Leveraging ArcGIS 10 for Land Records

Agenda

Welcome and Introductions

ArcGIS 10 Best Practices for Land Records Management
• Local Government Resource Center
• Parcel Asset Management with ArcGIS 10

Break

ArcGIS 10 Land Records Resource Center Templates
• Planning & Analysis
• Mobile GIS & Workforce Automation
• Decision Support and Situational Awareness
• Citizen Engagement

Wrap-up and Q&A
ArcGIS 10 is the Foundation

• New Parcel management tools are core functionality
  • Fully supported
  • Subject to incremental enhancements
• Optimized data model for parcel management
  • Streamlines parcel editing thus saving time and increasing productivity
  • Improves data integrity
  • Allows you to improve positional accuracy over time
• Templates that extend core ArcGIS platform and promote diverse use of land records data
• Cloud-based services that complement your implementation
ArcGIS

A Complete System for Geographic Information

• Easier
• More Powerful
• Everywhere

Discover
Create
Manage
Visualize
Analyze
Collaborate

Cloud
Enterprise
Local

Making GIS Available to Everyone
ArcGIS supports your work

Making GIS easier to implement and more effective for government

• Core Technology
  • ArcGIS

• ArcGIS Online
  • ArcGIS.com

• Maps and Apps
  • Templates

• Best Practices
  • Resource Centers, resources.ersi.com

ArcGIS for Local Government
ArcGIS
Addresses Common Workflows

Modeling and Analysis
Design and Planning
Situational Awareness
Field Collection
Asset Management
Cartographic Design
Collaboration and Transparency
ArcGIS for Local Government

Useful maps and apps that help local governments implement GIS

- Organized around the work you do in local government
  - Reference Data / Basemaps
  - Land Records
  - Public Infrastructure
  - Elections
  - Planning
  - Code Enforcement
  - Public Safety
  - Public Health

- Extend the ArcGIS platform

...a simple pattern to configure and use ArcGIS
Land Record Technology Patterns

Best practices Data models, Cartography and Workflows

- Asset Management: Automate, manage, and publish accurate property records
- Modeling & Analysis: Model value influences, trends, and Impacts
- Field Mobility: Field appraisals and data collection
- Situational Awareness: Workflow status, visualize value trends, foreclosures, sales, appeals
- Constituent Engagement: Public access to property information

...Making GIS Easier to Implement, Maintain and Use
Local Government Resource Center

An online community for Local Government

...a place where users and partners can collaborate
Goals

• Simplify GIS

• Broaden use of GIS throughout organization

• Reduce implementation time

• Reduce implementation cost

• Promote synergy
  • Each app works everywhere
  • Each map works everywhere

Successful users making a difference
Local Government Maps and Apps
An ArcGIS system for local governments

...desktop, web and mobile apps with meaningful maps and layers supported by a single geodatabase schema
Land Records Maps and Apps

Helps local governments maximize the value of land records information

- **Parcel Value for iPhone**
  - Provides authoritative property maps and characteristics on iOS platform

- **Value Analysis Dashboard**
  - Provides a high-level view into the changes in property assessments and tax revenue

- **Tax Parcel Viewer**
  - Provides focused public access with authoritative property maps and characteristics

- **Parcel Map Templates**
  - Consumer and industry focused multi-scale basemaps

Can be hosted on premise or in the cloud
GIS for Land Records

- Statutory responsibility to inventory legal records and value land
- Used in many vital government operations
  - Assessment and Taxation, Land Use, Infrastructure, Deeds and Documents
Evolving Land Records Requirements

• Historically, land records information has been used internally by local governments
  • And under valued and poorly utilized by public audiences
• But that is changing…..
ArcGIS for Land Records

*Helps local governments maximize the value of land records information*

- Efficient data management workflows
  - To manage the land records life cycle
  - Structured parcel content and improved accuracy
  - Imagery management
  - CAMA integration
  - Simple map atlases

