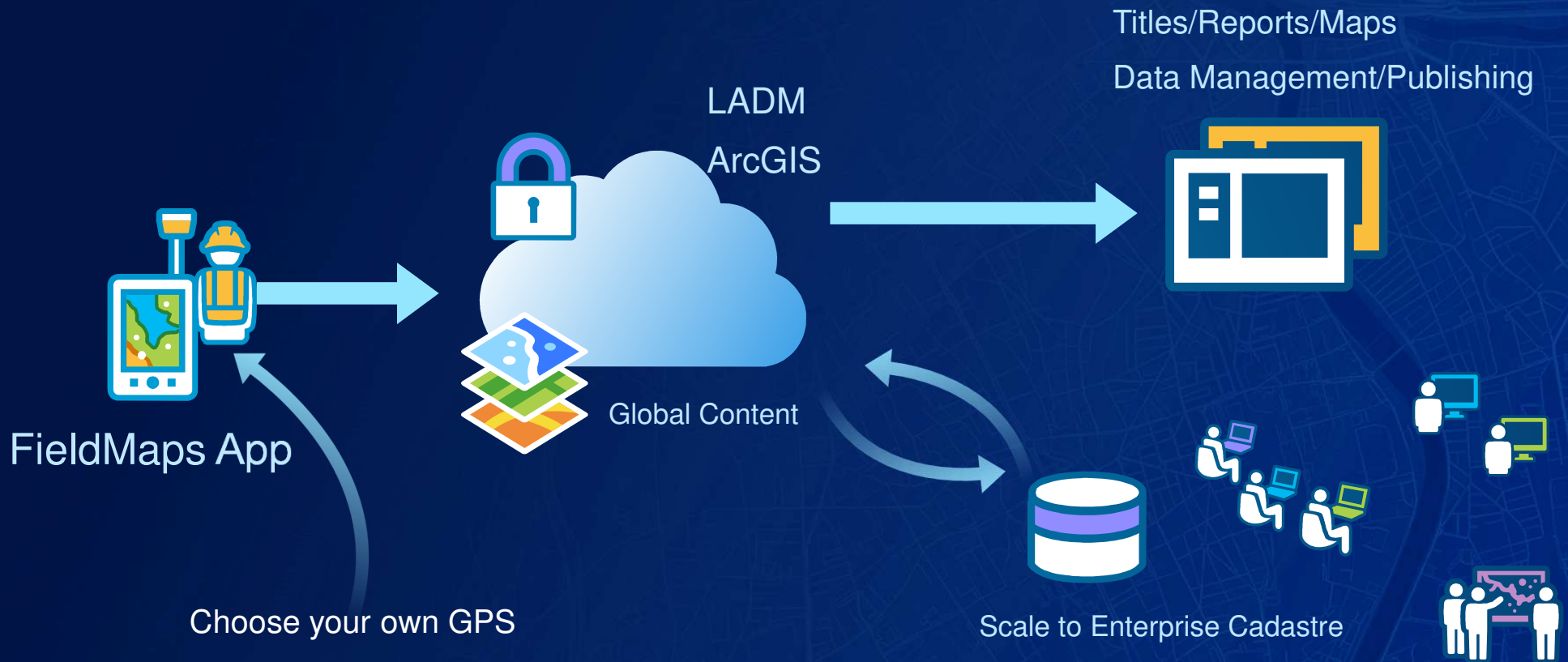
# Area Calculations

Critical for property tax calculations

Spatial Unit	Area IGAC m2	Area Test m2	$\Delta$ Area m2	Relative Error
21	1,378	1,330	48	0.0348
22	1,589	1,604	15	0.0943
23	1,806	1,768	28	0.0155
24	1,735	1,714	21	0.0121

# Fit-for Purpose Cadastre ArcGIS

Fit for Purpose Land Administration and ArcGIS



# Fit-for-Purpose Cadastre Colombia



kadaster



 esri Colombia

 Trimble



esri

THE SCIENCE OF WHERE™

# Cadasta

## Cadasta Global Impact Dashboard - General Statistics

Month:  
September

Year:  
2022

### Welcome to the Cadasta Impact Dashboard!



Esri, FAO, NOAA, USGS

Powered by Esri

HOUSEHOLDS



PEOPLE

6,186,494

\*estimated based on number of households and an average of 6 people per household. See Notes tab for

PARTNERS

99

PROJECTS

136

LAND DOCUMENTS  
ISSUED

169,812

COUNTRIES



PARCELS

395,528

NUMBER OF GOVERNMENTS



HECTARES

21,509,730

GENDER OF



COMMUNITIES

3,929

# Odisha India



 CADASTA

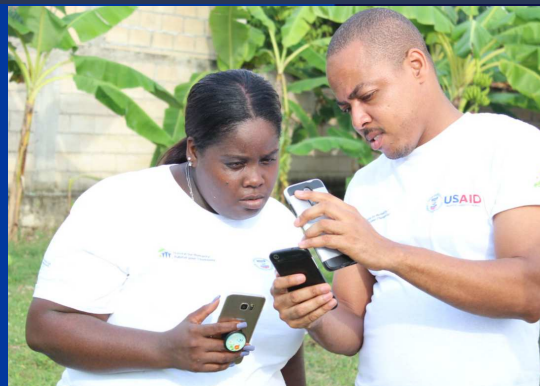
<https://www.esri.com/about/newsroom/blog/how-one-million-people-in-indias-odisha-slums-gain-land-rights/>

