

# Cadastral Mapping GIS

## “Best Practices”



# Best Practices

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## Topics

- Striving for Improvement
- Understanding the Process
- Planning for Change
- Do What Works



# Best Practices

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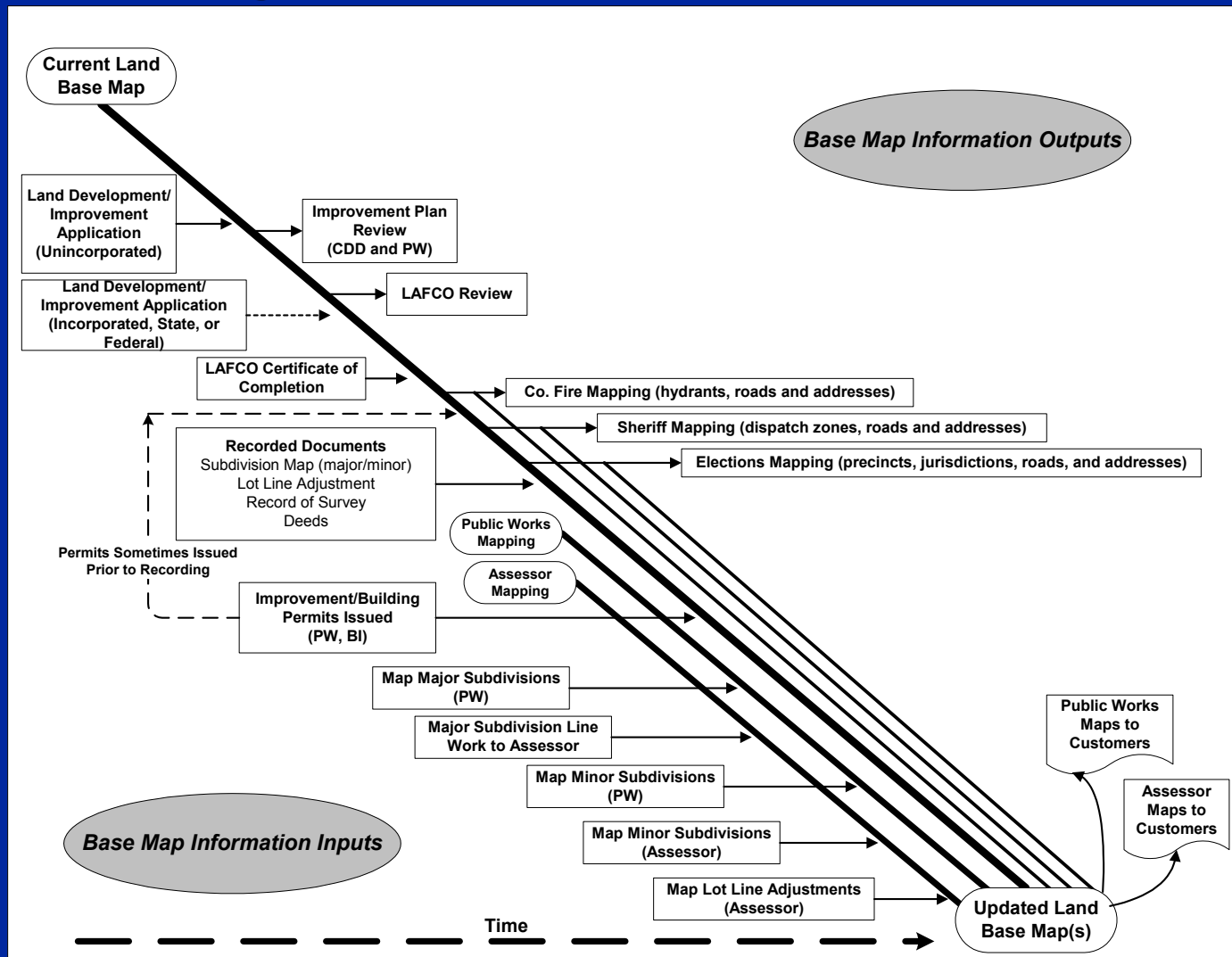
## Striving for Improvement

- Maintaining land records is a COMPLEX endeavor
- The business process is largely misunderstood by most
- Everybody wants ***something*** from us (NOW!)
- Mapping departments are dedicated to improving service to many constituencies