- Analytical tools for value analysis and geo-accounting
- Mobile solutions for field data collection and public access
- Great web maps and public access solutions
  - Can be hosted on ArcGIS.com
ArcGIS 10 is the Foundation

- New Parcel management tools are core functionality
- Optimized data model for parcel management
  - Streamlines parcel editing
  - Improves data integrity
  - Allows you to improve positional accuracy over time
- Templates that extend core ArcGIS platform
- Cloud-based services that complement your implementation
Land Records Asset Management

- At ArcGIS 10, tools within core software support editing workflows
  - Splits, merges, new subdivisions & condominiums, resurveys, etc.
- Optimized information model preserves record measurements
  - Improve integrity and positional accuracy over time
New Set of Tools for Editing Parcels in ArcGIS 10

- Data Model – Parcel Fabric
- Set of Parcel Editing tools
Scope of the Technology

The Workflow

- Land Records Submitted to Agency
- Agency Creates Digital Parcels
- Integrate parcels with the existing Fabric

A Framework for Parcel Information Management

Geodatabase

Parcel Fabric
Learning about Parcel Editing in ArcGIS 10

Parcel Fabric

Contents | Favorites | Search
---|---|---
What's new in ArcGIS | Professional Library
Essentials Library | What's in the Professional Library
Professional Library | Data Management
Geographic data types | Managing geodatabases
- About geographic data formats
  - Annotations
  - Dimension features
  - CAD
  - Coverages
  - Domains
  - Feature classes
  - Feature datasets
  - Geometric networks
  - KML
  - Locators
  - Metadata
  - NetCDF
  - Network datasets
- Parcel fabrics
  - What is a parcel fabric?
  - The parcel data model in the parcel fabric
  - An overview of land records
  - Managing the parcel fabric dataset
  - Migrating data to the parcel fabric
  - Rasters and images
  - Shapefiles
  - Subtypes

Editing data

Editing parcels
- What is parcel editing?
  - A quick tour of parcel editing in the parcel fabric
- Tutorials
  - Plans and the record of survey in the parcel
  - The parcel fabric layer
  - The parcel fabric editing environment
  - Creating parcels using the parcel traverse
  - Creating parcels from construction lines
  - Fabric editing and COGO tools
Demonstration
<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Description</th>
<th>Audience</th>
<th>Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valuation Analysis Web Map</td>
<td>Illustrates real estate trends within a local government and demonstrates the impact of real estate sales on property value</td>
<td>Assessing Department Staff, Tax Collection Department Staff, Finance and Budget Department Staff</td>
<td>ArcGIS Server Flex Viewer Sample Application</td>
</tr>
<tr>
<td>Public Access Web Map</td>
<td>Provides in-house and public access to parcel and related assessment information</td>
<td>Assessing Department Staff, Other Local Government Staff, General Public/Customers</td>
<td>ArcGIS Server Flex Viewer Sample Application</td>
</tr>
<tr>
<td>Parcel Value iPhone Map</td>
<td>Provides public access to tax parcel value and related assessment information</td>
<td>General Public/Customers</td>
<td>ArcGIS Server iPhone Sample Application</td>
</tr>
<tr>
<td>Parcel Editing Map</td>
<td>Supports parcel updates (splits, combos, subs, condos, etc.) and parcel data publishing</td>
<td>GIS Mapping Technicians</td>
<td>ArcGIS Desktop Parcel Editor Toolbar</td>
</tr>
<tr>
<td>Tax Parcel Atlas Map</td>
<td>Supports tax map atlas production</td>
<td>Assessing Department Staff, Other Local Government Staff, General Public/Customers</td>
<td>ArcGIS Desktop</td>
</tr>
</tbody>
</table>
Set of Tools for Editing Parcels

- Merge parcels
Parcel Fabric has Built-in History Management

Layer Properties

- Show all parcels
  - Parcels with a system end-date are called historic. When a parcel is marked historic, the system end-date is automatically set.
- Show a view of the fabric parcels
  - that have no system end-date (active parcels)
  - that had no system end-date on: 1/13/2011
  - that had no legal end-date on:

Today: 1/13/2011
Job Book – Tracks Parcel Edits

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
<th>Version</th>
<th>Operator</th>
<th>Last Mod</th>
</tr>
</thead>
</table>

2/24/2011 4:41:40 PM

- Name: 2/24/2011 4:41:40 PM
- Description: Merge
- Owner: jd1765
- Status: Active
- Modified Date: 2011-2-24

Edit Job Parcels:

1. Parcel Name: 1920128009
2. Parcel Name: 1920128017
3. Parcel Name: 1920128008

Job Parcels:
- Neighboring parcels
- Parcels within: 2
- Choose parcels manually:
  - Parcel Name: [Add]

Include parcels to fill gaps in the selection
Open job when click OK

OK | Cancel
Tracking Parcel Edits

- Jobs keep track of edits
  - **Who** - user name
  - **What** - type of edit
  - **When** - Date/time of edit
  - **Where** - selects edited parcels

- Optionally create and manage your own jobs
Streamlined workflows – parcel division

- Divide by area

Part of the NW ¼ Section 20, Township 2 North, Range 10 East, Bloomfield TWP, Oakland Co. Michigan. Further described as the East half of Lot 3, Supervisor’s Plat of North Devon Acres recorded March 30th, 1949.
Streamlined Workflows – Naming Parcels

- Parcel Namer aka “Snake” tool
Anatomy of a Parcel

- Parcel is an area of land

Parcel polygon
Anatomy of a Parcel

- Parcel is an area of land
- Related set of lines
- Defined by From/To Points
What is a Parcel Fabric?

- Set of related tables and feature classes stored in a geodatabase
- Forms a parcel boundary network
- Explicit topology
  - defined by common parcel corners, no overlaps and gaps between neighboring parcels
Maintaining Parcel Data Accuracy in ArcGIS 10

- Attribute data – **correct dimensions**
  - Data entry, parcel misclose
Maintaining Parcel Data Accuracy in ArcGIS 10

- Topological accuracy
  - Parcels are joined using shared points
Data Integrity

Eliminate slivers and gaps

- Easily and quickly incorporate new data
- Preserve parcel connectivity during incorporation
- Maintain positional relationships with other layers (easement, right of ways, utilities, etc.)
Data Model: Relationships

- Control
- Line Points
- Points
- Lines
- Parcels
- Plans

Relationships:
- 1-1
- 1-M
- 2-1
- 0-1
- 0-M
Data Model: Redundancy supports Spatial Quality

- Each parcel has its own set of related lines
  - Overlapping lines for a common boundary
- Redundant network
  - More boundary lines define relatively fewer points

![Diagram of a redundant network with 16 lines and 9 points]
Data Model

- Fabric allows overlapping parcels
- Natural boundaries
- Donut/island and multipart parcels
- Historic parcels
Data Model designed for managing Land Records

- Parcel Fabric
- Control
- Line Points
- Points
- Lines
  - Boundary Line
  - Dependent Line
  - Precise Connection
  - Connection
  - Radial
  - Road Frontage
  - Origin Connection
  - Part Connector
- Parcels

Plans

Parcels
Remaining Agenda

- Asset Management
  - Parcel types
  - Workflow Manager
  - Task Assistant
- Other Patterns
  - Field Mobility
  - Planning and Analysis
  - Situational Awareness
  - Constituent Engagement
- Implementation
- Final Thoughts
(SystemEndDate IS NULL) AND ("Type" = 7)
(SystemEndDate IS NULL) AND ("Type" = 5)
(SystemEndDate IS NULL) AND ("Type" = 6)

ParcelType Domain:
1. PLSS Township
2. PLSS Section
3. PLSS Quarter Section
4. Special Survey
5. Simultaneous Conveyance
6. Conveyance Division
7. Tax
8. Ownership
9. Encumbrance
10. Separated Right
11. Other
ArcGIS Workflow Manager