# UGANDA

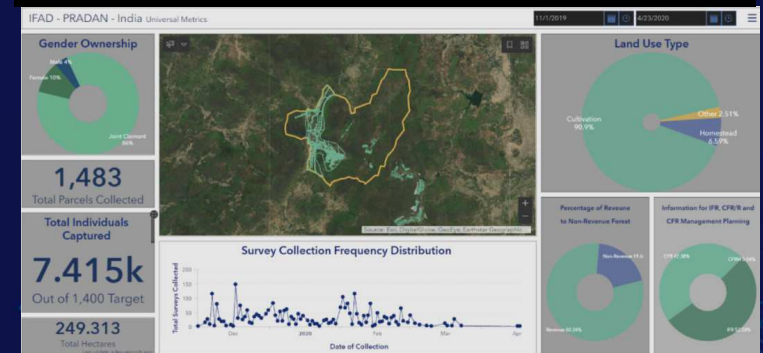
World's Largest Slum Titling Initiative Wins the UN-Habitat Award with Help from Cadasta

Pamoja Trust:  
Rapid Mapping of Areas  
Marked for Demolition

Leveraging Land in Haiti  
Cadasta & USAID



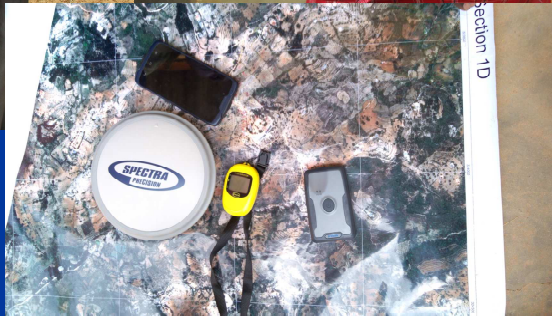
Protecting India's Forest-dwellers' Right to Land



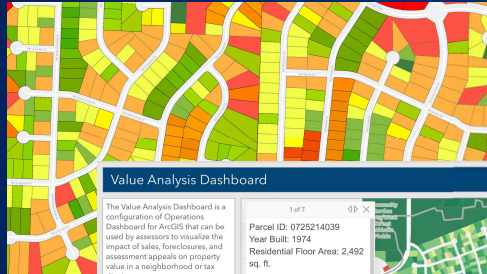
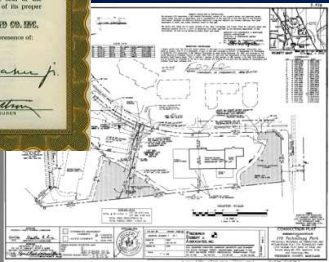
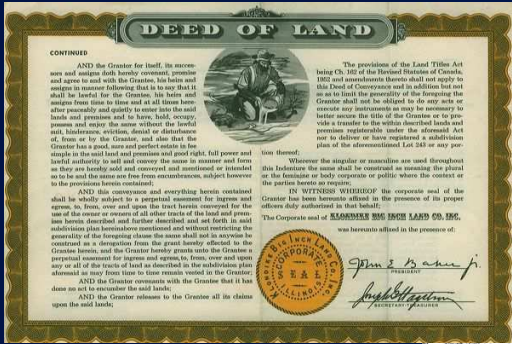
<https://cadasta.org/cadasta-stories/>



# Kenya



<https://www.esri.com/about/newsroom/blog/how-one-million-people-in-indias-odisha-slums-gain-land-rights/>



### Value Analysis Dashboard

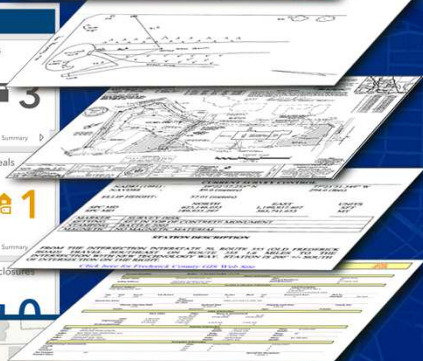
The Value Analysis Dashboard is a configuration of Operations Dashboard for ArcGIS that can be used by assessors to visualize the impact of sales, foreclosures, and assessment appeals on property values in a neighborhood or tax district.

Parcel ID: 0725214039  
 Year Built: 1974  
 Residential Floor Area: 2,492 sq. ft.