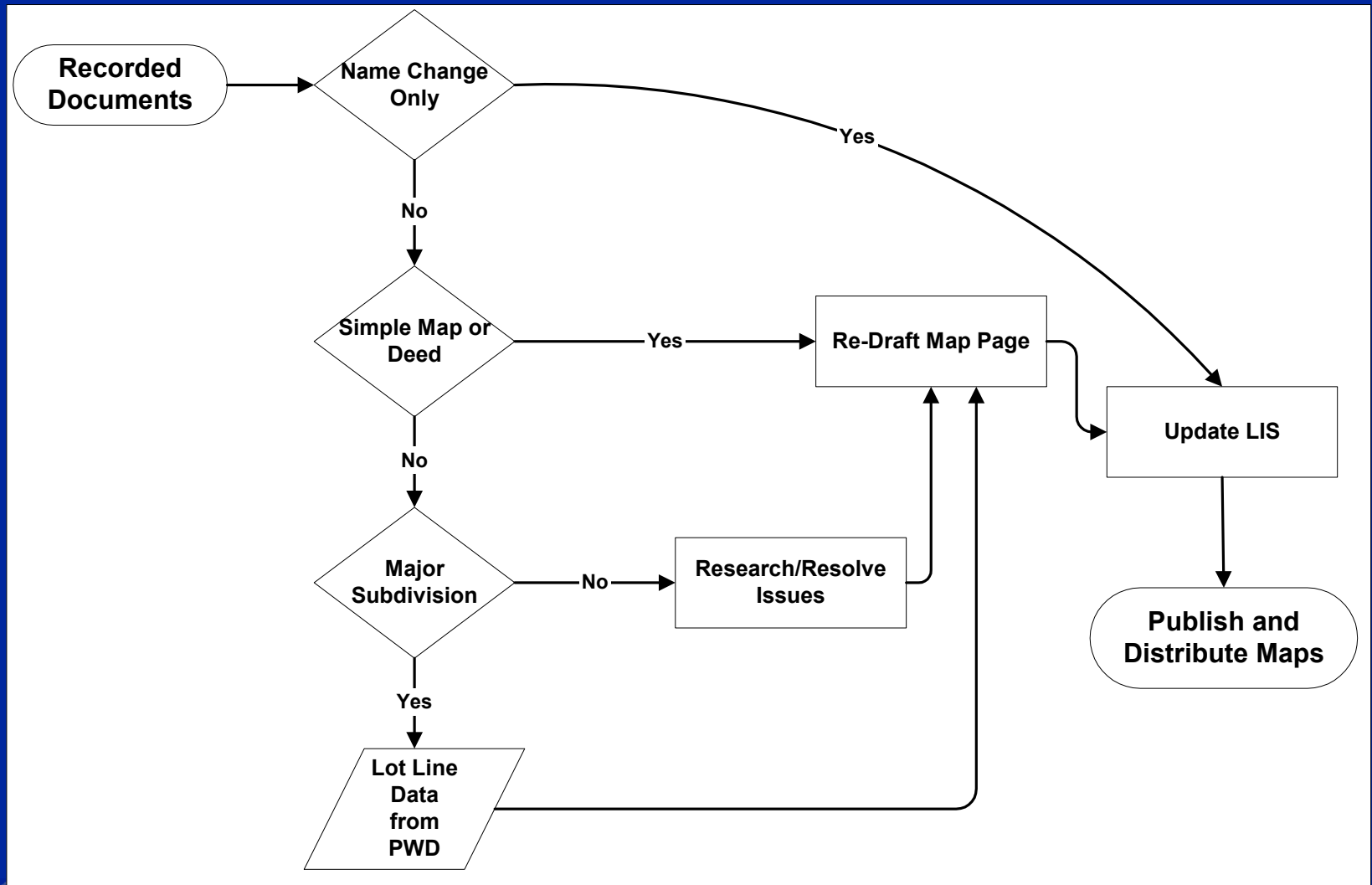
# Best Practices

## Understanding the Process



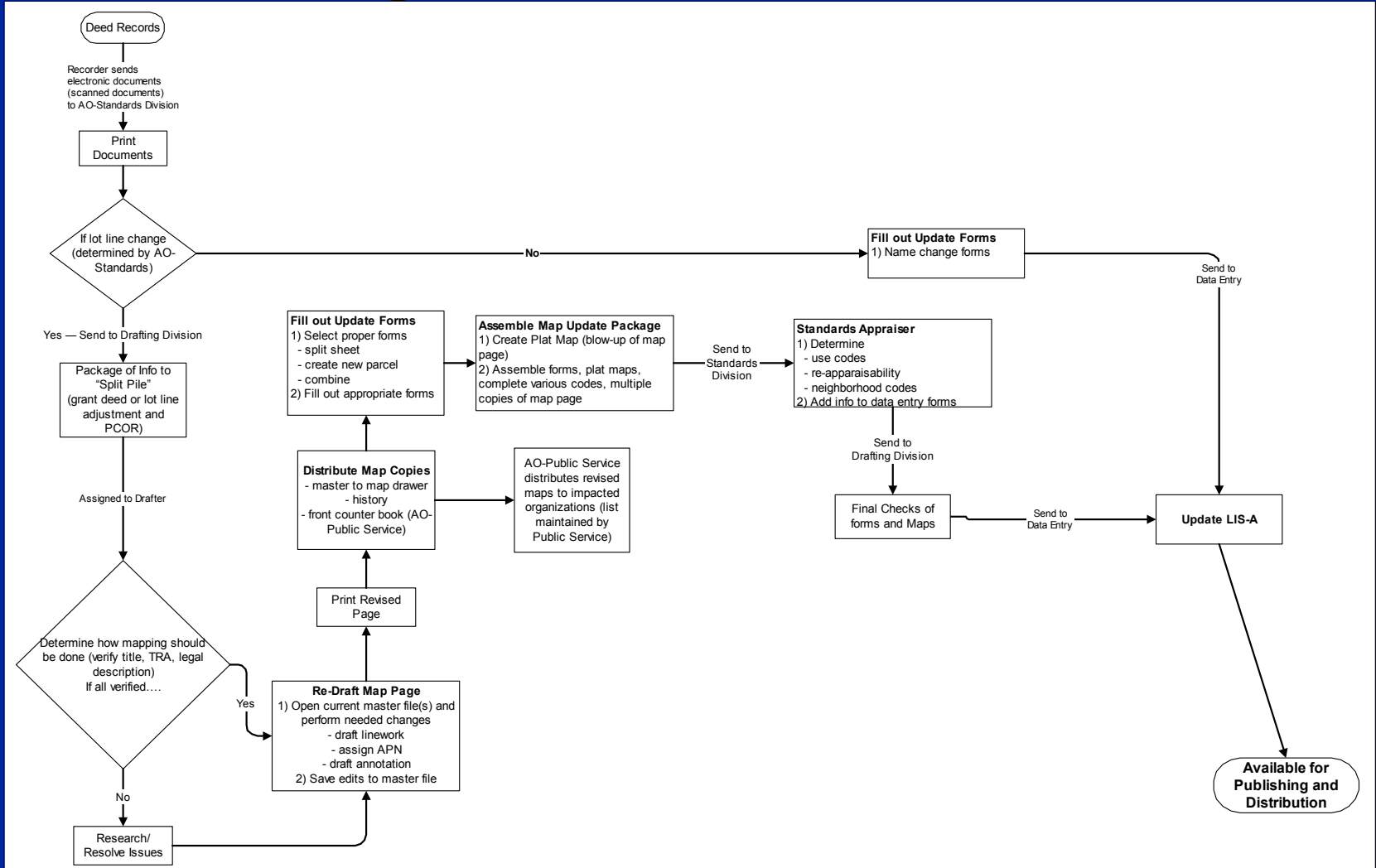
# Best Practices

## Understanding the Process

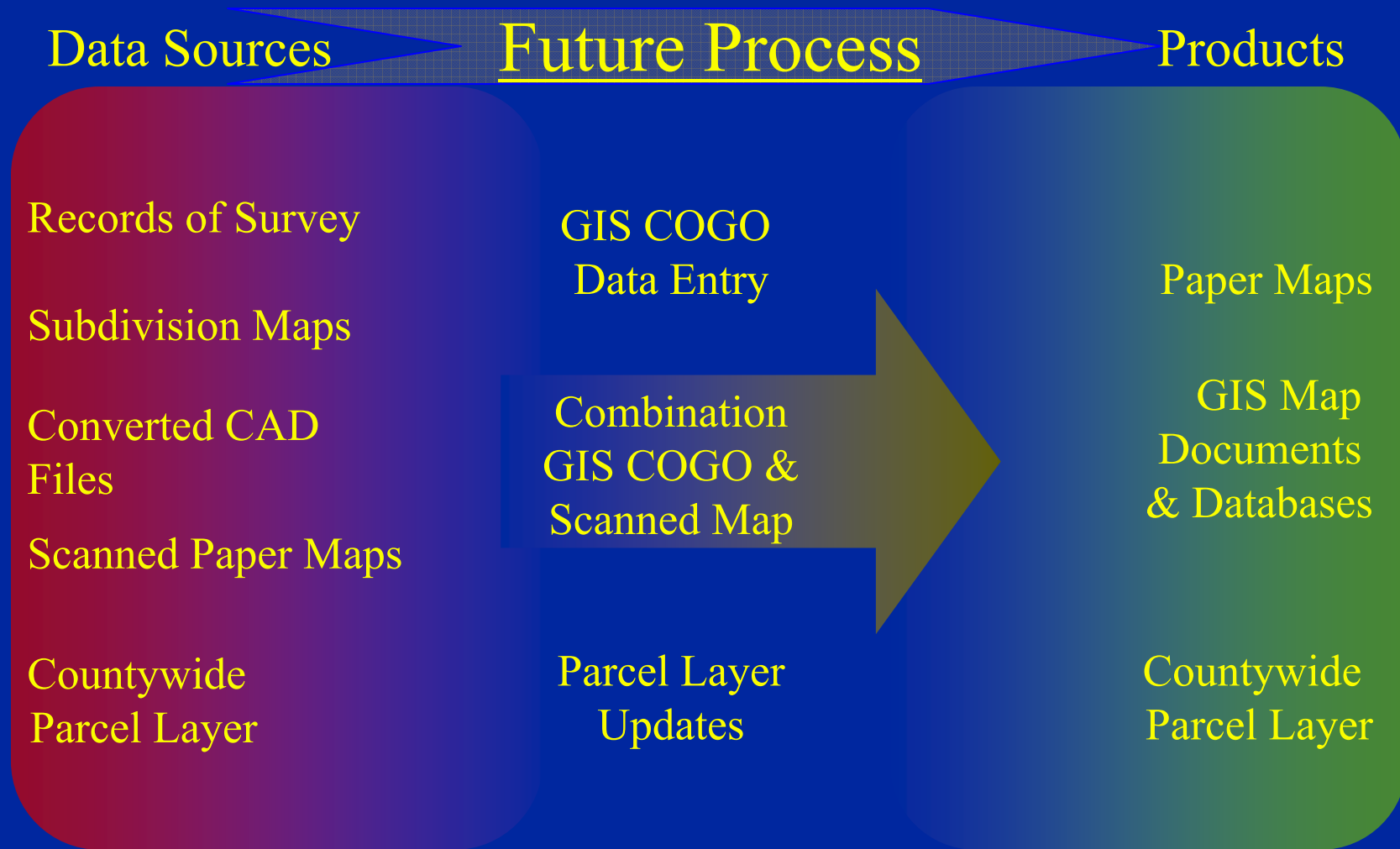


# Best Practices

## Understanding the Process

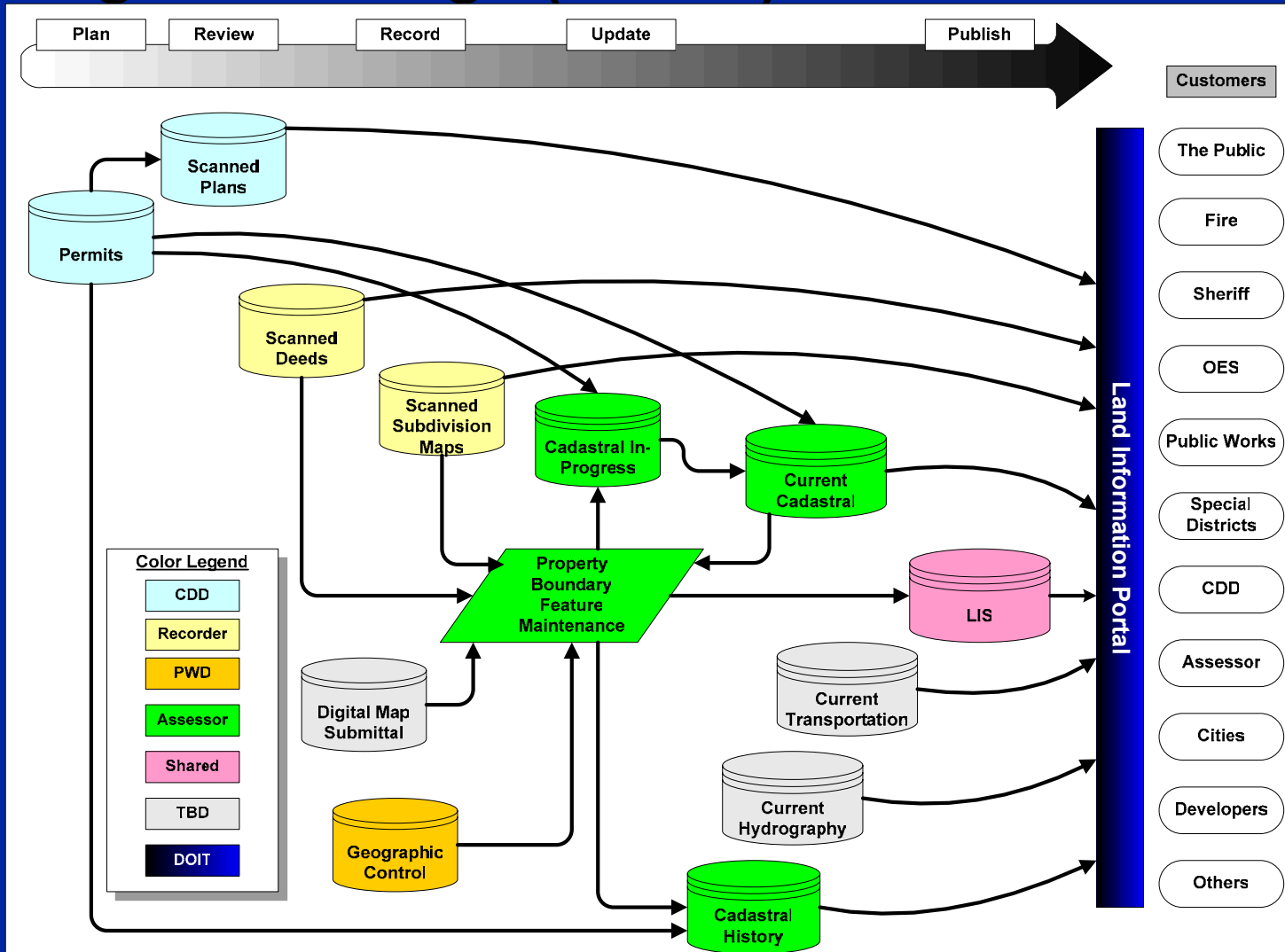


# Best Practices



# Best Practices

## Planning For Change (Vision)





# Best Practices

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## **Phase I – Initiate Basic Structure**

- Initiate a cross-departmental governance committee,
- Re-allocate staff resources,
- Upgrade hardware and software,
- Provide training,
- Begin restructuring workflow to more closely tie property boundary feature maintenance to recording transactions, and
- Identify and resolve problems with existing property boundary feature data.



# Best Practices

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## **Phase II – Enhanced Integration of Data and Workflow**

- Actively engage various departments to take responsibility for providing commonly used land information data,
- Provide training,
- Improve the integration of data maintenance with property recording workflow, and
- Continue to resolve any outstanding problems with property boundary feature data as encountered, and