- Enterprise workflow management application
- Key Features
  - Workflow management; Job/Task tracking
  - User/Role/Version management
Jobs – Unit of Work

Job List

Job Queries

Job properties
Workflows

- Defines steps/tasks that need to be completed
- Standardizes tasks
  - Create Job Types
- Supports:
  - Streamlining standardization of job tasks or steps
  - Visual task management and execution
Task Assistant

- Links a series of tasks together in a workflow
- Design step-by-step instructions
- Include ArcMap commands and geoprocessing tools
- Assists GIS users in completing workflow
Scope of Technology

The Workflow

- Land Records Submitted to Agency
- Agency Creates Digital Parcels
- Integrate parcels with the existing Fabric
- Adjust Fabric
- Adjust other GIS Layers

A Framework for Parcel Information Management

Geodatabase

Parcel Fabric
Adjustments
Two types of adjustments

Fabric adjustment (least-squares)

Feature adjustment
Many new tools and templates are available for free at the Local Government Resource Center.

New Parcel management tools are now included within the ArcGIS Desktop.

Optimized geodatabase parcel fabric model:
- Streamlines parcel editing workflows
- Integrated COGO and survey control capabilities
- Provides for improved positional accuracy over time
Field Mobility

- Access to relevant information in the field improves productivity
- Efficient data collection workflows improves data quality
- Mobile technology is a great platform for public access applications
Demonstration
Planning and Analysis

- Visualize property characteristics and analyze trends
  - Integration with Assessment and Taxation systems
- Identify geographic influences on property value and land use
Operational Awareness

- Tools to manage the performance of your organization
- Increase internal accountability and transparency
Constituent Engagement

- Provides access to authoritative land records information
- Invokes feedback from constituents
Demonstration
Implementing the Land Records Solution

• Identify your business needs
  • Which land records application will provide the largest business value in your organization

• Review content on the Resource Center
  • Templates, hosted apps, videos, blogs
  • Identify ArcGIS platform requirements
  • Configure template(s) in your organization

• Plan your migration
  • Data, workflows, apps

• Identify areas where you may need help
  • Esri and Partner Network available if needed
Business Needs

• General Land Records Platform
  - Start with Tax Parcel Editing and then add other apps

• Data Management
  - Start with Tax Parcel Editing and Tax Map Book

• Constituent Engagement
  - Start with Tax Parcel Viewer and Parcel Value for iPhone

• Planning and Analysis
  - Start with Value Analysis Dashboard

...many ways to leverage the maps and apps on the ArcGIS for Land Records system
Resource Center Content

• Review template downloads, they include:
  - Maps and Geodatabase
  - Documentation
  - Application
  - Getting Started Document
• Watch the videos, read the blogs
• Work with sample data
• Review Local Government GDB
• Ask questions

Email: ArcGISTeamLocalGov@esri.com
Scenario: Implement Tax Parcel Editing Template

- Review Tax Parcel Editing Template
  - Editing map – well defined layers, label expressions and attractive cartography
  - Productivity tools – enhance the core editing environment
  - Geodatabase – methods for managing multiple parcel types in a parcel fabric, annotation best practices
- Review how consistent your data is with the Local Government Model GDB
Scenario: Implement Tax Parcel Editing Template

- Download White Paper - *Loading Data Into a Parcel Fabric*
- Important aspects:
  - Different paths depending on state of source data
  - Using a topology to check initial data integrity
  - Delineating curves
  - Modeling different parcel types (lots, subdivisions, etc.)
  - Annotation
Scenario: Implement Tax Parcel Editing Template

- Lets start migrating data
  - The parcel fabric expects some level of spatial integrity to start
- Question #1 – How well do your tax parcels, boundaries, lots, etc. line up?
Scenario: Implement Tax Parcel Editing Template

- Question #2 – How are curves represented within your data?
Loading data into the Parcel Fabric Data Model