Current Assessed Value: \$96,820  
 Sale Price: \$327,000  
 Sales Ratio: 30% (33% Target)

Select an Assessment Neighborhood to refine the results.  
 272  
 All Sales

\$81,339,801      \$76,474,552



### Parcel Viewer

1668 Gardner Rd  
 Parcel Number: 020410204

Demolition	\$1,401.00
Elementary School	\$762.00
High School	\$1,640.00
Nursery	\$200.00
Home-Via Plan	\$25,600.00
Neighborhood	\$20,600.00
DuPage College	\$20,000.00
Neighborhood Library	\$81.00
DuPage County	\$14,400.00
Elementary	\$60.00
Township Roads	\$1,900.00
Township	\$15.00
DuPage Airport	\$9.00
<b>Total Tax</b>	<b>\$3,956.00</b>

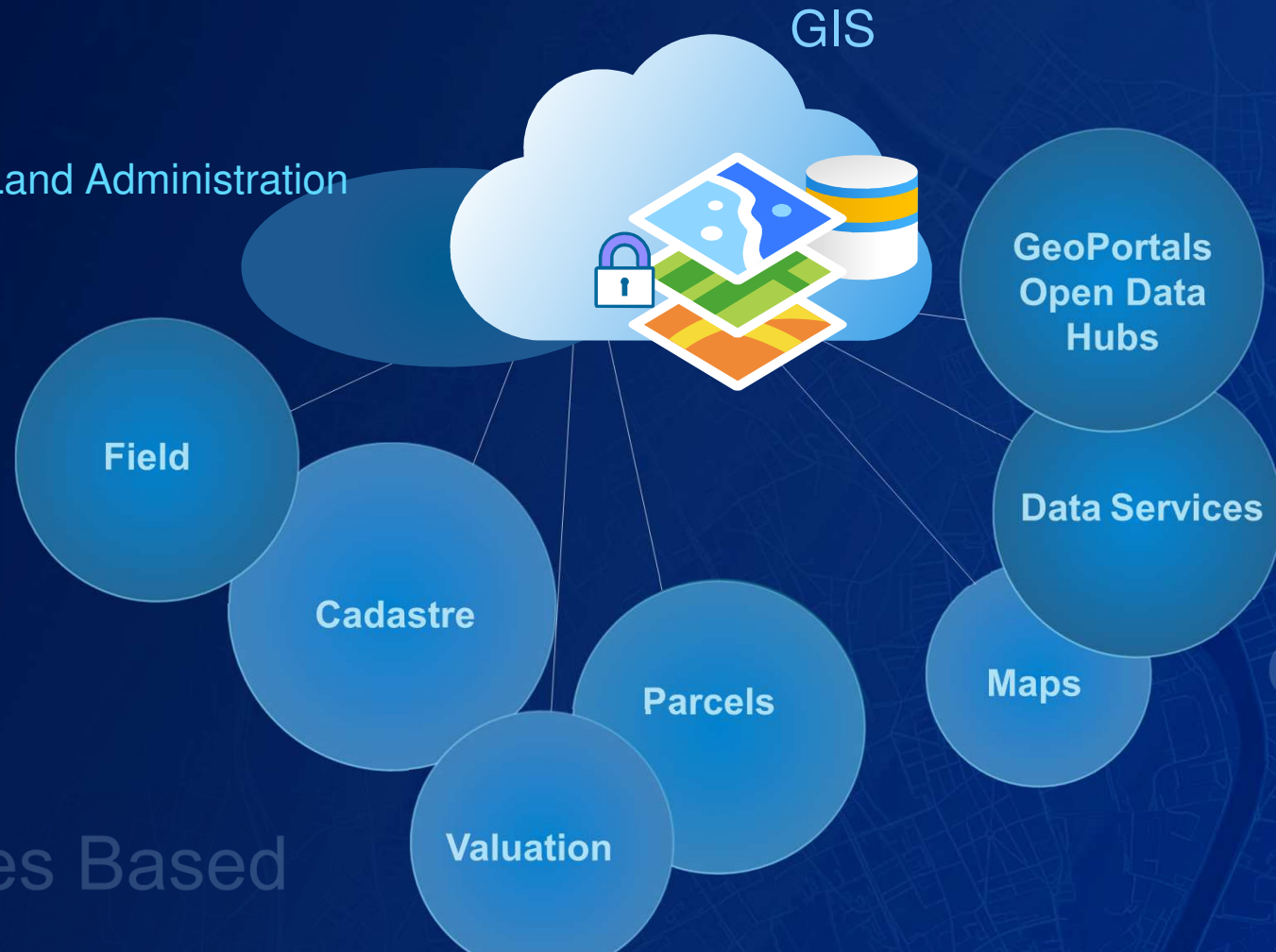
Owner: RICHARD LOVELL SR & DEBORAH  
 Address: 1217 E 10TH ST, BANGOR CITY  
 Property Area (Sq Ft): 7,104.14  
 Property Area (Acres): 0.16

2018  
 Market Value: \$76,246.00  
 Assessed Value: \$5,886.00  
 Taxable Value: \$5,887.00

Parcel Viewer

# GIS

The Platform for Land Administration



*Providing complete, configurable, open and scalable solutions.....*

2022

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**CATASTRO Y  
REGISTRO DE  
LA PROPIEDAD**



**¡GRACIAS!**