# Best Practices

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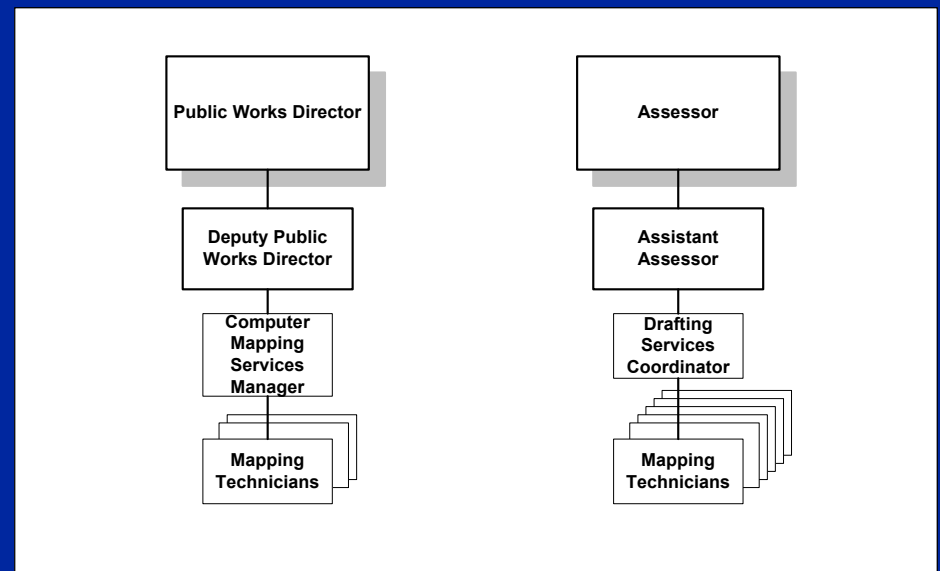
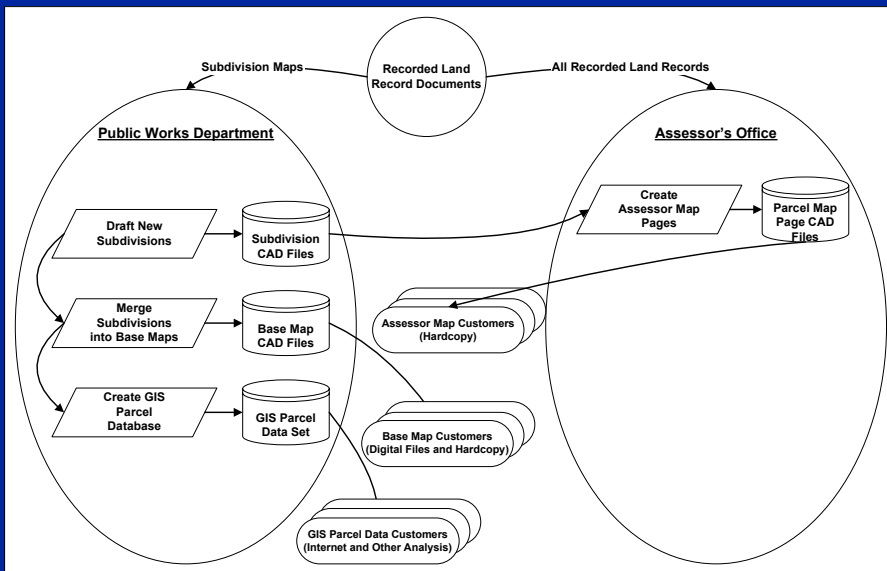
## **Phase III – Implement Parcel Management System.**

- Expand the governance structure to include organizations interested in land information countywide,
- Implement tight integration between the LIS and GIS-based parcel management system,
- Implement new software and systems,
- Provide training,
- Modify workflow, and
- Maintain accurate, consistent, current and historical land information



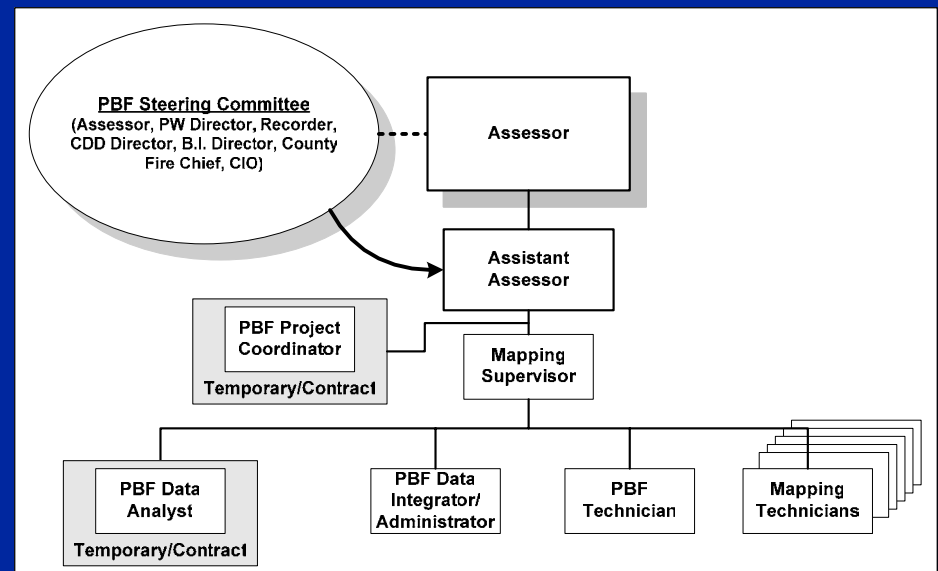
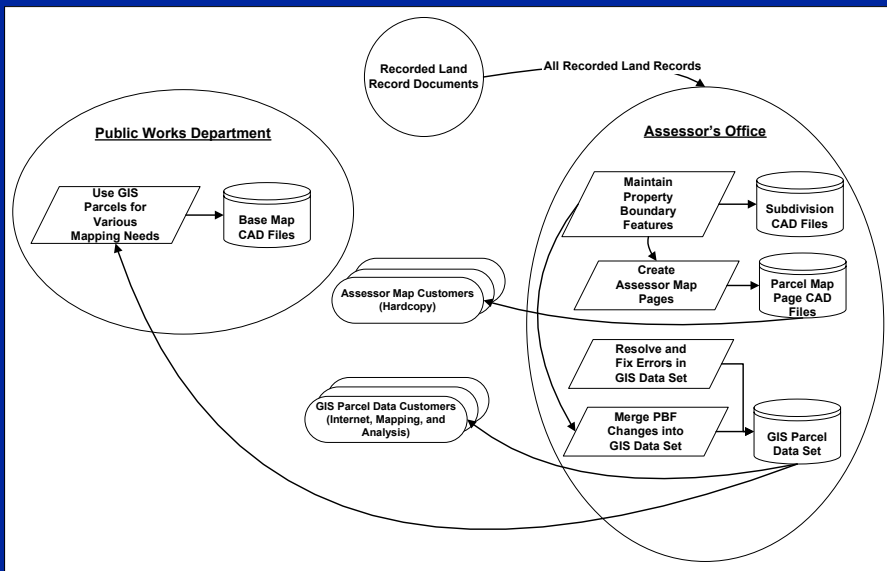
# Best Practices

## Current Information Flow and Structure

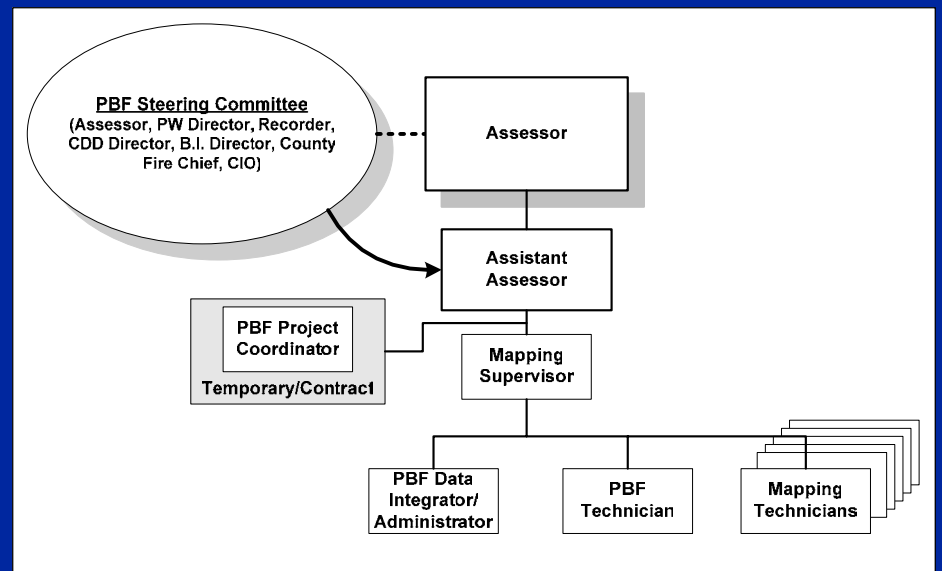


# Best Practices

## Phase I

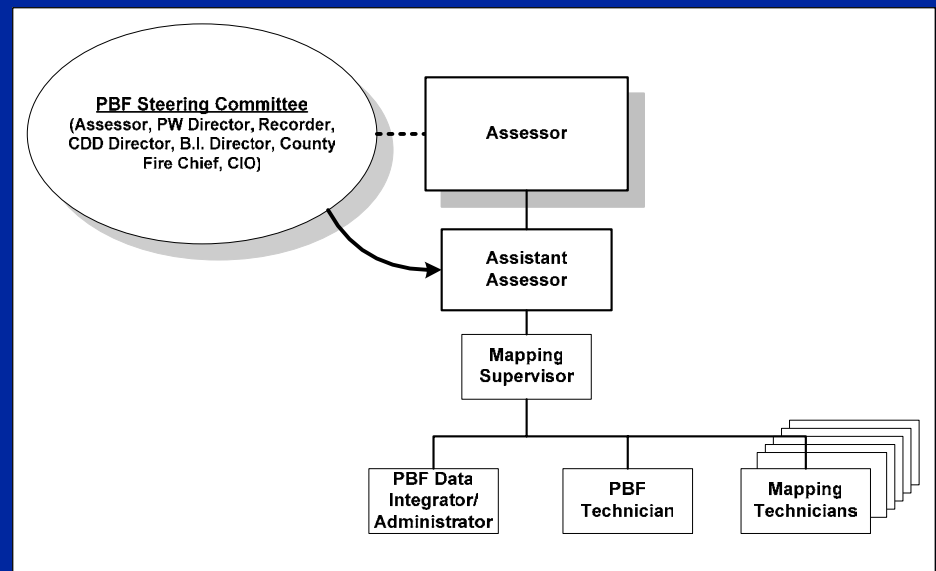
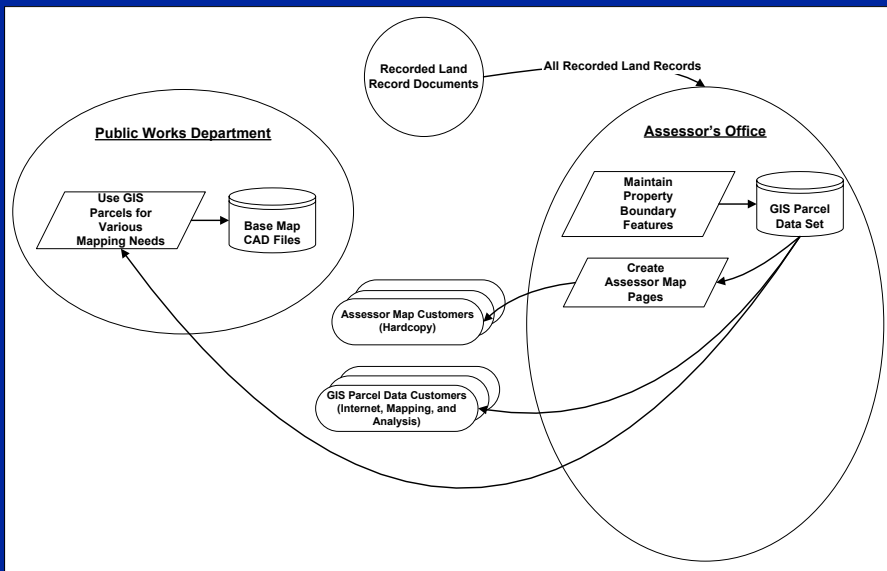