- **Parcels**
  - **Parcels**
  - **Parcel_Lines**
  - **Parcel_Topo**

"Name" = Parcel_ID
"Type" = 7

**ParcelType Domain**
1. PLSS Township
2. PLSS Section
3. PLSS Quarter Section
4. Special Survey
5. Simultaneous Conveyance
6. Conveyance Division
7. Tax
8. Ownership
9. Encumbrance
10. Separated Right
11. Other

- **Line**—Must be Single Part
- **Line**—Must Not Self-Overlap
- **Line**—Must Not Self-Intersect
- **Line**—Must Not Intersect Or Touch Interior
- **Line**—Must be Covered by Boundary Of (polygon)
- **Polygon**—Boundary Must be Covered By (Line)
Loading data into the Parcel Fabric Data Model

"Name" = Lot_Number
"Type" = 6
"SimConDivType" = "Lot"

- Line—Must be Single Part
- Line—Must Not Self-Overlap
- Line—Must Not Self-Intersect
- Line—Must Not Intersect Or Touch Interior
- Line—Must be Covered by Boundary Of (polygon)
- Polygon—Boundary Must be Covered By (Line)

Parcel Model

Lots
- Lot_Polygons
- Lot_Lines
- Lots_Topo

ParcelType Domain
1  PLSS Township
2  PLSS Section
3  PLSS Quarter Section
4  Special Survey
5  Simultaneous Conveyance
6  Conveyance Division
Loading data into the Parcel Fabric Data Model

Subdivisions
- Sub_Polygons
- Sub_Lines
- Sub_Topo

“Name” = Sub_Name
"Type" = 5
"ConveyanceType" = "Subdivision"

ParcelType Domain
1  PLSS Township
2  PLSS Section
3  PLSS Quarter Section
4  Special Survey
5  Simultaneous Conveyance
6  Conveyance Division

- Line—Must be Single Part
- Line—Must Not Self-Overlap
- Line—Must Not Self-Intersect
- Line—Must Not Intersect Or Touch Interior
- Line—Must be Covered by Boundary Of (polygon)
- Polygon—Boundary Must be Covered By (Line)
Scenario: Implement Tax Parcel Editing Template

- Ultimately, you’ll follow a process similar to this:
  - Step 1 - Prepare your Fabric Data Model
  - Step 2 - Prepare your Source Data
  - Step 3 - Clean up the Geometry on your Source Data
  - Step 4 - Establish Topology Required for Fabric Loading
  - Step 5 - Load your Source Data to the Fabric
  - Step 6 - Set up your Editing Map
GIS is a destination

For accessing and using geographic information

- For creating and sharing intelligent maps and related geographic information.
- For discovering and using maps and geographic information

... Online
Using GIS maps

*The map is the app*

Professional GIS maps to share with peers

Web maps to share with everyone

To share geographic data, editing, analysis, reporting, workflows, . . .
ArcGIS provides an information surface
Of useful maps and apps

Mobile workforce
Web communities
Developers
Professional staff

Use

Publish
An Information Surface
• Maps
• Apps
• Services

Author
GIS “Back Office”
The ArcGIS for Land Records Solution
A scalable solution for your organization

- Robust desktop tools
- Simple web mapping applications
- Flexible mobile platform
- Ready to use content and services
- Collaboration and sharing

CONTENT
Community Parcel Map
ArcGIS.com

AUTHORING
Tax Parcel Editing
Map Templates

desktop
server
enterprise

Parcels Value for the iPhone
Value Analysis Dashboard
Tax Parcel Viewer

SERVING

USING

Cloud
ArcGIS 10
Foundation for Land Records Solutions

Summary

- GIS can now be a destination for useful maps and apps
- Access to powerful planning and spatial analysis capabilities
- Full access to your data with Smart Phones and Mobile GIS
- New Generation of Web 2.0 capabilities that can provide easy near-real-time access to your land records data
- Citizen Engagement tools for transparent inquiry and feedback
- Enterprise Licensing provides simple low-cost access to the full range of ArcGIS tools
- Comprehensive application support from Esri and our Business Partners