## Phase II



# Best Practices

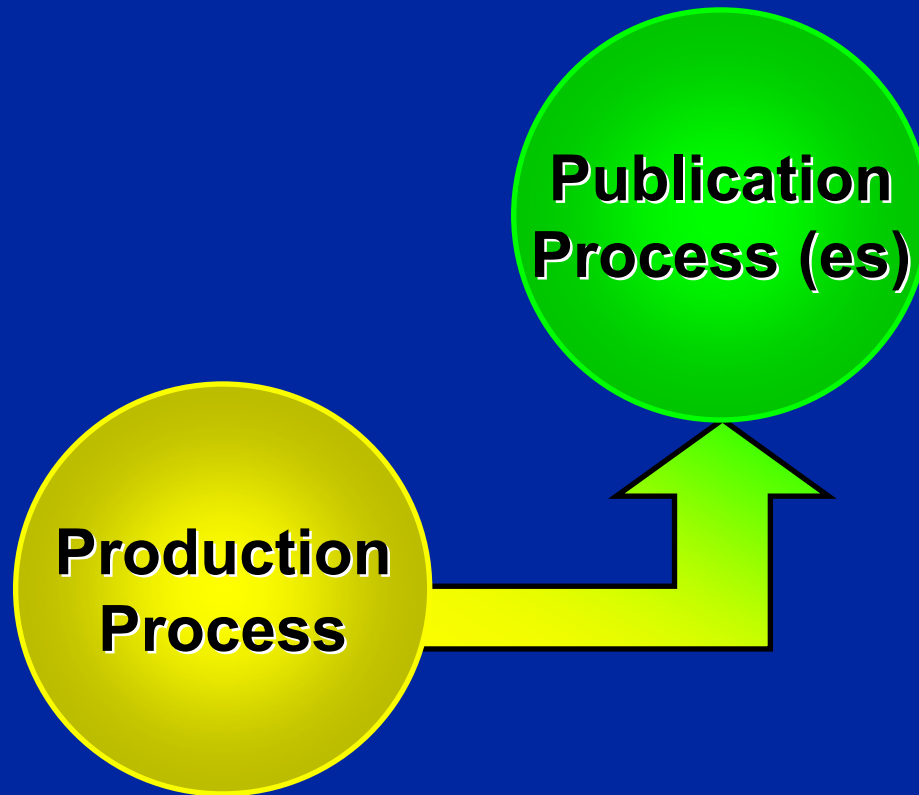
## Phase III



# Best Practices

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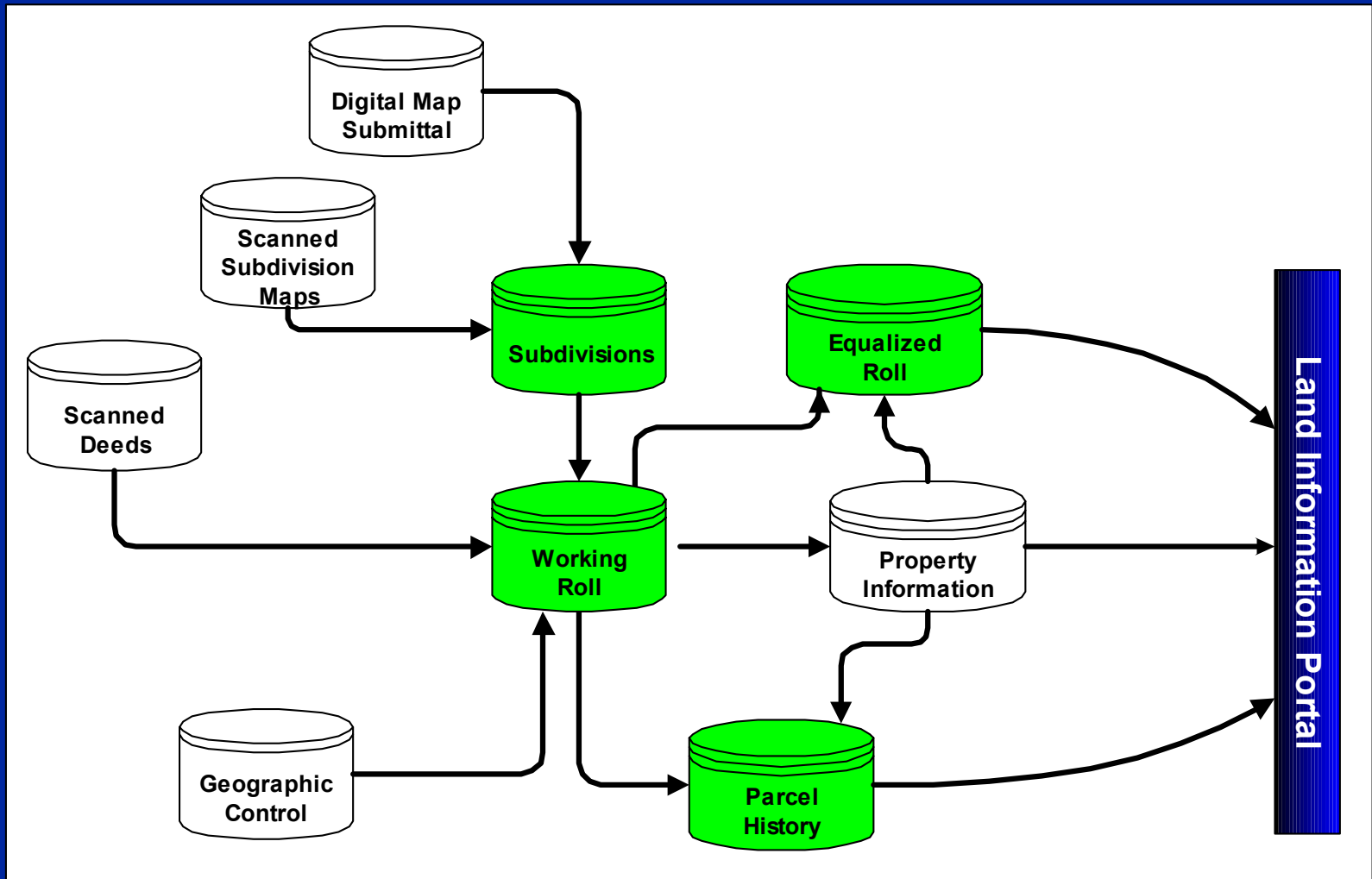
## A Liberating Concept





# Best Practices

## Workflow Overview



# Best Practices

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## Example Components to Design

- Assessor Page Geodatabase design
- Countywide Parcel Layer Geodatabase design
- Subdivision Geodatabase design
- Assessor page Status Database design
- ArcMap templates for standard SBE assessor maps
- Directory structure to store all parcel mapping data
- Procedures and Parcel Editor workflows for:
  - Adjusting parcels (parcel split, parcel merge, lot line adjustment)
  - Importing data to assessor page geodatabases
  - Creating and updating assessor parcel maps
  - Updating the Countywide Parcel Layer
  - Comparing the Property database and the Countywide Parcel Layer
  - Updating the assessor page Status Database



# Best Practices

## Subdivision Geodatabase Design

Directly imported from CAD files

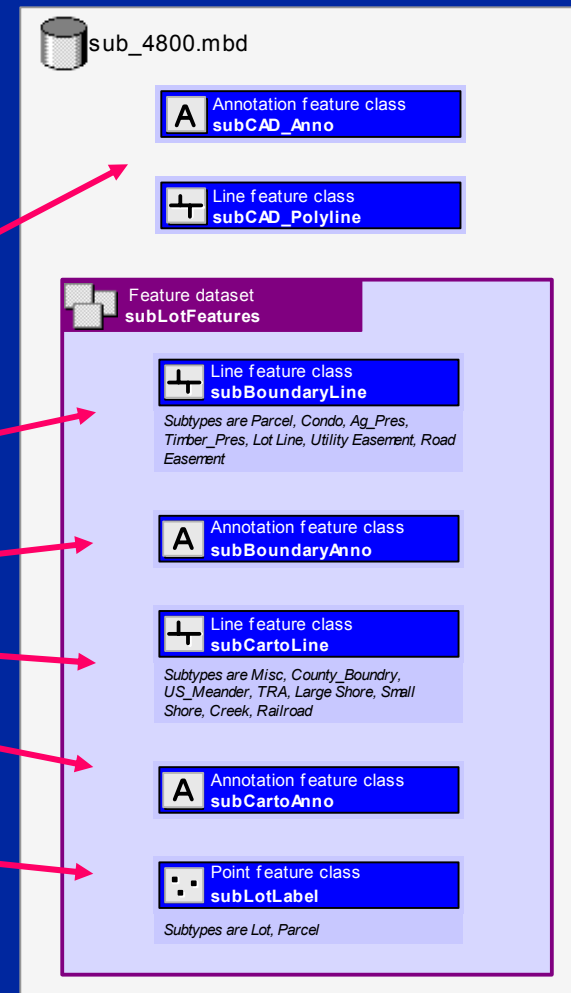
Boundary lines

Boundary line annotation (bearing/distance)

Mapping lines (road ROW, hooks, etc.)

Mapping annotation (blocks, neighboring  
pages, page titles, road names, etc.)

Lot labels



# Best Practices

## Countywide Parcel Layer Geodatabase Design

### Temporary (working) feature classes

- For importing parcel labels
- For constructing polygons
- For georeferencing data

### Topology to enforce data integrity

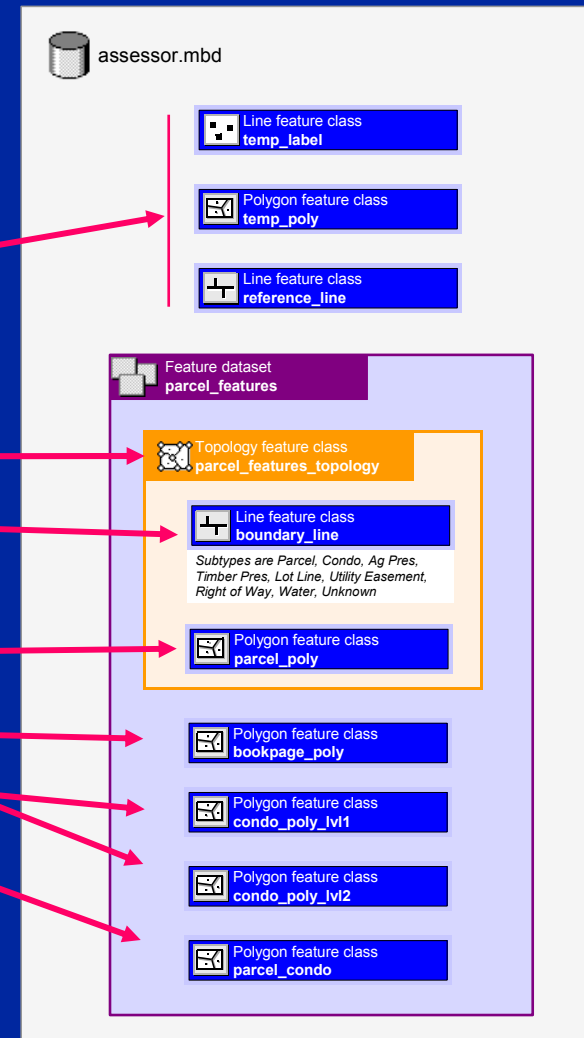
Boundary lines will store several boundary types with source data

Parcel polygons will store APNs

Book and Page feature class

Condominium feature classes (one per level)

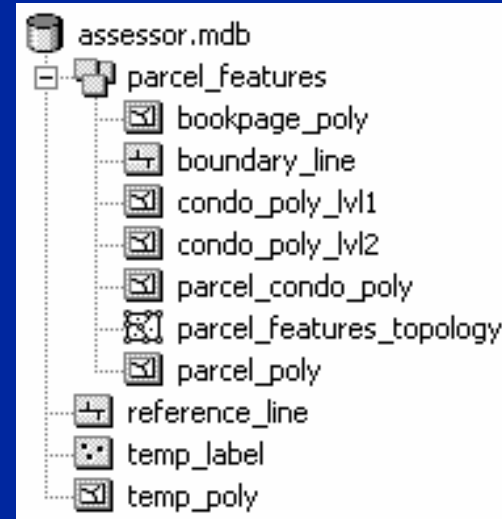
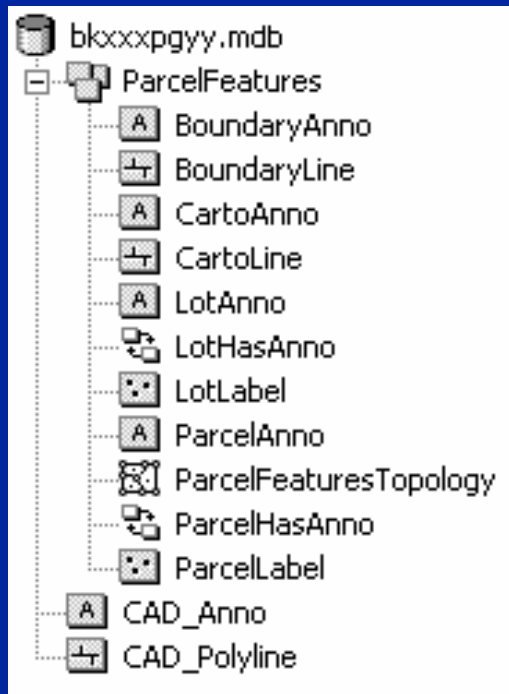
All parcels and condos in one feature class



# Best Practices

## The ArcCatalog tree views

- Assessor Page Geodatabase template
- Countywide Parcel Layer



# Best Practices

## Assessor Page Geodatabase Design

Directly imported from CAD files

Topology to enforce data integrity

Boundary lines

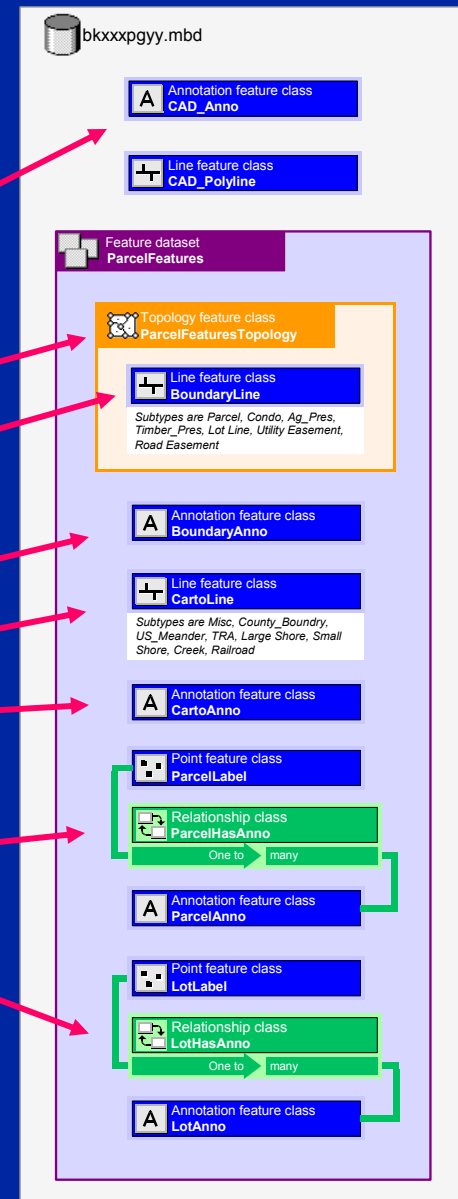
Boundary line annotation (bearing/distance)

Mapping lines (road ROW, hooks, etc.)

Mapping annotation (blocks, neighboring pages, page titles, road names, etc.)

Parcel labels with feature linked annotation

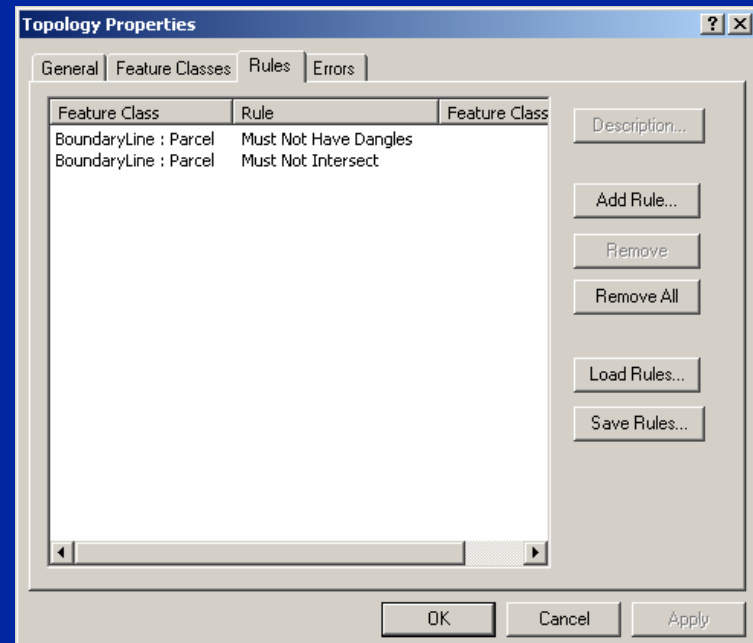
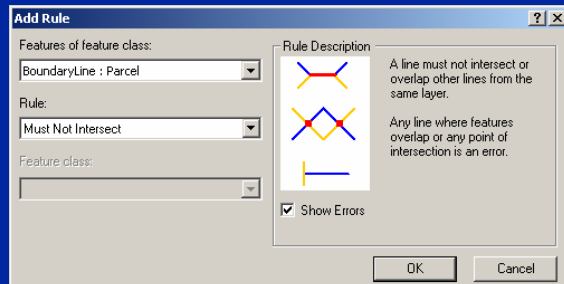
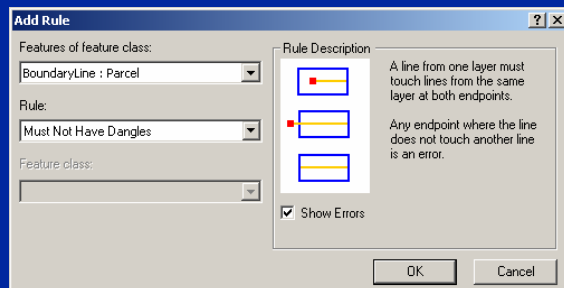
Lot labels with feature linked annotation



# Best Practices

## Topological rules help ensure data integrity

- Topology rules built for the assessor page geodatabase include
  - Parcel lines must not have dangles
  - Parcel lines must not intersect



# Best Practices

## Boundary lines are divided into 'subtypes'

- A single feature class stores multiple line types
- Simple model of 'real-world' lines
- Conforms to ESRI's parcel data model

Simple feature class

**BoundaryLine**

Geometry Polyline  
Contains M values No  
Contains Z values No

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	Object ID						
SHAPE	Geometry	Yes					
Type_ID	Short integer	No	0		0		
Type	String	Yes					30
Direction	String	Yes					24
Distance	String	Yes					12
Radius	String	Yes					12
Delta	String	Yes					20
Tangent	String	Yes					12
Arclength	String	Yes					12
Side	String	Yes					1
Source	String	Yes	Generic CAD	Line_Source			15
SHAPE_Length	Double	Yes			0	0	
Source_Date	Date	Yes			0	0	8

Subtypes of BoundaryLine

Subtype field *Type\_ID*

Default subtype 0

List of defined default values and domains for subtypes in this class

Subtype Code	Subtype Description	Field name	Default value	Domain
0	Parcel	Source	Generic CAD	Line_Source
1	Condo	Source	Generic CAD	Line_Source
2	Ag_Pres	Source	Generic CAD	Line_Source
3	Timber_Pres	Source	Generic CAD	Line_Source
4	Lot Line	Source	Generic CAD	Line_Source
5	Utility Easement	Source	Generic CAD	Line_Source
6	Road Easement	Source	Generic CAD	Line_Source



# Best Practices

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## Tracking Page Status

- A single database used to report the status for each book-page (as a Microsoft Access database)
- Fields to include:
  - Book-Page
  - Date of last update
  - Person who last updated the page
  - Type of last update eg. parcel split, lot line adjustment
  - Current format of the page data
  - Scale and Rotation
  - Is the page georeferenced?
- Updated with map changes – providing capability to summarize current status of mapping efforts



# Best Practices

## Status Database

- A single user interface provided through the 'Update Page' Form

The screenshot shows a software window titled "Update Page Information". It contains several input fields and buttons for updating page data:

- Book and Page:** A text field containing "026-16" and a "Find Page" button.
- Who:** A dropdown menu showing "Person who last updated the page" with the selected value "VESTRA/mar".
- Format:** A dropdown menu showing "The current format of the page data" with the selected value "CAD/GeoDB".
- When:** A date field showing "Date of last modification" with the value "2/26/2003" and a "Now" button.
- Scale:** A dropdown menu showing "The current scale of the page data" with the value "1200".
- Why:** A dropdown menu showing "Why was the page last updated" with the selected value "Format".
- Map Rotation:** A text field containing "0".
- Georeferenced?:** Radio buttons for "Yes" (selected) and "No".
- Has Blocks?:** Radio buttons for "Yes" and "No" (selected).
- Navigation:** Buttons for "Previous Record", "Add Book Page", and "Next Record".
- Status:** A record indicator at the bottom showing "Record: 468 of 823" with navigation icons.

# Best Practices

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## Metadata (Documenting Data)

- Use the 'ISO' stylesheet and wizard in ArcCatalog
- Suggested fields to populate
  - Originator
  - Abstract
  - Keywords
  - Update Cycle
  - Accuracy and Precision
- Important information on appropriate use of your data that is being published



# Best Practices

## Metadata Suggestions

- 'ISO' wizard greatly simplifies metadata editing

The image displays three overlapping screenshots of the 'ISO Metadata Wizard' software interface, illustrating the steps involved in creating metadata.

**Top Window: Theme keywords 1**

- Instruction: ★ Theme keywords identify subjects or topics. Enter any themes which apply to the dataset here:
- Text input fields: assessor, parcels, book-page, cadastral
- Instruction: If these theme keywords are defined in a formally registered authoritative source of keywords, then give the name and
- Date fields: Day (18), Month (April), Year (2003)
- Buttons: << Show Contents, < Back

**Middle Window: Abstract**

- Instruction: ★ Give a brief narrative summary about the content of the dataset:
- Text input field: Geodatabase containing data for a single assessor page
- Buttons: << Show Contents, < Back

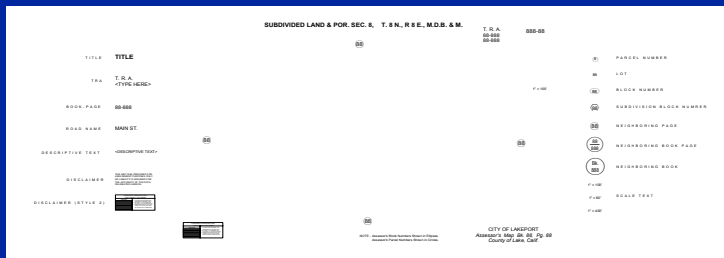
**Bottom Window: Metadata author**

- Instruction: ★ Your name:
- Text input field: Marcus Harner
- Instruction: ★ The organization you represent:
- Text input field: VESTRA Resources Inc.
- Instruction: ★ The position or role you have in the organization:
- Text input field: GIS Analyst
- Instruction: ★ Your function in relation to the metadata:
- Text input field: originator
- Text input fields: Your address: Delivery point (962 Maraglia Street), City (Redding), State or admin area (CA), Postal code and country (96002, United States)
- Text input fields: Your e-mail address (marcus@vestra.com), Your telephone number (530-223-2585), Your facsimile number (530-223-1145)
- Buttons: Save..., Load..., Make Default, Edit Contacts
- Text: Enter the information and then press Make Default so you won't have to enter it again next time.
- Buttons: << Show Contents, < Back, Next >, Finish, Cancel

# Best Practices

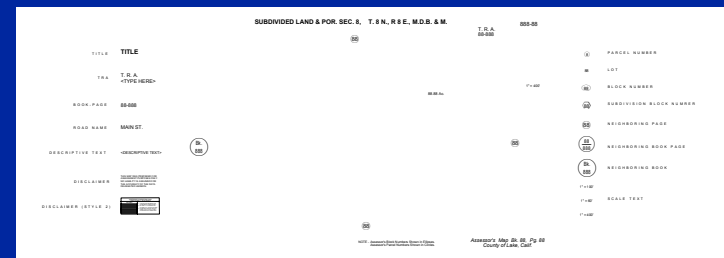
## Sample SBE Standard Layouts

### Standard No. 3 County Index to Assessor's Map Books



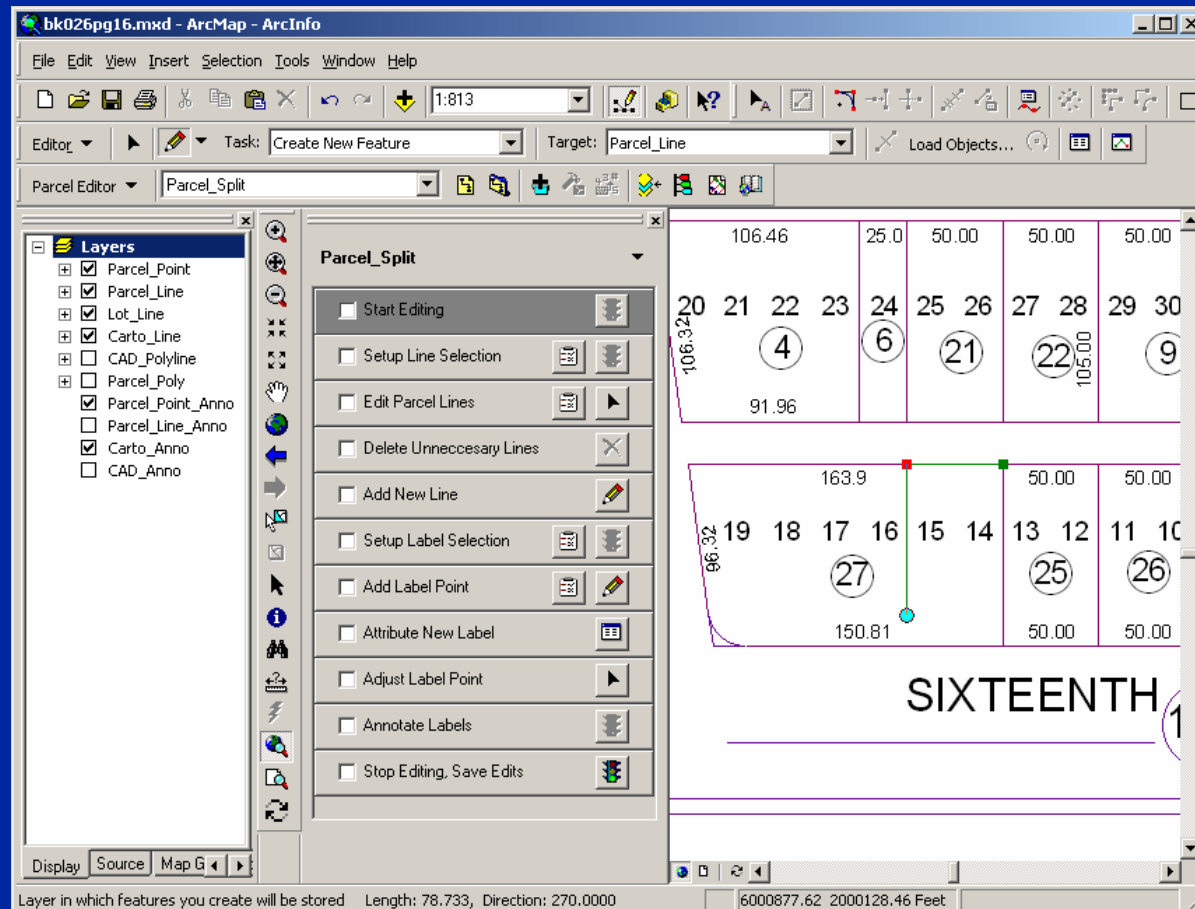
### Standard No. 7 Detailed Map – Urban Property, Scale 1" = 100'

### Standard No. 9 Detailed Map – Orchard and Small Farm Property, Scale 1" = 400'



# Best Practices

## Parcel Editor Workflows

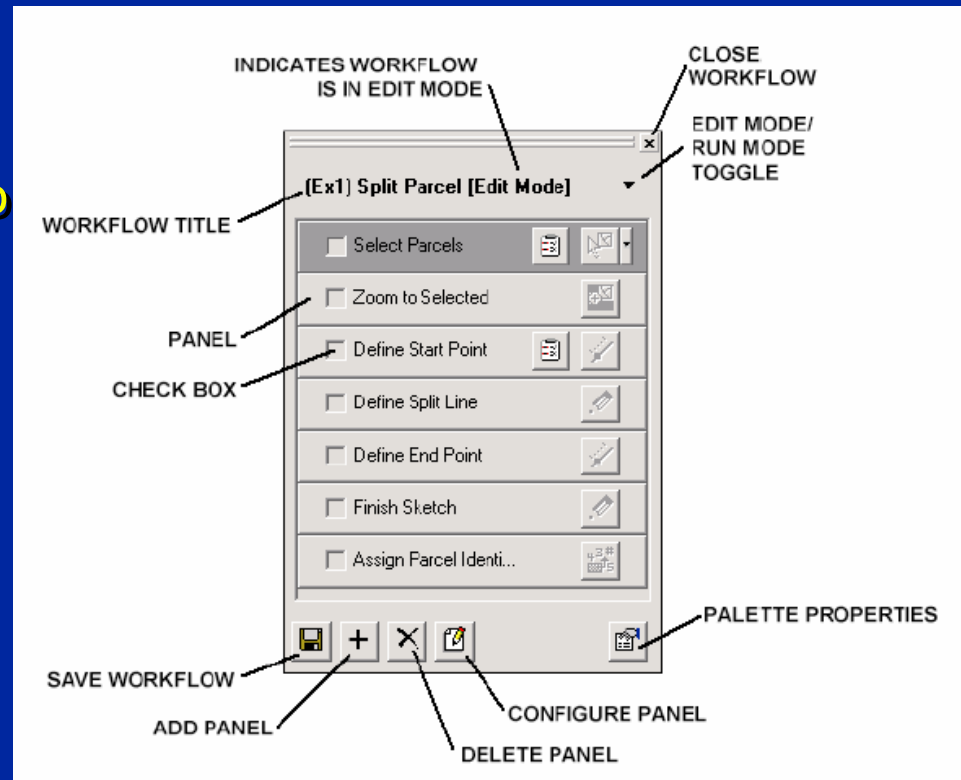


# Best Practices

## Parcel Editor Workflows

Workflows will be used as a guide through the steps of creating and maintaining parcel data.

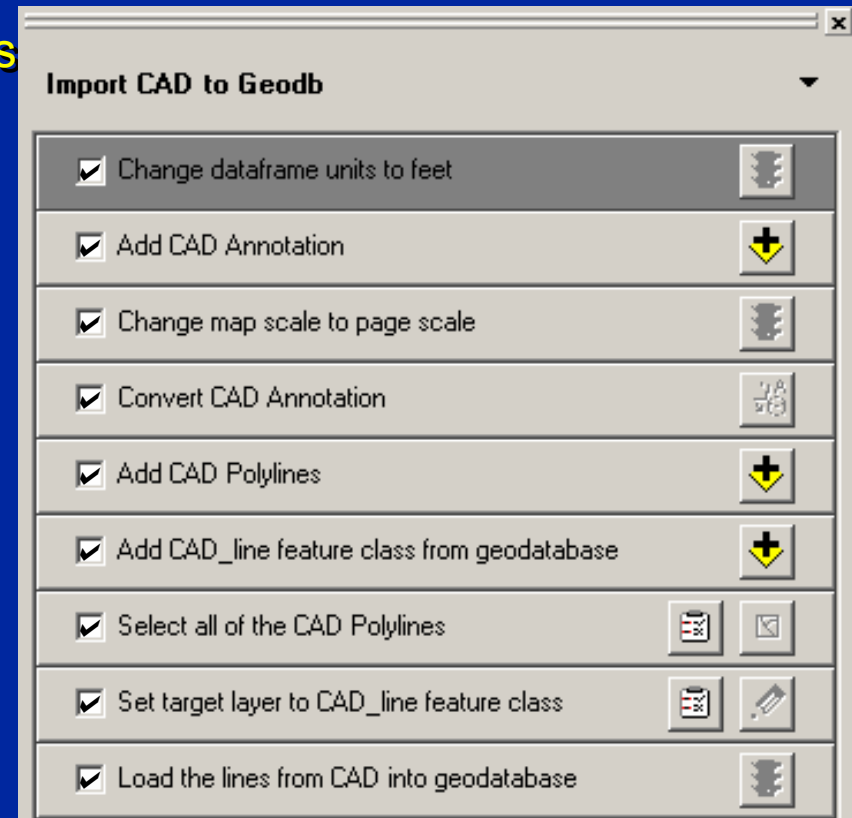
Workflows can only describe actions, simplify tool selection, and set up the working environment, they do not perform any editing actions.



# Best Practices

## How workflows work

- Each panel is a prescribed action or set of actions
- Some panels are only descriptions of tasks
- Some panels set environment variables, such as selection, editing, and snapping
- Start with the top panel and work down
- As each task is completed, check the 'check box' to avoid duplicating or skipping a step





# Best Practices

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## Workflows break complex tasks into simple steps

- An initial set of workflows have been created to do:
  - Simple assessor page maintenance
    - *Parcel\_Split, Parcel\_Merge, Lot\_Line\_Adjustment*
  - Adjusting and importing whole assessor pages
    - *Georeference\_AssrPg, Import\_CAD\_to\_AssrPg, Build\_AssrPg\_from\_RoS*
  - Editing Countywide Parcel Layer
    - *Edit\_CPL, Load\_AssrPg\_to\_CPL*
  - Assessor page mapping
    - *Edit\_Hybrid\_Raster, Edit\_Hybrid\_Vector, Edit\_Carto\_Anno*
  - Importing subdivisions building assessor pages
    - *Import\_CAD\_to\_sub, Split\_sub, Load\_sub\_to\_CPL, Build\_sub\_from\_RoS*



# Best Practices

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## Sample Editing Steps

1. Review source material
2. Identify type of edit
3. Open assessor page map document
4. Choose workflow
5. Edit assessor page geodatabase
6. Print new assessor page
7. Update countywide parcel layer
8. Update status database



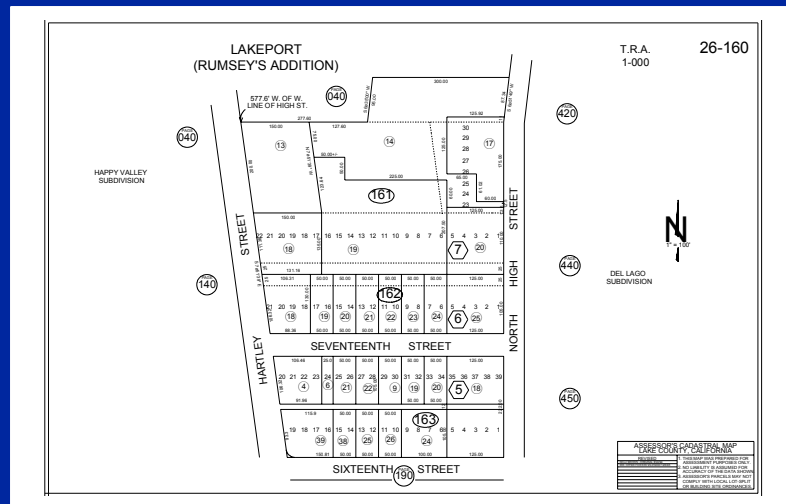
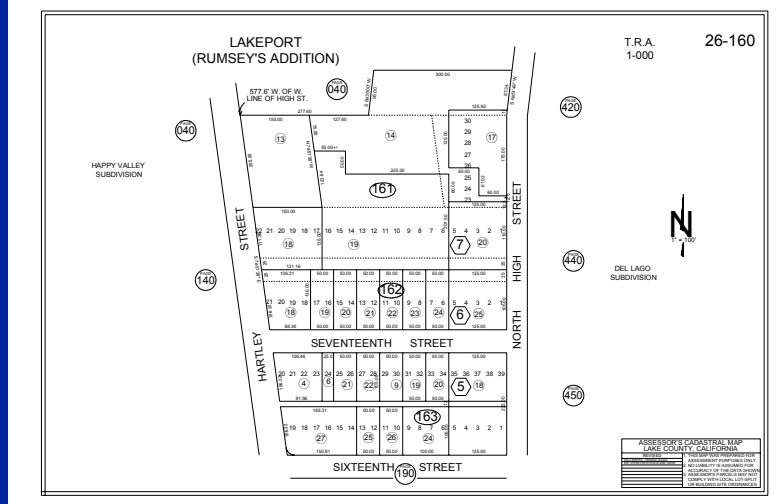
# Best Practices

## Editing Steps

### 1) Review source material

Current assessor page

New page with edits drawn  
in from Record of Survey



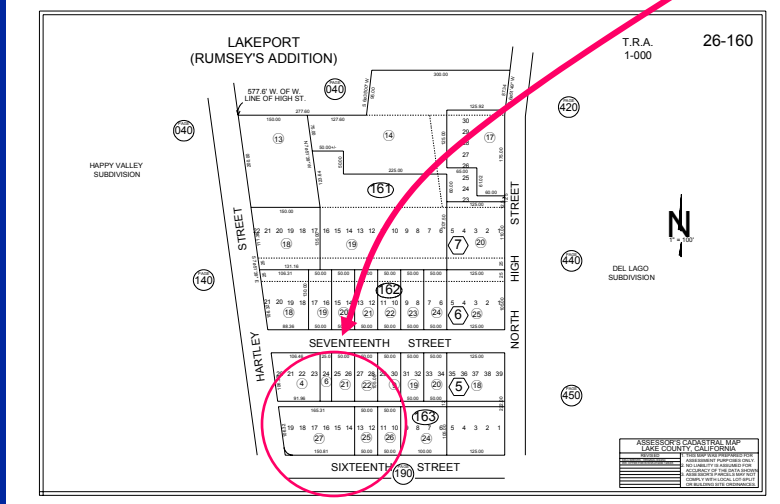
# Best Practices

## Editing Steps

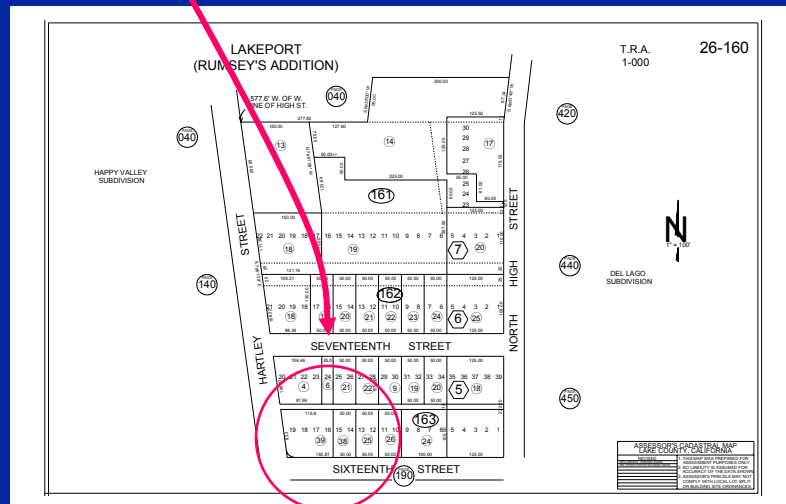
### 2) Identify type of edit

Edit identified as a parcel split

Current assessor page



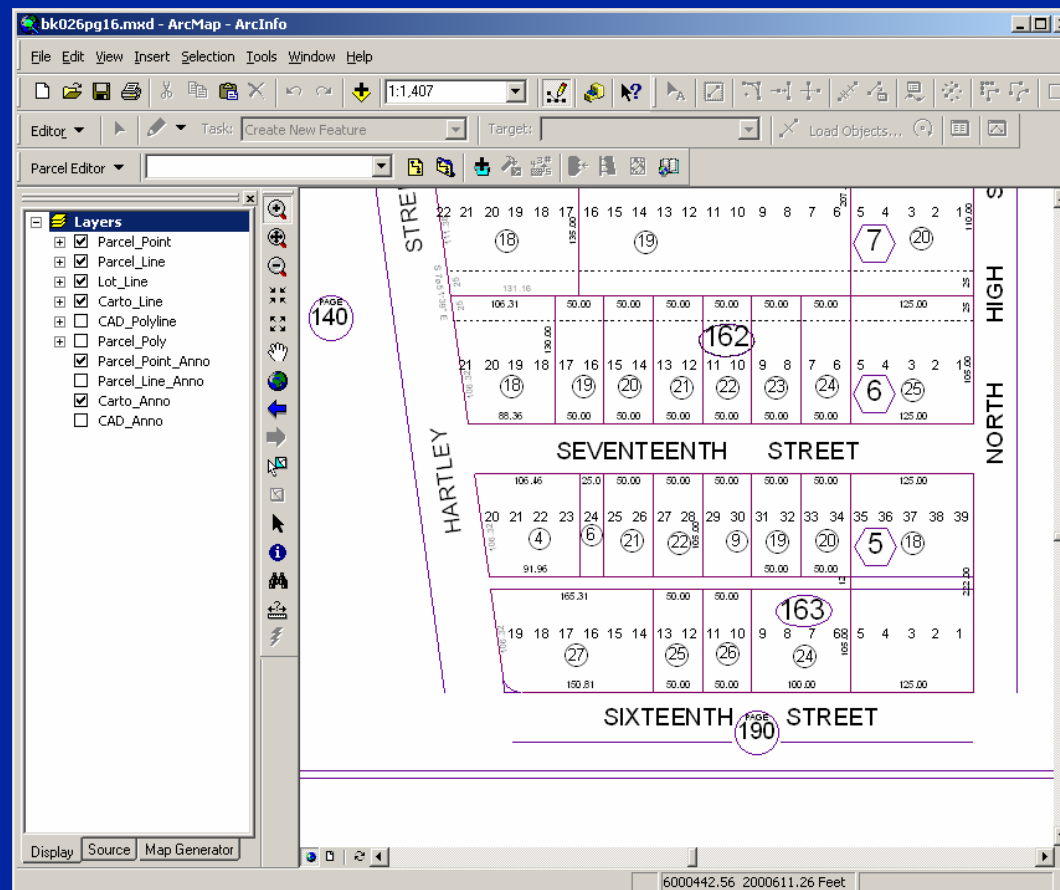
New page with edits drawn in from Recorded Deed



# Best Practices

## Editing Steps

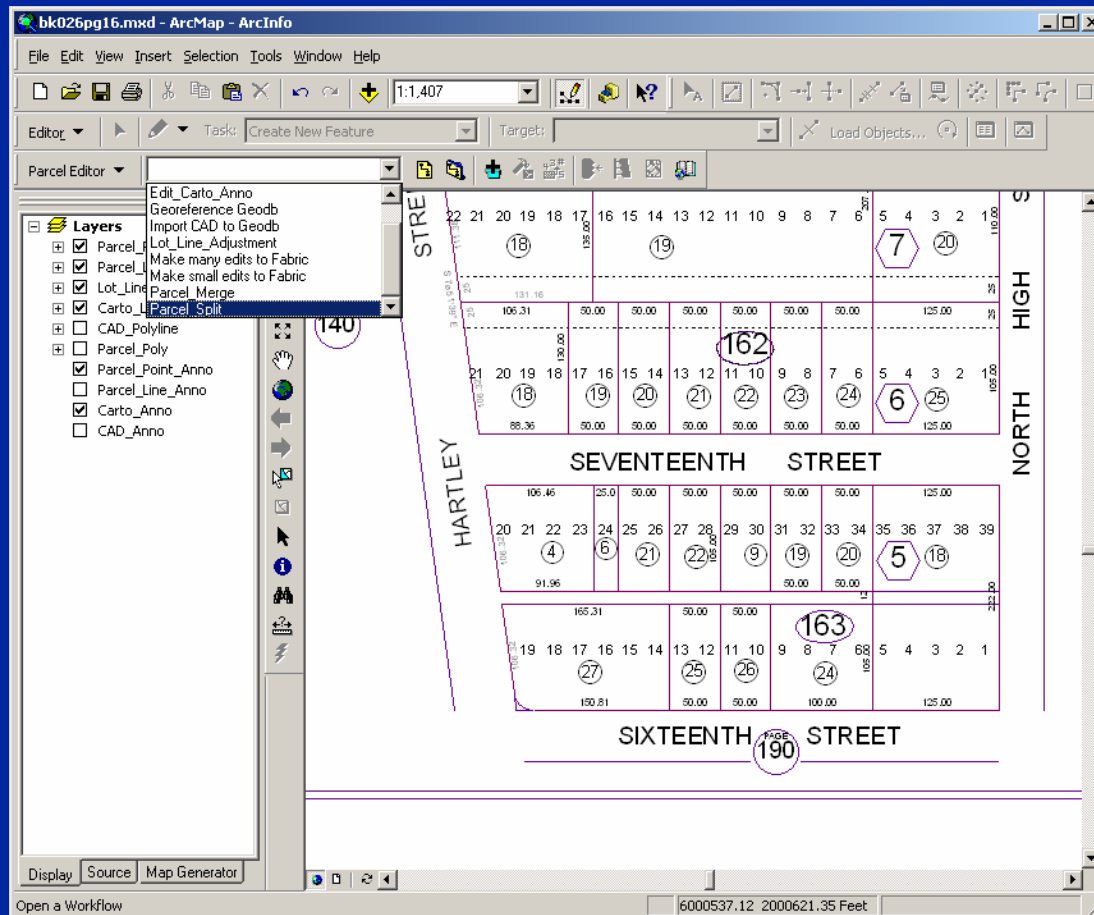
### 3) Open assessor page map document



# Best Practices

## Editing Steps

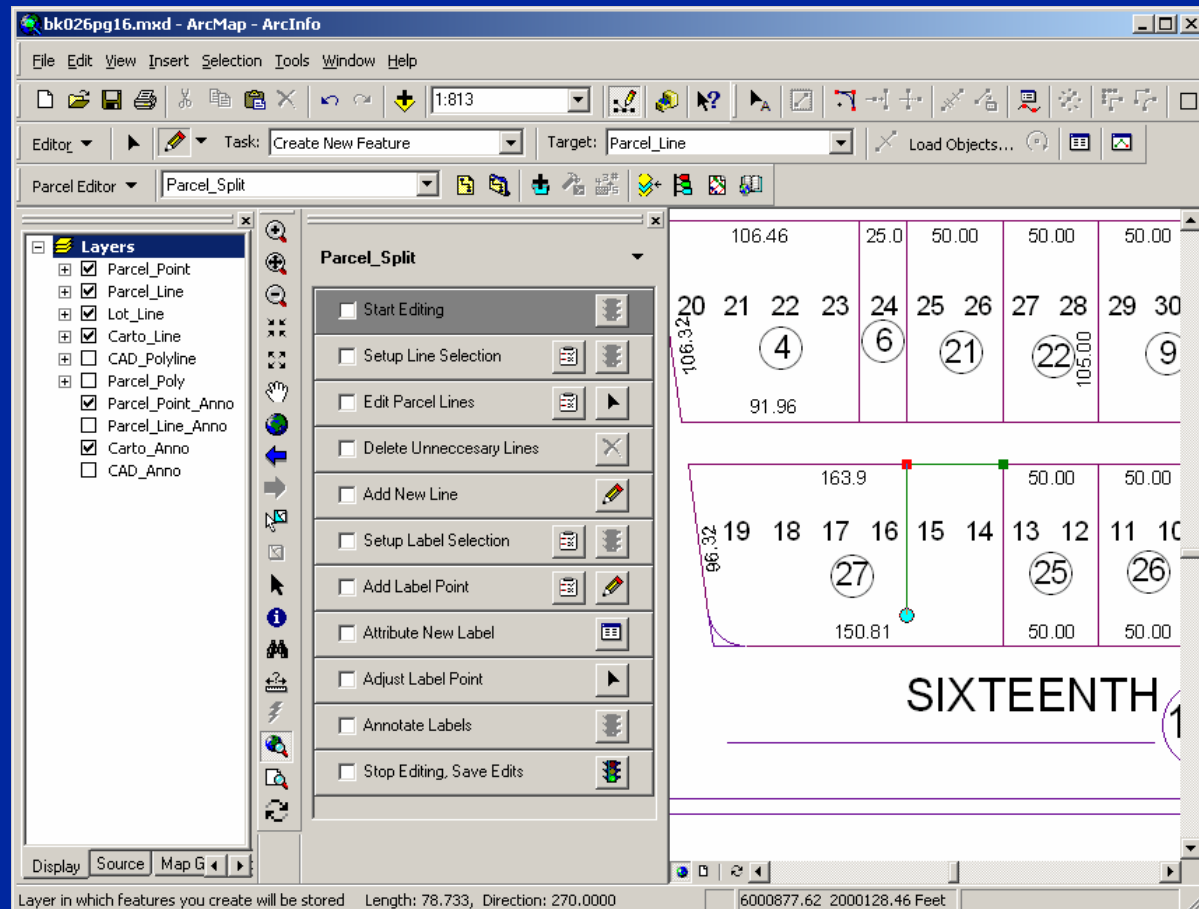
### 4) Choose workflow



# Best Practices

## Editing Steps

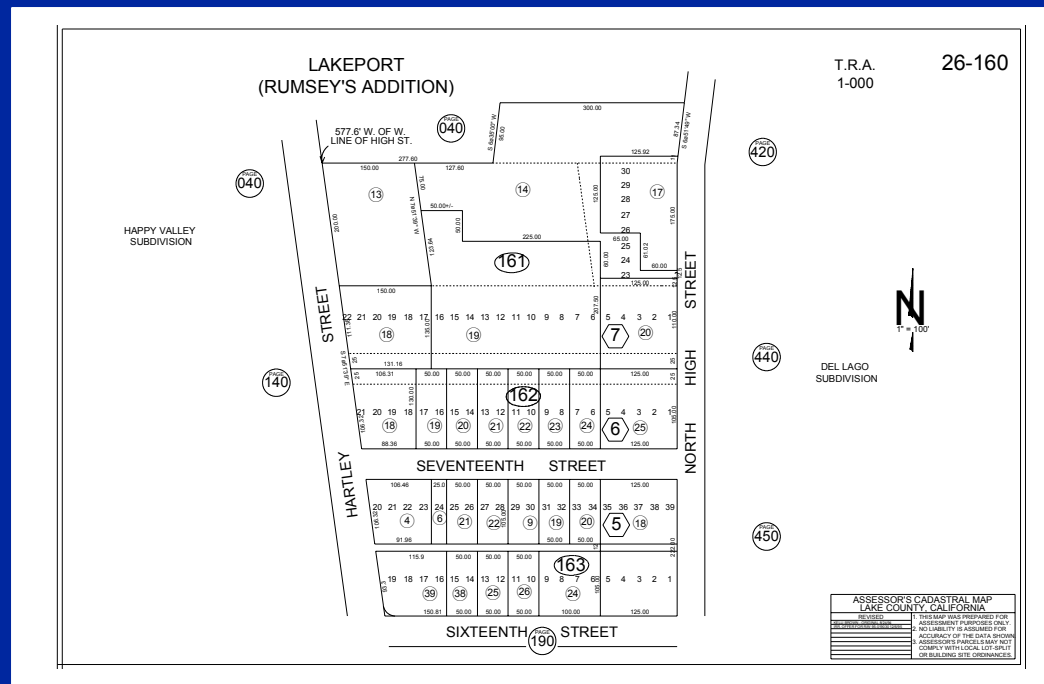
### 5) Edit assessor page geodatabase



# Best Practices

## Editing Steps

### 6) Print new assessor page



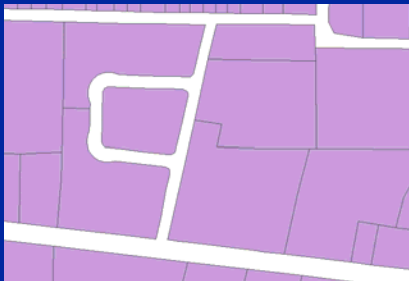


# Best Practices

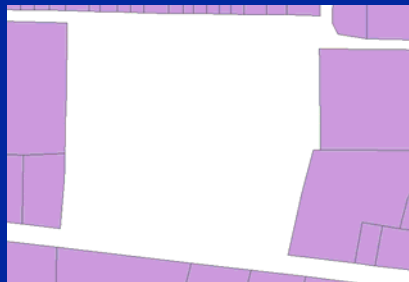
## Editing Steps

### 7) Updating Parcel Layer with Assessor Geodatabase features

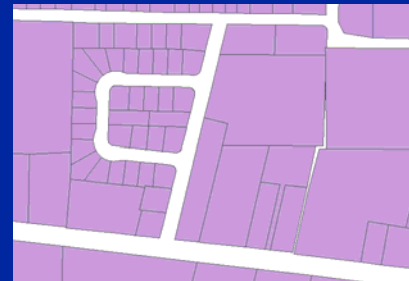
Initial Parcel Layer  
(without new subdivision)



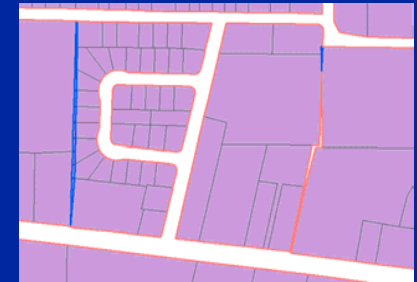
Delete old boundaries  
and polygons



Add new boundaries  
from Assessor page



Use topology to fix  
errors and  
construct polygons



# Best Practices

## Editing Steps

### 8) Update Status Database

The screenshot shows a software window titled "Update Page Information". It contains several input fields and buttons for updating page data:

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- Who:** A dropdown menu with the text "Person who last updated the page" and the selected value "VESTRA/mar".
- Format:** A dropdown menu with the text "The current format of the page data" and the selected value "GeoDB".
- When:** A date field with the text "Date of last modification", the date "4/18/2003", and a "Now" button.
- Scale:** A dropdown menu with the text "The current scale of the page data" and the selected value "1200".
- Why:** A dropdown menu with the text "Why was the page last updated" and the selected value "Format".
- Map Rotation:** A numeric field with the value "0".
- Georeferenced?:** Radio buttons for "Yes" (selected) and "No".
- Has Blocks?:** Radio buttons for "Yes" (selected) and "No".
- Navigation:** Buttons for "Previous Record", "Add Book Page", and "Next Record".
- Status Bar:** A record indicator showing "Record: 468 of 823" with navigation icons.

# Best Practices

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**Do What Works!!**

